



Omaha Public Power District

1623 HARNEY ■ OMAHA, NEBRASKA 68102 ■ TELEPHONE 536-4000 AREA CODE 402

March 8, 1983

LIC-830-063

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 letter from Omaha Public Power District dated December 30, 1982, provided a status update on the qualification testing of Conax electrical containment penetrations. This letter serves to supply an additional status update and to provide the Commission with an evaluation of the testing failure.

In the December 30, 1982, letter the District reported that abnormal leakage occurred during the electrical penetration testing. This leakage occurred after the penetrations were subjected to accelerated aging.

Upon subsequent analysis, the District has concluded that in all likelihood the failure was a consequence of the testing method and is not a true indication of the characteristics of the penetrations.

The leakage appears to be the result of the high temperature used in the accelerated aging process. The penetration consists of Teflon-insulated copper wire encased in a Teflon sealing material and encased in a stainless steel sheath. The conductor insulation and the sealing material are different polymers. Based on evaluations conducted to date, the following events are believed to have occurred:

The high temperature involved in accelerated aging caused the expansion of the various components of the penetration. Because these components each have a different coefficient of expansion, the expansion was not uniform during the aging process. The expansion of the copper caused the Teflon sealing material to be crushed between the conductor insulation and the stainless steel. Because the aging process required a sustained high temperature (440 hours at 120°C), the Teflon seal "set" in its crushed condition. Upon cooling, the copper resumed its normal size, but the Teflon sealing material did not. Thus, the deformed Teflon allowed leakage between the lead wire insulation and the seal.

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It should be noted that even during worst-case accident conditions, the containment atmosphere would be at or above the test temperature for only approximately 7 minutes. Based on preliminary evaluation of a sample aged for an intermediate period, at least several days at elevated temperature are required for the events postulated above to occur.

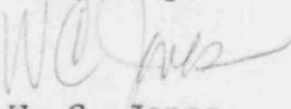
The District has been reviewing three possible options in light of the aging failure. These options are:

- 1) Test an unaged penetration and prove qualification to all other parameters.
- 2) Test an installed sample to prove aging to date and prove all other qualification parameters are met.
- 3) Age a sample for less than 40 years and prove full qualification to all other parameters.

The District is presently analyzing each of these options to determine the next step to be taken. Meanwhile, Wyle Laboratories is disassembling one of the penetrations to try to obtain more information. The District plans to reach a decision soon on what action will be taken.

Once again, the District would like to emphasize that all Conax penetrations installed at the Fort Calhoun Station have exhibited no unusual leakage during nine years of plant operation. To further attest to this, the District is aging a sample in an oven and is checking for aging failure at each ten-year interval. This is in an attempt to determine the qualified life. To date, the sample has passed the twenty-year interval. Since the test failure occurred in a laboratory environment and our experience with the installed penetrations has been excellent, continued operation of the Fort Calhoun Station is justified.

Sincerely,


W. C. Jones
Division Manager
Production Operations

WCJ/TLP:jmm

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

Mr. L. A. Yandell, NRC
Senior Resident Inspector