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-NOTICE-

WATTS BAR NUCLEAR PLANT UNIT 1

TENNESSEE VALLEY AUTHORITY

SUPPLEMENTAL INFORMATION-
TVA'S COMPLIANCE TO 10 CFR50.49-
ENVIRONMENTAL QUALIFICATION OF
ELECTRIC EQUIPMENT
IMPORTANT TO SAFETY FOR
NUCLEAR POWER PLANTS

SUPPLEMENTAL INFORMATION
TVA'S COMPLIANCE TO 10CFR50.49 - ENVIRONMENTAL QUALIFICATION
OF ELECTRIC EQUIPMENT IMPORTANT TO SAFETY
FOR NUCLEAR POWER PLANTS
VOLUME 3

TABLE OF CONTENTS

WATTS BAR NUCLEAR IDENTIFICATION MATRIX
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZIMUTH	ELEV(1) / CONTRACT	BLDG	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-TE -068-0373 -D REAC LEVEL CAP TUBE TEMP COMP	1-TE -068-0373 -D S8809	040	709'11" 71C62-54114-1	LC	A A A A A	1000 1000 1000 1MO 1MO	L FW/C MS/C RH/C CV/C	ACCURATE REACTOR VESSEL LEVEL INDICATION IS REQUIRED FOR ALL EVENTS AND REQUIRES TEMPERATURE COMPENSATION.
WBN-1-TE -068-0376 -D REAC LEVEL CAP TUBE TEMP COMP	1-TE -068-0376 -D S8810	090	708' 2" 71C62-54114-1	LC	A A A A A	1000 1000 1000 1MO 1MO	L FW/C MS/C RH/C CV/C	ACCURATE REACTOR VESSEL LEVEL INDICATION IS REQUIRED FOR ALL EVENTS AND REQUIRES TEMPERATURE COMPENSATION.
WBN-1-TE -068-0377 -D REAC LEVEL CAP TUBE TEMP COMP	1-TE -068-0377 -D S8809	069	714' 4" 71C62-54114-1	LC	A A A A A	1000 1000 1000 1MO 1MO	L FW/C MS/C RH/C CV/C	ACCURATE REACTOR VESSEL LEVEL INDICATION IS REQUIRED FOR ALL EVENTS AND REQUIRES TEMPERATURE COMPENSATION.
WBN-1-TE -068-0378 -D REAC LEVEL CAP TUBE TEMP COMP	1-TE -068-0378 -D S8809	030	753'10" 71C62-54114-1	LC	A A A A A	1000 1000 1000 1MO 1MO	L FW/C MS/C RH/C CV/C	ACCURATE REACTOR VESSEL LEVEL INDICATION IS REQUIRED FOR ALL EVENTS AND REQUIRES TEMPERATURE COMPENSATION.
WBN-1-TE -068-0379 -D REAC LEVEL CAP TUBE TEMP COMP	1-TE -068-0379 -D S8809	010	727' 8" 71C62-54114-1	LC	A A A A A	1000 1000 1000 1MO 1MO	L FW/C MS/C RH/C CV/C	ACCURATE REACTOR VESSEL LEVEL INDICATION IS REQUIRED FOR ALL EVENTS AND REQUIRES TEMPERATURE COMPENSATION.

		R 1	R____	R____
PREPARER/DATE	GJB 4/21/86	CCM 1/10/89	_____	_____
CHECKED/DATE	SRP 4/23/86	WOR 1-16-89	_____	_____

100-3TE

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-TE -068-0380 -E	1-TE -068-0380 -E	220	713' 8"	LC	A	1000	L	ACCURATE REACTOR VESSEL LEVEL
REAC LEVEL CAP TUBE TEMP COMP	S8809		71C62-54114-1		A	1000	FW/C	INDICATION IS REQUIRED FOR ALL
					A	1000	MS/C	EVENTS AND REQUIRES
					A	1MO	RH/C	TEMPERATURE COMPENSATION.
					A	1MO	CV/C	
WBN-1-TE -068-0383 -E	1-TE -068-0383 -E	090	706'10"	LC	A	1000	L	ACCURATE REACTOR VESSEL LEVEL
REAC LEVEL CAP TUBE TEMP COMP	S8810		71C62-54114-1		A	1000	FW/C	INDICATION IS REQUIRED FOR ALL
					A	1000	MS/C	EVENTS AND REQUIRES
					A	1000	RH/C	TEMPERATURE COMPENSATION.
					A	1000	CV/C	
WBN-1-TE -068-0384 -E	1-TE -068-0384 -E				A	1000	L	ACCURATE REACTOR VESSEL LEVEL
REAC LEVEL CAP TUBE TEMP COMP	S8809		71C62-54114-1		A	1000	FW/C	INDICATION IS REQUIRED FOR ALL
					A	1000	MS/C	EVENTS AND REQUIRES
					A	1MO	RH/C	TEMPERATURE COMPENSATION.
					A	1MO	CV/C	
WBN-1-TE -068-0385 -E	1-TE -068-0385 -E	002	753'	LC	A	1000	L	ACCURATE REACTOR VESSEL LEVEL
REAC LEVEL CAP TUBE TEMP COMP	S8809		71C62-54114-1		A	1000	FW/C	INDICATION IS REQUIRED FOR ALL
					A	1000	MS/C	EVENTS AND REQUIRES
					A	1MO	RH/C	TEMPERATURE COMPENSATION.
					A	1MO	CV/C	
WBN-1-TE -068-0386 -E	1-TE -068-0386 -E	094	733' 9"	LC	A	1000	L	ACCURATE REACTOR VESSEL LEVEL
REAC LEVEL CAP TUBE TEMP COMP	S8809		71C62-54114-1		A	1000	FW/C	INDICATION IS REQUIRED FOR ALL
					A	1000	MS/C	EVENTS AND REQUIRES
					A	1MO	RH/C	TEMPERATURE COMPENSATION.
					A	1MO	CV/C	

		R 1	R	R
PREPARER/DATE	GJB 4/21/86	ECM 1/10/89		
CHECKED/DATE	SRP 4/23/86	[illegible] 1-16-89		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-TE -068-0393 -E REAC LEVEL CAP TUBE TEMP COMP	1-TE -068-0393 -E S8309	218	737' 71C62-54114-1	LC	A A A A A	100D 100D 100D 1MO 1MO	L FW/C MS/C RH/C CV/C	ACCURATE REACTOR VESSEL LEVEL INDICATION IS REQUIRED FOR ALL EVENTS AND REQUIRES TEMPERATURE COMPENSATION.

		R 1	R	R
PREPARER/DATE	GJB 4/21/86	CEM 1/10/89		
CHECKED/DATE	SRP 4/23/86	JLG 1-16-89		

BINDER NO. WBNEQ-ITE-001	PLANT WBN	UNIT(S) 1	SHEET 1 OF 1
BINDER TITLE MINCO RTD	COMPUTED E. E. McW. DATE 12/19/88		R 1 R
	CHECKED HOR DATE 12-27-88		

TAB A

NOTES

1. Elevations shown are Actual elevations for equipment located in the Reactor Building and Floor elevations for equipment located outside the Reactor Building. Actual elevations for all equipment are documented in TAB F.

2. See Page B-1 for source of Category and Operating Time assignments.

BINDER NO. WBNEQ-ITE-001 PLANT WBN UNIT(S) 1 SHEET 1 OF 27

R 1 R

BINDER TITLE MINCO RTD COMPUTED GJB DATE 4/16/86

CHECKED SRP DATE 4/23/86

12-27-88

A. DOCUMENTATION

Equipment Description Resistance Temperature Detector (RTD)

Vendor/Manufacturer Minco Products, Inc.

Equipment Model No.(s) S8809

S8810

QUALIFICATION REPORTS

(1) Title/Number/Revision Equipment Qualification Test Report - Minco Surface Mounted RTDs/WCAP-8687, Supp. 2-E42A, Rev. 1 RIMS B45 850614 354 DATE January 1985

OTHER (ANALYSIS, VENDOR DATA, ETC.)

(2) TVA Environmental Data Drawing 47E235-42 R2

(3) Category and Operating Times Calculation, System 68, R8 (WBNOSG4-017, B45 860722 218)

(4) Westinghouse Equipment Qualification Data Package, EQDP-ESE-42A R1 (B45 851030 356) R1

(5) Westinghouse Auditable Link Document for Unit 1, EQUAL-WAT, Rev. 2, January, 1985, (B45 850321 352)

(6) Westinghouse Drawing 2654C65, Rev. 8

(7) Minco Products, Inc. Drawing S8809, sheets 1 and 2, Rev. C

(8) Minco Products, Inc. Drawing S8810, sheets 1 and 2, Rev. C

NOTE: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. This listing includes only those documents which are essential to qualification and accordingly should not be considered a complete listing of binder references.

BINDER NO. WBNEQ-ITE-001 PLANT WBN UNIT(S) 1 SHEET 2 OF 27

BINDER TITLE MINCO RTD COMPUTED DGB DATE 5/18/86 R ___ R ___

CHECKED SRP/RK DATE 5/18/86

B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified (Pending Satisfactory Resolution of Open Items)

___ Equipment Satisfies All Requirements Except Qualified Life or Justification of Replacement Schedule

___ Equipment Qualification Not Established by Documentation

___ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES

1) Section F - Conduit and Grounding Drawing 45W860-9 must be revised to show a connection that is qualified for submergence.

See open item sheets at the front of the binder for documentation of open items that apply to the other tabs in this binder.

COMMENTS/RECOMMENDATIONS

EQP085.53

TVA

BINDER NO. WBNEQ-ITE-001 PLANT WBN UNIT(S) 1 SHEET 3 OF 27

BINDER TITLE MINCO RTD COMPUTED DGB DATE 4/16/86 R ___ R ___

CHECKED GSP DATE 4/23/86

C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate Which Criteria is Applicable):

___ Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE323-1974)

X Components are Qualified to the Criteria of NUREG-0588 Category II or the DOR Guidelines of 1E Bulletin No. 79-01B (IEEE323-1971) (DOR Guidelines Applicable to only BFN)

JUSTIFICATION/COMMENTS This equipment was bought under the scope of Change of Contract 128 on the WBN NSSS contract with Westinghouse, dated January 31, 1980 (QEB 800214 111 - TAB E6).

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

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TVA

BINDER NO. WBNEQ-ITE-001 PLANT WBN UNIT(S) 1 SHEET 4 OF 27

R 1 R

BINDER TITLE MINCO RTD COMPUTED GJB DATE 5/23/86

CHECKED SRP/DLK DATE 5/27/86 12-27-88

D. QUALIFICATION METHODOLOGY (Check only one block)

X Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

___ Test of Similar Items with Supporting Analysis

___ Analysis in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

___ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS Reference QR(1), pages 24 and 31-35 (TAB D) specifies the equipment tested. The Field Verification Data (TAB F) specifies what is installed at the plant. The Traceability Package (TAB E11) links the plant RTD serial numbers to the WBN NSSS contract and the Purchase Order No. The Westinghouse Auditable Link Document, EQAL-WAT, Item ESE-42, p. 9 (TAB E9) links the Purchase Order number to the test report. Westinghouse letter WAT-D-6920 (B45 860328 600) - In Traceability Package - TAB E11) also links the test report in TAB D to the Watts Bar contract. R1

BINDER NO. WBNEQ-ITE-001	**PLANT** WBN	**UNIT(S)** 1	**SHEET** 5 **OF** 27
BINDER TITLE MINCO RTD	**COMPUTED** DJB	**DATE** 4/17/86	**R** **R**
	CHECKED SF	**DATE** 4/27/86	

E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification report identical to the plant equipment which requires qualification (yes/no/NA)? Yes

	Plant Device	Qualification Document	Reference
(1) Equipment Type	RTD	SAME	QR(1), page 24
(2) Manufacturer	MINCO	SAME	QR(1), page 1
(3) Model Number(s)	S8809	SAME	QR (1), page 24
	S8810	SAME	QR(1), page 24
(4) Serial Number(s)	See TAB F	146	QR(1), p.24
		039	QR(1), p.24
		058	QR(1), p.24
		041	QR(1), p.24

(5) Identify Component-Unique checksheet attached: NA

JUSTIFICATION/COMMENTS The model numbers have extra characters on the end which designates the size of the tube the RTD block fits. However, this does not affect qualification, as stated in the test report (QR(1)) conclusions on pages 20 and 21. Therefore, these additional characters will not be shown on the model numbers listed above.

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BINDER NO. WBNEQ-ITE-001	PLANT WBN	UNIT(S) 1	SHEET 6 OF 27 R 1 R
BINDER TITLE MINCO RTD	COMPUTED GJB	DATE 5/15/86 ELM 12/19/88	
	CHECKED SRP	DATE 5/18/86 FOR 12-27-88	

F. INSTALLATION INTERFACES

List all interfaces pertinent to EQ identified in the qualification documentation and/or evaluation and reference the source. Is the interface a requirement for our application (Yes/No)? (Note below.) If yes, enter requirement in QMDS, if no, provide justification. R1

Interface	Identify Interface	Plant Requirement? (Yes/No)	Reference Test Report
Mounting Bolts	NONE	NA	NA
External Process Connections	NONE	NA	NA
Electrical Connections	See Comments Below	NA	NA
Conduit Seals	See Comments Below	NA	NA
Connector Seals	NONE	NA	NA
Orientation	NONE	NA	NA
Physical Configuration	Install per Westinghouse Drawing 2654C65 *	No	QR(1), p.7 R1
Other	NONE	NA	NA

JUSTIFICATION/COMMENTS The moisture intrusion problem exhibited in the test via the insulation resistance data taken (QR(1), p.35) prompted the issuance of SCR WBNNEB8506 (TAB E7) which requires the ethylene propylene lead wires of all these RTDs (not just the submerged devices) to be protected by a watertight connection. This connection is shown on TVA Drawing 45W860-9 (TAB E8). The configuration shown includes a Conax connector, which is qualified per binder WBNEQ-CSC-001, and Raychem splices, which are qualified per binder WBNEQ-SPLC-001. R1

*This drawing has not had any changes made, since the one called out in the test report, that affect qualification (TAB E12). R1

BINDER NO. WBNEQ-ITE-001 PLANT WBN UNIT(S) 1 SHEET 7 OF 27

BINDER TITLE MINCO RTD COMPUTED DQB DATE 4/11/86 R ___ R ___

CHECKED GHL DATE 4/23/86

G. TEST SEQUENCE

(1) Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE-323 (74), paragraph 6.3.2 (yes/no/NA)? (note below)

	Yes/No/NA	Reference
(a) Equipment inspected for damage	YES	QR(1), pp. 13 & 31-34
(b) Baseline performance measurements taken	YES	QR(1), pp.31-34
(c) Equipment aged:		
Thermal	YES	QR(1), p.17
Radiation	YES	QR(1), p.17
Wear	NA	NA
(d) Vibration/seismic testing conducted	YES	QR(1), p. 18, App. B & C
(e) Design basis event (DBE) exposure	YES	QR(1), p.19
(f) Post-DBE exposure	YES	QR(1), pp.12, 19 & 131-134
(g) Final inspection and disassembly	YES	QR(1), pp.19, 48 & 31-35

(2) Was the same piece of equipment used throughout the test sequence described in item (1) above (yes/no/NA)? YES

(3) Have the test equipment, test equipment accuracies and calibration data been appropriately documented (yes/no/NA)? YES (Reference QR(1), pp. 25-28).

JUSTIFICATION/COMMENTS (1)(c) - Wear - This type of aging is not applicable to an RTD because it is a passive device with no moving parts.
(1)(g) - Disassembly - As far as can be ascertained from the test report, no disassembly was performed as part of the final inspection, just a visual inspection, calibration and insulation resistance checks.
(3) Test equipment accuracies were not included, but are available for audit or inspection at Westinghouse.

H. AGING

(1) Was aging considered in the qualification program (Yes/no/NA)? YES (Reference QR(1), pp. 3,6,9,14 and 17).

JUSTIFICATION/COMMENTS NONE

(2) Were the following effects considered in the aging program:

Aging Effect	Yes/No/NA	Reference
Thermal aging	YES	QR(1), pp. 6, 9,14 & 17
Radiation exposure	YES	QR(1), pp. 3,6, 7,9,15 & 17
Vibration (non-seismic) aging	NO	NA
Operational (electrical/mechanical/process) stress aging	NA	NA

JUSTIFICATION/COMMENTS Vibration Aging - The omission of this type of test is justified because: 1) No problems were encountered in the seismic test. 2)RTDs are passive devices with no moving or loose parts. 3)The surveillance and maintenance program is adequate to correct any problems that might arise from this aging effect such as loosened bolts and nuts.

(3) Were all known synergistic effects which are believed to have a significant effect on equipment performance considered in the aging program (yes/no/NA)? NA (Reference ________).

JUSTIFICATION/COMMENTS NUREG-0588 Category II requirements do not require that synergistic effects be addressed.

(4) Thermal Aging:

(a) Was thermal aging considered in the qualification program (yes/no/NA)? YES (Reference QR(1), pp. 3,6,9,14 & 17).

JUSTIFICATION/COMMENTS NONE

H. AGING (Continued)

(b) Were the materials susceptible to thermal aging degradation identified in the qualification program (yes/no/NA)? YES (Reference: QR(1), p. 9).

JUSTIFICATION/COMMENTS NONE

(c) Was the basis for thermal aging identified in the qualification program (yes/no/NA)? YES (Reference QR(1), p.3).

JUSTIFICATION/COMMENTS Also see Westinghouse letters TVA-85-176 and TVA-85-172 in TAB E1 and E2 respectively.

(d) Was the aging acceleration rate justified and the parameters of time and temperature identified in the qualification program (yes/no/NA)? YES (Reference QR(1), p. 9 and Westinghouse letter TVA-85-176 (B70 850925 006) - TAB E1.

Parameter	Plant Maximum Normal	Test	Equivalent
Temperature	120°F	250°F	120°F
Time	40 years	504h	21.8 years

JUSTIFICATION/COMMENTS See TAB C1 for calculation extending the qualified life.

(e) Was the Arrhenius methodology used for accelerated aging (yes/no/NA)? YES (Reference QR(1), p. 9 and TAB C1).

JUSTIFICATION/COMMENTS NONE

(f) If activation energies were used for determining accelerated aging parameters, are they properly referenced to the source of the technical data (yes/no/NA)? YES (Reference Westinghouse letter TVA-85-172 (B70 850925 002)-TAB E2).

JUSTIFICATION/COMMENTS NONE

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TVA

H. AGING (Continued)

(g) If a regression line was used for determining accelerated aging parameters, are test points or failure modes identified on the line (yes/no/NA)? NA (Reference ________).

JUSTIFICATION/COMMENTS NONE

(h) Was the equipment operated during the thermal aging (yes/no/NA)? YES (Reference QR(1), p. 14).

JUSTIFICATION/COMMENTS NONE

(5) Radiation Aging Exposure:

(a) Was radiaton aging exposure considered in the qualification program (yes/no/NA)? YES (Reference QR(1), p.3).

JUSTIFICATION/COMMENTS NONE

(b) Were the materials susceptible to radiation degradation identified in the qualification program (yes/no/NA)? NA (Reference ________).

JUSTIFICATION/COMMENTS This was not necessary, as a test was performed on the assembled device.

(c) Was the basis for radiation aging exposure identified in the qualification program (yes/no/NA)? YES (Reference QR(1), p. 3 and Westinghouse letter TVA-85-172 (B70 850925 002) - TAB E2).

JUSTIFICATION/COMMENTS NONE

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BINDER TITLE MINCO RTD	COMPUTED GJB	DATE 4/16/86	12/19/88
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H. AGING (Continued)

(d) Is the radiation test exposure dose and dose rate acceptable (Yes/No/NA)? Yes (Reference: QR(1) p. 17 and Westinghouse letter TVA-85-172 (B70 850925 002)-TAB E2).

Plant normal ambient radiation dose (rd)	5.45×10^{7} (21.8 yr. dose)
Test exposure dose (rd)	1.6×10^{8}
Test exposure dose rate (rd/hr)	2.18×10^{6}
Test exposure source type (e.g., Co-60 gamma)	Co - 60 gamma

JUSTIFICATION/COMMENTS (1) Worst case 40 year normal dose is 1×10^{8} rads. (2) Normal and Accident Doses were combined in the test.

(6) Vibration (non-seismic) Aging:

(a) Were the effects of non-seismic vibration induced during normal and abnormal operation addressed in the qualification program* No (Reference:________).

JUSTIFICATION/COMMENTS See Justification/Comments for H(2) on page 8 of this TAB.

(b) Was the basis for vibration aging identified and justified in the qualification program (Yes/No/NA)? NA (Reference:________).

JUSTIFICATION/COMMENTS NONE

*Qualification program refers to the test report and any supplemental documentation including TVA analyses in Tab C of the binder. R1

H. AGING (Continued)

(7) Operational Stress Aging:

(a) Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation addressed in the qualification program (Yes/No/NA)? NA (Reference:).

JUSTIFICATION/COMMENTS None

(b) Was the basis for stresses induced during operational aging identified and justified in the qualification program (Yes/No/NA)? NA (Reference:).

JUSTIFICATION/COMMENTS None

(8) Was the qualified life of the equipment and its basis defined in the qualification program (Yes/No/NA)? Yes (Reference: QR(1), p. 9).

Qualified life (Document in QMDS) 21.8 years

JUSTIFICATION/COMMENTS See TAB C1.

(9) Were replacement intervals for the equipment or its components defined in the qualification program (Yes/No/NA)? Yes (Reference: TAB C1).

JUSTIFICATION/COMMENTS No specific replacement intervals for any components of the RTD were specified in the qualification program. The instruction manual states that no periodic maintenance is required.

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	CHECKED GSP	DATE 4/23/86			

I. MATERIALS ANALYSIS

Identification of Materials Susceptible to Significant Thermal and/or Radiation Degradation and Aging (Use Section C of Binder for Detailed Materials Analysis)

	Material/Property/Function	Radiation Threshold	Reference	Activation Energy	Reference
(a)	Hypalon/Elongation/ Wire Jacket	NA	NA	1.13	Westinghouse letter TVA-85-172 (B70 850925 002) TAB E2
(b)	Epoxy/Flexural Strength/ Potting Material	NA	NA	0.98	"
(c)	EPR/Dielectric Strength/ Wire Insulation	NA	NA	0.90	"
(d)					
(e)					

JUSTIFICATION/COMMENTS 1) Radiation values were not given in the test report because the equipment underwent radiation testing which was successfully completed. 2) See TAB C1 for Arrhenius Calculations.

BINDER NO. WBNEQ-ITE-001 PLANT WBN UNIT(S) 1 SHEET 14 OF 27

BINDER TITLE MINCO RTD COMPUTED DQB DATE 4/16/86 R ___ R ___

CHECKED SBP DATE 4/27/86

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(1) Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics which would constitute failure if not met (yes/no/NA)? YES (Reference QR(1), p.5).

Identify Acceptance Criteria: 1)Insulation resistance must be greater than 500,000 ohms to guarantee a functional accuracy of $\pm$ 1.0°F. 2)Repeatability of the calibration must be $\pm$ 0.2°F.

(2) Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment which should be verified before, after, and periodically during the test to judge equipment performance (yes/no/NA)? YES (Reference QR(1), pp. 13, 14, & 135 -142).

Identify baseline and functional testing: 1)Calibration measurements before and after each test to verify repeatability. 2)Analog and digital recordings for verifying continuous operability during testing. 3)Insulation resistance measurements before, during and after HELB simulation to verify accuracy.

JUSTIFICATION/COMMENTS None

(3) Does the qualification report/analysis describe loads (or load combinations) applied during DBE test (yes/no/NA)? NA (Reference ___________).

JUSTIFICATION/COMMENTS Insulation resistance measurements were taken periodically throughout the LOCA test, as documented on page 35 of the test report (TAB D). Measurement of the performance was by evaluation of the recorded RTD outputs (QR(1), pp. 131-142). Insulation resistance was selected to guarantee functional accuracy. Load is an irrelevant parameter for these RTDs.

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	CHECKED SRP	DATE 4/23/86	12-27-88

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(4) Do the applied loads during baseline testing reflect normal operating conditions (Yes/No/NA)? NA (Reference:________).

JUSTIFICATION/COMMENTS Baseline testing consisted of calibration checks at various temperatures (QR(1), pp. 31-34). Load is an irrelevant parameter for these RTDs. Baseline testing is considered acceptable based on the application.

(5) Identify electrical characteristics necessary to ensure the equipment performance specifications can be satisfied.

(a)

Parameter	Plant Normal Conditions	Reference
Voltage	NA	NA
Load	NA	NA
Frequency	NA	NA
Accuracy	See Open Item 2	
Other(s)		

R1

JUSTIFICATION/COMMENTS

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(b)

Parameter	Specific Accident Conditions	Reference
Voltage	NA	NA
Load	NA	NA
Frequency	NA	NA
Accuracy	±5°F	Westinghouse EQDP-ESE-42A p. 14 (TAB E10) R1
Other(s)		

JUSTIFICATION/COMMENTS (1) See discussion in Section P on page 26 of this TAB on response time. (2) Applied voltage is 10VDC maximum across sensor resistance (TAB I - Note 5 on Minco drawings S8809 and S8810. (3) See Section M(5) Comments for a discussion on insulation resistance values and their relationship to accuracy. R1

(c)

Parameter	Demonstrated Conditions	Reference
Voltage	NA	
Load	NA	
Frequency	NA	
Accuracy	±1°F	Westinghouse EQDP-ESE-42A, p.14 (TAB E10) R1
Other(s)		

JUSTIFICATION/COMMENTS

BINDER NO. WBNEQ-ITE-001 PLANT WBN UNIT(S) 1 SHEET 17 OF 27
R 1 R

BINDER TITLE MINCO RTD COMPUTED GJB DATE 4/16/86 [illegible] 12/[illegible]

CHECKED SRP DATE 4/23/86 [illegible] 12-27-88

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-42, (Lower Containment) | R1

(1) Normal Max
(a) Temperature (°F) 120
(b) Pressure (psig) 0.3
(c) Humidity (%) 80
(d) Radiation (rd) 5.45×10^7* (21.8 yr dose)

(2) Abnormal Max
(a) Temperature (°F) 130
(b) Pressure (psig) 0.3
(c) Humidity (%) 100
(d) Radiation (rd) NA

(3) Process Interfaces: The RTD is in direct contact with the capillary instrument lines of the reactor vessel level transmitters; however, these are static lines at ambient temperature. Therefore, there is no additional heat contribution from the process line over and above that of the ambient containment temperature.

(4) State anticipated occurrence frequency and duration of abnormal conditions: Frequency = less than 1% of plant life; Duration - 8 hours maximum.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 327 Accident type HELB/LOCA

(b) Pressure (psig) 11.2 Accident type LOCA | R1

(c) Humidity (%) 100 Accident type HELB/LOCA

(d) Radiation (rd) 4×10^7 gamma 4.7×10^8 beta Accident type LOCA | R1

(e) Spray Type 2000 ppm Boron, 0.033 Molar NaOH pH 8.3 @ 25°C for 30 days at 0.92 gpm/ft^2 Accident type HELB/LOCA | R1

*Calculated from a worst case 40 yr. dose of 1×10^8 rads as shown on drawing 47E235-42. | R1

BINDER NO. WBNEQ-ITE-001	PLANT WBN	UNIT(S) 1	SHEET 18 OF 27 R 1 R
BINDER TITLE MINCO RTD	COMPUTED GJB	DATE 4/16/86	12/19/88
	CHECKED SRP	DATE 4/23/86	12-27-88

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): ______

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes

(Reference: 47E235-42, Note 46). R1

(7) Subject to submergence (Yes/No/NA)? Yes (Reference: TAB C). R1

Identify initiation time and duration of submergence: At the beginning of a LOCA and for 100 days thereafter.

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? Yes
(Reference: WCAP-8687, supp. 2-E42A, pg. 3).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: A beta dose of 9×10^8 rads is equivalent to a gamma dose of 2×10^7 rads. Since the actual plant beta dose is 4.7×10^8 rads, a gamma equivalent of 2×10^7 rads can be conservatively assumed in calculating the TID and that is reflected in the specified dose given in Section L(1) on page 19 of this TAB. R1

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS

(1) Comparison of worst-case maximum parameters:

Parameter	Specified	Demonstrated	Reference	
Operating Time	100 days	13 days	QR(1), App. D, p. 132	
Temperature (°F)	327	420	QR(1), pp. 4,19 & 131-132	
Pressure (psig)	11.2	75	QR(1), pp. 19 & 133-134	R1
Relative Humidity (%)	100	100	QR(1), p. 12	
Chemical Spray*	2000 Boron, pH 8.35, 0.033 Molar NaOH, 0.92 gpm/ft^2, 30 days	2750ppm Boron pH 10.7, 24 hrs	QR(1), p. 41 & TAB C	R1
Radiation (rd)**	1.145 x 10^8 gamma (See K(5) comments)	1.6 x 10^8 gamma	QR(1), p.17	
Submergence	Yes	No	TAB C	R1

*Includes spray concentration, flowrate, density, duration, and pH.

**Enter 40-year integrated normal dose plus integrated accident dose and specify type.

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference	
Temperature	Yes	TAB C	R1
Pressure	Yes	QR(1), pp. 19 & 133-134	
Relative Humidity	Yes	QR(1), p. 12	
Chemical Spray	Yes	TAB C	R1
Submergence	Yes	TAB C	R1

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-ITE-001	PLANT WBN	UNIT(S) 1	SHEET 20 OF 27
BINDER TITLE MINCO RTD	COMPUTED GJB DATE 4/16/86	R	R
	CHECKED SP DATE 4/23/86		

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, yes/no/NA)

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA
Temperature: +15 degrees F	+93°F	YES
Pressure: +10% but no more than 10 psig	+63psig	YES
Radiation: +10% of accident dose	40%	YES
Time: +10% (or 1 hour + operating time per NUREG-0588)	NA	NO
Voltage: ±10% of rated value	NA	NA
Frequency: ±5% of rated value	NA	NA
Environmental Transient: the initial transient and the peak temperature applied twice	2 dwells	YES
Vibration: +10% added to acceleration	QR(1), p.18, App B & C	YES

JUSTIFICATION/COMMENTS: Time Margin - See the analysis in TAB C2 which demonstrates qualification for the 100 day operating time requirement.

BINDER NO. WBNEQ-ITE-001	PLANT WBN	UNIT(S) 1	SHEET 21 OF 27 R 1 R
BINDER TITLE MINCO RTD	COMPUTED GJB	DATE 4/16/86	12/7/88
	CHECKED SRP	DATE 4/23/86	12-27-88

M. OPERABILITY TEST RESULTS

(1) Identify the safety function(s) of this equipment:
(Reference: See Sheet B-1 for Category and Operating Times). R1

JUSTIFICATION/COMMENTS These RTDs provide temperature compensation to the reactor vessel level indicators and must provide a continuous output during and after an accident to fulfill their Post-Accident Monitoring (PAM) function.

(2) Did the equipment perform its intended function during the simulated design basis accident exposure (Yes/No/NA)? Yes
(Reference: QR(1), p. 19).

JUSTIFICATION/COMMENTS None

(3) Did the equipment perform its intended function during the simulated post-design basis accident exposure (Yes/No/NA)? Yes
(Reference: QR(1), p. 19).

JUSTIFICATION/COMMENTS None

(4) Did the test demonstrate the operability requirements for the required time interval for which the equipment is required to operate (Yes/No/NA)? Yes (Reference: QR(1), p. 20 & TAB C2).

JUSTIFICATION/COMMENTS None

(5) Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved (Yes/No/NA)? Yes
(Reference: QR(1), pp. 19-20, App. A).

JUSTIFICATION/COMMENTS The original test was conducted with the lead wires run outside the test chamber because the insulation on them appeared to be cracked from excessive handling. The qualification of these lead wires was proven in a separate test which is documented in Appendix A of the report.

M.(5)(continued)

Insulation resistance during the HELB test is required to remain greater than 500,000 ohms to guarantee a functional accuracy of ±1.0°F (QR(1),p.5). The insulation resistance measurements taken during the HELB test for RTDs KK-1, KK-3, KK-4, and the dummy RTD all had insulation resistance values of greater than 500,000 ohms (QR(1),p.35). KK-2 exhibited unacceptable insulation resistance due to a faulty sealing between the potting boot and the adapter (QR(1),p.20). This is considered to be a random occurrence. These anomalies together with their resolutions have been reviewed and are considered to be adequately resolved. Therefore, the test demonstrated qualification of these RTDs.

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BINDER TITLE MINCO RTD		COMPUTED ggp	DATE 4/16/86	R	R		
		CHECKED gjp	DATE 4/23/86				

N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (yes/no/NA)? YES (Enter all requirements in Section G of the Binder - Qualification Maintenance Data Sheets).

JUSTIFICATION/COMMENTS See QMDS (TAB G).

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BINDER TITLE MINCO RTD		COMPUTED [illegible]	DATE 4/16/86	R		R	
		CHECKED [illegible]	DATE 4/23/86				

0. SUMMARY OF REVIEW

	Yes/No/NA
(1) Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	YES
(2) Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	NA
(3) Choice of qualification methodology adequately justified?	YES
(4) If analysis was performed, complete the following:	
(a) Were equipment performance requirements identified?	NA
(b) Were specific features and failure modes and effects analyzed?	NA
(c) Were assumptions and mathematical models used together with appropriate justification for their use?	NA
(d) Were environmental parameters which affect equipment performance identified?	NA
(5) Adequate similarity between equipment and test specimen established?	YES
(6) Aging degradation evaluated adequately?	YES
(a) Mechanical and/or cycle aging addressed?	NA
(b) Equipment aged to end of life condition prior to application of DBE conditions?	YES
(c) Absence of preaging in test/analysis justified?	NA
(d) Materials susceptible to thermal/radiation aging identified?	YES

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		CHECKED [illegible]	DATE 4/23/86				

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(e) Normally operating state of device (e.g., normally energized) considered?	YES
(7) Qualified life or replacement schedule established?	YES
(8) Criteria regarding temperature/pressure exposure satisfied?	YES
(a) Peak temperature adequate	YES
(b) Peak pressure adequate	YES
(c) Duration adequate	YES
(d) Required profile enveloped adequately	YES
(e) Steam exposure adequate	YES
(9) Criteria regarding test sequence satisfied?	YES
(10) Criteria regarding spray satisfied?	YES
(a) Was the spray testing done while under the extremes of pressure and temperature?	YES
(b) Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant?	YES
(11) Criteria regarding submergence satisfied?	YES
(12) Criteria regarding radiation satisfied?	YES
(a) Was dose rate considered?	YES
(b) Was beta radiation considered?	YES
(13) Criteria regarding operability status/mode satisfied?	YES
(14) Criteria regarding test failures or anomalies satisfied?	YES

EQP085.53

TVA

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(15) Criteria regarding functional testing satisfied?	YES
(a) Does the test plan/report specify an acceptance criteria for equipment performed?	YES
(b) Was an initial base line test done to establish required performance characteristics?	YES
(c) Has the test/analysis demonstrated that performance performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	YES
(16) Criteria regarding instrument accuracy satisfied?	YES
(17) Test duration margin (1 hour + function time) satisfied?	YES
(a) Is the minimum specified operating time at least 1 hour?	YES
(b) If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	NA
(18) Criteria regarding synergistic effects satisfied?	NA
(19) Criteria regarding margins satisfied?	YES
(20) Maintenance and surveillance requirements adequately identified?	YES

P. DISCUSSION

Response Time - In Section 6.2 on page 14 of the test report, it states that "The RTD accuracy during testing was not verified against a reference standard thermometer because of differences in time response, mounting location, RTD construction and local temperature variations." In Section 6.3 on the same page, it states that the

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P. DISCUSSION (Continued)

accuracy is established by measuring the insulation resistance and that a value of at least 500,000 ohms guarantees a functional accuracy of ±1°F. These measurements were taken and reported in Table 7 on page 35 of the test report. In spite of the fact that Westinghouse makes no claims to having measured accuracy of the RTDs during the test, Figures D2 (p. 132) and D12 (p. 142) in the test report (TAB D) show the temperature profiles recorded by the average of four Type K thermocouples monitoring the test chamber temperature (p. 16) and RTD test specimen KK-4 during DBA and post-DBA conditions. When these two profiles are compared, it can be seen that they do not match during the first hour or so of the test. This indicates a much slower response time for the RTDs as compared to the thermocouples. This is not considered to be a problem because these instrument's only safety function is to provide temperature compensation to a system (RVLIS) which is required for PAM. The temperature of the water, in the sensing lines these RTDs are measuring, also will not "see" the brief transients in temperature that occur, but will heat up gradually, which renders the response time concern insignificant. Westinghouse has also taken the position that time response testing has been done successfully on a sample model of this RTD via type testing per Section 2.9 on page 8 of EQDP-ESE-42A, TAB E10. R1

PRINT DATE: 01/[illegible]/89

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-TE -068-0001 RCS LOOP 1 HOT LEG TEMP	-D	1-TE -068-0001 21205	-D	030	718' 6" 71C62-54114-1	LC	A A A A A	100D 100D 100D 1MO 1MO	L MS FW CV/C RH/C	MONITORS RCS LOOP 1 HOT LEG TEMP, PAM
WBN-1-TE -068-0018 RCS LOOP 1 COLD LEG TEMP	-D	1-TE -068-0018 21205	-D	057	718' 4" 71C62-54114-1	LC	A A A A A	100D 100D 100D 1MO 1MO	L MS FW CV/C RH/C	MONITORS RCS LOOP 1 COLD LEG TEMP PAM
WBN-1-TE -068-0024 RCS LOOP 2 HOT LEG TEMP	-D	1-TE -068-0024 21205	-D	153	718' 71C62-54114-1	LC	A A A A A	100D 100D 100D 1MO 1MO	L MS FW CV/C RH/C	MONITORS RCS LOOP 2 HOT LEG TEMP PAM
WBN-1-TE -068-0041 RCS LOOP 2 COLD LEG TEMP	-D	1-TE -068-0041 21205	-D	119	718' 6" 71C62-54114-1	LC	A A A A A	100D 100D 100D 1MO 1MO	L MS FW CV/C RH/C	MONITORS RCS LOOP 2 COLD LEG TEMP PAM
WBN-1-TE -068-0043 RCS LOOP 3 HOT LEG TEMP	-E	1-TE -068-0043 21205	-E	208	718' 5" 71C62-54114-1	LC	A A A A A	100D 100D 100D 1MO 1MO	L MS FW CV/C RH/C	MONITORS RCS LOOP 3 HOT LEG TEMP PAM

R 1 R____ R____

PREPARER/DATE HWL 9/11/86

CHECKED/DATE WCG 9/12/86

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	LOCATION: ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-TE -068-0060 -E RCS LOOP 3 COLD LEG TEMP	1-TE -068-0060 -E 21205	232	718' 6" 71C62-54114-1	LC	A A A A A	100D 100D 100D 1MO 1MO	L MS FW CV/C RH/C	MONITORS RCS LOOP 3 COLD LEG TEMP PAM
WBN-1-TE -068-0065 -E RCS LOOP 4 HOT LEG TEMP	1-TE -068-0065 -E 21205	330	718' 6" 71C62-54114-1	LC	A A A A A	100D 100D 100D 1MO 1MO	L MS FW CV/C RH/C	MONITORS RCS LOOP 4 HOT LEG TEMP PAM
WBN-1-TE -068-0083 -E RCS LOOP 4 COLD LEG TEMP	1-TE -068-0083 -E 21205	308	718' 6" 71C62-54114-1	LC	A A A A A	100D 100D 100D 1MO 1MO	L MS FW CV/C RH/C	MONITORS RCS LOOP 4 COLD LEG TEMP PAM

PAGE A-2 R1

		R 1	R	R
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TAB A

NOTES

1. Elevations shown are actual elevations for equipment located in the Reactor Building and floor elevations for equipment located outside the Reactor Building. Actual elevations for all equipment are documented in TAB F.

2. See page B-1 for source of Category and Operating Times assignments.

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A. DOCUMENTATION

Equipment Description: Resistance Temperature Detector (RCS Well-Mounted)

Vendor/Manufacturer: RdF

Equipment Model No.(s): 21205

QUALIFICATION REPORTS

(1) Title/Number/Revision Equipment Qualification Test Report WCAP-8687 Supp. 2-E06A R3 RIMS B45 860512 365 DATE March, 1983

(2) Title/Number/Revision RIMS DATE

(3) Title/Number/Revision RIMS DATE

OTHER (ANALYSIS, VENDOR DATA, ETC.)

(1) The following documentation is required to support qualification: R1

a) OE Calculation WBNOSG4-017 R8 Reactor Coolant System (68) NUREG-0588 Category and Operating Times (B45 860722 218).

b) Deleted. R1

c) Justification for HELB/LOCA Chemical Spray Qualification Deficiency.

d) Initiation Time and Duration of Submergence Including Analysis Supporting Operation of Submerged RTDs.

e) Material Aging Calculation Reports WAC-104 DTD 5-20-86, and WAC-195 DTD 9-3-86. Calculations Determine Qualified Lifetimes and Post-DBE Qualified Lifetimes.

A. DOCUMENTATION - OTHER (ANALYSIS, VENDOR DATA, ETC.), (Continued)

f) Instrument Accuracy Calculations WBPE0688605005 (B43 860722 901).

g) Justification for Applied 10% Margin of Accident Radiation Dose.

(2) In addition to qualification reports listed on Sheet 1, this section, the following documentation required to support qualification is included in TAB D - Qualificaton Documents.

a) Equipment Qualification Data Package WCAP-8587, EQDP-ESE-6 R5, DTD 3/83 (B45 860512 366).

(3) The following documentation required to support qualification is included in TAB E - Miscellaneous Documents and Correspondence.

a) Design Specification 955322 R3, DTD 8/10/82 (B45 851210 351).

b) Design Specification 955270 R2, dated 6/4/84 (B45 850423 359).

c) Specification for Reactor Coolant RTD's Drawing No. WATS-325-04210 R1, dated 10/5/84, page 1 (B45 850425 352).

d) Traceability of Installed RTD to Its Qualification Documentation (Secton includes Auditable Link Document EQAL-WAT R3, dated March 1986, RIMS NO. B45 860521 351 and Quality Release 74284).

e) Letter from Westinghouse to D. L. Kitchel dated 8-22-86 (B71 860826 003) - States that Cal-Note SEC-OSA-1242-CO which provides justification for use of a max normal ambient temperature of 200°F is on file at Westinghouse.

f) Letter from Westinghouse to D. Wilson dated 3-27-86 (B71 860404 002) - States type, manufacturer and activation energy of the epoxy used in RTD assembly. Also deontes epoxy location in RTD assembly.

g) EN DES Calculations Maximum Containment Water Level Rise (NEB 811125 267).

A. DOCUMENTATION - OTHER (ANALYSIS, VENDOR DATA, ETC.), (Continued)

h) TVA Drawings

a) Conduit and Grounding Penetration Sealing and Fire Stop Details, DWG 45W883-3 R15.

b) Conduit and Grounding Floor EL 716.0 Details, Sheet 17, DWG 45W862-19 R22.

i) Traceability of Installed Thermowell.

(4) Westinghouse's Drawings 5365C29 R1, 271C315 R3 and 206C470 R5; All incorporated in TAB I. R1

NOTE: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. This listing includes only those documents which are essential to qualification and accordingly should not be considered a complete listing of binder references. R1

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R ___ R ___

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B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified (Pending Resolution of Open Items)

___ Equipment Satisfies All Requirements Except Qualified Life or Justification of Replacement Schedule

___ Equipment Qualification Not Established by Documentation

___ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES Refer to Sheet 5, this section, for open items and qualification deficiencies.

COMMENTS/RECOMMENDATIONS

B. CONCLUSION OF REVIEW - Open Items and Qualification Deficiencies

(1) Relocation of junction boxes for 1-TE-68-1, -18, -24, -41, -43, -60, and -83 above postulated flood level. Reference SCR WBNEEB8559/ECN5993.

(2) Binder Open Item WBNEQP8621 R1, (B45 860717 851) which requires review of Westinghouse's PAM Functional Requirements Document (B45 860122 351) to determine its adequacy for use in demonstrating qualification of the RCS wide range RTDs.

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R ____ R ____

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C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate Which Criteria is Applicable):

__X__ Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE323-1974)

_____ Components are Qualified to the Criteria of NUREG-0588 Category II or the DOR Guidelines of lE Bulletin No. 79-01B (IEEE323-1971) (DOR Guidelines Applicable to only BFN)

JUSTIFICATION/COMMENTS ______

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

IEEE 344-1975

D. QUALIFICATION METHODOLOGY (Check only one block)

_X_ Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

___ Test of Similar Items with Supporting Analysis

___ Analysis in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

___ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS The installed RTDs are identical to those tested. Refer to TAB E, Section 4, for traceability.

During HELB simulation tests, RTDs were subjected to chemical spray from start of test to 24 hours. Flow rate was not specified. RTDs are required to operate for 100 days following a LOCA or line breaks in either MS or FW lines. Refer to TAB C, Section 5, for acceptability.

RTDs are subject to submergence following a DBE. During HELB simulation tests, RTDs were not tested to demonstrate qualification for submergence. For analysis supporting operation of submerged RTDs, refer to TAB C, Section 6.

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E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification documentation identical to the plant equipment which requires qualification (Yes/No/NA)? Yes

	Plant Device	Qualification Document	Reference
(1) Equipment Type	Resistance Temperature Detector	Same	(1)
(2) Manufacturer	RdF	Same	(1)
(3) Model Number(s)	21205	21205	Tbl 1, p 20(1)
(4) Serial Number(s)	417, 418,	103, 114,	Tbl 1, p 20(1)
	419, 420,	115	
	421, 422,		
	423, 424		

(5) Identify Component-Unique checksheet attached:

JUSTIFICATION/COMMENTS

(1) Qualification Report WCAP-8687, Supp. 2-E06A |R1

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F. INSTALLATION INTERFACES

List all interfaces pertinent to EQ identified in the qualification documentation and/or evaluation and reference the source. Is the interface a requirement for our application (Yes/No)? (Note below.) If yes, enter requirement in QMDS, if no, provide justification.

Interface	Identify Interface	Plant Requirement? (Yes/No)	Reference Test Report	
Mounting Bolts	NA			
External Process Connections	NA			
Electrical Connections	NA (1)			
Conduit Seals	Nuclear qualified splice (1)	Yes	G-38 (2)	R1
Connector Seals	NA			
Orientation	NA			
Physical Configuration	NA			
Other	(3)(4)	Yes	(5)	

JUSTIFICATION/COMMENTS

(1) RTD cable assembly interfaces with a Conax seal and electrical connections are made within the Conax seal (Refer to TAB E, Section 8, TVA drawings 45W883-3, Detail F3 and 45W862-19, Detail F19). Environmental qualification of Conax seal is documented in EQ Binder WBNEQ-CSC-001. Environmental qualification of splice is documented in EQ Binder WBNEQ-SPLC-001. R1 R1

(2) Qualification Report WCAP-8687, Supp 2-E06A, Para 7.1, pp 17 and 18. R1

(3) The RTD cable must be seismically supported to maintain seismic qualification. For seismic installation requirements, refer to TAB I, DWG 2650C31, Note 1. R1

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JUSTIFICATION/COMMENTS (Continued)

(4) Installation requirements are per Westinghouse drawings RCS Cold Leg RTD Installation Details (Well Type), drawing no. 5365C29 (Refer to TAB I, Section 1). RTD to be used with thermowell as specified on Westinghouse drawing Installation Details Thermowell with Boss, drawing no. 271C315 (Refer to TAB I, Section 2). |R1 |R1

(5) Equipment Qualification Data Package EQDP-ESE-6, Paragraph 1.2, page 2. |R1

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G. TEST SEQUENCE

(1) Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE-323 (74), paragraph 6.3.2 (Yes/No/NA)? (Note below.) Refer to Para 2.9, p 9 (1)

	Yes/No/NA	Reference
(a) Equipment inspected for damage	Yes	Para 2.9, p 9 (1)
(b) Baseline performance measurements taken	Yes	Appx C, pp 58, 59, 60 (2)
(c) Equipment aged: (4)		
Thermal	Yes	Para 5.1, p 10 (2)
Radiation	Yes	Paras 5.3, 5.4 pp 10, 11 (2)
Wear	Yes	Para 3.2, p 5 (2)
(d) Vibration/seismic testing conducted	Yes	Paras 5.5, 5.6 pp 11 thru 14 (2)
(e) Design basis event (DBE) exposure	Yes	Para 5.7, p 14 (2)
(f) Post-DBE exposure	Yes	Para 5.7, p 14 (2)
(g) Final inspection and disassembly	(3)	(3)

(2) Was the same piece of equipment used throughout the test sequence described in item (1) above (Yes/No/NA)? Yes

(3) Have the test equipment, test equipment accuracies and calibration data been appropriately document (Yes/No/NA)? Yes (5)

(Reference: Tbl II, pp 21 thru 24 (2)).

JUSTIFICATION/COMMENTS (1) Equipment Qualification Data Package EQDP-ESE-6. |R1

G. TEST SEQUENCE - Justification/Comments (Continued)

(2) Qualification Report WCAP-8687, Supp. 2-E06A. |R1

(3) RTDs were subjected to final inspection (Refer to Equipment Qualification Data Package EQDP-ESE-6, Para 2.9, |R1 pp 9 & 10) and were subjected to post-qualification performance tests (Refer to Qualification Report WCAP-8687, Supp 2-E06A, Appx C). |R1

(4) RTDs were subjected to thermal cycling (Refer to Qualification Report WCAP-8687, Supp 2-E06A, Para 5.2, p 10). |R1

(5) Calibration Data and Test Equipment Accuracies are available for audit at Westinghouse.

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H. AGING

(1) Was aging considered in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687, Supp 2-E06A, Para 3.1, p 3).

JUSTIFICATION/COMMENTS

(2) Were the following effects considered in the aging program:

Aging Effect	Yes/No/NA	Reference
Thermal aging	Yes	Para 3.1.1, p 3(1)
Radiation exposure	Yes	Para 3.1.3, 3.1.4, p 4(1)
Vibration (non-seismic) aging	Yes	Para 3.1.5, p 4(1)
Operational (electrical/mechanical/ process) stress aging	Yes	Para 3.1.2, p3(1) Para 3.1.5, p4(1)

JUSTIFICATION/COMMENTS Qualification Report WCAP-8687, Supp 2-E06A. |R1

(3) Were all known synergistic effects which are believed to have a significant effect on equipment performance considered in the aging program (Yes/No/NA)? NA (Reference:).

JUSTIFICATION/COMMENTS Based upon review of materials of construction, no known synergistic effects apply to this equipment.

(4) Thermal Aging:

(a) Was thermal aging considered in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP, Supp 2-E06A, Para 3.1.1, p 3 and Para 5.1, p 10). |R1

JUSTIFICATION/COMMENTS

H. AGING (Continued)

(b) Were the materials susceptible to thermal aging degradation identified in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687, Supp 2-E06A, Para 3.1.1, p 3). |R1

JUSTIFICATION/COMMENTS

(c) Was the basis for thermal aging identified in the qualification program (Yes/No/NA)? Yes (Reference: Equipment Qualification Data Package EQDP-ESE-6, Para 1.9, p 4; Qualification Report WCAP-8687, Supp 2-E06A, Para 5.1, p 10). |R1

JUSTIFICATION/COMMENTS

(d) Was the aging acceleration rate justified and the parameters of time and temperature identified in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687, Supp 2-E06A, Para 5.1, p 10). |R1

Parameter	Plant Maximum Normal	Test	Equivalent
Temperature	200°F (1)	400°F (2)	200°F (3)
Time	40 years	11 days	>40 years

JUSTIFICATION/COMMENTS (1)(2)(3) Refer to Sheet 14, this tab.

(e) Was the Arrhenius methodolgy used for accelerated aging (Yes/No/NA)? Yes (Reference: Equipment Qualification Data Package EQDP-ESE-6, Para 1.9, p 4). |R1

JUSTIFICATION/COMMENTS

(f) If activation energies were used for determining accelerated aging parameters, are they properly referenced to the source of the technical data (Yes/No/NA)? No

(Reference: (4) Refer to Sheet 14, this tab).

JUSTIFICATION/COMMENTS

H. AGING

(4) Thermal Aging (Continued)

(d)[1] The plant maximum normal for RTDs 1-TE-68-1, -18, -24, -41, -43, -60, -65, -83 is 200°F. Westinghouse has performed an analysis which shows that the air velocity and ambient temperature of the area in which the RTDs are located are sufficient to limit the temperature of the RTDs head to approximately 200°F. Analysis, Cal-Note SEC-OSA-1242-CO, is on file at Westinghouse - Refer to TAB E, Section 5.

[2] Qualification Report WCAP-8687, Supp 2-E06A, Para 5.1, p 10. |R1

[3] Material Aging Calculation WAC-104, Refer to TAB C, Section 7.

(f)[4] The activation energy used is denoted in Para 3.1.1, p 3 of Qualification Report WCAP-8687, Supp 2-E06A. |R1 Also refer to TAB E, Sect 6 - Letter from Westinghouse to D. Wilson dated March 27, 1986 (B71 860404 002).

H. AGING (Continued)

(g) If a regression line was used for determining accelerated aging parameters, are test points or failure modes identified on the line (Yes/No/NA)? NA
(Reference: ____________________).

JUSTIFICATION/COMMENTS ____________________

(h) Was the equipment operated during the thermal aging (Yes/No/NA)? Yes (Reference: Qualification Report
WCAP-8687, Supp 2-E06A, Para 3.2, p 5). R1

JUSTIFICATION/COMMENTS ____________________

(5) Radiation Aging Exposure:

(a) Was radiation aging exposure considered in the qualification program (Yes/No/NA)? Yes (Reference: Qualification
Report WCAP-8687, Supp 2-E06A, Para 3.1.3, 3.1.4, p 4 and R1
Para 5.3, 5.4, pp 10, 11).

JUSTIFICATION/COMMENTS ____________________

(b) Were the materials susceptible to radiation degradation identified in the qualification program (Yes/No/NA)? Yes
(Reference: Qualification Report WCAP-8687, Supp 2-E06A R1
Para 3.1.1, p 3).

JUSTIFICATION/COMMENTS ____________________

(c) Was the basis for radiation aging exposure identified in the qualification program (Yes/No/NA)? Yes
(Reference: See comments).

JUSTIFICATION/COMMENTS Design Specification 955270, Para R1
6.2, p 6. Refer to TAB E, Sect 2: Qualification Report
WCAP-8687, Supp 2-E06A, Para 3.1.3, 3.1.4, p 4. R1

H. AGING (Continued)

(d) Is the radiation test exposure dose and dose rate acceptable (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687, Supp 2-E06A, Para 5.3, pp 10, 11). R1

Plant normal ambient radiation dose (rd)	8×10^{7}
Test exposure dose (rd)	Tip of RTD 2.47×10^{8}(1) Cable 1.22×10^{8}
Test exposure dose rate (rd/hr)	Between 2×10^{6}(2) and 3×10^{6}
Test exposure source type (e.g., Co-60 gamma)	Co-60 Gamma(2)

JUSTIFICATION/COMMENTS (1) Qualification Report WCAP-8687, Supp 2-E06A, Para 5.3, pp 10, 11. (2) Design Specification 955270, Para 6.2, p 6 (refer to TAB E, Sect 2) R1

(6) Vibration (non-seismic) Aging:

(a) Were the effects of non-seismic vibration induced during normal and abnormal operation addressed in the qualification program* (yes/no/NA)? Yes (Reference Qualification Report WCAP-8687, Supp 2-E06A, Para 3.1.5, p 4 and Para 5.5, pp 11 thru 13). R1

JUSTIFICATION/COMMENTS ______

(b) Was the basis for vibration aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687, Supp 2-E06A Para 3.1.5, p 4 and Para 5.5, pp 11 thru 13.). R1

JUSTIFICATION/COMMENTS ______

* Qualification program refers to the test report and any supplemental documentation including TVA analyses in Tab C of the binder.

H. AGING (Continued)

(7) Operational Stress Aging:

(a) Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation adressed in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687, Supp. 2-E06A, Para 3.1.2, p 3, and Para 5.2, |R1 p 10).

JUSTIFICATION/COMMENTS

(b) Was the basis for stresses induced during operational aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687, Supp. 2-E06A, Para 3.1.2, p 3). |R1

JUSTIFICATION/COMMENTS

(8) Was the qualified life of the equipment and its basis defined in the qualification program (Yes/No/NA)? Yes
(Reference: Qualification Report WCAP-8687, Supp 2-E06A, Para |R1
3.1.1, p 3, and Para 5.1, p 10. Equipment Qualification
Data Package EQDP-ESE-6, Para 1.9, p 4). |R1

Qualified life (Document in QMDS) > 40 years

JUSTIFICATION/COMMENTS

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H. AGING (Continued)

(9) Were replacement intervals for the equipment or its components defined in the qualification program (Yes/No/NA)? Yes
(Reference: See comments).

JUSTIFICATION/COMMENTS Qualified life of test specimen is 10 years (refer to Equipment Qualification Data Package EQDP-ESE-6, Tbl 1, p 18). R1

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I. MATERIALS ANALYSIS

Identification of Materials Susceptible to Significant Thermal and/or Radiation Degradation and Aging (Use Section C of Binder for Detailed Materials Analysis).

	Material/ Property/Function	Radiation Threshold	Reference	Activation Energy	Reference
(a)	Silicon Varnish (Cable Coating)	NA (1)	(1)	Not Specified (2)	Para 3.1.1, p 3 (3)
(b)	Epoxy (Potting Matl)	NA (1)	(1)	.98eV	Para 3.1.1, p 3 (3)
(c)					
(d)					
(e)					

JUSTIFICATION/COMMENTS (1) Materials were irradiated to 1.22 x 10^8 rads gamma and 9.23 x 10^8 rads beta during radiation exposure test (refer to Qualification Report WCAP-8687, Supp 2-E06A, Paras 5.3., 5.4, pp 10, 11). R1

(2) The silicon varnish is only used as a manufacturing process to prevent the fiberglass insulation of the cable from fraying during manufacturing and is not required for operation of the RTD.

(3) Qualification Report WCAP-8687, Supp 2-E06A. R1

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J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(1) Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics which would constitute failure if not met (Yes/No/NA)? Yes
(Reference: Equipment Qualification Data Package EQDP-ESE-6, Sect. 1.7, p 3; Qualification Report WCAP-8687, Supp 2-E06A, Para 3.2, p 5, and Para 6.3, p 16). R1

Identify Acceptance Criteria: ± 0.2°F repeatability, ±1.0°F drift allowance; insulation resistance > 1 Megohm.

(2) Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment which should be verified before, after, and periodically during the test to judge equipment performance (Yes/No/NA)? Yes
(Reference: Qualification Report WCAP-8687, Supp. 2-E06A, Para 3.2, p 5). R1

Identify baseline and functional testing: Refer to Sheet 21, this tab.

JUSTIFICATION/COMMENTS

(3) Does the qualification report/analysis describe loads (or load combinations) applied during DBE test (Yes/No/NA)? NA
(Reference: Equipment Qualification Data Package EQDP-ESE-6, Para 1.1, p 2). R1

JUSTIFICATION/COMMENTS For electric connections, refer to Sheet 21, this tab.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(2) Performance Characteristics (Continued)

Baseline Functional Tests (Operation - Normal Condition) are described in the Equipment Qualification Data Package EQDP-ESE-6, |R1 Para 2.9, p 9. For baseline functional test results and functional test (static calibration) results performed after each of the test phases, refer to Qualification Report WCAP-8687, Supp 2-E06A, Appx |R1 C, pp 57 thru 61.

(3) During static calibration checks, the RTDs were excited by a constant current (approximately 1 mA; refer to Equipment Qualification Data Package EQDP-ESE-6, Para 1.1, p 2) applied to the two |R1 leads while the voltage drop was measured across the other two leads. A digital voltmeter was used to measure resistance. Refer to Qualification Report WCAP-8687, Supp 2-E06A, Para 4.2.1, p 7, |R1 and Fig. 4, p 32. During each of the test phases, the RTD outputs were monitored via Westinghouse 300 series amplifiers. The 0-10-Volt analog outputs of the amplifiers were monitored and recorded on a digital data logger. Refer to Qualification Report WCAP-8687, Supp 2-E06A, Para 3.2, p 5, and Paras 4.2.2, 4.2.3, |R1 4.2.4, 4.2.5, and 4.2.6, pp 7 thru 9.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(4) Do the applied loads during baseline testing reflect normal operating conditions (Yes/No/NA)? NA (Reference: Refer to J.(3), Sheet 21, this tab).

JUSTIFICATION/COMMENTS

(5) Identify electrical characteristics necessary to ensure the equipment performance specifications can be satisfied.

(a)

Parameter	Plant Normal Conditions	Reference
Voltage	R/I Converter with 1-milliamp current	(1)
Load	NA	(1)
Frequency	NA	(1)
Accuracy	± 26.2°F	TAB C, Section 8
Other(s)		

R1

JUSTIFICATION/COMMENTS (1) Equipment Qualification Data Package EQDP-ESE-6, para. 1.1, p. 2.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(b)

Parameter	Specific Accident Conditions	Reference
Voltage	R/I Converter with 1-milliamp current	(1)(2)
Load	NA	(1)
Frequency	NA	(1)
Accuracy	± 21°F (3)	(4)
Other(s)		

R1

JUSTIFICATION/COMMENTS (1) Equipment Qualification Data Package EQDP-ESE-6, Para 1.1, p. 2. (2) Electric Control Drawing 47W610-68-1, -2, -3, and -4. (3) Open Item pending resolution of SCR WBNEQP8621. (4) Instrument Accuracy Calculation WBPE0688605005, p. 36 (refer to TAB C, Section 8). R1

(c)

Parameter	Demonstrated Conditions	Reference
Voltage	R/I Converter with 1 - milliamp current	(1)
Load	NA	(1)
Frequency	NA	(1)
Accuracy	± 26.2°F	(2)
Other(s)		

R1

JUSTIFICATION/COMMENTS (1) Equipment Qualification Data Package EQDP-ESE-6, Para 1.1, p. 2. R1

(2) Refer to Sheet 24 this tab.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(5)(b) Demonstrated Conditions

Accuracy - There are no changes in the RTD due to severe evnvironments. The calibration accuracy is ±0.2,F and the drift allowance is ±1.0,F (refer to Equipment Qualification Data Package EQDP-ESE-6, Tbl 1, p 18, and to Qualification Report WCAP-8687, Supp 2-E06A, Para. 7.2, p 18). For demonstrated loop accuracy of ±26.2,F, refer to Instrument Accuracy Calculations, TAB C, Section 8. R1

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-42 |R1

(1) Normal Max

(a) Temperature (°F) 120 (1)

(b) Pressure (psig) .3

(c) Humidity (%) 80

(d) Radiation (rd) 8×10^7

(2) Abnormal Max

(a) Temperature (°F) 130 (1)

(b) Pressure (psig) .3

(c) Humidity (%) 100

(d) Radiation (rd) NA

(3) Process Interfaces: NA; RTDs are installed in thermowells. For effects of process temperatures, refer to Sheet 26, this TAB.

(4) State anticipated occurrence frequency and duration of abnormal conditions: Maximum abnormal temperature, pressure, and humidity could exist for up to eight hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	327 (1)	Accident type	HELB
(b) Pressure (psig)	11.2	Accident type	LOCA
(c) Humidity (%)	100	Accident type	LOCA/HELB
	4.7×10^8 beta		
(d) Radiation (rd)	4×10^7 gamma	Accident type	LOCA
(e) Spray Type	Boron (2)	Accident type	LOCA/HELB

(1)(2) Refer to Sheet 26, this TAB.

K. REQUIRED OPERATING ENVIRONMENT (Continued)

(1) Due to effect of process temperatures, the temperature of the RTD head, during normal operation, will be approximately 200,F (refer to H(4)(d), Comment (1), Sheet 14, this TAB) and during DBE/Post-DBE environments, the RTD will be subjected to a conservative 50,C temperature rise above ambient (refer to Qualification Report WCAP-8687, Supp 2-E06A, Para 5.1, p 10). |R1

(2) Refer to Sheet 30, this TAB, for composition.

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Refer to Sheet 30, this TAB.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: Refer to Sheet 28, this TAB).

(7) Subject to submergence (Yes/No/NA)? Yes (Reference: Refer to Section 6, TAB C).

Identify initiation time and duration of submergence: Refer to Section 6, TAB C.

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? Yes (Reference: Environmental Drawing 47E235-42)

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: Required Beta dose is enveloped by the tested Beta dose (para. 5.4, p. 11) therefore no analysis was required. R1

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.

R1

K. REQUIRED OPERATING ENVIRONMENT (Continued)

(6) Reference - Environmental drawing 47E235-42 (note 46). |R1
To prevent moisture intrusion into the RTD/cable assembly, the RTD cable assembly interfaces with a Conax seal assembly. The RTD cable leads are enclosed in a flexibel, pressure-tight hose. The flexible, pressure-tight hose is helium leak tested to assure no degradation under HELB/LOCA environmental conditions (refer to Qualification Report WCAP-8687, Supp. 2-E06A, Para. 7.1, p 17). |R1
Therefore, the RTD/cable assembly is not subject to moisture intrusion and will function as required under design basis conditions.

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L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS

(1) Comparison of worst-case maximum parameters:

Parameter	Specified	Demonstrated	Reference
Operating Time	100 days	15 days	Fig 7, p 35[(1)]
Temperature (^{o}F)	327	420	Fig 7, p 35[(1)] Tbl 1, p 18[(2)]
Pressure (psig)	11.2	75	Fig 8.9, pp 36, 37[(1)] Tbl 1, p 18[(2)]
Relative Humidity (%)	100	100	Tbl 1, p 18[(2)]
*Chemical Spray	Sheet 30, this tab	Sheet 30, this tab	Para 3.1.7, pp 4, 5[(1)] Tbl 1, p 18[(2)]
**Radiation (rd)	1.2×10^{8} gamma 4.7×10^{8} beta	(3)	Paras 5.3, 5.4, pp 10, 11[(1)] Tbl 1, p 18[(2)]
Submergence	Yes	No	Refer to TAB C, Sect 6, for Analysis

*Includes spray concentration, flowrate, density, duration, and pH.

**Enter 40-year integrated normal dose plus integrated accident dose and specify type.

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference
Temperature	Yes	Fig 7, p 35[(1)] Tbl 1, p 18[(2)]
Pressure	Yes	Figs 8, 9 pp 36, 37[(1)] Tbl 1, p 18[(2)]
Relative Humidity	Yes	Tbl 1, p 18[(2)]
Chemical Spray	Yes	Sheet 30, this tab
Submergence	No	Refer to TAB C, Sect 6, for Analysis

JUSTIFICATION/COMMENTS Qualification for submergence has been established by analysis.

[(1)(2)(3)] Refer to Sheet 30, this tab.

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L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(1) Qualification Report WCAP-8687, Supp 2-E06A.

(2) Equipment Qualification Data Package EQDP-ESE-6. R1

(3) RTD TIP - 2.47×10^8 rads gamma

Cable - 1.22×10^8 rads gamma

RTD and Cable - 9.23×10^8 rads beta

Chemical Spray

Specified - The chemical spray composition is 0.19 Molar H_3BO_3 (2000 ppm Boron), 0.033 Molar NaOH resulting in a pH of 8.3 at 25°C. The flowrate is equal to 0.92 gal/min per square foot of containment cross section. Refer to Environmental Data Drawing 47E235-42, notes 5 and 22. R1

Demonstrated - The chemical spray composition consisted of 2750 ppm Boron buffered with 0.9 percent dissolved NaOH to a pH of 10.7 at 25°C and was applied from the start of HELB simulation to 24 hours. The flowrate was not specified. Refer to TAB C, Section 5 for acceptability.

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, Yes/No/NA).

