

Omaha Public Power District
1623 Harney Omaha, Nebraska 68102
402/536-4000

May 20, 1983
LIC-83-129

Mr. Robert A. Clark, Chief
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Licensing
Operating Reactors Branch No. 3
Washington, D.C. 20555

Reference: Docket No. 50-285

Dear Mr. Clark:

Environmental Qualification of
Safety Related Electrical Equipment

The Omaha Public Power District received the Commission's Safety Evaluation Report (SER) dated January 11, 1983, which included the Technical Evaluation Report (TER) prepared by Franklin Research Center. Subsequent to the SER, 10 CFR 50.49 was revised to provide regulations related to environmental qualification of safety related electrical equipment. The new 10 CFR 50.49(g) required all licensees to identify open issues related to their environmental qualification programs by May 20, 1983. The District also received the Commission's letter dated April 4, 1983, which provided clarification on the new rule and the SER requirements. Accordingly, this letter provides the 90-day response to the Commission's SER, the response required by 10 CFR 50.49(g), and the additional information requested by the April 4, 1983 clarification letter.

Attachment 1 to this letter provides the District's position on outstanding items identified in the TER. All equipment within the scope of the rule is identified in Enclosure 4 of the District's letter to the Commission dated November 5, 1982. As requested by the Commission's April 4, 1983

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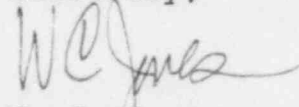
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Mr. Robert A. Clark
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letter, Attachment 2 contains a description of the methods used to identify equipment within the scope of 10 CFR 50.49(b)(2). Attachment 3 identifies the remaining open items and provides a schedule for their resolution, where appropriate.

The District also wishes to note that all SCEW sheets are referred to by electrical equipment qualification page number. (This number consists of the enclosure number, followed by an alpha-numeric page number; i.e., 6-29A.) It would be helpful to the District if the Commission would use this system in future correspondence.

Sincerely,



W. C. Jones
Division Manager
Production Operations

WCJ/TLP:jmm

Attachments

cc: LeBoeuf, Lamb, Leiby & MacRae
1333 New Hampshire Avenue, N.W.
Washington, D.C. 20036

Mr. L. A. Yandell, Senior Resident
Inspector

Attachment 1

TER Equipment Item Nos.: 1, 2, 3, and 4

NRC Qualification Category: II.a (qualification not established)

Subject: Foxboro Transmitters

Pages: 6-61, 6-116, 6-109, 6-113, 6-1A, 6-123

Deficiency: Multiple (see TER)

The District contracted Wyle Laboratories to evaluate the Foxboro transmitter qualification status in accordance with the DOR Guidelines of IE Bulletin 79-01B. Wyle Laboratories concluded the subject transmitters lacked sufficient documentation to support qualification.

In an attempt to preclude an expensive change-out of very reliable instrumentation, the Foxboro transmitter serial numbers were forwarded to Foxboro for evaluation. Based on Foxboro's reply, Modification Requests (MR's) were issued to upgrade the existing transmitters.

As of this date, all reported Foxboro transmitters have been upgraded to the NE-10 series transmitters which have a demonstrated accuracy of 0.5%. The Foxboro Company has notified the District that the NE-10 qualification is complete and the test specimens are certified to IEEE-323-1974. An Engineering Evaluation Assistance Request (EEAR) has been issued to gather all transmitter serial numbers and purchase information to be forwarded to the Foxboro Company, who will determine if adequate similarity between Fort Calhoun equipment and the test specimens can be established. Once established, the pertinent reports will be forwarded to the District. It is expected that this qualification will be established prior to the completion of the 1984 refueling outage.

TER Equipment Item No.: 5

NRC Qualification Category: I.b (qualification pending modification)

Subject: ASCO Pressure Switch - PC-1849

Page: 5-10

Deficiency: Inadequate Qualification Pending Modification

PC-1849 functions to isolate instrument air to containment on loss of air header pressure in conjunction with a CIAS signal. LER 79-007 identified the switch as lacking proper environmental qualification and indicated that the switch would either be upgraded or moved from the containment atmosphere. The switch was removed from containment and placed between valve PCV-1849 and penetration M-73 in Room 69. At the same time, the switch was changed from the Barksdale Model D2T-M1055 to an ASCO Model SB11AR/T10A32. This modification was completed in November, 1981.

At the time of installation, a fully qualified pressure switch that met the District's specifications could not be located. The ASCO switch was selected because ASCO had already commenced qualification and supplied the District with a test specification (AQS-21623). This specification was later replaced by AQS-02882, Appendix A. Test results, although not completed as of this date, are expected in June, 1983. The test specification requires radiation qualification to 5×10^5 RAD. As radiation is the only harsh environmental condition in Room 69, it is expected that the switch will meet the Room 69 requirement of 2.5×10^5 RAD. Aging requirements obtained from the type test will be incorporated into the Fort Calhoun qualified life program to preclude premature failure of the switch.

Please note that the SCEW sheet, Page 5-10, was inadvertently omitted from the District's November 5, 1982 submittal; therefore, it is attached for the Commission's reference.

Facility: Fort Calhoun
Docket No.: 50-285

SYSTEM COMPONENT EVALUATION WORK SHEET

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		QUALIFI- CATION METHOD	OUTSTAND- ING ITEMS
	Parameter	Specifi- cation	Qualif- cation	Specifi- cation	Qualifi- cation		
System: Instrument Air Item No.: PC-1849 Component: Pressure Switch Manufacturer: ASCO Model No.: SB11AR/T10A32 Function: Loss of Pressure Isolation Accuracy - Spec: Note 1 Demon: Service: Location: Room 69	Operating Time	Continous	Note 1		Note 1	Note 1	Note 1
	Tempera- ture °F	N/A	Note 1	N/A	Note 1	Note 1	Note 1
	Pressure PSIg	N/A	Note 1	N/A	Note 1	Note 1	Note 1
	Relative Humidity%	N/A	Note 1	N/A	Note 1	Note 1	Note 1
	Chemical Spray	N/A	Note 1	N/A	Note 1	Note 1	Note 1
	Radiation	2.5x10 ⁵ R	Note 1	N/A	Note 1	Note 1	Note 1
	Aging	N/A	Note 1	N/A	Note 1	Note 1	Note 1
Flood Level Elev: N/A Above Flood Level:	Submer- gence	N/A	N/A	N/A	N/A	N/A	N/A

