ATTACHMENT 3

DUKE POWER COMPANY

July 6, 1981

Mr. Harold R. Denton, Director
Office of Nuclear Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Ms. E. G. Adensam,
Licensing Branch 4

Re: McGuire Nuclear Station
Docket Nos. 50-369,370

Dear Mr. Denton:

A question has arisen with regard to the use of D. G. O'Brien connectors in the McGuire containment. The pupose of this letter is to confirm that the qualification of these connectors is adequate for plant operation to 100% of rated power. It is our position that the connectors in the electrical penetration assemblies (EPA) are fully qualified for in-service normal and postulated accident environments on the basis of original developmental and qualification testing in accordance with IEEE Standard 317-1972 and IEEE Standard 323-1971 performed by D. G. O'Brien, Inc. (D.G.O.) as documented in D.G.O. Engineering Report Number 252 dated March 21, 1977 as revised August 15, 1977, previously submitted to NRC. The adequacy of these tests is evident by the more severe exposure of the inside connectors to the accident steam environment and the margin included in the specified test environment; i.e., 340°F temperature for the test in lieu of 327 F and 240°F respectively for the maximum steam line break and LOCA conditions. Additionally three consecutive accident cycles were performed on the "K" type instrumentation without failures. Also, all the EPA's for the station were qualified by testing five different sizes of EPA's selected to envelope those installed in the plant.

The question concerning the McGuire connectors stems from recent qualification testing conducted at Sandia National Laboratory on several connectors like those installed in McGuire. This testing was conducted by the NRC as part of a qualification verification program initiated several years ago. Duke Power Company has cooperated with the NRC Staff in this effort.

There were four (4) variations between the Sandia tests and the original qualification program conducted by D. G. O'Brien:

1. The Sandia test profile was shorter than the original qualification profile by 30 hours at the 250 F plateau

This difference makes the Sandia test slightly less severe from the time at temperature standpoint. Both profiles encompass the postulated accident peak temperatures and hold these temperatures for times in excess of the postulated accident profiles.

2. The Sandia test included a junction box on the inside chamber end of the EPA. This simulated the actual installed configuration. The D. G. O'Brien test did not include this box and therefore allowed the inside connector to immediately see the full steam temperature. The Sandia test showed there was a considerable lag time between the introduction of the steam and the point where the connector temperature actually reached the chamber temperature (20-30minutes)

3. The Sandia test thermally aged the penetration at 300 F for 168 hours in a fully assembled and torqued condition. The D. G. O'Brien test did not include thermal aging of the cable grommet.

4. In the Sandia test the outside containment end of the penetration was covered throughout the test with an insulating blanket. D. G. O'Brien did not include insulation in their test.

The Sandia test did not allow for the normal heat sink provided by the outside containment end of the penetration being exposed to a much lesser temperature than the accident temperature. The D. G. O'Brien test did provide for this. The lack of the heat sink causes the connectors to see a higher total temperature than would be seen in the as installed condition.

It should be noted that neither of these tests fully represent the heat sink provided by the penetrations being bolted onto a flange sleeve which is part of the steel containment. In both tests the penetration flange was bolted directly to the heated test chamber. Normally heat would be lost through the flange and not introduced into it. A mocking up of the actual installation would further reduce the total temperature experienced by the connectors.

Several failures resulted from the Sandia test program. These failures can be attributed to the accelerated aging method that was employed. The thermal aging of these connectors in an assembled condition at the elevated temerature ,introduces a failure mode which would not exist under normal conditions during the life of the plant. This additional failure mode consisted of an expansion of the grommet material (Silicone RTV) which caused damage to the cable insulation. The subsequent retorquing of these connectors further introduced a situation which would not exist in the as installed condition. This retorquing further accelerated this failure mode when the penetration was exposed to the accident profile. Duke would note that tests of several connectors conducted by D. G. O'Brien for another facility resulted in failures similar to the Sandia experience inasmuch as the same failure mode was observed. It is Duke Power Company's position that such failures would not occur under postulated accident conditions, but rather, are the result of the artificialty of the accerlerated/thermal aging process. Regardless, whatever the ultimate disposition of the aging question may be, there is no immediate safety concern, due to the fact that McGuire has yet to commence operation.

- Notwithstanding the above, it is recognized that there are several aspects of the Sandia test which merit further investigation in order to better understand the failure mechanism observed. Duke Power Company has planned additional testing to further verify the adequacy of the qualification of these connectors. A more complete description of the planned testing will be submitted by July 15, 1981.

William O. Parker

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