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA
Temperature: +15 degrees F	> 15°F	Yes
Pressure: +10% but no more than 10 psig	> 10%	Yes
Radiation: +10% of accident dose	> 10%(4)	Yes
Time: +10% (or 1 hour + operating time per NUREG-0588)	None	(1)
Voltage: ±10% of rated value	NA	
Frequency: ±5% of rated value	NA	
Environmental Transient: the initial transient and the peak temperature applied twice	(2)	Yes
Vibration: +10% added to acceleration	(3)	Yes

JUSTIFICATION/COMMENTS (1) Refer to TAB C, Section 7 for plant specific margin.

(2) Qualification Report WCAP-8687, Supp 2-E06A, Fig. 7, p 35. R1

(3) Equipment Qualification Data Package EQDP-ESE-6, Para 2.10.3.3, p 11.

(4) Refer to TAB C, Section 9 for justification.

M. OPERABILITY TEST RESULTS

(1) Identify the safety function(s) of this equipment:
(Reference: Refer to TAB A).

JUSTIFICATION/COMMENTS

(2) Did the equipment perform its intended function during the simulated design basis accident exposure (Yes/No/NA)? Yes
(Reference: Qualification Report WCAP-8687, Supp 2-E06A, Para 3.2, p 5, Para 6.2, p 15, and Para 7.2, p 18). R1

JUSTIFICATION/COMMENTS

(3) Did the equipment perform its intended function during the simulated post-design basis accident exposure (Yes/No/NA)? Yes
(Reference: Qualification Report WCAP-8687, Supp 2-E06A, Para 3.2, p 5, Para 6.2, p 15, and Para 7.2, p 18). R1

JUSTIFICATION/COMMENTS

(4) Did the test demonstrate the operability requirements for the required time interval for which the equipment is required to operate (Yes/No/NA)? Yes (Reference: Refer to TAB C, Section 7).

JUSTIFICATION/COMMENTS

M. OPERABILITY TEST RESULTS (Continued)

(5) Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved (Yes/No/NA)? Yes
(Reference: Qualification Report WCAP-8687, Supp. 2-E06A, |R1
Para 6.2, p 15, and Para 7.3, p 19).

JUSTIFICATION/COMMENTS

The qualification report denotes that during beta irradiation testing, an apparent transient effect on the amplified RTD output occurred.

Tests were performed to investigate the apparent response to beta radiation, and in none of the tests were the original effects repeated. Westinghouse concluded that the responses observed in the initial tests were the result of conditions unique to the qualification test set-up and not a response to conditions reflecting accident doses.

The above anomaly was properly addressed in the qualification report and the conclusion concurred with.

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N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (yes/no/NA)? Yes (Enter all requirements in Section G of the Binder - Qualification Maintenance Data Sheets).

JUSTIFICATION/COMMENTS ____________________

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0. SUMMARY OF REVIEW

	Yes/No/NA
(1) Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	Yes
(2) Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	NA
(3) Choice of qualification methodology adequately justified?	Yes
(4) If analysis was performed, complete the following:	
(a) Were equipment performance requirements identified?	NA
(b) Were specific features and failure modes and effects analyzed?	NA
(c) Were assumptions and mathematical models used together with appropriate justification for their use?	NA
(d) Were environmental parameters which affect equipment performance identified?	NA
(5) Adequate similarity between equipment and test specimen established?	Yes
(6) Aging degradation evaluated adequately?	Yes
(a) Mechanical and/or cycle aging addressed?	Yes
(b) Equipment aged to end of life condition prior to application of DBE conditions?	Yes
(c) Absence of preaging in test/analysis justified?	NA
(d) Materials susceptible to thermal/radiation aging identified?	Yes

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R R
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0. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(e) Normally operating state of device (e.g., normally energized) considered?	Yes
(7) Qualified life or replacement schedule established?	Yes
(8) Criteria regarding temperature/pressure exposure satisfied?	Yes
(a) Peak temperature adequate	Yes
(b) Peak pressure adequate	Yes
(c) Duration adequate	Yes
(d) Required profile enveloped adequately	Yes
(e) Steam exposure adequate	Yes
(9) Criteria regarding test sequence satisfied?	Yes
(10) Criteria regarding spray satisfied?	Yes
(a) Was the spray testing done while under the extremes of pressure and temperature?	Yes
(b) Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant?	No; Refer to TAB C, Sect 5 for Acceptability
(11) Criteria regarding submergence satisfied?	Yes
(12) Criteria regarding radiation satisfied?	Yes
(a) Was dose rate considered?	Yes
(b) Was beta radiation considered?	Yes
(13) Criteria regarding operability status/mode satisfied?	Yes
(14) Criteria regarding test failures or anomalies satisfied?	Yes

EQP127.23

TVA 19537 (OE-3-86)

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				R	R		
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O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(15) Criteria regarding functional testing satisfied?	Yes
(a) Does the test plan/report specify an acceptance criteria for equipment performed?	Yes
(b) Was an initial base line test done to establish required performance characteristics?	Yes
(c) Has the test/analysis demonstrated that performance performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	Yes
(16) Criteria regarding instrument accuracy satisfied?	No pending resolution of open item
(17) Test duration margin (1 hour + function time) satisfied?	Yes
(a) Is the minimum specified operating time at least 1 hour?	Yes
(b) If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	NA
(18) Criteria regarding synergistic effects satisfied?	Yes
(19) Criteria regarding margins satisfied?	Yes
(20) Maintenance and surveillance requirements adequately identified?	Yes

P. DISCUSSION

PRINT DATE: 06/28/90

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO.	MODEL NUMBER	AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-TE -068-0319 -F RCS PRZR LIQUID TEMP	1-TE -068-0319 -F	21232-2	109	734' 9" 71C62-54114-1	LC	A A A A A	100D 100D 100D 1MO 1MO	L MS FW RH/C CV/C	MONITORS RCS PRZR LIQUID TEMP PAM
WBN-1-TE -068-0324 -G RCS PRZR VAPOR TEMP	1-TE -068-0324 -G	21232-2	113	777' 6" 71C62-54114-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS FW RH/C CV/C	MONITORS RCS PRZR VAPOR TEMP - PAM
WBN-1-TE -074-0014 -G RHR PUMP A-A DISCH PUMP	1-TE -074-0014 -G	21232-3		713' 71C62-54114-1	A12	A C C C C	100D N/A N/A N/A N/A	L AF AB RH/A CV/A	REQUIRED FOR POST ACCIDENT MONITORING OF CONTAINMENT SUMP TEMPERATURE -PAM |R2
WBN-1-TE -074-0025 -F RHR PUMP B-B OUTLET TEMP	1-TE -074-0025 -F	21232-3		713' 71C62-54114-1	A11	A C C C C	100D N/A N/A N/A N/A	L AF AB RH/A CV/A	REQUIRED FOR POST ACCIDENT MONITORING OF CONTAINMENT SUMP TEMPERATURE -PAM

		R 1	R 2	R
PREPARER/DATE	HWL 9/11/86	WCG 1/13/89	CXW 7/12/90	
CHECKED/DATE	WCG 9/18/86	HDR 1/13/89	AJM 7/16/90	

220-21I

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		R	R
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TAB A

NOTES

1. Elevations shown are Actual elevations for equipment located in the Reactor Building and Floor elevations for equipment located outside the Reactor Building. Actual elevations for all equipment are documented in TAB F.

2. See Page B-1 for source of Category and Operating Time assignments.

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R 1 R 2

BINDER TITLE INSTRUMENT COMPUTED HWL DATE 9/11/86 WCG CAH 12/20/88 7/12/90

TEMPERATURE ELEMENT CHECKED WCG DATE 9/17/86 HDR AJM 1/4/89 7/16/90

A. DOCUMENTATION

Equipment Description: Resistance Temperature Detector (Fast Response Well Mounted)

Vendor/Manufacturer: RdF

Equipment Model No.(s): 21232-2 and 3

QUALIFICATION REPORTS

(1) Title/Number/Revision Equipment Qualification Test Report WCAP-8687, Supp. 2-E07A, Revision 3 RIMS B45 851203 357 DATE March, 1983

OTHER (ANALYSIS, VENDOR DATA, ETC.) (1) The following documentation is required to support qualification:

a) OE Calculation WBNOSG4-017 R11, Reactor Coolant System (68) NUREG 0588 Category and Operating Times (B18 900612 252). R2

b) OE Calculation WBNOSG4-020 R8, Residual Heat Removal System (74) NUREG 0588 Category and Operating Times (~~B18~~ B26 900309 232). CAH 7/12/90

c) Environmental Drawing 47E235-50 R1

d) Environmental Drawing 47E235-42 R2

e) Environmental Drawing 47E235-41 R1

f) WBN Normal and Accident Process Temperatures for the RHR Pump Discharge (TAB C, Page C-22). R2

g) Justification for HELB/LOCA Chemical Spray Qualification Deficiency (TAB C, Page C-24). R2

OTHER (ANALYSIS, VENDOR DATA, ETC) (Continued)

h) Material Aging Calculation Reports WAC-103 Dtd 5-20-86, WAC-191 Dtd 9-3-86 (Both Applicable to 1-TE-68-319, -324) and WAC-58 Dtd 4-8-86 (Applicable to 1-TE-74-14, -25). Calculations determine qualified lifetimes and post-DBE qualified lifetimes.

i) OE Calculation WBNOSG4-075, NUREG-0588 Loop Accuracy for TE-68-319 and TE-68-324. (B45 860812 219)

j) DNE Calculation WBPEVAR9004014, Required/Demonstrated Accuracy Calculation for Reg. Guide 1.97 Cat. 2 Loops with Transmitter and/or Sensor in a Harsh Environment (B26 900609 400) (TE-74-14 and -25). R2

2. In addition to qualification reports listed on Sheet 1, this section, the following documentation required to support qualification is included in TAB D - Qualification Documents.

a) Equipment Qualification Data Package WCAP-8587, EQDP-ESE-7, Rev. 5, Dtd 3/83 (B45 851203 356).

3. The following documentation required to support qualification is included in TAB E - Miscellaneous Documents and Correspondence.

a) Equipment Specification 953297 Rev. 1 Dtd 3-11-83 (NEB 830629 354).

b) Specifications for Resistance Temperature Detectors with Wells, Spec Sheet No. 4.39 (Applicable to 1-TE-68-319, -324).

c) Specifications for Resistance Temperature Detectors with Wells, Spec Sheet No. 6.39 (Applicable to 1-TE-74-14, -25).

OTHER (ANALYSIS, VENDOR DATA, ETC) (Continued)

3. d) Traceability of Installed RTD to it's Qualification Documentation (Section includes Auditable Link Document EQAL-WAT, Rev. 3, Dtd March 1986, RIMS Accesssion No. B45 860521 351, Quality Releases N-58820 Rev. 0, and Applicable Certificate of Compliances).

e) Letter from Westinghouse to D. W. Wilson Dtd 3.-20-86 (B71 860403 004) states Qualified Radiation Exposure limits of 1.22×10^8 rads (on cable), applicable to Model 21205 RTD, are acceptable limits for use on Model 21232 RTD's.

f) Letter from J. A. Raulston to Westinghouse Dtd 1-13-86 (B45 860113 103) acknowledging receipt of Data Package WCAP-8587, EQDP-ESE-7, Rev 5 and Qualification Report WCAP-8687, Supp. 2-E07A, Rev. 3.

g) Letter from Westinghouse to D. Wilson Dtd 3-27-86 (B71 860404 002) states type, manufacture and activation energy of the epoxy used in RTD assembly. Also, states epoxy location in RTD assembly.

h) Letter from Westinghouse to D. L. Kitchel Dtd 5-15-86 (B71 860516 004) states Cal-Note SEC-OSA-1242-CO, on file at Westhouse, may be used for pressurizer RTDs 1-TE-68-319, -324 when calculating qualified life.

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OTHER (ANALYSIS, VENDOR DATA, ETC) (Continued)

3. i) Conduit and Grounding Penetration Sealing and Fire Stop Details, TVA Drawing 45W883-3 R15.

Conduit and Grounding Floor EL 716.0. Details Sheet 9, TVA Drawing 45N862-11 R32. Conduit and Grounding EL 713.0, Col A5-A11, U-W Floor Plan, TVA Drawing 45N824-4 R26.

j) Traceability of installed thermowells.

4. Westinghouse Drawings 2657C49 R3 and 21232 R5; Rdf Drawings 52475 and 52476; all incorporated in TAB I.

NOTE: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. This listing includes only those documents which are essential to qualification and accordingly should not be considered a complete listing of binder references. R1

R 2 R

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B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified (Pending Resolution of Open Items)

____ Equipment Satisfied All Requirements Except Qualified Life or Justification of Replacement Schedule

____ Equipment Qualification Not Established by Documentation

____ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES

1. Instrument Accuracy Calculations are required for System 68 RTDs. R2

COMMENT/RECOMMENDATIONS

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Page B-6 was deleted per revision 2.

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R ___ R ___

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C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate All Documents Which are Applicable):

X Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE323-1974)

___ Components are Qualified to the Criteria of NUREG-058 Category II or the DOR Guidelines of IE Bulletin No. 79-01B (IEEE323-1971) (DOR Guidelines Applicable to only BFN)

JUSTIFICATION/COMMENTS

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

IEEE 344-1975

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D. QUALIFICATION METHODOLOGY (Check only one block)

X Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

____ Test of Similar Items with Supporting Analysis

____ in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

____ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS The RTDs tested were RdF Models 21232-1 and 21232-3. The Model 21232-2 was not tested. It differs from those tested only in length. The test units were selected because their longer length better represented the design in vibration and seismic tests. All three models are otherwise of identical design. Refer to Qualification Report WCAP-8687, Suppl 2-E07A, page 2, |R1 paragraph 2.1, and to TAB E, Section 4 for Traceability of RTDs to their Qualification Documentation. During HELB simulation tests, the RTD/Cable Assemblies were subjected to chemical spray from start of test to 24 hours (Refer to Qualification Report WCAP-8687, Supp. 2-E07A, paragraph 3.1.7, page 5). Flow rate was not denoted. |R1 RTDs 1-TE-68-319 and -324 are required to operate for 100 days following a LOCA. Refer to TAB C, Section 3 for acceptability. |R1

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E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification documentation identical to the plant equipment which requires qualification (Yes/No/NA)? Yes

	Plant Device	Qualification Document	Reference
(1) Equipment Type	Resistance Temperature Detector	Same	(1)
(2) Manufacturer	RdF	Same	(1)
(3) Model Number(s)	(2)	21232-1	Table 1 page 19 (1)
		21232-3	
(4) Serial Number(s)	(2)	100, 101,	Table 1 page 19 (1)
		102, 103	

(5) Identify Component-Unique checksheet attached: NA

JUSTIFICATION/COMMENTS (1) Qualification Report WCAP-8687, Supp. 2-E07A R1

(2)

Component	Model No.	Serial No.
1-TE-68-319	21232-2	109
1-TE-68-324	21232-2	108
1-TE-74-14	21232-3	164
1-TE-74-25	21232-3	163

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F. INSTALLATION INTERFACES

List all interfaces pertinent to EQ identified in the qualification documentation and/or evaluation and reference the source. Is the interface a requirement for our application (Yes/No)? (Note below.) If yes, enter requirement in QMDS, if no, provide justification.

Interface	Identify Interface	Plant Requirement? (Yes/No)	Reference Test Report	
Mounting Bolts	NA			
External Process Connections	NA			
Electrical Connections	Nuclear qualified splice and (1)	Yes	G-38	R1
Conduit Seals	(1)	Yes	(2)	
Connector Seals	NA			
Orientation	NA			
Physical Configuration	NA			
Other	(3) (4)			

JUSTIFICATION/COMMENTS (1) RTD Cable Assembly interfaces with a Conax seal and electrical connections are made within the Conax Seal (Refer to TAB E Section 9 TVA Drawing 45W883-3, Detail F3). Environmental qualification of Conax seal is documented in EQ Binder WBNEQ-CSC-001. R1

(2) Qualification Report WCAP-8687, Supp. 2-E07A, para. 7.1, pages 16 and 17. R1

JUSTIFICATIONS/COMMENTS continued on Sheet 9A.

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(3) The RTD cable must be seismically supported to maintain seismic qualification. For seismic installation requirements, refer to TAB I, Drawing 2657C49, Note 1. R1

(4) Installation Requirements are per Westinghouse drawing RCS Fast Response RTD Installation Details Drawing No. 2657C49 (refer to TAB I, Section 1). R1 RTD to be used with thermowell as specified on Westinghouse drawing Reactor Coolant Fast Response RTD Drawing No. 21232 (refer to TAB I, Section 2). R1

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G. TEST SEQUENCE

(1) Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE-323 (74), paragraph 6.3.2 (Yes/No/NA)? (Note below.)

	Yes/No/NA	Reference
(a) Equipment inspected for damage	Yes	para. 2.9, pg 9 (1)
(b) Baseline performance measurements taken	Yes	para. 2.9, pg 9, (1) App C. pg 56 (2)
(c) Equipment aged: (4)		
Thermal	Yes	para. 5.1, pg 10 (2)
Radiation	Yes	para. 5.3, pg 10 (2)
Wear	Yes	para . 3.2, pg 5 (2)
(d) Vibration/seismic testing conducted	Yes	para. 5.4, pg 11 (2) para. 5.5, pg 12 (2)
(e) Design basis event (DBE) exposure	Yes	para. 5.6, pg 13 (2)
(f) Post-DBE exposure	Yes	para. 5.6, pg 13 (2)
(g) Final inspection and disassembly	(3)	(3)

(2) Was the same piece of equipment used throughout the test sequence described in item (1) above (Yes/No/NA)? Yes

(3) Have the test equipment, test equipment accuracies and calibration data been appropriately document (Yes/No/NA)? Yes

(Reference: Table 2, pp 20-23 (2)).

JUSTIFICATION/COMMENTS (1) Equipment Qualification Data Package EQDP-ESE-7 (2) Qualification Report WCAP-8687, Supp. 2-E07A |R1

(3) RTDs were subjected to final inspection (refer to Equipment Qualification Data Package EQDP-ESE-7 page 10 paragraph 2.9) |R1

PAGE B-12 R1

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JUSTIFICATION/COMMENTS (Continued)....

and were subjected to post Qualification Performance Tests (Refer to Qualification Report WCAP-8687, Supp. 2-E07A Appx C). |R1

(4) RTDs were subjected to thermal cycling (Refer to Qualification Report WCAP-8687 Supp. 2-E07A page 10 paragraph 5.2). |R1

H. AGING

(1) Was aging considered in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687 Supp. 2-E07A, paragraph 3.1, page 3). |R1

JUSTIFICATION/COMMENTS

(2) Were the following effects considered in the aging program:

Aging Effect	Yes/No/NA	Reference
Thermal aging	Yes	para, 3.1.1, pg 3 (1)
Radiation exposure	Yes	para. 3.1.3, 3.1.4, pg 4 (1)
Vibration (non-seismic) aging	Yes	para. 3.1.5, pg 4 (1)
Operational (electrical/mechanical/ process) stress aging	Yes	para. 3.1.2, pg 3 (1) Para 3.1.5, pg 4 (1)

JUSTIFICATION/COMMENTS (1) Qualification Report WCAP-8687, Supp. 2-E07A

(3) Were all known synergistic effects which are believed to have a significant effect on equipment performance considered in the aging program (Yes/No/NA)? NA (Reference:).

JUSTIFICATION/COMMENTS Based upon review of materials of construction, no known synergistic effects apply to this equipment.

(4) Thermal Aging:

(a) Was thermal aging considered in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687 Supp. 2-E07A paragraph 3.1.1., page 3 and paragraph 5.1, page 10). |R1

JUSTIFICATION/COMMENTS

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H. AGING (Continued)

(b) Were the materials susceptible to thermal aging degradation identified in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687 Supp. 2-E07A, paragraph 3.1.1, page 3). |R1

JUSTIFICATION/COMMENTS

(c) Was the basis for thermal aging identified in the qualification program (Yes/No/NA)? Yes (Reference: Equipment Qualification Data Package EQDP-ESE-7, paragraph 1.9, page 4; Qualification Report WCAP-8687 Supp. 2-E07A, paragraph 5.1, page 10). |R1

JUSTIFICATION/COMMENTS

(d) Was the aging acceleration rate justified and the parameters of time and temperature identified in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687 Supp. 2-E07A, paragraph 5.1, page 10). |R1

Parameter	Plant Maximum Normal	Test		Equivalent
Temperature	200°F (1) 104°F (2)	400°F (3)		200°F 104°F (4)
Time	40 Years	11 days	>	40 Years

JUSTIFICATION/COMMENTS (1) (2) (3) (4) Refer to Sheet 14, this TAB.

(e) Was the Arrhenius methodology used for accelerated aging (Yes/No/NA)? Yes (Reference: Equipment Qualification Data Package EQDP-ESE-7, paragraph 1.9, page 4). |R1

JUSTIFICATION/COMMENTS

(f) If activation energies were used for determining accelerated aging parameters, are they properly referenced to the source of the technical data (Yes/No/NA)? No (Reference: (5) Refer to Sheet 14, this TAB).

JUSTIFICATION/COMMENTS

H(4)Aging (Continued)

(1) The plant maximum normal temperature for RTDs 1-TE-68-319, -324 is 200°F. Qualification Report WCAP-8687, Supp 2-E07A, page 10, paragraph 5.1 denotes a 50° temperature rise due to the effects of the Reactor Coolant System temperature, was used in determining Qualified Life. Westinghouse has performed an analysis (Cal-note SEC-OSA-1242-CO- on file at Westinghouse) that demonstrates that the air velocity and the ambient temperature of the area are sufficient to limit the temperature of the RTD's head to 200°F. |R2

(2) Temperature rise due to process temperatures for RTDs 1-TE-74-14, -25 is considered negligible. The normal process temperature is 137°F (Refer to TAB C, Sect 1) and the air velocity and ambient temperature are considered sufficient to limit the temperature of the RTDs head to the plant's maximum normal of 104°F.

(3) Qualification Report WCAP-8687, Supp. 2-E07A, paragraph 5.1, page 10.

(4) Refer to TAB C, Sect, 3-Calculations WAC-103 and WAC-58 for plant specific Qualified Life.

(5) The activation energy used is denoted in paragraph 3.1.1, page 3 of Qualification Report WCAP-8687, Supp. E07A. Also, Refer to TAB E, Sect 7 - Letter from Westinghouse to D. Wilson Dtd March 27, 1986 (B71 860404 002).

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H. AGING (Continued)

(g) If a regression line was used for determining accelerated aging parameters, are test points or failure modes identified on the line (Yes/No/NA)? NA
(Reference: ______).

JUSTIFICATION/COMMENTS ______

(h) Was the equipment operated during the thermal aging (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687 Supp. 2-E07A, paragraph 3.2, page 5). |R1

JUSTIFICATION/COMMENTS ______

(5) Radiation Aging Exposure:

(a) Was radiation aging exposure considered in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687 Supp. 2-E07A, paragraph 3.1.3, 3.1.4, page 4 and paragraph 5.3, page 10). |R1

JUSTIFICATION/COMMENTS ______

(b) Were the materials susceptible to radiation degradation identified in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687, Supp. 2-E07A, para. 3.1.1, p 3). |R1

JUSTIFICATION/COMMENTS ______

(c) Was the basis for radiation aging exposure identified in the qualification program (Yes/No/NA)? Yes
(Reference: See Comments).

JUSTIFICATION/COMMENTS Design Specification 9532978 Rev 1, paragraph 12.3.2, page 17, Refer to TAB E, Sect. 1; Qualification Report WCAP-8687, Supp. 2-E07A, paragraph 3.1.3, 3.1.4, page 4). |R1

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H. AGING (Continued)

(d) Is the radiation test exposure dose and dose rate acceptable (Yes/No/NA)? Yes (Reference: See Comments).

Plant normal ambient radiation dose (rd)	$2x10^7$ (1) $4.3x10^5$ (2) $1x10^6$ (2A) Tip of RTD $1.56x10^8$ (3) |R1
Test exposure dose (rd)	Cable $1.22x10^8$ (4)
Test exposure dose rate (rd/hr)	Between $2x10^6$ and $2.5x10^6$ (5)
Test exposure source type (e.g., Co-60 gamma)	CO-60 gamma (6)

JUSTIFICATION/COMMENTS (1) (2) (3) (4) (5) (6) Refer to Sheet 17 this TAB.

(6) Vibration (non-seismic) Aging:

(a) Were the effects of non-seismic vibration induced during normal and abnormal operation addressed in the qualification program* (yes/no/NA)?
(Reference: Qualification Report WCAP-8687 Supp. 2-E07A para. 3.1.5, pg. 4 & para. 5.4, pg 11). |R1

JUSTIFICATION/COMMENTS

(b) Was the basis for vibration aging identified and justified in the qualification program (Yes/No/NA)? Yes
(Reference: Qualification Report WCAP-8687 Supp. 2-E07A para. 3.1.5 pg. 4 and para. 5.4 pg. 11). |R1

JUSTIFICATION/COMMENTS

* Qualification program refers to the test report and any supplemental documentation including TVA analyses in TAB C of the binder. |R1

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H(5)(d) Aging - Justification/Comments

(1) Applies to 1-TE-68-319. R1

(2) Applies to 1-TE-74-14, -25. (2A) Applies to 1-TE-68-324.

(3) Qualification Report WCAP-8687, Supp. 2-E07A paragraph 5.3 page 10 and 11.

(4) Refer to TAB E, Sect. 5, letter from Westinghouse to D. W. Wilson Dtd. 3-20-86 (B71 860403 004) - states qualified radiation exposure limits of 1.22×10^8 rads (on cable) applicable to Model 21205 RTDs, are acceptable limits for use on Model 21232 RTDs (Qualification of Model 21205 RTDs is documented in EQ Binder WBNEQ-ITE-004).

(5) Per telecon between J. Capone of Westinghouse and H. Luton of TVA on 6-2-86.

(6) Qualification Report WCAP-8687, Supp. 2-E07A, para. 4.2.3, page 8. R1

H. AGING (Continued)

(7) Operational Stress Aging:

(a) Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation adressed in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687 Supp. 2-E07A, para. 3.1.2, page 3, para. 3.1.5, page 4, para. 5.2, page 10, and para. 5.4, page 11). |R1

JUSTIFICATION/COMMENTS

(b) Was the basis for stresses induced during operational aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687 Supp. 2-E07A, para. 3.1.2, page 3, and para. 3.1.5, page 4). |R1

JUSTIFICATION/COMMENTS

(8) Was the qualified life of the equipment and its basis defined in the qualification program (Yes/No/NA)? Yes (Reference: Qualification Report WCAP-8687 Supp. 2-E07A, para. 3.1.1, pg. 3 & para. 5.1, pg. 10; Equipment Qualification Data Package EQDP-ESE-7, para. 1.9, pg. 4). |R1

Qualified life (Document in QMDS) > 40 YRS

JUSTIFICATION/COMMENTS

H. AGING (Continued)

(9) Were replacement intervals for the equipment or its components defined in the qualification program (Yes/No/NA)? Yes
(Reference: See comments).

JUSTIFICATION/COMMENTS Qualified life of test specimen was 20 years @ normal ambient temperature of 50°C (Refer to Equipment Qualification Data Package EQDP-ESE-7, page 17, Table 1). R1

I. MATERIALS ANALYSIS

Identification of Materials Susceptible to Significant Thermal and/or Radiation Degradation and Aging (Use Section C of Binder for Detailed Materials Analysis).

	Material/Property/Function	Radiation Threshold	Reference	Activation Energy	Reference
(a)	Silicon Varnish (Cable Coating)	(1) NA	(1)	Not Specified (2)	para.3.1.1 pg. 3 (3)
(b)	Epoxy (Potting Matl)	(4) NA	(1)	.93eV	para.3.1.1 pg. 3 (3)
(c)					
(d)					
(e)					

JUSTIFICATION/COMMENTS (1) Cable assembly is qualified to 1.22×10^{8} rads. Refer to Sheet 17, Comment (4), this TAB for Justification.

(2) The silicon varnish is only used as a manufacturing process to prevent the fiber glass insulation of the cable from frying during manufacturing and is not required for operation of RTD.

(3) Qualification Report WCAP-8687, Supp. 2-E07A, para. 3.1.1., pg. 3.

(4) Epoxy as part of RTD assembly is qualified to 1.56×10^{8} rads. R2
Refer to Qualification Report WCAP-8687, Supp. 2-E07A, para. 5.3, page 11. Also refer to TAB E, sect. 7, for epoxy location.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(1) Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics which would constitute failure if not met (Yes/No/NA)? Yes
(Reference: Equipment Qualification Data Package EQDP-ESE-7, Sect. 1.7, pg. 3; Qualification Report WCAP-8687 Supp. 2-E07A, para. 3.2, pg. 5). R1

Identify Acceptance Criteria: ± 0.2°F Repeatability, ± 1.0°F drift allowance; insulation resistance > 1 megohn.

(2) Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment which should be verified before, after, and periodically during the test to judge equipment performance (Yes/No/NA)? Yes
(Reference: Qualification Report WCAP-8687, Supp. 2-E07A, para. 3.2, page 5). R1

Identify baseline and functional testing: Refer to Sheet 22 this TAB.

JUSTIFICATION/COMMENTS

(3) Does the qualification report/analysis describe loads (or load combinations) applied during DBE test (Yes/No/NA)? NA
(Reference: Equipment Qualification Data Package EQDP-ESE-7, para. 1.1, pg. 2). R1

JUSTIFICATION/COMMENTS For electrical connections, refer to Sheet 22 this TAB.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (CONTINUED)

J.(2) Baseline Functional Tests (Operation - Normal Condition) are described in the Equipment Qualification Data Package EQDP-ESE-7, page 9, para. 2.9. For Baseline Functional Tests results and for Functional Tests (Static Calibration) results performed after each of the test phases refer to Qualification Report WCAP-8687 Supp. 2-E07A, Appx. C, pp. 57 through 60. |R1

J.(3) During static calibration checks, the RTD(s) were excited by a constant current (approx. 1 mA, refer to Equipment Qualification Data Package EQDP-ESE-7, page 2, para. 1.1) applied to two leads while the voltage drop was measured across the other two leads. A digital voltmeter was used to measure resistance. Refer to Qualification Report WCAP-8687 Supp. 2-E07A, page 6, para. 4.2.1 and page 31, Figure 4. During each of test phases, the RTD outputs were monitored via Westinghouse 7300 Series amplifiers. The 0-10 volt analog outputs of the amplifiers were monitored and recorded on a digital data logger. Refer to Qualification Report WCAP-8687 Supp. 2-E07A, page 5, para. 3.2 and pages 7 through 9, para(s). 4.2.2, 4.2.3, 4.2.4, and 4.2.5. |R1

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(4) Do the applied loads during baseline testing reflect normal operating conditions (Yes/No/NA)? NA (Reference: Refer to J.(3) Sheet this TAB.).

JUSTIFICATION/COMMENTS

(5) Identify electrical characteristics necessary to ensure the equipment performance specifications can be satisfied.

(a)

Parameter	Plant Normal Conditions	Reference
Voltage	R/I Converter with 1 milliamp current	(1)
Load	NA	(1)
Frequence	NA	(1)
Accuracy	(2)	(2)
Other(s)		

JUSTIFICATION/COMMENTS (1) Equipment Qualification Data Package EQDP-ESE-7, para. 1.1, page 2. (2) Refer to Sheet 25, this TAB.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(b)

Parameter	Specific Accident Conditions	Reference
Voltage	R/I Converter with 1 milliamp current	(1)(2)
Load	NA	(1)
Frequency	NA	(1)
Accuracy	(3)	(3)
Other(s)		

JUSTIFICATION/COMMENTS (1) Equipment Qualification Data Package EQDP-ESE-7, para 1.1, p. 2. (2) Electrical Control Diagram Dwg. 47W6, 10-68-5, -74, -1. (3) The demonstrated LOOP accuracy of ±24.2°F for RTDs 1-TE-68-319, -324 and ±10.85°F for RTDs 1-TE-74-14, -25 is acceptable for the required accuracy (refer to TAB C, Page C-47). (SEE OPEN ITEM No. 1 FOR RTDs 1-TE-68-319, -324). R2 R2

(c)

Parameter	Demonstrated Conditions	Reference
Voltage	R/I Converter with 1 milliamp current	(1)
Load	NA	(1)
Frequency	NA	(1)
Accuracy	(2)	(1)
Other(s)		

JUSTIFICATION/COMMENTS (1) Equipment Qualification Data Package EQDP-ESE-7, para. 1.1, page 2. (2) Refer to Sheet 25, this TAB.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(c) Accuracy - There are no changes in the RTD due to severe environments. The calibration accuracy is ± 0.2°F and the drift allowance is ± 1.0°F (Refer to Equipment Qualification Data Package EQDP-ESE-7, Table 1, page 17). Additional allowances of ± 2.0°F for environmental effects and ± 0.2°F for sensor drift to be included in Westinghouse's Safety Analyses (Refer to Qualification Report WCAP-8687 Supp. 2-E07A, page 18). For demonstrated loop accuracy refer to Instrument Accuracy Calculations Summary TAB C, Page C-47. R2

BINDER NO. WBNEQ-ITE-004 PLANT WBN UNIT(S) 1 SHEET 26 OF 43

R 1 R

BINDER TITLE INSTRUMENT COMPUTED HWL DATE 9/11/86 [illegible] [illegible]

TEMPERATURE ELEMENT CHECKED WCG DATE 9/17/86 [illegible] 1-4-89

K. 1 REQUIRED OPERATING ENVIRONMENT 1-TE-68-319 R1

Reference Environmental Drawing No. 47E235-42

(1) Normal Max		(2) Abnormal Max	
(a) Temperature (°F)	120 (1)	(a) Temperature (°F)	130 (1)
(b) Pressure (psig)	.3	(b) Pressure (psig)	.3
(c) Humidity (%)	80	(c) Humidity (%)	100
(d) Radiation (rd)	$2x10^7$	(d) Radiation (rd)	NA

(3) Process Interfaces: NA. RTDs are installed in thermowells. For effects of process temperatures, refer to Sheet 27, comment 1, this tab.

(4) State anticipated occurrence frequency and duration of abnormal conditions: Maximum abnormal temperature, pressure and humidity could exist for up to eight hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	327 (1)	Accident type	HELB
(b) Pressure (psig)	11.2	Accident type	LOCA
(c) Humidity (%)	100	Accident type	LOCA/HELB
(d) Radiation (rd)	$4.7x10^8$ beta $4x10^7$ gamma	Accident type	LOCA
(e) Spray Type	Boron (2)	Accident type	LOCA

(1)(2) Refer to Sheet 27, this TAB.

BINDER NO. WBNEQ-ITE-004	PLANT WBN	UNIT(S) 1	SHEET 26A OF 43
BINDER TITLE INSTRUMENT	COMPUTED /R1 [illegible] DATE 1-12-89	R	R
TEMPERATURE ELEMENT	CHECKED /R1 [illegible] DATE 1-12-89		

K. 2 REQUIRED OPERATING ENVIRONMENT 1-TE-68-324

Reference Environmental Drawing No. 47E235-41

(1) Normal Max		(2) Abnormal Max	
(a) Temperature (°F)	110 (1)	(a) Temperature (°F)	120 (1)
(b) Pressure (psig)	0.3	(b) Pressure (psig)	0.3
(c) Humidity (%)	80	(c) Humidity (%)	90
(d) Radiation (rd)	$1x10^6$	(d) Radiation (rd)	NA

(3) Process Interfaces: NA. RTDs are installed in thermowells. For effects of process temperatures, refer to Sheet 27, comment 1, this TAB.

(4) State anticipated occurrence frequency and duration of abnormal conditions: Maximum abnormal temperature, pressure and humidity could exist for up to eight hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	161 (1)	Accident type	HELB
(b) Pressure (psig)	11.2	Accident type	LOCA
(c) Humidity (%)	100	Accident Type	LOCA/HELB
(d) Radiation (rd)	$4.7x10^8$ Beta $3.8x10^7$ Gamma	Accident type	LOCA
(e) Spray Type	Boron (2)	Accident type	LOCA

(1)(2) Refer to Sheet 27, this TAB.

BINDER NO. WBNEQ-ITE-004	PLANT WBN	UNIT(S) 1	SHEET 27 OF 43 R 1 R
BINDER TITLE INSTRUMENT	COMPUTED HWL	DATE 9/11/86 WCG 12-28-88	
TEMPERATURE ELEMENT	CHECKED WCG	DATE 9/17/86 JWR 1-4-89	

K. REQUIRED OPERATING ENVIRONMENT (Continued)

(1) Qualification Report WCAP-8687 Supp 2-E07A, para. 5.1, p. 10 denotes a 50°C temperature rise, due to the effects of the Reactor Coolant System temperature, was used in determining qualified life. Westinghouse has performed an analysis (Cal-note SEC-OSA-1242-CO- on file at Westinghouse) that demonstrates that the air velocity and the ambient temperature of the area are sufficient to limit the temperature of the RTD's head to 200°F. R1

(2) Refer to Sheet 33, this TAB, for Composition.

BINDER NO. WBNEQ-ITE-004	PLANT WBN	UNIT(S) 1	SHEET 28 OF 43
			R 1 R
BINDER TITLE INSTRUMENT	COMPUTED HWL	DATE 9/11/86	
TEMPERATURE ELEMENT	CHECKED WCG	DATE 9/17/86 1-4-89	

K. 3 REQUIRED OPERATING ENVIRONMENT 1-TE-74-14, -25

Reference Environmental Drawing No. 47E235-50 |R1

(1) Normal Max		(2) Abnormal Max	
(a) Temperature (°F)	104 [(1)]	(a) Temperature (°F)	110 [(1)]
(b) Pressure (psig)	ATM(-)	(b) Pressure (psig)	ATM(-)
(c) Humidity (%)	80	(c) Humidity (%)	90
(d) Radiation (rd)	4.3×10^5	(d) Radiation (rd)	NA

(3) Process Interfaces: NA. RTDs are installed in thermowells. For effects of process temperatures, refer to Sheet 14, comment 2, this TAB.

(4) State anticipated occurrence frequency and duration of abnormal conditions: Maximum abnormal temperature and humidity could exist for up to eight hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	NA	Accident type	LOCA
(b) Pressure (psig)	NA	Accident type	LOCA
(c) Humidity (%)	NA	Accident Type	LOCA
(d) Radiation (rd)	1×10^7	Accident type	LOCA
(e) Spray Type	NA	Accident type	NA

(1) Refer to Sheet 17, Comment 2, this TAB.

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Refer to Sheet 33 this TAB for spray composition and pH.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: Refer to ~~S~~h Sheet 30 this TAB.). HOR/ RHM 3-17-89 WGM 3-17-89

(7) Subject to submergence (Yes/No/NA)? Yes (Reference: Refer to Sheet 30 this TAB.). R1

Identify initiation time and duration of submergence: ______

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? Yes (Reference: Environmental data drawing 47E235-50). R1

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: NA - Refer to Sheet 30 this TAB.

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.

R1

K. REQUIRED OPERATING ENVIRONMENT (Continued)

K. (6) Reference - Environmental Data Drawings 47E235-42 (Note 46) and -50 (Note 48). R1

K. (7) Reference - RTDs 1-TE-68-319, -324 are located above surge flood level of 722'. RTDs 1-TE-74-14, -25 are located 1'1" below the RHR HELB flood level (the only event causing flooding on elevation 713, room A12 per environmental drawing 47E235-50). The RTD's are not required to function for this event per OE calcualtion WBNOSG4-020 - Category and Operating Times (see Section A, this TAB). R1

BINDER NO. WBNEQ-ITE-004	PLANT WBN	UNIT(S) 1	SHEET 31 OF 43 R 1 R
BINDER TITLE INSTRUMENT	COMPUTED HWL	DATE 9/11/86	HWL 12-28-88
TEMPERATURE ELEMENT	CHECKED WCG	DATE 9/17/86	HOR 1-4-89

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS
1-TE-68-319, 324

(1) Comparison of worst-case maximum parameters:

Parameter	Specified	Demonstrated	Reference
Operating Time	100 days	15 days	Tab C, Sect. 3 (1) Fig. 7, pg. 34 R1
Temperature (°F)	327	420	Fig. 7, pg. 34 (1) Table 1, pg. 17
Pressure (psig)	11.2	75	Fig 9, pg. 36 (1) Table 1, pg. 17 (2)
Relative Humidity (%)	100	100	Table 1, pg. 17 (2)
Chemical Spray*	Sheet 33 this TAB	Sheet 33 this TAB	Para. 3.1.7, pg. 5 (1) Table 1, pg. 17 (2)
	$6x10^7$ gamma		Table 1, pg. 17 (2)
Radiation (rd)**	$4.7x10^8$ beta	(3)	Para. 5.3, pg. 11 (1)
Submergence	NA		

*Includes spray concentration, flowrate, density, duration, and pH.
**Enter 40-year integrated normal dose plus integrated accident dose and specify type.

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference
Temperature	Yes	Fig. 7, pg. 34 (1) Table 1, pg. 17 (2)
Pressure	Yes	Fig. 9, pg. 36 (1) Table 1, pg. 17 (2)
Relative Humidity	Yes	Table 1, pg. 17 (2)
Chemical Spray	No	Sheet 33 this TAB
Submergence	NA	

(1)(2)(3) Refer to Sheet 32, this TAB.

PAGE B 33 R1

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(1) Qualification Report WCAP-8687, Supp. 2-E07A.

(2) Equipment Qualification Data Package EQDP-ESE-7.

(3) a)RTD TIP - 1.56×10^8 rads gamma.

b)Cable - 8.64×10^6 rads gamma. However, the cable is identical in design and makeup to the RdF Model 21205 cable. Therefore, qualified radiation exposure limits of 1.22×10^8 rads gamma are acceptable limits (Refer to TAB E, Section 5, letter from Westinghouse to D. W. Wilson, Dtd. 3-20-86. RIMS No. B71 860403 004). Qualification of the Model 21205 RTD/Cable Assembly is documented in EQ Binder WBNEQ-ITE-003.

CAH 7/12/90

c)No actual Beta irradiation was performed. However, the cable is identical in design and makeup to the RdF Model 21205 RTD cable (Refer to TAB E, Sect. 5, letter to D. W. Wilson Dtd. 3-20-86, RIMS No. B71 860403 004). The RTD probe contains no aging sensitive materials (materials consist of stainless steel, platinum wire and magesium oxide). Therefore, the qualified radiation exposure limits of 9.13×10^8 rads beta for the RdF Model 21205 RTD/Cable Assembly as documented in EQ Binder WBNEQ-ITE-003, are acceptable limits for the RdF Model 21232 RTD/Cable Assembly. R2

BINDER NO. WBNEQ-ITE-004	PLANT WBN	UNIT(S) 1	SHEET 33 OF 43 R 1 R
BINDER TITLE INSTRUMENT	COMPUTED HWL	DATE 9/11/86 [illegible] 12-14-88	
TEMPERATURE ELEMENT	CHECKED WCG	DATE 9/17/86 [illegible] 1-4-89	

L.(1) SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS - COMPARISON OF WORST-CASE PROFILES AND MARGIN ASSESSMENT

Chemical Spray

Specified - The chemical spray composition is 0.19 molar H_3BO_3 (2000ppm Boron), 0.003 molar NaOH resulting in a pH of 8.3 at 25°C. The flow rate is equal to 0.92 gal/min per square foot of containment cross section. Refer to Environmental Data Drawings 47E235-41 and -42, Notes 5 and 22 (Both Drawings). R1

Demonstrated - The chemical spray composition consisted of 2750ppm Boron buffered with 0.9 percent dissolved NaOH to a pH of 10.7 at 25°C and was applied from the start of HELB simulation to 24 hours. The flow rate was not specified. Refer to TAB C, Section 2 for acceptability. R1

BINDER NO. WBNEQ-ITE-004	PLANT WBN	UNIT(S) 1	SHEET 34 OF 43 R___ R___
BINDER TITLE INSTRUMENT	COMPUTED HWL	DATE 9/11/86 [handwritten initials] 1-12-89	
TEMPERATURE ELEMENT	CHECKED WCG	DATE 9/17/86 [handwritten initials] 1-12-89	

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, Yes/No/NA).

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA
Temperature: +15 degrees F	>15°F	Yes
Pressure: +10% but no more than 10 psig	>10%	Yes
Radiation: +10% of accident dose	>10%	Yes
Time: +10% (or 1 hour + operating time per NUREG-0588)	No	(3)
Voltage: ±10% of rated value	NA	
Frequency: ±5% of rated value	NA	
Environmental Transient: the initial transient and the peak temperature applied twice	Yes (1)	Yes
Vibration: +10% added to acceleration	(2)	Yes

JUSTIFICATION/COMMENTS (1) Qualification Report WCAP-8687, Supp. 2-E07A, Figure 7, page 34. (2) Equipment Qualification Data Package EQDP-ESE-7, paragraph 2.10.3.3, page 11. (3) Refer to TAB C, Section 3 Material Aging Calculation Report WAC-191 for plant specific applied margin. R1

BINDER NO. WBNEQ-ITE-004	PLANT WBN	UNIT(S) 1	SHEET 35 OF 43 R 1 R
BINDER TITLE INSTRUMENT	COMPUTED HWL	DATE 6/10/86 [illegible] 1-4-89	
TEMPERATURE ELEMENT	CHECKED WBK	DATE 6/11/86 [illegible] 1-4-89	

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS
1-TE-74-14, -25

(1) Comparison of worst-case maximum parameters:

Parameter	Specified	Demonstrated	Reference
Operating Time	100 days	15 days	Tab C, Sect. 3 Fig. 7, pg. 34 (1) | R1
Temperature (°F)	110	420	Fig. 7, pg. 34 (1) Table 1, pg. 17
Pressure (psig)	0	75	Fig 9, pg. 36 (1) Table 1, pg. 17 (2)
Relative Humidity (%)	90	100	Table 1, pg. 17 (2)
Chemical Spray*	NA		Para. 5.3, pg. 11 (2) Table 1, pg. 17 (2)
Radiation (rd)**	1.043×10^7 gamma	(3)	Para. 5.3, pg. 11 (1) Table 1, pg. 17 (2)
Submergence	NA		

*Includes spray concentration, flowrate, density, duration, and pH.
**Enter 40-year integrated normal dose plus integrated accident dose and specify type.

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference
Temperature	Yes	Fig. 7, pg. 34 (1) Table 1, pg. 17 (2)
Pressure	Yes	Fig. 9, pg. 36 (1) Table 1, pg. 17 (2)
Relative Humidity	Yes	Table 1, pg. 17 (2)
Chemical Spray	NA	
Submergence	NA	

(1)(2)(3) Refer to Sheet 36 this TAB.

BINDER NO. WBNEQ-ITE-004 PLANT WBN UNIT(S) 1 SHEET 36 OF 43
R 1 R

BINDER TITLE INSTRUMENT COMPUTED HWL DATE 6/10/86 WCT 1-4-89

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L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(1) Qualification Report WCAP-8687, Supp. 2-E07A. R1

(2) Equipment Qualification Data Package EQDP-ESE-7.

(3) a)RTD TIP - 1.56×10^8 rads gamma.

b)Cable - 8.64×10^6 rads gamma. However, the cable is identical in design and makeup to the RdF Model 21205 cable. Therefore, qualified radiation exposure limits of 1.22×10^8 rads gamma are acceptable limits (Refer to TAB E, Section 5, letter from Westinghouse to D. W. Wilson, Dtd. 3-20-86. RIMS No. B71 860403 004). Qualification of the Model 21205 RTD/Cable Assembly is documented in EQ Binder WBNEQ-ITE-003.

BINDER NO. WBNEQ-ITE-004 PLANT WBN	UNIT(S) 1	SHEET 37 OF 43	
		R /	R
BINDER TITLE INSTRUMENT	COMPUTED HWL	DATE 9/11/86 [initials] 12-7-88	
TEMPERATURE ELEMENT	CHECKED WCG	DATE 9/17/86 [initials] 1-4-89	

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, Yes/No/NA).

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA
Temperature: +15 degrees F	>15°F	Yes
Pressure: +10% but more than 10 psig	>10%	Yes
Radiation: +10% of accident dose	>10%	Yes
Time: +10% (or 1 hour + operating time per NUREG-0588)	No	(3)
Voltage: ±10% of rated value	NA	
Frequency: ±5% of rated value	NA	
Environmental Transient: the initial transient and the peak temperature applied twice	Yes (1)	Yes
Vibration: +10% added to acceleration	(2)	Yes

JUSTIFICATION/COMMENTS (1) Qualification Report WCAP-8687, Supp. 2-E07A, Figure 7, page 34. (2) Equipment Qualification Data Package EQDP-ESE-7, paragraph 2.10.3.3, page 11. (3) Refer to TAB C, Section 3 Material Aging Calculation Report WAC-191 for plant specific applied margin. R1

M. OPERABILITY TEST RESULTS

(1) Identify the safety function(s) of this equipment:
(Reference: Refer to TAB A).

JUSTIFICATION/COMMENTS

(2) Did the equipment perform its intended function during the simulated design basis accident exposure (Yes/No/NA)? Yes
(Reference: Qualification Report WCAP-8687 Supp. 2-E07A, para. 6.2, pg. 14, and para. 7.2, pp. 17, 18). |R1

JUSTIFICATION/COMMENTS

(3) Did the equipment perform its intended function during the simulated post-design basis accident exposure (Yes/No/NA)? Yes
(Reference: Qualification Report WCAP-8687, Supp. 2-E07A, para. 6.2, pg. 14, and para 7.2, pp. 17, 18). |R1

JUSTIFICATION/COMMENTS

(4) Did the test demonstrate the operability requirements for the required time interval for which the equipment is required to operate (Yes/No/NA)? Yes (Reference: Refer to TAB C, Section 3). |R1

JUSTIFICATION/COMMENTS

BINDER NO. WBNEQ-ITE-004 PLANT WBN UNIT(S) 1 SHEET 39 OF 43

R 1 R

BINDER TITLE INSTRUMENT COMPUTED HWL DATE 6/10/86 [illegible] [illegible]

TEMPERATURE ELEMENT CHECKED WBK DATE 6/11/86 [illegible] 1-4-89

M. OPERABILITY TEST RESULTS (Continued)

(5) Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved (Yes/No/NA)? NA
(Reference: ____).

JUSTIFICATION/COMMENTS No anomalies were noted in Qualification Report WCAP-8687 Supp. 2-E07A or Equipment Qualification Data Package EQDP-ESE-7. R1

BINDER NO. WBNEQ-ITE-004	PLANT WBN	UNIT(S) 1	SHEET 40 OF 43
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TEMPERATURE ELEMENT	CHECKED WHK	DATE 6-11-86	

N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (yes/no/NA)? Yes (Enter all requirements in Section G of the Binder - Qualification Maintenance Data Sheets).

JUSTIFICATION/COMMENTS

TVA 10293 (EN DES-2-86)

BINDER NO. WBNEQ-ITE-004 PLANT WBN UNIT(S) 1 SHEET 41 OF 43

R ____ R ____

BINDER TITLE INSTRUMENT COMPUTED Hwc DATE 6-10-86

TEMPERATURE ELEMENT CHECKED WBK DATE 6-11-86

O. SUMMARY OF REVIEW

	Yes/No/NA
(1) Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	Yes
(2) Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	NA
(3) Choice of qualification methodology adequately justified?	Yes
(4) If analysis was performed, complete the following:	
(a) Were equipment performance requirements identified?	NA
(b) Were specific features and failure modes and effects analyzed?	NA
(c) Were assumptions and mathematical models used together with appropriate justification for their use?	NA
(d) Were environmental parameters which affect equipment performance identified?	NA
(5) Adequate similarity between equipment and test specimen established?	Yes
(6) Aging degradation evaluated adequately?	Yes
(a) Mechanical and/or cycle aging addressed?	Yes
(b) Equipment aged to end of life condition prior to application of DBE conditions?	Yes
(c) Absence of preaging in test/analysis justified?	NA
(d) Materials susceptible to thermal/radiation aging identified?	Yes

O. SUMMARY OF REVIEW (Continued)

		Yes/No/NA
	(e) Normally operating state of device (e.g., normally energized) considered?	Yes
(7)	Qualified life or replacement schedule established?	Yes
(8)	Criteria regarding temperature pressure exposure satisfied?	Yes
	(a) Peak temperature adequate	Yes
	(b) Peak pressure adequate	Yes
	(c) Duration adequate	Yes
	(d) Required profile enveloped adequately	Yes
	(e) Steam exposure adequate	Yes
(9)	Crieria regarding test sequence satisfied?	Yes
(10)	Criteria reqarding spray satisfied?	Yes
	(a) Was the spray testing done while under the extremes of pressure and temperature?	Yes
	(b) Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant?	No-Refer to TAB C, Sect. 2, for acceptability R1
(11)	Criteria regarding submergence satisfied?	Yes
(12)	Criteria regarding radiation satisfied?	Yes
	(a) Was dose rate considered?	Yes
	(b) Was beta radiation considered?	Yes
(13)	Criteria regarding operability status/mode satisfied?	Yes
(14)	Criteria regarding test failures or anomalies satisfied?	Yes

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R ____ R ____

BINDER TITLE INSTRUMENT COMPUTED Kwl DATE 6-10-86

TEMPERATURE ELEMENT CHECKED WW DATE 6-11-86

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(15) Criteria regarding functional testing satisfied?	Yes
(a) Does the test plan/report specify an acceptance criteria for equipment performed?	Yes
(b) Was an initial base line test done to establish required performance characteristics?	Yes
(c) Has the test/analysis demonstrated that performance performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	Yes
(16) Criteria regarding instrument accuracy satisfied?	Yes
(17) Test duration margin (1 hour + function time) satisfied?	Yes
(a) Is the minimum specified operating time at least 1 hour?	Yes
(b) If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	NA
(18) Criteria regarding synergistic effects satisfied?	Yes
(19) Criteria regarding margins satisfied?	Yes
(20) Maintenance and surveillance requirements adequately identified?	Yes

P. DISCUSSION

BINDER NO. WBNEQ-ITS-001	PLANT WBN	UNIT(S) 1			SHEET 1 OF		
					R	R	
BINDER TITLE: FENWAL		COMPUTED BDM	DATE 5-15-86				
		CHECKED ANL	DATE 5/15/86				

TAB A - IDENTIFICATION OF EQUIPMENT COMPRISING THE EQUIPMENT TYPE

EQP059.61

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-TS -001-0017A -A TEMP SWITCH STM FLOW TO AFPT	1-TS -001-0017A -A 17323-0		692' 75K13-086422	A06	A B	5MIN 100D	AF L	DETECT AFPT ROOM HIGH TEMP TO INITIATE STEAM SUP ISLN. SWITCH CANNOT FAIL SO AS TO INDICATE AFPT ROOM HIGH TEMP AND INITIATE STEAM SUPPLY ISLN
WBN-1-TS -001-0017B -A TEMP SWITCH STM FLOW TO AFPT	1-TS -001-0017B -A 17323-0		692' 75K13-086422	A06	A B	5MN 100D	AF L	DETECT AFPT ROOM HIGH TEMP TO INITIATE STEAM SUP ISLN. SWITCH CANNOT FAIL SO AS TO INDICATE AFPT ROOM HIGH TEMP AND INITIATE STEAM SUPPLY ISLN
WBN-1-TS -001-0018A -B TEMP SWITCH STM FLOW TO AFPT	1-TS -001-0018A -B 17323-0		692' 75K13-086422	A06	A B	5MN 100D	AF L	DETECT AFPT ROOM HIGH TEMP TO INITIATE STEAM SUP ISLN. SWITCH CANNOT FAIL SO AS TO INDICATE AFPT ROOM HIGH TEMP AND INITIATE STEAT SUPPLY ISLN
WBN-1-TS -001-0018B -B TEMP SWITCH STM FLOW TO AFPT	1-TS -001-0018B -B 17323-0		692' 75K13-086422	A06	A B	5MN 100D	AF L	DETECT AFPT ROOM HIGH TEMP TO INITIATE STEAM SUP ISLN. SWITCH CANNOT FAIL SO AS TO INDICATE AFPT ROOM HIGH TEMP AND INITIATE STEAM SUPPLY ISLN
WBN-0-TS -012-0091A -A TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0091A -A 18023-7		729' 34KK3-334197	A06	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.

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			R 1	R	R
PREPARER/DATE	BDM	8/11/86	EGM 2/21/89		
CHECKED/DATE	AWL	8/16/86	HOR 2-21-89		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-0-TS -012-0091B -B TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0091B -B 18023-7		729' 84KK3-834197	A06	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.
WBN-0-TS -012-0092A -A TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0092A -A 18023-7		692' 84KK3-834197	A14	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.
WBN-0-TS -012-0092B -B TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0092B -B 18023-7		692' 84KK3-834197	A14	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.
WBN-0-TS -012-0093A -A TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0093A -A 18023-7		713' 84KK3-834197	A01	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.
WBN-0-TS -012-0093B -B TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0093B -B 18023-7		713' 84KK3-834197	A01	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.

			R 1	R	R
PREPARER/DATE	BDM	8/11/86	EEM 2/21/89		
CHECKED/DATE	AWL	8/16/86	2/21/89 2-21-89		

PRINT DATE: 01/11/89

BINDER NO. : WBNEQ-ITS -0
MANUFACTURER : FENWAL

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	AZIMUTH (LOCATION)	ELEV(1) (LOCATION) CONTRACT	RM/RAD (LOCATION)	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-0-TS -012-0095A -A TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0095A -A 18023-7		692' 84KK3-834197	A01	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.
WBN-0-TS -012-0095B -B TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0095B -B 18023-7		692' 84KK3-834197	A01	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.
WBN-0-TS -012-0096A -A TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0096A -A 18023-7		692' 84KK3-834197	A01	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.
WBN-0-TS -012-0096B -B TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0096B -B 18023-7		692' 84KK3-834197	A01	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.
WBN-0-TS -012-0098A -A TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0098A -A 18023-7		692' 84KK3-834197	A01	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.

		R 1	R	R
PREPARER/DATE	BDM 8/11/86	EEM 1/31/89		
CHECKED/DATE	AWL 8/16/86	? 2-21-89		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	LOCATION: ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-0-TS -012-0098B -B TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0098B -B 18023-7		692' 84KK3-834197	A01	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.
WBN-0-TS -012-0099A -A TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0099A -A 18023-7		692' 84KK3-834197	A14	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.
WBN-0-TS -012-0099B -B TEMP SW - AUX BLDG STEAM LINE RUPTURE	0-TS -012-0099B -B 18023-7		692' 84KK3-834197	A14	A	1MN	AB	DETECT AUX BLDG STEAM LINE RUPTURE AND INITIATE ISLN OF TURBINE BLDG STEAM FLOW TO AUX BLDG.

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		R 1	R	R
PREPARER/DATE	BDM 8/11/86	EG [illegible] 3/31/89		
CHECKED/DATE	AWL 8/16/86	[illegible] 2-21-87		

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R ____ R ____

BINDER TITLE FENWAL COMPUTED 1R1 EEM DATE 2/21/89

CHECKED 1R1 HOK DATE 2-21-89

TAB A

NOTES

1. Elevations shown are Actual elevations for equipment located in the Reactor Building and Floor elevations for equipment located outside the Reactor Building. Actual elevations for all equipment are documented in TAB F.

2. See Page B-2 for source of Category and Operating Time assignments.

BINDER NO. WBNEQ-ITS-001 PLANT WBN UNIT(S) 1 SHEET 1 OF 1

R ____ R ____

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TAB B

Contents:

EQ Checksheets

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2/21/89 1/30/90

CHECKED AWL DATE 9-18-86 HDR RJM
2/21/89 2/7/90

A. DOCUMENTATION

Equipment Description	Temperature Switches
Vendor/Manufacturer	Fenwal
Equipment Model No.(s)	17323-0
	18023-7

QUALIFICATION REPORTS

(1) Title/Number/Revision Wyle Nuclear Equipment Qualification, Temperature Switches/ 17509-1/R0 RIMS EEB 830803516 DATE May 16, 1983

OTHER (ANALYSIS, VENDOR DATA, ETC.)

(2) Material Aging Calculation (WAC-10).

(3) System "1" Category and Operating Times (WBNOSG4-004 R10, B45 861017 218).

(4) System "12" Category and Operating Times (WBNOSG4-006 R4, B45 851031 226).

(5) QIR NEB86072, "Location Specific Dose Analysis for 0-TS-12-91 A & B" (B45 860613 263).

(6) WBPE0018604016 R0 System "1" Instrument Accuracy Calculation (B43 860519 901).

(7) 0-TS-12-91A Instrument Accuracy Calculation (B43 860117 903).

(8) System "1" Set-point Evaluation (B44 860401 008).

(9) WBNOSG4-050 R1 System "12" Set-point Evaluation (B45 860530 219).

(10) Environmental Data Drawing 47E235-39, R4 and DCA-P-02351-06-0 and -07-0 per DCN P-02351-A (B26 881210 801)

(11) Environmental Data Drawing 47E235-40, R3 and DCA-P-022351-08-0 and -09-0 per DCN P-02351-A (B26 881210 801). R3

WBEP-0094Q

A. DOCUMENTATION

OTHER (ANALYSIS, VENDOR DATA, ETC.) (Continued)

(12) Environmental Data Drawing 47E235-52, R1.

(13) Environmental Data Drawing 47E235-62, R1.

(14) Environmental Data Drawing 47E235-68, R1.

(15) Environmental Data Drawing 47E235-69, R2 and DCA-P-02351-23-0 per DCN P-02351-A (B26 881210 801). R3

(16) Environmental Data Drawing 47E235-54, R2.

(17) Environmental Data Drawing 47E235-63, R2 and DCA-P-02351-19-0 per DCN P-02351-A (B26 881210 801). R3

(18) Environmental Data Drawing 47E235-64, R2 and DCA-P-02351-20-0 per DCN P-02351-A (B26 881210 801). R3

(19) QIR NEB86203, "Re-Analysis of Location Specific Calculations" (B45 861007 258).

(20) EQIR WBN EQC 89007 (Attachment 2) "Calibration Cards For System 12 Temperature Switches" (T48 890928 918).

(21) EQIR WBN EQC 89013 "Explanation of 1D number variations for system 12 temperature switches." (T48 891122 984) R3

Note: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. This listing includes only those documents which are essential to qualification and accordingly should not be considered a complete listing of binder references.

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			R 3	R	
BINDER TITLE FENWAL		COMPUTED BDM	DATE 9-15-86	EEM 1/30/90	
		CHECKED AWL	DATE 9-18-86	AWL 2/7/90	

B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified (Pending Acceptable Resolution of Open Items)

___ Equipment Satisfies All Requirements Except Qualified Life or Justification of Replacement Schedule

___ Equipment Qualification Not Established by Documentation

___ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES:

(1) Deleted.

(2) Deleted | R3

(3) Required accuracy for System 1 switches based on preliminary information. Audit Finding Deficiency number 86-21-D01 identifies concern with required accuracy calculations and system 12 demonstrated accuracy calculation.

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R 1 R

BINDER TITLE FENWAL COMPUTED BDM DATE 5-15-86 EEM 2/21/89

CHECKED AWL DATE 5-15-86 HGR 2-21-89

C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate Which Criteria is Applicable):

X Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE323-1974)

______ Components are Qualified to the Criteria of NUREG-0588 Category II or the DOR Guidelines of IE Bulletin No. 79-01B (IEEE323-1971) (DOR Guidelines Applicable to only BFN)

JUSTIFICATION/COMMENTS M/N 17323-0 devices were original installation and subject to NUREG 0588, Cat. II. M/N 18023-7 was a later procurement and subject to NUREG 0588, Cat. I. All Fenwal M/Ns were qualified by test in accordance with 10CFR50.49 and NUREG 0588, Cat. I.

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

Reference Report Section XIII (1.2)

- IEEE 323-1974 and 344-1975
- NUREG 0588, Category I
- Reg Guides 1.89 and 1.100
- 10CFR50 Appendix B
- ANSI N45.2

BINDER NO. WBNEQ-ITS-001 PLANT WBN	UNIT(S) 1	SHEET B4 OF 40	R 1 R
BINDER TITLE FENWAL	COMPUTED BDM	DATE 8-9-86	EEM 2/21/89
	CHECKED AWL	DATE 8-16-86	~~HS~~ 2-21-89

D. QUALIFICATION METHODOLOGY (Check only one block)

X Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

____ Test of Similar Items with Supporting Analysis

____ Analysis in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

____ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS The Wyle EQ Test Report No. 17509-1 (TAB D) | R1 was conducted specifically for TVA BFN, and SQN; however, due to similar environment (temperature, pressure, radiation), similar application and test of identical model numbers--the test report is also applicable to WBN. Testing was performed on identical types of temperature switches (Model No. 18023-7 and 17323-0) installed at WBN.

BINDER NO. WBNEQ-ITS-001	PLANT WBN	UNIT(S) 1	SHEET B5 OF 40
			R ___ R ___
BINDER TITLE FENWAL	COMPUTED BDM	DATE 8-9-86	
	CHECKED ANL	DATE 8/16/86	

E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification report identical to the plant equipment which requires qualification (yes/no/NA)? Yes

	Plant Device	Qualification Document	Reference
(1) Equipment Type	Temp Switch	Same	See 1 below
(2) Manufacturer	Fenwal	Same	See 1 below
(3) Model Number(s)	17323-0	Same	See 1 below
	18023-7	Same	See 1 below
(4) Serial Number(s)	NA	NA	NA

(5) Identify Component-Unique checksheet attached: NA

JUSTIFICATION/COMMENTS

1. Tab D, PAGE XII, and Tab F (Field Verification).

EQP058.21

TVA 19537 (OE-3-86)

BINDER NO. WBNEQ-ITS-001	PLANT WBN	UNIT(S) 1	SHEET B6 OF 40
			R ___ R ___
BINDER TITLE FENWAL	COMPUTED BOM	DATE 7-11-86	
	CHECKED ASL	DATE 8/16/86	

F. INSTALLATION INTERFACES

List all interfaces pertinent to EQ identified in the test report and/or evaluation and reference the source. Is the interface a requirement for our application (Yes/No)? (Note below.) If yes, enter requirement in QMDS, if No, provide justification.

Interface	Identify Interface	Plant Requirement (Yes/No)	Reference Test Report
Mounting Bolts	None	NA	NA
External Process Connections	None	NA	NA
Electrical Connections	**Connections should be per qualified plant procedures and covered with Raychem tubing.	*	Section I, pgs I-2, I-3,(2.2.1 & 2.2.4) Sect. XIII, (Fig 26)
Conduit Seals	**	*	Section I, pgs I-2, I-3, (2.2.2 & 2.2.4), Sect. XIII (Fig 26)
Connector Seals	***Raychem heat-shrink tubing on terminations	*	Sect. I, pg I-2, I-3, (2.2.2 & 2.2.4, Sect. XIII (Fig. 26)
Orientation	None	NA	NA
Physical Configuration	None	NA	NA
Other	None	NA	NA

JUSTIFICATION/COMMENTS

*Requirements entered in QMDS (See Tab G).

**M/N 18023-7 does not require conduit seals; however, continuous conduit (flex or rigid) is required from the switch to the junction box.

***Refer to Binder No. WBNEQ-SPLC-001 regarding qualification of the Raychem heat-shrink tubing.

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R ___ R ___

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CHECKED AWL DATE 5-20-86

G. TEST SEQUENCE

(1) Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE-323 (74), paragraph 6.3.2 (yes/no/NA)? (note below)

	Yes/No/NA	Reference
(a) Equipment inspected for damage	Yes	Tab D Sect. I, pg I-1, (2.1)
(b) Baseline performance	Yes	Tab D Sect. I, pgs I-3 thru I-7 (2.3 thru 2.4, 3.0 results)
(c) Equipment aged:		
Thermal	Yes	Tab D Sect. IV, pgs IV-1 thru IV-5
Radiation	*NA	Tab D Sect. II (1.1)
Wear	Yes	Sect. VI, pgs VI-1 thru VI-4
(d) Vibration/seismic testing conducted	Yes	Tab D Sect. VIII, pgs VIII-1 thru VIII-5
(e) Design basis event (DBE) exposure	Yes	Tab D Section X, pgs X-1 thru X-5
(f) Post-DBE exposure	Yes	Tab D Section X pgs X2 thru X-4
(g) Final inspection and disassembly	Yes	Tab D Section XII

(2) Was the same piece of equipment used throughout the test sequence described in item (1) above (yes/no/NA)? Yes

(3) Have the test equipment, test equipment accuracies and calibration data been appropriately documented (yes/no/NA)? Yes (Reference Tab D page xii).