Documentation References:

1) Appendix A

Notes:

1) Pending Qualification per ASCO Test Spec. AQS-02882 Appendix A

TER Equipment Item Nos.: 8 through 13
NRC Qualification Category: II.a (qualification not established)

Subject: Fisher 304 Electrical Valve Stem Position Switches

Pages: 6-127, 6-125, 6-91, 6-77B, 6-11A, 6-3, 6-106, 6-8, 6-104, 6-10, 6-14, 6-98, 6-42, 6-31, 6-23, 6-18, 6-45, 6-81, 6-100

Deficiency: Radiation Qualification

The material analysis used to support the 10^6 RAD rating was accomplished using Fisher Controls Bulletin 62.3.304 and Fisher Form 2007B (May, 1969). The above documents list the Model 304 constituent materials as follows:

Base 7 Cover	-	Aluminum
Cams and Cam Rod	-	Stainless Steel
Operating Arm	-	Cadmium-Plated Steel
Cam Gears	-	Cadmium-Plated Steel
O-Rings	-	Nitrile
Electrical Switch	-	Phenolic

Only the Nitrile and Phenolic materials are susceptible to radiation degradation (reference Table C-1 of Appendix C to IE Bulletin 79-01B). The threshold (the radiation exposure required to change at least one physical property) is listed as 10^6 RAD for both materials. TER Item Nos. 8, 9, and 10 (switches in Rooms 13, 21, and 22) are the only Fisher 304 limit switches in an environment where accident radiation levels could exceed 10^6 RAD. The normal 40-year dose does not exceed the 10^6 limit. Therefore, the District is unable to use preventive maintenance to preclude radiation aging. At this time, the District has issued a purchase order to Franklin Institute for radiation testing, which is expected to be completed prior to the end of the 1984 refueling outage.

TER Equipment Item No.: 14

NRC Qualification Category: II.a (qualification not established)

Subject: Fisher 304 Electrical Position Indication Switch

Pages: 6-5, 6-95, 6-102

Deficiency: Temperature, Pressure, and Humidity Requirements

Franklin Research Center found the Type 304 switch installed in Room 81 to be deficient with respect to temperature, pressure, and humidity requirements. The District replaced the Type 304 with NAMCO Type EA-180 limit switches during the 1982 refueling outage. These limit switches are fully qualified (see TER Item No. 7). SCEW sheets were revised and forwarded to the NRC as part of the District's November 5, 1982 submittal.

TER Equipment Item No.: 20

NRC Qualification Category: II.a (qualification not established)

Subject: NAMCO Model D2400X Limit Switch

Page: 6-65

- Deficiencies:
- (1) Documented Evidence of Qualification Not Adequate
 - (2) Criteria Regarding Radiation Not Satisfied

Adequate qualification for NAMCO D2400X limit switches could not be established. Therefore, during the 1981 refueling outage, these items were replaced with NAMCO Model EA-180 limit switches. NAMCO Type EA-180 limit switches are classified as NRC Qualification Category I.a (equipment qualified, see TER Item No. 7). The SCEW sheet was revised and submitted to the NRC as part of the District's submittal dated November 5, 1982.

In Note 1 to TER Item No. 7, it was stated that the District made no attempt to qualify EA-180 electrical connection points. SCEW Page 6-59A reports the qualification status of Conax electrical conductor seal assemblies. These seal assemblies are used to seal the electrical connection of NAMCO limit switches. The Conax connector precludes steam from entering the limit switch during an actual LOCA.

TER Equipment Item No.: 28, 29, 31 through 40

NRC Qualification Category: II.a (qualification not established)

Subject: Limitorque Valves

Pages: 6-118, 6-117, 6-96A, 6-75, 6-92, 6-63, 6-62A, 6-62, 6-84, 6-113A, 6-85, 6-4

- Deficiencies:
- (1) Adequate Similarity Not Established
 - (2) Aging Degradation Not Evaluated Adequately
 - (3) Qualified Life Not Established

TER Item Nos. 28, 29, and 31 through 40 note that equipment qualification was not established for Limitorque motor operated valves. The TER cites lack of documentation from the manufacturer which establishes similarity between installed equipment and the actual test specimen. Table I compiles the information obtained from Limitorque, denotes appropriate test report, provides motor manufacturer, and indicates insulation class for each tag number identified.

The District wishes to reiterate its position concerning the necessity of qualifying the PORV block valves (TER Item No. 38). It was and is the District's contention that these block valves do not require qualification. The Franklin Research Center rejected this position claiming "defense-in-depth" requires qualification of these valves. Even in the unlikely event that the PORV's stick open and the block valves fail (a double failure), the resulting condition is still within the bounds of the existing safety analysis and would be handled as a small break LOCA.

No further qualification effort is to be made on Item No. 38. However, the reference to the equipment in the plant emergency procedures will not be eliminated, thus providing the operator with the maximum flexibility in accident mitigation.

