

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

May 11, 1983
LIC-83-120

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:

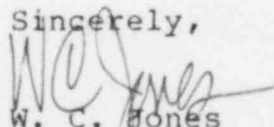
Environmental Qualification of
Safety Related Electrical Equipment
in a Harsh Environment

The District received the Commission's letter dated April 4, 1983 which provided clarification to the electrical equipment qualification Safety Evaluation Report (SER). As requested, the District has reviewed its 30-day response to the Commission's SER (OPPD letter dated February 16, 1983).

This review identified 3 items requiring additional responses. Attached is the District's justification for continued operation for the following items:

- (1) Fisher 546 E/P Valve Positioner
- (2) Pyrotrol III Cable
- (3) Limitorque Valve Motor Brake

Sincerely,


W. C. Jones
Division Manager
Production Operations

WCJ/TLP:jmm

Attachment

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

Mr. L. A. Yandell, Senior
Resident Inspector

Employment with Equal Opportunity
Male/Female

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Attachment

ITEM 1
FISHER MODEL 546 E/P TRANSDUCER

TER Equipment Item No.: 84

NRC Qualification Category: IV (Documentation Not Made
Available)

Justification for continued operation is not necessary because Fisher Model 546 E/P transducers are fully qualified for the environmental conditions encountered at Fort Calhoun. The qualification documentation is on file and the SCEW sheets were revised to reflect the new documentation. This equipment should be reclassified to Category I.a. (equipment qualified).

ITEM 2.a.
PYROTROL III CABLE

TER Equipment Item Nos.: 85, 87, 88, and 89

NRC Qualification Category: II.a. (Equipment Qualification
Not Established)

Subject: Instrumentation Cable (W57, W59)
Power Cable (W10)
Power Cable (W14, W16, W17, W18, W19, W21)
Control Cable (W37, W38, W39, W40, W41, W42)

Pages: 6-55, 6-58A, 6-57, 6-56

Deficiency: Aging Degradation Evaluation, Qualified Life or
Replacement Schedule, Radiation Criteria

Justification for continued operation has already been provided for these items. (NOTE: FRC did not find a lack of justification for continued operation in the TER.) However, in light of the deficiencies noted in the TER, the District feels that additional information on these items is warranted.

The TER concluded that the documentation submitted for the Rockbestos (Cerro) Pyrotrol III cable is insufficient to satisfy the DOR Guidelines in the areas of qualified life, age related degradation, and radiation. Specifically, the case for the similarity between Pyrotrol III and the Firewall III cable (which has been fully qualified) was not felt to be adequately demonstrated because the chemical composition and the manufacturing process of the Pyrotrol III cable has not been shown to be the same as for the Firewall III cable.

Due to the qualification deficiencies noted in the TER, the District has attempted to locate additional qualification data for Pyrotrol III cable. Two Franklin Institute Research Laboratories (FIRL) technical reports have been obtained which establish radiation dose qualifications for Pyrotrol III cable that envelope the requirements for the auxiliary building and the reactor containment (i.e., 7MRads and 30MRads, respectively). The FIRL reports are as follows:

F-C2404-01 Test of Electrical Cables Under Simulated
Post-Accident Reactor Containment Service,
June 1969

ITEM 2.a.
PYROTROL III CABLE
(Continued)

F-C2057 Test of Electrical Cables Under Simulated
Post-Accident Reactor Containment Service,
September 1970

The District has expended considerable effort in attempting to obtain information and establish aging qualifications for the Pyrotrol III cable. These efforts continue on three fronts:

1. Trying to establish that the chemical composition and manufacturing process of the Pyrotrol III cable are equivalent to the Firewall III cable.
2. Considering establishment of a test program (presently being developed by Rockbestos).
3. Considering implementation of a surveillance program.

The District expects that the aging qualification of the Pyrotrol III cables will be resolved using one or more of the above methods by the end of the 1984 refueling outage.

ITEM 2.b.

TER Equipment Item No.: 86

NRC Qualification Category: II.c.

Subject: Component Cooling Water Pump Power Cable (W11)

Page: 6-58B

Deficiency: Aging Degradation Evaluation, Qualified Life or
Replacement Schedule

See the discussion for TER Equipment Item Nos. 85, 87, 88,
and 89 which is applicable to this cable, except for the
portion which relates to radiation. (No deficiencies were
identified for radiation qualifications of this cable.)

ITEM 3
LIMITORQUE VALVE MOTOR BRAKES

TER Equipment Item No.: 28

Motor Brakes for Feedwater Isolation Valves HCV-1385 and
HCV-1386

The TER noted that certain information concerning the motor brake assemblies to HCV-1385 and HCV-1386 was not provided. The motor brakes provided with the main feedwater isolation valves HCV-1385, HCV-1386, and backup isolation valves HCV-1103 and 1104 (Limitorque motor operators) were manufactured by Dings Company, division of Wehr Corporation in Milwaukee, Wisconsin. The brakes are electrically operated disc brakes, energized to disengage and described as follows:

Model:	R72035-4
Voltage:	460 volt, single phase
Insulation:	Class B
Enclosure:	Dust tight - watertight
Manufacturer:	Dings Company Dynamic & Magnetic Group Division of Wehr Corporation 4740 West Electric Avenue Milwaukee, Wisconsin 53219

The brakes are electrically connected in parallel to one phase of the operator motor. The brake is energized (disengaged) whenever the motor is energized, allowing the motor to turn freely. The two failure modes of the brake coils, either open or short circuit, would prohibit operation of the valve.