JUSTIFICATION/COMMENTS Refer also to Tab D pages i, ii.

*See page B12, Section H5-C.

BINDER NO. WBNEQ-ITS-001	PLANT WBN	UNIT(S) 1	SHEET B8 OF 40
			R ____ R ____
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	CHECKED ANL	DATE 5/15/86	

H. AGING

(1) Was aging considered in the qualification program (Yes/no/NA)? Yes (Reference Tab D Section IV, VI).

JUSTIFICATION/COMMENTS ____________________

(2) Were the following effects considered in the aging program:

Aging Effect	Yes/No/NA	Reference
Thermal aging	Yes	Tab D Section IV
Radiation exposure	* NA	Tab D Section II (1.1)
Vibration (non-seismic) aging	** No	NA
Operational (electrical/mechanical/process) stress aging	Yes	Tab D Section IV

JUSTIFICATION/COMMENTS * See page B12, Section H5-C.

** See page B9.

(3) Were all known synergistic effects which are believed to have a significant effect on equipment performance considered in the aging program (yes/no/NA)? No (Reference Section XIII (3.4)).

JUSTIFICATION/COMMENTS Long-term effects from temperature, cycling, seismic and humidity were considered in the testing; however, radiation exposure was not performed in the test program due to low TID (see page B12, Section H-5C).

(4) Thermal Aging:

(a) Was thermal aging considered in the qualification program (yes/no/NA)? Yes (Reference Tab D Section IV).

JUSTIFICATION/COMMENTS ____________________

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BINDER NO. WBNEQ-ITS-001 PLANT WBN UNIT(S) 1 SHEET B9 OF 40

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**Non-seismic vibration is not an EQ consideration for these devices. These devices are rigidly wall mounted. Also, the seismic testing (Tab D Section VIII, Section IX) adequately demonstrates the mechanical structural integrity of these devices.

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H. AGING

(b) Were the materials susceptible to thermal aging degradation identified in the qualification program (yes/no/NA)? Yes (Reference: Tab D Section XIII, Table I).

JUSTIFICATION/COMMENTS

(c) Was the basis for thermal aging identified in the qualification program (yes/no/NA)? Yes (Reference Tab D Section XIII (3.4)).

JUSTIFICATION/COMMENTS

(d) Was the aging acceleration rate justified and the parameters of time and temperature identified in the qualification program (yes/no/NA)? Yes (Reference Tab D Sect. XIII(3.4),Sect. IV).

Parameter	Plant Maximum Normal	Test	Equivalent
Temperature	(.99)104°F + (.01)110°F=104.06°F	*	*
Time	40 years	*	*

JUSTIFICATION/COMMENTS *See Sheet B11.

(e) Was the Arrhenius methodology used for accelerated aging (yes/no/NA)? Yes (Reference Tab D Sect. XIII(3.4), Sect. IV).

JUSTIFICATION/COMMENTS

(f) If activation energies were used for determining accelerated aging parameters, are they properly referenced to the source of the technical data (yes/no/NA)? Yes (Reference Tab D Section XIII, Table I).

JUSTIFICATION/COMMENTS

BINDER NO. WBNEQ-ITS-001 PLANT WBN UNIT(S) 1 SHEET B11 OF 40

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M/N 17323-0

Case I

Parameter	* Plant Maximum Normal	Test	Equivalent
Temperature (°F)	104.06	172.4	104.06
Time	40 years	213.2 hrs	21.30 yrs

Case II

Parameter	* Plant Maximum Normal	Test	Equivalent
Temperature (°F)	104.06	172.4	104.06
Time	40 years	406 hrs	40.56 yrs

Case I - Applications where switch is required to actuate on both increasing and decreasing temperatures.

Case II - Applications where switch is required to actuate on increasing temperature only. (Reference Tab C, Thermal Aging Analysis).

*Plant max normal includes 1% of 40 year plant life at max abnormal temperature.

M/N 18023-7

Parameter	* Plant Maximum Normal	Test	Equivalent
Temperature (°F)	104.06	172.4	104.06
Time	40 years	102 hrs	10.19 yrs

Reference-Tab C, Thermal Aging Analysis

*Plant max normal includes 1% of 40 year plant life at max abnormal temperature.

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	CHECKED RWL	DATE 6/25/86	

H. AGING (Continued)

(g) If a regression line was used for determining accelerated aging parameters, are test points or failure modes identified on the line (yes/no/NA)? NA (Reference ________).

(h) Was the equipment operated during the thermal aging (yes/no/NA)? No (Reference Tab D Section IV).

JUSTIFICATION/COMMENTS Operation during thermal aging not a factor for this type of equipment.

(5) Radiation Aging Exposure:

(a) Was radiation aging exposure considered in the qualification program (yes/no/NA)? Yes (Reference Tab D Section II(1.1)).

JUSTIFICATION/COMMENTS These devices were exempted from radiation exposure in testing. See comment below.

(b) Were the materials susceptible to radiation degradation identified in the qualification program (yes/no/NA)? Yes (Reference Tab D Section XIII, Table I).

JUSTIFICATION/COMMENTS ________

(c) Was the basis for excluding radiation aging exposure identified in the qualification program (yes/no/NA)? No (Reference Tab D Section II(1.1), Section XIII, Table I).

JUSTIFICATION/COMMENTS Worst case radiation exposure for both M/N 17323-0 and 18023-7 is less than 5×10^4 rad (TID). For this equipment a dose of approximately 5×10^4 rad, gamma is considered negligible based on the equipment's design, materials used, and other test data. In the qualification test, identical devices with respect to materials and functional design, but having different model numbers were successfully qualified for doses in excess of 1×10^7 rad, gamma (Tab D sheets iii, iv and Section II(1.1)).

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R 1 R

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H. AGING (Continued)

(d) Is the radiation test exposure dose and dose rate acceptable (Yes/No/NA)? NA (Reference: NA).

Plant normal ambient radiation dose (rd)	NA
Test exposure dose (rd)	NA
Test exposure dose rate (rd/hr)	NA
Test exposure source type (e.g., Co-60 gamma)	NA

JUSTIFICATION/COMMENTS *See page B12 Section H(5)

(6) Vibration (non-seismic) Aging:

(a) Were the effects of non-seismic vibration induced during normal and abnormal operation addressed in the qualification program[1] No (Reference: NA).

JUSTIFICATION/COMMENTS **See comment on Section H(2) page B9. Non-seismic Aging.

(b) Was the basis for vibration aging identified and justified in the qualification program (Yes/No/NA)? NA (Reference: NA).

JUSTIFICATION/COMMENTS

(7) Operational Stress Aging:

(a) Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation adressed in the qualification program (Yes/No/NA)? Yes (Reference: TAB D Section VI, Section XIII (3.4.4)).

JUSTIFICATION/COMMENTS

[1] Qualification program refers to the test report and any supplemental documentation including TVA analyses in TAB C of the Binder. R1

BINDER NO. WBNEQ-ITS-001 PLANT WBN UNIT(S) 1 SHEET B14 OF 40

R 1 R

BINDER TITLE FENWAL COMPUTED BDM DATE 5-15-86 EEM 2/21/89

CHECKED AWL DATE 5-15-86 ~~HER~~ 2-21-89

H. AGING (Continued)

(b) Was the basis for stresses induced during operational aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, Section VI).

JUSTIFICATION/COMMENTS These devices are cycled only during routine testing; not during normal operation.

(8) Was the qualified life of the equipment and its basis defined in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, page iii, Section IV).

Qualified life (Document in QMDS) See sheets B15

JUSTIFICATION/COMMENTS

(9) Were replacement intervals for the equipment or its components defined in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, page iii, Section IV).

|R1

JUSTIFICATION/COMMENTS

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R ____ R ____

BINDER TITLE FENWAL COMPUTED 1R1 EEM DATE 2/21/89

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BINDER NO. WBNEQ-ITS-001	PLANT WBN	UNIT(S) 1	SHEET B16 OF 40
BINDER TITLE FENWAL	COMPUTED BDM	DATE 5-20-86	R ___ R ___
	CHECKED AJWL	DATE 5/20/86	

I. MATERIALS ANALYSIS

Identification of Materials Susceptible to Significant Thermal and/or Radiation Degradation and Aging (Use Section C of Binder for Detailed Materials Analysis) (M.N.'s 17323-0, 18023-7)

	Material/Property/Function	Radiation Threshold	Reference	Activation Energy	Reference
(a)	TAGT/Wire Insulation	1.7×10^4	*	1.69	*
(b)	Teflon/Insulation	1.7×10^4	*	1.69	*
(c)	Glass/Insulation	5×10^8	*	NAS	*
(d)					
(e)					

JUSTIFICATION/COMMENTS *Tab D, Section XIII, Table I; and Section XIII, (3.4.2).

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TVA

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R ____ R ____

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J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(1) Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics which would constitute failure if not met (yes/no/NA)? Yes (Reference Tab D Section X(1.1)).

Identify Acceptance Criteria: Specimens shall switch on increasing temperature and remain switched as long as accident temperature remains above setpoint (i.e., operability and switching temperature only).

(2) Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment which should be verified before, after, and periodically during the test to judge equipment performance (yes/no/NA)? Yes (Reference Tab D Section X (2.4)).

Identify baseline and functional testing: Specimens electrically loaded as described in references and monitored before, during, and after testing to judge equipment performance.

JUSTIFICATION/COMMENTS

(3) Does the qualification report/analysis describe loads (or load combinations) applied during DBE test (yes/no/NA)? Yes (Reference Tab D Section X (2.4)).

JUSTIFICATION/COMMENTS See (2) above.

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BINDER TITLE FENWAL	COMPUTED BDM	DATE 5-15-86 EEM 2/21/89	
	CHECKED AWL	DATE 5-15-86 HDR 2-21-89	

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS. (Continued)

(4) Do the applied loads during baseline testing reflect normal operating conditions (Yes/No/NA)? Yes (Reference: TAB D, Section I-2.3.4).

JUSTIFICATION/COMMENTS The applied load used by Wyle for baseline testing includes a 10% margin for voltage.

(5) Identify electrical characteristics necessary to ensure the equipment performance specifications can be satisfied.

(a)

Parameter	Plant Normal Conditions	Reference
Voltage	120 VAC	45 W760-1-2 45 N 600-12
Load	N/A	
Frequency	60 Hz	45W760-1-2 45N600-12
Accuracy	17323-0 ± 11.6°F 18023-7 ± 10.7°F	Instrument Accuracy Calc TAB C
Other(s)		

R1

JUSTIFICATION/COMMENTS

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(b)

Parameter	Specific Accident Conditions	Reference
Voltage	120 ±2.4 VAC	TAB E, 120 VAC Vital Instr Pwr
Load	N/A	
Frequency	60 ± 0.6 Hz	TAB E, 120 VAC Vital Instr Pwr
*Accuracy	MN.17323-0 ±11.5°F MN.18023-7 ±11°F	Instrument Accuracy Calc (TAB C) |R2
Other(s)	N/A	

JUSTIFICATION/COMMENTS Variations in voltage, load and frequency are accounted for in the design process and will not vary from the continuous operating characteristics outlined in the 120 VAC Vital Instrument Power Design Criteria (TAB C).

(c)

Parameter	Demonstrated Conditions	Reference
Voltage	132 VAC	TAB D Sect. X (2.4)
Load	1.61 Amps	TAB D Sect. X (2.4)
Frequency	N/A	
*Accuracy	MN.17323-0 ±11.6°F MN.18023-7 ±10.72°F	Instrument Accuracy Calc (TAB C) |R2
Other(s)		

JUSTIFICATION/COMMENTS *See open item 3, Sheet B2. |R2

K. REQUIRED OPERATING ENVIRONMENT (Model No. 17323-0)

Reference Environmental Drawing No. 47E235-68, -69 (692' Rm A06) and DCA-P-02351-23-0 R3

(1) Normal Max		(2) Abnormal Max	
(a) Temperature (°F)	104	(a) Temperature (°F)	110
(b) Pressure (psig)	ATM(-)	(b) Pressure (psig)	ATM(-)
(c) Humidity (%)	80	(c) Humidity (%)	90
(d) Radiation (rd)	1.8×10^3 gamma	(d) Radiation (rd)	NA

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal max conditions could exist up to eight hours per excursion and will occur less than 1% of the plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	212/110	Accident type	AF
(b) Pressure (psig)	0.06	Accident type	AF
(c) Humidity (%)	100	Accident type	LOCA/HELB
(d) Radiation (rd)	Less than 1×10^4 gamma	Accident type	LOCA/HELB
(e) Spray Type	NA	Accident type	NA

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R 1 R

BINDER TITLE FENWAL COMPUTED BDM DATE 8-14-86 EEM 2/21/89

CHECKED AWL DATE 8-16-86 [illegible] 2-21-89

K. REQUIRED OPERATING ENVIRONMENT (Model No. 17323-0)(692' Rm A06) - (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): None

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: R1

*See comment Page B22).

(7) Subject to submergence (Yes/No/NA)? No (Reference: See page B30/A).

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? NA
(Reference: Environmental Data Drawing 47E235-68).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: R1

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.

K. REQUIRED OPERATING ENVIRONMENT (Continued)

JUSTIFICATION/COMMENTS

*The Environmental Data Drawing 47E235-68, Note 49 requires additional conduit sealing; however, Fenwal model numbers located in this room (692' Rm A06) are 17323-0 which have vendor supplied seals (see TAB F) on lead wires and adjustment knob. R1

K. REQUIRED OPERATING ENVIRONMENT (Model No. 18023-7)

Reference Environmental Drawing No. 47E235-39, (729' Rm A06) and DCA-P-02351-06-0, -07-0 R3

(1) Normal Max		(2) Abnormal Max	
(a) Temperature (°F)	104	(a) Temperature (°F)	110
(b) Pressure (psig)	ATM(-)	(b) Pressure (psig)	ATM(-)
(c) Humidity (%)	80	(c) Humidity (%)	90
(d) Radiation (rd)	1.8×10^3 gamma	(d) Radiation (rd)	NA

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal maximum conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a)	Temperature (°F)	116°F (@ 1 min) 125°F (PK)	Accident type AB
(b)	Pressure (psig)	0.15	Accident type AB
(c)	Humidity (%)	100	Accident type AB
(d)	Radiation (rd)	1.3×10^4 gamma	Accident type AB
(e)	Spray Type	NA	Accident type NA

**See Section A, Reference 5, Sheet B1

K. REQUIRED OPERATING ENVIRONMENT (Model No. 18023-7)(729' Rm A06) - (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): None

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? No (Reference: Drawing 47E235-39 does not require conduit sealing analysis). R1

(7) Subject to submergence (Yes/No/NA)? No (Reference: See page B30/A).

Identify initiation time and duration of submergence: NA

R1

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? NA (Reference: Drawing 47E235-39).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify:

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.

R1

K. REQUIRED OPERATING ENVIRONMENT (Model No. 18023-7)

Reference Environmental Drawing No. 47E235-40, (692' Rm A14) and DCA-P-02351-08-0, -09-0 R3

(1) Normal Max		(2) Abnormal Max	
(a) Temperature (°F)	104	(a) Temperature (°F)	110
(b) Pressure (psig)	ATM(-)	(b) Pressure (psig)	ATM(-)
(c) Humidity (%)	80	(c) Humidity (%)	90
(d) Radiation (rd)	3.5×10^4 gamma	(d) Radiation (rd)	NA

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal maximum conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	143	Accident type	AB
(b) Pressure (psig)	0.15	Accident type	AB
(c) Humidity (%)	100	Accident type	AB
(d) Radiation (rd)	Less than 1×10^4 gamma	Accident type	L
(e) Spray Type	NA	Accident type	NA

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K. REQUIRED OPERATING ENVIRONMENT (Model No. 18023-7)(692' Rm A14) - (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): None

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? No (Reference: Drawing 47E235-40 does not require conduit sealing analysis). R1

(7) Subject to submergence (Yes/No/NA)? No (Reference: See page B30/A).

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? NA
(Reference: 47E235-40).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: R1

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.

R1

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R 1 R

BINDER TITLE FENWAL COMPUTED BDM DATE 5-15-86 EEM 2/21/89

CHECKED AWL DATE 5-15-86 ~~[illegible]~~ 2-21-89

K. REQUIRED OPERATING ENVIRONMENT (Model No. 18023-7)

Reference Environmental Drawing No. 47E235-52, -54, (713' Rm A01) |R1

(1) Normal Max		(2) Abnormal Max	
(a) Temperature (°F)	104	(a) Temperature (°F)	110
(b) Pressure (psig)	ATM(-)	(b) Pressure (psig)	ATM(-)
(c) Humidity (%)	80	(c) Humidity (%)	90
(d) Radiation (rd)	$4x10^4$ gamma (zone D)	(d) Radiation (rd)	NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal maximum conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	128	Accident type	AB
(b) Pressure (psig)	0.03	Accident type	AB
(c) Humidity (%)	100	Accident type	AB
(d) Radiation (rd)	Less than $1x10^4$ gamma	Accident type	L |R1
(e) Spray Type	NA	Accident type	NA

R1

BINDER NO. WBNEQ-ITS-001	PLANT WBN	UNIT(S) 1	SHEET B28 OF 40 R 1 R
BINDER TITLE FENWAL	COMPUTED BDM	DATE 8-14-86 EEM 3/31/89	
	CHECKED AWL	DATE 8-16-86 ~~HOK2~~ 2-21-87	

K. REQUIRED OPERATING ENVIRONMENT (Model No. 18023-7)(713' Rm A01)-(Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): None

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? No (Reference: Drawing 47E235-52 does not require conduit sealing analysis). R1

(7) Subject to submergence (Yes/No/NA)? No (Reference: See page B30/A).

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? NA (Reference: 47E235-52). R1

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify:

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.

R1

K. REQUIRED OPERATING ENVIRONMENT (Model No. 18023-7)

Reference Environmental Drawing No. 47E235-62, -63, -64 (692' Rm A01) and DCA-P-02351--19-0, -20-0 | R3

(1) Normal Max		(2) Abnormal Max	
(a) Temperature (°F)	104	(a) Temperature (°F)	110
(b) Pressure (psig)	ATM(-)	(b) Pressure (psig)	ATM(-)
(c) Humidity (%)	80	(c) Humidity (%)	90
(d) Radiation (rd)	$3.2x10^4$ gamma (zone C)	(d) Radiation (rd)	NA

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal maximum conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a)	Temperature (°F)	153	Accident type AB
(b)	Pressure (psig)	0.03	Accident type AB
(c)	Humidity (%)	100	Accident type AB
(d)	Radiation (rd)	Less than $1x10^4$ gamma	Accident type L
(e)	Spray Type	NA	Accident type NA

K. REQUIRED OPERATING ENVIRONMENT (Model No. 18023-7)(692' Rm A01) - (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): None

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? No (Reference: Drawing 47E235-62 does not require conduit sealing analysis). R1

(7) Subject to submergence (Yes/No/NA)? No (Reference: See page B30/A).

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? NA
(Reference: 47E235-62). R1

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify:

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.

R1

BINDER NO. WBNEQ-ITS-001 PLANT WBN UNIT(S) 1 SHEET B30/A OF 40
R 1 R

BINDER TITLE FENWAL COMPUTED BDM DATE 8-18-86 EEM 2/21/89

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SUBMERGENCE EVALUATION

Component (As listed TAB A)	ACTUAL ELEVATION (From TAB F)	FLOOR ELEV/RM #/ REQUIRED ACCIDENT (From TAB A)	MAX FLOOD ELEV (From 47E235-Series Drawings)	
				R1
1-TS-1-17A-A	*695'-9"	692'/A06/L,AF	692'-2"	
1-TS-1-17B-A	*695'-9"	692'/A06/L,AF	692'-2"	
1-TS-1-18A-B	*695'-9"	692'/A06/L,AF	692'-2"	
1-TS-1-18B-B	*695'-9"	692'/A06/L,AF	692'-2"	
0-TS-12-91A-A	735'-9"	729'/A06/AB	NA	
0-TS-12-91B-B	735'-9"	729'/A06/AB	NA	
0-TS-12-92A-A	724'-0"	692'/A14/AB	692'-1"	
0-TS-12-92B-B	724'-0"	692'/A14/AB	692'-1"	
0-TS-12-93A-A	715'-7"	713'/A01/AB	713'-1"	
0-TS-12-93B-B	715'-10"	713'/A01/AB	713'-1"	
0-TS-12-95A-A	705'-2"	692'/A01/AB	692'-1"	
0-TS-12-95B-B	698'-9"	692'/A01/AB	692'-1"	R1
0-TS-12-96A-A	707'-0"	692'/A01/AB	692'-1"	
0-TS-12-96B-B	706'-1"	692'/A01/AB	692'-1"	
0-TS-12-98A-A	701'-4"	692'/A01/AB	692'-1"	
0-TS-12-98B-B	700'-11"	692'/A01/AB	692'-1"	
0-TS-12-99A-A	721'-6"	692'/A14/AB	692'-1"	
0-TS-12-99B-B	724'-0"	692'/A14/AB	692'-1"	

All temperature switches are located at least 2 feet above respective floor elevations. From Auxiliary Building Environmental Data Drawings, flood levels for AB or AF HELBs do not exceed 1 foot; therefore, no switches are subject to submergence. R1

*Elevation measured to bottom of J.B. switches have the "flange" type mounting (see TAB H. 1.10.K) and are mounted on J.B. above low-point of J.B.

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			R ___ R ___
BINDER TITLE FENWAL	COMPUTED BLM	DATE 5-20-86	
	CHECKED RWL	DATE 5/20/86	

L. SUMMARY COMPARISON OF TEST OCNDITIONS TO SPECIFIED CONDITIONS

(1) Comparison of worst-case maximum parameters: (M/N 17323-0)

Parameter	Specified	Demonstrated	Reference
Operating Time (See pg 32)	100 days	24 hours	Tab D pg iii, X Sect. X (3.0)
Temperature (°F)	212°F	323°F	Tab D Sect. X (Fig X-1, pg X-3)
Pressure (psig)	0.06	7.9	Tab D Sect. X (Fig X-2)
Relative Humidity (%)	100%	100%	Tab D, Sect. XIII (3.10.3, pg 39
*Chemical Spray	NA	NA	NA
**Radiation (rd)	1.18×10^4 gamma	NA	See pg B12 (H5-C) Tab D Sect. II(1.1)
Submergence	No	No	See page B30/A

*Includes spray concentration, flowrate, density, duration, and pH.
**Enter 40-year integrated normal dose plus integrated accident dose and specify type.

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelops Specified (Yes/No/NA)	Reference
Temperature	Yes (See sheet B32)	Tab D Sect. X (3.0) Tab D Sect. X Figs. X-3, X-4
Pressure	Yes (See sheet B32)	Tab D Sect. X (3.0) Figs. X-3, X-4
Relative Humidity	Yes	Tab D, Sect. XIII (3.10.3, pg 39)
Chemical Spray	NA	NA
Submergence	NA	NA

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

JUSTIFICATION/COMMENTS

*The 24 hour duration test profile envelops the accident profile for the AF HELB specified in the category and operating time calculation for System 1 which is the only DBE which results in a harsh environment. The 100-day post-DBE operability requirement is from a category B/LOCA requirement for these devices (M/N 17323-0). However, the environmental conditions resulting from a LOCA are essentially mild. (See K(5) page B20). The 100-day post-LOCA operability requirement is accounted for due to the demonstrated qualified life being 40.56 years (see TAB C, page C-2, Section H(8), but only a 40-year qualified life is specified on the QMDSs. R1

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	CHECKED AJVL	DATE 5-15-86					

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS M/N 17323-0)
(Continued)

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, yes/no/NA)

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA
Temperature: +15 degrees F	+111°F	Yes
Pressure: +10% but no more than 10 psig	+7.84 psig	Yes
* Radiation: +10% of accident dose	NA	NA
Time: +10% (or 1 hour + operating time per NUREG-0588)	10%	Yes
Voltage: +10% of rated value	10%	Yes
Frequency: +5% of rated value	NA	NA
Environmental Transient: the initial transient and the peak temperature applied twice	Margin of 111°F	Yes
Vibration: +10% added to acceleration	NA	NA

JUSTIFICATION/COMMENTS: *See Page B12.

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L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS

(1) Comparison of worst-case maximum parameters: (M/N 18023-7)

Parameter	Specified	Demonstrated	Reference
Operating Time	1 minute	100 days	Tab D Sect. X (3.0)
Temperature (°F)	153°F	323°F	Tab D Sect. X (Fig X-1, pg X-3)
Pressure (psig)	0.15	7.9	Tab D Sect. X (Fig X-2)
Relative Humidity (%)	100%	100%	Tab D, Sect. XIII (3.10.3, pg 39)
*Chemical Spray	NA	NA	NA
Radiation (rd)	Less than 5×10^4 Gamma	NA	Tab D Sect. II(1.1)
Submergence	No	No	See pg B30/A

*Includes spray concentration, flowrate, density, duration, and pH.

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference
Temperature	Yes	Tab D Sect. X (3.0) Sect. X Figs. Tab D X-3, X-4
Pressure	Yes	Sect. X (3.0) Sect. X Figs. Tab D X-3, X-4
Relative Humidity	Yes	Tab D, Sect XIII (3.10.3, pg 39)
Chemical Spray	NA	NA
Submergence	NA	NA

JUSTIFICATION/COMMENTS

BINDER NO. WBNEQ-ITS-001	PLANT WBN	UNIT(S) 1		SHEET B35 OF 40		R	R
BINDER TITLE FENWAL		COMPUTED BDM	DATE 5-15-86				
		CHECKED AWL	DATE 5/16/86				

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (M/N 18023-7) (Continued)

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, yes/no/NA)

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA
Temperature: +15 degrees F	+170°F	Yes
Pressure: +10% but no more than 10 psig	+7.75 psig	Yes
* Radiation: +10% of accident dose	NA	NA
Time: +10% (or 1 hour + operating time per NUREG-0588)	10%	Yes
Voltage: +10% of rated value	10%	Yes
Frequency: +5% of rated value	NA	NA
Environmental Transient: the initial transient and the peak temperature applied twice	Margin of 170°F	Yes
Vibration: +10% added to acceleration	NA	NA

JUSTIFICATION/COMMENTS: * See Page B12

EQP058.21

TVA 19537 (OE-3-86)

M. OPERABILITY TEST RESULTS

(1) Identify the safety function(s) of this equipment:
(Reference: See page B-2 for category and operating time assignments). R1

JUSTIFICATION/COMMENTS

(2) Did the equipment perform its intended function during the simulated design basis accident exposure (Yes/No/NA)? Yes
(Reference: TAB D, Section X (3.0)).

JUSTIFICATION/COMMENTS

(3) Did the equipment perform its intended function during the simulated post-design basis accident exposure (Yes/No/NA)? Yes (Reference: TAB D, Sections X (3.0), XI).

JUSTIFICATION/COMMENTS

(4) Did the test demonstrate the operability requirements for the required time interval for which the equipment is required to operate (Yes/No/NA)? Yes (Reference: TAB D, page X, Section X (3.0)).

JUSTIFICATION/COMMENTS

(5) Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved (Yes/No/NA)? Yes
(Reference: TAB D, Page iv-xi).

JUSTIFICATION/COMMENTS *See page B36/A.

M. OPERABILITY TEST RESULTS (Continued)

JUSTIFICATION/COMMENTS

*There were 23 anomalies which occurred during testing. Of the 23, 10 anomalies (#'s 3, 4, 6, 8/A, 16, 17, 20, 21, 22/A, 23) involved specimens 7-9 and 13-15 (M.N.'s 17323-0, and 18023-7, respectively.) The anomalies are summarized on pages iv-xi of the Wyle report. Anomaly resolutions were reviewed and concurred with. Resolution of anomaly 22/A will be evaluated upon receipt of the revised demonstrated and required accuracy calculations (see open item 3, sheet B1). R1

N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (yes/no/NA)? Yes (Enter all requirements in Section G of the EQC Binder - Qualification Maintenance Data Sheets).

JUSTIFICATION/COMMENTS All requirements entered in QMDSs.

BINDER NO. WBNEQ-ITS-001	PLANT WBN	UNIT(S) 1		SHEET B38	OF 40		
				R	R		
BINDER TITLE FENWAL	COMPUTED BDm	DATE 8-9-86					
	CHECKED ANL	DATE 8/16/86					

0. SUMMARY OF REVIEW

	Yes/No/NA
(1) Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	Yes
(2) Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	NA
(3) Choice of qualification methodology adequately justified?	Yes
(4) If analysis was performed, complete the following:	
(a) Were equipment performance requirements identified?	NA
(b) Were specific features and failure modes and effects analyzed?	NA
(c) Were assumptions and mathematical models used together with appropriate justification for their use?	NA
(d) Were environmental parameters which affect equipment performance identified?	NA
(5) Adequate similarity between equipment and test specimen established?	Yes
(6) Aging degradation evaluated adequately?	Yes
(a) Mechanical and/or cycle aging addressed?	Yes
(b) Equipment aged to end of life condition prior to application of DBE conditions?	Yes
(c) Absence of preaging in test/analysis justified?	NA
(d) Materials susceptible to thermal/radiation aging identified?	Yes

EQP058.21

TVA 19537 (OE-3-86)

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(e) Normally operating state of device (e.g., normally energized) considered?	Yes
(7) Qualified life or replacement schedule established?	Yes
(8) Criteria regarding temperature/pressure exposure satisfied?	Yes
(a) Peak temperature adequate	Yes
(b) Peak pressure adequate	Yes
(c) Duration adequate	Yes
(d) Required profile enveloped adequately	Yes
(e) Steam exposure adequate	Yes
(9) Criteria regarding test sequence satisfied?	Yes
(10) Criteria regarding spray satisfied?	NA
(a) Was the spray testing done while under the extremes of pressure and temperature?	NA
(b) Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant?	NA
(11) Criteria regarding submergence satisfied?	Yes
(12) Criteria regarding radiation satisfied?	Yes
(a) Was dose rate considered?	NA
(b) Was beta radiation considered?	NA
(13) Criteria regarding operability status/mode satisfied?	Yes
(14) Criteria regarding test failures or anomalies satisfied?	Yes

BINDER NO. WBNEQ-ITS-001 PLANT WBN	UNIT(S) 1		SHEET B40 OF 40 R 1 R 2
BINDER TITLE FENWAL	COMPUTED BDM	DATE 9-3-86	EEM 2/21/89 EEm 12/7/89
	CHECKED AWL	DATE 9-3-86	HDR 2/21/89 AWL 10/18/89

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(15) Criteria regarding functional testing satisfied?	Yes
(a) Does the test plan/report specify an acceptance criteria for equipment performed?	Yes
(b) Was an initial base line test done to establish required performance characteristics?	Yes
(c) Has the test analyis demonstrated that performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	Yes
(16) Criteria regarding instrument accuracy satisfied?	**
(17) Test duration margin (1 hour + function time) satisfied?	Yes
(a) Is the minimum specified operating time at least 1 hour?	Yes
(b) If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	NA
(18) Criteria regarding synergistic effects satisfied?	Yes
(19) Criteria regarding margins satisfied?	Yes
(20) Maintenance and surveillance requirements adequately identified?	Yes

P. DISCUSSION

**See open item 3, sheet B2. | R2

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 1 OF 1

R ___ R ___

BINDER TITLE STATIC-O-RING COMPUTED BDm DATE 5-22-86

TEMPERATURE SWITCHES CHECKED AWR DATE 6/3/86

TAB A - Identification of equipment comprising the equipment type

EQP136.51

WATTS BAR NUCLEAR PLANT
TAB A – EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-0-TS -012-0094A -A TEMP SW – AUX BLDG STEAM LINE RUPTURE	0-TS -012-0094A -A 201TAB123JJTTX7		692' 85KLC-837662	A29	A	1MN	AB	DETECT STEAM LINE BREAK AND ISOLATE FLOW FROM THE TURBINE BLDG TO AUX BLDG.
WBN-0-TS -012-0094B -B TEMP SW – AUX BLDG STEAM LINE RUPTURE	0-TS -012-0094B -B 201TAB123JJTTX7		692' 86PLB-376059	A29	A	1MIN	AB	DETECT STEAM LINE BREAK AND ISOLATE FLOW FROM THE TURBINE BLDG TO AUX BLDG.
WBN-0-TS -012-0097A -A TEMP SW – AUX BLDG STEAM LINE RUPTURE	0-TS -012-0097A -A 201TAB123JJTTX7		692' 85KLC-837662	A30	A	1MIN	AB	DETECT STEAM LINE BREAK AND ISOLATE FLOW FROM THE TURBINE BLDG TO AUX BLDG.
WBN-0-TS -012-0097B -B TEMP SW – AUX BLDG STEAM LINE RUPTURE	0-TS -012-0097B -B 201TAB123JJTTX7		692' 85KLC-837662	A30	A	1MIN	AB	DETECT STEAM LINE BREAK AND ISOLATE FLOW FROM THE TURBINE BLDG TO AUX BLDG.
WBN-0-TS -030-0192A -A SFP & THERM BARRIER BSTR PUMP COOLER FAN	0-TS -030-0192A -A 201TAB125JJTTX6		737' 84K2-835754	A01	A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A CV/A AF AB	IF ASSOCIATED HS IN AUTO, TEMP SWITCH REQUIRED TO START ROOM COOLER FAN ON HIGH TEMP.

R4

PREPARER/DATE BDM

CHECKED/DATE AWL

R 1	R 3	R 4
WCG 4-4-89	WCG 10-12-89	WCD 6-18-90
KBN 4-28-89	HDR 10-18-89	CAH 6/27/90

PAGE A-2

R4

PRINT DATE: 02/02/89

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-0-TS -030-0192B -A	0-TS -030-0192B -A		737'	A01	A	100D	L	IF ASSOCIATED HS IN STANDBY,
SFP & THERM BARRIER BSTR PUMP COOLER FAN	201TA8125JJTTX6		85KJ2-836755		A	1MO	RH/A	TEMP SWITCH IS REQUIRED TO
					A	1MO	CV/A	CLOSE ON ROOM HIGH TEMP.
					A	1MO	AF	
					A	1MO	AB	
WBN-0-TS -030-0193A -B	0-TS -030-0193A -B		737'	A01	A	100D	L	IF ASSOCIATED HS IN AUTO, TEMP
SFP & THERM BARRIER BSTR PUMP COOLER FAN	201TA8125JJTTX6		84K2-835754		A	1MO	RH/A	SWITCH REQUIRED TO START
					A	1MO	CV/A	ROOM COOLER FAN ON HIGH TEMP.
					A	1MO	AF	
					A	1MO	AB	
WBN-0-TS -030-0193B -B	0-TS -030-0193B -B		737'	A01	A	100D	L	IF ASSOCIATED HS IN STANDBY, T
SFP & THERM BARRIER BSTR PUMP COOLER FAN	201TA8125JJTTX6		85KN2-836755		A	1MO	RH/A	REQD TO CLOSE ON ROOM HIGH TEM
					A	1MO	CV/A	
					A	1MO	AF	
					A	1MO	AB	
WBN-1-TS -030-0194A -A	1-TS -030-0194A -A		737'	A05	A	100D	L	IF ASSOCIATED HS IN AUTO,TEMP
PENETRATION ROOM COOLER FAN	201TA8125JJTTX6		83XJ9-833271		A	1MO	RH/A	SWITCH REQD TO START ROOM
					A	1MO	CV/A	COOLER FAN ON HIGH TEMP.
					A	1MO	AF	
					A	1MO	AB	
WBN-2-TS -030-0194A -A	2-TS -030-0194A -A		737'	A09	A	100D	L	REQ'D FOR AUTO START OF UNIT 2
PENETRATION ROOM COOLER FAN	201TA8125JJTTX6		83XJ9-833371					ROOM COOLER WHICH SERVES ABGTS
								TRAIN B.

			R 1	R	R
PREPARER/DATE	BDM	8/12/86	4-4-89		
CHECKED/DATE	AWL	8/16/86	4/28/89		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/PAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-TS -030-0194B -A	1-TS -030-0194B -A		737'	A05	A	1000	L	IF ASSOCIATED HS IN STANDBY,
PENETRATION ROOM COOLER FAN	201TA8125JJTTX6		85KJ2-336755		A	1MO	RH/A	TEMP SWITCH IS REQUIRED TO
					A	1MO	CV/A	CLOSE ON ROOM HIGH TEMP.
					A	1MO	AF	
					A	1MO	AB	
WBN-2-TS -030-0194B -A	2-TS -030-0194B -A		737'	A09	A	1000	L	REQ'D FOR AUTO START OF UNIT 2
PENETRATION ROOM COOLER FAN	201TA8125JJTTX6		85KJ2-336755					ROOM COOLER WHICH SERVES ABGTS
								TRAIN B.
WBN-1-TS -030-0195A -B	1-TS -030-0195A -B		737'	A05	A	1000	L	IF ASSOCIATED HS IN AUTO, TEMP
PENETRATION ROOM COOLER FAN	201TA8125JJTTX6		83XJ9-333871		A	1MO	RH/A	SWITCH REQD TO START ROOM
					A	1MO	CV/A	COOLER FAN ON HIGH TEMP.
					A	1MO	AF	
					A	1MO	AB	
WBN-2-TS -030-0195A -B	2-TS -030-0195A -B		737'	A09	A	1000	L	REQ'D FOR AUTO START OF UNIT 2
PENETRATION ROOM COOLER FAN	201TA8125JJTTX6		83XJ9-833871					ROOM COOLER WHICH SERVES ABGTS
								TRAIN B.
WBN-1-TS -030-0195B -B	1-TS -030-0195B -B		737'	A05	A	1000	L	IF ASSOCIATED HS IN STANDBY,
PENETRATION ROOM COOLER FAN	201TA8125JJTTX6		85KJ2-336755		A	1MO	RH/A	TEMP SWITCH IS REQUIRED TO
					A	1MO	CV/A	CLOSE ON ROOM HIGH TEMP.
					A	1MO	AF	
					A	1MO	AB	

			R 1	R ____	R ____
PREPARER/DATE	BDM	8/12/86	WBJ 4-4-89	____	____
CHECKED/DATE	AWL	8/16/86	KBW 4/24/89	____	____

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO.	AZMITH / MODEL NUMBER	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/PAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-2-TS -030-0195B -B	2-TS -030-0195B -B		737'	A09	A	1000	L	REQ'D FOR AUTO START OF UNIT 2
PENETRATION ROOM COOLER FAN		201TA8125JJTTX6	85KJ2-836755					ROOM COOLER WHICH SERVES ABGTS
								TRAIN B.
WBN-1-TS -030-0196A -A	1-TS -030-0196A -A		713'	A06	A	1000	L	IF ASSOCIATED HS IN AUTO, TS
PENETRATION ROOM COOLER FAN		201TA8125JJTTX6	83XJ9-333871		A	1MO	RH/A	REQUIRED TO START ROOM COOLER
					A	1MO	CV/A	FAN ON HI TEMP.
					A	1MO	AF	
					A	1MO	AB	
WBN-1-TS -030-0196B -A	1-TS -030-0196B -A		713'	A06	A	1000	L	IF ASSOCIATED HS IN STANDBY,
PENETRATION ROOM COOLER FAN		201TA8125JJTTX6	85KJ9-836755		A	1MO	RH/A	TEMP SWITCH IS REQUIRED TO
					A	1MO	CV/A	CLOSE ON ROOM HIGH TEMP.
					A	1MO	AF	
					A	1MO	AB	
WBN-1-TS -030-0197A -B	1-TS -030-0197A -B		713'	A06	A	1000	L	IF ASSOCIATED HS IN AUTO, TEMP
PENETRATION ROOM COOLER FAN		201TA8125JJTTX6	83XJ9-333871		A	1MO	RH/A	SWITCH REQUIRED TOSTART
					A	1MO	CV/A	ROOM COOLER FAN ON HIGH TEMP.
					A	1MO	AF	
					A	1MO	AB	
WBN-1-TS -030-0197B -B	1-TS -030-0197B -B		713'	A06	A	1000	L	IF ASSOCIATED HS IN STANDBY,
PENETRATION ROOM COOLER FAN		201TA8125JJTTX6	85KJ2-836755		A	1MO	RH/A	TEMP SWITCH IS REQUIRED TO
					A	1MO	CV/A	CLOSE ON ROOM HIGH TEMP.
					A	1MO	AF	
					A	1MO	AB	

			R 1	R	R
PREPARER/DATE	BDM	8/12/86	WCP 4-4-89		
CHECKED/DATE	AWL	8/26/86	KBU 4/11/89		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	ELEV(1) / CONTRACT	RM/PAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-2-TS -030-0200A -A EGTS COOLER FAN	2-TS -030-0200A -A 201TAB125JJTTX6		757' 85KJ2-836755	A16	A	100D	L	EGTS HVAC REQUIRED FOR UNIT 1 LOCA MITIGATION.
WBN-1-TS -030-0201A -A PIPE CHASE COOLERS FAN	1-TS -030-0201A -A SEE OPEN ITEM 1		692'	A08	A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A CV/A AF AB	L: ABI OR ESF SIGNAL WILL AUTO START FANS. RH, CV, AF, AB: AUTO START COOLING FANS ON PIPE CHASE HIGH TEMP.
WBN-1-TS -030-0201B -A PIPE CHASE COOLERS FAN	1-TS -030-0201B -A 201TAB125JJTTX6		692' 86PLB-367310	A08	A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A CV/A AF AB	IF ASSOCIATED HS IN STANDBY-TS REQD TO CLOSE ON ROOM HIGH TEM
WBN-1-TS -030-0202A -B PIPE CHASE COOLERS FAN	1-TS -030-0202A -B SEE OPEN ITEM 1		692'	A08	A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A CV/A AF AB	L: ABI OR ESF SIGNAL WILL AUTO START FANS. RH, CV, AF, AB: AUTO-STARTCOOLING FANSON PIPE CHASE HIGH TEMP.
WBN-1-TS -030-0202B -B PIPE CHASE COOLERS FAN	1-TS -030-0202B -B 201TAB125JJTTX6		692' 85KJ2-836755	A08	A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A CV/A AF AB	IF ASSOCIATED HS IN STANDBY-TS REQD TO CLOSE ON ROOM HIGH TEM

			R 1	R	R
PREPARER/DATE	BDM	5/30/86	4-4-87		
CHECKED/DATE	AWL	6/3/86	4/2/87		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-2-TS -030-0207A -B EGTS COOLER FAN	2-TS -030-0207A -B 201TAB125JJTTX5		757' 35KJ2-336755	A15	A	1000	L	EGTS HVAC REQ'D FOR UNIT 1 LOC MITIGATION.
WBN-1-TS -074-0043 -A RHR RETURN LINE BREAK DETECTION	1-TS -074-0043 -A SEE OPEN ITEM 1		713'	A28	A A	15MIN 30MIN	RH/A CV/A	MUST PROVIDE SIGNAL TO INITIATE MANUAL ISOLATION DURING A LINE BREAK
WBN-1-TS -074-0044 -A RHR RETURN LINE BREAK DETECTION	1-TS -074-0044 -A SEE OPEN ITEM 1		713'	A28	A A	15MIN 30MIN	RH/A CV/A	MUST PROVIDE SIGNAL TO INITIATE MANUAL ISOLATION DURING A LINE BREAK
WBN-1-TS -074-0045 -B RHR RETURN LINE BREAK DETECTION	1-TS -074-0045 -B SEE OPEN ITEM 1		713'	A28	A A	15MIN 30MIN	RH/A CV/A	MUST PROVIDE SIGNAL TO INITIATE MANUAL ISOLATION DURING A LINE BREAK
WBN-1-TS -074-0046 -B RHR RETURN LINE BREAK DETECTION	1-TS -074-0046 -B SEE OPEN ITEM 1		713'	A28	A A	15MIN 30MIN	RH/A CV/A	MUST PROVIDE SIGNAL TO INITIATE MANUAL ISOLATION DURING A LINE BREAK

			R 1	R____	R____
PREPARER/DATE	BDM	5/30/86	WEJ 4-4-89		
CHECKED/DATE	AWL	6/03/86	KBW 4/28/89		

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 1 OF 1
			R____ R____
BINDER TITLE STATIC-O-RING	COMPUTED /R1 WCN	DATE 4-4-89	
TEMPERATURE SWITCHES	CHECKED /R1 KBW	DATE 4/28/89	

TAB A

NOTES

1. Elevations shown are Actual elevations for equipment located in the Reactor Building and Floor elevations for equipment located outside the Reactor Building. Actual elevations for all equipment are documented in TAB F.

2. See Page B-1 for source of Category and Operating Time assignments.

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 1 OF 1	R	R		
BINDER TITLE STATIC O-RING		COMPUTED BDM	DATE 5-22-86				
TEMPERATURE SWITCHES		CHECKED AWL	DATE 6/3/86				

TAB B - Checklist for evaluation of environmental qualification including summary and conclusion

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 1 OF 60

BINDER TITLE STATIC O-RING TEMPERATURE SWITCHES

COMPUTED BDM DATE 6-24-86 R ___ R ___

CHECKED [signature] DATE 6/25/86

A. DOCUMENTATION

Equipment Description: Temperature Switches

Vendor/Manufacturer: Static O-Ring

Equipment Model No.(s): 201TA-B125-JJTTX6

201TA-B123-JJTTX7

QUALIFICATION REPORTS

(1) Title/Number/Revision See below RIMS ______

DATE ______

(2) Title/Number/Revision ______ RIMS ______

DATE ______

(3) Title/Number/Revision ______ RIMS ______

DATE ______

OTHER (ANALYSIS, VENDOR DATA, ETC.)

(1) AETC "Generic Qualification of Class 1E Electrical Equipment Used for Nuclear Power Generating Stations", Report No. 17344-82N-D, Rev. 1, Date 2-28-83, (RIMS: EEB 840612 500 and B70 851009 101).

(2) AETC "Qualification Testing and Analysis of Class 1E Electrical Equipment in Accordance with IEEE Standard 323-1974" Addendum I to 17344-82N-D, Report No. 18441-83N, Rev. 1, Date 8-17-83, RIMS: B70 851009 102.

(3) AETC "Generic Qualification of Class 1E Electrical Equipment Used for Nuclear Power Generating Stations", Report No. 17344-82N-C, Rev. 3, Date 2-27-85, (RIMS: B70 851009 103 and B70 851009 101).

A. DOCUMENTATION

OTHER (ANALYSIS, VENDOR DATA, ETC.) (Continued)

(4) AETC "Qualification Testing of Class 1E Electrical Equipment in Accordance with IEEE Standard 323-1974", Report No. 18577-83N, Rev. 1, Dated 7-18-83, RIMS: B43 851223 510.

(5) AETC "Qualification Testing of Class 1E Electrical Equipment in Accordance with IEEE Standard 323-1974", Report No. 18878-84N-2, Rev. 1, Date 8-30-84, RIMS: EEB 850122 301.

(6) Aux. Boiler Category and Operating Times WBNOSG4-006 Rev. 4 (B45 851031 226).

(7) Containment HVAC Category and Operating Times WBNOSG4-008 Rev. 15 (B26 900309 231). R4

(8) RHR Category and Operating Times WBNOSG4-020 Rev. 8 (B26 900309 ~~231~~ 232). WCJ 7/9/90 CAH 7/10/90

(9) Unit 2 Components Required for Unit 1 Operation Category and Operating Times WBNOSG4-040 Rev. 7 (B26 900327 203).

(10) Calculation WBNTSR-014 R0 (B26 890725-551).

(11) DCA-P02351-17-0

(12) NTS "Report of Test for SLB Testing of SOR Model 12TA-B4-NX-C1A-JJX6 Pressure Switch" Report No. 21510-86N, Revision 0, dated January 14, 1986. R4

(13) Deleted

(14) Material Aging Calculation (WAC-92).

(15) System 30 Demonstrated Accuracies (B43 851029 926).

(16) System 12 Demonstrated Accuracies (B43 851121 915).

(17) HVAC and RHR Demonstrated Accuracies (see Open Item No. 1).

(18) HVAC Set-point Evaluation (B45 860317 236).

(19) Aux. Boiler Set-point Evaluation (B45 860530 219) (see Open Item No. 2)

(20) HVAC and RHR Set-point Evaluation (see Open Item No. 1)

A. DOCUMENTATION

OTHER (ANALYSIS, VENDOR DATA, ETC.) (Continued)

(21) SCR WBNEQP8603/R1 (B71 860509 007).

(22) 100 Day LOCA Dose in EGTS WBNNAL3-031 Rev. 1 (B45 880826 235). R1

(23) NCRs 6224/RO and 6774/RO.

(24) Deleted R1

(25) SOR Letter Addressing Qualified Life (EEB 840802 004).

(26) SOR Confirmation Letter (B71 860521 100).

(27) Environmental Data Drawing 47E235-85 Rev. 1.
(28) Environmental Data Drawing 47E235-86 Rev. 1.
(29) Environmental Data Drawing 47E235-46 Rev. 1.
(30) Environmental Data Drawing 47E235-47 Rev. 2.
(31) Environmental Data Drawing 47E235-48 Rev. 3.
(32) Environmental Data Drawing 47E235-49 Rev. 2. R1
(33) Environmental Data Drawing 47E235-56 Rev. 1.
(34) Environmental Data Drawing 47E235-57 Rev. 2.
(35) Environmental Data Drawing 47E235-59 Rev. 2.
(36) Environmental Data Drawing 47E235-60 Rev. 1.
(37) Environmental Data Drawing 47E235-78 Rev. 3.
(38) Environmental Data Drawing 47E235-61 Rev. 1.

(39) SOR Confirmation Letter Addressing Switch Orientation B71 860610 100

Note: All references in this section are to AETC Test Report 17344-82N-C unless otherwise stated.

Note: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. This listing includes only those documents which are essential to qualification and accordingly should not be considered a complete listing of binder references. R1

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 3 OF 60
			R 3 R
BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 8/27/86 WCJ? 10-17-89	
TEMPERATURE SWITCHES	CHECKED AWL	DATE 8/27/86 HOR 10-17-89	

B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified

___ Equipment Satisfies All Requirements Except Qualified Life or Justification of Replacement Schedule

___ Equipment Qualification Not Established by Documentation

___ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES

(1) SCRWBNEQP8603 must be implemented and closed.

(2) Set-point evaluation outstanding for system 12 switches. The demonstrated accuracy and set-point evaluations must be revised for system 30 temperature switches.

(3) Deleted

(4) Deleted | R3

(5) Deleted

COMMENTS/RECOMMENDATIONS None

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 4 OF 60

R 1 R

BINDER TITLE STATIC-O-RING COMPUTED BDM DATE 5/22/86 wa? 4-4-89

TEMPERATURE SWITCHES CHECKED AWL DATE 6/03/86 KG 4/29/89

C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate Which Criteria is Applicable):

X Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE323-1974)

___ Components are Qualified to the Criteria of NUREG-0588 Category II or the DOR Guidelines of 1E Bulletin No. 79-01B (IEEE323-1971) (DOR Guidelines Applicable to only BFN) |R1

JUSTIFICATION/COMMENTS

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

IEEE 323-1974

IEEE 344-1975

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 5 OF 60

R ____ R ____

BINDER TITLE STATIC O-RING COMPUTED BLM DATE 5-31-86

TEMPERATURE SWITCHES CHECKED AAIR DATE 6/3/86

D. QUALIFICATION METHODOLOGY (Check only one block)

____ Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

X Test of Similar Items with Supporting Analysis

____ Analysis in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

____ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS The Certificates of Conformance (see TAB C, Section 16) for these temperature switches list the first four reports in Section A as applicable to show generic qualification. Report 17344-82N-C is mainly used as a basis for qualification of these switches. The fifth report, 18878-84N-2, is used to obtain an activation energy for silicone rubber and for thermal aging data on silicone rubber.

Qualification of the temperature switches is accomplished by considering separately the two basic subassemblies of the device. The temperature switch is composed of the switch (electrical) and the sensor (mechanical).

Examination of catalog information (TAB E) shows that the switch subassembly is identical to that tested in 17344-82N-C with two exceptions - the material used in the secondary diaphragms and the attachment at the pressure port.

TVA 19537 (OE-3-86) EQP105.41

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 6 OF 60	R		R	
BINDER TITLE STATIC O-RING		COMPUTED BDm	DATE 5-31-86				
TEMPERATURE SWITCHES		CHECKED RWR	DATE 6/3/86				

JUSTIFICATION/COMMENTS (Continued)

The secondary diaphragms of the plant equipment have grey silicone rubber (see TAB C, Section #22 on index); the tested switch has fluorinated silicone on dacron polyester cloth. Several factors allow the assumption that the silicone rubber is as good as or better than the fluorinated silicone on dacron polyester cloth for this application. These are:

1) The fluorinated silicone and silicone rubber are both members of the silicone family of materials. The activation energy, which is an indication of thermal stability, is higher for silicone rubber (1.59eV - see 18878-84N-2, Section 3.0) than it is for fluorinated silicone (1.2eV - see 17344-82N-C, Appendix D) or for dacron polyester cloth (1.18eV - see 17344-82N-C, Appendix D). Therefore, the silicone rubber is less susceptible to the long-term effects of time and temperature.

2) Silicone rubber has been thermally aged for 131 hours at 280°F (see 18878-84N-2, Appendix E). This represents a life of 725 years at the normal and abnormal service temperatures (see calculation WAC-92 in TAB C). Therefore, silicone rubber is not sensitive to thermal aging at these temperatures.

3) Silicone rubber has been subjected to 325°F (peak) in an HELB

JUSTIFICATION/COMMENTS (Continued)

simulation (See 18878-84N-2, Section 7.5.2). This temperature very adequately envelops the maximum accident temperature (219°F) for the areas in which these switches are located. Therefore, silicone rubber is not sensitive to accident temperatures for this application.

4) Radiation testing has been done on the silicone rubber to a dose of 3.3×10^7 rads (see 18441-83N, Section 5.1.B). Therefore, silicone rubber is not significantly affected by radiation doses of least 3.3×10^7 rads.

In conclusion, the silicone rubber can perform as well as or better than the fluorinated silicone in the plant applications.

The attachment at the pressure port of a pressure switch is a pressure port fitting; in a temperature switch it is a temperature bulb (see Sales Manuals in TAB E). In this binder, the temperature bulb is considered as a separate subassembly in the qualification of the temperature switch.

Therefore, the testing performed on the pressure switch in 17344-82N-C is representative of the environment in which the switch subassemblies are located in the plant providing that radiation exposure for a 40-year life plus DBE accident is limited to 3.3×10^7 rads.

JUSTIFICATION/COMMENTS (Continued)

The sensor subassembly is a purely mechanical device consisting of a T316 stainless steel tube filled with Dupont "Freon-12" charge material (see 18441-83N, pg 5-6). Being such, this device is not required to be qualified to IEEE 323-1974. It will, however, be evaluated to demonstrate that it would not be affected by the accident environments to which it could be exposed.

The stainless steel is not sensitive to the temperature and radiation levels being considered in this binder.

"Freon-12" is not susceptible to thermal aging at the temperatures being considered as evidenced by the thermal decomposition data in 18441-83N, Appendix E. It shows a decomposition rate of 1% per year at at temperatures greater than 900°F. Irradiation testing performed on the temperature switch in 18441-83N, Section 5.1.B, shows that "Freon-12" is not significantly affected by doses to at least 3.3×10^7 rads.

Therefore, based on the data presented above and on sound engineering rationale, the mechanical temperature bulb assembly could withstand the harsh environments under consideration in this binder.

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 9 OF 60 R 1 R
BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 6/04/86 wcp 4-4-89	
TEMPERATURE SWITCHES	CHECKED AWL	DATE 6/04/86 KBJ 4/23/89	

E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification documentation identical to the plant equipment which requires qualification (Yes/No/NA)? No

	Plant Device	Qualification Document	Reference
(1) Equipment Type	Temperature Switch	See (1) below	
(2) Manufacturer	Static O-Ring	Static O-Ring	Sect. 3.0 pg 3-1
(3) Model Number(s)	201TA-B125-JJTTX6	12TA-B4-NX-C1A-JJTTX6	Add. I, Sect. 3.0 pg 3-2
	201TA-B123-JJTTX7	201TA-B125-JJ (See (2) below)	Add. I, Sect. 3.0 pg 3-1
(4) Serial Number(s)	See Sheet 10	82-6-384	Sect. 3.0 pg 3-1 R1
		83-4-3530	18441-83N, Sect. 3.0 pg 3-2

(5) Identify Component-Unique checksheet attached: None

JUSTIFICATION/COMMENTS

(1) The temperature switch is qualified using tests of pressure switches (17344-82N-C and 18878-84N-2) and a test of a temperature switch (18441-83N).

(2) The differences between the plant model and the models tested are in the last section of the model numbers (i.e. -JJTX6 versus - JJ and 125 versus 123)(See page 11).

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 10 OF 60 R 1 R 3
BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 8/12/86 WCG 4/4/89	WCP 10-17-89
TEMPERATURE SWITCHES	CHECKED AWL	DATE 8/25/86 KBN 4/28/89	HDK 10-17-89

1. From TAB B, Section E(4):

EIN	Serial Numbers	PO Number	
0-TS-12-94A	85-7-4260	85K1C-837662	
0-TS-12-94B	86-10-2389R	86PLB-376059	R3
0-TS-12-97A	85-7-4262	85K1C-837662	
0-TS-12-97B	85-7-4263	85K1C-837662	
0-TS-30-192A	84-9-3733	84KN2-835754	
0-TS-30-192B	85-3-3457	85KJ2-836755	
0-TS-30-193A	84-9-3734	84KN2-835754	
0-TS-30-193B	85-3-3452	85KJ2-836755	
1-TS-30-194A	84-2-249	83XJ9-833871	
1-TS-30-194B	85-3-3439	85KJ2-836755	
1-TS-30-195A	84-2-250	83XJ9-833871	
1-TS-30-195B	85-3-3440	85KJ2-836755	
1-TS-30-196A	84-2-252	83XJ9-833871	
1-TS-30-196B	85-3-3437	85KJ2-836755	
1-TS-30-197A	84-2-254	83XJ9-833871	
1-TS-30-197B	85-3-3438	85KJ2-836755	
1-TS-30-201A	*	*	
1-TS-30-201B	85-12-269	86PLB-367310	
1-TS-30-202A	*	*	
1-TS-30-202B	85-3-3444	85KJ2-836755	
2-TS-30-194A	84-2-248	83XJ9-833871	
2-TS-30-194B	85-3-3449	85KJ2-836755	
2-TS-30-195A	84-2-251	83XJ9-833871	
2-TS-30-195B	85-3-3450	85KJ2-836755	
2-TS-30-200A	85-3-3451	85KJ2-836755	
2-TS-30-207A	85-3-3458	85KJ2-836755	
1-TS-74-43	*	*	
1-TS-74-44	*	*	
1-TS-74-45	*	*	
1-TS-74-46	*	*	

* See Open Item No. 1

JUSTIFICATION/COMMENTS (Continued)

2. From TAB B, Section E(3): (Continued)

TT = 316 stainless steel tag permanently attached to the housing (reference TAB E).

X6 = Designates the required documentation for a nuclear qualified switch (reference SOR letter in TAB C).

X7 = Designates nuclear qualified switch and also indicates it has a smaller temperature bulb.

123 = Contains a special spring size which results in a quicker response time and a narrower range (40-150°F).

125 = Contains standard spring and has a range of 40-225°F.

Reference: TAB C, SOR Confirmation letter; TAB E, Vendor Drawings and Sales manual.

F. INSTALLATION INTERFACES

List all interfaces pertinent to EQ identified in the qualification documentation and/or evaluation and reference the source. Is the interface a requirement for our application (Yes/No)? (Note below.) If yes, enter requirement in QMDS, if no, provide justification.

Interface	Identify Interface	Plant Requirement? (Yes/No)	Reference Test Report
Mounting Bolts	See (1) below	Yes	Sect. 7.8.1 pages 7-19
External Process Connections	None	NA	NA
Electrical Connections	See (4) on page 13	NA	NA
Conduit Seals	See (2) below	No	Sect. 7.10.4 pages 7-37
Connector Seals	See (4) on page 13	NA	NA
Orientation	See (3) page 13	Yes	Sect. 7.10.4 pages 7-37
Physical Configuration	None	NA	NA
Other	See (4) and (5), page 13	Yes	See (4) and (5)

JUSTIFICATION/COMMENTS

(1) 3 Standard grade 1/4" U-bolts; this requirement is also stated in SOR's general instructions for qualified switches - SOR document No. 8215-439R1 (reference TAB H, page 1).

(2) The Environmental Drawings identify areas with high potential for condensate formation and specifies conduit sealing requirements (see Section K(6) of TAB B). Additionally, conduit seals are required by the test report; however, since SOR provides seals as an integral part of their qualified R4

From TAB B, Section F: (Continued)

switches, a conduit seal requirement is not necessary for the plant equipment.

(3) Test report 17344-82N-C mounted the unit with the pressure port vertical axis parallel to earth. The general instruction sheet sent with the switches, however, states that the switches should be mounted with the pressure port vertical axis oriented downward. The purpose of testing the switch in the horizontal position was to show that the switch is not position sensitive. (Reference TAB C).

(4) The test report does not identify a requirement for the interface to field wiring: however, connections should be per qualified plant procedures and sealed with Raychem heat-shrink tubing. Refer to Binder WBNEQ-SPLC-001 regarding qualification of the Raychem splice.

(5) Test report 17344-82N-C tested a pressure switch with a plugged housing which resulted in severe setpoint shifts due to pressure buildup in the housing at high temperatures (LOCA testing). Report 18577-83N is a LOCA test of a second switch with the housing vented. In this test the setpoint shift was acceptable. For plant applications, housing venting requirements are dependent upon local temperature extremes. Venting is required for components located in environments with maximum accident temperatures greater than their abnormal temperatures. (See TAB G, QMDS). |R1

G. TEST SEQUENCE

(1) Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE-323 (74), paragraph 6.3.2 (yes/no/NA)? (note below)

	Yes/No/NA	Reference (1)
(a) Equipment inspected for damage	Yes	Sect. 2.0 page 2-1
(b) Baseline performance measurements taken	Yes	Sect. 2.0 page 2-1
(c) Equipment aged:		
Thermal	Yes	Sect. 2.0 page 2-1
Radiation	Yes	See (2) below
Wear	Yes	Sect. 2.0 page 2-1
(d) Vibration/seismic testing conducted	Yes	Sect. 2.0 page 2-2
(e) Design basis event (DBE) exposure	Yes	Sect. 2.0 page 2-2
(f) Post-DBE exposure	Yes	Sect. 2.0 page 2-2
(g) Final inspection and disassembly	NO	**See page 14A

(2) Was the same piece of equipment used throughout the test sequence described in item (1) above (yes/no/NA)? Yes (Reference *See page 14A).

(3) Have the test equipment, test equipment accuracies and calibration data been appropriately documented (yes/no/NA)? Yes (Reference See (3) below).

JUSTIFICATION/COMMENTS (1)References refer to AETC Test Report 17344-82N-C unless otherwise stated. (2)18441-83N, Section 5.1.B, page 5-2 and Section 2.0 of 17344-82N-C, page 2-2. (3)Appendix E of 17344-82N-C and Appendix F of Addendum I to 17344-82N-D.

*During the accelerated aging, SOR replaced the "N6" switch housing with a "TA" type (See 17344-82N, Section 7.2.3, page 7-42). The epoxy lead wire seal, with cover gasket and silicone thread sealant also were replaced; however, a supplemental thermal aging was conducted to compensate. The remainder of the test sequence was completed with the same device.

**Final disassembly and inspection of the test device was not performed; however, a post-accident visual inspection was performed.

H. AGING

(1) Was aging considered in the qualification program (Yes/no/NA)? Yes (Reference See Comments).

JUSTIFICATION/COMMENTS Sections 7.2, page 7-6; 7.3, page 7-13; 7.5, page 7-16; 7.8.5, page 7-25; and 5.1.B 18441-83N, page 5-2.

(2) Were the following effects considered in the aging program:

Aging Effect	Yes/No/NA	Reference
Thermal aging	Yes	Sect. 7.2 page 7-6
Radiation exposure	Yes	See (1) below
Vibration (non-seismic) aging	Yes	Sect. 7.8.5 page 7-25
Operational (electrical/mechanical/process) stress aging	Yes	Sect. 7.3 page 7-13

JUSTIFICATION/COMMENTS (1)Section 7.5, page 7-16 and Section 5.1.B of 18441-83N.

(3) Were all known synergistic effects which are believed to have a significant effect on equipment performance considered in the aging program (yes/no/NA)? Yes (Reference See Comments).

JUSTIFICATION/COMMENTS No synergistic effects are known for the material contained within this device in its specific configuration (O-Ring). Any unknown synergistic effects will be compensated for by the large margin in testing (Section 7.7, pages 7-17 and 18).

(4) Thermal Aging:

(a) Was thermal aging considered in the qualification program (yes/no/NA)? Yes (Reference Section 7.2, page 7-6).

JUSTIFICATION/COMMENTS None

H. (4) Thermal Aging: (Continued)

(b) Were the materials susceptible to thermal aging degradation identified in the qualification program (yes/no/NA)? Yes (Reference: See Comments).

JUSTIFICATION/COMMENTS 17344-82N-C, Appendix D, 18878-84N-2, Section 3.0, and 18441-83N, Appendix E.

(c) Was the basis for thermal aging identified in the qualification program (yes/no/NA)? Yes (Reference See Comments).

JUSTIFICATION/COMMENTS Appendix F, Section 9.1, page 41.

(d) Was the aging acceleration rate justified and the parameters of time and temperature identified in the qualification program (yes/no/NA)? Yes (Reference Section 7.2.3, page 7-11).

Parameter	Plant Maximum Normal	Test	Equivalent
Temperature (°F)	*111.06	302	111
Time	40 Years	100 Hrs	1004.75 Years

JUSTIFICATION/COMMENTS *Plant maximum normal includes 1% of 40-year plant life at maximum abnormal temperature.

See TAB C for equivalent life calculation.

(e) Was the Arrhenius methodology used for accelerated aging (yes/no/NA)? Yes (Reference Section 5.2, page 5-2).

JUSTIFICATION/COMMENTS

(f) If activation energies were used for determining accelerated aging parameters, are they properly referenced to the source of the technical data (yes/no/NA)? Yes (Reference See Comments).

JUSTIFICATION/COMMENTS 17344-82N-C, Appendix D, 18878-84N-2, Section 3.0, and 18441-83N, Appendix E. (See page 17 for further discussion).

H. (4) Thermal Aging, Section (f): (Continued)

However, the actual Arrhenius calculations are found in Section 7.3, pages 7-9 and 7-11. Originally, the weak-link material in the switches was thought to be nitrile rubber with an activation energy of 1.04eV. Thus, an aging time of 277.7 hours was determined (Section 7.2.1, page 7-9). Subsequent to the aging process, data was provided to show that nitrile rubber was not present in the switch. Thus, based on data in Appendix D, the actual weak-link material was a dacron polyester cloth with an activation energy of 1.18eV. Prior to irradiation, SOR replaced the N6 housing with a TA housing which involved replacement of some previously aged components (Section 7.2.3, page 7-11). Therefore, a supplemental thermal aging was done to retain the aged status of the test unit. The plant devices, however, do not have dacron polyester cloth. Instead, they have grey silicone rubber (see TAB C, Section 22) which has an activation energy of 1.59 eV (18878-84N-2, Section 3.0). That then makes the weak-link material for the switch to be the Emmerson and Cummings 2651 Epoxy Potting Compound with an activation energy of 1.24 eV. The Arrhenius calculations for the supplemental aging are found in 17344-82N-C, pages 7-11 and 7-13 and calculate the qualified life for switches with the dacron polyester cloth. The qualified life for the plant devices is determined by calculations found in TAB C, Section 9.