TABLE I

Valve Tag #	Limiter Order No.	Report No.	Insulation Class	SCEW	ROOM	Microfilm	Model Number	Motor Manufacturer	Motor Brake Manufacturer	Volts/Phase Cycles
HCV-311	337597	600198	H	6-62A	Cont.	17068/19547	SMB-00	Reliance	NA	480/3/60
HCV-312	337597	600198	H	6-62A	Cont.	17068/19547	SMB-00	Reliance	NA	480/3/60
HCV-313	337597	600198	H	6-62A	Cont.	17068/19547	SMB-00	Reliance	NA	480/3/60
HCV-315	337597	600198	H	6-62A	Cont.	17068/19547	SMB-00	Reliance	NA	480/3/60
HCV-317	337597	600198	H	6-62A	Cont.	17068/19547	SMB-00	Reliance	NA	480/3/60
HCV-318	337597	600198	H	6-62A	Cont.	17068/19547	SMB-00	Reliance	NA	480/3/60
HCV-320	337597	600198	H	6-62A	Cont.	17068/19547	SMB-00	Reliance	NA	480/3/60
HCV-319	337597	600198	H	6-62A	Cont.	17068/19547	SMB-00	Reliance	NA	480/3/60
HCV-327	337988A	600198	H	6-84	Cont.	17042/19546	SMB-0	Reliance	NA	480/3/60
HCV-329	337988A	500198	H	6-84	Cont.	17042/19546	SMB-0	Reliance	NA	480/3/60
HCV-331	337988A	600198	H	6-84	Cont.	17042/19546	SMB-0	Reliance	NA	480/3/60
HCV-333	337988A	600198	H	6-84	Cont.	17042/19546	SMB-0	Reliance	NA	480/3/60
HCV-348	337637A	600198	H	6-85	Cont.	17042/19546	SMB-0	Reliance	NA	480/3/60
HCV-383-3	340217A	B0003	B	6-63	Cont.	/15160		Reliance	NA	480/3/60
HCV-383-4	340217A	B0003	B	6-63	Cont.	/15160		Reliance		
HCV-2914	337063	600198	H	6-62	Cont.	17071/19545	SMB-00	Reliance	NA	480/3/60
HCV-2934	337063	600198	H	6-62	Cont.	17071/19545	SMB-00	Reliance	NA	480/3/60
HCV-2954	337063	600198	H	6-62	Cont.	17071/19545	SMB-00	Reliance	NA	480/3/60
HCV-2974	337063	600198	H	6-62	Cont.	17071/19545	SMB-00	Reliance	NA	480/3/60
LCV-218-3	343748	B0003	B	6-4	7	17052/15158	SMB-00	Reliance	NA	480/3/60
HCV-347	337637B	600198	H	6-92	13	17044/19544	SMB-2	Reliance	NA	480/3/60
HCV-1041C	345763A	B0003	B	6-96A	81	17055/15180	SMB-000	Reliance	NA	480/3/60
HCV-1042C	345763A	B0003	B	6-96A	81	17055/15180	SMB-000	Reliance	NA	480/3/60
HCV-1384	352016A	B0003	B	6-117	81	17057/15181	SMB-000	Reliance	NA	480/3/60
HCV-1385	345255A	F-C3271	B	6-118	81	NA	SMB 41	Elec. Apparatus	Dings	480/3/60
HCV-1386	345255A	F-C3271	B	6-118	81	NA	SMB 41	Elec. Apparatus	Dings	480/3/60
HCV-150	349404A	B0003	B	6-113A	Cont.	17054/17034	SMB-00	Peerless	NA	480/3/60
HCV-151	349404A	B0003	B	6-113A	Cont.	17054/17034	SMB-00	Peerless	NA	480/3/60
HCV-308	346081	B0003	B	6-75	13	17056/15160 (for District use)	SMB-000	Peerless	NA	480/3/60

TER Equipment Item Nos.: 41, 42, 43

NRC Qualification Category: II.a (qualification not established)

Subject: GE Motors

Pages: 6-83, 6-60, 6-36

Deficiencies:

- (1) Aging Degradation Not Evaluated Adequately
- (2) Qualified Life or Replacement Schedule Not Established
- (3) Criteria Regarding Aging Simulation Not Satisfied
- (4) Criteria Regarding Radiation Not Satisfied

The District contracted Wyle Laboratories to perform a thermal aging analysis of GE Series 8000 electric motors. The Wyle report #26333-27 concluded that the HPSI motor and the containment spray pump motors have useful lives in excess of 120 years.

The LPSI pump motors, due to their increased operating time, were identified as being susceptible to aging degradation. The two components in question are Permifil Rope and Vulkaflex Power Cables. All remaining materials have useful lives calculated in excess of 120 years. At the present time, the District plans to use preventive maintenance to preclude the aging of the components in question. However, the District will continue analysis of the items, since GE has indicated that the time/temperature condition specified in the aging analysis may have been excessive. GE has also stated that they know of no failures of the materials cited by Wyle.

The TER also requested additional information as to the radiation qualification of the motor to lead splices. The splices are the standard 4160 and 480 volt bolted splice used during the construction of Fort Calhoun. The District will inspect the splices in question and perform a radiation qualification analysis. This analysis and corrective action, if necessary, will be completed by the end of the 1984 refueling outage.

TER Equipment Item Nos.: 44, 45

NRC Qualification Category: II.a (qualification not established)

Subject: Containment Cooling Fan Motors (VA-7C, 7D)
Containment Vent Fan Motors (VA-3A, 3B)

Pages: 6-25, 6-24

- Deficiencies:
- (1) Adequate Similarity Between Equipment and Test Specimen Not Established
 - (2) Aging Degradation Not Evaluated Adequately
 - (3) Qualified Life or Replacement Schedule Not Established
 - (4) Temperature and Pressure Duration Not Adequate
 - (5) Required Profile Not Developed Adequately
 - (6) Criteria Regarding Spray Not Satisfied
 - (7) Criteria Regarding Radiation Not Satisfied

The District contends that the fan tested in report X-377A was similar to the Fort Calhoun fans. In fact, the tested fan was one of four fans purchased by Waldinger Corporation for installation at Fort Calhoun. Joy Manufacturing Company's letter dated April 5, 1983 is submitted to substantiate equipment similarity. As X-377A was a destructive test, only three of the four fans were initially shipped to Fort Calhoun. The fourth (the tested fan) was refurbished and then shipped to the station where it is presently installed as VA-3B.

Wyle Laboratories performed an aging analysis on containment ventilation fans. Their report #26333-28 concluded that there are no materials susceptible to aging degradation for a 40-year qualified life.

It is the District's engineering judgement, based on Joy test reports X-377 and X-377A and Wyle Laboratories report #26333-28, that containment vent fan and containment cooling fan motors are fully qualified for their environment and further qualification will not be undertaken.