Environment

All four valves are located in the mechanical penetration room 81 and will be subjected to the following environments:

Normal

Temperature:	40°F to 122°F
Humidity:	15 to 95%
Radiation:	Negligible
Pressure:	Atmospheric

ITEM 3
LIMITORQUE VALVE MOTOR BRAKES
(Continued)

Accident (main steam line break)

Temperature: 216°F
Humidity: 100% condensing
Radiation: 10^3 rads
Pressure: 1.2 psi

Isolation valves HCV-1385, HCV-1386, HCV-1103, and HCV-1104 would be expected to operate (close) under the accident conditions.

Discussion

All mechanical parts of the brakes are composed of either cast or cold rolled steel which will not show degradation under the environmental conditions in room 81. Electrical components are limited to eight (8) 460 volt coils which disengage the brake when energized. A material list for the coils has been obtained from Dings Company and that list is reprinted as follows with the environmental resistance of each item:

DINGS DYNAMICS & MAGNETIC GROUPS

H20003 Class B insulated coils in the R72035-4 electric brake

<u>IT</u>	<u>Description</u>	<u>Material</u>	<u>Environmental Resistance</u>
1	Magnetic Wire	Copper	Characteristics of copper are not appreciably affected by radiation or temperature levels seen in room 81.
2	Cross Over Insulation	Permacel #243 Tape Polyester Film/ Polyester Matt	Temperature: 200°F GAMMA: 1×10^5 RAD Aging: The polyester materials show the least resistance to aging conditions. Exposure to $10^5 - 10^6$ RAD will cause the polyester tensile and impact strength to decrease at $10^7 - 10^8$ ergs g^{-1} . At these levels, its usefulness as an insulator could be degraded due to cracking.

ITEM 3
LIMITORQUE VALVE MOTOR BRAKES
(Continued)

<u>IT</u>	<u>Description</u>	<u>Material</u>	<u>Environmental Resistance</u>
			Polyester shows a 20% decrease in strength after exposure to 100°C temperature for 170 hours which could cause degradation due to cracking. It should be noted that both these levels are far in excess of normal or accident conditions.
3	Construction Tape	Permacel #243 Tape Polyester Film/ Polyester Matt	See Item 2.
4	Leadwire Insulation	NOMEX-M Nylon & Mica Paper	Temperature: 167°F (nylon) GAMMA: 8.6×10^4 RAD (nylon) Aging: Mica will not undergo any discernible degradation due to accident environmental parameters seen in room 81.
5	Core Liner	NOMEX-M Nylon & Mica	See Item 4.
6	Anchor Tape	Permacel #243 Polyester Film/ Polyester Matt	See Item 2.

ITEM 3
LIMITORQUE VALVE MOTOR BRAKES
(Continued)

<u>IT</u>	<u>Description</u>	<u>Material</u>	<u>Environmental Resistance</u>
7	Leadwire	Copper Wire TPE Insulation (Thermo Plastic Elastimer)	Temperature: 256°F GAMMA: The radiation resistance for Styrene Butadiene rubber is 2×10^6 RAD. TPE insulation system is a Styrene block copolymer and as such has the same radiation resistance.
8	Part No. Label	NOMEX	Nonessential element - See IT 4.
9	Outerwrap	Fiberglass	Temperature: 480°F GAMMA: 1×10^4 RAD
10	Finish Coat	130°C Varnish Dolth PC 346A Polyester Based	Temperature: 266°F GAMMA: 1×10^5 RAD Varnish is mineral filled and used as a final finish to give the coil an integrated temperature rating of 130°C (266°F).

The Dings Company states that the integrated temperature rating of the entire coil assembly meets the requirements as NEMA Class B insulation rated for 80°C temperature rise over a 40°C ambient. It should be noted that most of the materials comprising the insulation system show maximum temperature less than the 130°C (266°F) maximum temperature for a Class B system. However, the Class B requirements have been met by testing the complete insulation system per the NEMA standards for Class B insulation.

The integrated radiation dose limit for the brakes is 10^4 RAD as determined by the threshold level of nylon used for leadwire insulation and core liners.

Conclusion

The Dings Company brakes used on feedwater isolation valves HCV-1385 and HCV-1386, HCV-1103, and HCV-1104 are a standard industrial general purpose brake. Continued use of these brakes can be justified in the mild environment of room 81.

ITEM 3
LIMITORQUE VALVE MOTOR BRAKES
(Continued)

The brakes are only energized during valve operation which is a short period of time occurring infrequently throughout the life of the plant. It is therefore a reasonable assumption that the brake coils are subjected to only ambient temperatures throughout their lifetime and should have a qualified life consistent with the Class B insulated motor provided with the Limitorque operators.

During a main steam line break incident, the brakes would be required to operate once immediately after detection of the leak. Since the brakes are housed in a watertight cast-iron enclosure, the coils will be protected from condensing steam. The combination of the short operating period and the immediacy of their operation should prevent the coils from exceeding the 130°C (266°F) maximum temperature limitation. Subsequent failure of the brakes after the isolation operation will be of no consequence to obtaining a safe shutdown condition after the main steam line break.

The low radiation threshold of some of the insulating material poses no problem in the mild radiation environment of room 81.

The Dings Company Model R72035-4 brakes provided with the motorized valve operators on feedwater isolation valves HCV-1385, HCV-1386, HCV-1103, and HCV-1104 will be replaced during the 1984 refueling outage with brakes manufactured for use in nuclear power plants. The general duty brakes currently installed on the valve operators appear to be adequate for use in the mild environment of room 81 based on the material analysis of the degradable electrical components. However, acceptable operation under the design basis accident conditions has not been demonstrated by testing and no aging analysis has been performed. Therefore, the brakes should be replaced with a Dings Model 6-72035-6 brake. Although the brake manufacturer does not have a qualification program for these brakes, Limitorque has tested the valve operator/brake combination. Dings will be asked, with purchase of the brakes, to provide in writing proof of similarity of the purchased brakes to the brakes tested in Limitorque test report 600198.