H. (4) Thermal Aging: (Continued)

(g) If a regression line were used for determining accelerated aging parameters, are test points or failure modes identified on the line (yes/no/NA)? NA (Reference NA).

JUSTIFICATION/COMMENTS None

(h) Was the equipment operated during the thermal aging (yes/no/NA)? No (Reference Section 7.2.2, page 7-10).

JUSTIFICATION/COMMENTS Only contact resistance measurements were taken during thermal aging.

(5) Radiation Aging Exposure:

(a) Was radiaton aging exposure considered in the qualification program (yes/no/NA)? Yes (Reference Section 7.5, page 7-16).

JUSTIFICATION/COMMENTS See (1) page 19.

(b) Were the materials susceptible to radiation degradation identified in the qualification program (yes/no/NA)? No (Reference Section 7.7, page 7-17 and 18441-83N, Section 5.1.B).

JUSTIFICATION/COMMENTS See (2) page 19.

(c) Was the basis for radiation aging exposure identified in the qualification program (yes/no/NA)? No (Reference See Comments).

JUSTIFICATION/COMMENTS See (2) page 19.

(1) From TAB B, Section H(5)(a): (Continued)

Radiation withstand capability of the switch part of the device is proven in Section 7.5 of 17344-82N-C, where the device is exposed to $2.2x10^8$ rads and then successfully completes the seismic and LOCA portions of the test. However, withstand capability of the grey silicone rubber in the secondary diaphragm and of the temperature-sensing bulb is proven in Addendum I of 17344-82N-D, where it is irradiated to $3.3x10^7$ rads.

(2) From TAB B, Sections H(5)(b)and H(5)(c): (Continued)

A generic level of irradiation was administered in both reports. The $2.2x10^8$ rads dose was generic for inside containment (see Section 7.5 of 17344-82N-C) and the $3.3x10^7$ rads dose was generic for outside containment (see Section 5.5 of 17344-82N-D, page 5-6).

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BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 6/13/86	4-4-89
TEMPERATURE SWITCHES	CHECKED AWL/RNB	DATE 6/13/86	4/20/89

H. AGING (Continued)

(5) (d) Is the radiation test exposure dose and dose rate acceptable (Yes/No/NA)? Yes (Reference: See Comments).

Plant normal ambient radiation dose (rd) — 7.5×10^6 rads (737'P.C.)

Test exposure dose (rd) — *$2.2\text{x}10^8$ rads/$3.3\text{x}10^7$ rads

Test exposure dose rate (rd/hr) — *$2.36\text{x}10^6$ rads/hr

*$2.2\text{x}10^5$ rads/hr

Test exposure source type (e.g., Co-60 gamma) — *Cobalt-60 Gamma

JUSTIFICATION/COMMENTS *Section 7.5 of 17344-82N-C, Addendum I of 17344-82N-D. R1

(6) Vibration (non-seismic) Aging:

(a) Were the effects of non-seismic vibration induced during normal and abnormal operation addressed in the qualification program[1] Yes (Reference: Section 7.8.5, page 7-25). R1

JUSTIFICATION/COMMENTS None

(b) Was the basis for vibration aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: Section 7.8.5, page 7-25).

JUSTIFICATION/COMMENTS None

(7) Operational Stress Aging:

(a) Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation adressed in the qualification program (Yes/No/NA)? Yes (Reference: Section 7.3, page 7-13).

JUSTIFICATION/COMMENTS None

[1] Qualification program refers to the test report and any supplemental documentation including TVA analyses in TAB C of the Binder. R1

H. AGING (Continued)

(7) (b) Was the basis for stresses induced during operational aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: Section 7.3, page 7-13).

JUSTIFICATION/COMMENTS None

(8) Was the qualified life of the equipment and its basis defined in the qualification program (Yes/No/NA)? Yes (Reference: Section 7.2.3, pages 7-11 and 7-13).

Qualified life (Document in QMDS) 40 years

JUSTIFICATION/COMMENTS See note (1) on page 22.

(9) Were replacement intervals for the equipment or its components defined in the qualification program (Yes/No/NA)? No (Reference: See Comments).

R1

JUSTIFICATION/COMMENTS The qualification program does not define any replacement intervals for the switch or any of its components. SOR, however, does require replacement of the cover gasket whenever the cover is removed. (See TAB H - SOR General Instructions 8215-475, Rev. 2, and TAB I - SOR Dimensional Drawing 8215-602, Rev. 1.)

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BINDER TITLE STATIC O-RING	COMPUTED BDM	DATE 9-3-86	R ___ R ___
TEMPERATURE SWITCHES	CHECKED AWL	DATE 9/3/86	

From TAB B, Section H(8):

(1) The service temperature of 160°F used in Section 7.2.3 is higher than e maximum normal/abnormal temperatures seen by the switches in their varus locations. The qualified life calculation is based on the worst case "maximum normal temperature" of 111°F and the "maximum abnormal temperature" of 117°F (see TAB C for calculation). Reference TAB B Section (K) for maximum normal and abnormal temperatures, for respective locations.

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 23 OF 60
			R ___ R ___
BINDER TITLE STATIC O-RING		COMPUTED BDM DATE 6-13-86	
TEMPERATURE SWITCHES		CHECKED [illegible] DATE 6-13-86	

I. MATERIALS ANALYSIS

Identification of Materials Susceptible to Significant Thermal and/or Radiation Degradation and Aging (Use Section C of EQC Binder for Detailed Materials Analysis)

	Material/Property/Function	Radiation Threshold	Reference	Activation Energy	Reference
(a)	Viton E60C or Fluorel 2174	Not Given		1.32eV	See (1) below
(b)	Nomex Paper	Not Given		1.60eV	See (1) below
(c)	Silicone Rubber	Not Given		1.59eV	See (1) below
(d)	Ethylene Propylene Rubber	Not Given		1.28eV	See (1)&(3) below
(e)	Emerson & Cummings 2651 Epoxy Potting Compound	Not Given		1.24eV	See (1) below
(f)	Belden No. 32418, Silicone Rubber Glass Braid Impregnated	Not Given		1.51eV	See (1) below
(g)	Rodgers No. 640 Glass Filled Phenolic	Not Given		1.75eV	See (1) below
(h)	Grey Silicone Rubber	Not Given		1.59eV	See (1) below
(i)	Kapton Polyimide	Not Given		1.41eV	See (1) below

JUSTIFICATION/COMMENTS

(1) The materials for the temperature switch were taken from the comparison list in Addendum I of 17344-82N-D. Activation energies for all materials except grey silicone rubber were taken from 17344-82N-C, Appendix D. The activation energy for grey silicone rubber was taken from Section 3.0 of 18878-84N-2 (TAB D).

(2) Material function can be found in 18878-84N-2, Section 3.0 (TAB D).

(3) A literature search has determined that the only material subject to synergistic effects is ethylene propylene rubber used in the O-Ring.

I. MATERIALS ANALYSIS (Continued)

The onset of synergistic effects occurs at relatively high dose levels compared to normal service conditions and therefore is not a significant aging concern. Figure 2 of NUREG/CR-2157 shows a relationship between dose rate and dose for an EPR material. Up to about 10 to 20 Mrad there is an insignificant difference in observed property degradation due to the dose rate effect, especially in view of the normal variation in properties experienced by EPRs over this same range. Low service doses should minimize the impact of potential synergisms with respect to aging for this equipment.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(1) Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics which would constitute failure if not met (yes/no/NA)? Yes (Reference See page 25).

Identify Acceptance Criteria: See page 25.

(2) Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment which should be verified before, after, and periodically during the test to judge equipment performance (yes/no/NA)? Yes (Reference See page 25).

Identify baseline and functional testing: See page 25.

JUSTIFICATION/COMMENTS None

(3) Does the qualification report/analysis describe loads (or load combinations) applied during DBE test (yes/no/NA)? Yes (Reference Section 7.10.5, page 7-42).

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 25 OF 60

R ____ R ____

BINDER TITLE STATIC O-RING TEMPERATURE SWITCHES

COMPUTED BDM DATE 5-22-86

CHECKED AWR DATE 6/3/86

From TAB B, Sections J(1) and (2):
(Reference 17344-82N-C, Appendix F, Sections 7.0 and 16.0)

1. Dielectric Withstand Voltage

Baseline Criteria: less than 2mA leakage at 1240 VAC rms applied for 1 minute

Post-LOCA Criteria: Same

2. Insulation Resistance

Baseline Criteria: Greater than 100 M at 500 VDC applied for 1 minute

Post-LOCA Criteria: Greater than or equal to 1 M at 500 VDC applied for 1 minute

3. Contact Resistance

Baseline Criteria: 200 M less than at 1 amp

Post-LOCA Criteria: Same

4. Overpressure Test

Baseline Criteria: No pressure loss at 200 psig

Post-LOCA Criteria: Same

5. Operability

Baseline Criteria: Must operate within the adjustable range

Post-LOCA Criteria: Must actuate on increasing and decreasing pressure at rated voltage and current. Setpoint repeatability was not required due to the temperature-influenced shift on the setpoint.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(4) Do the applied loads during baseline testing reflect normal operating conditions (Yes/No/NA)? Yes (Reference: See below).

JUSTIFICATION/COMMENTS Only the applied load during DBE was identified - 120 VAC at 5A (Section 7.10.5, page 7.42).

(5) Identify electrical characteristics necessary to ensure the equipment performance specifications can be satisfied.

(a)

Parameter	Plant Normal Conditions	Reference
Voltage	120 VAC	(1)
Load	NA	
Frequency	60 ± 0.6 Hz	(1)
Accuracy	NA	
Other(s)		
NA		

JUSTIFICATION/COMMENTS (1) Variations in voltage, load, and frequency are accounted for in the design process and will not vary from the continuous operating characteristics outlined in section 8.3.1 of Watts Bar Final Safety Analysis Report. R1

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(b)

Parameter	Specific Accident Conditions	Reference	
Voltage	120 ± 2.4 VAC	(1)	R1
Load	NA		
Frequency	60 ± 0.6 Hz	(1)	R1
** Accuracy	201TA-B125-JJTTx6 * ±8.19°F 201TA-B125-JJTTx7 ± 8.00°F	TAB C, B45860317236 TAB C, B45860530219	
Other(s)	NA		

JUSTIFICATION/COMMENTS (1) Variations in voltage, load, and frequency are accounted for in the design process and will not vary from the continuous operating characteristics outlined in section 8.3.1 of Watts Bar Final Safety Analysis Report (FSAR) |R1

(c)

Parameter	Demonstrated Conditions	Reference	
Voltage	120 VAC	Sect. 7.10.5 page 7-42	
Load	5A	Sect. 7.10.5 page 7-42	
Frequency	NA		
** Accuracy	201TA-B125-JJTTx6 * 201TA-B123-JJTTx7 ± 7.07°F	* TAB C TAB C, B43 851121 915	
Other(s)			

JUSTIFICATION/COMMENTS

* See Open Item No. 2. |R1

** The demonstrated accuracy and the set-point evaluation calculations for components under SCR 8603 are outstanding (See Open Item No. 1). |R1

PLUSEQ/139.41

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 28 OF 60 R 1 R
BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 6/03/86	wcr 4-4-89
TEMPERATURE SWITCHES	CHECKED AWL/RNB	DATE 6/03/86	KBU 5/24/89

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-85, -86 (692' Rm A29) |R1

(1) Normal Max

(a) Temperature (°F) 111

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 63

(d) Radiation (rd) 1.7×10^{6} gamma

(2) Abnormal Max

(a) Temperature (°F) 117

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 70

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: These conditions could exist for up to 8 hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	219	Accident type	AB
(b) Pressure (psig)	0.20	Accident type	AB
(c) Humidity (%)	100	Accident type	AB
(d) Radiation (rd)	Less than 1×10^{4} gamma	Accident type	L |R1
(e) Spray Type	NA	Accident type	NA

|R1

PLUSEQ/139.41

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Accident temperature and pressure will decrease linearly to the normal maximum values at the end of 24 hours.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? No (Reference: See Environmental Data Drawing 47E235-85).

(7) Subject to submergence (Yes/No/NA)? No (Reference: See pages B-51 and B-52). R1

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? No*
(Reference: Environmental Data Drawing 47E235-85).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: NA R1

* Location is outside the reactor building, therefore, no beta contribution.

(9) Special environmental calculations (temp., rad., etc.) R1

Type	RIMS No.
See TAB B, Section A	See TAB B, Section A

R1

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 30 OF 60
			R 1 R
BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 6/03/86 WCP 4-4-89	
TEMPERATURE SWITCHES	CHECKED AWL	DATE 6/03/86 KEW 4/20/89	

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-85, -86 (692' Rm A30) |R1

(1) Normal Max

(a) Temperature (°F) 111

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 63

(d) Radiation (rd) 2.0×10^6 gamma

(2) Abnormal Max

(a) Temperature (°F) 117

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 70

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: These conditions could exist for up to 8 hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 219 Accident type AB

(b) Pressure (psig) 0.20 Accident type AB

(c) Humidity (%) 100 Accident type AB

(d) Radiation (rd) Less than 1×10^4 gamma Accident type L |R1

(e) Spray Type NA Accident type NA

|R1

PLUSEQ/139.43

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Accident temperature and pressure will decrease linearly to the normal maximum value at the end of 24 hours.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? No (Reference: See Environmental Data Drawing 37E235-85). R1

(7) Subject to submergence (Yes/No/NA)? No (Reference: See pages B-51 and B-52). R1

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? No*
(Reference: Environmental Data Drawing 47E235-85).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: NA R1

* Location is outside the reactor building, therefore, no beta contribution.

(9) Special environmental calculations (temp., rad., etc.) R1

Type	RIMS No.	
See TAB B, Section A	See TAB B, Section A	R1

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-46, -47 (737' Rm A01) |R1

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 80

(d) Radiation (rd) $1.8x10^3$ gamma

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 90

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: These conditions could exist for up to 8 hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 128 Accident type RH

(b) Pressure (psig) 0.03 Accident type AF/AB

(c) Humidity (%) 100 Accident type RH/CV/AB/AF

(d) Radiation (rd) Less than $1x10^4$ gamma Accident type LOCA/HELB |R1

(e) Spray Type NA Accident type NA

R1

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Accident temperature and pressure will decrease linearly to the normal maximum values at the end of 24 hours.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? No (Reference: See Environmental Data Drawing 47E235-46).

(7) Subject to submergence (Yes/No/NA)? No (Reference: See pages B-51 and B-52). R1

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? No*
(Reference: Environmental Data Drawing 47E235-46).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: NA R1

* Location is outside the reactor building, therefore no beta contribution.

(9) Special environmental calculations (temp., rad., etc.) R1

Type	RIMS No.	
See TAB B, Section A	See TAB B, Section A	R1

PLUSEQ/139.46

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 34 OF 60		R 1	R 2
BINDER TITLE STATIC-O-RING	COMPUTED BDM		DATE 6/05/86		WCG 04/04/89	WCG 7-26-89
TEMPERATURE SWITCHES	CHECKED AWL		DATE 6/05/86		KBN 04/28/89	RCF 8/3/89

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-48, -49 (737' Rm A05)

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 80

(d) Radiation (rd) 8.8×10^5 gamma

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 90

(d) Radiation (rd) NA R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: These conditions could exist for up to 8 hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	195	Accident type	RH/A
(b) Pressure (psig)	0.03	Accident type	RH/A
(c) Humidity (%)	100	Accident type	RH/CV/AB/AF
(d) Radiation (rd)	6.21×10^5 *	Accident type	LOCA/HELB R2
(e) Spray Type	NA	Accident type	NA

*Worst case value for this area obtained from Calculation WBNTSR-014. R2

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Accident temperature and pressure will decrease linearly to the normal maximum at the end of 24 hours.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: See Environmental Data Drawing 47E235-48, note 47). R1

(7) Subject to submergence (Yes/No/NA)? No (Reference: See pages B-51 and B-52). R1

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? No* (Reference: Environmental Data Drawing 47E235-48).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: NA R1

* Location is outside the reactor building, therefore no beta contribution.

(9) Special environmental calculations (temp., rad., etc.) R1

Type	RIMS No.
See TAB B, Section A	See TAB B, Section A

R1

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 36 OF 60	R 1	R 2
BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 6/03/86		WCG 04/04/89	wcg 7-31-89
TEMPERATURE SWITCHES	CHECKED AWL	DATE 6/03/86		KBN 04/28/89	RCF 8/2/89

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-56, -57 (713' Rm A06)

(1) Normal Max		(2) Abnormal Max	
(a) Temperature (°F)	104	(a) Temperature (°F)	110
(b) Pressure (psig)	ATM(-)	(b) Pressure (psig)	ATM(-)
(c) Humidity (%)	80	(c) Humidity (%)	90
(d) Radiation (rd)	2.2×10^6 gamma	(d) Radiation (rd)	NA

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: These conditions could exist for up to 8 hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	199*	Accident type	RH	R2
(b) Pressure (psig)	0.03	Accident type	AB	
(c) Humidity (%)	100	Accident type	RH/CV/AB/AF	
(d) Radiation (rd)	2×10^6	Accident type	LOCA/HELB	
(e) Spray Type	NA	Accident type	NA	

*Value obtained from DCA-P02351-17-0 R2

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 37 OF 60
R 1 R

BINDER TITLE STATIC-O-RING COMPUTED BDM DATE 8/19/86 4-4-89

TEMPERATURE SWITCHES CHECKED AWL DATE 8/26/86 4/12/89

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Accident temperature and pressure will decrease linearly to the normal maximum values at the end of 24 hours.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: See Environmental Data Drawing 47E235-56, note 47). R1

(7) Subject to submergence (Yes/No/NA)? No (Reference: See pages B-51 and B-52). R1

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? No*
(Reference: Environmental Data Drawing 47E235-56).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: NA R1

* Location is outside the reactor building, therefore no beta contribution.

(9) Special environmental calculations (temp., rad., etc.) R1

Type	RIMS No.
See TAB B, Section A	See TAB B, Section A

R1

PLUSEQ/139.50

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-60, -59 (692' Rm A08)

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 80

(d) Radiation (rd) $7.5x10^6$ gamma

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 90

(d) Radiation (rd) NA

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: These conditions could exist for up to 8 hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 210* Accident type RH |R2

(b) Pressure (psig) 0.03 Accident type RH/AB

(c) Humidity (%) 100 Accident type RH/CV/AB/AF

(d) Radiation (rd) $5x10^6$ gamma Accident type LOCA/HELB

(e) Spray Type NA Accident type NA

*Value obtained from DCA-P02351-17-0 |R2

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Accident temperature and pressure will decrease linearly to the normal maximum values at the end of 24 hours.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: See Environmental Data Drawing 47E235-60, note 47). R1

(7) Subject to submergence (Yes/No/NA)? No (Reference: See pages B-51 and B-52). R1

Identify initiation time and duration of submergence: NA

* See Open Item No. 1 for 1-TS-30-201A and -202A R1

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? No*
(Reference: Environmental Data Drawing 47E235-60).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: NA R1

* Location is outside the reactor building, therefore no beta contribution.

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.
See TAB B, Section A	See TAB B, Section A R1

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 40 OF 60
			R 1 R 2
BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 6/03/86	WCG WCG
			04/12/89 7-26-89
TEMPERATURE SWITCHES	CHECKED AWL	DATE 6/03/86	KBN RG
			04/28/89 8/2/89

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-48 (737' Rm A09)

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 80

(d) Radiation (rd) 8.8×10^{5} gamma

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 90

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: These conditions could exist for up to 8 hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	110	Accident type	L
(b) Pressure (psig)	NA	Accident type	L
(c) Humidity (%)	NA	Accident type	L
(d) Radiation (rd)	1.18×10^{6}*	Accident type	LOCA/HELB |R2
(e) Spray Type	NA	Accident type	NA

*Value obtained from Calculation WBNTSR-014. |R2

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Accident temperature and pressure will decrease linearly to the normal maximum values at the end of 24 hours.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: See Environmental Data Drawing 47E235-48, note 47).

(7) Subject to submergence (Yes/No/NA)? No (Reference: See pages B-51 and B-52 and Open Item No. 3).

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? No*
(Reference: Environmental Data Drawing 47E235-48).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: NA R1

* Location is outside of the reactor building, therefore no beta contribution.

(9) Special environmental calculations (temp., rad., etc.) R1

Type	RIMS No.
See TAB B, Section A	See TAB B, Section A

R1

PLUSEQ/139.54

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 42 OF 60
			R 1 R
BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 8/12/86 WCJ 4-4-89	
TEMPERATURE SWITCHES	CHECKED AWL	DATE 8/16/86 KBN 4/12/89	

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-78 (757' Rm A16) |R1

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) ATM

(c) Humidity (%) 80

(d) Radiation (rd) 1.8×10^3 gamma

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM

(c) Humidity (%) 90

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: These conditions could exist for up to 8 hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 110 Accident type LOCA

(b) Pressure (psig) NA Accident type LOCA

(c) Humidity (%) NA Accident type LOCA

*(d) Radiation (rd) 1.8×10^6 gamma Accident type LOCA/HELB |R1

(e) Spray Type NA Accident type NA

Additional References

|R1

* LOCA Doses EGTS Rm. WBNNAL3-031 |R1

PLUSEQ/139.55

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Accident temperature and pressure will decrease linearly to the normal maximum values at the end of 24 hours.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? No (Reference: See Environmental Data Drawing 47E235-78).

(7) Subject to submergence (Yes/No/NA)? No (Reference: See pages B-51 and B-52 and Open Item No. 1). R1

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? No (Reference: Environmental Data Drawing 47E235-78).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: NA R1

Location is outside the reactor building, therefore no beta contribution.

(9) Special environmental calculations (temp., rad., etc.) R1

Type	RIMS No.	
See TAB B, Section A	See TAB B, Section A	R1
		R1

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 44 OF 60 R 1 R
BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 6/03/86 wcr 4-4-89	
TEMPERATURE SWITCHES	CHECKED AWL	DATE 6/04/86 KEN 4/10/89	

K. REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-59, -61, (713' A28) | R1

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) Atm(-)

(c) Humidity (%) 80

(d) Radiation (rd) 7.5×10^6 gamma

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) Atm(-)

(c) Humidity (%) 90

(d) Radiation (rd) NA | R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: These conditions could exist for up to 8 hours per excursion and will occur less than 1% of plant life.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 210 Accident type RH

(b) Pressure (psig) 0.03 Accident type RH

(c) Humidity (%) 100 Accident type RH/CV

(d) Radiation (rd) 5×10^6 gamma Accident type LOCA | R1

(e) Spray Type NA Accident type NA

| R1

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 45 OF 60
R 1 R

BINDER TITLE STATIC-O-RING COMPUTED BDM DATE 8/03/86 wcr 4-4-89

TEMPERATURE SWITCHES CHECKED AWL DATE 8/16/86 KBN 4/20/89

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): Accident temperature and pressure will decrease linearly to the normal maximum values at the end of 24 hours.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: See Environmental Data drawing 47E235-61, note 47). |R1

(7) Subject to submergence (Yes/No/NA)? No* (Reference: See pages B-51 and B-52 and Environmental Data Drawing 47E235-61, Table 1.).

Identify initiation time and duration of submergence: NA

*See Open Item No. 1 for system 74 switches |R1

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? No*
(Reference: Drawing 47E235-61).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: ______ R1

*Equipment located outside the reactor building, therefore no beta contribution.

(9) Special environmental calculations (temp., rad., etc.) |R1

Type	RIMS No.
See TAB B, Section A	See TAB B, Section A |R1

PLUSEQ/139.58

K.(6) GENERAL:

Justification for Eliminating Consideration of Moisture Intrusion into SOR Temperature Switches

In 17344-82N-C, where moisture intrusion through the seal was noted, the LOCA test conditions included 100% relative humidity, a 120 psig atmosphere, and a 6200 ppm Boron spray. During an accident, the equipment would be exposed to 100% humidity at less than 0.1 psig (no caustic spray); therefore, there would be no driving force for moisture intrusion.

Also, the LOCA/HELB test of 18577-83N was run with the same model switch using the same types of materials at 100% humidity but without caustic spray and only a 48 psig atmosphere and moisture intrusion was not observed. (Insulation resistance at post-HELB test was in excess of 1 Giga. ohm. SOR provides a conduit seal on these switches; therefore, based on the above, moisture intrusion need not be considered.

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 47 OF 60
R 1 R

BINDER TITLE STATIC-O-RING COMPUTED BDM DATE 8/20/86 wcr 4-4-89

TEMPERATURE SWITCHES CHECKED AWL DATE 8/25/86 KB 4/24/89

K.(7) GENERAL SUBMERGENCE EVALUATION

Component (TAB A)	Actual Elevation (TAB F)	Floor Elevation/ Rm#/Required Accident (TAB A)	Worst Case Accident/Flood Level(Environmental Data Drawings) R1
0-TS-12-94A	708'	692'/A29/AB	692'-2"
0-TS-12-94B	708'-0"	692'/A29/AB	692'-2"
0-TS-12-97A	705'-7 1/2"	692'/A30/AB	692'-2"
0-TS-12-97B	704'-6 1/2"	692'/A30/AB	692'-2"
0-TS-30-192A	741'-6"	737'/A01/L,RH,CV,AF,AB	NA
0-TS-30-192B	741'6"	737'/A01/L,RH,CV,AF,AB	NA
0-TS-30-193A	741'5 1/2"	737'/A01/L,RH,CV,AF,AB	NA
0-TS-30-193B	742'-1"	737'/A01/L,RH,CV,AF,AB	NA
1-TS-30-194A	739'-11"	737'/A05/L,RH,CV,AF,AB	NA
1-TS-30-194B	739'-0"	737'/A05/L,RH,CV,AF,AB	NA
1-TS-30-195A	740'-3"	737'/A05/L,RH,CV,AF,AB	NA
1-TS-30-195B	740'-4"	737'/A05/L,RH,CV,AF,AB	NA
1-TS-30-196A	715'-5 1/2"	713'/A06/L,RH,CV,AF,AB	713'1"
1-TS-30-196B	714'-10"	713'/A06/L,RH,CV,AF,AB	713'1"
1-TS-30-197A	714'-2 1/2"	713'/A06/L,RH,CV,AF,AB	713'1"
1-TS-30-197B	714'-2 1/2"	713'/A06/L,RH,CV,AF,AB	713'1"
1-TS-30-201A	*	692'/A08/L,RH,CV,AF,AB	692'2"
1-TS-30-201B	696'-3 1/2"	692'/A08/L,RH,CV,AF,AB	692'2"
1-TS-30-202A	*	692'/A08/L,RH,CV,AF,AB	692'2"
1-TS-30-202B	696'-3 1/4"	692'/A08/L,RH,CV,AF,AB	692'2"
2-TS-30-194A	746'-1"	737'/A09/L	NA
2-TS-30-194B	739'-8"	737'/A09/L	NA
2-TS-30-195A	743'-0"	737'/A09/L	NA
2-TS-30-195B	739'-7 1/2"	737'/A09/L	NA
2-TS-30-200A	760'-11"	737'/A16/L	NA
2-TS-30-207A	758'-9 1/2"	737'/A16/L	NA
1-TS-74-43	*	713'/A28/RH,CV	713'-3"
1-TS-74-44	*	713'/A28/RH,CV	713'-3"
1-TS-74-45	*	713'/A28/RH,CV	713'-3"
1-TS-74-46	*	713'/A28/RH,CV	713'-3"

*See Open Item No. 1 R1

K.(7) GENERAL:

All temperature switches are located greater than 1.0' above respective floor elevations. The flood levels do not exceed 3" above floor elevations; therefore, the temperature switches are not subject to submergence.

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS

(1) Comparison of worst-case maximum parameters:

Parameter	Specified	Demonstrated	Reference
Operating Time	100	30 (1)	Fig 14, page 7-41
Temperature (°F)	219	430	Fig 14, page 7-41
Pressure (psig)	Atm	120 psig	Fig 14, page 7-41
Relative Humidity (%)	100	100	Sect. 7.10.3 page 7-36
Chemical Spray*	NA	NA	NA
Radiation (rd)**	$1.25x10^7$ gamma	$3.3x10^7$ gamma	See page 20(1) |R2
Submergence	NA	NA	NA

*Includes spray concentration, flowrate, density, duration, and pH.
**Enter 40-year integrated normal dose plus integrated accident dose and specify type.

|R2

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference
Temperature	Yes	Fig 14 page 7-41
Pressure	Yes	Fig 14 page 7-41
Relative Humidity	Yes	Sect. 7.10.3 page 7-36
Chemical Spray	NA	NA
Submergence	NA	NA

JUSTIFICATION/COMMENTS (1) The 30-day DBE simulation translates into more than the 100 days required operating time. See post-DBE life calculation in TAB C.

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1	SHEET 50 OF 60	R 1 R
BINDER TITLE STATIC-O-RING	COMPUTED BDM	DATE 8/09/86 WCM 4-4-89
TEMPERATURE SWITCHES	CHECKED AWL	DATE 8/16/86 KBN 4/23/89

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, Yes/No/NA).

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA	
Temperature: +15 degrees F	>15°F	Yes	R1
Pressure: +10% but no more than 10 psig	+120 psig	Yes	
Radiation: +10% of accident dose	>> 10%	Yes	
Time: +10% (or 1 hour + operating time per NUREG-0588)	+ 376%	See (1) below	
Voltage: ±10% of rated value	See page 51 (2)	Yes	
Frequency: ±5% of rated value	NA	NA	
Environmental Transient: the initial transient and the peak temperature applied twice	2 Transients	Yes	
Vibration: +10% added to acceleration	NA	NA	

JUSTIFICATION/COMMENTS (1) Yes; this figure reflects the margin between the equivalent post-DBE life calculated in TAB C, page 3, and athe required post-DBE life.

PLUSEQ/139.63

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

From TAB B, Section L(3):

(2) Per 17344-82N-C, Appendix F, page 22 and Section 7.1.1, page 7-1, the switch has been tested with the application of a higher than rated voltage (1240 VAC rms for 1 minute) to demonstrate that the switch can operate safely at rated voltage and withstand momentary surges due to switching. A large margin is also provided by plant application since the plant circuit is 120 VAC (Vital Instr. Power Calculation, reference TAB E), and the maximum rated value of the switch is 250 VAC (reference TAB I). During DBE testing 120 VAC @ 5amps was applied (sect. 7.10.5, page 7-42) which falls within ± 10% of normal plant voltage.

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 52 OF 60

R ___ R ___

BINDER TITLE STATIC O-RING COMPUTED BCm DATE 6-4-86

TEMPERATURE SWITCHES CHECKED AWL DATE 6/4/86

M. OPERABILITY TEST RESULTS

(1) Identify the safety function(s) of this equipment: (Reference See TAB A).

JUSTIFICATION/COMMENTS ______

(2) Did the equipment perform its intended function during the simulated design basis accident exposure (yes/no/NA)? Yes (Reference See pages 55 and 56).

JUSTIFICATION/COMMENTS ______

(3) Did the equipment perform its intended function during the simulated post-design basis accident exposure (yes/no/NA)? Yes (Reference See pages 55 and 56).

JUSTIFICATION/COMMENTS ______

(4) Did the test demonstrate the operability requirements for the required time interval for which the equipment is required to operate (yes/no/NA)? Yes (Reference See Section 8.3 and Table 5, and post-DBE calculation in TAB C).

JUSTIFICATION/COMMENTS ______

(5) Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved (yes/no/NA)? Yes (Reference See below).

JUSTIFICATION/COMMENTS See Section 7.11, page 7-42 and Section 8.3, page 8-2 and pages 53 and 54 for justification.

M. OPERABILITY TEST RESULTS

(5) Test Anomalies

1. Due to functional anomalies noted for other test units being simultaneously tested with the SOR test unit, Magnetrol decided to interrupt the LOCA/MSLB simulation test to investigate. The specified test chamber step-down to 259°F/20 psig was continued to room ambient. Test restart was initiated after a 25.5 hour downtime. Calrod-induced heating, in lieu of additional steam injection, was utilized to retain the 259°F/20 psig plateau. A 25.5 hour period was added to the end of the test. The SOR test unit was operated without anomaly both immediately prior to the test chamber cooldown and immediately subsequent to re-achieving the 259°F/20 psig plateau.

2. Visual inspection of the test unit after post-LOCA/MSLB simulation testing revealed that the switch lead wires, external to the sealed electrical port, were brittle and cracked. This, however, did not affect the function of the unit as shown by the results of functional tests run during the simulation in Table 5, page 7-43; therefore, this anomaly is not significant.

3. The insulation resistance of the test unit decreased significantly (see Table 5, page 7-43) due to moisture/condensate penetration of the switch housing. Despite this, the test unit did function; therefore, this anomaly is not significant.

Test Anomalies (Continued)

4. As shown in Table 5, page 7-43, the test unit failed the post-LOCA functional tests. The test unit, however, did operate through the test which meets the requirements specified in the Category and Operating Times for these temperature switches. This anomaly, therefore, is not significant (reference sections 7.11 and 8.3).

From TAB B, Section M(2) and M(3):

The switch in 17344-82N-C was exposed to a simulated LOCA/MSLB. In the test setup, however, the switch housing was not vented. As a result, the high temperatures in the simulation caused a pressure buildup within the sealed housing and therefore a shift in the setpoint of the switch. This effect was noted in Table 5, page 7-43 of 17344-82N-C. In order to demonstrate the ability of the Model 12TA-B4 switch to perform its intended function, a second switch was tested in a simulated design basis accident (reference 18577-83N, TAB D). This second switch, S/N 82-6-1267R, was built using various previously aged parts from switches in test reports 17344-82N-C, 17344-82N-D and Addendum I of 17344-82N-D (reference SOR letter TAB E, page 8). This was necessary to place the tested unit in an end-of-life condition. The resulting test unit was a model 12TA-B4 switch with identical materials as were in the switch tested in 17344-82N-C. All materials were in an end-of-life condition at least equal to those in 17344-82N-C before the simulated LOCA test.

As shown in Figure 2, page 4-4 of 18577-83N, the second switch was vented to the atmosphere during the simulation. Table 1, page 4-7 of the same report shows the results of baseline and functional tests performed during the simulation. The setpoints for the switch ranged from 2.85 psig to 3.20 psig increasing and from 2.75 psig to 2.98 psig decreasing.

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1			SHEET 56 OF 60	R 4	R
BINDER TITLE STATIC O-RING		COMPUTED BDM	DATE 6-4-86			7-10-90	
TEMPERATURE SWITCHES		CHECKED AWL	DATE 6-4-86			7/10/90	

From TAB B, Section M(2) and M(3):

The tested unit successfully performed its intended safety function. Since the temperature switch is a pressure switch with a temperature-sensing bulb attached at the pressure port, evidence that the pressure switch can perform its intended safety function is also evidence that the temperature switch will perform its intended safety function.

For the justification for venting to the room atmosphere for the SOR switches see TAB C, p. C-103 R4

BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 57 OF 60

R ____ R ____

BINDER TITLE STATIC O-RING COMPUTED BDM DATE 5-22-86

TEMPERATURE SWITCHES CHECKED AWR DATE 6/3/86

N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (yes/no/NA)? Yes (Enter all requirements in Section G of the EQC Binder Qualification Maintenance Data Sheets).

JUSTIFICATION/COMMENTS See TAB G.

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BINDER NO. WBNEQ-ITS-002 PLANT WBN UNIT(S) 1 SHEET 58 OF 60

BINDER TITLE STATIC O-RING TEMPERATURE SWITCHES

COMPUTED BDM DATE 5-22-86 R ___ R ___

CHECKED AWC DATE 6/3/86

0. SUMMARY OF REVIEW

	Yes/No/NA
(1) Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	Yes
(2) Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	NA
(3) Choice of qualification methodology adequately justified?	Yes
(4) If analysis was performed, complete the following:	
(a) Were equipment performance requirements identified?	Yes
(b) Were specific features and failure modes and effects analyzed?	NA
(c) Were assumptions and mathematical models used together with appropriate justification for their use?	Yes
(d) Were environmental parameters which affect equipment performance identified?	Yes
(5) Adequate similarity between equipment and test specimen established?	Yes
(6) Aging degradation evaluated adequately?	Yes
(a) Mechanical and/or cycle aging addressed?	Yes
(b) Equipment aged to end of life condition prior to application of DBE conditions?	Yes
(c) Absence of preaging in test/analysis justified?	NA
(d) Materials susceptible to thermal/radiation aging identified?	Yes

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 59 OF 60
BINDER TITLE STATIC O-RING	COMPUTED BDM	DATE 5-22-86	R ___ R ___
TEMPERATURE SWITCHES	CHECKED ANR	DATE 6/3/86	

0. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(e) Normally operating state of device (e.g., normally energized) considered?	NA
(7) Qualified life or replacement schedule established?	Yes
(8) Criteria regarding temperature/pressure exposure satisfied?	Yes
(a) Peak temperature adequate	Yes
(b) Peak pressure adequate	Yes
(c) Duration adequate	Yes
(d) Required profile enveloped adequately	Yes
(e) Steam exposure adequate	Yes
(9) Criteria regarding test sequence satisfied?	Yes
(10) Criteria regarding spray satisfied?	NA
(a) Was the spray testing done while under the extremes of pressure and temperature?	NA
(b) Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant?	NA
(11) Criteria regarding submergence satisfied?	NA
(12) Criteria regarding radiation satisfied?	Yes
(a) Was dose rate considered?	Yes
(b) Was beta radiation considered?	NA
(13) Criteria regarding operability status/mode satisfied?	Yes
(14) Criteria regarding test failures or anomalies satisfied?	Yes

BINDER NO. WBNEQ-ITS-002	PLANT WBN	UNIT(S) 1	SHEET 60 OF 60	R	R
BINDER TITLE STATIC O-RING	COMPUTED BDm	DATE 6-5-86			
TEMPERATURE SWITCHES	CHECKED AWK	DATE 6/5/86			

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(15) Criteria regarding functional testing satisfied?	Yes
(a) Does the test plan/report specify an acceptance criteria for equipment performed?	Yes
(b) Was an initial base line test done to establish required performance characteristics?	Yes
(c) Has the test/analysis demonstrated that performance performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	Yes
(16) Criteria regarding instrument accuracy satisfied?	*
(17) Test duration margin (1 hour + function time) satisfied?	Yes
(a) Is the minimum specified operating time at least 1 hour?	No
(b) If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	NA
(18) Criteria regarding synergistic effects satisfied?	Yes
(19) Criteria regarding margins satisfied?	Yes
(20) Maintenance and surveillance requirements adequately identified?	Yes

P. DISCUSSION

*See Open Items pages 1 and 2

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -001-0005A -A SG1 MS HDR PWR RELIEF CNTL VALVE POS SW	1-ZS -001-0005A -A EA180-11302		729'	A01	A A	100D 100D	FW/V MS/V	MUST PROVIDE PORV POSITION INDICATION POSITION INDICATION IS A PAM B1 VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -001-0005B -A SG1 MS HDR PWR RELIEF CNTL VALVE POS SW	1-ZS -001-0005B -A EA180-11302		729'	A01	A A	100D 100D	FW/V MS/V	MUST PROVIDE PORV POSITION INDICATION POSITION INDICATION IS A PAM B1 VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -001-0012A -B SG2 MS HDR PRESS RELIEF CNTL VLV POS SW	1-ZS -001-0012A -B EA180-12302		729'	A02	A A	100D 100D	FW/V MS/V	MUST PROVIDE PORV POSITION INDICATION POSITION INDICATION IS A PAM B1 VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -001-0012B -B SG2 MS HDR PRESS RELIEF CNTL VLV POS SW	1-ZS -001-0012B -B EA180-11302		729'	A20	A A	100D 100D	FW/V MS/V	MUST PROVIDE PORV POSITION INDICATION POSITION INDICATION IS A PAM B1 VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -001-0023A -A SG3 MS HDR PRESS RELIEF CNTL VLV POS SW	1-ZS -001-0023A -A EA180-12302		729'	A02	A A	100D 100D	FW/V MS/V	MUST PROVIDE PORV POSITION INDICATION POSITION INDICATION IS A PAM B1 VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.

		R 4	R	R
PREPARER/DATE	D.R. Scontrino 8/22/86	KBN 11/8/90		
CHECKED/DATE	R.N. Bell 8/22/86	JDH 11/8/90		

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -001-0023B -A SG3 MS HDR PRESS RELIEF CNTL VLV POS SW	1-ZS -001-0023B -A EA180-11302		729'	A02	A A	100D 100D	FW/V MS/V	MUST PROVIDE PORV POSITION INDICATION POSITION INDICATION IS A PAM B1 VERIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -001-0030A -B SG4 MS HDR PRESS RELIEF CNTL VLV POS SW	1-ZS -001-0030A -B EA180-11302		729'	A01	A A	100D 100A	FW/V MS/V	MUST PROVIDE PORV POSITION INDICATION POSITION INDICATION IS A PAM B1 VARIABLE AND MUST BE MONITORED FOR THE DURATION OF THE EVENT.
WBN-1-ZS -001-0030B -B SG4 MS HDR PRESS RELIEF CNTL VLV POS SW	1-ZS -001-0030B -B EA180-11302		729'	A01	A A	100D 100D	FW/V MS/V	MUST PROVIDE PORV POSITION INDICATION POSITION INDICATION IS A PAM B1 VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -030-0002A -A PURGE AIR SUP FAN A ISLN VALVE POS SW	1-FCV -030-0002/ZS1 -A EA180-11302		737'	A05	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -030-0002B -A PURGE AIR SUP FAN A ISLN VALVE POS SW	1-FCV -030-0002/ZS2 -A EA180-12302		737'	A05	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL

PAGE A-2 R4

		R 4	R	R
PREPARER/DATE	D.R. Scantrino 8/22/86	KBN 11/8/90		
CHECKED/DATE	R.N. Bell 8/22/86	JDH 11/8/90		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0005A -A PURGE AIR SUPPLY FAN B ISLN VALVE POS SW	1-FCV -030-0005/ZS1 -A EA180-11302		737'	A05	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -030-0005B -A PURGE AIR SUPPLY FANB ISLN VALVE POS SW	1-FCV -030-0005/ZS2 -A EA180-12302		737'	A05	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -030-0007A -A UPPER COMPT PURGE ISLN VALVE POS SW	1-ZS -030-0007/1 -A EA180-12302	288	795' 8"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAILUPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -030-0007B -A UPPER COMPT PURGE ISLN VALVE POS SW	1-ZS -030-0007/2 -A EA180-11302	288	795' 8"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT. R3
WBN-1-ZS -030-0009A -B UPPER COMPT PURGE ISLN VALVE POS SW	1-ZS -030-0009/1 -B EA180-12302	263	800' 1"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.

		R 3	R	R
PREPARER/DATE	D.R. SCONTRINO 8/22/86	KAW 6/8/90		
CHECKED/DATE	R.N. BELL 8/22/86	CSH 6/8/90		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0009B -B UPPER COMPT PURGE ISLN VALVE POS SW	1-ZS -030-0009/2 -B EA180-11302	263	800' 1"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT. R3
WBN-1-ZS -030-0012A -A ANNULUS PURGE VALVE POS SW	1-FCV -030-0012/ZS1 -A EA180-12302	360	794' 9"	ANN	A/B A/B A/B A/B A/B	5MN/100D 5MN/100D 5MN/100D 15MN/1MO 1HR/1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -030-0012B -A ANNULUS PURGE VALVE POS SW	1-FCV -030-0012/ZS2 -A EA180-11302	260	795' 3"	ANN	A/B A/B A/B A/B A/B	5MN/100D 5MN/100D 5MN/100D 15MN/1MO 1HR/1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -030-0013A -A INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0013/1 -A EA180-11302		713'	A06	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
WBN-1-ZS -030-0013B -A INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0013/2 -A EA180-12302		713'	A06	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL

		R 3	R	R
PREPARER/DATE	D.R. SCONTRINO 8/22/86	KBN 6/8/90		
CHECKED/DATE	R.N. BELL 8/22/86	[illegible] 6/8/90		

PRI[illegible]E: 05/30/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0014A -A LOWER COMPT PURGE ISLN VALVE POS SW	1-ZS -030-0014/1 -A EA180-12302	303	739' 2"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -030-0014B -A LOWER COMPT PURGE ISLN VALVE POS SW	1-ZS -030-0014/2 -A EA180-11302	303	739' 3"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -030-0016A -B LOWER COMPT PURGE ISLN VALVE POS SW	1-FCV -030-0016/ZS1 -B EA180-12302	240	733' 8"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -030-0016B -B LOWER COMPT PURGE ISLN VALVE POS SW	1-FCV -030-0016/ZS2 -B EA180-11302	240	733' 8"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -030-0018A -B INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0018/1 -B EA180-11302		713'	A06	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL

R3

		R 3	R	R
PREPARER/DATE	D.R. SCONTRINO 8/22/86	KBN 6/8/90		
CHECKED/DATE	R.N. BELL 8/22/86	CNF 6/8/90		

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0018B -B INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0018/2 -B EA180-12302		713'	A06	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
WBN-1-ZS -030-0019A -B INCORE INST RM PURGE ISLN VALVE POS SW	1-ZS -030-0019/1 -B EA180-12302	058	730' 4"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -030-0019B -B INCORE INST RM PURGE ISLN VALVE POS SW	1-ZS -030-0019/2 -B EA180-11302	057	730' 4"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
WBN-1-ZS -030-0028A -A INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0028/1 -A EA180-12302		737'	A05	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
WBN-1-ZS -030-0028B -A INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0028/2 -A EA180-11302		737'	A05	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL

R3

		R 3	R	R
PREPARER/DATE	D.R. SCONTRINO 8/22/86	KRN 6/8/90		
CHECKED/DATE	R.N. BELL 8/22/86	CAK 6/8/90		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0029A -B INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0029/1 -B EA180-12302		737'	A05	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
WBN-1-ZS -030-0029B -B INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0029/2 -B EA180-11302		737'	A05	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
WBN-1-ZS -030-0037A -B LOWER COMPT PURGE CNTL VALVE POS SW	1-FCV -030-0037/ZS1 -B EA180-12302	280	719' 7"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
					A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	
WBN-1-ZS -030-0037B -B LOWER COMPT PURGE CNTL VALVE POS SW	1-FCV -030-0037/ZS2 -B EA180-11302	280	719' 1"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
					A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	
WBN-1-ZS -030-0051A -A UPPER CNTMT EXH ISLN VALVE POS SW	1-ZS -030-0051/1 -A EA180-12302	290	745'11"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.
					A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	

R3

		R 3	R	R
PREPARER/DATE	D.R. SCONTRINO 8/22/86	KBN 6/8/90		
CHECKED/DATE	R.N. BELL 8/22/86	CAH 6/8/90		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH (LOCATION)	ELEV(1) / CONTRACT (LOCATION)	RM/RAD (LOCATION)	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0051B -A	1-ZS -030-0051/2 -A	290	745'11"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL UPON
UPPER CNTMT EXH ISLN VALVE POS SW	EA180-11302				A	100D	MS/C	CNTMT ISOLATION SIGNAL. THIS
					A	100D	FW/C	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	RH/C	AND MUST BE MONITORED FOR THE
					A	1MO	CV/C	DURATION OF EACH EVENT.
WBN-1-ZS -030-0053A -B	1-ZS -030-0053/1 -B	252	748'	ANN	A	100D	L	MUST OPERATE AND NOT FAIL UPON
UPPER CNTMT EXH ISLN VALVE POS SW	EA180-11302				A	100D	MS/C	CNTMT ISOLATION SIGNAL. THIS
					A	100D	FW/C	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	RH/C	AND MUST BE MONITORED FOR THE
					A	1MO	CV/C	DURATION OF EACH EVENT.
WBN-1-ZS -030-0053B -B	1-ZS -030-0053/2 -B	252	748'	ANN	A	100D	L	MUST OPERATE AND NOT FAIL UPON
UPPER CNTMT EXH ISLN VALVE POS SW	EA180-12302				A	100D	MS/C	CNTMT ISOLATION SIGNAL. THIS
					A	100D	FW/C	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	RH/C	AND MUST BE MONITORED FOR THE
					A	1MO	CV/C	DURATION OF EACH EVENT.
WBN-1-ZS -030-0054A -A	1-FCV -030-0054/ZS1 -A	039	729' 2"	ANN	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL
ANNULUS EXH ISLN VALVE POS SW	EA180-12302				A/B	5MN/100D	MS/C	UPON CNTMT ISOLATION SIGNAL
					A/B	5MN/100D	FW/C	
					A/B	15MN/1MO	RH/C	
					A/B	1HR/1MO	CV/C	
WBN-1-ZS -030-0054B -A	1-FCV -030-0054/ZS2 -A	039	729' 2"	ANN	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL
ANNULUS EXH ISLN VALVE POS SW	EA180-11302				A/B	5MN/100D	MS/C	UPON CNTMT ISOLATION SIGNAL
					A/B	5MN/100D	FW/C	
					A/B	15MN/1MO	RH/C	
					A/B	1HR/1MO	CV/C	

R3

		R 3	R____	R____
PREPARER/DATE	D.R. SCONTRINO 8/22/86	KBW 6/8/90		
CHECKED/DATE	R.N. BELL 8/22/86	CAH 6/8/90		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0057A -B	1-ZS -030-0057/1 -B	035	731'10"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL UPON
LOWER CNTMT EXH ISLN VALVE POS SW	EA180-11302				A	100D	MS/C	CNTMT ISOLATION SIGNAL. THIS
					A	100D	FW/C	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	RH/C	AND MUST BE MONITORED FOR THE
					A	1MO	CV/C	DURATION OF EACH EVENT.
WBN-1-ZS -030-0057B -B	1-ZS -030-0057/2 -B	035	731' 4"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL UPON
LOWER CNTMT EXH ISLN VALVE POS SW	EA180-12302				A	100D	MS/C	CNTMT ISOLATION SIGNAL. THIS
					A	100D	FW/C	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	RH/C	AND MUST BE MONITORED FOR THE
					A	1MO	CV/C	DURATION OF EACH EVENT.
WBN-1-ZS -030-0059A -A	1-ZS -030-0059/1 -A	115	740' 9"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL UPON
INCORE INSTR RM EXH ISLN VALVE POS SW	EA180-12302				A	100D	MS/C	CNTMT ISOLATION SIGNAL. THIS
					A	100D	FW/C	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	RH/C	AND MUST BE MONITORED FOR THE
					A	1MO	CV/C	DURATION OF EACH EVENT.
WBN-1-ZS -030-0059B -A	1-ZS -030-0059/2 -A	115	741'	ANN	A	100D	L	MUST OPERATE AND NOT FAIL UPON
INCORE INSTR RM EXH ISLN VALVE POS SW	EA180-11302				A	100D	MS/C	CNTMT ISOLATION SIGNAL. THIS
					A	100D	FW/C	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	RH/C	AND MUST BE MONITORED FOR THE
					A	1MO	CV/C	DURATION OF EACH EVENT.
WBN-1-ZS -030-0060A -A	1-ZS -030-0060/1 -A		757'	A16	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL
INTERIM ABSCE ISLN VALVE POS SW	EA180-11302							UPON AUX BLDG ISOLATION SIGNAL

R3

	R 3	R	R
PREPARER/DATE D.R. SCONTRINO 8/22/86	KBU 6/8/90		
CHECKED/DATE R.N. BELL 8/22/86	CXJ 6/8/90		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0060B -A INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0060/2 -A EA180-12302		757'	A16	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
WBN-1-ZS -030-0061A -A PURGE AIR EXH UNIT A SUCT VALVE POS SW	1-FCV -030-0061/ZS1 -A EA180-11302		713'	A06	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -030-0061B -A PURGE AIR EXH UNIT A SUCT VALVE POS SW	1-FCV -030-0061/ZS2 -A EA180-12302		713'	A06	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -030-0062A -A PURGE AIR EXH UNIT B SUCT VALVE POS SW	1-FCV -030-0062/ZS1 -A EA180-11302		713'	A06	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -030-0062B -A PURGE AIR EXH UNIT B SUCT VALVE POS SW	1-FCV -030-0062/ZS2 -A EA180-12302		713'	A06	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL

		R 2	R	R
PREPARER/DATE	D.P. SCONTRINO 8/22/86	JDH 12/12/89		
CHECKED/DATE	R.N. BELL 8/22/86	WCM 12/13/89		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	--------LOCATION-------- AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
✓WBN-1-ZS -030-0069A -B INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0069/1 -B EA180-11302		757'	A16	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
✓WBN-1-ZS -030-0069B -B INTERIM ABSCE ISLN VALVE POS SW	1-ZS -030-0069/2 -B EA180-12302		757'	A16	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
WBN-1-ZS -030-0296A -A INTERIM ISLN DAMPER CDWE POS SWITCH	1-FCO -030-0296/ZS1 -A		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
WBN-1-ZS -030-0296B -A INTERIM ISLN DAMPER CDWE POS SWITCH	1-FCO -030-0296/ZS2 -A		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
WBN-1-ZS -030-0297A -B INTERIM ISLN DAMPER CDWE POS SWITCH	1-FCO -030-0297/ZS1 -B		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL

		R 2	R	R
PREPARER/DATE	D.R. SCONTRINO 8/22/86	JDH 12/12/89		
CHECKED/DATE	R.N. BELL 8/22/86	WKJ 12/13/89		

W A T T S   B A R   N U C L E A R   P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		--------LOCATION-------- AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0297B	-B	1-FCO -030-0297/ZS2	-B		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
INTERIM ISLN DAMPER CDWE POS SWITCH										
WBN-1-ZS -030-0298A	-B	1-FCO -030-0298/ZS1	-B		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
INTERIM ISLN DAMPER CDWE POS SWITCH										
WBN-1-ZS -030-0298B	-B	1-FCO -030-0298/ZS2	-B		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
INTERIM ISLN DAMPER CDWE POS SWITCH										
WBN-1-ZS -030-0299A	-A	1-FCO -030-0299/ZS1	-A		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
INTERIM ISLN DAMPER CDWE POS SWITCH										
WBN-1-ZS -030-0299B	-A	1-FCO -030-0299/ZS2	-A		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON AUX BLDG ISOLATION SIGNAL
INTERIM ISLN DAMPER CDWE POS SWITCH										

		R 2	R ____	R ____
PREPARER/DATE	D.R. SCONTRINO 9/22/86	JDH 12/12/89		
CHECKED/DATE	R.N. BELL 9/22/86	WEP 12/13/89		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -032-0080A -A	1-FCV -032-0080/ZS1 -A	290	717' 5"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL
RB UNIT 1 TRAIN A ISLN VALVE POS SW	EA180-11302				A	100D	MS/C	UPON CNTMT ISOLATION SIGNAL.
					A	100D	FW/C	PERFORMS A PAM TYPE B FUNCTION
					A	1MO	RH/C	& MUST BE MONITORED TO ENSURE
					A	1MO	CV/C	CNTMT INTEGRITY IS MAINTAINED.
WBN-1-ZS -032-0080B -A	1-FCV -032-0080/ZS2 -A	293	717'10"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL
RB UNIT 1 TRAIN A ISLN VALVE POS SW	EA180-11302				A	100D	MS/C	UPON CNTMT ISOLATION SIGNAL.
					A	100D	FW/C	PERFORMS A PAM TYPE B FUNCTION
					A	1MO	RH/C	& MUST BE MONITORED TO ENSURE
					A	1MO	CV/C	CNTMT INTEGRITY IS MAINTAINED.
WBN-1-ZS -032-0102A -B	1-FCV -032-0102/ZS1 -B	277	728' 4"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL
RB UNIT 1 TRAIN B ISLN VALVE POS SW	EA180-11302				A	100D	MS/C	UPON CNTMT ISOLATION SIGNAL.
					A	100D	FW/C	PERFORMS A PAM TYPE B FUNCTION
					A	1MO	RH/C	& MUST BE MONITORED TO ENSURE
					A	1MO	CV/C	CNTMT INTEGRITY IS MAINTAINED.
WBN-1-ZS -032-0102B -B	1-FCV -032-0102/ZS2 -B	278	728' 2"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL
RB UNIT 1 TRAIN B ISLN VALVE POS SW	EA180-11302				A	100D	MS/C	UPON CNTMT ISOLATION SIGNAL.
					A	100D	FW/C	PERFORMS A PAM TYPE B FUNCTION
					A	1MO	RH/C	& MUST BE MONITORED TO ENSURE
					A	1MO	CV/C	CNTMT INTEGRITY IS MAINTAINED.
WBN-1-ZS -032-0110A -A	1-FCV -032-0110/ZS1 -A	290	718' 7"	ANN	A	100D	L	MUST OPERATE AND NOT FAIL
RB U1 NON ESNTL ISLN VALVE POS SWITCH	EA180-11302				A	100D	MS/C	UPON CNTMT ISOLATION SIGNAL.
					A	100D	FW/C	PERFORMS A PAM TYPE B FUNCTION
					A	1MO	RH/C	& MUST BE MONITORED TO ENSURE
					A	1MO	CV/C	CNTMT INTEGRITY IS MAINTAINED.

	R 2	R	R
PREPARER/DATE D.R. SCONTRINO 9/22/86	JOH 12/12/89		
CHECKED/DATE R.N. BELL 9/22/86	WCS 12/13/89		

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
✓WBN-1-ZS -032-0110B -A RB U1 NON ESNTL ISLN VALVE POS SWITCH	1-FCV -032-0110/ZS2 -A EA180-11302	295	719' 7"	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. PERFORMS A PAM TYPE B FUNCTION & MUST BE MONITORED TO ENSURE CNTMT INTEGRITY IS MAINTAINED.
✓WBN-1-ZS -062-0069A -A RC LOOP 3 LETDOWN FLOW POS SW	1-FCV -062-0069/ZS1 -A EA180-11302	131	725' 7"	LC	A/B	1HR/1MO	CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
✓WBN-1-ZS -062-0069B -A RC LOOP 3 LETDOWN FLOW POS SW	1-FCV -062-0069/ZS2 -A EA180-11302	131	725' 7"	LC	A/B	1HR/1MO	CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
✓WBN-1-ZS -062-0070A -A RC LOOP 3 LETDOWN FLOW POS SW	1-FCV -062-0070/ZS1 -A EA180-12302	133	719'11"	AC2	A/B	1HR/1MO	CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
✓WBN-1-ZS -062-0070B -A RC LOOP 3 LETDOWN FLOW POS SW	1-FCV -062-0070/ZS2 -A EA180-12302	133	719' 8"	AC2	A/B	1HR/1MO	CV/C	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL

		R 2	R	R
PREPARER/DATE	D.R. SCONTRINO 8/22/86	JDH 12/12/89		
CHECKED/DATE	R.N. BELL 8/22/86	WCR 12/13/89		

W A T T S   B A R   N U C L E A R   P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	--------LOCATION-------- AZMITH	ELEV(1) CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION	
WBN-1-ZS -062-0077A -B LTDN LINE ISLN VLV FLOW CONTROL POS SW	1-FCV -062-0077/ZS1 -B		(*)		A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A CV/A AF AB	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.	R3
WBN-1-ZS -062-0077B -B LTDN LINE ISLN VLV FLOW CONTROL POS SW	1-FCV -062-0077/ZS2 -B		(*)		A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A CV/A AF AB	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.	
WBN-1-ZS -063-0003 -A SIS PMP RECIRC TO RWST VLV ZONE SWITCH	1-ZS -063-0003 -A		(*)		A/B	1WK/100D	L	MUST OPERATE AND NOT FAIL UPON SIS RECIRC SIGNAL	
WBN-1-ZS -063-0004 -B SIS PMP RECIRC TO RWST VLV ZONE SWITCH	1-ZS -063-0004 -B		(*)		A/B	1WK/100D	L	MUST OPREATE AND NOT FAIL UPON SIS RECIRC SIGNAL	
WBN-1-ZS -063-0023A -B SIS ACCUM FILL LINE ISLN VLV POS SWITCH	1-FCV -063-0023/ZS1 -B		(*)		A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A AB AF/A CV/A	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. THIS LIMIT SWITCH IS A PAM VARIABLE AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT.	R3

		R 3	R	R
PREPARER/DATE	D.R. SCONTRINO 8/22/86	[illegible] 6/8/90		
CHECKED/DATE	R.N. BELL 8/22/86	CAH 6/8/90		

W A T T S   B A R   N U C L E A R   P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -063-0023B -B	1-FCV -063-0023/ZS2 -B		(*)		A	100D	L	MUST OPERATE AND NOT FAIL UPON
SIS ACCUM FILL LINE ISLN VLV POS SWITCH					A	1MO	RH/A	CNTMT ISOLATION SIGNAL. THIS
					A	1MO	AB	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	AF/A	AND MUST BE MONITORED FOR THE
					A	1MO	CV/A	DURATION OF EACH EVENT.
WBN-1-ZS -063-0064A -A	1-FCV -063-0064/ZS1 -A		(*)		A	100D	L	MUST OPERATE AND NOT FAIL UPON
SIS ACCUM TANK N2 HDR INLET VLV POS SW					A	1MO	RH/A	CNTMT ISOLATION SIGNAL. THIS
					A	1MO	AB	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	AF/A	AND MUST BE MONITORED FOR THE
					A	1MO	CV/A	DURATION OF EACH EVENT.
WBN-1-ZS -063-0064B -A	1-FCV -063-0064/ZS2 -A		(*)		A	100D	L	MUST OPERATE AND NOT FAIL UPON
SIS ACCUM TANK N2 HDR INLET VLV POS SW					A	1MO	RH/A	CNTMT ISOLATION SIGNAL. THIS
					A	1MO	AB	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	AF/A	AND MUST BE MONITORED FOR THE
					A	1MO	CV/A	DURATION OF EACH EVENT.
WBN-1-ZS -063-0084A -B	1-FCV -063-0084/ZS1 -B		(*)		A	100D	L	MUST OPERATE AND NOT FAIL UPON
SIS CHECK VLV LEAK TEST ISLN VLV POS SW					A	1MO	RH/A	CNTMT ISOLATION SIGNAL. THIS
					A	1MO	AB	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	AF/A	AND MUST BE MONITORED FOR THE
					A	1MO	CV/A	DURATION OF EACH EVENT.
WBN-1-ZS -063-0084B -B	1-FCV -063-0084/ZS2 -B		(*)		A	100D	L	MUST OPERATE AND NOT FAIL UPON
SIS CHECK VLV LEAK TEST ISLN VLV POS SW					A	1MO	RH/A	CNTMT ISOLATION SIGNAL. THIS
					A	1MO	AB	LIMIT SWITCH IS A PAM VARIABLE
					A	1MO	AF/A	AND MUST BE MONITORED FOR THE
					A	1MO	CV/A	DURATION OF EACH EVENT.

R3

		R 3	R	R
PREPARER/DATE	D.R. SCONTRINO 8/22/86	KBN 6/8/90		
CHECKED/DATE	R.N. BELL 8/22/86	CAJ 6/8/90		

PRINT DATE: 11/07/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -063-0175 -B SIS PMP 1B-B DISCH RWST SHTOFF POS SW	1-ZS -063-0175 -B		(*)		A/B	1WK/100D	L	MUST OPERATE AND NOT FAIL UPON SIS RECIRC SIGNAL
WBN-2-ZS -065-0005A -A CNTMT ANN VAC FANS ISLN DMPR VLV POS SW	2-FCO -065-0005/ZS1 -A		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
WBN-2-ZS -065-0005B -A CNTMT ANN VAC FANS ISLN DMPR VLV POS SW	2-FCO -065-0005/ZS2 -A		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -065-0052A -A CNTMT ANN VAC FANS ISLN VALVE POS SW	1-FCV -065-0052/ZS1 -A EA180-11302		757'	A16	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON SI SIGNAL
WBN-1-ZS -065-0052B -A CNTMT ANN VAC FANS ISLN VALVE POS SW	1-FCV -065-0052/ZS2 -A EA180-12302		757'	A16	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON SI SIGNAL

		R 4	R	R
PREPARER/DATE	D.R. Scontrino 9/22/86	KBN 11/8/90		
CHECKED/DATE	R.N. Bell 9/22/86	JDH 11/8/90		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	---LOCATION--- AZMITH	ELEV(1) CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -065-0053A -B CNTMT ANN VAC FANS ISLN VALVE POS SW	1-FCV -065-0053/ZS1 -B EA180-11302		757'	A16	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON SI SIGNAL
WBN-1-ZS -065-0053B -B CNTMT ANN VAC FANS ISLN VALVE POS SW	1-FCV -065-0053/ZS2 -B EA180-12302		757'	A16	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL UPON SI SIGNAL
WBN-1-ZS -068-0305A -A RCS FCV WDS N2 MAN TO PRT POS SWITCH	1-ZS -068-0305A -A		(*)		A A A A A	100D 1MO 1MO 1MO 1MO	L AF AB RH/A CV/A	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL POSITION INDICATION IS A PAM VARIABLE AND MUST BE MONITORED FOR DURATION OF EACH EVENT.
WBN-1-ZS -068-0305B -A RCS FCV WDS N2 MAN TO PRT POS SWITCH	1-ZS -068-0305B -A		(*)		A A A A A	100D 1MO 1MO 1MO 1MO	L AF AB RH/A CV/A	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL POSITION INDICATION IS A PAM VARIABLE AND MUST BE MONITORED FOR DURATION OF EACH EVENT.
WBN-1-ZS -070-0085A -B EXCESS LETDOWN HTX OUTLET VALVE POS SW	1-ZS -070-0085A -B EA180-11302		713'	A28	A A A A A	100D 1MO 1MO 1MO 1MO	L CV/A RH/A AF/A AB/A	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. PERFORMS A PAM TYPE B FUNCTION & MUST BE MONITORED TO ENSURE CNTMT INTEGRITY IS MAINTAINED.

	R 4	R	R
PREPARER/DATE D.R. Scontrino 9/22/86	KBW 11/8/90		
CHECKED/DATE R.N. Bell 9/22/86	JOH 11/8/90		

W A T T S   B A R   N U C L E A R   P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	--------LOCATION-------- AZMITH	ELEV(1) CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -070-0085B -B EXCESS LETDOWN HTX OUTLET VALVE POS SW	1-ZS -070-0085B -B EA180-12302		713'	A28	A A A A A	100D 1MO 1MO 1MO 1MO	L CV/A RH/A AF/A AB/A	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL. PERFORMS A PAM TYPE B FUNCTION & MUST BE MONITORED TO ENSURE CNTMT INTEGRITY IS MAINTAINED.
WBN-1-ZS -072-0040 -A RHR SPRAY HDR A ISLN VLV STEM POS SWITCH	1-ZS -072-0040 -A		(*)		A/B	1WK/100D	L	MUST NOT FAIL IN A MANNER THAT WOULD ADVERSELY IMPACT THE OPERATION OF THE ASSOCIATED FCV.
WBN-1-ZS -072-0041 -B RHR SPRAY HDR B ISLN VLV STEM POS SWITCH	1-ZS -072-0041 -B		(*)		A/B	1WK/100D	L	MUST NOT FAIL IN A MANNER THAT WOULD ADVERSELY IMPACT THE OPERATION OF THE ASSOCIATED FCV.
WBN-1-ZS -077-0019A -A RCDT TO VENT HDR FCV POS SWITCH	1-ZS -077-0019A -A		(*)		A A A A A	100D 1MO 1MO 1MO 1MO	L AF AB RH/A CV/A	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL POSITION INDICATION IS A PAM VARIABLE AND MUST BE MONITORED FOR DURATION OF EACH EVENT.
WBN-1-ZS -077-0019B -A RCDT TO VENT HDR FCV POS SWITCH	1-ZS -077-0019B -A		(*)		A A A A A	100D 1MO 1MO 1MO 1MO	L AF AB RH/A CV/A	MUST OPERATE AND NOT FAIL UPON CNTMT ISOLATION SIGNAL POSITION INDICATION IS A PAM VARIABLE AND MUST BE MONITORED FOR DURATION OF EVENT.