April 5, 1983

JOY INDUSTRIAL EQUIPMENT COMPANY

NEW PHILADELPHIA DIVISION
338 SOUTH BROADWAY
P. O. BOX 431C
NEW PHILADELPHIA, OHIO 44663
Telephone: (216) 339-1111

Stone & Webster Engineering Corporation
P.O. Box 5406
Denver, Colorado 80217

Attention: Mr. Mike Watson

Subject: Omaha Public Power
P.O. #7391-CN481-108, Section 21
Joy Fan Test Report

Gentlemen:

Please find attached one partial copy of Report X-377 which covers the four fans that were supplied under P.O. #7391-CN481-108 to American Air Filter Company for Omaha Public Power. The partial outlines the fan serial numbers to the motor serial numbers to assure that the motors were manufactured at the same time as the test conducted on the fan indicated in Report X-377A.

I am including a copy of our Qualification Test of the fan and motor design for service in Nuclear Containment. This report covers the fan and motor as it was tested to simulate a LOCA condition.

Very truly yours,

JOY MANUFACTURING COMPANY

By: R.D. Schilz

R.D. Schilz, Proposal Engineer
New Philadelphia Division
Joy Industrial Equipment Company

RDS:pm

Attachment.

TER Equipment Item No.: 48

NRC Qualification Category: II.a (qualification not established)

Subject: Component Cooling Water Pump Motors (Allis-Chalmers)

Page: 6-15

Deficiency: Documented Evidence of Qualification Inadequate

Wyle Laboratories report #26333-23 (Rev. A) cited six components of these motors that may be of concern under the specified environmental parameters. Three components were susceptible to radiation-induced damage at the specified 2.5×10^5 RAD. Threshold radiation levels for these three components are as listed below:

Thermister Lead Wire Insulation (Teflon)	-	1.7×10^4 RADS
Polyester Varnish	-	1×10^5 RADS
Vellumoid Gasket	-	1×10^5 RADS

The specified 2.5×10^5 radiation parameter was determined from a design review of plant shielding and environmental qualification for equipment operating spaces and systems which may be used in post accident operations. This review was done by Combustion Engineering for the District. The CE report states that Room 69 radiation levels vary widely throughout the large area. The highest readings are near the containment spray pipes. As the component cooling pumps are more than 30 feet from the major radiation source, GSE Nuclear performed component-specific radiation calculations for each pump. The calculations show that the dose levels expected are below the threshold levels of both the varnish and gasket materials. Therefore, further discussion of these items will not be necessary.

The thermister lead wire insulation is subject to embrittlement at the specified radiation levels. However, as the lead wire is inside the motor case and not electrically connected at Fort Calhoun, it is the District's engineering judgement that failure of the teflon lead wire insulation will not impair the operation of the motor.

The Wyle Laboratories report also cites 3 components of the motors that have qualified lives of less than 40 years. The three components are:

1. Vellumoid Gasket
2. Corprene Gasket
3. Phase Insulation

Items 1 and 2 are not necessary for motor operation. The District will use preventive maintenance to rewind the motor prior to the specified life. This will preclude all aging degradation.

TER Equipment Item Nos.: 53, 63, 72, 73, 75, 76, 81,
108

NRC Qualification Category: II.a or I.b

Subject: Solenoid Valves

- Deficiencies:
- (1) Documented Evidence of Qualification Inadequate
 - (2) Adequate Similarity Between Equipment and Test Specimen Not Established

TER Item Nos. 53 and 108 both refer to the same solenoid pilot for valves HCV-883A and 884A. As such, Item No. 53 should be disregarded. The corrected SCEW Page 6-78A for Item No. 108 was provided in the District's November 5, 1982 submittal.

TER items listed in Table I concern solenoid valves installed as pilots for various system valves. The solenoid valves were replaced by ASCO solenoid valves Model NP-1 except as noted in Table II.

The District's November 5, 1982 submittal utilizes the latest ASCO test report (AQR67368/REV 0). The information contained in the new report was used to establish a 40-year qualified life for ASCO NP-1 solenoids. The 40-year established life requires that ASCO-recommended maintenance be accomplished. This maintenance is now being accomplished on a year-to-year basis until the qualified life program is instituted at Fort Calhoun. For the above reasons, it is the District's engineering judgement that all NP-1 solenoids are fully qualified.

The five solenoids listed as "not accomplished" will be replaced prior to the completion of the 1984 outage. The reason for the delay in replacing these is a problem associated with the high differential pressure required across the valve seat. The District is engineering a control system that utilizes qualified NP-1 solenoids at a pressure below the 200 psig rating of the NP-1 solenoids. These five solenoids are de-energized during normal and accident operation and are not expected to fail.

TABLE II

TER ITEM #	TAG NUMBER	ORIGINAL EQUIPMENT	REVISED EQUIPMENT	PAGE NUMBER
ASCO				
63	HCV-349	WPHT831429	NP8320A185E	6-77A
63	HCV-350	WPHT831429	NP8320A185E	6-77A
ASCO				
72	HCV-2917	LB8316C44	NP8316A75E	6-73
72	HCV-2927	LB8316C44	NP8316A75E	6-73
72	HCV-2947	LB8316C44	Not accomplished	6-86
72	HCV-2948	LB8316C44	NP8316A75E	6-88A
72	HCV-2957	LB8316C44	NP8316A75E	6-37
72	HCV-2958	LB8316C44	NP8316A75E	6-37
ASCO				
75	HCV-2918	HT8321AS	Not accomplished	6-68
75	HCV-2928	HT8321AS	Not accomplished	6-68
ASCO				
76	HCV-2908	HT8321A6	Not accomplished	6-71
VALCOR				
81	HCV-438A	V70900213	NP8320A185E	6-19
81	HCV-438C	V70900213	NP8320A185E	6-19
81	HCV-864	V70900213	NP8321A185E	6-36A
81	HCV-865	V70900213	NP8321A185E	6-36A
81	HCV-881	V70900213	NP8320A185E	6-79B
81	HCV-882	V70900213	NP8320A185E	6-79B
81	HCV-1107A	V70900213	NP823DA175E	6-125D
81	HCV-1108B	V70900213	NP823DA175E	6-125D
108	HCV-884A	V70900213	NP8320A185E	6-78A
108	HCV-883A	V70900213	NP8320A185E	6-78A
ASCO				
73	HCV-2907	LB8316B24	NP8316A75E	6-70
73	HCV-2937	LB8316B24	Not accomplished	6-88
73	HCV-2937	LB8316B24	NP8316A75E	6-88A
73	HCV-2967	LB8316C44	NP8316A75E	6-39
73	HCV-2968	LB8316C44	NP8316A75E	6-39
73	HCV-2977	LB8316C44	NP8316A75E	6-39
73	JCV-2978	LB8316C44	NP8316A75E	6-39

TER Equipment Item No.: 82

NRC Qualification Category: II.a (qualification not established)

Subject: Target Rock Solenoids Model 80BC017

Page: 6-113B

Deficiency: Adequate Similarity Between Equipment and Test Specimen Not Established

The District has enclosed a letter (Reference 1) from Target Rock Corporation to Combustion Engineering dated May 6, 1981 for use in establishing similarity. It is the District's engineering judgement that the 80B-001 valves are indeed similar to the test specimens of the 2375 and 2804 Target Rock reports and are therefore fully qualified.

Target Rock Corporation, 1966E Broadhollow Road, East Farmingdale, New York 11735/Phone: (516) 293-3800
May 6, 1981

SUBSIDIARY CURTISS-WRIGHT CORPORATION
Please refer to:
CN 9025

Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, Conn. 06095

Attention: Mr. W. Blowers
Dept. 9487-403

Subject: 9070109-NSSS P.O. No.
PCGV5 "Solenoid Valves"
Contract Spec. No. NSSS-STD
Target Rock Project 80B

Gentlemen:

This letter does hereby certify that the Qualification to IEEE 382-1972 demonstrated by Report No. 2375, Revision C extends to all the valves and valve operators and accessories used on the ASME Section III, 80B-001 valves supplied to Combustion Engineering Inc. on the subject contract. The basis for this extension is that the supplied valves, operators and accessories use the same materials, details of construction and design features that have been qualified by the previously submitted Report No. 2375, Revision C.

One copy of Target Rock Report No. 2804, Revision B, "Qualification Analysis Report, Aging Seismic & Accident Conditions, Models 79Q-001 thru 79Q-009 Solenoid Operated Globe Valves", is also included with the letter. This report is submitted as substantiation of qualification for the models 79Q Solenoid Valves. In particular valve models 79Q-005 and 79Q-009 are both represented by the 1032110-4, Revision G, Assembly Drawing. (See Paragraphs 3.13, 3.21, and 3.22). Only minor differences exist between the two valves, (i.e.: The size of the 79Q-005 valve is 3/8" while the size of the 79Q-009 valve is 3/4". Both valves are made from the same 1" Basic Body Forging.), which are not considered significant for the purpose of IEEE Qualification.

The 80B-001 valves supplied to Combustion Engineering Inc., are represented by the 1032110-4, Revision F, Assembly Drawing. There are no significant differences between the 80B-001 valves and the 79Q-005 and 79Q-009 valves discussed above. Therefore, the substantiation of IEEE Qualification Presented in Target Rock Report No. 2804, Revision B applies equally as well to the 80B-001 valves.

TARGET ROCK CORPORATION

Page 2 of 2

CN 9025

May 6, 1981

We hope the information supplied above satisfies your requirements, and please do not hesitate to call this office if any questions arise.

Very truly yours,

TARGET ROCK CORPORATION

Steven Karidas

Steven Karidas

Project Engineer

Thomas D. Crowley

Thomas D. Crowley

Contracts Manager

Power Products

SK/KK

Enclosures (2)

cc: B. Hughes

TEF Equipment Item No.: 91

NRC Qualification Category: II.a (qualification not established)

Subject: Cable Splices at Solenoids and Transmitters

Page: 6-50

Deficiency: Documented Evidence of Qualification Inadequate

The District contracted Wyle Laboratories to evaluate six types of cable splices. Wyle completed its evaluation in accordance with the requirements of IE Bulletin 79-01B (DOR Guidelines) in June, 1982. Both the transmitter and solenoid splices lacked sufficient accident test data to support full qualification in strict accordance with DOR Guidelines. As a result of this Wyle report (#26333-26), the District reviewed all solenoid valve control circuits. Ten valves were identified as having to operate after a LOCA. Of the ten valves, all but two, as a result of the 79-01B solenoid upgrade, had been replaced including installation of qualified Raychem inline splices (WCSF-N). A modification package was issued to upgrade the splices at the remaining two valves. This modification will be completed prior to or during the 1984 refueling outage.

The transmitters in question have been upgraded to 1974 standards. The new Foxboro transmitters contain fully qualified terminal blocks that replace the splices. No further action is required.

TER Equipment Item No.: 92

NRC Qualification Category: II.a (qualification not established)

Subject: Splices at Containment Penetrations for Solenoid Valves and Instrumentation

Page: 6-49

- Deficiencies:
- (1) Aging Degradation Not Evaluated Adequately
 - (2) Qualified Life or Replacement Schedule Not Established
 - (3) Criteria Regarding Radiation Not Satisfied
 - (4) Criteria Regarding Test Sequence Not Satisfied

With regard to deficiency (4), the District was aware of the test sequence requirement for materials with known sensitivity to radiation and aging. The District contracted Wyle Laboratories to complete an aging and radiation test of electrical penetration and associated splices. The testing is presently in progress at the Wyle Laboratories NORCO facility. The results and schedule of modifications, if required, will be forwarded to the Commission as soon as they become available.

TER Equipment Item Nos.: 95, 96

NRC Qualification Category: I.b

Subject: Containment Vent Fan Cable Splice at Motor and
at Penetration

Pages: 6-51, 6-52

Deficiency: Documented Evidence of Qualification Not Adequate

It is the District's engineering judgement that the 480V, 3 phase, AC splices at the motor leads and both sides of containment electrical penetrations are adequately qualified for the environmental conditions in which they must operate in both LOCA and post LOCA situations. A description of the motor lead splices can be found in Enclosure 9 of the District's submittal on IE Bulletin 79-01B, dated November 5, 1982. A description of splices at the electrical penetrations can be found on Page 22 of the Wyle Laboratories report #26333-26, "Environmental Qualification Evaluation of Cable Splices Inside Containment".