PAGE A-19 R4

		R 4	R___	R___
PREPARER/DATE	D.R. Scontrino 9/22/86	KBN 11/8/90		
CHECKED/DATE	R.N. Bell 9/22/86	JDH 11/8/90		

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -077-0020A -A	1-ZS -077-0020A -A		(*)		A	100D	L	MUST OPERATE AND NOT FAIL
RCDT N2 SUPPLY FCV POS SWITCH					A	1MO	AF	UPON CNTMT ISOLATION SIGNAL
					A	1MO	AB	POSITION INDICATION IS A PAM
					A	1MO	RH/A	VARIABLE AND MUST BE MONITORED
					A	1MO	CV/A	FOR DURATION OF EACH EVENT.
WBN-1-ZS -077-0020B -A	1-ZS -077-0020B -A		(*)		A	100D	L	MUST OPERATE AND FAIL UPON
RCDT N2 SUPPLY FCV POS SWITCH					A	1MO	AF	CNTMT ISOLATION SIGNAL
					A	1MO	AB	POSITION INDICATION IS A PAM
					A	1MO	RH/A	VERIABLE AND MUST BE MONITORED
					A	1MO	CV/A	FOR DURATION OF EACH EVENT.
WBN-1-ZS -081-0012A -A	1-FCV -081-0012/ZS1 -A		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL
PW-RCS PRESS RELF TKRCP STANPIPES POS SW								UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -081-0012B -A	1-FCV -081-0012/ZS2 -A		(*)		A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL
PW-RCS PRESS RELF TKRCP STANPIPES POS SW								UPON CNTMT ISOLATION SIGNAL
WBN-1-ZS -090-0107 -A	1-FCV -090-0107/ZS -A	294	740'10"	ANN	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL
CNTMT BLDG LWR COMPT MON ISLN VLV POS SW	EA180-11302				A/B	5MN/100D	MS/C	UPON CNTMT ISOLATION SIGNAL
					A/B	5MN/100D	FW/C	
					A/B	15MN/1MO	RH/C	
					A/B	1HR/1MO	CV/C	

R 4 R____ R____

PREPARER/DATE D.R. Scontrino 9/22/86 KDV 11/8/90

CHECKED/DATE R.N. Bell 9/22/86 JDH 11/8/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -090-0111 -A	1-FCV -090-0111/ZS -A	293	740'10"	ANN	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL
CNTMT BLDG LWR COMPT MON ISLN VLV POS SW	EA180-12302				A/B	5MN/100D	MS/C	UPON CNTMT ISOLATION SIGNAL
					A/B	5MN/100D	FW/C	
					A/B	15MN/1MO	RH/C	
					A/B	1HR/1MO	CV/C	
WBN-1-ZS -090-0113 -A	1-FCV -090-0113/ZS -A	290	740' 9"	ANN	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL
CNTMT BLDG UP COMPT MON ISLN VLV POS SW	EA180-11302				A/B	5MN/100D	MS/C	UPON CNTMT ISOLATION SIGNAL
					A/B	5MN/100D	FW/C	
					A/B	15MN/1MO	RH/C	
					A/B	1HR/1MO	CV/C	
WBN-1-ZS -090-0117 -A	1-FCV -090-0117/ZS -A	290	740' 5"	ANN	A/B	5MN/100D	L	MUST OPERATE AND NOT FAIL
CNTMT BLDG UP COMPT MON ISLN VLV POS SW	EA180-12302				A/B	5MN/100D	MS/C	UPON CNTMT ISOLATION SIGNAL
					A/B	5MN/100D	FW/C	
					A/B	15MN/1MO	RH/C	
					A/B	1HR/1MO	CV/C	

		R 4	R	R
PREPARER/DATE	D.R. Scantrina 9/22/86	KBN 11/8/90		
CHECKED/DATE	R.N. Bell 9/22/86	JDH 11/8/90		

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Pages A-22 R1 thru A-27 R1 were deleted per revision 2 .

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 1 OF 1
		R	R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED R1 JDH	DATE 6-9-89	
	CHECKED R1 HDM	DATE 6/9/89	

TAB A

NOTES

1. Elevations shown are Actual elevations for equipment located in the Reactor Building and Floor elevations for equipment located outside the Reactor Building. Actual elevations for all equipment are documented in TAB F. Elevations shown as (*) are covered by SCR WBNEEB 8578 and are documented as Open Item No. 2 of this binder.

2. See Page B-1A for source of Category and Operating Time assignments.

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 1 OF 37
			R 1 R 4
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 6/25/86 JDH 5/25/89	KBN 11/6/90
	CHECKED RNB	DATE 6/27/86 HDR 6/9/89	JDH 11/7/90

A. DOCUMENTATION (See Note)

Equipment Description Limit Switch

Vendor/Manufacturer NAMCO

Equipment Model No.(s) See TAB A

QUALIFICATION REPORTS (See Note)

(1) Title/Number/Revision Qualification of EA 180 Series Limit Switches Namco Report No. QTR 105, Rev. 4 (TAB D) RIMS B70 851021 100 DATE 1/9/84

(2) Title/Number/Revision Qualification of EA 180 Series Limit Switches NAMCO Report No. QTR 155, Rev. 0 (TAB D) RIMS B26 890516 926 DATE 10/5/87

(3) Title/Number/Revision RIMS
DATE

OTHER (ANALYSIS, VENDOR DATA, ETC.)

(4) Deleted per revision 4. |R4

(5) Material Aging and Accident Degradation Equivalency Calculation - WAC-427 (B44 901011 802) (TAB C-4) |R4

(6) Vendor telecon: TVA (L.P. Woodley) and Namco (John R. Bendokaitis) on 10/3/85 - See TAB E(1)

(7) Vendor telecon: TVA (L.P. Woodley) and Namco (John R. Bendokaitis) on 10/22/85 - See TAB E(2)

(8) Vendor telecon: TVA (L.P. Woodley) and Namco (John R. Bendokaitis) on 11/4/85 - See TAB E(3)

(9) TI-RPS-32 R2 (B45 860407 237), Shield Design Review and Equipment Qualification Study

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 1a OF 37 R 4 R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED R1 JDH	DATE 6/15/89 KBW 11/7/90	
	CHECKED R1 HDR	DATE 6/16/89 JDH 11/7/90	

A. DOCUMENTATION

OTHER (ANALYSIS, VENDOR DATA, ETC.) (Continued)

(10) WBNNAL3-022 R0 (B45 860314 239), Pipe Chase and Pipe Shaft 100 Day Total Integrated Dose
(11) WBNTSR-051 R0 (B26 891129 202), Reduction of Beta Dose by Sheet Metal
(12) TVA Environmental Drawing 47E235-42 R2, DCA P-04104-02-1, -03-0, -05-0, and DCA S-09715-02-0, -03-0, -04-0, -05-0, -13-0, -14-0, -15-0 R4
(13) TVA Environmental Drawing 47E235-44 R1
(14) TVA Environmental Drawing 47E235-48 R3
(15) TVA Environmental Drawing 47E235-56 R1
(16) TVA Environmental Drawing 47E235-61 R1
(17) TVA Environmental Drawing 47E235-76 R3
(18) TVA Environmental Drawing 47E235-78 R3

	Category and Operating Times	RIMS NO.	
(19)	System 1 (WBNOSG4-004 R11)	B18 900612 253	
(20)	System 30 (WBNOSG4-008 R16)	B26 900717 201	R4
(21)	System 32 (WBNOSG4-010 R4)	B26 891205 200	
(22)	System 62 (WBNOSG4-013 R16)	B18 901011 501	
(23)	System 63 (WBNOSG4-014 R12)	B26 900713 212	R4
(24)	System 65 (WBNOSG4-015 R10)	B26 900309 226	
(25)	System 68 (WBNOSG4-017 R11)	B18 900612 252	
(26)	System 70 (WBNOSG4-018 R14)	B26 900614 204	R4
(27)	System 72 (WBNOSG4-019 R9)	B26 900717 002	
(28)	System 77 (WBNOSG4-021 R5)	B18 900612 251	
(29)	System 81 (WBNOSG4-023 R3)	B45 851127 219	
(30)	System 90 (WBNOSG4-026 R7)	B45 870227 426	
(31)	U2 for U1 (WBNOSG4-040 R8)	B26 900626 224	R4

(32) WBNNAL3-031 R1 (B45 880826 235), EGTS Room 100 Day LOCA dose
(33) WBNTSR-018 R0 (B26 891106 203), Dose Grid around the EGTS filter train.
(34) QIR MNMWBN90032 R0 (B26 900226 251) R4
(35) QIR MNMWBN90057 R0 (B26 900515 250)

Note: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. This listing includes only those documents which are essential to qualification and accordingly should not be considered a complete listing of binder references.

B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified

____ Equipment Satisfies All Requirements Except Qualified Life or Justification of Replacement Schedule

____ Equipment Qualification Not Established by Documentation

____ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES Equipment is qualified pending resolution of open item noted in the open items list.

1. SCR WBNEEB8578 R5 - Change out unqualified switches
2. DCN P-06660-A, M-07533-A, M-07890-A, M-08055-A, M-08061-A - Add conduit seals R4

COMMENTS/RECOMMENDATIONS The required operating environments, normal and accident, have been reviewed for each switch location identified in TAB A. All switches are qualified to the worst case combination of these environmental parameters. This includes consideration of peak levels and profiles.

Approximately 60 standard and short travel switches are being changed out per ECN 6613 (Unit 1) and ECN 6614 (Unit 2 for Unit 1 operation). The documentation for the short travel switches is presently referenced in the binder even though they are not yet included in the binder.

BINDER NO WBNEQ-IZS-001 PLANT WBN UNIT(S) 1 SHEET 3 OF 37

BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED AFTER 7/30/80

COMPUTED DWS DATE 6/13/86 R ___ R ___

CHECKED RWB DATE 6/27/86

C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate Which Criteria is Applicable):

X Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE-323-1974)

___ Components are Qualified to the Criteria of NUREG-0588 Category II or the DOR Guidelines of 1E Bulletin No. 79-01B (IEEE-323-1971) (DOR Guidelines Applicable to only BFN)

JUSTIFICATION/COMMENTS None

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

IEEE Std 323-1974

IEEE Std 344-1975

IEEE Std 382-1972 (Pressurized Water Reactor Portion Only)

BINDER NO WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 4 OF 37		
BINDER TITLE EA180 SERIES LIMIT	COMPUTED DRS	DATE 6/13/86		R	R
SWITCHES MANUFACTURED AFTER 7/30/80	CHECKED RWB	DATE 6/27/86			

D. QUALIFICATION METHODOLOGY

X Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

X Test of Similar Items with Supporting Analysis

___ Analysis in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

___ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS This test provides generic group qualification for Model EA180 Series limit switches. The Model EA180-11302 selected for test purposes is identical to some of the equipment qualified by this binder. TAB C(5) contains a similarity evaluation which addresses the remainder of the equipment.

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 5 OF 37
BINDER TITLE EA180 SERIES LIMIT	COMPUTED DMS	DATE 6/13/86	R ___ R ___
SWITCHES MANUFACTURED AFTER 7/30/80	CHECKED RWB	DATE 6/27/86	

E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification report identical to the plant equipment which requires qualification (yes/no/NA)? Yes

	Plant Device	Qualification Document	Reference
(1) Equipment Type	Limit Switch	Limit Switch	TAB D, pp. 3-1,3-6
(2) Manufacturer	Namco	Namco	TAB D, pp. 3-1,3-6
(3) Model Number(s)	See TAB A	EA180-11302	TAB D, pp. 3-1,3-6
(4) Serial Number(s)	See Comment	See Comment	TAB D, p. 3-10

(5) Identify Component-Unique checksheet attached: NA

JUSTIFICATION/COMMENTS These limit switches do not have serial numbers but are provided with date codes per the manufacturer's date code system described in TAB D, page 3-10 of the test report. Field Verification (TAB F) has determined that all limit switches covered in TAB A have date codes after July 30, 1980, and are therefore covered by QTR 105. See TAB C(5) for similarity evaluation.

F. INSTALLATION INTERFACES

List all interfaces pertinent to EQ identified in the qualification documentation and/or evaluation and reference the source. Is the interface a requirement for our application (Yes/No)? (Note below.) If yes, enter requirement in QMDS, if no, provide justification.

Interface	Identify Interface	Plant Requirement? (Yes/No)	Reference Test Report
Mounting Bolts	NA	NA	NA
External Process Connections	NA	NA	NA
Electrical Connections	NA	NA	NA
Conduit Seals	See Comment (1)	Yes	TAB D, p 4-2
Connector Seals	NA	NA	NA
Orientation	None	NA	NA
Physical Configuration	None	NA	NA
Other	See Comments (2)	Yes	NA

JUSTIFICATION/COMMENTS

(1) For installation instruction refer to EA 189-90008, TAB D, page 4-2 of QTR 105. The conduit entrance must be sealed in such a way as to maintain the switch integrity under required service condition (see QMDS (TAB G) for conduit seal requirements). |R4

(2) Although, it was not considered part of the qualification test, an operating lever is required for proper operation of the switch. The lever and roller should be of metallic construction. Nylon rollers are not acceptable and are controlled through TVA's maintenance program (See TAB G).

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 7 OF 32		
BINDER TITLE EA180 SERIES LIMIT	COMPUTED DRS	DATE 6/13/86	R	R	
SWITCHES MANUFACTURED AFTER 7/30/80	CHECKED RNB	DATE 6/27/86			

G. TEST SEQUENCE

(1) Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE-323 (74), paragraph 6.3.2 (yes/no/NA)? (note below)

	Yes/No/NA	Reference
(a) Equipment inspected for damage	Yes	TAB D, p. 10-6
(b) Baseline performance measurements taken	Yes	TAB D, p. 10-6
(c) Equipment aged:		
Thermal	Yes	TAB D, p. 10-6
Radiation	Yes	TAB D, p. 10-7
Wear	Yes	TAB D, p. 10-6
(d) Vibration/seismic testing conducted	Yes	TAB D, p. 10-7
(e) Design basis event (DBE) exposure	Yes	TAB D. p. 10-8
(f) Post-DBE exposure	Yes	TAB D, p. 10-9
(g) Final inspection and disassembly	Yes	TAB D, p. 6-2

(2) Was the same piece of equipment used throughout the test sequence described in item (1) above (yes/no/NA)? Yes - See Comment (2)

(3) Have the test equipment, test equipment accuracies and calibration data been appropriately documented (yes/no/NA)? No - See Comment (1) (Reference TAB D, page 10-61).

TVA EQP025.52

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 8 OF 37				
BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED AFTER 7/30/80	COMPUTED DRS	DATE 7/8/86	R		R		
	CHECKED RNB	DATE 7/9/86					

JUSTIFICATION/COMMENTS (1)Test equipment and calibration dates were recorded; however, test equipment accuracies were not documented in the test report. (2) The recorded seismic test in TAB D, App. B p. 10-20 (QTR 105) is from a different Model EA180 switch; however, full fragility testing was performed on the switch used throughout the test sequence (Ref TAB D, p. 10-7).

H. AGING

(1) Was aging considered in the qualification program (Yes/no/NA)? Yes (Reference TAB D, page 10-6).

JUSTIFICATION/COMMENTS None

(2) Were the following effects considered in the aging program:

Aging Effect	Yes/No/NA	Reference
Thermal aging	Yes	TAB D, p. 10-6
Radiation exposure	Yes	TAB D, p. 10-7
Vibration (non-seismic) aging	Yes	TAB D, p. 10-7
Operational (electrical/mechanical/process) stress aging	Yes	TAB D, p. 10-6

JUSTIFICATION/COMMENTS None

(3) Were all known synergistic effects which are believed to have a significant effect on equipment performance considered in the aging program (yes/no/NA)? Yes (Reference See TAB C(18)).

H. AGING (Continued)

JUSTIFICATION/COMMENTS See TAB C 18 |R1

(4) Thermal Aging:

(a) Was thermal aging considered in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, page 10-6).

(b) Were the materials susceptible to thermal aging degradation identified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, page 4-7).

JUSTIFICATION/COMMENTS None

(c) Was the basis for thermal aging identified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, page 4-6, 4-7).

JUSTIFICATION/COMMENTS None

(d) Was the aging acceleration rate justified and the parameters of time and temperature identified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, page 4-6, 4-7).

Parameter	Plant Maximum Normal	Test	Equivalent
Temperature	54.4°C (55°C)	120°	55°C
Time	40 Years	432.5 hrs	5 Years

JUSTIFICATION/COMMENTS The qualified life can be extended to 40 years through periodic refurbishment as defined in EA189-90051 TAB D, (Page 4-3).

(e) Was the Arrhenius methodolgy used for accelerated aging (Yes/No/NA)? Yes (Reference: TAB D, page 4-7).

JUSTIFICATION/COMMENTS None

(f) If activation energies were used for determining accelerated aging parameters, are they properly referenced to the source of the technical data (Yes/No/NA)? Yes (Reference: TAB D, pp 4-8, 4-9).

H. AGING (Continued)

JUSTIFICATION/COMMENTS None

(g) If a regression line was used for determining accelerated aging parameters, are test points or failure modes identified on the line (yes/no/NA)? NA (Reference NA).

JUSTIFICATION/COMMENTS None

(h) Was the equipment operated during the thermal aging (yes/no/NA)? No (Reference TAB D, pp. 11-13, 11-14).

JUSTIFICATION/COMMENTS Performance testing conducted before and after aging test adequately provided a basis for aging degradation evaluation

(5) Radiation Aging Exposure:

(a) Was radiaton aging exposure considered in the qualification program (yes/no/NA)? Yes (Reference TAB D, p. 10-7).

JUSTIFICATION/COMMENTS None

(b) Were the materials susceptible to radiation degradation identified in the qualification program (yes/no/NA)? NA (Reference NA).

JUSTIFICATION/COMMENTS Assembled test specimen irradiated to 204 megarads.

(c) Was the basis for radiation aging exposure identified in the qualification program (yes/no/NA)? Yes (Reference TAB D, p. 5-3).

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 11 OF 37
			R 1 R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 6/13/86	JOH 5/17/89
	CHECKED RNB	DATE 6/27/86	HOR 6/9/89

H. AGING (Continued)

(d) Is the radiation test exposure dose and dose rate acceptable (Yes/No/NA)? Yes (Reference: TAB D, pp. 11-21, 10-7).

Plant normal ambient radiation dose (rd) 2×10^7 (worst case)

Test exposure dose (rd) 204×10^6

Test exposure dose rate (rd/hr) 0.91×10^6

Test exposure source type (e.g., Co-60 gamma) Co-60 gamma

JUSTIFICATION/COMMENTS None

(6) Vibration (non-seismic) Aging:

(a) Were the effects of non-seismic vibration induced during normal and abnormal operation addressed in the qualification program[1] Yes (Reference: TAB D, p. 10-7). R1

JUSTIFICATION/COMMENTS Plant induced vibration simulation 1×10^6 cycles @100Hz at 0.75 g's per QTR 105 TAB D, p. 4-4, Section 4.5.5.

(b) Was the basis for vibration aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, p. 5-3, Section 5.4).

JUSTIFICATION/COMMENTS None

(7) Operational Stress Aging:

(a) Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation adressed in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, p. 10-6).

JUSTIFICATION/COMMENTS None

[1] Qualification program refers to the test report and any supplemental documentation including TVA analyses in TAB C of the Binder. R1

PLUSEQ/158.26

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 12 OF 37 R 1 R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 6/13/86 JDH 5/17/89	
	CHECKED RNB	DATE 6/27/86 JWR 6/7/89	

H. AGING (Continued)

(b) Was the basis for stresses induced during operational aging identified and justified in the qualification program (Yes/No/NA)? No (Reference: NA).

JUSTIFICATION/COMMENTS See Section P for additional discussion.

(8). Was the qualified life of the equipment and its basis defined in the qualification program (Yes/No/NA)? Yes - See next sheet for discussion.
(Reference: TAB D, pp 4-6 through 4-12).

Qualified life (Document in QMDS) 40 years*

JUSTIFICATION/COMMENTS *Through periodic refurbishment as defined in EA 189-90051 (TAB D, p 4-3).

(9) Were replacement intervals for the equipment or its components defined in the qualification program (Yes/No/NA)? Yes
(Reference: TAB D, pp 4-3.1, 4-3.2).

R1

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-IZS-001 PLANT WBN UNIT(S) 1 SHEET 13 OF 37

BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED AFTER 7/30/80

COMPUTED DMS DATE 6/13/86 R ___ R ___

CHECKED RWB DATE 6/27/86

QUALIFIED LIFE (H8)

The qualified life for all equipment covered by this binder is 40 years through periodic refurbishment. The refurbishment schedule was determined by NAMCO's use of a very conservative 0.8eV activation energy. Figure 8 on page 4-12 of the test report (TAB D) shows the qualified life based on on a 0.8eV activation energy for the various ambient temperatures. The scheduled maintenance service times in TAB D, page 4-3.1 and 4-3.2 (EA 189-90051) comes directly from this Arrhenius curve and are shown below:

Max. Normal Ambient	Service Time
104°F	20.6 years
110°F	15 years
120°F	9 years
130°F	5.5 years

The QMDS section found in TAB G, will document the limit switches which require refurbishment and the appropriate schedule.

I. MATERIALS ANALYSIS

Identification of Materials Susceptible to Significant Thermal and/or Radiation Degradation and Aging (Use Section C of EQC Binder for Detailed Materials Analysis)

	Material/Property/Function	Radiation Threshold	Reference	Activation Energy	Reference
(a)	Ethylene/O-Ring Propylene/Shaft Seal	NA	NA	0.8eV See Comment	TAB D, p.4-9
(b)	Silicone Rubber/Gasket	NA	NA	1.14eV See Comment	TAB D, p.4-9
(c)	Grease/Lubricant	NA	NA	Unknown See Comment	TAB D, p.4-8
(d)	Asbestos Filled Phenolic/ Contact Carrier and Block	NA	NA	(.99eV) 0.96eV See Comment	TAB D, p.4-8
(e)	Aromatic Ether Based Oil/ Lubricant	NA	NA	Unknown See Comment	TAB D, p.4-8

JUSTIFICATION/COMMENTS Namco has assumed an activation energy of 0.8eV for the elastomer portions of the limit switch. Based on 0.8eV, the qualified life of the EA180 Series limit switch (mfg after 7/80) is 5.3 years at 55°C. The qualified life can be extended to 40 years through periodic refurbishment as defined by EA189-90051 (TAB D, p. 4-3). The 0.8eV assumed activation energy for Ethylene Propylene is considered to be conservative based on a review of the Digital Data Base, other test reports, & EPRI NP-1558 (See TAB C(8)). Martin Marietta indicates an activation energy of 1.14 for silicones (TAB D, p. 4-9) that have been tested for 432.5 hours at 120°C. Therefore, these gaskets are capable of

I. MATERIALS ANALYSIS (Continued)

withstanding both the required normal and abnormal conditions over the life of the plant. An activation energy for the lubricant was not required since greases are designed for high temperature applications and are typically rated for temperatures of at least 250°F (TAB D, p. 4-7). The qualified life of the lubricants will be controlled through maintenance procedures. In QTR 105 Namco has assigned an activation energy of 0.96eV to Asbestos-filled Phenolic (thermoset plastic). Based on an ambient temperature of 55°C and the test performed in QTR 105, the resultant life of the phenolic would be as follows:

(Arrhenius EQ.) $t_1 = t_2 \exp^{[\emptyset/K\ (1/T_1 - 1/T_2)]}$

Where t_1 = Life

t_2 = Test Time = 432.5 hours

$\emptyset$ = Activation energy = 0.96eV

k = Boltzmann's Constant = 8.617×10^{-5}

T_1 = Ambient Temp = 55°C = 328°K

T_2 = Test Temp = 120°C = 393°K

t_1 = 13.58 years @ 55°C

More recent IEEE-323-74 testing of this material, as documented in QTR 140 (See 11/4/85 telecon in TAB E(3)), demonstrated 1049 hours @ 120°C at an assigned activation energy of 0.99eV (See materials analysis in TAB C(17)). Using the above Arrhenius equation, the equivalent life would be 39 years @55°C. Therefore, the 20-year replacement schedule recommended by Namco (See maintenance instruction in TAB H) for switches exposed to temperatures greater than 50°C is reasonable and conservative.

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 15a OF 37 R____ R____
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED |R1 JDH	DATE 5/25/89	
	CHECKED |R1 JDR	DATE 6/9/89	

I. MATERIALS ANALYSIS (Continued)

JUSTIFICATION/COMMENTS

Qualification Report QTR 155 supports the change of contact block/carrier material from Asbestos-filled Phenolic to glass-filled Phenolic for the contact block and Poly (Amide-Imide) for the carrier. This test report provides a comprehensive comparison of the physical properties between the old and new material and concludes that both new materials (RX865 glass-filled Phenolic and Torlon 4203L Poly) either meet or exceed the capabilities of the old Asbestos-filled Phenolic material (RX490). We agree with this conclusion and find replacement parts made from these materials and new switches containing these materials acceptable for use. All switches and replacement parts shipped after November, 1986 will be made from these materials.

BINDER NO. WBNEQ-IZS-001 PLANT WBN UNIT(S) 1 SHEET 16 OF 37

BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED AFTER 7/30/80

COMPUTED DRG DATE 6/26/86 R ___ R ___

CHECKED RNB DATE 6/27/86

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(1) Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics which would constitute failure if not met (yes/no/NA)? Yes (Reference TAB D, p 11-27).

Identify Acceptance Criteria: See TAB D, Section 7.0, page 11-27.

(2) Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment which should be verified before, after, and periodically during the test to judge equipment performance (yes/no/NA)? Yes (Reference TAB D, p 11-15, Sect 6.2).

Identify baseline and functional testing: See TAB D, p 11-16, Sect 6.2.1 and p 11-17, Sect 6.2.2.

JUSTIFICATION/COMMENTS None

(3) Does the qualification report/analysis describe loads (or load combinations) applied during DBE test (yes/no/NA)? Yes (Reference TAB D, p 10-50).

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 17 OF 37 R 1 R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 6/25/86 JDH 5/25/89	
	CHECKED RNB	DATE 6/27/86 JDH 6/9/89	

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(4) Do the applied loads during baseline testing reflect normal operating conditions (Yes/No/NA)? Yes (Reference: TAB D, pp 5-1 through 5-3).

JUSTIFICATION/COMMENTS None

(5) Identify electrical characteristics necessary to ensure the equipment performance specifications can be satisfied.

(a)

Parameter	Plant Normal Conditions	Reference
Voltage	NA	NA
Load	NA	NA
Frequency	NA	NA
Accuracy	NA	NA
Other(s)		
Insulation Resistance Minimum	NA	NA
Closed Contact open less than 2 milli-sec during seismic test	NA	NA

JUSTIFICATION/COMMENTS See Comment J(5)(c) R1

(b)

Parameter	Specific Accident Conditions	Reference
Voltage	See Comment	NA
Load	See Comment	NA
Frequency	NA	NA
Accuracy	NA	NA
Other(s)		
Insulation Resistance Minimum	See Comment	NA
Closed Contact open less than 2 milli-sec during seismic test	See Comment	NA

R1

JUSTIFICATION/COMMENTS See Comment J(5)(c) R1

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(c)

Parameter	Demonstrated Conditions	Reference	
			R1
Voltage	125V AC/DC	TAB D, p 3-4	
Load	0.5 amp/100VDC 0.086 amp/100VDC	TAB D, pp 10-43, 7-1, Section 7.1	
Frequency	NA	NA	
Accuracy	NA	NA	
Other(s) Insulation Resistance	$\geq$ 5 M oHM	TAB D, pp 10-41, 10-45, 10-50	
Contact Opening	< 2 milli-sec	TAB D, p 7-1, Section 7.1	

JUSTIFICATION/COMMENTS The typical application of these limit switches is in control circuits, for example solenoid valves. These circuits operate at 120VAC or 125VDC with current ratings of approximately 0.3 to 1.3 amps. This is well within the UL and nameplate ratings of 20 amps @ 125VAC and 5 amps @ 125VDC. The demonstrated load of 0.5 amps @ 100VDC for mechanical aging and 0.086 amps @ 100VDC for all other performance tests is considered adequate for the following reasons: (1) Low voltage and currents may not break down the film/oxide and therefore provide little contact surface renewal. R1

J. <u>EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS</u> (Continued)

JUSTIFICATION/COMMENTS (CONTINUED)

(2) When switches are operated at rated voltage and currents, the contact surfaces tend to be self-cleaning and/or the potential of the circuit is sufficient to break down films or oxides that might form on the contact faces. While there are no plant specific requirements with regard to contact bounce and insulation resistance minimum, the values demonstrated are considered adequate. At 5M ohms, there would be a slight leakage current of approximately 0.025 milliamps for a typical 125V circuit. This small leakage current should not provide enough amperage to cause any adverse circuit operation.

(3) Since TVA's standard design practices prevent circuits from exceeding the UL ratings of contacts, the 100VDC and 0.086 amp load used for testing is conservative and adequate considering items (1) and (2) above.

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Page B-19 R1 was deleted per revision 2.

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 20 OF 37 R 1 R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 6/25/86 JDH 5/17/89	
	CHECKED RNB	DATE 6/27/86 JHR 6/9/89	

K.2 REQUIRED OPERATING ENVIRONMENT Room 737.0-A5

Reference Environmental Drawing No. 47E235-48 |R1

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 80

(d) Radiation (rd) 8.8×10^{5}

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 90

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life. (Effect on qualified life is negligible. See generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 110 Accident type LOCA

(b) Pressure (psig) NA Accident type NA

(c) Humidity (%) NA Accident type NA

(d) Radiation (rd) 1.2×10^{8} Accident type LOCA |R1

(e) Spray Type NA Accident type NA

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 21 OF 37
			R 1 R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 8/14/86 JDH 5/17/89	
	CHECKED RNB	DATE 8/14/86 HOR 6/9/89	

K.3 REQUIRED OPERATING ENVIRONMENT Room 713.0-A6

Reference Environmental Drawing No. 47E235-56 |R1

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 80

(d) Radiation (rd) 2.2×10^6

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 90

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life. (Effect on qualified life is negligible. See generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	110	Accident type LOCA
(b) Pressure (psig)	NA	Accident type NA
(c) Humidity (%)	NA	Accident type NA
(d) Radiation (rd)	2×10^6	Accident type LOCA |R1
(e) Spray Type	NA	Accident type NA

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 22 OF 37 R 1 R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 8/14/86 JDH 6-9-89	
	CHECKED RNB	DATE 8/14/86 [illegible] 6/9/89	

K.4 REQUIRED OPERATING ENVIRONMENT Room 713.0-A28

Reference Environmental Drawing No. 47E235-61 |R1

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 80

(d) Radiation (rd) 7.5×10^6

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 90

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life. (Effect on qualified life is negligible. See generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a)	Temperature (°F) 110	Accident type LOCA	
(b)	Pressure (psig) NA	Accident type NA	
(c)	Humidity (%) NA	Accident type NA	
(d)	Radiation (rd) 5×10^6*	Accident type LOCA	R1
(e)	Spray Type NA	Accident type NA	

* Worst case per WBNNAL3-022 (OE Calculation). See TAB C(13). |R1

PLUSEQ/158.35

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Page B-23 R1 was deleted per revision 2.

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 24 OF 37 R 1 R 2
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 8/14/86 JDH 5/17/89	JDH 12/11/89
	CHECKED RNB	DATE 8/14/86 HDR 6/9/89	12/14/89

K.6 REQUIRED OPERATING ENVIRONMENT Room 757.0-A16

Reference Environmental Drawing No. 47E235-78

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) ATM

(c) Humidity (%) 80

(d) Radiation (rd) 1.8×10^3

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM

(c) Humidity (%) 90

(d) Radiation (rd) NA

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Maximum and minimum abnormal temperatures could exist for up to eight hours per excursion and will occur less than 1% of the plant life. Maximum abnormal temperatures could exist for up to 10 hours "per month during" 4 months of the year because of the EGTS units being operated for testing and maintenance.

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 110 Accident type LOCA

(b) Pressure (psig) NA Accident type NA

(c) Humidity (%) NA Accident type NA

(d) Radiation (rd) $\leq 1.7 \times 10^7$ * Accident type LOCA |R2

(e) Spray Type NA Accident type NA

* See TAB C (2)

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BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 25 OF 37
			R 1 R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 8/15/86 JDH 5/17/89	
	CHECKED RNB	DATE 8/15/86 JHK 6/9/89	

K.7 REQUIRED OPERATING ENVIRONMENT ANN

Reference Environmental Drawing No. 47E235-44 | R1

(1) Normal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 80

(d) Radiation (rd) 1×10^6

(2) Abnormal Max

(a) Temperature (°F) 120

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 90

(d) Radiation (rd) NA | R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life. (Effect on qualified life is negligible. See generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	133.7	Accident type LOCA | R1
(b) Pressure (psig)	ATM(-)	Accident type LOCA
(c) Humidity (%)	61	Accident type LOCA
(d) Radiation (rd)	1.2×10^7 gamma 6×10^5 beta	Accident type LOCA
(e) Spray Type	NA	Accident type NA

R1

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 26 OF 37 R 1 R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 8/14/86 JDH 5/17/89	
	CHECKED RNB	DATE 8/14/86 RBK 6/9/89	

K.8 REQUIRED OPERATING ENVIRONMENT L-Lower Containment

Reference Environmental Drawing No. 47E235-42 R1

(1) Normal Max

(a) Temperature (°F) 120

(b) Pressure (psig) 0.3

(c) Humidity (%) 80

(d) Radiation (rd) $2x10^7$

(2) Abnormal Max

(a) Temperature (°F) 130

(b) Pressure (psig) 0.3

(c) Humidity (%) 100

(d) Radiation (rd) NA R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to 8 hours per excursion and will occur less than 1% of the plant life. (Effect on qualified life is negligible. See generic position in binder WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a)	Temperature (°F)	327	Accident type LOCA/HELB
(b)	Pressure (psig)	11.2	Accident type LOCA/HELB
(c)	Humidity (%)	100	Accident type LOCA/HELB
(d)	Radiation (rd)	$4.7x10^8$ beta $4x10^7$ gamma	Accident type LOCA
(e)	Spray Type	*	Accident type LOCA/HELB

R1

* 0.19 molar H_3BO_3 (2000 PPM Boron), 0.033 molar NaOH resulting in a pH of 8.3 at 25°C. Spray duration is 30 days, at a flow rate equal to 0.92 GPM per square foot of containment cross section.

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 27 OF 37 R 14 R 2
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 8/14/86 KBN 11/6/90	
	CHECKED RNB	DATE 8/14/86 JDH 11/7/90	

K.9 REQUIRED OPERATING ENVIRONMENT North and South Valve Rooms

Reference Environmental Drawing No. 47E235-76

(1) Normal Max

(a) Temperature (°F) 130

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 50%

(d) Radiation (rd) 1.8×10^3 North, 1.8×10^3 South

(2) Abnormal Max

(a) Temperature (°F) 140

(b) Pressure (psig) ATM

(c) Humidity (%) 100%

(d) Radiation (rd) NA

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal temperature conditions could exist for up to 8 hours per excursion and will occur less than 1% of the plant life. The abnormal humidity of 10% will occur simultaneously with abnormal maximum temperature of 140°F. The humidity conditions could exist for up to 8 hours and will return to the normal maximum of 50%. (Effect on qualified life is negligible. See generic position in binder WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

*(a) Temperature (°F) *453 — Accident type MSLB | R4

(b) Pressure (psig) 8.77 North, 10.78 South — Accident type FW

(c) Humidity (%) 100% — Accident type FW

(d) Radiation (rd) $< 1 \times 10^4$ — Accident type LOCA

(e) Spray Type NA — Accident type NA

* - Per QIR MNMWBN90032 R0

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): For a cross-reference of equipment to environmental drawing see TAB G.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: See TAB G for the limit switches requiring conduit seals). R4

(7) Subject to submergence (Yes/No/NA)? No* (Reference: TAB C (10)).

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? Yes (Reference: Environmental Drawing 47E235-42).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify:

See Section P(3) this TAB.

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.
See TAB B, Section A	

* All devices located in the valve vault rooms have been verified to be above the maximum possible flood levels.

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 29 OF 37
			R 1 R 4
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 8/14/86 JDH 6/9/89	KBN 11/6/90
	CHECKED RNB	DATE 8/14/86 HDR 6/9/89	JDH 11/7/90

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS

(1) Comparison of worst-case maximum parameters:

Parameter	Specified	Demonstrated	Reference	
Operating Time	100 days ***453(MSLB)	30 days	TAB C(4)	R4
Temperature (°F)	327	391	TAB D, p 10-14	
Pressure (psig)	12.0	119	TAB D, p 10-14	
Relative Humidity (%)	100	100	TAB D, pp 10-9, 10-51	
Chemical Spray*	TAB C(3)	TAB C(3)	TAB D, pp 10-9, 10-51	
Radiation (rd)**	4.7×10^8 beta 6×10^7 gamma	2.04×10^8 gamma	beta-see P(3) TAB D, p 10-5	
Submergence	NA	NA	NA	

*Includes spray concentration, flowrate, density, duration, and pH.

**Enter 40-year integrated normal dose plus integrated accident dose and specify type.

***See TAB C(4) R4

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference
Temperature	Yes	TAB C
Pressure	Yes	See L(1)
Relative Humidity	Yes	See L(1)
Chemical Spray	Yes	TAB C
Submergence	NA	NA

JUSTIFICATION/COMMENTS See TAB C(4) for comparison of test profiles and WBN accident profile and demonstration of 100 days operability (accident degradation equivalency calculation). R4

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L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, yes/no/NA)

Suggested Margins Per IEEE-323(74)	Applied	Yes/No/NA
Temperature: +15 degrees F	+64	Yes
Pressure: +10% but no more than 10 psig	+892% (107 psig)	Yes
Radiation: +10% of accident dose	10%	Yes
Time: +10% (or 1 hour + operating time per NUREG-0588)	TAB C(4)	Tab C(4) R4
Voltage: ± 10% of rated value	NA	NA
Frequency: ± 5% of rated value	NA	NA
Environmental Transient: the initial transient and the peak temperature applied twice	2 Dwells	Yes
Vibration: +10% added to acceleration	317% - See Comments	Yes

JUSTIFICATION/COMMENTS: Per TVA standard specification SS-E18.12.10, Seismic Requirements for Category I Electrical and I&C Equipment, these limit switches should be tested to 3 g's horizontal and 2 g's vertical. Since Namco verified in App. C of their report (TAB D, pp 10-35 through 10-39) that cross-coupling was not significant, the single axis test performed in each of the 3 axis to 9.52 g's was more than adequate.

The applied margin to the maximum accident temperatures is acceptable since the initial transient and the peak temperature were applied twice. Reference: NUREG-0588, Revision 1, Part II, Comment No. 73, pages II-38 and II-39, and IEEE 323-1983, pages 18 and 19.

M. OPERABILITY TEST RESULTS

(1) Identify the safety function(s) of this equipment: (Reference See TAB A).

JUSTIFICATION/COMMENTS None

(2) Did the equipment performs its intended function during the simulated design basis accident exposure (yes/no/NA)? Yes - See comment (Reference TAB D, p. 7-1, Section 7.1).

JUSTIFICATION/COMMENTS One failure to transfer was recorded. Namco believes this may have been aggravated by the test set-up. See TAB D, page 7-1, Section 7.2.

(3) Did the equipment perform its intended function during the simulated post-design basis accident exposure (yes/no/NA)? Yes (Reference TAB D, p. 10-10).

JUSTIFICATION/COMMENTS None

(4) Did the test demonstrate the operability requirements for the required time interval for which the equipment is required to operate (yes/no/NA)? Yes (Reference See TAB C(4).

JUSTIFICATION/COMMENTS See TAB C(4) for additional comments. R4

(5) Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved (yes/no/NA)? Yes (Reference TAB C(6)).

JUSTIFICATION/COMMENTS See TAB C(6) for additional comments.

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 32 OF 37				
BINDER TITLE EA180 SERIES LIMIT		COMPUTED DRG	DATE 8/14/86	R	R		
SWITCHES MANUFACTURED AFTER 7/30/80		CHECKED RHB	DATE 8/14/86				

N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (yes/no/NA)? Yes (Enter all requirements in Section G of the EQC Binder - Qualification Maintenance Data Sheets).

JUSTIFICATION/COMMENTS SEE QMDS- TAB G

BINDER NO. WBNEQ-IZS-001 PLANT WBN UNIT(S) 1 SHEET 33 OF 37

BINDER TITLE EA180 SERIES LIMIT COMPUTED DRG DATE 8/14/86 R ___ R ___

SWITCHES MANUFACTURED AFTER 7/30/80 CHECKED RNB DATE 8/14/86

0. SUMMARY OF REVIEW

(1) Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	Yes
(2) Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	NA
(3) Choice of qualification methodology adequately justified?	Yes
(4) If analysis was performed, complete the following:	
(a) Were equipment performance requirements identified?	NA
(b) Were specific features and failure modes and effects analyzed?	NA
(c) Were assumptions and mathematical models used together with appropriate justification for their use?	NA
(d) Were environmental parameters which affect equipment performance identified?	NA
(5) Adequate similarity between equipment and test specimen established?	YES
(6) Aging degradation evaluated adequately?	YES
(a) Mechanical and/or cycle aging addressed?	YES
(b) Equipment aged to end of life condition prior to application of DBE conditions?	YES
(c) Absence of preaging in test/analysis justified?	NA
(d) Materials susceptible to thermal/radiation aging identified?	YES-Section I & TAB C(8)

BINDER NO. WBNEQ-IZS-001 PLANT WBN UNIT(S) 1 SHEET 34 OF 37

BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED AFTER 7/30/80 COMPUTED DK DATE 8/14/86 R ___ R ___

CHECKED RNB DATE 8/14/86

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA See Section P(2)
(e) Normally operating state of device (e.g., normally energized) considered?	YES
(7) Qualified life or replacement schedule established?	Yes
(8) Criteria regarding temperature/pressure exposure satisfied?	Yes
(a) Peak temperature adequate	Yes
(b) Peak pressure adequate	Yes
(c) Duration adequate	Yes
(d) Required profile enveloped adequately	Yes
(e) Steam exposure adequate	Yes
(9) Criteria regarding test sequence satisfied?	Yes
(10) Criteria regarding spray satisfied?	Yes
(a) Was the spray testing done while under the extremes of pressure and temperature?	Yes
(b) Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant?	Yes See TAB C(3)
(11) Criteria regarding submergence satisfied?	Yes
(12) Criteria regarding radiation satisfied?	Yes
(a) Was dose rate considered?	Yes
(b) Was beta radiation considered?	Yes
(13) Criteria regarding operability status/mode satisfied?	Yes
(14) Criteria regarding test failures or anomalies satisfied?	Yes

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 35 OF 37 R 4 R
BINDER TITLE EA 180 Series Limit Switches Manufactured After 7/30/80	COMPUTED DRS	DATE 8/14/86 KBN 11/6/90	
	CHECKED RNB	DATE 8/14/86 JDH 11/7/90	

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(15) Criteria regarding functional testing satisfied?	Yes
(a) Does the test plan/report specify an acceptance criteria for equipment performed?	Yes
(b) Was an initial base line test done to establish required performance characteristics?	Yes
(c) Has the test/analysis demonstrated that performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	Yes
(16) Criteria regarding instrument accuracy satisfied?	NA
(17) Test duration margin (1 hour + function time) satisfied?	Yes-See TAB C(4) R4
(a) Is the minimum specified operating time at least 1 hour?	Yes
(b) If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	NA
(18) Criteria regarding synergistic effects satisfied?	Yes-See TAB C(18)
(19) Criteria regarding margins satisfied?	Yes
(20) Maintenance and surveillance requirements adequately identified?	Yes

P. DISCUSSION 1. AGING - SECTION H(7)(b) - This device was subject to 100,200 actuation cycles during mechanical aging testing. This is equivalent to an average of 208 actuations per month or approximately 7 actuations per day over the 40 year life of the plant. This is judged to be in excess of the full open/close actuation cycles the associated valves will be required to operate for normal plant (cont. on Next page)

P. DISCUSSION (Continued)

operation, surveillance, and maintenance. Therefore, the mechanical aging performed is adequate to demonstrate qualification over the 40 year life of the plant.

2. O(6)(e) - This device operates intermittently at relatively low voltages and currents which will not result in significant heat rise.

5. O(12)(b) Beta dose is not required to be considered since this device is housed in a sealed metal enclosure which will prevent the passage of beta radiation through it and the entrance of beta - emitting particles into it.

3. Per TVA Drawing 47E235-42 (Lower Compartment), the unattenuated free field post-LOCA beta radiation dose contribution for inside primary containment is 4.7×10^8 rads. The limit switch internals will not; however, be subject to the unattenuated free field beta dose. The switch housing assembly consists of three rectangular parts; the Bronwite alloy housing body (a corrosion resistant bronze casting alloy) and top and bottom stainless steel covers which are tightly bolted together. The minimum thickness is 1/8". Silicone rubber gaskets 0.060" thick are compressed between the housing and top and bottom covers at 20-inch pounds, creating a completely sealed unit that is water, oil, dust, and pressure tight, meeting NEMA type 1, 4, and 13 requirements. Also, all limit switches inside primary containment include a qualified seal. Therefore, all beta radiation sources will be external to the housing and subject to dose attenuation due to the housing. The beta dose to the switch internals will essentially be attenuated completely by a factor of 0.009 due to the minimum metal thickness (reference TVA Calculation No. GENNAL3-002, TAB C, Section 19). The gap created by the gasket is sufficiently small to allow only a negligible fraction of the unattenuated 4-pi geometry free field dose to penetrate. However, as a conservatism to account for the gap (without taking credit for attenuation due to the silicone gasket), 10% of the unattenuated free field dose is added to the dose attenuated by the metal housing. Therefore, the 100-day beta dose to the switch internals is conservatively estimated to be: 10% unattenuated contribution = $0.10\ (4.7 \times 10^8) = 4.7 \times 10^7$, 100% attenuated contribution = $0.009\ (4.7 \times 10^8) = 4.23 \times 10^6$. Total = 5.12×10^7 rads beta. |R1

P. DISCUSSION (Continued)

Additionally, the silicone gaskets themselves are not a concern. They receive significant geometric shielding due to being tightly compressed between the metal housing parts. Based on the switch geometry, the outer gasket material will be exposed to only a fraction of the unattenuated 4-pi geometry free field beta radiation dose. This unattenuated dose would be further reduced due to the angle of incidence into the narrow gap and attenuation due to the outer gasket material resulting in minimal dose to the innermost gasket material. The gasket width is approximately equal to the housing thickness (1/8 inch). Also, Target Rock Corp. has conducted tests on a similar silicone rubber gasket used in a similar application (reference EQ Binder WBNEQ-SOL-001, Section D, page D-29) and found that after exposure to 185 megarads of gamma radiation,

BINDER NO. WBNEQ-IZS-001	PLANT WBN	UNIT(S) 1	SHEET 37A OF 37
			R ___ R ___
BINDER TITLE EA180 SERIES LIMIT		COMPUTED DRG DATE 8/14/86	
SWITCHES MANUFACTURED AFTER 7/30/80		CHECKED RNB DATE 8/14/86	

P. DISCUSSION (Continued)

embrittlement had occurred in the excess gasket material extending beyond the mated parts. The gasket material actually trapped between the mated parts was still flexible. Likewise, in our application, the gaskets would not be a concern even should they become brittle due to their being tightly sandwiched between the housing and housing covers in a static application; especially considering that the outer part of the gasket (least important) would exhibit the more significant degradation. The limit switches also contain EPDM O-rings used for screw gaskets and the operating shaft seal. These O-rings are enclosed by the metal screws and shaft housing which shields them from the effects of beta radiation.

In conclusion: The total combined beta and gamma radiation dose will equal 9.12×10^7 rads TID (5.12×10^7 beta + 4.0×10^7 gamma) for accident conditions. The accident radiation plus the large lower compartment 40-year dose of 2.0×10^7 rads equals a total radiation dose of 1.1×10^8 rads TID. These switches were tested to 2.04×10^8 rads which envelops our plant requirements. Therefore, they are qualified for our worst case gamma and beta radiation dose.

BINDER NO. WBNEQ-IZS-002 PLANT WBN	UNIT(S) 1	SHEET 1 OF 1
		R 2 R
BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 5/78 and 7/20/80	COMPUTED R1/JWH DATE 9/28/89	WCD 7/23/90
	CHECKED R1/WCG DATE 9/28/89	JDH 7/23/90

IZS-002

TAB A

NOTES

1. Elevations shown are Actual elevations for equipment located in the Reactor Building and Floor elevations for equipment located outside the Reactor Building.

2. See Page B-1 for source of Category and Operating Time assignments.

3. A phase "A" containment isolation will cause the associated FCV to close. The limit switches must then open and remain open preventing solenoid reenergization and valve opening upon phase "A" containment isolation reset. This limit switch position indication is a PAM B1 variable and must be monitored to verify that containment isolation integrity is maintained for the duration of each event. R2

WBEP-0248Q

PRINT DATE: 07/07/90

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -061-0097A -B INLET ISLN VALVE REACTOR BLDG POS SW	1-FCV -061-0097/ZS1 -B EA180-15302	300	772'10" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	VLV POS IND IS A PAM B1 VARIB AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -061-0097B -B INLET ISLN VALVE REACTOR BLDG POS SW	1-FCV -061-0097/ZS2 -B EA180-15302	300	772' 5" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	VLV POS IND IS A PAM B1 VARIB AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -061-0122A -B OUTLET ISLN VALVE REACTOR BLDG POS SW	1-FCV -061-0122/ZS1 -B EA180-15302	300	776' 2" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	VLV POS IND IS A PAM B1 VARIB AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -061-0122B -B OUTLET ISLN VALVE REACTOR BLDG POS SW	1-FCV -061-0122/ZS2 -B EA180-15302	300	775' 9" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	VLV POS IND IS A PAM B1 VARIB AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -061-0192A -B GLYCOL SUP ISLN VALVE POS SW	1-FCV -061-0192/ZS1 -B EA180-15302	294	807' 7" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	VLV POS IND IS A PAM B1 VARIB AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT TO VERIFY CONTAINMENT INTEGRITY.

		R 1	R 2	R
PREPARER/DATE	D.R.S. 9/8/86	JWH 9-28-89	WCJ 7-23-90	
CHECKED/DATE	N.A.P. 9/8/86	WCG 9-28-89	JDH 7/23/90	

PRINT DATE: 07/07/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -061-0192B -B GLYCOL SUP ISLN VALVE POS SW	1-FCV -061-0192/ZS2 -B EA180-15302	294	807' 1" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	VLV POS IND IS A PAM B1 VARIB AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -061-0194A -B GLYCOL RETURN ISLN VALVE POS SW	1-FCV -061-0194/ZS1 -B EA180-15302	300	810' 3" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	VLV POS IND IS A PAM B1 VARIB AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -061-0194B -B GLYCOL RETURN ISLN VALVE POS SW	1-FCV -061-0194/ZS2 -B EA180-15302	300	809' 9" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	VLV POS IND IS A PAM B1 VARIB AND MUST BE MONITORED FOR THE DURATION OF EACH EVENT TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -062-0072A -A REGEN HTX LETDOWN ISOLATION VLV	1-FCV -062-0072A/ZS1 -A EA180-31302	047	704' 6"	RW	A A A A A	5MIN 5MIN 5MIN 15MIN 1HR	L MS/C FW/C RH/C CV/C	LS POS IND IS A PAM B1 AND D2 VARIABLE AND MUST BE MONITORED TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -062-0072B -A REGEN HTX LETDOWN ISOLATION VLV	1-FCV -062-0072B/ZS2 -A EA180-31302	047	704' 3"	RW	A A A A A	5MIN 5MIN 5MIN 15MIN 1HR	L MS/C FW/C RH/C CV/C	LS POS IND IS A PAM B1 AND D2 VARIABLE AND MUST BE MONITORED TO VERIFY CONTAINMENT INTEGRITY.

PAGE A-3 R2

		R 1	R 2	R
PREPARER/DATE	D.R.S. 9/8/86	JWH 9-28-89	WCD 7-23-90	
CHECKED/DATE	N.A.P. 9/8/86	WCG 9-28-89	JDH 7/23/90	

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -062-0073A -A REGEN HTX LETDOWN ISOLATION VLV	1-FCV -062-0073A/ZS1 -A EA180-31302	047	704' 8"	RW	A A A A A	5MIN 5MIN 5MIN 15MIN 1HR	L MS/C FW/C RH/C CV/C	LS POS IND IS A PAM B1 AND D2 VARIABLE AND MUST BE MONITORED TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -062-0073B -A REGEN HTX LETDOWN ISOLATION VLV	1-FCV -062-0073B/ZS2 -A EA180-11302	047	704' 3"	RW	A A A A A	5MIN 5MIN 5MIN 15MIN 1HR	L MS/C FW/C RH/C CV/C	LS POS IND IS A PAM B1 AND D2 VARIABLE AND MUST BE MONITORED TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -062-0074A -A REGEN HTX LETDOWN ISOLATION VLV	1-FCV -062-0074A/ZS1 -A EA180-11302	050	704' 6"	RW	A A A A A	5MIN 5MIN 5MIN 15MIN 1HR	L MS/C FW/C RH/C CV/C	LS POS IND IS A PAM B1 AND D2 VARIABLE AND MUST BE MONITORED TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -062-0074B -A REGEN HTX LETDOWN ISOLATION VLV	1-FCV -062-0074B/ZS2 -A EA180-31302	050	704' 4"	RW	A A A A A	5MIN 5MIN 5MIN 15MIN 1HR	L MS/C FW/C RH/C CV/C	LS POS IND IS A PAM B1 AND D2 VARIABLE AND MUST BE MONITORED TO VERIFY CONTAINMENT INTEGRITY.
WBN-1-ZS -063-0071A -A SIS CHECK VALVE LEAKTEST ISLN POS SW	1-FCV -063-0071/ZS1 -A EA180-31302	290	721' 5" 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	PHASE A CNTMT ISO CAUSES ASSOC FCV TO CLOSE. LS OPENS & REMAINS OPEN PREVENTING SOL REENERGIZATION & VLV OPENING ON PHASE A CNTMT ISO RESET.

		R 1	R 2	R
PREPARER/DATE	D.R.S. 9/8/86	JWH 9-28-89	WCJ 7-23-90	
CHECKED/DATE	N.A.P. 9/8/86	WCG 9-28-89	JOH 7/23/90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT	DEVICE ID NO. MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -063-0071B SIS CHECK VALVE LEAKTEST ISLN POS SW	-A	1-FCV -063-0071/ZS2 -A EA180-31302	290	721' 6" 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	PHASE A CNTMT ISO CAUSES ASSOC FCV TO CLOSE. LS OPENS & REMAINS OPEN PREVENTING SOL REENERGIZATION & VLV OPENING ON PHASE A CNTMT ISO RESET.
WBN-1-ZS -063-0072A CNTMT SUMP TO RHR PUMP A-A VLV LIMIT SW	-A	1-FCV -063-0072/ZS1 -A EA180-12302		685' 79K3-824495-1	A07'	A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A AB AF CV/A	PROVIDE INTERLOCK TO ALLOW RHR SPRAY HDR VLVS TO BE MANUALLY OPENED. MUST RETAIN POS FOR 30D MUST NOT FAIL SUCH THAT RHR SPRAY HDR CAN'T BE OPENED.
WBN-1-ZS -063-0072B CNTMT SUMP TO RHR PUMP A-A VLV LIMIT SW	-A	1-FCV -063-0072/ZS2 -A EA180-12301		685'	A07'	A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A AB AF CV/A	PROVIDE INTERLOCK TO ALLOW RHR SPRAY HDR VLVS TO BE MANUALLY OPENED. MUST RETAIN POS FOR 30D. MUST NOT FAIL SUCH THAT RHR SPRAY HDR CAN'T BE OPENED.
WBN-1-ZS -063-0073A CNTMT SUMP TO RHR PUMP B-B VLV LIMIT SW	-B	1-FCV -063-0073/ZS1 -B EA180-12302		685' 79K3-824495-1	A07'	A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A AB AF CV/A	PROVIDE INTERLOCK TO ALLOW RHR SPRAY HDR VLVS TO BE MANUALLY OPENED. MUST RETAIN POS FOR 30D. MUST NOT FAIL SUCH THAT RHR SPRAY HDR CAN'TBE OPENED.
WBN-1-ZS -063-0073B CNTMT SUMP TO RHR PUMP B-B VLV LIMIT SW	-B	1-FCV -063-0073/ZS2 -B EA180-12302		685' 79K3-824495-1	A07'	A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A AB AF CV/A	PROVIDE INTERLOCK TO ALLOW RHR SPRAY HDR TO BE MANUALLY OPENED. MUST RETAIN POS FOR 30D. MUST NOT FAIL SUCH THAT RHR SPRAY HDR CAN'T BE OPENED.

		R 1	R 2	R
PREPARER/DATE	D.R.S. 9/8/86	JWH 9-28-89	WCD 7-23-90	
CHECKED/DATE	N.A.P. 9/8/86	WCG 9-28-89	JDH 7/23/90	

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -068-0308A -B RCS FLOW CNTL VALVE WDS GA TO PRT POS SW	1-FCV -068-0308/ZS1 -B EA180-11302	317	724' 4" 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	SEE NOTE 3.
WBN-1-ZS -068-0308B -B RCS FLOW CNTL VALVE WDS GA TO PRT POS SW	1-FCV -068-0308/ZS2 -B EA180-11302	317	723' 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	SEE NOTE 3.
WBN-1-ZS -072-0044 -A CNTMT SMP TO HDR A FCV STEM SW	1-ZS -072-0044 -A EA180-12302		685'	A07'	A/B B B B B	1WK/100D 30D 30D 30D 30D	L RH/A CV/A AF AB	LS PROVIDES INTERLOCKS WHICH PREVENT THE OPENING OF THE FCV LS MUST NOT FAIL IN ORDER TO PREVENT INADVERTENT DRAINING OF THE RWST TO CNMT SUMP.
WBN-1-ZS -072-0045 -B CNTMT SMP TO HDR B FCV STEM SW	1-ZS -072-0045 -B EA180-12302		685' 79K3-824495-1	A07'	A/B B B B B	1WK/100D 30D 30D 30D 30D	L RH/A CV/A AF AB	LS PROVIDES INTERLOCKS WHICH PREVENT THE OPENING OF THE FCV LS MUST NOT FAIL IN ORDER TO PREVENT INADVERTENT DRAINING OF THE RWST TO CNMT SUMP.
WBN-1-ZS -077-0009A -B RCDT PUMP DISCH FLOW CNTL VLV LIMIIT SW	1-FCV -077-0009/ZS1 -B EA180-15302	280	724' 1" 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	SEE NOTE 3.

		R 1	R 2	R
PREPARER/DATE	D.R.S. 9/8/86	JWH 9-28-89	WCP 7-23-90	
CHECKED/DATE	N.A.P. 9/8/86	WCG 9-28-89	JCH 7/23/90	

PRINT DATE: 07/07/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -077-0009B -B	1-FCV -077-0009/ZS2 -B	280	723' 8"	AC4	A	100D	L	SEE NOTE 3.
RCDT PUMP DISCH FLOW CNTL VLV LIMIT SW	EA180-15302		79K3-824495-1		A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	
WBN-1-ZS -077-0016A -B	1-FCV -077-0016/ZS1 -B	285	718' 8"	AC4	A	100D	L	SEE NOTE 3.
RCDT TO GAS ANALYZER FLOW CNTL VLV LS	EA180-15302		79K3-824495-1		A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	
WBN-1-ZS -077-0016B -B	1-FCV -077-0016/ZS2 -B	285	718' 3"	AC4	A	100D	L	SEE NOTE 3.
RCDT TO GAS ANALYZER FLOW CNTL VLV LS	EA180-15302		79K3-824495-1		A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	
WBN-1-ZS -077-0018A -B	1-FCV -077-0018/ZS1 -B	280	723' 9"	AC4	A	100D	L	SEE NOTE 3.
RCDT TO VENT HDR FLOW CNTL VLV LIMIT SW	EA180-15302		79K3-824495-1		A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	
WBN-1-ZS -077-0018B -B	1-FCV -077-0018/ZS2 -B	280	723' 4"	AC4	A	100D	L	SEE NOTE 3.
RCDT TO VENT HDR FLOW CNTL VLV LIMIT SW	EA180-15302		79K3-824495-1		A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	

		R 1	R 2	R
PREPARER/DATE	D.R.S. 9/8/86	JWH 9-28-89	WCG 7-23-90	
CHECKED/DATE	N.A.P. 9/8/86	WCG 9-28-89	JDH 7/23/90	

PRINT DATE: 07/07/90

BINDER NO. : WBNEQ-IZS -002
MANUFACTURER : NAMCO

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -090-0108 -B CNTMT BLDG LWR COMPT MON ISLN VLV POS SW	I-FCV -090-0108/ZS -B EA180-14302	296	736' 1"	AC4	A/B A/B A/B A/B A/B	5MN/100D 5MN/100D 5MN/100D 15MN/1MO 1HR/1MO	L MS/C FW/C RH/C CV/C	CNTMT VENT ISO SIG WILL CAUSE ASSOC FCV TO CLOSE. THE LS MUST OPEN & REMAIN OPEN PREVENTING SOL REENERGIZATION & VLV OPENING ON SIGNAL RESET.
WBN-1-ZS -090-0109 -B CNTMT BLDG LWR COMPT MON ISLN VLV POS SW	1-FCV -090-0109/ZS -B EA180-14302	297	736'10"	AC4	A/B A/B A/B A/B A/B	5MN/100D 5MN/100D 5MN/100D 15MN/1MO 1HR/1MO	L MS/C FW/C RH/C CV/C	CNTMT VENT ISO SIG WIL CAUSE ASSOC FCV TO CLOSE. THE LS MUST OPEN & REMAIN OPEN PREVENTING SOL REENERGIZATION & VLV OPENING ON SIGNAL RESET.
WBN-1-ZS -090-0110 -B CNTMT BLDG LWR COMPT MON ISLN VLV POS SW	1-FCV -090-0110/ZS -B EA180-14302	295	737' 3"	AC4	A/B A/B A/B A/B A/B	5MN/100D 5MN/100D 5MN/100D 15MN/1MO 1HR/1MO	L MS/C FW/C RH/C CV/C	CNTMT VENT ISO SIG WILL CAUSE ASSOC FCV TO CLOSE. THE LS MUST OPEN & REMAIN OPEN PREVENTING SOL REENERGIZATION & VLV OPENING ON SIGNAL RESET.
WBN-1-ZS -090-0114 -B CNTMT BLDG UP COMPT MON ISLN VLV POS SW	1-FCV -090-0114/ZS -B EA180-14302	296	736 4"	AC4	A/B A/B A/B A/B A/B	5MN/100D 5MN/100D 5MN/100D 15MN/1MO 1HR/1MO	L MS/C FW/C RH/C CV/C	CNTMT VENT ISO SIG WILL CAUSE ASSOC FCV TO CLOSE. THE LS MUST OPEN & REMAIN OPEN PREVENTING SOL REENERGIZATION & VLV OPENING ON SIGNAL RESET.
WBN-1-ZS -090-0115 -B CNTMT BLDG UP COMPT MON ISLN VLV POS SW	1-FCV -090-0115/ZS -B EA180-14302	296	736' 3"	AC4	A/B A/B A/B A/B A/B	5MN/100D 5MN/100D 5MN/100D 15MN/1MO 1HR/1MO	L MS/C FW/C RH/C CV/C	CNTMT VENT ISO SIG WILL CAUSE ASSOC FCV TO CLOSE. THE LS MUST OPEN & REMAIN OPEN PREVENTING SOL REENERGIZATION & VLV OPENING ON SIGNAL RESET.

		R 1	R 2	R
PREPARER/DATE	D.R.S. 9/8/86	JWH 9-28-89	WCP 7-23-90	
CHECKED/DATE	N.A.P. 9/8/86	WCG 9-28-89	JOH 7/23/90	

PRINT DATE: 07/07/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -090-0116 -B	1-FCV -090-0116/ZS -B	291	736'11"	AC4	A/B	5MN/100D	L	CNTMT VENT ISO SIG WILL CAUSE
CNTMT BLDG UP COMPT MON ISLN VLV POS SW	EA180-14302				A/B	5MN/100D	MS/C	ASSOC FCV TO CLOSE. THE LS
					A/B	5MN/100D	FW/C	MUST OPEN & REMAIN OPEN
					A/B	15MN/1MO	RH/C	PREVENTING SOL REENERGIZATION
					A/B	1HR/1MO	CV/C	& VLV OPENING ON SIGNAL RESET.

		R 1	R 2	R
PREPARER/DATE	D.R.S. 9/8/86	JWH 9-28-89	WCD 7-23-90	
CHECKED/DATE	N.A.P. 9/8/86	WCG 9-28-89	JOH 7/23/90	

BINDER NO. WBNEQ-IZS-002 PLANT WBN	UNIT(S) 1	SHEET 1 OF 32	
		R 1	R 2
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS DATE 5/22/86	JWH 9/28/89	WCJ 7-23-90
	CHECKED NAP DATE 5/23/86	WCG 9/28/89	TDH 7/23/90

A. DOCUMENTATION

Equipment Description Limit Switch

Vendor/Manufacturer NAMCO

Equipment Model No.(s) See Tab A

QUALIFICATION REPORTS

(1) Title/Number/Revision Qualification of NAMCO controls Limit Switch Model EA 180 to IEEE Standards 344 ('75), 323 ('74) and 382 ('72) Revision 1 — RIMS NEB 820318 202 — DATE 9/5/78

OTHER (ANALYSIS, VENDOR DATA, ETC.)

WBNOSG4-012 R5 (B18 900531 252) Category & Operating Times-System 61
WBNOSG4-013 R12 (B26 900327 200) Category & Operating Times-System 62
WBNOSG4-014 R11 (B26 900309 227) Category & Operating Times-System 63 R2
WBNOSG4-017 R11 (B18 900612 252) Category & Operating Times-System 68
WBNOSG4-019 R8 (B26 900628 201) Category & Operating Times-System 72
WBNOSG4-021 R5 (B18 900612 251) Category & Operating Times-System 77
WBNOSG4-026 R7 (B45 870227 426) Category & Operating Times-System 90
Vendor Telecon: TVA (L. P. Woodley) and NAMCO (J. R. Bendokaitis) on 10/22/85 - See TAB E (3)
Watts Bar Environmental Drawing 47E235-41 R1
Watts Bar Environmental Drawing 47E235-42 R2
Watts Bar Environmental Drawing 47E235-77 R1
Material Aging Calculation WAC-293 (B44 900410 805) R2
Reduction of Beta Dose by Sheet Steel WBNTSR-051 R0 (B26 891129 202)

Note: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. This listing includes only those documents which are essential to qualification and accordingly should not be considered a complete listing of binder references.

BINDER NO. WBNEQ-IZS-002 PLANT WBN	UNIT(S) 1		SHEET 2 OF 32 R 1 R
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 9/8/86	
	CHECKED NAP	DATE 9/8/86	9-28-89

B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified

______ Equipment Satisfies All Requirements Except Qualified Life or Justification of Replacement Schedule

______ Equipment Qualification Not Established by Documentation

______ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES

Equipment is qualified pending resolution of open items identified in the front of the binder. 1. SCR WBNEEB8578 R3 - Gasket replacement | R1

COMMENTS/RECOMMENDATIONS

The required operating environments, normal and accident, have been reviewed for each switch location identified in TAB A. All switches are qualified to the worst case combination of these environmental parameters. This includes consideration of peak levels and profiles.

BINDER NO. WBNEQ-IZS-002 **PLANT** WBN **UNIT(S)** 1 **SHEET** 3 **OF** 32

BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80 **COMPUTED** DRS **DATE** 5/22/86 **R** ___ **R** ___

CHECKED JLP **DATE** 5/23/86

C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate Which Criteria is Applicable):

____ Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE323-1974)

_X_ Components are Qualified to the Criteria of NUREG-0588 Category II or the DOR Guidelines of 1E Bulletin No. 79-01B (IEEE323-1971) (DOR Guidelines Applicable to only BFN)

JUSTIFICATION/COMMENTS Purchase contract is dated 1978 (see Tab E(2)).

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

IEEE 323-1971

BINDER NO. WBNEQ-IZS-002 PLANT WBN UNIT(S) 1 SHEET 4 OF 32

BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80

COMPUTED DRS DATE 5/22/86 R ___ R ___

CHECKED nap DATE 5/23/86

D. QUALIFICATION METHODOLOGY

X Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

X Test of Similar Items with Supporting Analysis

___ Analysis in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

___ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS This test provides generic group qualification for EA180 series limit switches. Model EA180-11302 was selected for test purposes and is identical to models of the same number at Watts Bar. Other models of the EA180 series have been qualified with supporting supplementary testing and similarity discussions. See Tab C(1) for similarity evaluation.

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 5 OF 32
			R 1 R
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 5/22/86	4/12/84
	CHECKED NAP	DATE 5/23/86	WCP 9-28-89

E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification documentation identical to the plant equipment which requires qualification (Yes/No/NA)? Yes - See Comment Section D.

		Plant Device	Qualification Document	Reference
(1)	Equipment Type	Limit Switch	Limit Switch	TAB D, Page D-6
(2)	Manufacturer	NAMCO	NAMCO	TAB D, Page D-6
(3)	Model Number(s)	See TAB A	EA 180-11302	TAB D, Page D-6
(4)	Serial Number(s)	See Comment	See Comment	

R1

(5) Identify Component Unique checksheet attached: N/A

JUSTIFICATION/COMMENTS

These limit switches do not have serial numbers but are provided with date codes per the manufacturer's date code system described on EA 189-90051, page 1 of 3 (TAB H). These date codes are documented on field verification sheets found in TAB F. All limit switches in this binder have date codes between 9/5/78 and 7/30/80. Contract Certification of Compliance for these switches, found in TAB E(1), documents qualification to the test report found in TAB D.

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 6 OF 32
			R 1 R
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 5-22-86	9/28/89
	CHECKED NAP	DATE 5-23-86	WCP 9-28-89

F. INSTALLATION INTERFACES

List all interfaces pertinent to EQ identified in the qualification documentation and/or evaluation and reference the source. Is the interface a requirement for our application (Yes/No)? (Note below.) If yes, enter requirement in QMDS, if no, provide justification.

Interface	Identify Interface	Plant Requirement? (Yes/No)	Reference Test Report
Mounting Bolts	None	No	None
External Process Connections	None	No	None
Electrical Connections	None	No	None
Conduit Seals	Required	Yes	TAB D, Page D-7
Connector Seals	None	No	None
Orientation	None	No	None
Physical Configuration	None	No	None
Other	See Comments	See Comments	None

JUSTIFICATION/COMMENTS

Although it was not considered part of the qualification test, an operating lever is required for proper operation of the switch. The lever and roller should be of metal construction. Nylon rollers are not acceptable and are controlled through TVA's maintenance program (see TAB G).

R1

PLUSEQ/248.15

G. TEST SEQUENCE

(1) Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE-323 (74), paragraph 6.3.2 (Yes/No/NA)? (Note below.)

	Yes/No/NA	Reference
(a) Equipment inspected for damage	Yes	TAB D, Page D-7
(b) Baseline performance measurements taken	Yes	TAB D, Page D-7
(c) Equipment aged:		
Thermal	Yes	TAB D, Page D-7
Radiation	Yes	TAB D, Page D-8
Wear	Yes	TAB D, Page D-7
(d) Vibration/seismic testing conducted	Yes	TAB D, Page D-8
(e) Design basis event (DBE) exposure	Yes	TAB D, Page D-12
(f) Post-DBE exposure	Yes	TAB D, Page D-13
(g) Final inspection and disassembly	Yes	TAB D, Page D-41

R1

(2) Was the same piece of equipment used throughout the test sequence described in item (1) above (Yes/No/NA)? Yes - See Comment (2)

(3) Have the test equipment, test equipment accuracies and calibration data been appropriately document (Yes/No/NA)? No - See Comment (1) (Reference: TAB D, Appendix E).

JUSTIFICATION/COMMENTS (1) Test equipment and calibration dates were recorded; however, test equipment accuracies were not documented in the test report. (2) The test report recorded seismic test data (TAB D, Appendix B) for a different EA 180 switch. However, the switch

G. TEST SEQUENCE (continued)

used throughout the test sequence was seismically conditioned by subjecting it to all vibrations contained in the seismic test (TAB D, pages D-11 and D-12). |R1

H. AGING

(1) Was aging considered in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, pages D-7 & D-8). |R1

JUSTIFICATION/COMMENTS None

(2) Were the following effects considered in the aging program:

Aging Effect	Yes/No/NA	Reference
Thermal aging	Yes	TAB D, Page D-7
Radiation exposure	Yes	TAB D, Page D-8
Vibration (non-seismic) aging	Yes	TAB D, Page D-35
Operational (electrical/mechanical/ process) stress aging	Yes	TAB D, Page D-7

R1

JUSTIFICATION/COMMENTS None

(3) Were all known synergistic effects which are believed to have a significant effect on equipment performance considered in the aging program (Yes/No/NA)? N/A (Reference: See Comment).

JUSTIFICATION/COMMENTS No known synergistic effects.

(4) Thermal Aging:

a) Was thermal aging considered in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, page D-7). |R1

JUSTIFICATION/COMMENTS None

PLUSEQ/248.18

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 10 OF 32
			R 1 R
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 5-22-86	[illegible]
	CHECKED NAP	DATE 5-23-86	WCP 9-18-89

H. AGING (Continued)

(b) Were the materials susceptible to thermal aging degradation identified in the qualification program (Yes/No/NA)? Yes
(Reference: N/A).

JUSTIFICATION/COMMENTS See Material Analysis in TAB C(5).

(c) Was the basis for thermal aging identified in the qualification program (Yes/No/NA)? Yes Reference TAB D Page D-7 footnote "+"). R1

JUSTIFICATION/COMMENTS See Material Analysis in TAB C(5).

(d) Was the aging acceleration rate justified and the parameters of time and temperature identified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, Page D-7, footnote "+"). R1

Parameter	Plant Maximum Normal	Test	Equivalent
Temperature	104°F/110°F/120°F	N/A	104°F/ 110°F/120°F
Time	40 Years	N/A	20.6/ 12.9/8.2 yrs

JUSTIFICATION/COMMENTS *Qualified life established by Materials Analysis in TAB C(5).

(e) Was the Arrhenius methodolgy used for accelerated aging (Yes/No/NA)? Yes (Reference: N/A).

JUSTIFICATION/COMMENTS See Materials Analysis in TAB C(5).

(f) If activation energies were used for determining accelerated aging parameters, are they properly referenced to the source of the technical data (Yes/No/NA)? Yes (Reference: N/A).

JUSTIFICATION/COMMENTS See Materials Analysis in TAB C(5).

H. AGING (Continued)

(g) If a regression line was used for determining accelerated aging parameters, are test points or failure modes identified on the line (Yes/No/NA)? N/A (Reference: N/A).

JUSTIFICATION/COMMENTS None

(h) Was the equipment operated during the thermal aging (Yes/No/NA)? N/A (Reference: N/A).

JUSTIFICATION/COMMENTS Qualified life determined by Materials Analysis rather than accelerated aging test on assembled device.

(5) Radiation Aging Exposure:

(a) Was radiation aging exposure considered in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, Page D-8). | R1

JUSTIFICATION/COMMENTS None

(b) Were the materials susceptible to radiation degradation identified in the qualification program (Yes/No/NA)? No (Reference: N/A).

JUSTIFICATION/COMMENTS Assembled test specimen irradiated to 204 megarads.

(c) Was the basis for radiation aging exposure identified in the qualification program (Yes/No/NA)? No (Reference: N/A).

JUSTIFICATION/COMMENTS 204 megarads exposed the switch to a greater radiation dose than expected for the serivce life of the switch plus accident conditions and margins.

H. AGING (Continued)

(d) Is the radiation test exposure dose and dose rate acceptable (Yes/No/NA)? Yes (Reference: TAB D, Page D-18). | R1

Plant normal ambient radiation dose (rd)	2×10^7
Test exposure dose (rd)	2.04×10^8
Test exposure dose rate (rd/hr)	$.7 \times 10^6$
Test exposure source type (e.g., Co-60 gamma)	Co-60 Gamma

JUSTIFICATION/COMMENTS None

(6) Vibration (non-seismic) Aging:

(a) Were the effects of non-seismic vibration induced during normal and abnormal operation addressed in the qualification program[1] Yes (Reference: TAB D, Page D-35). | R1

JUSTIFICATION/COMMENTS None

(b) Was the basis for vibration aging identified and justified in the qualification program (Yes/No/NA)? No (Reference: N/A).

JUSTIFICATION/COMMENTS See TAB C(2)

1. Qualification program refers to the test report and any supplemental documentation including TVA analyses in TAB C of the Binder. | R1

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 13 OF 32
			R 1 R
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 5-22-86	9/28/89
	CHECKED NAP	DATE 5-23-86	WCF 9-28-89

H. AGING (Continued)

(7) Operational Stress Aging:

(a) Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation adressed in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, Pages D-50 & D-51). | R1

JUSTIFICATION/COMMENTS None

(b) Was the basis for stresses induced during operational aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D, Pages D-7 & D-8). | R1

JUSTIFICATION/COMMENTS See Section P(1) for additional discussion.

(8) Was the qualified life of the equipment and its basis defined in the qualification program (Yes/No/NA)? Yes. See next sheet for discussion. (Reference: N/A).

Qualified life (Document in QMDS) 40 years*

JUSTIFICATION/COMMENTS *Through periodic refurbishment as defined in EA 189-90051 (TAB H).

(9) Were replacement intervals for the equipment or its components defined in the qualification program (Yes/No/NA)? No (Reference: N/A).

Replacement Intervals (Document in QMDS) See QMDS TAB G.

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-IZS-002 PLANT WBN UNIT(S) 1 SHEET 14 OF 32

BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80

COMPUTED DBS DATE 5/22/86 R ___ R ___

CHECKED MP DATE 5/23/86

QUALIFIED LIFE H(8) The qualified life for all equipment covered by this binder is 40 years through periodic refurbishment. For further discussion on material analysis and Arrhenius methodology, refer to material analysis discussion found in Tab C(5). The scheduled maintenance service times shown below comes directly from this Arrhenius curve.

Max Normal Ambient	Service Time
104°F	20.6 yrs.
110°F	12.9 yrs.
120°F	8.2 yrs.

The QMDS section found in Tab G will document the limit switches which require refurbishment and the appropriate schedule.

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 15 OF 32		
BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 5/22/86	R	R	
	CHECKED Nap	DATE 5/23/86			

I. MATERIALS ANALYSIS

Identification of Materials Susceptible to Significant Thermal and/or Radiation Degradation and Aging (Use Section C of EQC Binder for Detailed Materials Analysis)

	Material/Property/Function	Radiation Threshold	Reference	Activation Energy	Reference
(a)	Ethylene Propylene/ O-Ring Shaft Seal	NA	NA	0.8eV	TAB C(5)
(b)	Silicone rubber/Gasket	NA	NA	1.14eV	TAB C(5)
(c)	Synthetic hydrocarbon grease with fluorocarbon/ lubricant	NA	NA	Unknown	TAB C(5)
(d)	Aromatic ether based oil/ lubricant	NA	NA	Unknown	TAB C(5)
(e)	Glass filled polyester (thermoset plastic)/ contact block contact carrier	NA	NA	Unknown	TAB C(5)

JUSTIFICATION/COMMENTS None

TVA EQP025.51

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 16 OF 32
			R 1 R
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 5-29-86	9/28/89
	CHECKED NAP	DATE 5-29-86	WC 9-28-89

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(1) Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics which would constitute failure if not met (Yes/No/NA)? No (Reference: N/A).

Identify Acceptance Criteria: See Section P(3).

(2) Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment which should be verified before, after, and periodically during the test to judge equipment performance (Yes/No/NA)? No (Reference: N/A).

Identify baseline and functional testing: See Section P(3).

JUSTIFICATION/COMMENTS None

(3) Does the qualification report/analysis describe loads (or load combinations) applied during DBE test (Yes/No/NA)? Yes (Reference: TAB D, Page D-43). | R1

JUSTIFICATION/COMMENTS None

PLUSEQ/248.23

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 17 OF 32
			R 1 R
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 5-31-86	[illegible] 9/28/89
	CHECKED NAP	DATE 6-2-86	WCS 9-28-89

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(4) Do the applied loads during baseline testing reflect normal operating conditions (Yes/No/NA)? Yes (Reference: See Comment).

JUSTIFICATION/COMMENTS See Comment J(5)(b)

(5) Identify electrical characteristics necessary to ensure the equipment performance specifications can be satisfied.

(a)

Parameter	Plant Normal Conditions	Reference
Voltage	See Comment	N/A
Load	See Comment	N/A
Frequency	N/A	N/A
Accuracy	N/A	N/A
Other(s)		
Insulation Resis. minimum	See Comment	N/A
Closed contact open less than 2 mili-sec during seismic test	See Comment	N/A

R1

JUSTIFICATION/COMMENTS See Comment J(5)(b)

PLUSEQ/248.24

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(b) Parameter	Specific Accident Conditions	Reference
Voltage	See Comment	N/A
Load	See Comment	N/A
Frequency	N/A	N/A
Accuracy	N/A	N/A
Other(s)		
Insulation Resis. minimum	See Comment	N/A
Closed contact open less than 2 mili-sec during seismic test	See Comment	N/A

R1

JUSTIFICATION/COMMENTS

Just /Comment
← See Comment
JSC

(c) Parameter	Demonstrated Conditions	R
Voltage	125V AC/DC	TAB D, Page D-22
Load	0.5 amp/100VDC 0.086 amp/100VDC	TAB D, Page D-38 TAB D, Page D-43
Frequency	N/A	N/A
Accuracy	N/A	N/A
Other(s)		
Constant Resistance	50,000 ohms	TAB D, Page D-13
Contact Opening	2 mili-sec	TAB D, Page D-28

R1

PLUSEQ/248.25

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(c) (Continued)

JUSTIFICATION/COMMENTS

The typical application of these limit switches is in control circuits, for example, solenoid valves. These circuits

REVISE PER BELOW:

1. THE TYPICAL APPLICATION OF THESE LIMIT SWITCHES IS IN THE CONTROL CIRCUIT OF, FOR EXAMPLE, SOLENOID OPERATED VALVES

g the

and

currents, the contact surfaces tend to be self-cleaning and/or the potential of the circuit is sufficient to break down films or oxides that might form on the contact faces.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

JUSTIFICATION/COMMENTS (Continued)

(3) Since standard design practices should prevent circuits from exceeding the UL ratings of contacts, the 100 VDC and 0.086 amp load used for testing is conservative and adequate considering items (1) and (2) above.

While there are no plant specific requirements with regard to contact bounce and insulation resistance minimum, the values demonstrated are considered adequate. At 50,000 ohms, there would be a slight leakage current of approximately 2.5 milliamps for a typical 125V circuit. This small leakage current should not provide enough amperage to cause any adverse circuit operation.

K.1 REQUIRED OPERATING ENVIRONMENT - UPPER COMPARTMENT R1

Reference Environmental Drawing No. 47E235-41

(1) Normal Max

(a) Temperature (°F) 110

(b) Pressure (psig) 0.3

(c) Humidity (%) 80

(d) Radiation (rd) 1×10^6

(2) Abnormal Max

(a) Temperature (°F) 120

(b) Pressure (psig) 0.3

(c) Humidity (%) 90

(d) Radiation (rd) N/A R1

(3) Process Interfaces: None.

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life. (Effect on qualified life is negligible. See generic position in binder WBNEQ-GEN-001.)

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	161	Accident type	LOCA/HELB
(b) Pressure (psig)	11.2	Accident type	LOCA/HELB
(c) Humidity (%)	100	Accident type	LOCA/HELB
(d) Radiation (rd)	4.7×10^8 Beta 3.8×10^7 Gamma	Accident type	LOCA
(e) Spray Type	*	Accident type	LOCA/HELB

R1

R1

*0.1844 Molar H_3BO_3 (2000 PPM Boron), 0.033 Molar NaOH resulting in a PH of 8.35 at 25°C. Spray duration is up to 30 days at a flow rate equal to 0.92 GPM per square foot of containment cross section.

R1

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 21 OF 32
			R 1 R
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 5-29-86	
	CHECKED NAP	DATE 5-29-86	9-28-89

K.2 REQUIRED OPERATING ENVIRONMENT - LOWER COMPARTMENT

Reference Environmental Drawing No. 47E235-42 |R1

(1) Normal Max

(a) Temperature (°F) 120

(b) Pressure (psig) 0.3

(c) Humidity (%) 80

(d) Radiation (rd) 2×10^7

(2) Abnormal Max

(a) Temperature (°F) 130

(b) Pressure (psig) 0.3

(c) Humidity (%) 100

(d) Radiation (rd) N/A |R1

(3) Process Interfaces: None.

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life. (Effect on qualified life is negligible. See generic position in binder WBNEQ-GEN-001.)

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 327 Accident type HELB

(b) Pressure (psig) 11.2 Accident type LOCA/HELB |R1

(c) Humidity (%) 100 Accident type LOCA/HELB

(d) Radiation (rd) 4.7×10^8 Beta, 4×10^7 Gamma Accident type LOCA |R1

(e) Spray Type * Accident type LOCA/HELB

*0.1844 Molar H_3BO_3 (2000 PPM Boron), 0.033 Molar NaOH resulting in a PH of 8.35 at 25°C. Spray duration is up to 30 days at a flow rate equal to 0.92 GPM per square foot of containment cross section. |R1

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 22 OF 32 R 1 R
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 5-22-86	
	CHECKED NAP	DATE 5-23-86	WCP 9-28-89

K.3 **REQUIRED OPERATING ENVIRONMENT:** RHR Valve Rooms

Reference Environmental Drawing No. 47E235-77 |R1

(1) Normal Max

(a) Temperature (°F) 104

(b) Pressure (psig) ATM

(c) Humidity (%) 80

(d) Radiation (rd) 1.8×10^6

(2) Abnormal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM

(c) Humidity (%) 90

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None.

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life. (Effect on qualified life is negligible. See generic position in binder WBNEQ-GEN-001.)

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a)	Temperature (°F)	190	Accident type	LOCA
(b)	Pressure (psig)	NA	Accident type	NA
(c)	Humidity (%)	90	Accident type	LOCA
(d)	Radiation (rd)	1×10^7	Accident type	LOCA |R1
(e)	Spray Type	NA	Accident type	NA

|R1

PLUSEQ/248.29

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): For a cross-reference of equipment to environmental drawing, see Tab G

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: Tab C(8)).

(7) Subject to submergence (Yes/No/NA)? No
(Reference: see Section P(2)).

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? Yes
(Reference: ________).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: 5.12×10^7 rads, See TAB B, Section P, Page B-32. R1

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.
None	

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 24 OF 32 R 1 R
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	COMPUTED DRS	DATE 5-22-86	9/25/89
	CHECKED NAP	DATE 5-23-86	WCS 9-25-89

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS

(1) Comparison of worst-case maximum parameters:

Parameter	Specified	Demonstrated	Reference
Operating Time	100 days	30 days	Tab C(6)
Temperature (°F)	327	349	TAB D, p D-45
Pressure (psig)	11.2	83	TAB D, p D-45
Relative Humidity (%)	100	100	TAB D, p D-45
Chemical Spray*	Tab C(3)	Tab C(3)	TAB D, p D-45
Radiation (rd)**	6×10^7 Gamma	2.04×10^8 Gamma	TAB D, p D-39
Submergence	NA	NA	TAB B, Sec. P(2)

R1

*Includes spray concentration, flowrate, density, duration, and pH.

**Enter 40-year integrated normal dose plus integrated accident dose and specify type.

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference
Temperature	Yes	TAB C(9)
Pressure	Yes	See L(1)
Relative Humidity	Yes	See L(1)
Chemical Spray	Yes	TAB C(3)
Submergence	NA	TAB B, Sect. P(2)

JUSTIFICATION/COMMENTS None

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, Yes/No/NA).

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA
Temperature: +15 degrees F	+22 +591%	Yes
Pressure: +10% but no more than 10 psig	+71PSIG +240%	Yes
Radiation: +10% of accident dose	$+1.4 \times 10^8$	Yes
Time: +10% (or 1 hour + operating time per NUREG-0588)	Tab C(6)	Yes
Voltage: ±10% of rated value	NA	NA
Frequency: ±5% of rated value	NA	NA
Environmental Transient: the initial transient and the peak temperature applied twice	2 Dwells	Yes
Vibration: +10% added to acceleration	+217% See Comment	Yes

JUSTIFICATION/COMMENTS: Per TVA Standard Specification - SS-E18. 12.01 - Seismic Requirements for Category I Electrical and I&C Equipment, these limit switches should be tested to 3 g's horizontal and 2 g's vertical. Since NAMCO verified in their test report (TAB D, Page D-11) that cross-coupling was not significant, the single axis test performed in each of the 3 axis to 9.52 g's was more than adequate. R1

M. OPERABILITY TEST RESULTS

(1) Identify the safety function(s) of this equipment:
(Reference: See Tab A).

JUSTIFICATION/COMMENTS None

(2) Did the equipment perform its intended function during the simulated design basis accident exposure (Yes/No/NA)? Yes
(Reference: TAB D, Page D-50). |R1

JUSTIFICATION/COMMENTS None

(3) Did the equipment perform its intended function during the simulated post-design basis accident exposure (Yes/No/NA)? Yes
(Reference: TAB D, Page D-50). |R1

JUSTIFICATION/COMMENTS None

(4) Did the test demonstrate the operability requirements for the required time interval for which the equipment is required to operate (Yes/No/NA)? Yes (Reference: See Tab C(6)).

JUSTIFICATION/COMMENTS See Tab C(6)

(5) Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved (Yes/No/NA)? Yes
(Reference: Tab C(4)).

JUSTIFICATION/COMMENTS See Tab C(4)

BINDER NO. WBNEQ-IZS-002	**PLANT** WBN	**UNIT(S)** 1	**SHEET** 27 **OF** 32				
BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80	**COMPUTED** DB	**DATE** 5/22/86	**R**	**R**			
	CHECKED Nap	**DATE** 5/23/86					

N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (yes/no/NA)? Yes (Enter all requirements in Section G of the EQP Binder - Qualification Maintenance Data Sheets).

JUSTIFICATION/COMMENTS See QMDS - Tab G

BINDER NO. WBNEQ-IZS-002	PLANT WBN	UNIT(S) 1	SHEET 28 OF 32				
BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80		COMPUTED DRS	DATE 5/22/86	R		R	
		CHECKED nap	DATE 5/23/86				

0. SUMMARY OF REVIEW

	Yes/No/NA
(1) Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	Yes
(2) Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	NA
(3) Choice of qualification methodology adequately justified?	Yes
(4) If analysis was performed, complete the following:	
(a) Were equipment performance requirements identified?	NA
(b) Were specific features and failure modes and effects analyzed?	NA
(c) Were assumptions and mathematical models used together with appropriate justification for their use?	Yes-TAB C(5)
(d) Were environmental parameters which affect equipment performance identified?	NA
(5) Adequate similarity between equipment and test specimen established?	Yes
(6) Aging degradation evaluated adequately?	Yes-Tab C(6)
(a) Mechanical and/or cycle aging addressed?	Yes
(b) Equipment aged to end of life condition prior to application of DBE conditions?	NA-See Section P(6)
(c) Absence of preaging in test/analysis justified?	Yes-See Section P(6)
(d) Materials susceptible to thermal/radiation aging identified?	Yes-Tab C(5)

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(e) Normally operating state of device (e.g., normally energized) considered?	Yes-See Sect.P(4)
(7) Qualified life or replacement schedule established?	Yes
(8) Criteria regarding temperature/pressure exposure satisfied?	Yes
(a) Peak temperature adequate	Yes
(b) Peak pressure adequate	Yes
(c) Duration adequate	Yes
(d) Required profile enveloped adequately	Yes
(e) Steam exposure adequate	Yes
(9) Criteria regarding test sequence satisfied?	Yes
(10) Criteria regarding spray satisfied?	Yes
(a) Was the spray testing done while under the extremes of pressure and temperature?	Yes
(b) Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant?	Yes-See TAB C(3)
(11) Criteria regarding submergence satisfied?	NA
(12) Criteria regarding radiation satisfied?	Yes
(a) Was dose rate considered?	Yes
(b) Was beta radiation considered?	Yes-See Sect.P(5)
(13) Criteria regarding operability status/mode satisfied?	Yes
(14) Criteria regarding test failures or anomalies satisfied?	Yes

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(15) Criteria regarding functional testing satisfied?	Yes
(a) Does the test plan/report specify an acceptance criteria for equipment performed?	Yes-See Sect.P(3)
(b) Was an initial base line test done to establish required performance characteristics?	Yes
(c) Has the test/analysis demonstrated that performance performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	Yes
(16) Criteria regarding instrument accuracy satisfied?	NA
(17) Test duration margin (1 hour + function time) satisfied?	Yes
(a) Is the minimum specified operating time at least 1 hour?	Yes-TAB C(6)
(b) If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	NA
(18) Criteria regarding synergistic effects satisfied?	NA
(19) Criteria regarding margins satisfied?	Yes
(20) Maintenance and surveillance requirements adequately identified?	Yes

P. DISCUSSION

1. H(7)(b) This device was subject to 100,000 actuation cycles during mechanical aging testing. This is equivalent to an average of 208 actuations per month or approximately 7 actuations per day over the 40-year life of the plant. This is judged to be in excess of the full open/close actuation cycles the associated valves will be required to

P. DISCUSSION

operate for normal plant operation, surveillance, and maintenance. Therefore, the mechanical aging performed is adequate to demonstrate qualification over the 40-year life of the plant.

2. K(7) All equipment listed in Tab A has been evaluated for possible submergence due to flooding as defined by environmental drawings 47E235-42, 47E235-41 and 47E235-77 for Lower and Upper Containment and RHR Valve Rooms. No equipment will be submerged and required to operate. R1

3. J(1)&(2) Acceptance criteria - As discussed on TAB D, Pages D-13 and D-14 of the test report, the following performance results were observed. R1
   1. Open contact resistance remained greater than 50 Kohms during all test phases.
   2. During seismic testing, the trip point varied by .107" or less for all units seismically.
   3. The closed current remained within two milliamps of the specified load.

While the test report does not cite limiting values for performance characteristics, the performance observed as noted above is judged acceptable. This judgment by the evaluator is based on acceptance criteria documented in QTR No. 105, for NAMCO EA180's manufactured after 7/30/80. This report and acceptance criteria can be found in binder WBNEQ-IZS-001.

4. O(6)(e) This device operates intermittently at relatively low voltages and currents which will not result in significant heat rise.

|R2

P. DISCUSSION (Continued)

5. Per Watts Bar Environmental Drawing 47E235-41 and 47E235-42, the unattenuated free field post-LOCA beta radiation dose contribution for inside primary containment is 4.7 X 10^8 rads. The limit switch internals will not, however, be subject to the unattenuated free field beta dose. The switch housing assembly consists of three rectangular parts; the Bronwite alloy housing body (a corrosion resistant bronze casting alloy) and top and bottom stainless steel covers which are tightly bolted together. The minimum thickness is 1/8". Silicone rubber gaskets 0.060" thick are compressed between the housing and top and bottom covers at 20-inch pounds, creating a completely sealed unit that is water, oil, dust, and pressure tight, meeting NEMA type 1, 4, and 13 requirements. Also, all limit switches inside primary containment include a qualified seal. Therefore, all beta radiation sources will be external to the housing and subject to dose attenuation due to the housing. The beta dose to the switch internals will essentially be attenuated completely by a factor of 0.009 due to the minimum metal thickness (reference TVA Calculation No. WBNTSR-051 (TAB C, Section 14). The gap created by the gasket is sufficiently small to allow only a negligible fraction of the unattenuated 4-pi geometry free field dose to penetrate. However, as a conservatism to account for the gap (without taking credit for attenuation due to the silicone gasket), 10% of the unattenuated free field dose is added to the dose attenuated by the metal housing. |R2

P. DISCUSSION (Continued)

Therefore, the 100-day beta does to the switch internals is conservatively estimated to be 10% unattenuated contribution + 0.10 $(4.7 \times 10^8) = 4.7 \times 10^7$, 100% attenuated contribution = 0.009 $(4.7 \times 10^8) = 4.23 \times 10^6$. Total = 5.12×10^7 rads beta. Additionally, the silicone gaskets themselves are not a concern. They receive significant geometric shielding due to being tightly compressed between the metal housing parts. Based on the switch geometry, the outer gasket material will be exposed to only a fraction of the unattenuated 4-pi geometry free field beta radiation dose. This unattenuated dose would be further reduced due to the angle of incidence into the narrow gap and attenuation due to the outer gasket material resulting in minimal dose to the innermost gasket material. The gasket width is approximately equal to the housing thickness (1/8 inch). Also, Target Rock Corp. has conducted tests on a similar silicone rubber gasket used in a similar application (reference EQ Binder WBNEQ-SOL-001, Section D, and found that after exposure to 185 megarads of gamma radiation, embrittlement had occurred in the excess gasket material extending beyond the mated parts. The gasket material actually trapped between the mated parts was still flexible. Likewise, in our application, the gaskets would not be a concern even should they become brittle due to their being tightly sandwiched between the housing and housing covers in a static application; especially considering that the outer part of the gasket (least important would exhibit the more significant

BINDER NO. WBNEQ-IZS-002 PLANT WBN UNIT(S) 1 SHEET 32B OF 32

BINDER TITLE EA180 SERIES LIMIT SWITCHES MANUFACTURED BETWEEN 9/5/78 AND 7/30/80

COMPUTED DLL DATE 7/23/86 R ___ R ___

CHECKED nap DATE 7/23/86

P. DISCUSSION (Continued)

degradation. The limit switches also contain EPDM O-rings used for screw gaskets and the operating shaft seal. These O-rings are enclosed by the metal screws and shaft housing which shields them from the effects of beta radiation.

In conclusion: The total combined beta and gamma radiation dose will equal 9.12×10^7 rads TID (5.12×10^7 beta + 4.0×10^7 gamma) for accident conditions. The accident radiation plus the large lower compartment 40-year dose of 2.0×10^7 rads equals a total radiation dose of 1.1×10^8 rads TID. These switches were tested to 2.04×10^8 rads which envelops our plant requirements. Therefore, they are qualified for our worst case gamma and beta radiation dose.

6. O(6)(b)&(c) This equipment is being qualified to NUREG-0588, Category II and therefore does not have to be aged to an end-of-life condition prior to DBE testing. The qualified life was determined by evaluating the potential for significant thermal aging degradation of the nonmetallic materials of construction (See TAB C(5)).

IZS-003

	UNIT(S) 1	SHEET 1 OF 1
		R 3 R
BINDER NO. WBNEQ-IZS-003 PLANT WBN		
ER TITLE EA740 LIMIT TCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 4-15/86 JDH 10/15/90
	CHECKED WBK	DATE 6/19/86 CAH 10/18/90

TAB A

Identification of equipment comprising the equipment type

The following notes apply to all pages of this TAB A

1. Elevations shown are actual elevations for equipment located in the Reactor Building and floor elevations for equipment located outside the Reactor Building. Actual elevations for all equipment are documented in TAB F.

2. See Page B-4 for source of Category and Operating Time assignments.

3. A containment vent isolation signal will cause the associated FCVs to close. The limit and zone switches must then open preventing solenoid reenergization and valve opening. The switches must remain open to prevent valve position changes after containment vent isolation reset. The limit switch position indication is a PAM B and D2 variable and must be monitored for the duration of each event to verify that containment integrity is maintained.

4. A phase "A" containment isolation signal will cause the associated FCVs to close. The limit switches must then open and remain open preventing solenoid reenergization and valve opening upon Phase "A" containment isolation reset. The limit switch position indication is a PAM B1 and D2 variable and must be monitored for the duration of each event to verify that containment integrity is maintained.

5. A Phase "A" containment isolation signal will cause the associated FCVs to close. The limit switches must then open and remain open preventing solenoid reenergization and valve opening upon Phase "A" containment isolation reset. The limit switch position indication is a PAM B1 variable and must be monitored for the duration of each event to verify that containment integrity is maintained. R3

WBEP - 0142Q

PRINT DATE: 09/25/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0058A -B	1-ZS -030-0058/1 -B	116	739'	IIR	A	100D	L	SEE NOTE 3
INCORE INSTR RM EXHAUST POS SWITCH	EA74020000		83KJ1-832128		A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	
WBN-1-ZS -030-0058B -B	1-ZS -030-0058/2 -B	117	738' 5"	IIR	A	100D	L	SEE NOTE 3
INCORE INSTR RM EXHAUST POS SWITCH	EA74020001		83KJ1-832128		A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	
WBN-1-ZS -031-0326B -A	1-FCV -031-0326/ZS2 -A	106	745'10"	ANN	A	100D	L	SEE NOTE 4
INCORE INSTR RM CHILLER B CWR ISO VL LS	EA74020100				A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	
WBN-1-ZS -077-0127A -B	1-ZS -077-0127A -B	290	720' 9"	AC4	A	100D	L	SEE NOTE 5.
REACTOR BLDG SUMP DISCH FLOW CNTL VLV LS	EA74020120		84KJ5-836242		A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	
WBN-1-ZS -077-0127B -B	1-ZS -077-0127B -B	290	720' 9"	AC4	A	100D	L	SEE NOTE 5.
REACTOR BLDG SUMP DISCH FLOW CNTL VLV LS	EA74020120		84KJ5-836242		A	100D	MS/C	
					A	100D	FW/C	
					A	1MO	RH/C	
					A	1MO	CV/C	

R3

		R 3	R	R
PREPARER/DATE	WCG 8/26/86	JOH 10/15/90		
CHECKED/DATE	WBK 8/26/86	CAF 10/18/90		

PRINT DATE: 09/25/90

BINDER NO. : WBNEQ-IZS -003
MANUFACTURER : NAMCO
PAGE 2 OF 2

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -077-0128A -A REACTOR BLDG SUMP DISCH FCV LIMIT SW	1-ZS -077-0128A -A				A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A CV/A AF AB	SEE NOTE 5.
WBN-1-ZS -077-0128B -A REACTOR BLDG SUMP DISCH FCV LIMIT SW	1-ZS -077-0128B -A				A A A A A	100D 1MO 1MO 1MO 1MO	L RH/A CV/A AF AB	SEE NOTE 5.

R3

			R 3	R	R
PREPARER/DATE	WCG	9/9/86	JOH 10/15/90		
CHECKED/DATE	WBK/DLK	9/9/86	CSR 10/18/90		

PAGE A-3 R3

BINDER NO. WBNEQ-IZS-003 PLANT WBN UNIT(S) 1 SHEET 1 OF 1

BINDER TITLE EA740 LIMIT SWITCHES COMPUTED WCH DATE 4-15-86 R ___ R ___

MANUFACTURED AFTER OCTOBER 1, 1981 CHECKED WBK DATE 6/13/86

TAB B - Checklist for evaluation of environmental qualification including summary and conclusion

BINDER NO. WBNEQ-IZS-003 PLANT WBN UNIT(S) 1 SHEET 1 OF 1

BINDER TITLE EA740 LIMIT SWITCHES COMPUTED WCJ DATE 4-15-86 R ___ R ___

MANUFACTURED AFTER OCTOBER 1, 1981 CHECKED WBK DATE 6/13/86

TAB B - CHECKLIST

-Contents-

BINDER NO. WBNEQ-IZS-003 PLANT WBN UNIT(S) 1 SHEET 1 OF 32
R 2 R

BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81

COMPUTED WCG DATE 6/13/86 JDM/WK 6/15/90

CHECKED WBK DATE 6/13/86 KBN/YBK 6-15-90

A. DOCUMENTATION (SEE NOTE) R2

Equipment Description Limit Switch

Vendor/Manufacturer Namco

Equipment Model No.(s) See TAB A

QUALIFICATION REPORTS (SEE NOTE) R2

(1) Title/Number/Revision Qualification of EA740 Series Limit Switches/QTR111/Revision 1 RIMS B71 860325 100 DATE 1/09/84

(2) Title/Number/Revision Supplement 02 to QTR 111 Qualification by Similarity Presentation to Support the Change of Contact Block/ Carrier Material RIMS B70 870121 003 DATE 12/16/86 R2

(3) Title/Number/Revision General Qualification of Series EA-740 Switches for use in Nuclear Power Plant Class IE Applications in Compliance with IEEE Standards 323-74, 382-72, and 344-75, QTR 140, Revision 0 RIMS B37 900214 800 DATE

OTHER (ANALYSIS, VENDOR DATA, ETC.)

Note: Unless specified otherwise, all references made herein are to the above report (1).

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 1a OF 32 R 3 R
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER	COMPUTED WCG	DATE 8/19/86 JDH 10/15/90	
10/1/81	CHECKED WBK	DATE 8/19/86 CBH 10/18/90	

A. DOCUMENTATION

OTHER (ANALYSIS, VENDOR DATA, ETC.) (Continued)

1. EPDM Activation Energy Analysis

2. Material Aging Calculation Report, WAC-405

3. Similarity Analysis

4. OE Calculation WBNTSR-051 RO (B26 891129 202), Reduction of Beta Dose by Sheet Steel.

5. TVA Environmental Drawing No. 47E235-42 R2 and DCA P-04104-02-0, -03-0, -02-1, -05-0, and S-09715-02, -03, -04, -05, -13, -14, -15 R3

6. TVA Environmental Drawing No. 47E235-44 R1

7. TVA Environmental Drawing No. 47E235-45 R1 and DCA P-04104-06-0, and S-09715-06, -07, -08, -09, -19 R3

8. Category and Operating Times Calculation, System 30, WBNOSG4-008 R16 (R26 900717 201)

9. Category and Operating Times Calculation, System 31, WBNOSG4-009 R7 (B26 900309 233)

10. Category and Operating Times Calculation, System 77, WBNOSG4-021 R5 (B18 900612 251) R3

Note: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. This listing includes only those documents which are essential to qualification and accordingly, should not be considered a complete listing of binder references.

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 2 OF 32 R 1 R
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 9/9/86 RJM 5/5/89	
	CHECKED WBK/DLK	DATE 9/9/86 JDH 5/5/89	

B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified (Pending acceptable resolution of open items)

____ Equipment Satisfies All Requirements Except Qualified Life or Justification of Replacement Schedule

____ Equipment Qualification Not Established by Documentation

____ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES

1. Limit switches WBN-1-ZS-077-0128A-A and -0128B-A are to be replaced by SCR WBNEEB8578 R5. See Open Item No. 1. R1

See open item sheets in front of binder for more details.

COMMENTS/RECOMMENDATIONS The required operating environments, Normal and Accident, have been reviewed for each switch location identified in TAB A. All switches are qualified to the worst case combination of these environmental parameters. This includes consideration of peak levels and profiles.

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 3 OF 32				
BINDER TITLE EA740 LIMIT SWITCHES		COMPUTED wcm	DATE 4-15-86	R	R		
MANUFACTURED AFTER 10/1/81		CHECKED WAK	DATE 4/13/86				

C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate Which Criteria is Applicable):

X Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE323-1974)

___ Components are Qualified to the Criteria of NUREG-0588 Category II or the DOR Guidelines of lE Bulletin No. 79-01B (IEEE323-1971) (DOR Guidelines Applicable to only BFN)

JUSTIFICATION/COMMENTS None

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

IEEE STD. 323-1974

IEEE STD. 344-1975

IEEE STD. 382-1972 (Pressurized water reactor portion only)

BINDER NO. WBNEQ-IZS-003 PLANT WBN UNIT(S) 1 SHEET 4 OF 32

BINDER TITLE EA740 LIMIT SWITCHES COMPUTED WCJ DATE 4-15-86 R ___ R ___

MANUFACTURED AFTER 10/1/81 CHECKED WBK DATE 6/13/86

D. QUALIFICATION METHODOLOGY (Check only one block)

X Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

___ Test of Similar Items with Supporting Analysis

___ Analysis in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

___ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS None

TVA EQP090.54

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 5 OF 32
BINDER TITLE: EA740 LIMIT SWITCHES	COMPUTED vcg	DATE 6/27/86	R ___ R ___
MANUFACTURED AFTER 10/1/81	CHECKED WJK	DATE 6/27/86	

E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification report identical to the plant equipment which requires qualification (yes/no/NA)? Yes, See TAB C, Sect. 15.

	Plant Device	Qualification Document	Reference
(1) Equipment Type	Limit Switch	Limit Switch	pp. 3-4, 10-24,10-55
(2) Manufacturer	NAMCO	NAMCO	pp. 3-4, 10-24,10-55
(3) Model Number(s)	EA74020000	EA74020000	pp. 3-4, 10-24,10-55
	EA74020001	EA74020100	
	EA74020100		
	EA74020120		
(4) Serial Number(s)	See Comments	See Comments	See Comments

(5) Identify Component-Unique checksheet attached: NA

NA

JUSTIFICATION/COMMENTS These limit switches do not have serial numbers, but are provided with date codes per the manufacturer's date code system described on p. 3-35 of the Test Report. Field Verification (TAB F) has verified that all limit switches covered in TAB A have data codes after November 1980 and are, therefore, covered by QTR 111 (TAB "D").

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 6 OF 32
			R 1 R 2
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 6/13/86 RHM 5/5/89	JDH/bkk 6/15/90
	CHECKED WBK	DATE 6/13/86 JDH 5/5/89	KBN/HBK 6-15-90

F. INSTALLATION INTERFACES

List all interfaces pertinent to EQ identified in the qualification documentation and/or evaluation and reference the source. Is the interface a requirement for our application (Yes/No)? (Note below.) If yes, enter requirement in QMDS, if no, provide justification.

Interface	Identify Interface	Plant Requirement? (Yes/No)	Reference Test Report
Mounting Bolts	NA	NA	NA
External Process Connections	NA	NA	NA
Electrical Connections	NA	NA	NA
Conduit Seals	See TAB C, Sect. 1	Yes	p. 4-4.1 Sect. 4
Connector Seals	NA	NA	NA
Orientation	NA	NA	NA
Physical Configuration	NA	NA	NA
Other	See Comments	NA	NA

JUSTIFICATION/COMMENTS For installation instructions refer to EA74990004 on page 4-4.1 of QTR 111. For Verification of Conduit seals see TAB F. Mounting and connection requirements are also addressed on page 11-11, Section 4.2.

Although, it was not considered part of the Qualification Test, an operating lever is required for proper operation of the switch. The lever and roller should be of metallic construction. Nylon rollers are not acceptable and are controlled through TVA's Maintenance Program (see TAB G). R2

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 7 OF 32		
			R 2 R		
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 6/27/86 JDH/BZK 6/18/90			
	CHECKED WBK	DATE 6/27/86 KBN/BZK 6-15-90			

G. TEST SEQUENCE

(1) Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE-323 (74), paragraph 6.3.2 (Yes/No/NA)? (Note below.)

	Yes/No/NA	Reference
(a) Equipment inspected for damage	Yes	p. 10-56, Sect. 10
(b) Baseline performance measurements taken	Yes	p. 10-82
(c) Equipment aged:		
Thermal	Yes	p. 10-82
Radiation	Yes	p. 10-84
Wear	Yes	p. 10-83
(d) Vibration/seismic testing conducted	Yes	p.10-85
(e) Design basis event (DBE) exposure	Yes	pp. 10-89, through 10-95
(f) Post-DBE exposure	Yes	pp. 10-89, 10-93 through 10-98
(g) Final inspection and disassembly	Yes	pp.6-3, & 10-99

(2) Was the same piece of equipment used throughout the test sequence described in item (1) above (Yes/No/NA)? Yes

(3) Have the test equipment, test equipment accuracies, and calibration data been appropriately document (Yes/No/NA)? Yes (1)(Reference: See Comment (2)).

JUSTIFICATION/COMMENTS (1) Test equipment and calibration dates were recorded; however, test equipment accuracies were not documented in the test report. (2) See pages ~~20~~ 10 BZK 6/14/90 -104 through 10-106 for calibration data. Test equipment is periodically calibrated traceable to NBS (see page 13-6). R2

BINDER NO. WBNEQ-IZS-003 PLANT WBN UNIT(S) 1 SHEET 8 OF 32

R ___ R ___

BINDER TITLE EA740 LIMIT SWITCHES COMPUTED WCN DATE 6/13/86

MANUFACTURED AFTER 10/1/81 CHECKED WJK DATE 6/19/86

H. AGING

(1) Was aging considered in the qualification program (Yes/no/NA)? Yes (Reference P. 10-82 through 10-83).

JUSTIFICATION/COMMENTS None

(2) Were the following effects considered in the aging program:

Aging Effect	Yes/No/NA	Reference
Thermal aging	Yes	P. 10-82
Radiation exposure	Yes	P. 10-84
Vibration (non-seismic) aging	Yes	P. 10-58
Operational (electrical/mechanical/process) stress aging	Yes	P. 10-83

JUSTIFICATION/COMMENTS None

(3) Were all known synergistic effects which are believed to have a significant effect on equipment performance considered in the aging program (yes/no/NA)? Yes (Reference See TAB C, Section 17).

JUSTIFICATION/COMMENTS None

(4) Thermal Aging:

(a) Was thermal aging considered in the qualification program (yes/no/NA)? Yes (Reference TAB "D", Section 10, P. 10-82).

JUSTIFICATION/COMMENTS None

H. AGING

(b) Were the materials susceptible to thermal aging degradation identified in the qualification program (yes/no/NA)? Yes (Reference: See TAB "D", pp. 4-9 through 4-12 and 4-17).

JUSTIFICATION/COMMENTS None

(c) Was the basis for thermal aging identified in the qualification program (yes/no/NA)? Yes (Reference TAB "D", Sect. 11, p. 11-19).

JUSTIFICATION/COMMENTS None

(d) Was the aging acceleration rate justified and the parameters of time and temperature identified in the qualification program (yes/no/NA)? Yes (Reference TAB "D", Sect. 4, p 4-9).

Parameter	Plant Maximum Normal	Test	Equivalent
Temperature	120°F	248°F	120°F
Time	40 years	408 hrs	7.8 years

JUSTIFICATION/COMMENTS Qualified life is 40 years through periodic maintenance and replacement of the elastomeric components as specified in TAB G.

(e) Was the Arrhenius methodology used for accelerated aging (yes/no/NA)? Yes (Reference TAB "D", Sect. 4.8 pp. 4-9 & 4-10).

JUSTIFICATION/COMMENTS None

(f) If activation energies were used for determining accelerated aging parameters, are they properly referenced to the source of the technical data (yes/no/NA)? Yes (Reference TAB "D", Sect. 4.8, pp. 4-9 through 4-14).

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-IZS-003 PLANT WBN UNIT(S) 1 SHEET 10 OF 32

BINDER TITLE EA740 LIMIT SWITCHES COMPUTED WCR DATE 6/13/86 R ___ R ___

MANUFACTURED AFTER 10/1/81 CHECKED WBK DATE 6/13/86

H. AGING (Continued)

(g) If a regression line was used for determining accelerated aging parameters, are test points or failure modes identified on the line (yes/no/NA)? NA (Reference NA).

JUSTIFICATION/COMMENTS Regression line not used.

(h) Was the equipment operated during the thermal aging (yes/no/NA)? No (Reference TAB "D", Sect.10, p.10-58).

JUSTIFICATION/COMMENTS None

(5) Radiation Aging Exposure:

(a) Was radiaton aging exposure considered in the qualification program (yes/no/NA)? Yes (Reference Refer to TAB "D", Sect. 10 P. 10-84).

JUSTIFICATION/COMMENTS None

(b) Were the materials susceptible to radiation degradation identified in the qualification program (yes/no/NA)? Yes (Reference P. 4-15).

JUSTIFICATION/COMMENTS Assembled test specimen irradiated to 204 Mrads.

(c) Was the basis for excluding radiation aging exposure identified in the qualification program (yes/no/NA)? NA (Reference NA).

JUSTIFICATION/COMMENTS Test included irradiation.

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 11 OF 32 R 1 R
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 6/13/86 RWM 5/5/89	
	CHECKED WBK	DATE 6/13/86 JDH 5/5/89	

H. AGING (Continued)

(d) Is the radiation test exposure dose and dose rate acceptable (Yes/No/NA)? Yes (Reference: TAB D, Section 10, page 10-84).

Plant normal ambient radiation dose (rd)	2×10^{7} (worst case)
Test exposure dose (rd)	2.04×10^{8}
Test exposure dose rate (rd/hr)	9.1×10^{5} (average)
Test exposure source type (e.g., Co-60 gamma)	Cobalt 60 gamma

JUSTIFICATION/COMMENTS None

(6) Vibration (non-seismic) Aging:

(a) Were the effects of non-seismic vibration induced during normal and abnormal operation addressed in the qualification program* Yes (Reference: TAB D, page 10-58).

JUSTIFICATION/COMMENTS Plant induced vibration simulation 1×10^{6} cycles at 100Hz at 0.75g's per TAB D, page 10-58.

(b) Was the basis for vibration aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: page 11-23).

JUSTIFICATION/COMMENTS None

* Qualification program refers to the test report and any supplemental documentation including TVA analyses in TAB C of the Binder. R1

PLUSEQ/142.27

H. AGING (Continued)

(7) Operational Stress Aging:

(a) Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation adressed in the qualification program (Yes/No/NA)? Yes (Reference: TAB "D", Section 10, page 10-83).

JUSTIFICATION/COMMENTS None

(b) Was the basis for stresses induced during operational aging identified and justified in the qualification program (Yes/No/NA)? NA (Reference: NA).

JUSTIFICATION/COMMENTS See TAB C, Section 11 for Additional Discussion R1

(8) Was the qualified life of the equipment and its basis defined in the qualification program (Yes/No/NA)? Yes (Reference: See TAB "G").

Qualified life (Document in QMDS) 40* YRS

JUSTIFICATION/COMMENTS * Through periodic Refurbishment as defined in EA74920011 (p. 4-4.4); Refer also to TAB "C", Section 5.

BINDER NO. WBNEQ-IZS-003 PLANT WBN UNIT(S) 1 SHEET 13 OF 32

BINDER TITLE EA740 LIMIT SWITCHES COMPUTED wcg DATE 6/27/86 R ___ R ___

MANUFACTURED AFTER 10/1/81 CHECKED WMK DATE 6/27/86

(9) Were replacement intervals for the equipment or its components defined in the qualification program (yes/no/NA)? Yes
(Reference See pp. 4-4.3 and 4-4.4).

Replacement Intervals (Document in QMDS) See TAB "G"

JUSTIFICATION/COMMENTS None

I. MATERIALS ANALYSIS

Identification of Materials Susceptible to Significant Thermal and/or Radiation Degradation and Aging (Use Section C of Binder for Detailed Materials Analysis).

	Material/Property/Function	Radiation Threshold	Reference	Activation Energy	Reference
(a)	Silicone rubber/top & Bottom cover gasket	NA	NA	1.14eV	See 4-12 & comment (3)
(b)	EPDM/O-ring (lever shaft) O-ring (cover screws)	NA	NA	0.94eV	comment (2)
(c)	Synthetic Polyphenyl based grease/lubricant	NA	NA	Unknown see comment(1)	P.4-10
(d)	Thermoset plastic asbestos or glass-filled phenolic/contact block Contact Carrier	NA	NA	0.827	See comment (4)
(e)	Polyphenyl Ether based oil/lubricant	NA	NA	Unknown See comment(1)	See comment (1)

R2

JUSTIFICATION/COMMENTS

1. The qualified life of the lubricant is controlled by the maintenance procedure (reference page 4-11). (Scheduled maintenance requirements documented in TAB G required periodic lubrication.) An activation energy for the lubricant was not required since greases are designed for high temperature applications (the synthetic grease has a rating of 500°F [260°C] Page 4-10).

2. Namco has assumed an activation energy number of 0.8eV for the elastomeric portions of the limit switch. As explained in TAB C, TVA considers this overly conservative and will use 0.94eV. The activation energy of EPDM is a conservative value based on data in TAB C, Section ~~2~~ 4. DRK 6/14/90

3. Silicone rubber activation energy is based on reference No. 7, page 4-14 of QTR 111 (TAB D).

WBEP-0142Q

JUSTIFICATION/COMMENTS

4. Namco test report QTR 111 documents the qualification of EA740 limit switches whose contact block and carrier material is asbestos-filled phenolic (RX490). However, in December 1986, the contact block material was changed to glass-filled phenolic (RX865) and the contact carrier material was changed to poly amide-imide (Torlon 4203L). This binder addresses both types of switches. Subsequently, an in-depth analysis was performed in Supplement 02 to QTR 111 (TAB D) comparing the properties of RX490 to RX865 and Torlon 4203L. As a result of this analysis, a different activation energy has been derived for the RX490 contact block (QTR 111 assigned an activation energy of 0.96eV to RX490). Activation energies of 0.834eV, 0.836eV, and 0.99eV were derived for the RX490, RX865, and Torlon 4203L materials, respectively (see Section 3.2.1 of Supplement 02). The data used to derive these values are in Appendix E (RX865) and Appendix F (RX490 and Torlon 4203L) of Supplement 02 to QTR 111. The derivation of 0.836eV for the RX865 utilized only two of the four data points given in Appendix E (869 hours at 230°C and 5775 hours at 185°C). Using all four data points, TVA has derived an activation energy of 0.827eV for the RX865 (see calculation WAC-405 in TAB C). Because of the similarity between RX490 and RX865, 0.827eV will also be used as the activation energy for RX490. R2

QTR 111 aged the switches for 408 hours at 120°C. TVA considers this aging insufficient. In Namco test report QTR 140, an EA740 limit switch with a RX490 contact block was aged for 1049 hours at 120°C (see excerpts in TAB D) with no adverse effects. Because of its similarity to RX490, the RX865 contact block would also be able to withstand this aging. Therefore, the qualified life of the contact blocks on the switches in this binder was based on the aging parameters in QTR 140.

BINDER NO. WBNEQ-IZS-003 PLANT WBN UNIT(S) 1 SHEET 16 OF 32

BINDER TITLE EA740 LIMIT SWITCHES COMPUTED WCA DATE 6/13/86 R ___ R ___

MANUFACTURED AFTER 10/1/81 CHECKED [illegible] DATE 6/13/86

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(1) Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics which would constitute failure if not met (yes/no/NA)? Yes (Reference TAB D; Section 11, P. 11-27).

Identify Acceptance Criteria: See Section 11, P. 11-27.

(2) Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment which should be verified before, after, and periodically during the test to judge equipment performance (yes/no/NA)? Yes (Reference TAB D; Section 11, PP. 11-16 and 11-27).

Identify baseline and functional testing: Voltage-100VDC, current-0.086A, Insulation Resistance-50K ohms minimum, contacts must transfer during each switch operation, closed circuit shall not open for more than 2 milli-seconds during seismic testing.

JUSTIFICATION/COMMENTS None

(3) Does the qualification report/analysis describe loads (or load combinations) applied during DBE test (yes/no/NA)? Yes (Reference Section 10, p. 10-90).

JUSTIFICATION/COMMENTS None

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(4) Do the applied loads during baseline testing reflect normal operating conditions (Yes/No/NA)? Yes (Reference: TAB D, Section 5.6, pp 5-8 thru 5.9).

JUSTIFICATION/COMMENTS None

(5) Identify electrical characteristics necessary to ensure the equipment performance specifications can be satisfied.

(a)

Parameter	Plant Normal Conditions	Reference	
Voltage	125V DC	NA	R2
Load	5 amps	NA	R2
Frequency	NA	NA	
Accuracy	NA	NA	
Other(s)			

JUSTIFICATION/COMMENTS See J(5)(b) comments, pages B-20A and B-21. R2

BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81

COMPUTED WCG DATE 6/27/86 JDH 10/18/90

CHECKED WBK DATE 6/29/86 CZH 10/18/90

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(5)(b)

Parameter	Specific Accident Conditions	Reference
Voltage	125V DC	NA
Load	5 amps	NA
Frequency	NA	NA
Accuracy	NA	NA
Other(s)		

JUSTIFICATION/COMMENTS

1. The typical application of these limit switches is in the control circuits of, for example, solenoid operated valves. The UL and nameplate ratings of the switches being bought (20 amps @ 125V AC and 5 amps at 125V DC) envelop the required loads of the switches under normal and accident conditions. R3

2. The demonstrated load of 0.5 amps @ 100V DC is considered adequate for the following reasons:

   a. Low voltage and currents may not break down the film/oxide; therefore, provide little contact surface renewal.

   b. When switches are operated at rated voltage and current, the contact surfaces tend to be self-cleaning and/or the potential of the circuit is sufficient to break down films or oxides that might form on the contact faces.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(5)(b)(2) JUSTIFICATION/COMMENTS (Continued)

c. Since TVA's standard design practices prevent circuits from exceeding the UL ratings of contacts, the 100V DC and 0.086 amp load used for testing is conservative and adequate considering items a and b above.

3. At the demonstrated insulation resistance value of 50 Megohms, there would be a slight leakage current of approximately 2.5 milliamps for a typical 125V circuit. This small leakage current should not provide enough amperage to cause any adverse circuit operation. R2

4. While there are no plant-specific requirements with regard to contact bounce/circuit opening, it was demonstrated that none occurred during seismic and vibration testing of the limit switch.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(5)(c)

Parameter	Demonstrated Conditions	Reference	
Voltage	100V DC	TAB D, p. 5-9	R2
Load	0.5 amps	TAB D, p. 5-9	
Frequency	NA	NA	
Accuracy	NA	NA	
Other(s)			
Minimum Insulation Resistance	50 megohms	pp. 10-82 thru 10-85 and 10-90	
Closed Contact Open <2ms during seismic tests	<2ms	p. 5-11, sect. 5.10, p. 10-86 (chart)	

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 20 OF 32
			R 1 R
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 6/27/86	RJM 5/5/89
	CHECKED WBK	DATE 6/27/86	JDH 5/5/89

K.1 REQUIRED OPERATING ENVIRONMENT - Lower Compartment

Reference Environmental Drawing No. 47E235-42 |R1

(1) Normal Max

(a) Temperature (°F) 120

(b) Pressure (psig) 0.3

(c) Humidity (%) 80

(d) Radiation (rd) 2×10^7

(2) Abnormal Max

(a) Temperature (°F) 130

(b) Pressure (psig) 0.3

(c) Humidity (%) 100

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist up to eight hours per excursion and will occur less than 1% of the plant life (effect on qualified life is negligible - see generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 327 Accident type LOCA/HELB

(b) Pressure (psig) 11.2 Accident type LOCA/HELB |R1

(c) Humidity (%) 100 Accident type LOCA/HELB

(d) Radiation (rd) 4.7×10^8 Beta, 4×10^7 Gamma Accident type LOCA |R1

(e) Spray Type * Accident type LOCA/HELB

* 0.19 molar H_3BO_3 (2000 ppm Boron), 0.033 molar NaOH resulting in a pH of 8.3 at 25°C. The duration of the containment spray is 30 days, at a flow rate equal to 9500 gal/min. or 0.92 gpm per square foot of containment cross section. |R1

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 21 OF 32
			R 1 R
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 8/19/86 RJM 5/5/89	
	CHECKED WBK	DATE 8/19/86 JDH 5/5/89	

K.2 REQUIRED OPERATING ENVIRONMENT - Annulus

Reference Environmental Drawing No. 47E235-44 | R1

(1) Normal Max

(a) Temperature (°F) 110

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 80

(d) Radiation (rd) 1.0×10^6

(2) Abnormal Max

(a) Temperature (°F) 120

(b) Pressure (psig) ATM(-)

(c) Humidity (%) 90

(d) Radiation (rd) NA | R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist up to eight hours per excursion and will occur less than 1% of the plant life (effect on qualified life is negligible - see generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	133.7	Accident type LOCA/HELB	R1
(b) Pressure (psig)	ATM(-)	Accident type NA	
(c) Humidity (%)	61	Accident type LOCA/HELB	R1
*(d) Radiation (rd)	1.2×10^7	Accident type LOCA	
(e) Spray Type	NA	Accident type NA	

* This dose includes a beta contribution of 6×10^5 rads. See environmental drawing 47E235-44, Note 37. | R1

PLUSEQ/142.36

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 22 OF 32
			R 1 R 2
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 6/13/86 RHM 5/5/89	JDH/BLK 6/15/90
	CHECKED WBK	DATE 6/13/86 JDH 5/5/89	KBN/HEK 6-15-90

K.3 REQUIRED OPERATING ENVIRONMENT - IIR

Reference Environmental Drawing No. 47E235-45

(1) Normal Max

(a) Temperature (°F) 75

(b) Pressure (psig) 0.3

(c) Humidity (%) 60

(d) Radiation (rd) 3.5×10^{5}

(2) Abnormal Max

(a) Temperature (°F) 120

(b) Pressure (psig) 0.3

(c) Humidity (%) 90

(d) Radiation (rd) NA

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist up to eight hours per excursion and will occur less than 1% of the plant life (effect on qualified life is negligible - see generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 327 Accident type LOCA/HELB

(b) Pressure (psig) 11.2 Accident type LOCA/HELB

(c) Humidity (%) 100 Accident type LOCA/HELB

(d) Radiation (rd) 1×10^{7} Gamma, 4.7×10^{8} Beta Accident type LOCA

(e) Spray Type * Accident type LOCA/HELB

*0.19 molar H_3BO_3 (2,000 ppm Boron), 0.033 molar NaOH resulting in a pH of 8.3 at 25°C. The duration of the containment spray is 30 days, at a flow rate equal to 9,500 gallons per minute or 0.92 gpm per square foot of containment cross section. R2

WBEP-0142Q

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.): For a cross-reference of equipment to environmental drawing, See TAB G.

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference: See TAB G). | R3

(7) Subject to submergence (Yes/No/NA)? No (Reference: See * note below). | R3

Identify initiation time and duration of submergence: See * note below.

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? Yes (Reference: TAB C, Section 9).

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: See TAB C, Section 9

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.
See TAB B, Section A	

* All switches inside containment have been verified to be outside the crane wall and, therefore, are not submerged by the transient flood level of 722' inside the crane wall.

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 24 OF 32 R 1 R 3
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 6/27/86 RHM 5/5/89	JDH 10/15/90
	CHECKED WBK	DATE 6/27/86 JDH 5/5/89	CAH 10/18/90

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS

(1) Comparison of worst-case maximum parameters:

Parameter	Specified	Demonstrated	Reference
Operating Time	100 days	32 days*** (test time)	TAB C, Section 8
Temperature (°F)	327°F	350	p. 10-92
Pressure (psig)	11.2	76	p. 10-92
Relative Humidity (%)	100	100	p. 10-57
Chemical Spray*	See TAB C Sect. 6	See TAB C Sect. 6	p. 4-7. p. 10-101 pp. 10-91 thru 93
Radiation (rd)**	$6x10^7$gamma $5.12x10^7$beta ****	2.04×10^8 gamma	p. 10-84
Submergence	NA	NA	NA-See TAB B, Page B-26 R3

*Includes spray concentration, flow rate, density, duration, and pH.

**Enter 40-year integrated normal dose plus integrated accident dose and specify type.

****See TAB C, Section 9.

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference
Temperature	Yes	See L(1)
Pressure	Yes	See L(1)
Relative Humidity	Yes	See L(1)
Chemical Spray	Yes	See L(1)
Submergence	NA	NA-See TAB B, Page B-26 R3

JUSTIFICATION/COMMENTS *** For comparison of test profile to WBN accident profile see TAB C, Section 8.

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, Yes/No/NA).

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA	
Temperature: +15 degrees F	+ 23°F	Yes	
Pressure: +10% but no more than 10 psig	> 10%	Yes	R1
Radiation: +10% of accident dose	> 10%	Yes-See TAB C, Section 9	R1
Time: +10% (or 1 hour + operating time per NUREG-0588)	10% See TAB C Section 8	Yes	
Voltage: ±10% of rated value	NA	NA	R1
Frequency: ±5% of rated value	NA	NA	
Environmental Transient: the initial transient and the peak temperature applied twice	2 Dwells	Yes	
Vibration: +10% added to acceleration	See Comments	Yes	

JUSTIFICATION/COMMENTS Per TVA Standard Specification SS-E18.12.01 - "Seismic Requirements for Category I Electrical and I & C Equipment." These limit switches should be tested to 3 g's Horizontal and 2 g's Vertical. Since NAMCO verified in Appendix A of their report (p. 10-71) that cross coupling was not significant, the single axis test performed in each of the 3 axis to 10 g's was more than adequate.

M. OPERABILITY TEST RESULTS

(1) Identify the safety function(s) of this equipment:
(Reference See Tab A).

JUSTIFICATION/COMMENTS None

(2) Did the equipment perform its intended function during the simulated design basis accident exposure (yes/no/NA)? Yes
(Reference p. 7-3).

JUSTIFICATION/COMMENTS A 2.5 millisecond contact opening during seismic conditioning was considered a random occurance (see p. 5-11).

(3) Did the equipment perform its intended function during the simulated post-design basis accident exposure (yes/no/NA)? Yes
(Reference p.7-3).

JUSTIFICATION/COMMENTS None

(4) Did the test demonstrate the operability requirements for the required time interval for which the equipment is required to operate (yes/no/NA)? Yes (Reference Tab C, Section 8).

JUSTIFICATION/COMMENTS The qualified life can be extended to 40 years through refurbishment as defined in EQ749-20011.

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 27 OF 32
BINDER TITLE EA740 LIMIT SWITCHES	COMPUTED wcg	DATE 6/27/86	R R
MANUFACTURED AFTER 10/1/81	CHECKED wmk	DATE 6/27/86	

M. OPERABILITY TEST RESULTS

(5) Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved (yes/no/NA)? Yes (Reference Tab D, Sect. 10, p. 10-63 and Sect. 5, p. 5-11).

JUSTIFICATION/COMMENTS The 2.5 ms contact opening occured at 10 g's which is well above our 3 g test requirement. All other tests (Ref. 5-11, Sect. 5.10) showed no failures.

BINDER NO. WBNEQ-IZS-003 PLANT WBN UNIT(S) 1 SHEET 28 OF 32

BINDER TITLE EA740 LIMIT SWITCHES COMPUTED WCJ DATE 4-15-86 R ___ R ___

MANUFACTURED AFTER 10/1/81 CHECKED WHK DATE 6/19/86

N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (yes/no/NA)? Yes (Enter all requirements in Section G of the EQC Binder - Qualification Maintenance Data Sheets).