The District believes the key to qualification is viewing the splices as a system in which the inner layers of tape provide for the electrical integrity of the circuit. The outer layer of RTV (Dow Corning 3144 or 3145 clear) provides protection for the electrical insulation from those parameters of harsh environment which could be detrimental to the splice's electrical integrity.

To substantiate the District's engineering judgement, each of the environmental stress parameters (pressure, humidity, steam, temperature, chemical spray, radiation, and aging) were investigated to determine any adverse impact on the splice systems. The results of the investigation are as follows:

- (1) Pressure: In general, the splices are viewed to be a mechanically passive system which provides electrical insulation for the connection. The insulation is placed over the connector and wire jacket in such a fashion as to minimize voids. The RTV is placed over all. In addition, the pressure would tend to compress the splice, making it watertight. It is also felt that since the splices are so "over-built", any small compression could not cause damage that would lead to splice failure. A pressure transient should not cause splice failure. This is also substantiated by the fact that the splices have remained functional throughout four (to date) containment ILRT's in which the fans are operated at accident pressure.

- (2) Humidity: This was not judged to be a factor. The RTV coating provides an adequate seal over the splice, thus causing the effects of humidity to be insignificant.
- (3) Steam: The judgement for steam is the same as for humidity. The RTV should provide an adequate barrier to steam. (Reference Dow Corning's letter dated March 24, 1980 regarding Dow Corning 3145 RTV and adhesive/sealant integrity.)
- (4) Temperature: A review of the Wyle Laboratories report #26333-26 indicates all materials in these splices are capable of operating in an accident environment. Temperature is not judged to be a problem.
- (5) Chemical Spray: The only splices which are exposed to chemical spray are containment-side electrical penetration splices. (The motor leads are protected by a junction box, and the splices in Room 81 are not exposed to chemical spray.) RTV is not affected by mild basic solutions and should prevent any damage to the splices.
- (6) Radiation: There are three types of splice installations to be considered. The first type is the electrical penetration splice in Room 81. These are outside the containment and are not expected to see radiation. No further consideration is required on these splices. The second type of splice is the motor lead splice. These are protected by a junction box which eliminates the need to consider beta radiation. A revised calculation indicates VA-3A and VA-3B could see an accident gamma dose of 8.64×10^6 RADS, while VA-7C and VA-7D would see 1.92×10^7 RADS. Both are below the 1.0×10^8 RADS value as summarized in Wyle Laboratories' report.

The third type of splice is the electrical penetration in containment. Under accident conditions, this splice could be exposed to 1.44×10^7 RADS gamma and 2.0×10^8 RADS beta (IE Bulletin 79-01B supplied number). It should be noted that the total integrated dose of 1.12×10^6 RADS used in Wyle Laboratories' report #26333-26 (as supplied by the District) was in error. The normal 40-year operating dose should be given as 3.5×10^5 RADS (which is a very conservative 1R/HR for 40 year life). This would bring the gamma dose to 1.475×10^7 RADS which is not considered a significant change.

The beta dose is dealt with in two ways. For the insulation inside the RTV, Wyle Laboratories estimates the beta dose would be reduced to 2×10^5 RADS due to the RTV shielding. This would indicate a total integrated dose of 1.495×10^7 RADS to the insulation. For the RTV, the outer surface would be exposed to 2×10^8 RADS beta and the inner surface to 2×10^5 RADS beta (in both numbers, 1.475×10^7 RADS gamma must be added as the qualification radiation dose). In reviewing the radiation test information supplied by Dow Corning, both the RTV 3144 and its equivalent 3145 clear become brittle with radiation exposure. However, 3144 did not fail at 1.94×10^8 RADS and failure occurred only after mechanical stress at 4.55×10^8 RADS. Based on this information and the fact that the inner approximately 85 mills should be exposed to approximately 3.475×10^7 RADS, which is well below test values, the "operability" of the RTV should be ensured.

In reviewing the electrical insulation, a system approach is necessary. The insulation is performed by the inner layers of Irrathene SPT tape. The Irrasil tape and Scotch 33 tape are used for protection and to hold the Irrathene SPT tape. From Table 3, Page 29, Item 3, of Wyle report #26333-26, it can be seen that all materials except the Irrasil tape show adequate radiation resistance. The Irrasil could be expected to degrade after approximately one hour of accident operation. However, since it performs as a holder for the qualified Irrathene tape and is itself supported by Scotch 33 tape, the District feels the Irrasil tape should not contribute to a failure of the splice system.

- (7) Aging: The Wyle Laboratories report #26333-26 indicates that no aging related failures should be encountered.

Conclusion

It is the District's engineering judgement that adequate qualification documentation exists. It is recognized that the Wyle Laboratories report #26333-26 states that the splices do not meet the DOR Guidelines for testing. However, it is the District's judgement that the key is the testing done on the RTV and the fact that it should protect the electrical insulation. Based on this analysis and the supporting documents, no further action will be taken.

TER Equipment Item No.: 97
NRC Qualification Category: II.a (qualification not established)

Subject: States Type NT Terminal Blocks

Page: 2-53

Deficiency: Lack of Adequate Similarity

Qualification of these blocks was deemed lacking by the Franklin Research Center because similarity between the test specimen and the actual equipment in use was not demonstrated. This problem arose from the District's submittal of qualification documentation which identified the terminal blocks in use as States Models M25014, M25016, M25018, and M25112. Because the States terminal blocks corresponding to these model numbers are, in fact, Type NT, this concern is unwarranted. (Verification of this fact can be found by referring to the vendor's catalog.)