JUSTIFICATION/COMMENTS See Tab G

TVA EQP090.54

BINDER NO. WBNEQ-IZS-003 PLANT WBN UNIT(S) 1 SHEET 29 OF 32

BINDER TITLE EA740 LIMIT SWITCHES COMPUTED wcw DATE 4-15-86 R ___ R ___

MANUFACTURED AFTER 10/1/81 CHECKED WAK DATE 6/19/86

O. SUMMARY OF REVIEW

	Yes/No/NA
(1) Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	Yes
(2) Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	NA
(3) Choice of qualification methodology adequately justified?	Yes
(4) If analysis was performed, complete the following:	
(a) Were equipment performance requirements identified?	NA
(b) Were specific features and failure modes and effects analyzed?	NA
(c) Were assumptions and mathematical models used together with appropriate justification for their use?	NA
(d) Were environmental parameters which affect equipment performance identified?	NA
(5) Adequate similarity between equipment and test specimen established?	Yes
(6) Aging degradation evaluated adequately?	Yes
(a) Mechanical and/or cycle aging addressed?	Yes
(b) Equipment aged to end of life condition prior to application of DBE conditions?	Yes
(c) Absence of preaging in test/analysis justified?	NA
(d) Materials susceptible to thermal/radiation aging identified?	Yes

TVA EQP090.54

BINDER NO. WBNEQ-IZS-003 PLANT WBN	UNIT(S) 1		SHEET 30 OF 32 R 1 R
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 6/13/86 RJM 5/5/89	
	CHECKED WBK	DATE 6/19/86 JDH 5/5/89	

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(e) Normally operating state of device (e.g., normally energized) considered?	Yes- See TAB C Sect. 10 R1
(7) Qualified life or replacement schedule established?	Yes
(8) Criteria regarding temperature pressure exposure satisfied?	Yes
(a) Peak temperature adequate	Yes
(b) Peak pressure adequate	Yes
(c) Duration adequate	Yes
(d) Required profile enveloped adequately	Yes
(e) Steam exposure adequate	Yes
(9) Criteria regarding test sequence satisfied?	Yes
(10) Criteria reqarding spray satisfied?	Yes
(a) Was the spray testing done while under the extremes of pressure and temperature?	Yes
(b) Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant?	Yes-See TAB C Sect. 6
(11) Criteria regarding submergence satisfied?	NA
(12) Criteria regarding radiation satisfied?	Yes
(a) Was dose rate considered?	Yes
(b) Was beta radiation considered?	Yes- See TAB C Sect. 9 R1
(13) Criteria regarding operability status/mode satisfied?	Yes
(14) Criteria regarding test failures or anomalies satisfied?	Yes

PLUSEQ/142.45

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 31 OF 32
			R 1 R
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED WCG	DATE 6/19/86 RWM 5/5/89	
	CHECKED WBK	DATE 6/19/86 JDH 5/5/89	

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(15) Criteria regarding functional testing satisfied?	Yes
(a) Does the test plan/report specify an acceptance criteria for equipment performed?	Yes
(b) Was an initial base line test done to establish required performance characteristics?	Yes
(c) Has the test analyis demonstrated that performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	Yes
(16) Criteria regarding instrument accuracy satisfied?	NA
(17) Test duration margin (1 hour + function time) satisfied?	Yes-See TAB C
(a) Is the minimum specified operating time at least 1 hour?	Yes
(b) If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	NA
(18) Criteria regarding synergistic effects satisfied?	Yes
(19) Criteria regarding margins satisfied?	Yes
(20) Maintenance and surveillance requirements adequately identified?	Yes

P. DISCUSSION

PLUSEQ/142.46

BINDER NO. WBNEQ-IZS-003	PLANT WBN	UNIT(S) 1	SHEET 32 OF 32
			R ___ R ___
BINDER TITLE EA740 LIMIT SWITCHES MANUFACTURED AFTER 10/1/81	COMPUTED /R/ RJM	DATE 5-5-89	
	CHECKED /R/ JDH	DATE 5-5-89	

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Pages B-35 thru B-36 were deleted per revision 1 .

BINDER NO. WBNEQ-IZS-004 PLANT WBN UNIT(S) 1 SHEET 1 OF 1

R R

BINDER TITLE EA740 Limit Switches COMPUTED wcn DATE 5/22/86

Manufactured between February 20, 1978 and October 1, 1981 CHECKED nap DATE 6/27/86

IZS-004

TAB A - Identification of equipment comprising the equipment type

BINDER NO. WBNEQ-IZS-004	PLANT WBN	UNIT(S) 1	SHEET 1a OF 1
			R 2 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED /R1 CAG	DATE 2-22-89 WEP 6-6-90	
	CHECKED /R1 JDH	DATE 2-22-89 CAH 6/8/90	

TAB A

NOTES

1. Elevations shown are Actual elevations for equipment located in the Reactor Building and Floor elevations for equipment located outside the Reactor Building. Actual elevations for all equipment are documented in TAB F.

2. See Page B-2A for source of Category and Operating Time assignments.

3. For 1-ZS-30-0056-A Model No. Discrepancy, See TAB C, Page C-135.

4. The safety function of this limit switch is as follows:

   To open preventing solenoid reenergization and valve opening, it must remain open to prevent valve position changes after containment vent isolation reset. It must also provide position indication for PAM. R2

WBEP-0095Q

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT	DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0008A UPPER COMPT PURGE ISLN VALVE POS SW	-B	1-ZS -030-0008/1 EA74050001	-B	289	797' 2" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -030-0008B UPPER COMPT PURGE ISLN VALVE POS SW	-B	1-ZS -030-0008/2 EA74050000	-B	289	797' 2" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -030-0010A UPPER COMPT PURGE ISLN VALVE POS SW	-A	1-ZS -030-0010/1 EA74050000	-A	270	790' 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	SEE NOTE 4.
WBN-1-ZS -030-0010B UPPER COMPT PURGE ISLN VALVE POS SW	-A	1-ZS -030-0010/2 EA74050000	-A	270	790' 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	SEE NOTE 4.
WBN-1-ZS -030-0015A LOWER COMPT PURGE ISLN VALVE POS SW	-B	1-ZS -030-0015/1 EA74050000	-B	299	737' 1" 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	SEE NOTE 4.

		R 1	R 2	R
PREPARER/DATE	WCG 9/10/86	CAG 2-23-89	WCD 6-8-90	
CHECKED/DATE	NAP 9/10/86	JDH 2-23-89	CAG 6/8/90	

PRINT DATE: 06/05/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0015B -B LOWER COMPT PURGE ISLN VALVE POS SW	1-ZS -030-0015/2 -B EA74050000	299	736' 7" 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	SEE NOTE 4.
WBN-1-ZS -030-0017A -A LOWER COMPT PURGE ISLN VALVE LIMIT SW	1-FCV -030-0017/ZS1 -A EA74050000	239	738' 1" 79K3-824495-1	AC3	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	SEE NOTE 4.
WBN-1-ZS -030-0017B -A LOWER COMPT PURGE ISLN VALVE LIMIT SW	1-FCV -030-0017/ZS2 -A EA74050000	239	737' 6" 79K3-824495-1	AC3	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	SEE NOTE 4.
WBN-1-ZS -030-0020A -A IIR PURGE ISLN VALVE POS SWITCH	1-ZS -030-0020/1 -A EA74050000	059	727' 8" 79K3-824495-1	IIR	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -030-0020B -A IIR PURGE ISLN VALVE POS SWITCH	1-ZS -030-0020/2 -A EA74050000	059	727' 2" 79K3-824495-1	IIR	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN PREVENTING SOL REENERGIZATION AND VALVE OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.

			R 1	R 2	R
PREPARER/DATE	WCG	9/10/86	CAG 2-23-89	WCG 6-8-90	
CHECKED/DATE	NAP	9/10/86	JDH 2-23-89	CAH 6/8/90	

PAGE A-3

R2

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0040A -A LOWER COMPT PURGE CONT VALVE POS SW	1-FCV -030-0040/ZS1 -A EA74050000	284	721'11" 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -030-0040B -A LOWER COMPT PURGE CONT VALVE POS SW	1-FCV -030-0040/ZS2 -A EA74050000	290	721' 8" 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -030-0050A -B UPPER CNTMT EXH ISLN VALVE POS SW	1-ZS -030-0050/1 -B EA74050000	295	746' 4" 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET.PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -030-0050B -B UPPER CNTMT EXH ISLN VALVE POS SW	1-ZS -030-0050/2 -B EA74050000	295	746' 4" 79K3-824495-1	AC4	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -030-0052A -A UPPER CNTMT EXH ISLN VALVE POS SW	1-ZS -030-0052/1 -A EA74050000	247	754' 3" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.

			R 1	R 2	R
PREPARER/DATE	WCG	9/10/86	CAG 2-23-89	WCP 6-8-90	
CHECKED/DATE	NAP	9/10/86	JDH 2-23-89	CAG 6/8/90	

PRINT DATE: 06/05/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -030-0052B -A UPPER CNTMT EXH ISLN VALVE POS SW	1-ZS -030-0052/2 -A EA74050000	247	754' 3" 79K3-824495-1	UC	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -030-0056A -A LOWER CNTMT EXH ISLN VALVE POS SW	1-ZS -030-0056/1 -A EA74050000	034	737' 9" 79K3-824495-1	AC1	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -030-0056B -A LOWER CNTMT EXH ISLN VALVE POS SW	1-ZS -030-0056/2 -A EA74050000 (3)	034	737' 9" 79K3-824495-1	AC1	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON CNTMNT VENT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0305A -B IIR CHILLER A CWR ISLN VALVE LIMIT SW	1-FCV -031-0305/ZS1 -B EA74020100	062	736' 3" 79K3-824495-1	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0305B -B IIR CHILLER A CWR ISLN VALVE LIMIT SW	1-FCV -031-0305/ZS2 -B EA74020100	060	736' 79K3-824495-1	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VALVE OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.

			R 1	R 2	R
PREPARER/DATE	WCG	9/10/86	CAG 2-23-89	WCD 6-8-90	
CHECKED/DATE	NAP	9/10/86	JDH 2-23-89	CAH 6/8/90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -031-0306A -A IIR CHILLER A CWR ISLN VALVE LIMIT SW	1-FCV -031-0306/ZS1 -A EA74020100	061	737'11" 79K3-824495-1	IIR	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0306B -A IIR CHILLER A CWR ISLN VALVE LIMIT SW	1-FCV -031-0306/ZS2 -A EA74020100	061	737' 5" 79K3-824495-1	IIR	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0308A -A IIR CHILLER A CWS ISLN VALVE LIMIT SW	1-FCV -031-0308/ZS1 -A EA74020100	061	739' 2" 79K3-824495-1	IIR	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0308B -A IIR CHILLER A CWS ISLN VALVE LIMIT SW	1-FCV -031-0308/ZS2 -A EA74020100	061	739' 2" 79K3-824495-1	IIR	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0309A -B IIR CHILLER A CWS ISLN VALVE LIMIT SW	1-FCV -031-0309/ZS1 -B EA74020100	062	738' 4" 79K3-824495-1	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.

			R 1	R 2	R
PREPARER/DATE	WCG	9/10/86	CAG 2-23-89	WCD 6-8-90	
CHECKED/DATE	NAP	9/10/86	JDH 2-23-89	CAH 6/8/90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -031-0309B -B IIR CHILLER A CWS ISLN VALVE LIMIT SW	1-FCV -031-0309/ZS2 -B EA74020100	062	738' 1" 79K3-824495-1	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0326A -A IIR CHILLER B CWR ISLN VALVE LIMIT SW	1-FCV -031-0326/ZS1 -A EA74020100	105	733' 9" 79K3-824495-1	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0327A -B IIR CHILLER B CWR ISLN VALVE LIMIT SW	1-FCV -031-0327/ZS1 -B EA74020100	103	734' 1" 79K3-824495-1	IIR	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0327B -B IIR CHILLER B CWR ISLN VALVE LIMIT SW	1-FCV -031-0327/ZS2 -B EA74020100	103	733' 3" 79K3-824495-1	IIR	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0329A -B IIR CHILLER B CWR ISLN VALVE LIMIT SW	1-FCV -031-0329/ZS1 -B EA74020100	103	733' 5" 79K3-824495-1	IIR	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.

			R 1	R 2	R
PREPARER/DATE	WCG	9/10/86	CAG 2-23-89	WCG 6-8-90	
CHECKED/DATE	NAP	9/10/86	JDH 2-23-89	CBD 6/8/90	

BINDER NO. : WBNEQ-IZS -004
MANUFACTURER : NAMCO

PRINT DATE: 06/05/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-ZS -031-0329B -B IIR CHILLER B CWR ISLN VALVE LIMIT SW	1-FCV -031-0329/ZS2 -B EA74020100	103	732' 5" 79K3-824495-1	IIR	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0330A -A IIR CHILLER B CWS ISLN VALVE LIMIT SW	1-FCV -031-0330/ZS1 -A EA74020100	109	734' 5" 79K3-824495-1	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.
WBN-1-ZS -031-0330B -A IIR CHILLER B CWR ISLN VALVE LIMIT SW	1-FCV -031-0330/ZS2 -A EA74020100	110	733' 9" 79K3-824495-1	ANN	A A A A A	100D 100D 100D 1MO 1MO	L MS/C FW/C RH/C CV/C	TO OPEN AND REMAIN OPEN PREVENTING SOL REENERGIZATION AND VLV OPENING UPON PHASE A CNTMNT ISOL RESET. PROVIDE POS INDICATION FOR PAM.

			R 1	R 2	R
PREPARER/DATE	WCG	9/10/86	CAG 2-23-89	WCG 6-8-90	
CHECKED/DATE	NAP	9/10/86	JDH 2-23-89	CAH 6/8/90	

BINDER NO. WBNEQ-IZS-004 PLANT WBN UNIT(S) 1 SHEET 1 OF 1

BINDER TITLE EA740 Limit Switches COMPUTED wcj DATE 5-22-86 R ____ R ____

Manufactured between February 20, 1978 and October 1, 1981 CHECKED ncp DATE 6/27/86

TAB B - Checklist for evaluation of environmental qualfication including summary and conclusion

BINDER NO. WBNEQ-IZS-004 PLANT WBN	UNIT(S) 1		SHEET 1 OF 28 R 1 R 3
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 6/25/86 CAG	JDH 2/22/89 10/15/90
	CHECKED NAP	DATE 6/27/86 JDH	CAH 2/22/89 10/16/90

A. DOCUMENTATION (See Note)

Equipment Description Limit Switch

Vendor/Manufacturer NAMCO

Equipment Model No.(s) EA740-20100

EA740-50000

EA740-50001

QUALIFICATION REPORTS (See Note)

*(1) Title/Number/Revision Qualification of NAMCO Controls Limit Switch Model EA-740 to IEEE Standards 344 ('75), 323 ('74), and 382 ('72) RIMS B70 851017 104 DATE 2/20/78

(2) Title/Number/Revision Test Plan 8/31/77 Qualification of Series EA-180 and EA-740 Switches for Class IE use in Nuclear Power Plants in Compliance with IEEE Standard 382-1972 RIMS B70 851031 007 DATE 8/31/77

(3) Title/Number/Revision Supplement 02 to QTR 111 - Qualification by Similarity Presentation to Support the Change of Contact Block/Carrier Material RIMS B70 870121 003 DATE 12/16/86

(4) NAMCO Report No. QTR 140, Dated 4/19/84. (Selected Parts) (C-82 thru C-92)

(5) NAMCO Report No. QTR 155, Dated 10/5/87. (Selected Parts) (D-161 thru D-165)

(6) NAMCO Report No. QTR 107, Dated 4/6/82. (Selected Parts) (C-81A thru C-81D) R3

(7) NAMCO Report No. QTR 111, Dated 10/1/81. (Selected Parts) (C-75 thru C-78)

OTHER (ANALYSIS, VENDOR DATA, ETC.) ~~R3~~ JDH 10/15/90

(8) TVA Environmental Drawing 47E235-41 R1, DCA P-04104-01-0, and S-09715-10,-11,-12

(9) TVA Environmental Drawing 47E235-42 R2, DCA P-04104-02-0, -03-0,-02-1,-05-0, and S-09715-02,-03,-04,-05,-13,-14,-15 R3

(10) TVA Environmental Drawing 47E235-44 R1

WBEP-0095Q

A. DOCUMENTATION

OTHER (ANALYSIS, VENDOR DATA, ETC.) (Continued)

(11) TVA Environmental Drawing 47E235-45 R1, DCA P-04104-06-0, and S-09715-06,-07,-08,-09,-19

(12) WBNTSR-051 R0 (B26 891129 202), Reduction of Beta Dose by Sheet Steel

(13) WBNOSG4-008 R16 (B26 900717 201) System 30 Category and Operating Times Calculation R3

(14) WBNOSG4-009 R7 (B26 900309 233) System 31 Category and Operating Times Calculation

(15) WBN-EEB-MS-TI06-0017 (B26 900202 410) 120V AC Vital Instrument Power Voltage Profile

*Unless specified otherwise, all references made herein are to this report.

Note: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. This listing includes only those documents which are essential to qualification and accordingly should not be considered a complete listing of binder references.

B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified

_____ Equipment Satisfies All Requirements Except Qualified Life or Justification of Replacement Schedule

_____ Equipment Qualification Not Established by Documentation

_____ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES

1. Unqualified lever arms | R3

2. Unqualified gaskets | R3

COMMENTS/RECOMMENDATIONS The required operating environments, normal and accident, have been reviewed for each switch location identified in TAB A. All switches are qualified to the worst case combination of these environmental parameters. This includes consideration of peak levels and profiles.

BINDER NO. WBNEQ-IZS-004	PLANT WBN	UNIT(S) 1	SHEET 3 OF 28
			R ___ R ___
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEBRUARY 20, 1978 AND OCTOBER 1, 1981	COMPUTED wcr	DATE 5-22-86	
	CHECKED nup	DATE 6/27/86	

C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate Which Criteria is Applicable):

_____ Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE323-1974)

__X__ Components are Qualified to the Criteria of NUREG-0588 Category II or the DOR Guidelines of 1E Bulletin No. 79-01B (IEEE323-1971) (DOR Guidelines Applicable to only BFN)

JUSTIFICATION/COMMENTS The date codes on the limit switches (TAB F) indicate that all switches were manufactured in the year of 1979.

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

IEEE Standard 323-1971

BINDER NO. WBNEQ-IZS-004 PLANT WBN UNIT(S) 1 SHEET 4 OF 28

BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEBRUARY 20, 1978 AND OCTOBER 1, 1981 COMPUTED wcg DATE 6/25/86 R ___ R ___

CHECKED nap DATE 6/27/86

D. QUALIFICATION METHODOLOGY

X Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

X Test of Similar Items with Supporting Analysis

___ Analysis in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

___ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS This test provides generic group qualification for EA-740 series limit switches. Model EA-740-20000 was selected for test purposes and is identical to models of the same number at Watts Bar. Other models of the EA-740 series have been qualified with supporting supplementary testing and similarity discussions. See TAB C, Section 3 for similarity evaluation.

BINDER NO. WBNEQ-IZS-004	PLANT WBN	UNIT(S) 1	SHEET 5 OF 28 R 1 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 6/25/86 [initials] 2-22-89	
	CHECKED NAP	DATE 6/27/86 TDH 2-22-89	

E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification documentation identical to the plant equipment which requires qualification (Yes/No/NA)? Yes

	Plant Device	Qualification Document	Reference	
(1) Equipment Type	Limit Switch	Limit Switch	TAB D-1, Page D-5	
(2) Manufacturer	NAMCO	NAMCO	TAB D-1, Page D-5	R1
(3) Model Number(s)	EA-74020100	EA-74020000	TAB D-1, Page D-5	
	EA-74050000			
	EA-74050001			
(4) Serial Number(s)	See comments	See comments	See comments	

(5) Identify Component-Unique checksheet attached: NA

NA

JUSTIFICATION/COMMENTS NAMCO Limit Switches do not have serial numbers but date codes stamped on the conduit entrance of the switch. These are documented in TAB F (Date Code System described in TAB E, Section 1). Field Verification (TAB F) has confirmed that all limit switches covered in TAB A have a date code of Feb. 1979. Similarity of the different model numbers is discussed in TAB C, Section 3. Contract Certification of Compliance for these switches found in TAB E, Section 1: Documents Qualification to the test reports found in TAB D. R1

BINDER NO. WBNEQ-IZS-004	PLANT WBN	UNIT(S) 1	SHEET 6 OF 28 R 1 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 6/25/86 [illegible] 2-22-89	
	CHECKED NAP	DATE 6/27/86 JDH 2-22-89	

F. INSTALLATION INTERFACES

List all interfaces pertinent to EQ identified in the qualification documentation and/or evaluation and reference the source. Is the interface a requirement for our application (Yes/No)? (Note below.) If yes, enter requirement in QMDS, if no, provide justification.

Interface	Identify Interface	Plant Requirement? (Yes/No)	Reference Test Report
Mounting Bolts	NA	NA	NA
External Process Connections	NA	NA	NA
Electrical Connections	NA	NA	NA
Conduit Seals	Required	Yes	TAB D, p D-10 |R1
Connector Seals	NA	NA	NA
Orientation	None	NA	NA
Physical Configuration	None	NA	NA
Other	See comments (1) and (2)	NA	NA

JUSTIFICATION/COMMENTS (1) For installation instructions refer to EA749 90002 (TAB H, Section 1). Mounting and connection requirements are also addressed in TAB D - TEST PLAN page 1, Section (2). Wire passage through switch conduit entrance must be sealed in such a way as to maintain switch integrity under required service conditions. All switches inside containment must have a qualified Conax seal (Ref. to generic binder WBNEQ-CSC-001).

F. INSTALLATION INTERFACES (continued)

JUSTIFICATION/COMMENTS (Continued)

(2) Although it was not considered part of the qualification test, an operating lever is required for proper operation of the switch. The lever and roller shall be of metal construction. Nylon rollers are not acceptable and are controlled through TVA's Maintenance Program (see TAB G). |R1

BINDER NO. WBNEQ-IZS-004 PLANT WBN UNIT(S) 1 SHEET 7 OF 28
R 1 R

BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981

COMPUTED WCG DATE 6/25/86 [illegible] 2-22-89

CHECKED NAP DATE 6/27/86 JDH 2-22-89

G. TEST SEQUENCE

(1) Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE-323 (74), paragraph 6.3.2 (Yes/No/NA)? (Note below.)

	Yes/No/NA	Reference	
(a) Equipment inspected for damage	Yes	TAB D-1, p D-6	
(b) Baseline performance measurements taken	Yes	TAB D-1, p D-6	
(c) Equipment aged: Thermal	Yes	TAB D-1, p D-6	
Radiation	Yes	TAB D-1, p D-7	R1
Wear	Yes	TAB D-1, p D-6	
(d) Vibration/seismic testing conducted	Yes	TAB D-1, p D-7	
(e) Design basis event (DBE) exposure	Yes	TAB D-1,p D-10	
(f) Post-DBE exposure	Yes	TAB D-1,p D-11	
(g) Final inspection and disassembly	Yes	TAB D-1,p D-38	

(2) Was the same piece of equipment used throughout the test sequence described in item (1) above (Yes/No/NA)? Yes See Comment (2).

(3) Have the test equipment, test equipment accuracies and calibration data been appropriately document (Yes/No/NA)? No See Comment (1) (Reference TAB D-1, Appendix E, page 1). R1

JUSTIFICATION/COMMENTS (1) Test equipment and calibration dates were recorded; however, test equipment accuracies were not documented in the test report. (2) The test switch was not used in the seismic qualification, however, it was seismically conditioned by subjecting it to all vibrations contained in the seismic tests (Ref. TAB D-1, pages D-8 and D-10) R1

BINDER NO. WBNEQ-IZS-004 PLANT WBN	UNIT(S) 1	SHEET 8 OF 28	R 1 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 6/25/86	2-22-89
	CHECKED NAP	DATE 6/27/86	JDH 2-22-89

H. AGING

(1) Was aging considered in the qualification program (Yes/No/NA)? Yes (Reference: TAB D-1 pages D-6 and D-7). R1

JUSTIFICATION/COMMENTS None

(2) Were the following effects considered in the aging program:

Aging Effect	Yes/No/NA	Reference
Thermal aging	Yes	TAB D-1 Pages D-6 and D-34
Radiation exposure	Yes	TAB D-1 Pages D-7 and D-36
Vibration (non-seismic) aging	Yes	TAB D-1 Page D-32
Operational (electrical/mechanical/ process) stress aging	Yes	TAB D-1 Pages D-6 and D-35

R1

JUSTIFICATION/COMMENTS None

(3) Were all known synergistic effects which are believed to have a significant effect on equipment performance considered in the aging program (Yes/No/NA)? Yes (Reference: See TAB C, Section 16).

JUSTIFICATION/COMMENTS None

(4) Thermal Aging:

(a) Was thermal aging considered in the qualification program (Yes/No/NA)? Yes (Reference: TAB D-1, page D-6). R1

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-IZS-004	PLANT WBN	UNIT(S) 1	SHEET 9 OF 28
			R 1 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 6/26/86	2-22-89
	CHECKED NAP	DATE 6/27/86	JDH 2-22-89

H. AGING (Continued)

(b) Were the materials susceptible to thermal aging degradation identified in the qualification program (Yes/No/NA)? Yes (Reference: TAB E, Section 2).

JUSTIFICATION/COMMENTS See also Materials Analysis in TAB C, Section 6.

(c) Was the basis for thermal aging identified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D-1, Page D-6, footnote "+"). R1

JUSTIFICATION/COMMENTS See Materials Analysis in TAB C, Section 6.

(d) Was the aging acceleration rate justified and the parameters of time and temperature identified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D-1, page D-6, footnote "+"). R1

Parameter	Plant Maximum Normal	Test	Equivalent
Temperature	75°F/110°F/120°F	NA	75°F/110°F/120°F
Time	40 yrs	NA	40/14.2/8.6 yrs.

JUSTIFICATION/COMMENTS Qualified life established by Materials Analysis in TAB C, Section 6.

(e) Was the Arrhenius methodolgy used for accelerated aging (Yes/No/NA)? Yes (Reference: NA).

JUSTIFICATION/COMMENTS See Materials Analysis in TAB C, Section 6.

(f) If activation energies were used for determining accelerated aging parameters, are they properly referenced to the source of the technical data (Yes/No/NA)? Yes (Reference: NA).

JUSTIFICATION/COMMENTS See Materials Analysis in TAB C, Section 6.

BINDER NO. WBNEQ-IZS-004 PLANT WBN UNIT(S) 1 SHEET 10 OF 28
R 1 R

BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981

COMPUTED WCG DATE 6/25/86 [initials] 2-22-89

CHECKED NAP DATE 6/27/86 JDH 2-22-89

H. AGING (Continued)

(g) If a regression line was used for determining accelerated aging parameters, are test points or failure modes identified on the line (Yes/No/NA)? NA (Reference: NA).

JUSTIFICATION/COMMENTS Regression line not used.

(h) Was the equipment operated during the thermal aging (Yes/No/NA)? NA (Reference: NA).

JUSTIFICATION/COMMENTS Qualified life determined by Material Analysis rather than accelerated aging test on the assembled device.

(5) Radiation Aging Exposure:

(a) Was radiation aging exposure considered in the qualification program (Yes/No/NA)? Yes (Reference: TAB D-1, pages D-7 and D-36). R1

JUSTIFICATION/COMMENTS None

(b) Were the materials susceptible to radiation degradation identified in the qualification program (Yes/No/NA)? No (Reference: NA).

JUSTIFICATION/COMMENTS Assembled test speciment irradiated to 204 megarads.

(c) Was the basis for radiation aging exposure identified in the qualification program (Yes/No/NA)? NA (Reference: NA).

JUSTIFICATION/COMMENTS 204 Megarads exposed the switch to a greater radiation dose than expected for the service life of the switch plus accident conditions and margins.

H. AGING (Continued)

(d) Is the radiation test exposure dose and dose rate acceptable (Yes/No/NA)? Yes (Reference: TAB D-1, p D-36). | R1

Plant normal ambient radiation dose (rd)	2×10^7
Test exposure dose (rd)	2.04×10^8
Test exposure dose rate (rd/hr)	1.2×10^6
Test exposure source type (e.g., Co-60 gamma)	Co-60 Gamma

JUSTIFICATION/COMMENTS None

(6) Vibration (non-seismic) Aging:

(a) Were the effects of non-seismic vibration induced during normal and abnormal operation addressed in the qualification program* Yes (Reference: TAB D-1, page D-32). | R1

JUSTIFICATION/COMMENTS None

(b) Was the basis for vibration aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D-1, page D-32). | R1

JUSTIFICATION/COMMENTS See TAB C, Section 7

(7) Operational Stress Aging:

(a) Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation adressed in the qualification program (Yes/No/NA)? Yes (Reference: TAB D-1, pages D-47 and D-48).

JUSTIFICATION/COMMENTS Wear cycling - 100,000 cycles.

* Qualification program refers to the test report and any supplemental documentation including TVA analyses in TAB C of the Binder. | R1

BINDER NO. WBNEQ-IZS-004 PLANT WBN	UNIT(S) 1		SHEET 12 OF 28 R 1 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 6/25/86	2-22-89
	CHECKED NAP	DATE 6/27/86 TDH	2-22-89

H. AGING (Continued)

(7) (b) Was the basis for stresses induced during operational aging identified and justified in the qualification program (Yes/No/NA)? Yes (Reference: TAB D-1 page D-6). R1

JUSTIFICATION/COMMENTS See Section P(1) for additional discussion

(8) Was the qualified life of the equipment and its basis defined in the qualification program (Yes/No/NA)? Yes-See TAB B, pg 16 R1 (Reference: NA).

Qualified life (Document in QMDS) 40 years

JUSTIFICATION/COMMENTS See TAB C - Material Analysis for qualified life.

(9) Were replacement intervals for the equipment or its components defined in the qualification program (Yes/No/NA)? No - See TAB B, page 16 for discussion

(Reference: NA).

Replacement Intervals (Document in QMDS) See QMDS - TAB G. R1

JUSTIFICATION/COMMENTS None

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Page B-15 was deleted per revision 1.

BINDER NO. WBNEQ-IZS-004 PLANT WBN UNIT(S) 1 SHEET 13a OF 28
R 1 R

BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981

COMPUTED WCG DATE 5/22/86 2-22-89

CHECKED NAP DATE 6/27/86 JDH 2-22-89

H. AGING (Continued)

Qualified Life - H(8)

The qualified life for all equipment covered by this binder is 40 years through periodic refurbishment. For further discussion on Materials Analysis and Arrhenius Methodology, refer to material analysis discussion found in TAB C, Section 6. The scheduled maintenance service times shown below come directly from this Arrhenius curve.

Max Normal Ambient	Service Time
75°F	> 40 yrs.
110°F	14.2 yrs.
120°F	8.6 yrs.

The QMDS Section found in TAB G will document the limit switches which require refurbishment and the appropriate schedule.

BINDER NO. WBNEQ-IZS-004 PLANT WBN	UNIT(S) 1		SHEET 14 OF 28 R 1 R 2
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 6/26/86 CAG 2/22/89	WCP 6-6-90
	CHECKED NAP	DATE 6/27/86 JDH 2/22/89	CAH 6/8/90

I. MATERIALS ANALYSIS

Identification of Materials Susceptible to Significant Thermal and/or Radiation Degradation and Aging (Use Section C of Binder for Detailed Materials Analysis).

Material/Property/Function	Radiation Threshold	Reference	Activation Energy	Reference
(a)*Top/Bottom Silicone Rubber/Gaskets	NA	NA	1.14 eV	TAB C, Section 6
(b) EPDM/O-Rings	NA	NA	0.94 eV	TAB C, Section 6
(c)*Glass Filled Polyester/ Contact Block	NA	NA	0.50 eV	TAB C, Section 6
(d) Asbestos Filled Phenolic/Contact Carrier	NA	NA	0.99 eV	TAB C, Section 6
(e) Lubricant	NA	NA	Not Required	TAB C, Section 6

JUSTIFICATION/COMMENTS See TAB C, Section 6 for further analysis.

*NOTE: See Page E-14 for change history of materials thru January 9, 1984. Also see Page C-74A for current contact block and carrier material.

WBEP-0095Q

BINDER NO. WBNEQ-IZS-004 PLANT WBN	UNIT(S) 1		SHEET 15 OF 28 R 1 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN	COMPUTED WCG	DATE 6/25/86	2-22-89
FEB. 20, 1978 AND OCT. 1, 1981	CHECKED NAP	DATE 6/27/86	TOH 2-22-89

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

(1) Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics which would constitute failure if not met (Yes/No/NA)? Yes
(Reference: TAB D-2, page D-60
). R1

Identify Acceptance Criteria: See page B-19

(2) Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment which should be verified before, after, and periodically during the test to judge equipment performance (Yes/No/NA)? Yes
(Reference: TAB D-1, page D-6 and pages D-35, D-36, D-37, R1
D-39 and D-40).

Identify baseline and functional testing: See page B-19

JUSTIFICATION/COMMENTS None

(3) Does the qualification report/analysis describe loads (or load combinations) applied during DBE test (Yes/No/NA)? Yes
(Reference: TAB D-1, pages D-39 and D-40 R1
).

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-IZS-004 PLANT WBN UNIT(S) 1 SHEET 16 OF 28

BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEBRUARY 20, 1978 AND OCTOBER 1, 1981

COMPUTED WCG DATE 6/25/86 R R

CHECKED nap DATE 6/27/86

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

Item J(1) - (1) Failure of one or more contact pairs to test as open when the unit is in such a condition that said contacts would normally be open. (2) Failure of one or more contact pairs to test as closed when the unit is in such a condition that said contacts would normally be closed. (3) Shorting of any contact to the unit housing. (4) Shorting of any two contacts which are not of the same pair. (5) The opening of a closed contact for more than two milli-seconds during seismic testing.

Item J(2) - (1) Before: o open and closed circuit performance measured and recorded.

o meggar and conductivity (amps) during WEAR TEST (0.086A@100VDC).

o meggar and conductivity (amps) during radiation test and seismic test (86mA@100VDC).

(2) During: o meggar and conductivity during LOCA Test (.086A@100VDC).

(3) After: o meggar and conductivity (0.086A@100VDC).

BINDER NO. WBNEQ-IZS-004	PLANT WBN	UNIT(S) 1	SHEET 17 OF 28
			R 1 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 5/22/86 *[initials]* 2-22-89	
	CHECKED NAP	DATE 6/27/86 *TDH* 2-22-89	

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(4) Do the applied loads during baseline testing reflect normal operating conditions (Yes/No/NA)? Yes (Reference: See J(5) comments page B-22). R1

JUSTIFICATION/COMMENTS None

(5) Identify electrical characteristics necessary to ensure the equipment performance specifications can be satisfied.

(a)

Parameter	Plant Normal Conditions	Reference
Voltage	See Comments	NA
Load	See Comments	NA
Frequency	NA	NA
Accuracy	NA	NA
Other(s)		

R1

JUSTIFICATION/COMMENTS See J(5) Comments page B-22

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

(b)

Parameter	Specific Accident Conditions	Reference
Voltage	See Comments	NA
Load	See Comments	NA
Frequency	NA	NA
Accuracy	NA	NA
Other(s)		

R1

JUSTIFICATION/COMMENTS See J(5) Comments page B-22

(c)

Parameter	Demonstrated Conditions	Reference
Voltage	125V AC/DC	TAB D-1, p D-6 TAB I, p I-3
Load	100VDC/86MA, 100VAC/500MA	TAB D-1, p D-6
Frequency	NA	NA
Accuracy	NA	NA
Other(s) Open Contact Resistance	40,000 OHMS	TAB D-1, p D-40
Closed Contact Open < 2ms	< 2ms	TAB D-1, p D-26

R1

JUSTIFICATION/COMMENTS The typical application of these limit switches is in the control circuits of, for example, solenoid operated valves. These circuits operate at 120VAC or 125VDC with current ratings of approximately 0.3 to 1.3 amps. This is well within the UL and nameplate ratings of 20 amps at 125VAC and 5 amps at 125VDC.

BINDER NO. WBNEQ-IZS-004 PLANT WBN	UNIT(S) 1 SHEET 19 OF 28 R1	R 1	R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 6/20/86	2-22-89
	CHECKED NAP	DATE 6/27/86 JDH	2-22-89

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

J(5) - JUSTIFICATION/COMMENTS (Continued)

The demonstrated load of 0.5 amps @ 100VDC for mechanical aging and 0.086 amps @100VDC for all other performance tests is considered adequate for the following reasons:

(1) Low voltages and currents may not break down the films/oxides and therefore provide little contact surface renewal.

(2) When switches are operated at rated voltages and currents, the contact surfaces tend to be self-cleaning and/or the potential of the circuit is sufficient to break down films or oxides that might form on the contact faces.

(3) Since TVA's standard design practices prevent circuits from exceeding the UL ratings of the contacts, the 100VDC and 0.086 amp load used for testing is conservative and adequate considering items (1) and (2) above.

While there are no plant specific requirements with regard to contact bounce and open contract resistance minimums, the values demonstrated are considered adequate. At 40,000 ohms, there would be a slight leakage current of approximately 3.1 milliamps for a typical 125V circuit. This small leakage current should not provide enough amperage to cause any adverse circuit operations.

BINDER NO. WBNEQ-IZS-004 PLANT WBN	UNIT(S) 1	SHEET 20 OF 28	R 1 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 6/25/86	2-22-89
	CHECKED NAP	DATE 6/27/86	JDH 2-22-89

K.1 REQUIRED OPERATING ENVIRONMENT - UPPER COMPARTMENT

Reference Environmental Drawing No. 47E235-41 | R1

(1) Normal Max

(a) Temperature (°F) 110

(b) Pressure (psig) 0.3

(c) Humidity (%) 80

(d) Radiation (rd) 1×10^6

(2) Abnormal Max

(a) Temperature (°F) 120

(b) Pressure (psig) 0.3

(c) Humidity (%) 90

(d) Radiation (rd) NA | R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist up to eight hours per excursion and will occur less than 1 percent of the plant life (effect on qualified life is negligible - (See generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	161	Accident type LOCA/HELB	R1
(b) Pressure (psig)	10.9	Accident type LOCA/HELB	R1
(c) Humidity (%)	100	Accident type LOCA/HELB	
(d) Radiation (rd)	4.7×10^8 beta 3.8×10^7 gamma	Accident type LOCA	R1
(e) Spray Type	*	Accident type LOCA/HELB	

*0.19 molar H_3BO_3 (2000 ppm Boron), 0.033 molar NaOH, resulting in a pH of 8.3 at 25°C. The duration of the containment spray is 30 days, at a flow rate equal to 9500 gal/min. or 0.92 gpm per square foot of containment. | R1

BINDER NO. WBNEQ-IZS-004 PLANT WBN UNIT(S) 1 SHEET 20a OF 28 | R1

R 1 R

BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981

COMPUTED WCG DATE 6/25/86 2-22-89

CHECKED NAP DATE 6/27/86 JDH 2-22-89

K.2 REQUIRED OPERATING ENVIRONMENT - LOWER COMPARTMENT

Reference Environmental Drawing No. 47E235-42 | R1

(1) Normal Max

(a) Temperature (°F) 120

(b) Pressure (psig) 0.3

(c) Humidity (%) 80

(d) Radiation (rd) 2×10^7

(2) Abnormal Max

(a) Temperature (°F) 130

(b) Pressure (psig) 0.3

(c) Humidity (%) 100

(d) Radiation (rd) NA | R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist up to eight hours per excursion and will occur less than 1 percent of the plant life (effect on qualified life is negligible - (See generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F) 327 Accident type LOCA/HELB

(b) Pressure (psig) 10.9 Accident type LOCA/HELB

(c) Humidity (%) 100 Accident type LOCA/HELB

(d) Radiation (rd) 4.7×10^8 beta 4×10^7 gamma Accident type LOCA | R1

(e) Spray Type * Accident type LOCA/HELB

*0.19 molar H_3BO_3 (2000 ppm Boron), 0.033 molar NaOH resulting in a pH of 8.3 at 25°C. The duration of the containment spray is 30 days, at a flow rate equal to 9500 gal/min. or 0.92 gpm per square foot of containment. | R1

BINDER NO. WBNEQ-IZS-004 PLANT WBN	UNIT(S) 1	SHEET 20b OF 28	R 3 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 8/20/86 JDH 10/3/90	
	CHECKED NAP	DATE 8/20/86 CNL 10/16/90	

K.3 REQUIRED OPERATING ENVIRONMENT - ANNULUS

Reference Environmental Drawing No. 47E235-44

(1) Normal Max		(2) Abnormal Max	
(a) Temperature (°F)	110	(a) Temperature (°F)	120
(b) Pressure (psig)	ATM(-)	(b) Pressure (psig)	ATM(-)
(c) Humidity (%)	80	(c) Humidity (%)	90
(d) Radiation (rd)	$1x10^6$	(d) Radiation (rd)	NA

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist up to eight hours per excursion and will occur less than 1 percent of the plant life (effect on qualified life is negligible - (See generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	133.7	Accident type LOCA/HELB	R3
(b) Pressure (psig)	ATM(-)	Accident type NA	
(c) Humidity (%)	61	Accident type LOCA/HELB	R3
(d) Radiation (rd)	$*1.2x10^7$	Accident type LOCA	
(e) Spray Type	NA	Accident type NA	

*Includes beta dose of $6x10^5$ rads.

BINDER NO. WBNEQ-IZS-004 PLANT WBN	UNIT(S) 1 SHEET 20c OF 28 |R1	R 1 R	
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFUACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981	COMPUTED WCG	DATE 6/25/86 [handwritten initials] 2-22-89	
	CHECKED NAP	DATE 6/27/86 JOH 2-22-89	

K.4 REQUIRED OPERATING ENVIRONMENT - IIR

Reference Environmental Drawing No. 47E235-45 |R1

(1) Normal Max

(a) Temperature (°F) 75

(b) Pressure (psig) 0.3

(c) Humidity (%) 60

(d) Radiation (rd) 3.5×10^5

(2) Abnormal Max.

(a) Temperature (°F) 120

(b) Pressure (psig) 0.3

(c) Humidity (%) 90

(d) Radiation (rd) NA |R1

(3) Process Interfaces: None

(4) State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist up to eight hours per excursion and will occur less than 1 percent of the plant life (effect on qualified life is negligible - (See generic position in Binder No. WBNEQ-GEN-001).

(5) Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

(a) Temperature (°F)	327	Accident type LOCA/HELB	
(b) Pressure (psig)	10.9	Accident type LOCA/HELB	|R1
(c) Humidity (%)	100	Accident type LOCA/HELB	
(d) Radiation (rd)	4.7×10^8 beta, 1×10^7 gamma	Accident type LOCA	|R1
(e) Spray Type	*	Accident type LOCA/HELB	

*0.19 molar H_3BO_3 (2000 ppm Boron), 0.033 molar NaOH resulting in a pH of 8.3 at 25°C. The duration of the containment spray is 30 days, at a flow rate equal to 9500 gal/min. or 0.92 gpm per square foot of containment.

BINDER NO. WBNEQ-IZS-004 PLANT WBN UNIT(S) 1 SHEET 20d OF 28
R 3 R

BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981

COMPUTED WCG DATE 8/14/86 JDH 9/25/90

CHECKED NAP DATE 8/15/86 CAT 10/14/90

K. REQUIRED OPERATING ENVIRONMENT (Continued) R3

Comments (duration/peak/profile/spray composition and pH, margin, etc.): None

(6) Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (Yes/No/NA)? Yes (Reference:

See Tab G R3

(7) Subject to submergence (Yes/No/NA)? No (Reference:

TAB C, Section 1).

Identify initiation time and duration of submergence: NA

(8) Is the equipment subject to a beta radiation contribution to the total accident dose (Yes/No/NA)? Yes
(Reference: See Section P, 2.0 (12)(b), page B-35, B-36, R3

B-37 and B-38

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify:

See Section P, 2.0 (12)(b), page B-35, B-36 & B-37 and B-38 R3

(9) Special environmental calculations (temp., rad., etc.)

Type	RIMS No.
See TAB B, Section A	

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L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS

(1) Comparison of worst-case maximum parameters:

Parameter	Specified	Demonstrated	Reference
Operating Time	100 days	30 days+	TAB D-1, p D-11 & P D-41 thru D-46
Temperature (°F)	327	356	TAB D-1, p D-42
Pressure (psig)	12.3	83 ***	TAB D-1, p D-41 thru D-46
Relative Humidity (%)	100	100	TAB D-1, p D-41 thru D-46
Chemical Spray*	See TAB C, p C-71 & C-72	See TAB C, p C-71 & C-72	See TAB C, p C-71 & C-72
Radiation (rd)**	5.12×10^7 beta 6×10^7 gamma	2.04×10^8 gamma	TAB D-1, p D-15
Submergence	NA	NA	TAB C, p C-3

*Includes spray concentration, flowrate, density, duration, and pH.

**Enter 40-year integrated normal dose plus integrated accident dose and specify type. (Reference also p. B-36 of this TAB.) |R2

***7 PSI subtracted from peak pressure of 90 psig due to test instrument miscalibration (Appendix E).

(2) Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference
Temperature	Yes	TAB C, Section 2
Pressure	Yes	See L(1)
Relative Humidity	Yes	See L(1)
Chemical Spray	Yes	TAB C, pages C-71 & C-72
Submergence	NA	TAB C, page C-3

JUSTIFICATION/COMMENTS +Justification for long term operability (30 days vs. 100 days) is given in TAB C, Section 2.

BINDER NO. WBNEQ-IZS-004	PLANT WBN	UNIT(S) 1	SHEET 22 OF 28
			R 2 R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN 2-20-78 AND 10-1-81	COMPUTED WCG	DATE 6/27/86 WCG 6-6-90	
	CHECKED NAP	DATE 6/27/86 CAH 6/8/90	

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

(3) Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? (Note margin applied, Yes/No/NA).

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA	
Temperature: +15 degrees F	+29 F	Yes	
Pressure: +10% but no more than 10 psig	+574% 70.7 psig	Yes	
Radiation: +10% of accident dose	155% 9.3×10^7	Yes	R2
Time: +10% (or 1 hour + operating time per NUREG-0588)	TAB C, Section 2	Yes	
Voltage: ±10% of rated value	NA	NA	
Frequency: ± 5% of rated value	NA	NA	
Environmental Transient: the initial transient and the peak temperature applied twice	2 Dwells	Yes	
Vibration: +10% added to acceleration	217% See Comment	Yes	

JUSTIFICATION/COMMENTS Per TVA Standard Specification SS-E18-12.01 - Seismic Requirements for Category I Electrical and I&C Equipment - these limit switches should be tested to 3 g's horizontal and 2 g's vertical. Since NAMCO verified in their test report (page 5) that cross-coupling was not significant, the single axis test performed in each of the 3 axes to 9.52 g's was more than adequate.

BINDER NO. WBNEO-IZS-004 PLANT WBN UNIT(S) 1 SHEET 23 OF 28

R 1 R

BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981

COMPUTED WCG DATE 6/25/86 [initials] 2-22-89

CHECKED NAP DATE 6/27/86 JDH 2-22-89

M. OPERABILITY TEST RESULTS

(1) Identify the safety function(s) of this equipment:
(Reference: See TAB A).

JUSTIFICATION/COMMENTS None

(2) Did the equipment perform its intended function during the simulated design basis accident exposure (Yes/No/NA)? Yes
(Reference: TAB D-1, pages D-39 and D-40). |R1

JUSTIFICATION/COMMENTS None

(3) Did the equipment perform its intended function during the simulated post-design basis accident exposure (Yes/No/NA)? Yes (Reference: TAB D-1, pages D-39 and D-40). |R1

JUSTIFICATION/COMMENTS None

(4) Did the test demonstrate the operability requirements for the required time interval for which the equipment is required to operate (Yes/No/NA)? Yes (Reference: See TAB C, Section 2).

JUSTIFICATION/COMMENTS None

BINDER NO. WBNEQ-IZS-004 PLANT WBN UNIT(S) 1 SHEET 23a OF 28
R_____ R_____

BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEB. 20, 1978 AND OCT. 1, 1981

COMPUTED /R1 [illegible] DATE 2-22-89

CHECKED /R1 JDH DATE 2-22-89

M. OPERABILITY TEST RESULTS (Continued)

(5) Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved (Yes/No/NA)? Yes
(Reference: See TAB C, Pages C-100 and C-101).

JUSTIFICATION/COMMENTS See TAB C, Pages C-100 and C-101

BINDER NO. WBNEQ-IZS-004	PLANT WBN	UNIT(S) 1		SHEET 24		OF 28	
				R		R	
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEBRUARY 20, 1978 AND OCTOBER 1, 1981	COMPUTED wcr	DATE 5-22-86					
	CHECKED nap	DATE 6/27/86					

N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (yes/no/NA)? Yes (Enter all requirements in Section G of the Binder - Qualification Maintenance Data Sheets).

JUSTIFICATION/COMMENTS See QMDS - TAB G.

BINDER NO. WBNEQ-IZS-004	PLANT WBN	UNIT(S) 1		SHEET 25	OF 28		
				R	R		
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEBRUARY 20, 1978 AND OCTOBER 1, 1981	COMPUTED WCR		DATE 6/25/86				
	CHECKED RLP		DATE 6/27/86				

O. SUMMARY OF REVIEW

	Yes/No/NA
(1) Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	Yes
(2) Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	NA
(3) Choice of qualification methodology adequately justified?	Yes
(4) If analysis was performed, complete the following:	
(a) Were equipment performance requirements identified?	NA
(b) Were specific features and failure modes and effects analyzed?	NA
(c) Were assumptions and mathematical models used together with appropriate justification for their use?	Yes TAB C, Section 6
(d) Were environmental parameters which affect equipment performance identified?	Yes-See TAB C, Section 6
(5) Adequate similarity between equipment and test specimen established?	Yes
(6) Aging degradation evaluated adequately?	Yes TAB C, Section 6
(a) Mechanical and/or cycle aging addressed?	Yes
(b) Equipment aged to end of life condition prior to application of DBE conditions?	NA-See Section P(4)
(c) Absence of preaging in test/analysis justified?	Yes-See Section P(4)
(d) Materials susceptible to thermal/radiation aging identified?	Yes-See TAB C, Section 6

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0. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(e) Normally operating state of device (e.g., normally energized) considered?	Yes-See Section P(3)
(7) Qualified life or replacement schedule established?	Yes
(8) Criteria regarding temperature/pressure exposure satisfied?	Yes
(a) Peak temperature adequate	Yes
(b) Peak pressure adequate	Yes
(c) Duration adequate	Yes
(d) Required profile enveloped adequately	Yes
(e) Steam exposure adequate	Yes
(9) Criteria regarding test sequence satisfied?	Yes
(10) Criteria regarding spray satisfied?	Yes
(a) Was the spray testing done while under the extremes of pressure and temperature?	Yes
(b) Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant?	Yes-See TAB C, Section 5
(11) Criteria regarding submergence satisfied?	NA
(12) Criteria regarding radiation satisfied?	Yes
(a) Was dose rate considered?	Yes
(b) Was beta radiation considered?	Yes-See Section P(2)
(13) Criteria regarding operability status/mode satisfied?	Yes
(14) Criteria regarding test failures or anomalies satisfied?	Yes

BINDER NO. WBNEQ-IZS-004	PLANT WBN	UNIT(S) 1	SHEET 27 OF 28			R	R
BINDER TITLE NAMCO EA740 LIMIT SWITCHES MANUFACTURED BETWEEN FEBRUARY 20, 1978 AND OCTOBER 1, 1981		COMPUTED WCM	DATE 6/26/86				
		CHECKED MP	DATE 6/27/86				

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(15) Criteria regarding functional testing satisfied?	Yes
(a) Does the test plan/report specify an acceptance criteria for equipment performed?	Yes
(b) Was an initial base line test done to establish required performance characteristics?	Yes
(c) Has the test/analysis demonstrated that performance performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	Yes
(16) Criteria regarding instrument accuracy satisfied?	NA
(17) Test duration margin (1 hour + function time) satisfied?	Yes-See TAB C, Section 2
(a) Is the minimum specified operating time at least 1 hour?	Yes
(b) If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	NA
(18) Criteria regarding synergistic effects satisfied?	Yes-See TAB C, Section 16
(19) Criteria regarding margins satisfied?	Yes
(20) Maintenance and surveillance requirements adequately identified.	Yes

P. DISCUSSION

1. Aging - Section H(7)(b)

This device was subjected to 100,000 actuation cycles during mechanical aging testing. This is equivalent to an average of 208 actuations per month or approximately 7 actuations per day over the 40 year life of the plant. This is judged to be in excess of the full open/close actuation cylces the associated valves will be required

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P. DISCUSSION (continued)

to operate for normal plant operation, | R2
surveillance, and maintenance. Therefore the mechanical aging performed is adequate to demonstrate qualification over the forty year life of the plant. | R2

2.0(12)(B)-Per TVA Drawings 47E235-41,42,44 and 45, the attenuated free field post-LOCA beta radiation dose contribution for inside primary containment is 4.7 x 10^{8} rads. The limit switch internals will not, however, be subject to the unattenuated free field beta dose. The switch housing assembly consists of three rectangular parts; the Brownite alloy housing body (a corrosion resistant bronze casting alloy) and top and bottom stainless steel covers which are tightly bolted to the body. The minimum thickness is 1/8". Silicone rubber gaskets 0.030" thick are compressed between the housing and top and bottom covers at 20-inch pounds, creating a completely sealed unit that is water, oil, dust, and pressure tight, meeting NEMA type 1, 4, and 13 requirements. Also, all limit switches inside primary containment include a qualified seal. Therefore, all beta radiation sources

P. DISCUSSION

will be external to the housing and subject to dose attenuation due to the housing. The beta dose to the switch internals will essentially be attenuated completely by a factor of 0.009 due to the minimum metal thickness (reference TVA Calculation No. WBNTSR-051 TAB C, Section 15 - which is conservative for the bronze alloy housing). The gap created by the gasket is sufficiently small to allow only a negligible fraction of the unattenuated 4-pi geometry free field dose to penetrate. However, as a conservatism to account for the gap (without taking credit for attenuation due to the silicone gasket), 10% of the unattenuated free field dose is added to the dose attenuated by the metal housing. Therefore, the 100-day beta dose to the switch internals is conservatively estimated to be: 10% attenuated contribution = $0.10\ (4.7 \times 10^8) = 4.7 \times 10^7$. 100% attenuated contribution = $0.009\ (4.7 \times 10^8) = 4.23 \times 10^6$. Total = 5.12×10^7 rads beta. Additionally, the silicone gaskets themselves are not a concern. They receive significant geometric shielding due to being tightly compressed between the metal housing parts. Based on the switch geometry, the outer gasket material R2

P. DISCUSSION (Continued)

will be exposed to only a fraction of the unattenuated 4-pi geometry free field beta radiation dose. This unattenuated dose would be further reduced due to the angle of incidence into the narrow gap and attenuation due to the outer gasket material resulting in minimal dose to the innermost gasket material. The gasket width is approximately equal to the housing thickness (1/8 inch). Also, Target Rock Corp. has conducted tests on a similar silicone rubber gasket used in a similar application (reference EQ Binder WBNEQ-SOL-001, Section D, Page D-29) and found that after exposure to 185 megarads of gamma radiaiton, embrittlement had occurred in the excess gasket material extending beyond the mated parts. The gasket material actually trapped between the mated parts was still flexible. Likewise, in our application, the gaskets would not be a concern even should they become brittle due to their being tightly sandwiched between the housing and housing covers in a static application; especially considering that the outer part of the gasket (least important) would exhibit the more significant degradation.

The limit switches also contain EPDM O-rings used for

P. DISCUSSION

screw gaskets and the operating shaft seal. These O-rings are enclosed by the metal screws and shaft housing which shields them from the effects of beta radiation. In conclusion: The total combined Beta and Gamma radiation dose will equal 9.12×10^7 rads TID (5.12×10^7 Beta + 4.0×10^7 Gamma) for accident conditions. The accident radiation plus the large lower compartment 40-year dose of 2.0×10^7 rads equal a total radiation dose of 1.11×10^8 rads TID. These switches | R2 were tested to 2.04×10^8 rads which envelops our plant requirements. Therefore, they are qualified for our worst case Gamma and Beta radiation dose. | R2

3. O(6)(e)-This device operates intermittently at relatively low voltages and currents which will not result in a significant heat rise.

4. O(6)(b)&(c)-This equipment is being qualified to NUREG-0588, Category II and therefore does not have to be aged to an end-of-life condition prior to DBE testing. The qualified life was determined by evaluating the potential for significant thermal aging degradation of the non-metallic materials of construction (See TAB C, Section 6).

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R ____ R ____

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COMPUTED JDH DATE 4/6/90

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IZS-005

TAB A

NOTES

1. No TAB A is provided because the equipment is not installed. TAB A will be added as a binder revision after notification via EQIR that the equipment has been installed.

2. See Page B-~~1~~ 2 JDH 4/16/90 WCA 4/20/90 for source of Category and Operating Time assignments.

WBEP-0272Q

BINDER NO. WBNEQ-IZS-005	PLANT WBN	UNIT(S) 1	SHEET ___ OF ___
			R ___ R ___
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED AFTER DECEMBER 1986	COMPUTED JDH	DATE 4/20/90	
	CHECKED WCJ	DATE 4/20/90	

A. DOCUMENTATION (See note at the end of this section)

Equipment Description: Limit Switch

Vendor/Manufacturer: NAMCO Controls

Equipment Model No.(s): See TAB A

QUALIFICATION REPORTS

*1. Title/Number/Revision Generic Qualification of EA180 Series Limit Switches/NAMCO Controls Test Report No. QTR155/Revision 0 — RIMS B26 900320 902 — DATE Oct. 5, 1987

2. Title/Number/Revision Test Plan for the Generic Qualification of Series EA180 and EA740 Switches/ NAMCO Controls Test Plan No. QTP215/Revision 2 — RIMS B74 890818 501 — DATE Feb. 18, 1987

OTHER (ANALYSIS, VENDOR DATA, ETC.)

3. TVA Environmental Drawing 47E235-41 R1 and DCA P-04104-01-0

4. TVA Environmental Drawing 47E235-42 R2 and DCA P-04104-02-0, -03-0, -02-1, -05-0

5. TVA Environmental Drawing 47E235-44 R1

6. TVA Environmental Drawing 47E235-45 R1 and DCA P-04104-06-0

7. TVA Environmental Drawing 47E235-76 R3

8. TVA Environmental Drawing 47E235-77 R1

9. TVA Environmental Drawing 47E235-78 R3

10. WBNTSR-051 R0 (B26 891129 202), Reduction of Beta Dose by Sheet Steel.

11. WBNNAL3-031 R1 (B45 880826 235), EGTS Room 100 Day LOCA Dose.

12. WBNTSR-018 R0 (B26 891106 203), Dose Grid Around the EGTS Filter Train.

13. WBNTSR-016 R0 (B26 890703 552), Location Specific Radiation Doses to Limit Switches in EGTS Room A16 Elevation 757.

*All references herein are to NAMCO Report QTR 155 unless otherwise stated.

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OTHER (ANALYSIS, VENDOR DATA, ETC.)

CATEGORY AND OPERATING TIMES	RIMS NUMBER
14. System 3 (WBNOSG4-005 R10)	B26 900314 202
15. System 30 (WBNOSG4-008 R15)	B26 900309 231
16. System 31 (WBNOSG4-009 R7)	B26 900309 233
17. System 62 (WBNOSG4-013 R12)	B26 900327 200
18. System 63 (WBNOSG4-014 R11)	B26 900309 227
19. System 65 (WBNOSG4-015 R10)	B26 900309 226
20. Material Aging Calculation-WAC-~~258~~ 392 JDH 4/16/90	B44 900403 801 JDH 4/16/90

NOTE: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. This listing includes only those documents which are essential to qualification and accordingly should not be considered a complete listing of binder references.

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B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified

___ Equipment Satisfies All Requirements Except Qualified Life or Justification of Replacement Schedule

___ Equipment Qualification Not Established by Documentation

___ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES

COMMENTS/RECOMMENDATIONS

JDH 5/3/90 WCJ 5/3/90 THE DCNs REFERENCED IN THE REVISION LOG WERE REVIEWED TO DETERMINE LIMIT SWITCH ID, CATEGORY AND OPERATING TIMES, LOCATION, AND ELEVATION.

C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate Which Criteria is Applicable):

__X__ Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE 323-1974).

______ Components are Qualified to the Criteria of NUREG-0588 Category II

JUSTIFICATION/COMMENTS

None

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

IEEE Standard 323-1974
IEEE Standard 344-1975
IEEE Standard 382-1972 (Pressurized Water Reactor portion only)

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D. QUALIFICATION METHODOLOGY (Check only one block)

X Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

X Test of Similar Items with Supporting Analysis

___ Analysis in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

___ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS

This test provides generic group qualification for Model EA180 Series limit switches. The Model EA180-11302 selected for test purposes is identical to some of the equipment qualified by this binder. TAB C.2 contains a similarity evaluation which addresses the remainder of the equipment.

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E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification report identical to the plant equipment which requires qualification (yes/no/NA)? Yes

	Plant Device	Qualification Document	Reference
1. Equipment Type	Limit Switches	Limit Switch	TAB D p. 3-1
2. Manufacturer	NAMCO Controls	NAMCO Controls	TAB D p. 3-1
3. Model number(s)	See TAB A	EA180-11302	TAB D p. 3-7
4. Serial Number(s)	See Comment	3179/383	TAB D p 3-9,3-10
5. Identify Component-Unique checksheet attached:	NA		

JUSTIFICATION/COMMENTS

These limit switches do not have serial numbers but are provided with date codes per the manufacturer's date code system described on page 10-12 of the test report. (See TAB D.)

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F. INSTALLATION INTERFACES

List all interfaces pertinent to EQ identified in the qualification documentation and/or evaluation and reference the source. Is the interface a requirement for our application (yes/no/NA)? (note below). If yes, enter requirement in QMDS; If No, provide justification.

Interface	Identify Interface	Plant Requirement (Yes/No)	Reference Test Report
Mounting Bolts	~~See Comment (1)~~	~~Yes~~	~~TAB D p. 5-16~~ 4/24/90 JDH WCJ 4/25/90
External Process Connections	NA	No	NA
Electrical Connections	NA	No	NA
Conduit Seals	See Comment (2)	Yes	TAB D p. 4-5, 4-6
Connector Seals	NA	No	NA
Orientation	NA	No	NA
Physical Configuration	NA	No	NA
Other	See Comment (3)	Yes	TAB D p. 4-6

JUSTIFICATION/COMMENTS

4/24/90 JDH ~~(1) For standard side mounting, use two 5/16-18 bolts. For long or wide mounting use four 1/4-20 bolts. All bolts must be grade 2 (minimum). Torque to 80-85 inch pounds (minimum).~~

WCJ 4/25/90 1 (~~2~~) For installation instructions refer to EA189 90008 on page 11-9 of QTR155. The conduit entrance must be sealed in such a way as to maintain the switch integrity under required service conditions (see TAB G).

2 (~~3~~) Although it was not considered part of the qualification test, an operating lever is required for proper operation of the switch. The lever and roller shall be of metallic construction. Nylon rollers are not acceptable and are controlled through TVA's maintenance program (see TAB G).

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G. TEST SEQUENCE

1. Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE-323 (74), paragraph 6.3.2 (yes/no/NA)? (note below)

	Yes/No/NA	Reference
a. Equipment inspected for damage	Yes	TAB D pp. 3-5, 8-6
b. Baseline performance measurements taken	Yes	TAB D p. 8-12
c. Equipment aged:		
Thermal	Yes	TAB D pp. 6-2, 8-17
Radiation	Yes	TAB D pp. 6-1, 8-31
Wear	Yes	TAB D 6-1, 8-25
d. Vibration/seismic testing conducted	Yes	TAB D p. 8-41
e. Design basis event (DBE) exposure	Yes	TAB D p. 8-50
f. Post-DBE exposure	Yes	TAB D p. 8-50
g. Final inspection and disassembly	Yes	TAB D p. 8-64

3. Was the same piece of equipment used throughout the test sequence described in item 1 above (yes/no/NA)? Yes

4. Have the test equipment, test equipment accuracies and calibration data been appropriately documented (yes/no/NA)? Yes, See Comment (Reference QTR155, Sect. 8 & p. 15-8).

JUSTIFICATION/COMMENTS

The test equipment documentation is provided on the "Instrumentation Equipment Sheets" located throughout Section 8 of QTR155.

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H. AGING

1. Was aging considered in the qualification program (Yes/no/NA)? Yes (Reference TAB D, p. 6-1).

JUSTIFICATION/COMMENTS

None

2. Were the following effects considered in the aging program:

Aging Effect	Yes/No/NA	Reference
Thermal aging	Yes	TAB D p. 6-2
Radiation exposure	Yes	TAB D p. 6-1
Vibration (non-seismic) aging	Yes	TAB D p. 6-1
Operational (electrical/mechanical/process) stress aging	Yes	TAB D p. 6-1

JUSTIFICATION/COMMENTS

None

3. Were all known synergistic effects which are believed to have a significant effect on equipment performance considered in the aging program (yes/no/NA)? NA (Reference TAB D, p. 7-4).

JUSTIFICATION/COMMENTS

No known synergistic effects.

4. Thermal Aging:

a. Was thermal aging considered in the qualification program (yes/no/NA)? Yes (Reference TAB D, p. 6-2, 8-17).

JUSTIFICATION/COMMENTS

None

H. AGING (Continued)

b. Were the materials susceptible to thermal aging degradation identified in the qualification program (yes/no/NA)? Yes (Reference TAB D, p. 6-7).

JUSTIFICATION/COMMENTS

None

c. Was the basis for thermal aging identified in the qualification program (yes/no/NA)? Yes (Reference TAB D, p. 6-4).

JUSTIFICATION/COMMENTS

None

d. Was the aging acceleration rate justified and the parameters of time and temperature identified in the qualification program (yes/no/NA)? Yes (Reference TAB D, p. 6-12).

Parameter	Plant Maximum Normal	Test	Equivalent
Temperature	130°F (54.4°C)	248°F	130°F (54.4°C)
Time	40 years	837 hrs	10.8 years

JUSTIFICATION/COMMENTS

The qualified life of all switches can be extended to 40 years through periodic refurbishment (See TAB G for refurbishment schedules).

e. Was the Arrhenius methodology used for accelerated aging (yes/no/NA)? Yes (Reference TAB D, p. 6-2).

JUSTIFICATION/COMMENTS

None

f. If activation energies were used for determining accelerated aging parameters, are they properly referenced to the source of the technical data (yes/no/NA)? Yes (Reference TAB D, pp. 6-7, 6-8).

JUSTIFICATION/COMMENTS

None

H. AGING (Continued)

g. If a regression line was used for determining accelerated aging parameters, are test points or failure modes identified on the line (yes/no/NA)? NA (Reference NA).

JUSTIFICATION/COMMENTS

None

h. Was the equipment operated during the thermal aging (yes/no/NA)? Yes (Reference TAB D, p. 8-17).

JUSTIFICATION/COMMENTS

None

5. Radiation Aging Exposure:

a. Was radiation aging exposure considered in the qualification program (yes/no/NA)? Yes (Reference TAB D, p. 8-31).

JUSTIFICATION/COMMENTS

None

b. Were the materials susceptible to radiation degradation identified in the qualification program (yes/no/NA)? Yes (Reference TAB D, p 6-7).

JUSTIFICATION/COMMENTS

Assembled test specimen irradiated to 220 Megarads.

c. Was the basis for radiation aging exposure identified in the qualification program (yes/no/NA)? Yes (Reference TAB D, p. 5-7).

JUSTIFICATION/COMMENTS

None

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H. AGING (Continued)

d. Is the radiation test exposure dose and dose rate acceptable (yes/no/NA)? Yes (Reference TAB D, pp. 8-33, 8-34).

Plant normal ambient radiation dose (rd)	2.0×10^{7} (worst case)
Test exposure dose (rd)	2.2×10^{8}
Test exposure dose rate (rd/hr)	7.73×10^{5}
Test exposure source type (e.g., Co-60 gamma)	Co-60 gamma

JUSTIFICATION/COMMENTS

None

6. Vibration (non-seismic) Aging:

a. Were the effects of non-seismic vibration induced during normal and abnormal operation addressed in the qualification program (1)? Yes (Reference TAB D, pp. 8-41, 8-42).

JUSTIFICATION/COMMENTS

Plant induced vibration simulation 1×10^{6} cycles @ 100 Hz and 0.75 g's per QTR155, pp. 8-41 and 8-42.

b. Was the basis for vibration aging identified and justified in the qualification program (yes/no/NA)? Yes (Reference TAB D, pp. 5-9).

JUSTIFICATION/COMMENTS

None

7. Operational Stress Aging:

a. Were the effects of electrical, mechanical, and process operational stresses induced during normal and abnormal operation addressed in the qualification program (yes/no/NA)? Yes (Reference TAB D, pp 5-13 and ~~35~~ 8-25).
JDH 5/3/90 WCS 5-3-90

JUSTIFICATION/COMMENTS

None

(1) Qualification program refers to the test report and any supplemental documentation including TVA analyses in TAB C of the binder.

H. AGING (Continued)

b. Was the basis for stresses induced during operational aging identified and justified in the qualification program (yes/no/NA)? Yes (Reference TAB D, p. 8-3).

JUSTIFICATION/COMMENTS

See section P.1 for additional discussion.

8. Was the qualified life of the equipment and its basis defined in the qualification program (yes/no/NA)? Yes, See TAB C.4. (Reference TAB D, p. 6-1).

Qualified life (Document in QMDS): 40 years*

JUSTIFICATION/COMMENTS

*Through periodic refurbishment as defined in TAB G.

9. Were replacement intervals for the equipment or its components defined in the qualification program (yes/no/NA)? Yes (Reference TAB D, p. 6-11, 11-14).

JUSTIFICATION/COMMENTS

None

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I. MATERIALS ANALYSIS

Identification of Materials Susceptible to Significant Thermal and/or Radiation Degradation and Aging (Use Section C of Binder for Detailed Materials Analysis)

	Material/Property/Function	Radiation Threshold	Reference	Activation Energy	Reference
a.	Synthetic Hydrocarbon Grease/Lubricant	NA	NA	1.19 eV	TAB D p. 6-7
b.	Silicone Rubber/Gaskets	NA	NA	1.14eV, See Comment	TAB D p. 6-7
c.	EPDM/O-Rings	NA	NA	.94eV, See Comment	TAB D p. 6-7
d.	Glass-filled Phenolic RX865 Contact Carrier and Block	NA	NA	.827eV, See Comment	TAB D p. 6-7
e.	RTV/Thread Sealant	NA	NA	.63eV, See Comment	TAB D p. 6-7

JUSTIFICATION/COMMENTS

See the Materials Analysis discussion in TAB C.4 for justification of activation energies shown for listed materials.

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J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS

1. Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics which would constitute failure if not met (yes/no/NA)? Yes (Reference QTP215, p. 7-1).

   Identify Acceptance Criteria: QTP215, p. 7-1

2. Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment which should be verified before, after, and periodically during the test to judge equipment performance (yes/no/NA)? Yes (Reference QTP215, p. 7-1).

   Identify baseline and functional testing: QTP215, p. 7-1

   JUSTIFICATION/COMMENTS

   None

3. Does the qualification report/analysis describe loads (or load combinations) applied during DBE test (yes/no/NA)? Yes (Reference TAB D, p. 7-7).

   JUSTIFICATION/COMMENTS

   None

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J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

4. Do the applied loads during baseline testing reflect normal operating conditions (yes/no/NA)? Yes (Reference TAB D, p. 5-5, 5-6).

JUSTIFICATION/COMMENTS

None

5. Identify electrical characteristics necessary to ensure the equipment performance specifications can be satisfied.

a.

Parameter	Plant Normal Condition	Reference
Voltage	125 VDC (1)	Contract (See TAB E)
Load	5 Amps (1)	Contract (See TAB E)
Frequency	NA	NA
Accuracy	NA	NA
Other(s)		
	NA	NA
	NA	NA

JUSTIFICATION/COMMENTS

See comment (1) at end of section.

BINDER NO. WBNEQ-IZS-005	PLANT WBN	UNIT(S) 1	SHEET ____ OF ____ R ____ R ____
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J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

5. (Continued)

5. b.

Parameter	Specific Accident Conditions	Reference
Voltage	125 VDC (1)	Contract (See TAB E)
Load	5 Amps (1)	Contract (See TAB E)
Frequency	NA	NA
Accuracy	NA	NA
Other(s)		
	NA	NA
	NA	

JUSTIFICATION/COMMENTS

See comment (1) at end of section.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

5. (Continued)

c. Parameter	Demonstrated Conditions	Reference
Voltage	125 VDC (2)	TAB D p. 5-6
Load	0.5A (2)	TAB D p. 5-6
Frequency	NA	NA
Accuracy	NA	NA
Other(s)		
Insulation Resistance (Minimum)	280 Megohms (3)	TAB D p. 7-3
Circuit Opening/ Contact Bounce (During Seismic/ Vibration Test)	See Comment (4)	TAB D p. 7-2

JUSTIFICATION/COMMENTS

(1) The typical application of these limit switches is in control circuits. for example solenoid valves. The U.L. and nameplate ... ıd 5 ... :s under

Revise per below.

1. THE TYPICAL APPLICATION OF THESE LIMIT SWITCHES IS IN THE CONTROL CIRCUITS OF, FOR EXAMPLE, SOLENOID OPERATED VALVES

(2 ...

ı/oxide and therefore, provide little contact surface renewal.

(b) When switches are operated at rated voltage and current, the contact surfaces tend to be self-cleaning and/or the potential of the circuit is sufficient to break down films or oxides that might form on the contact faces.

J. EQUIPMENT ELECTRICAL CHARACTERISTICS NECESSARY TO ENSURE THE PERFORMANCE SPECIFICATIONS CAN BE SATISFIED UNDER ACCIDENT CONDITIONS (Continued)

5. (Continued)

(c) Since TVA's standard design practices prevent circuits from exceeding the U.L. ratings of contacts, the 100VDC and 0.086 Amp load used for testing is conservative and adequate considering items a and b above.

(3) At the demonstrated insulation resistance value of 280 Megohms, there would be a slight leakage current of approximately 0.446 microamps for a typical 125V circuit. This small leakage current should not provide enough amperage to cause any adverse circuit operation.

(4) While there are no plant specific requirements with regard to contact bounce/circuit opening, it was demonstrated that none occurred during seismic and vibration testing of the limit switch.

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K.1 REQUIRED OPERATING ENVIRONMENT

Reference Environmental Drawing No. 47E235-41 (Upper Compartment)

1. Normal Max
   - a. Temperature (°F) 110
   - b. Pressure (psig) 0.3
   - c. Humidity (%) 80
   - d. Radiation (rd) 1×10^6

2. Abnormal Max
   - a. Temperature (°F) 120
   - b. Pressure (psig) 0.3
   - c. Humidity (%) 90
   - d. Radiation (rd) NA

3. Process Interfaces: None

4. State anticipated occurrence frequency and duration of abnormal conditions:

   Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life. ~~(Effect on qualified life is negligible.)~~ (See generic position in Binder No. WBNEQ-GEN-001). 4/24/90 JDH WCS 4/25/90

5. Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

a.	Temperature (°F)	161	Accident type LOCA/HELB
b.	Pressure (psig)	11.2	Accident type LOCA/HELB
c.	Humidity (%)	100	Accident type LOCA/HELB
d.	Radiation (rd)	*4.7×10^8 beta 3.8×10^7 gamma	Accident type LOCA
e.	Spray Type	**	Accident type LOCA/HELB

* Refer to TAB C.6 for justification regarding acceptability of beta radiation.

** 0.19 molar H_3BO_3 (2000 PPM Boron), 0.033 molar NaOH resulting in a pH of 8.3 at 25°C. Spray duration is 30 days, at a flow rate equal to 0.92 GPM per square foot of containment cross section.

K.2 REQUIRED OPERATING ENVIRONMENT (Continued)

Reference Environmental Drawing No. 47E235-42 (Lower Compartment)

1. Normal Max
   a. Temperature (°F) 120
   b. Pressure (psig) 0.3
   c. Humidity (%) 80
   d. Radiation (rd) 2×10^7

2. Abnormal Max
   a. Temperature (°F) 130
   b. Pressure (psig) 0.3
   c. Humidity (%) 100
   d. Radiation (rd) NA

3. Process Interfaces: None.

4. State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life. ~~(Effect on qualified life is negligible.~~ (See generic position in Binder No. WBNEQ-GEN-001.) 4/24/90 JDH WCP 4/25/90

5. Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):
   a. Temperature (°F) 327 Accident Type LOCA/HELB
   b. Pressure (psig) 11.2 Accident Type LOCA/HELB
   c. Humidity (%) 100 Accident Type LOCA/HELB
   d. Radiation (rd) *4.7×10^8 beta, 4×10^7 gamma Accident Type LOCA
   e. Spray Type ** Accident Type LOCA/HELB

* Refer to TAB C.6 for justification regarding acceptability of beta radiation.

** 0.19 molar H_3BO_3 (2000 PPM Boron), 0.033 molar NaOH resulting in a pH of 8.3 at 25°C. Spray duration is 30 days, at a flow rate equal to 0.92 GPM per square foot of containment cross section.

K.3 REQUIRED OPERATING ENVIRONMENT (Continued)

Reference Environmental Drawing No. 47E235-44 (Annulus)

1. Normal Max
   a. Temperature (°F) 110
   b. Pressure (psig) ATM(-)
   c. Humidity (%) 80
   d. Radiation (rd) $1x10^{6}$

2. Abnormal Max
   a. Temperature (°F) 120
   b. Pressure (psig) ATM(-)
   c. Humidity (%) 90
   d. Radiation (rd) NA

3. Process Interfaces: None.

4. State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1% of the plant life. ~~(Effect on qualified life is negligible.~~ (See generic position in Binder No. WBNEQ-GEN-001.) 4/24/90 JDH WCJ 4/25/90

5. Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

a. Temperature (°F)	133.7	Accident Type	LOCA/HELB
b. Pressure (psig)	ATM(-)	Accident Type	LOCA/HELB
c. Humidity (%)	61	Accident Type	LOCA/HELB
d. Radiation (rd)	* 1.2×10^{7} ~~gamma~~ ~~6×10^{5} beta~~ JDH 5/3/90 WCJ 5-3-90	Accident Type	LOCA
e. Spray Type	NA	Accident Type	NA

JDH 5/3/90
* THIS DOSE INCLUDES A BETA CONTRIBUTION OF 6×10^{5} RADS.

BINDER NO. WBNEQ-IZS-005	PLANT WBN	UNIT(S) 1	SHEET ___ OF ___
			R ___ R ___
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED AFTER DECEMBER 1986	COMPUTED JDH	DATE 4/16/90	
	CHECKED WCR	DATE 4/20/90	

K.4 REQUIRED OPERATING ENVIRONMENT (Continued)

Reference Environmental Drawing No.: 47E235-45 (Instrument Room)

1. Normal Max
   a. Temperature (°F) 75
   b. Pressure (psig) 0.3
   c. Humidity (%) 60
   d. Radiation (rd) 3.5×10^{5}

2. Abnormal Max
   a. Temperature (°F) 120
   b. Pressure (psig) 0.3
   c. Humidity (%) 90
   d. Radiation (rd) NA

3. Process Interfaces: None

4. State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1 percent of the plant life. ~~(Effect on qualified life is negligible.~~ (See generic position in binder No. WBNEQ-GEN-001). 4/24/90 JDH WCR 4/25/90

5. Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

a. Temperature (°F)	327	Accident type	LOCA/HELB
b. Pressure (psig)	11.2	Accident type	LOCA/HELB
c. Humidity (%)	100	Accident type	LOCA/HELB
d. Radiation (rd)	*4.7×10^8 beta 1.0×10^7 gamma	Accident type	LOCA
e. Spray Type	**	Accident type	LOCA

* Refer to TAB C.6 for justification regarding acceptability of beta radiation.

** 0.19 molar H_3BO_3 (2000 PPM Boron), 0.033 molar NaOH resulting in a pH of 8.3 at 25°C. Spray duration is 30 days, at a flow rate equal to 0.92 GPM per square foot of containment cross section.

BINDER NO. WBNEQ-IZS-005	PLANT WBN	UNIT(S) 1	SHEET ___ OF ___ R ___ R ___
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED AFTER DECEMBER 1986	COMPUTED JDH	DATE 4/16/90	
	CHECKED WCJ	DATE 4/20/90	

K.5 REQUIRED OPERATING ENVIRONMENT (Continued)

Reference Environmental Drawing No.: 47E235-76 (North and South Valve Rooms)

1. Normal Max
   a. Temperature (°F) 130
   b. Pressure (psig) ATM(-)
   c. Humidity (%) 50
   d. Radiation (rd) 1.8×10^3

2. Abnormal Max
   a. Temperature (°F) 140
   b. Pressure (psig) ATM
   c. Humidity (%) 100
   d. Radiation (rd) NA

3. Process Interfaces: None

4. State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1 percent of the plant life. ~~(Effect on qualified life is negligible.~~ (See generic position in binder No. WBNEQ-GEN-001). 4/24/90 JDH WCJ 4/25/90

5. Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):

a. Temperature (°F)	325 north 323 south	Accident type FW
b. Pressure (psig)	8.77 north 10.78 south	Accident type FW
c. Humidity (%)	100	Accident type FW
d. Radiation (rd)	$<1 \times 10^4$	Accident type LOCA
e. Spray Type	NA	Accident type NA

WBEP-0272Q

K.6 REQUIRED OPERATING ENVIRONMENT: (Continued)

Reference Environmental Drawing No.: 47E235-77 (RHR Valve Rooms)

1. Normal Max
   a. Temperature (°F) 104
   b. Pressure (psig) ATM
   c. Humidity (%) 80
   d. Radiation (rd) 1.8×10^{6}

2. Abnormal Max
   a. Temperature (°F) 110
   b. Pressure (psig) ATM
   c. Humidity (%) 90
   d. Radiation (rd) NA

3. Process Interfaces: None

4. State anticipated occurrence frequency and duration of abnormal conditions: Abnormal conditions could exist for up to eight hours per excursion and will occur less than 1 percent of the plant life. ~~(Effect on qualified life is negligible.~~ (See generic position in binder No. WBNEQ-GEN-001). 4/24/90 JDH WCJ 4/25/90

5. Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):
   a. Temperature (°F) 190 Accident type LOCA
   b. Pressure (psig) ATM Accident type LOCA
   c. Humidity (%) 90 Accident type LOCA
   d. Radiation (rd) 1×10^{7} Accident type LOCA
   e. Spray Type NA Accident type NA

BINDER NO. WBNEQ-IZS-005	PLANT WBN	UNIT(S) 1	SHEET ___ OF ___ R___ R___
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED AFTER DECEMBER 1986	COMPUTED JDH	DATE 4/16/90	
	CHECKED WCJr	DATE 4/20/90	

K.7 REQUIRED OPERATING ENVIRONMENT (Continued)

Reference Environmental Drawing No.: 47E235-78 (EGTS Room)

1. Normal Max
   a. Temperature (°F) 104
   b. Pressure (psig) ATM
   c. Humidity (%) 80
   d. Radiation (rd) 1.8×10^3

2. Abnormal Max
   a. Temperature (°F) 110
   b. Pressure (psig) ATM
   c. Humidity (%) 90
   d. Radiation (rd) NA

3. Process Interfaces: None

4. State anticipated occurrence frequency and duration of abnormal conditions: Maximum and minimum abnormal temperatures could exist for up to eight hours per excursion and will occur less than 1 percent of the plant life. Maximum abnormal temperatures could exist for up to 10 hours "per month during" 4 months of the year because of the EGTS units being operated for testing and maintenance.

5. Accident (worst case for any combination of specified accident parameter including peak, duration, and profile):
   a. Temperature (°F) 110 Accident type LOCA
   b. Pressure (psig) NA Accident type NA
   c. Humidity (%) NA Accident type NA
   d. Radiation (rd) 1.06×10^7* Accident type LOCA
   e. Spray Type NA Accident type NA

*Worst case per WBNTSR-016 calculation.

BINDER NO. WBNEQ-IZS-005	PLANT WBN	UNIT(S) 1	SHEET ____ OF ____ R ____ R ____
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED AFTER DECEMBER 1986	COMPUTED JDH	DATE 4/20/90	
	CHECKED WCN	DATE 4/20/90	

K. REQUIRED OPERATING ENVIRONMENT (Continued)

Comments (duration/peak/profile/spray composition and pH, margin, etc.):

For a cross-reference of equipment to environmental drawing, see TAB G.

6. Is the equipment subject to moisture or liquid intrusion which can affect the performance of the equipment under design basis accident conditions (yes/no/NA)? Yes (Reference ~~TAB G,~~ SECTION P(3) JDH 5/3/90 WCN 5/3/90 47E235-41, -42, -45, and -76).

7. Subject to submergence (yes/no/NA)? No (Reference ____________).

Identify initiation time and duration of submergence:

8. Is the equipment subject to a beta radiation contribution to the total accident dose (yes/no/NA)? Yes (Reference 47E235-41, -42, -45 .)

If yes, identify the fraction of the unattenuated free field beta dose to be added to the total dose and justify: See TAB C-6 .

9. Special environmental calculations (temp., rad., etc.)

Type	RIMS No.
See TAB B, Section A	

BINDER NO. WBNEQ-IZS-005	PLANT WBN	UNIT(S) 1	SHEET ___ OF ___				
			R ___ R ___				
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED AFTER DECEMBER 1986	COMPUTED JDH	DATE 4/6/90					
	CHECKED WCJ	DATE 4/20/90					

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS

1. Comparison of worst-case maximum parameters:

Parameter	Specified	Demonstrated	Reference
Operating Time	100 days	30 days	TAB D, p. 8-53
Temperature (°F)	327	342***	TAB D, p. 8-54
Pressure (psig)	11.2	76.4	TAB D, p. 7-6
Relative Humidity (%)	100	100	TAB D, p. 7-6
* Chemical Spray	TAB C.1	TAB C.1	TAB D, p. 7-7
** Radiation (rd)	1.11×10^8 gamma plus beta	2.2×10^8 gamma	TAB D, p. 7-6
Submergence	NA	NA	NA

* Includes spray concentration, flowrate, density, duration, and pH.
** Enter 40-year integrated normal dose plus integrated accident dose and specify type. Refer to TAB C.6 for beta dose contribution.
*** See TAB B, Section P.2

2. Comparison of worst-case profiles and margin assessment:

Parameter	Test Profile Envelopes Specified (Yes/No/NA)	Reference
Temperature	Yes	See L(1)
Pressure	Yes	See L(1)
Relative Humidity	Yes	See L(1)
Chemical Spray	Yes	TAB C-1
Submergence	NA	NA

JUSTIFICATION/COMMENTS

See TAB C-3 for demonstration of 100 day operability (Accident Degradation Equivalency Calculation).

L. SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS (Continued)

3. Were margins applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for: (Note margin applied, yes/no/NA)

Suggested Margins per IEEE-323(74)	Margin Applied	Yes/No/NA
Temperature: +15 degrees F	15°F	Yes
Pressure: +10% but no more than 10 psig	10%	Yes
Radiation: +10% of accident dose	10%	Yes
Time: +10% (or 1 hour + operating time per NUREG-0588)	TAB C-3	TAB C-3
Voltage: ±10% of rated value	NA	NA
Frequency: ±5% of rated value	NA	NA
Environmental Transient: the initial transient and the peak temperature applied twice	2 Dwells	Yes
Vibration: ±10% added to acceleration	10% See Comments	Yes

JUSTIFICATION/COMMENTS

Per TVA Standard Specification SS-E18.12.01, Seismic Requirements for Category I Electrical and I&C Equipment, these limit switches should be tested to 3 g's horizontal and 2 g's vertical. Since NAMCO verified in their report (TAB D, p. 5-9 and 5-10) that cross coupling was not significant, the single axis test performed in each of the 3 axes to 10 g's was more than adequate.

BINDER NO. WBNEQ-IZS-005 PLANT WBN UNIT(S) 1	SHEET ___ OF ___	R ___	R ___
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED AFTER DECEMBER 1986	COMPUTED JDH	DATE 4/6/90	
	CHECKED WCJ	DATE 4/20/90	

M. OPERABILITY TEST RESULTS

1. Identify the safety function(s) of this equipment:
   (Reference See TAB A).

   JUSTIFICATION/COMMENTS

   None

2. Did the equipment perform its intended function during the simulated design basis accident exposure (yes/no/NA)? Yes
   (Reference TAB D, p. 7-1).

   JUSTIFICATION/COMMENTS

   None

3. Did the equipment perform its intended function during the simulated post-design basis accident exposure (yes/no/NA)? Yes (Reference TAB D, p. 7-1).

   JUSTIFICATION/COMMENTS

   None

4. Did the test demonstrate the operability requirements for the required time interval for which the equipment is required to operate (yes/no/NA)? Yes
   (Reference TAB D, p. 7-7).

   JUSTIFICATION/COMMENTS

   See TAB C.3 for discussion

5. Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved (yes/no/NA)? Yes (Reference TAB D, p. 8-52).

   JUSTIFICATION/COMMENTS

   None

N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (yes/no/NA)? Yes (Enter all requirements in Section G of the Binder - Qualification Maintenance Data Sheets).

JUSTIFICATION/COMMENTS

See QMDS-TAB G

BINDER NO. WBNEQ-IZS-005	PLANT WBN	UNIT(S) 1	SHEET ___ OF ___				
				R___	R___		
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED AFTER DECEMBER 1986	COMPUTED JDH	DATE 4/6/90					
	CHECKED WCJ	DATE 4/20/90					

0. SUMMARY OF REVIEW

	Yes/No/NA
1. Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	Yes
2. Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	NA
3. Choice of qualification methodology adequately justified?	Yes
4. If analysis was performed, complete the following:	
a. Were equipment performance requirements identified?	NA
b. Were specific features and failure modes and effects analyzed?	NA
c. Were assumptions and mathematical models used together with appropriate justification for their use?	NA
d. Were environmental parameters which affect equipment performance identified?	NA
5. Adequate similarity between equipment and test specimen established?	Yes
6. Aging degradation evaluated adequately?	Yes
a. Mechanical and/or cycle aging addressed?	Yes
b. Equipment aged to end of life condition prior to application of DBE conditions?	Yes
c. Absence of preaging in test/analysis justified?	NA
d. Materials susceptible to thermal/radiation aging identified?	Yes

0. SUMMARY OF REVIEW (Continued) — Yes/No/NA

e. Normally operating state of device (e.g., normally energized) considered? — Yes

7. Qualified life or replacement schedule established? — Yes

8. Criteria regarding temperature/pressure exposure satisfied? — Yes

a. Peak temperature adequate — Yes

b. Peak pressure adequate — Yes

c. Duration adequate — Yes

d. Required profile enveloped adequately — Yes

e. Steam exposure adequate — Yes

9. Criteria regarding test sequence satisfied? — Yes

10. Criteria regarding spray satisfied? — Yes

a. Was the spray testing done while under the extremes of pressure and temperature? — Yes

b. Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant? — Yes

11. Criteria regarding submergence satisfied? — Yes

12. Criteria regarding radiation satisfied? — Yes

a. Was dose rate considered? — Yes

b. Was beta radiation considered? — Yes

13. Criteria regarding operability status/mode satisfied? — Yes

14. Criteria regarding test failures or anomalies satisfied? — Yes

BINDER NO. WBNEQ-IZS-005	PLANT WBN	UNIT(S) 1	SHEET ___ OF ___ R___ R___
BINDER TITLE EA 180 SERIES LIMIT SWITCHES MANUFACTURED AFTER DECEMBER 1986	COMPUTED JDH	DATE 4/6/90	
	CHECKED WCJ	DATE 4/20/90	

O. SUMMARY OF REVIEW (Continued)

		Yes/No/NA
15.	Criteria regarding functional testing satisfied?	Yes
a.	Does the test plan/report specify an acceptance criteria for equipment performed?	Yes
b.	Was an initial base line test done to establish required performance characteristics?	Yes
c.	Has the test/analysis demonstrated that performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	Yes
16.	Criteria regarding instrument accuracy satisfied?	NA
17.	Test duration margin (1 hour + function time) satisfied?	Yes
a.	Is the minimum specified operating time at least 1 hour?	Yes
b.	If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	NA
18.	Criteria regarding synergistic effects satisfied?	Yes
19.	Criteria regarding margins satisfied?	Yes
20.	Maintenance and surveillance requirements adequately identified?	Yes

P. DISCUSSION

(1) AGING - Section H.7.b - This device was subject to 100,300 actuation cycles during mechanical aging testing. This is equivalent to an average of 209 actuations per month or approximately 7 actuations per day over the 40 year life of the plant. This is judged to be in excess of the full open/close actuation cycles the associated valves will be required to operate for normal plant operation, maintenance, and surveillance. Therefore, the mechanical aging performed is adequate to demonstrate qualification over the 40 year life of the plant.

P. DISCUSSION (Continued)

(2) SUMMARY COMPARISON OF TEST CONDITIONS TO SPECIFIED CONDITIONS - Section L.1 - QTR 155 states that the peak temperature in the test chamber was 361°F (p. 7-6). Two thermocouples were used to measure temperatures during the test. The 361°F was measured by the thermocouple, TC-13, that was closest to the steam inlet (p. 8-61). For qualification purposes, this binder has used the more conservative temperatures measured by thermocouple TC-06.

JDH 5/3/90 WCA 5/3/90

(3) REQUIRED OPERATING ENVIRONMENT - SECTION K.6 - SEE PAGES G-2 THRU G-6. FOR LIST OF LIMIT SWITCHES WHICH REQUIRE CONDUIT SEALS DUE TO MOISTURE INTRUSION.

BINDER NO. WBNEQ-JBOX-001	PLANT WBN	UNIT(S) 1	SHEET 1 OF 1
			R 1 R 4
[BIN]DER TITLE JUNCTION BOXES	COMPUTED JLH	DATE 6/16/86 CAG 3/24/89	WCJ 9-25-90
	CHECKED ETD	DATE 6/16/86 JAW 4/26/89	CRH 9/26/90

JBOX-001

TAB A COMPLILATION METHODOLOGY

1. The Watts Bar Environmental Qualification binder WBNEQ-JBOX-001 equipment list (TAB A) was compiled by utilizing the DNE calculation WBPEVAR 8601003 as a baseline reference document. This calculation listed all of the Class 1E junction boxes and local instrumentation panels in the harsh environment. All end devices (devices whose circuits terminate in the junction box) were listed for each JB. A crosscheck of the end devices in each JB was made to the category and operating times calculations and, if any device was determined to be category A or B for any event, the JB was entered into the binder TAB A.

   This process was performed for each revision and QIR to the WBPEVAR 8601003 calculation to ensure a comprehensive assessment of all Class 1E harsh environment JBs.

   WBPEVAR 8601003 R4 dated 5/26/88 is superceded by the Environmental Qualification (EQ) Binders.

2. Elevations shown are actual elevations for equipment located in the reactor building and floor elevations for equipment located outside the reactor building. Actual elevations for all equipment are documented in TAB F.

3. Junction Box number 1-JB-292-3870 contains a MOS varistor. For discussion of this, see TAB C, page C-4. R4

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	--------LOCATION-------- ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -276-L182A -D LOC PNL JUNCTION BOX	1-JB -276-L182A -D BY PNL MFR	183	721' 6"	FN2	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -276-L182B -D LOC PNL JUNCTION BOX	1-JB -276-L182B -D BY PNL MFR	181	721' 6"	FN2	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -276-L183A -E LOC PNL JUNCTION BOX	1-JB -276-L183A -E BY PNL MFR	005	721' 6"	FN1	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -276-L183B -E LOC PNL JUNCTION BOX	1-JB -276-L183B -E BY PNL MFR	002	721' 6"	FN1	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -276-L183C -B LOC PNL JUNCTION BOX	1-JB -276-L183C -B BY PNL MFR	359	721' 6"	FN1	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -276-L196 LOC PNL JUNCTION BOX	-D	1-JB -276-L196 BY PNL MFR	-D		713'	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -276-L197 LOC PNL JUNCTION BOX	-E	1-JB -276-L197 BY PNL MFR	-E		713'	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -276-L216 LOC PNL JUNCTION BOX	-A	1-JB -276-L216 BY PNL MFR	-A		713'	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -276-L217 LOC PNL JUNCTION BOX	-A	1-JB -276-L217 BY PNL MFR	-A		737'	A05	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0004 JUNCTION BOX	-A	1-JB -292-0004 JXA	-A		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	RLF 2-23-90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-2-JB -292-0006 JUNCTION BOX	-B	2-JB -292-0006 JXA	-B		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-0228 JUNCTION BOX	-A	0-JB -292-0228 JQE	-A		729' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-0229 JUNCTION BOX	-B	0-JB -292-0229 JQE	-B		729' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0358 JUNCTION BOX	-B	1-JB -292-0358 JXA	-B		692' VARIOUS	A12	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0359 JUNCTION BOX	-B	1-JB -292-0359 JXA	-B		692' VARIOUS	A13	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCM 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	AZMITH	ELEV(1) CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
		--------LOCATION--------						
WBN-1-JB -292-0530 -B JUNCTION BOX	1-JB -292-0530 -B JVF		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0540 -A JUNCTION BOX	1-JB -292-0540 -A JVE		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0567 -A JUNCTION BOX	1-JB -292-0567 -A JFD		676' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0569 -B JUNCTION BOX	1-JB -292-0569 -B JFD		676' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0593 -A JUNCTION BOX	1-JB -292-0593 -A JQE		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CMG 9-20-89	WCP 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2.23.90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-0748 -B JUNCTION BOX	1-JB -292-0748 -B JXA		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0772 -B JUNCTION BOX	1-JB -292-0772 -B JFD		676' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0773 -A JUNCTION BOX	1-JB -292-0773 -A JXA		676' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0846 -B JUNCTION BOX	1-JB -292-0846 -B JVC		692' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-0847 -A JUNCTION BOX	1-JB -292-0847 -A JVC		692' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCM 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

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W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1005 -A JUNCTION BOX	1-JB -292-1005 -A JXA		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1006 -B JUNCTION BOX	1-JB -292-1006 -B JXA		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-1008 -B JUNCTION BOX	2-JB -292-1008 -B JXA		737' VARIOUS	A09	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-1163 -B JUNCTION BOX	0-JB -292-1163 -B JSE		757' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-1164 -A JUNCTION BOX	0-JB -292-1164 -A JSE		757' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2.23.90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1189 JUNCTION BOX	-A	1-JB -292-1189 JYJ	-A		692' VARIOUS	A09	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1190 JUNCTION BOX	-B	1-JB -292-1190 JYJ	-B		692' VARIOUS	A10	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1195 JUNCTION BOX	-A	1-JB -292-1195 JYJ	-A		692' VARIOUS	A13	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R 4
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	WGD 9-19-90
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	RCF 2-23-90	CK 9/26/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1196 -B JUNCTION BOX	1-JB -292-1196 -B JYJ		692' VARIOUS	A12	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1231 -A JUNCTION BOX	1-JB -292-1231 -A JQD		713' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1232 -B JUNCTION BOX	1-JB -292-1232 -B JQD		713' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1235 -A JUNCTION BOX	1-JB -292-1235 -A JXA		713' VARIOUS	A13	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1246 -A JUNCTION BOX	1-JB -292-1246 -A JXB		713' VARIOUS	A13	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CMG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	RF 2-23-90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1352 JUNCTION BOX	-A	1-JB -292-1352 JXD	-A		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1353 JUNCTION BOX	-A	1-JB -292-1353 JXA	-A		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1354 JUNCTION BOX	-B	1-JB -292-1354 JXD	-B		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1355 JUNCTION BOX	-B	1-JB -292-1355 JXA	-B		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1356 JUNCTION BOX	-A	1-JB -292-1356 JXA	-A		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-20-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2.23.90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1357 JUNCTION BOX	-A	1-JB -292-1357 JXA	-A		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1358 JUNCTION BOX	-B	1-JB -292-1358 JXD	-B		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1367 JUNCTION BOX	-A	1-JB -292-1367 JQG	-A		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1368 JUNCTION BOX	-B	1-JB -292-1368 JQH	-B		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1369 JUNCTION BOX	-A	1-JB -292-1369 JQG	-A		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1370 JUNCTION BOX	-A	1-JB -292-1370 JQE	-A		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1371 JUNCTION BOX	-B	1-JB -292-1371 JQE	-B		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1391 JUNCTION BOX	-S	1-JB -292-1391 JVC	-S		692' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

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PREPARER/DATE JLH 9-8-86
CHECKED/DATE ETD 9-10-86

R 2	R 3	R 4
CAG 9-20-89	WCG 2-22-90	WCJ 9-19-90
WCG 9-25-89	RCF 9-23-90	CXH 9/26/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION	UNIT DEVICE ID NO. MODEL NUMBER	AZMITH	LOCATION ELEV(1) CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1421 -A JUNCTION BOX	1-JB -292-1421 -A JXA		713' VARIOUS	A12	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1422 -B JUNCTION BOX	1-JB -292-1422 -B JXA		713' VARIOUS	A11	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1425 -A JUNCTION BOX	1-JB -292-1425 -A JXA		713' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1426 -B JUNCTION BOX	1-JB -292-1426 -B JXA		713' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1446 -B JUNCTION BOX	1-JB -292-1446 -B JXA		713' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCP 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	RH 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION		UNIT DEVICE ID NO. MODEL NUMBER		AZMITH	LOCATION ELEV(1) CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1447 JUNCTION BOX	-A	1-JB -292-1447 JXA	-A		713' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-1448 JUNCTION BOX	-B	2-JB -292-1448 JXA	-B		713' VARIOUS	A19	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-1449 JUNCTION BOX	-A	2-JB -292-1449 JXA	-A		713' VARIOUS	A19	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1502 JUNCTION BOX	-A	1-JB -292-1502 JXA	-A		713' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-1503 JUNCTION BOX	-A	2-JB -292-1503 JXA	-A		713' VARIOUS	A19	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCP 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	AT 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1504 JUNCTION BOX	-B	1-JB -292-1504 JXA	-B		713' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-1505 JUNCTION BOX	-B	2-JB -292-1505 JXA	-B		713' VARIOUS	A19	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1506 JUNCTION BOX	-A	1-JB -292-1506 JXA	-A		713' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1507 JUNCTION BOX	-B	1-JB -292-1507 JXA	-B		713' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-1508 JUNCTION BOX	-A	2-JB -292-1508 JXA	-A		713' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	NCP 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	AF 2-23-90	

W A T T S   B A R   N U C L E A R   P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-2-JB -292-1509 -B JUNCTION BOX	2-JB -292-1509 -B JXA		713' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1512 -A JUNCTION BOX	1-JB -292-1512 -A JVE		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1514 -A JUNCTION BOX	1-JB -292-1514 -A JVE		729' VARIOUS	A02	B	100D	ALL	COMPONENT PROTECTION ← -1514-A Located in NSVR
WBN-1-JB -292-1516 -B JUNCTION BOX	1-JB -292-1516 -B JVE		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1518 -B JUNCTION BOX	1-JB -292-1518 -B JVC		729' VARIOUS	A02	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-24-89	WCP 2-20-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	AH 2-23-90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1543 -A JUNCTION BOX	1-JB -292-1543 -A JFD		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1544 -B JUNCTION BOX	1-JB -292-1544 -B JFD		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-1547 -A JUNCTION BOX	0-JB -292-1547 -A JXA		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-1548 -B JUNCTION BOX	0-JB -292-1548 -B JXA		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1549 -A JUNCTION BOX	1-JB -292-1549 -A JXA		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCP 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2.23.90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-2-JB -292-1550 JUNCTION BOX	-A	2-JB -292-1550 JXA	-A		737' VARIOUS	A09	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1551 JUNCTION BOX	-B	1-JB -292-1551 JXA	-B		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-1552 JUNCTION BOX	-B	2-JB -292-1552 JXA	-B		737' VARIOUS	A09	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-1553 JUNCTION BOX	-A	2-JB -292-1553 JFD	-A		692' VARIOUS	A25	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-1554 JUNCTION BOX	-B	2-JB -292-1554 JFD	-B		692' VARIOUS	A25	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-2-JB -292-1555 JUNCTION BOX	-A	2-JB -292-1555 JYJ	-A		692' VARIOUS	A25	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-1556 JUNCTION BOX	-B	2-JB -292-1556 JYJ	-B		692' VARIOUS	A25	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1564 JUNCTION BOX	-A	1-JB -292-1564 JXA	-A		692' VARIOUS	A08	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1565 JUNCTION BOX	-B	1-JB -292-1565 JXA	-B		692' VARIOUS	A08	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1566 JUNCTION BOX	-B	1-JB -292-1566 JXA	-B		692' VARIOUS	A08	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-26-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1567 JUNCTION BOX	-A	1-JB -292-1567 JXA	-A		692' VARIOUS	A08	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1598 JUNCTION BOX	-A	1-JB -292-1598 JXA	-A		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1599 JUNCTION BOX	-B	1-JB -292-1599 JXA	-B		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R 4
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	WCD 9-19-90
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	RCF 2-23-90	CKK 9/26/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1933 JUNCTION BOX	-S	1-JB -292-1933 JVH	-S		692' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-1942 JUNCTION BOX	-A	0-JB -292-1942 JXA	-A		757' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-1943 JUNCTION BOX	-B	0-JB -292-1943 JXA	-B		757' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1964 JUNCTION BOX	-B	1-JB -292-1964 JWB	-B		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1966 JUNCTION BOX	-A	1-JB -292-1966 JWB	-A		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCN 2-20-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2.23.90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1968 JUNCTION BOX	-A	1-JB -292-1968 JWH	-A		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1970 JUNCTION BOX	-B	1-JB -292-1970 JWH	-B		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1972 JUNCTION BOX	-B	1-JB -292-1972 JWH	-B		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1974 JUNCTION BOX	-A	1-JB -292-1974 JWH	-A		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1985 JUNCTION BOX	-A	1-JB -292-1985 JVC	-A		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCS 2-22-90	
CHECKED/DATE	ETD 9-8-86	WCG 9-25-89	MF 2.23.90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-1986 JUNCTION BOX	-B	1-JB -292-1986 JVC	-B		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1987 JUNCTION BOX	-B	1-JB -292-1987 JVE	-B		729' VARIOUS	A02	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-1988 JUNCTION BOX	-A	1-JB -292-1988 JVE	-A		729' VARIOUS	A02	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2007 JUNCTION BOX	-B	1-JB -292-2007 JYJ	-B		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2008 JUNCTION BOX	-A	1-JB -292-2008 JYJ	-A		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCM 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-2012 JUNCTION BOX	-B	1-JB -292-2012 JXD	-B		713' VARIOUS	A13	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2013 JUNCTION BOX	-A	1-JB -292-2013 JXD	-A		713' VARIOUS	A13	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2034 JUNCTION BOX	-A	1-JB -292-2034 JQD	-A		713' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-2035 JUNCTION BOX	-B	0-JB -292-2035 JQD	-B		713' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R 4
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	WCP 9-19-90
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	RCF 2-23-90	CKW 9/26/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

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EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER			LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-2063 JUNCTION BOX	-A	1-JB	-292-2063 JXA	-A		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2064 JUNCTION BOX	-B	1-JB	-292-2064 JXA	-B		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2065 JUNCTION BOX	-A	1-JB	-292-2065 JFE	-A		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2066 JUNCTION BOX	-B	1-JB	-292-2066 JFE	-B		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION

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PREPARER/DATE JLH 9-8-86
CHECKED/DATE ETD 9-10-86

R 2	R 3	R 4
CAG 9-20-89	WCG 2-22-90	WCP 9-19-90
WCG 9-25-89	RCF 2-23-90	GSN 9/26/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-2071 JUNCTION BOX	-A	1-JB -292-2071 JXA	-A		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2122 JUNCTION BOX	-A	1-JB -292-2122 JQE	-A		713' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2140 JUNCTION BOX	-A	1-JB -292-2140 JVC	-A		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2141 JUNCTION BOX	-B	1-JB -292-2141 JVC	-B		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2202 JUNCTION BOX	-A	1-JB -292-2202 JXB	-A		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-2204 -A JUNCTION BOX	1-JB -292-2204 -A JXD		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2205 -A JUNCTION BOX	1-JB -292-2205 -A JXD		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2206 -A JUNCTION BOX	1-JB -292-2206 -A JXD		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2207 -A JUNCTION BOX	1-JB -292-2207 -A JQD		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2208 -B JUNCTION BOX	1-JB -292-2208 -B JXD		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCO 2-23-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-2209 -B JUNCTION BOX	1-JB -292-2209 -B JXB		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2211 -B JUNCTION BOX	1-JB -292-2211 -B JQD		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2212 -B JUNCTION BOX	1-JB -292-2212 -B JXD		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2234 -S JUNCTION BOX	1-JB -292-2234 -S JVE		692' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2236 -S JUNCTION BOX	1-JB -292-2236 -S JXD		692' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCA 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	AF 2.23.90	

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W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-2238 -S JUNCTION BOX	1-JB -292-2238 -S JVC		692' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2240 -A JUNCTION BOX	1-JB -292-2240 -A JVA		692' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2242 -S JUNCTION BOX	1-JB -292-2242 -S JVB		692' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2244 -A JUNCTION BOX	1-JB -292-2244 -A JVA		692' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2248 -B JUNCTION BOX	1-JB -292-2248 -B JVA		692' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	NCO 2.22.90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	RT 2.23.90	

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W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH (LOCATION)	ELEV(1) / CONTRACT (LOCATION)	RM/RAD (LOCATION)	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-2249 JUNCTION BOX	-B	1-JB -292-2249 JVA	-B		692' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2252 JUNCTION BOX	-A	1-JB -292-2252 JXA	-A		757' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2257 JUNCTION BOX	-A	1-JB -292-2257 JQE	-A		713' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2260 JUNCTION BOX	-B	1-JB -292-2260 JQE	-B		713' VARIOUS	A06	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2262 JUNCTION BOX	-B	1-JB -292-2262 JXA	-B		757' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-2-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-2265 JUNCTION BOX	-B	1-JB -292-2265 JXD	-B		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2386 JUNCTION BOX	-B	1-JB -292-2386 JXA	-B		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2387 JUNCTION BOX	-A	1-JB -292-2387 JXA	-A		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2388 JUNCTION BOX	-A	1-JB -292-2388 JXA	-A		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-2389 JUNCTION BOX	-A	2-JB -292-2389 JWB	-A		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 4-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 4-25-89	DCF 2-23-90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-2-JB -292-2390 -B JUNCTION BOX	2-JB -292-2390 -B JWB		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-2391 -A JUNCTION BOX	2-JB -292-2391 -A JWB		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2503 -B JUNCTION BOX	1-JB -292-2503 -B JFG		676' VARIOUS	A08	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2504 -A JUNCTION BOX	1-JB -292-2504 -A JFG		676' VARIOUS	A09	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-2507 -B JUNCTION BOX	1-JB -292-2507 -B JFG		676' VARIOUS	A10	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2.23.90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-2508 JUNCTION BOX	-A	1-JB -292-2508 JQE	-A		676' VARIOUS	A11	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-2761 JUNCTION BOX	-B	2-JB -292-2761 JXA	-B		757' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-2-JB -292-2762 JUNCTION BOX	-A	2-JB -292-2762 JXA	-A		757' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-2765 JUNCTION BOX	-A	0-JB -292-2765 JQE	-A		692' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-2766 JUNCTION BOX	-B	0-JB -292-2766 JQE	-B		692' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCS 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	AT 2.23.90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-0-JB -292-2856 JUNCTION BOX	-A	0-JB -292-2856 JXA	-A		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-2894 JUNCTION BOX	-B	0-JB -292-2894 JXA	-B		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-3032 JUNCTION BOX	-B	1-JB -292-3032 JXA	-B		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-3033 JUNCTION BOX	-A	1-JB -292-3033 JXB	-A		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-3208 JUNCTION BOX	-A	1-JB -292-3208 JXA	-A		692' VARIOUS	A07	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCM 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	DT 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-0-JB -292-3213 JUNCTION BOX	-B	0-JB -292-3213 JXA	-B		692' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-3214 JUNCTION BOX	-B	1-JB -292-3214 JXA	-B		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-3215 JUNCTION BOX	-A	0-JB -292-3215 JXA	-A		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-3341 JUNCTION BOX	-B	0-JB -292-3341 JXA	-B		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-0-JB -292-3342 JUNCTION BOX	-A	0-JB -292-3342 JXA	-A		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-3422 -A JUNCTION BOX	1-JB -292-3422 -A JQQ		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-3423 -B JUNCTION BOX	1-JB -292-3423 -B JQQ		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-3424 -A JUNCTION BOX	1-JB -292-3424 -A JVB		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-3425 -A JUNCTION BOX	1-JB -292-3425 -A JVB		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-3426 -B JUNCTION BOX	1-JB -292-3426 -B JVB		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION

		R2	R3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCJ 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-3427 -B JUNCTION BOX	1-JB -292-3427 -B JVB		713' VARIOUS	A28	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-3870 -A JUNCTION BOX	1-JB -292-3870 -A JWH		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION R4
WBN-1-JB -292-4011 -A JUNCTION BOX	1-JB -292-4011 -A JXA		729' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-4013 -A JUNCTION BOX	1-JB -292-4013 -A JXA		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-4015 -B JUNCTION BOX	1-JB -292-4015 -B JXA		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R 4
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	WCG 4-19-90
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	RCF 2-23-90	[illegible] 9/26/90

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-4026 JUNCTION BOX	-B	1-JB -292-4026 JVE	-B		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-4027 JUNCTION BOX	-A	1-JB -292-4027 JVE	-A		737' VARIOUS	A05	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-4166 JUNCTION BOX	-A	1-JB -292-4166 JVE	-A		729' VARIOUS	A04	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-4167 JUNCTION BOX	-B	1-JB -292-4167 JVE	-B		729' VARIOUS	A04	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-4261 JUNCTION BOX	-B	1-JB -292-4261 JXA	-B		713' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WXJ 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	AH 2-23-90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -292-4275 JUNCTION BOX	-A	1-JB -292-4275 JQO	-A		737' VARIOUS	A01	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-4984 JUNCTION BOX	-A	1-JB -292-4984 JQB	-A		757' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -292-4985 JUNCTION BOX	-B	1-JB -292-4985 JQB	-B	321	757' VARIOUS	A16	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0159 JUNCTION BOX	-B	1-JB -293-0159 JVC	-B	341	804' 7" VARIOUS	UC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0368 JUNCTION BOX	-B	1-JB -293-0368 JVC	-B	163	806' VARIOUS	UC	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCP 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-0369 JUNCTION BOX	-A	1-JB -293-0369 JVC	-A	0	706' 7" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0394 JUNCTION BOX	-A	1-JB -293-0394 JVD	-A	045	706' VARIOUS	RW	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0542 JUNCTION BOX	-A	1-JB -293-0542 JVB	-A	234	736' 4" VARIOUS	AC3	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0544 JUNCTION BOX	-A	1-JB -293-0544 JVC	-A	248	754' VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0546 JUNCTION BOX	-B	1-JB -293-0546 JXA	-B	300	724' 5" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCP 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	RG 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
				--------LOCATION--------						
WBN-1-JB -293-0548 JUNCTION BOX	-B	1-JB -293-0548 JQE	-B	248	753'10" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0550 JUNCTION BOX	-A	1-JB -293-0550 JQB	-A	287	792' VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0553 JUNCTION BOX	-A	1-JB -293-0553 JSE	-A	294	744' 6" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0574 JUNCTION BOX	-A	1-JB -293-0574 JVB	-A	013	734' 9" VARIOUS	FN1	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0578 JUNCTION BOX	-B	1-JB -293-0578 JVB	-B	349	730' 5" VARIOUS	FN1	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCJ 2-23-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-0596 JUNCTION BOX	-B	1-JB -293-0596 JVC	-B	346	706' 7" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0656 JUNCTION BOX	-A	1-JB -293-0656 JVC	-A	132	731' 7" VARIOUS	AC2	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0691 JUNCTION BOX	-A	1-JB -293-0691 JVB	-A	213	706' VARIOUS	RW	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0724 JUNCTION BOX	-B	1-JB -293-0724 JQE	-B	059	748' 6" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0745 JUNCTION BOX	-A	1-JB -293-0745 JVC	-A	199	805' 8" VARIOUS	UC	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-0760 JUNCTION BOX	-B	1-JB -293-0760 JVC	-B	115	731' 4" VARIOUS	IIR	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0762 JUNCTION BOX	-A	1-JB -293-0762 JQE	-A	105	751' 6" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0764 JUNCTION BOX	-A	1-JB -293-0764 JVC	-A	060	740' 2" VARIOUS	IIR	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0766 JUNCTION BOX	-B	1-JB -293-0766 JVJ	-B	291	745' VARIOUS	AC4	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0768 JUNCTION BOX	-A	1-JB -293-0768 JQG	-A	297	731' 4" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-2-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER			LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-0775 JUNCTION BOX	-A	1-JB -293-0775 JVB		-A	035	720' 4" VARIOUS	AC1	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0788 JUNCTION BOX	-A	1-JB -293-0788 JQG		-A	287	727' 9" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0792 JUNCTION BOX	-B	1-JB -293-0792 JVD		-B	285	722' VARIOUS	AC4	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-0795 JUNCTION BOX	-A	1-JB -293-0795 JXA		-A	283	728'10" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1034 JUNCTION BOX	-A	1-JB -293-1034 JQD		-A	006	835' 9" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCJ 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	RT 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-1036 -B JUNCTION BOX	1-JB -293-1036 -B JQD	357	835' 9" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1255 -A JUNCTION BOX	1-JB -293-1255 -A JQE	028	727'10" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1277 -A JUNCTION BOX	1-JB -293-1277 -A JXA	311	804'10" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1283 -B JUNCTION BOX	1-JB -293-1283 -B JXA	317	804'10" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1285 -B JUNCTION BOX	1-JB -293-1285 -B JXA	319	804'10" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

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WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-1287 JUNCTION BOX	-A	1-JB -293-1287 JXA	-A	313	804'10" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1576 JUNCTION BOX	-A	1-JB -293-1576 JVC	-A	100	787' VARIOUS	PRS	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1736 JUNCTION BOX	-B	1-JB -293-1736 JVB	-B	304	738' 6" VARIOUS	AC4	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1738 JUNCTION BOX	-B	1-JB -293-1738 JVC	-B	285	720' VARIOUS	AC4	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1750 JUNCTION BOX	-A	1-JB -293-1750 JVC	-A	308	724'10" VARIOUS	AC4	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-1758 -B JUNCTION BOX	1-JB -293-1758 -B FIELD	280	719'10" VARIOUS	AC4	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1764 -B JUNCTION BOX	1-JB -293-1764 -B JVC	285	719'11" VARIOUS	AC4	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1883 -B JUNCTION BOX	1-JB -293-1883 -B JXA	165	727'11" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1885 -A JUNCTION BOX	1-JB -293-1885 -A JXA	191	727'11" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1887 -A JUNCTION BOX	1-JB -293-1887 -A JXA	007	725' 3" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCA 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	ACT 2-20-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION	UNIT DEVICE ID NO. / MODEL NUMBER	LOCATION AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-1889 -B JUNCTION BOX	1-JB -293-1889 -B JXA	350	728' 2" VARIOUS	ANN	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-1921 -A JUNCTION BOX	1-JB -293-1921 -A JVB	297	718' 1" VARIOUS	AC4	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-2649 -A JUNCTION BOX	1-JB -293-2649 -A JVC		805' 7" VARIOUS	UC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-3193 -B JUNCTION BOX	1-JB -293-3193 -B JVD		784'10" VARIOUS	UC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-3201 -B JUNCTION BOX	1-JB -293-3201 -B JVB	288	720' 3" VARIOUS	AC4	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCG 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		AZMITH	LOCATION ELEV(1) / CONTRACT	LOCATION RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-3203 / JUNCTION BOX	-A	1-JB -293-3203 / JVB	-A	235	721' 2" / VARIOUS	AC3	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-3317 / JUNCTION BOX	-B	1-JB -293-3317 / JVB	-B	280	732'11" / VARIOUS	AC4	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4326 / JUNCTION BOX	-D	1-JB -293-4326 / JVB	-D	030	720' 5" / VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4328 / JUNCTION BOX	-D	1-JB -293-4328 / JVB	-D	050	721'11" / VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4330 / JUNCTION BOX	-E	1-JB -293-4330 / JVB	-E	150	721' / VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCR 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	AT 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-4332 JUNCTION BOX	-E	1-JB -293-4332 JVB	-E	135	721' 3" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4334 JUNCTION BOX	-F	1-JB -293-4334 JVB	-F	224	723' 7" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4336 JUNCTION BOX	-F	1-JB -293-4336 JVB	-F	229	720' 8" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4338 JUNCTION BOX	-G	1-JB -293-4338 JVB	-G	333	720' 9" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4340 JUNCTION BOX	-G	1-JB -293-4340 JVB	-G	315	717' 1" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WGD 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	QJ 2-23-90	

W A T T S B A R N U C L E A R P L A N T
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER / DESCRIPTION		UNIT DEVICE ID NO. / MODEL NUMBER		LOCATION: AZMITH	LOCATION: ELEV(1) / CONTRACT	LOCATION: RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-4342 JUNCTION BOX	-D	1-JB -293-4342 JVA	-D	030	720'10" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4344 JUNCTION BOX	-D	1-JB -293-4344 JVA	-D	068	719' 7" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4346 JUNCTION BOX	-D	1-JB -293-4346 JVA	-D	148	720' 4" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4348 JUNCTION BOX	-D	1-JB -293-4348 JVA	-D	117	719' 4" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4350 JUNCTION BOX	-E	1-JB -293-4350 JVA	-E	185	716' 9" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION

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		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WGM 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

WATTS BAR NUCLEAR PLANT
TAB A - EQUIPMENT IDENTIFICATION MATRIX

EQIS NUMBER DESCRIPTION		UNIT DEVICE ID NO. MODEL NUMBER		---LOCATION--- AZMITH	ELEV(1) CONTRACT	RM/RAD	CAT (2)	OPER TIME	EVENT	SAFETY FUNCTION
WBN-1-JB -293-4352 JUNCTION BOX	-E	1-JB -293-4352 JVA	-E	240	716' 4" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4354 JUNCTION BOX	-E	1-JB -293-4354 JVA	-E	340	720' 9" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION
WBN-1-JB -293-4356 JUNCTION BOX	-E	1-JB -293-4356 JVA	-E	300	716' 4" VARIOUS	LC	B	100D	ALL	COMPONENT PROTECTION

		R 2	R 3	R
PREPARER/DATE	JLH 9-8-86	CAG 9-20-89	WCA 2-22-90	
CHECKED/DATE	ETD 9-10-86	WCG 9-25-89	[illegible] 2-23-90	

BINDER NO. WBNEQ-JBOX-001 PLANT WBN UNIT(S) 1 SHEET B1 OF B11

R 1 R

BINDER TITLE JUNCTION BOXES COMPUTED JLH DATE 9/10/86 4-21-89

CHECKED ETD DATE 9/15/86 4-27-89

A. DOCUMENTATION

Equipment Description: Junction Boxes

Vendor/Manufacturer: Various*

Equipment Model No.(s): See Binder TAB E for a list of mark numbers used at WBN

QUALIFICATION REPORTS

(1) Title/Number/Revision Wyle Test Report No. 17733-1, RB, "Nuclear Environmental Qualification Test Program On Terminal Blocks & Cables for TVA" RIMS B43 860514 501 DATE 3/19/86

(2) Title/Number/Revision Calc WBPEVAR8601003, R4 Watts Bar Plant Class 1E Junction Boxes and local instrument panel list (Harsh Environment) RIMS B26 880527 030 DATE 5/26/88 R1

OTHER (ANALYSIS, VENDOR DATA, ETC.)

*Comment - The Junction Boxes were purchased on various contracts. They are static, passive devices which only serve to provide a mounting location and a certain degree of protection for other components and devices, therefore contractural documentation is not included.

PLUSEQ/135.25

BINDER NO. WBNEQ-JBOX-001	PLANT WBN	UNIT(S) 1	SHEET B1a OF B11 R 1 R
BINDER TITLE JUNCTION BOXES	COMPUTED JLH	DATE 9/10/86	ELH 4-27-89
	CHECKED ETD	DATE 9/15/86	JW 4-27-89

A. DOCUMENTATION

OTHER (ANALYSIS, VENDOR DATA, ETC.) (Continued) R1

3. Memorandum, M. L. Rayfield to P. D. Metcalf, August 21, 1986; Watts Bar Nuclear Plant - Engineering Report (ER) for Significant Conditin Report (SCR) WBNEQP 8632 (RIMS No. B26 860821 005).

4. Environmental Dwgs 47E235-41 R1, -42 R2 & -76 R3.

Note: Documents listed above are used throughout this binder for equipment qualification. The revision levels and Records & Information Management System (RIMS) numbers, as listed above, need not be repeated in other sections of the binder. R1
This listing includes only those documents which are essential to qualification and accordingly should not be considered a complete listing of binder references.

BINDER NO. WBNEQ-JBOX-001	PLANT WBN	UNIT(S) 1	SHEET B2 OF B11 R 1 R 3				
BINDER TITLE JUNCTION BOXES	COMPUTED JLH	DATE 6/13/86 CAG 4/11/89	WCP 2/22/90				
	CHECKED ETD	DATE 6/13/86 JAW 4/26/89	2-23-90				

B. CONCLUSION OF REVIEW (Check only one block)

X Equipment Qualified *

___ Equipment Satisfies All Requirements Except Qualified Life or Justification of Replacement Schedule

___ Equipment Qualification Not Established by Documentation

___ Equipment Not Qualified Based on Test Failures

OPEN ITEMS AND QUALIFICATION DEFICIENCIES * The conclusion of equipment qualified is conditional depending upon resolution of the technical issues listed (see front of binder).

Open Item No.	Punchlist Item No.	
1	JBOX-001-009	
2	JBOX-001-002	
3	JBOX-001-003	
4	JBOX-001-004	R3
6	JBOX-001-001	
9	JBOX-001-007	
10	JBOX-001-008	
~~11~~	~~JBOX-001-016~~ WCP 2/22/90	~~R3~~

COMMENTS/RECOMMENDATIONS The size and type of Junction Boxes used is determined by electrical design requirements. Any junction box manufactured to applicable industry standards (NEMA, UL, ANSI) will meet the WBN Normal/Accident environment. Junction boxes used as pull boxes or splice boxes are not included in TAB A.

BINDER NO. WBNEQ-JBOX-001	PLANT WBN	UNIT(S) 1	SHEET ___ OF ___				
			R 1	R			
BINDER TITLE JUNCTION BOXES	COMPUTED JLH	DATE 9/15/86	JLH 4-26-89				
	CHECKED ETD	DATE 9/15/86	JTW 4-26-89				

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Page B-4 was deleted per revision 1 .

BINDER NO. WBNEQ-JBOX-001	PLANT WBN	UNIT(S) 1	SHEET B3 OF B11
BINDER TITLE JUNCTION BOXES	COMPUTED JLH	DATE 9/10/86	R R
	CHECKED E.T.D.	DATE 9-11-86	

C. QUALIFICATION CRITERIA

Criteria Used to Demonstrate Qualification is in Accordance with the Following (Indicate Which Criteria is Applicable):

__X__ Components are Qualified to the Criteria of 10CFR50.49 and/or NUREG-0588 Category I (IEEE323-1974)

_____ Components are Qualified to the Criteria of NUREG-0588 Category II or the DOR Guidelines of IE Bulletin No. 79-01B (IEEE323-1971) (DOR Guidelines Applicable to only BFN)

JUSTIFICATION/COMMENTS Criteria and requirements as set forth in 10CFR50.49 and 10CFR50 App. A have been met through the box manufacturer's adherence to recognized industry standards and this binder's utilization of qualification methods as outlined in IEEE 323-1974.

INDICATE OTHER REGULATORY DOCUMENTS AND/OR INDUSTRY STANDARDS MET

NEMA STD 250

ANSI/UL 50

JIC EMP-1/EGP-1-1967

BINDER NO. WBNEQ-JBOX-001 PLANT WBN UNIT(S) 1 SHEET B4 OF B11

BINDER TITLE JUNCTION BOXES COMPUTED JLH DATE 5/15/86 R ___ R ___

CHECKED ETW DATE 5/15/86

D. QUALIFICATION METHODOLOGY (Check only one block)

____ Test of Identical Item Under Identical Conditions or Under Similar Conditions with Supporting Analysis

____ Test of Similar Items with Supporting Analysis

X Analysis in Combination with Partial Type Test Data that Supports the Analytical Assumptions and Conclusions

____ Experience with Identical or Similar Equipment Under Similar Conditions with Supporting Analysis

JUSTIFICATION/COMMENTS IEEE 323-1974 states that: "Qualification May Be Accomplished in Several Ways; Type Testing, Operating Experience, or Analysis." The method used for qualifying junction boxes at WBN relies heavily on analysis with some supporting type test data from qualification testing of other equipment housed in junction boxes during testing. See WYLE Laboratories Test Report 17733-1 in TAB D, portions of which support the analysis presented in TAB C. TAB C presents a quantitative analysis (where pertinent) in addition to a qualitative analysis of the junction boxes which affirms that the performance/functional requirements of the junction boxes (based on applicable industry standards - NEMA 250, ANSI/UL 50, etc.) are met when the boxes are subjected to the WBN normal/accident service conditions and accident environments. Full consideration of the time dependent effects of environmental influences was taken in establishing the qualified life of the WBN junction boxes.

E. EQUIPMENT DESCRIPTION

Is the equipment identified in the qualification documentation identical to the plant equipment which requires qualification (Yes/No/NA)? ______ |R1

	Plant Device	Qualification Document	Reference
(1) Equipment Type	Junction Boxes (Various Types and Sizes)	NEMA 12 Junction Box (12½"x10"x8")	17733-1 Section X Para 3.2.1
(2) Manufacturer	Various	Various	
(3) Model Number(s)	See TAB E	N/A	N/A
(4) Serial Number(s)	N/A	N/A	N/A

(5) Identify Component-Unique checksheet attached: N/A

JUSTIFICATION/COMMENTS The basic structure and function of junction boxes are similar regardless of variations in size and NEMA types/features. The type box used in the WYLE Laboratories Test is representative of those boxes used at WBN.

BINDER NO. WBNEQ-JBOX-001	PLANT WBN	UNIT(S) 1	SHEET B6 OF B11		
BINDER TITLE JUNCTION BOXES	COMPUTED JLH	DATE 5/15/86	R	R	
	CHECKED ETD	DATE 5/15/86			

F. INSTALLATION INTERFACES

Does the qualification program address all relevant interfaces of the equipment so that the installed design and configuration is similar or identical to the test configuration (yes/no/NA)? (note below)

Interface	Identify Interface Requirement	Acceptable? (Yes/No/NA)	Reference Test Report
Mounting Bolts	N/A		
External Process Connections	N/A		
Electrical Connections	N/A		
Conduit Seals	N/A		
Connector Seals	N/A		
Orientation	N/A		
Physical Configuration	N/A		
Other	Internal Components See Comments		

JUSTIFICATION/COMMENTS Mounting of internal components is addressed in the qualification of terminal blocks, handswitches, etc. Where placement orientation, etc. is important to qualification, it is addressed for those particular components being qualified.

BINDER NO. WBNEQ-JBOX-001 PLANT WBN UNIT(S) 1 SHEET B7 OF B11

BINDER TITLE JUNCTION BOXES COMPUTED JLH DATE 5/15/86 R ___ R ___

CHECKED ETA DATE 5/15/86

Sections G through M are omitted as not being applicable to this equipment.

BINDER NO. WBNEQ-JBOX-001 PLANT WBN UNIT(S) 1 SHEET B8 OF B11
R 1 R

BINDER TITLE JUNCTION BOXES COMPUTED JLH DATE 5/15/86 [illegible] 7/11/89

CHECKED ETD DATE 5/15/86 [illegible] 4-26-89

N. MAINTENANCE AND SURVEILLANCE

Has the qualification program identified those surveillance, maintenance, and inspection parameters which are essential to maintain qualification and which aid in detecting degrading materials or equipment performance (Yes/No/NA)? Yes (Enter all requirements in Section G of the Binder - Qualification Maintenance Data Sheets). |R1

JUSTIFICATION/COMMENTS Recommended surveillance and maintenance parameters are addressed in TAB G.

PLUSEQ/135.48

BINDER NO. WBNEQ-JBOX-001	PLANT WBN	UNIT(S) 1	SHEET B9 OF B11
BINDER TITLE JUNCTION BOXES	COMPUTED JLH	DATE 5/15/86	R ___ R ___
	CHECKED [illegible]	DATE 5/15/86	

0. SUMMARY OF REVIEW

	Yes/No/NA
(1) Documented evidence of qualification adequate (Have all assumptions, mathematical models, and all extrapolations of test data used in an analysis been justified and documented)?	Yes
(2) Any exceptions (i.e., sound reasons to the contrary) taken to the specified qualification level adequately justified?	N/A
(3) Choice of qualification methodology adequately justified?	Yes
(4) If analysis was performed, complete the following:	
(a) Were equipment performance requirements identified?	Yes
(b) Were specific features and failure modes and effects analyzed?	N/A
(c) Were assumptions and mathematical models used together with appropriate justification for their use?	N/A
(d) Were environmental parameters which affect equipment performance identified?	Yes
(5) Adequate similarity between equipment and test specimen established?	Yes
(6) Aging degradation evaluated adequately?	Yes
(a) Mechanical and/or cycle aging addressed?	N/A
(b) Equipment aged to end of life condition prior to application of DBE conditions?	N/A
(c) Absence of preaging in test/analysis justified?	N/A
(d) Materials susceptible to thermal/radiation aging identified?	Yes

BINDER NO. WBNEQ-JBOX-001	PLANT WBN	UNIT(S) 1	SHEET B10 OF B11
BINDER TITLE JUNCTION BOXES	COMPUTED JLH	DATE 5/15/86	R ___ R ___
	CHECKED ETD	DATE 5/15/86	

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(e) Normally operating state of device (e.g., normally energized) considered?	N/A
(7) Qualified life or replacement schedule established?	Yes
(8) Criteria regarding temperature/pressure exposure satisfied?	Yes
(a) Peak temperature adequate	N/A
(b) Peak pressure adequate	Yes
(c) Duration adequate	Yes
(d) Required profile enveloped adequately	Yes
(e) Steam exposure adequate	N/A
(9) Criteria regarding test sequence satisfied?	N/A
(10) Criteria regarding spray satisfied?	N/A
(a) Was the spray testing done while under the extremes of pressure and temperature?	N/A
(b) Does the spray concentration, flow rate, density, duration, and pH used in tests meet or exceed those to be used for the plant?	N/A
(11) Criteria regarding submergence satisfied?	N/A
(12) Criteria regarding radiation satisfied?	N/A
(a) Was dose rate considered?	N/A
(b) Was beta radiation considered?	N/A
(13) Criteria regarding operability status/mode satisfied?	Yes
(14) Criteria regarding test failures or anomalies satisfied?	N/A

BINDER NO. WBNEQ-JBOX-001	PLANT WBN	UNIT(S) 1		SHEET B11 OF B11	
				R	R
BINDER TITLE JUNCTION BOXES		COMPUTED JLH	DATE 5/15/86		
		CHECKED ETR	DATE 5/15/86		

O. SUMMARY OF REVIEW (Continued)

	Yes/No/NA
(15) Criteria regarding functional testing satisfied?	N/A
(a) Does the test plan/report specify an acceptance criteria for equipment performed?	N/A
(b) Was an initial base line test done to establish required performance characteristics?	N/A
(c) Has the test/analysis demonstrated that performance performance specifications and characteristics (e.g., voltage, load frequency, and other electrical characteristics) can be ensured?	N/A
(16) Criteria regarding instrument accuracy satisfied?	N/A
(17) Test duration margin (1 hour + function time) satisfied?	N/A
(a) Is the minimum specified operating time at least 1 hour?	N/A
(b) If exception to the 1-hour minimum operating time was taken, was adequate justification provided?	N/A
(18) Criteria regarding synergistic effects satisfied?	N/A
(19) Criteria regarding margins satisfied?	N/A
(20) Maintenance and surveillance requirements adequately identified?	Yes

P. DISCUSSION

TVA EQP065.25