States Type NT terminal blocks were subjected to LOCA conditions and performed satisfactorily (Plant-Specific Reference #10 of the TER). A materials analysis was performed to determine radiation and chemical spray qualification. This was submitted as Enclosure 10 of the District's November 5, 1982 submittal. Results of this analysis showed spray and radiation effects would not prevent the terminal blocks from performing their design function. Aging analysis was also performed for the District by Wyle Laboratories. The Wyle Laboratories report #26333-29 demonstrates that the qualified life of the equipment exceeds 40 years. In addition to these qualifications, the Type NT terminal blocks installed are enclosed in junction boxes of NEMA 12 rating and are covered with Dow Corning 3144 or 3145 RTV.

It is the District's judgement that the qualification documentation plus the additional conservatism supplied by the junction box and RTV make States Type NT terminal blocks NRC Qualification Category I.a.

TER Equipment Item No.: 99

NRC Qualification Category: II.a (qualification not established)

Subject: Conax Electrical Penetrations

Page: 6-46

- Deficiencies:
- (1) Aging Degradation Not Evaluated Adequately
 - (2) Qualified Life Not Established
 - (3) Criteria Regarding Radiation Not Satisfied
 - (4) Criteria Regarding Test Sequence Not Satisfied

The District is in agreement that the sequence testing of Conax penetrations was not in strict accordance with DOR Guidelines. The Conax penetrations are undergoing testing by Wyle Laboratories. The District has provided the Commission with status updates on this testing in our letters dated December 30, 1982 and March 8, 1983. The results and final resolution are expected prior to the 1984 refueling outage.

TER Equipment Item No.: 100

NRC Qualification Category: II.a (qualification not established)

Subject: Conax Electrical Conductor Seal Assembly

Page: 6-59A

Deficiency: Adequate Similarity Not Established

Conax electrical conductor seal assemblies were reported in the District's November 5, 1982 submittal with the model number listed as N/A. The seal assemblies in use at Fort Calhoun are Model No. N-11006-64, which are indeed similar to the test specimens of IPS-409. Enclosed for your information is the Conax Certificate of Conformance to IPS-409, which establishes qualification.

CONAX CORPORATION
2300 WALDEN AVENUE
BUFFALO, NEW YORK 14225

QUALITY CONTROL DEPARTMENT

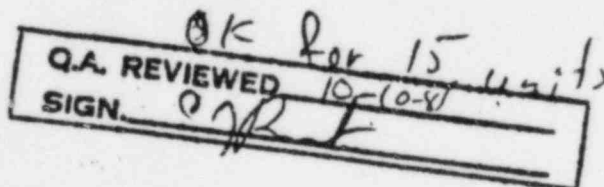
OMAHA PUBLIC POWER DISTRICT
FT. CALHOUN STATION
FT. CALHOUN, NE 68023

CERTIFICATE OF CONFORMANCE

Customer P.O. # PO 57526 DATE October 6, 1981
Conax W.O. # 7-20100 Item No.(s) 1
Quantity 15 Part No. (s) N-11006-64
Serial No. (s) N/A

Conax certifies that:

1. The materials, processes, and equipment furnished on this purchase order were produced in conformance with all contractually applicable specifications as referenced in, or furnished with the above purchase order.
2. The materials and equipment furnished under this purchase order were produced either from materials furnished by the customer for the production of such parts or from materials for which Conax has available for examination, chemical and/or physical test reports or other evidence of conformance to applicable specifications.



CONAX CORPORATION

By: [Signature]
Daniel A. Pellow

Title: Quality Control Engineer

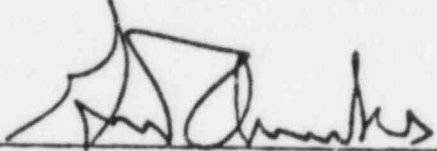
CERTIFICATE OF CONFORMANCE

CUSTOMER: OMAHA PUBLIC POWER DISTRICT
CUSTOMER P.O. No. 57526-5 DATE August 7, 1981
CONAX W.O. No. 7-20100 ITEM No.(s) 1
QUANTITY (1) 15 PART No.(s) (1) N-11006-64

CONAX CERTIFIES THAT:

1. ELECTRIC CONDUCTOR SEAL ASSEMBLIES
FURNISHED ON THIS ORDER ARE DESIGNED TO PROVIDE ELECTRIC CONDUCTOR SEALS FOR SAFETY RELATED INSTRUMENTS, SWITCHES, MOTORS, VALVES, AND OTHER EQUIPMENT LOCATED INSIDE CON-TAINMENT OF A NUCLEAR POWER GENERATING STATION.
2. ELECTRIC CONDUCTOR SEAL ASSEMBLIES
FURNISHED ON THIS ORDER ARE QUALIFIED TO THE REQUIREMENTS OF IEEE STANDARDS 323-1974, 344-1975 AND 383-1974, SECTION 2.5, AS DOCUMENTED IN CONAX IPS-409 "QUALIFICATION REPORT FOR CONDUCTOR MODULES FOR ARKANSAS NUCLEAR ONE, UNIT 2".
3. ELECTRIC CONDUCTOR SEAL ASSEMBLIES
FURNISHED ON THIS ORDER WERE FABRICATED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONAX NUCLEAR QUALITY ASSURANCE PROCEDURES MANUAL FOR MANUFACTURE OF NUCLEAR POWER PLANT COMPONENTS TO ANSI-N45.2 AND 10CFR50, APPENDIX B.

OK for 15 units
Q.A. REVIEWED 10-10-81
SIGN. CyB


G. M. RHODES
MANAGER OF ENGINEERING
NUCLEAR PRODUCTS DIVISION

CONAX CORPORATION
2300 WALDEN AVENUE
BUFFALO, NEW YORK 14225

TER Equipment Item No.: 103

NRC Qualification Category: II.a (qualification not established)

Subject: Raychem Inline Splices

Pages: 6-59B, 6-59C, 6-59D

Deficiency: Lack of Adequate Similarity

The District inadvertently reported these splices as Raychem breakout kits, when in fact the splices are Raychem Model WCSF-N inline splices. The discrepancy was discovered in August, 1982 and correctly reported in the District's November 5, 1982 submittal. The FRC's TER states that there is no question of the qualification of the inline splices (reference TER Item No. 103, Page 5g). Therefore, the District concludes that the correctly reported splices are NRC Qualification Category I.a (equipment qualified).

TER Equipment Item No.: 106

NRC Qualification Category: II.a (qualification not established)

Subject: High Range Containment Radiation Area Monitor

Pages: 6-100A, 6-100B

Deficiency: Lack of Adequate Similarity

The District inadvertently reported the model number of the radiation detectors as 878-1. The SCEW sheet was revised and issued as Page 6-100A of the District's November 5, 1982 submittal.

The Victoreen test report cited a degradation of exposed signal and high voltage cable during LOCA conditions. To preclude this degradation, radiation detector cables inside containment at Fort Calhoun are totally enclosed in stainless steel tubing (see SCEW Page 6-100B). It is the District's engineering judgement that the reasons above correct all outstanding discrepancies and this equipment should be classified as NRC Qualification Category I.a.

Attachment 2

10 CFR 50.49(b)(2) EQUIPMENT

10 CFR 50.49(b)(2) equipment was identified as that equipment contained in the following three categories:

Category 1: Non-safety grade electrical equipment whose failure may cause equipment actuation which would result in a situation outside the bounds of the safety analysis.

Category 2: Non-safety grade electrical equipment whose failure may cause CQE electrical bus interaction.

Category 3: Non-safety grade or unqualified CQE equipment whose failure may provide misleading displays to the control room operator.

Category 1 items were previously addressed in the District's response to IE Bulletin 79-22. Any concerns were addressed and corrected at that time. The District is unaware of any systems installed since then (most of those being TMI-related) which could result in a Category 1 failure. The District will conduct an investigation to verify this.

Category 2 items may be divided into two classifications:

- (1) Control power buses.
- (2) Power buses.

IE Bulletin 79-27 investigated the control power buses. Based on this, the District feels adequate isolation devices (fuses or breakers) are installed to ensure proper operation. As in the Category 1 items, the control power aspects of the modifications installed since 1979 will be investigated. No problems are anticipated.

The power buses consist of 480V and 4160V, 3 phase, distribution systems in which each item is equipped with a circuit breaker and/or a fuse which would act as an isolation device in the event of a fault. The District will review this system in more detail, but again anticipates no problem.

Category 3 equipment was previously addressed in response to the NRC's SER of the District's electrical equipment qualification. The SER required assurance that failure of non-safety related display equipment would not mislead the operator. An orange dot placed on the control panel next to the

nameplate of all qualified electrical equipment was selected as the means to identify the qualified device. Fort Calhoun's operating staff is trained in the use of orange dots to mitigate the consequence of misleading display information during accident conditions.

Attachment 3

OPEN ITEMS

The following items have been identified as requiring follow-up action:

- (1) The Foxboro and GEMS transmitter test reports have not been received as yet. These reports include the test data for the Foxboro transmitter change-out and the containment sump level detection system. Appropriate SCEWS and preventive maintenance must be completed.
- (2) Conax penetration testing must be completed.
- (3) MR-FC-80-88 involves 79-01B equipment. When this MR is completed, appropriate reporting must be accomplished. Reference the MR package and memorandum TS-FC-82-325.
- (4) When testing of Fisher 304 limit switches is complete, the appropriate SCEWS must be updated. In addition, maintenance to maintain qualified life must be incorporated into the Fort Calhoun preventive maintenance system.
- (5) MR-82-15 concerns modifications to mitigate the consequences of an FW-10 steam line break. This area should be reviewed to identify any possible harsh environment equipment.
- (6) The following valves require site survey to determine nameplate data for the components indicated:

HCV-238	-	Solenoid
HCV-240	-	Solenoid
HCV-383-1	-	Solenoid
HCV-383-2	-	Solenoid
HCV-400A,B,C,D	-	Solenoid and Fisher 546
HCV-401A,B,C,D	-	Solenoid and Fisher 546
HCV-402A,B,C,D	-	Solenoid and Fisher 546
HCV-403A,B,C,D	-	Solenoid and Fisher 546
HCV-438B,D	-	Fisher 304
HCV-467B,D	-	Fisher 304
HCV-2927**	-	Solenoid and NAMCO
HCV-724A,B**	-	Solenoid and NAMCO
HCV-725A,B**	-	Solenoid and NAMCO

HCV-742A,C**	-	Solenoid and NAMCO
HCV-820A,B	-	Solenoid
HCV-8209C,D,E,F,G,H	-	Solenoid
HCV-883B,,C,D,E,F,G,H	-	Solenoid
HCV-884**	-	NAMCO and Solenoid
HCV-1107A**	-	NAMCO and Solenoid
HCV-1108A**	-	NAMCO and Solenoid
HCV-1107B	-	Fisher 304 and 546 and Solenoid
HCV-1108B	-	Fisher 304 and 546 and Solenoid
HCV-1849	-	Fisher 304 and Solenoid
HCV-2506A**	-	NAMCO and Solenoid
HCV-2507A**	-	NAMCO and Solenoid
HCV-2604A	-	Solenoid
HCV-2929**	-	NAMCO and Solenoid
HCV-2969**	-	NAMCO and Solenoid

**Require additional PM item forms for NAMCO limit switch

- (7) High energy line break consideration should be given to the new steam generator blowdown system.
- (8) Inspect SI pump motor and AC motor lead splices.
- (9) Review control system failure/safety analysis interaction for modifications completed since 1979.
- (10) Review control power bus isolation for modifications completed since 1979.
- (11) Review power bus isolation.
- (12) The qualified life maintenance program will be implemented formally by December 1, 1983. This was originally scheduled for full implementation by July 1, 1983; however, because of a main turbine failure, the 1983 refueling outage caused delays in program implementation due to the unanticipated increased burden on the maintenance staff. All qualified life maintenance for the current year was completed during the 1983 outage.
- (13) The justification for deletion of TE866 and 867 from the qualified equipment list will be completed by the end of the 1984 refueling outage.
- (14) Complete qualification of Pyrotrol III cable.
- (15) Complete qualification of main feedwater isolation valve operator brakes.