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DUKE POWER COMPANY
POWER BUILDING
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WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

February 12, 1981

Mr. James P. O'Reilly, Director
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Re: RII:JPO
Catawba Nuclear Station
Docket Nos. 50-413 and 50-414

Dear Mr. O'Reilly:

Please find attached a response to IE Bulletin 80-23 for the Catawba Nuclear Station.

Approximately ten manhours, in addition to the 200 manhours required for the McGuire response, were required to perform the review and prepare this response for Catawba. Approximately 200 manhours will be required by the Construction Department to replace the valve solenoid coils.

Very truly yours,

William O. Parker, Jr.

William O. Parker, Jr.

RWO:scs
Attachment

cc: P. K. Van Doorn
Catawba Resident Inspector

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
RESPONSE TO IE BULLETIN 80-23

By February 13, 1981 the coils of all Valcor solenoid valves with part numbers V70900-21-1 or V70900-21-3 used at Catawba Nuclear Station will be replaced with coils of an improved potted construction. Valves with the new coils are qualified for their intended 1E service (i.e., normally energized; denergized on receipt of a safety signal) by similarity and testing based on Valcor qualification test reports QR52600-515 Rev. B, QP70900-21-1 Rev. A, and interim test report MR70905-21-3-1. Valcor has submitted addendum 1 to their interim test report which provides the latest information available from on-going aging tests on the new design coils and states the coil's qualified life based on the testing completed as of the report date (1/9/81).

Valcor solenoid valves V70900-21-1 and V70900-21-3 equipped with the new potted coils are considered qualified for their intended 1E service based on the following:

1. The solenoid valves with coils of the original design were qualified by similarity by Valcor qualification test reports QR52600-515 Rev. B and QR70900-21-1 Rev. A for a normally deenergized mode of operation and cycling operation during a LOCA.

2. The problems experience with normally energized operation were a result of a problem with the coil design only, and does not affect the thermal, cyclic, radiation, seismic or LOCA qualification of the solenoid valve (less coil).

3. The coil has been redesigned for normally energized operation by (1) a change in materials of construction and (2) the addition of a potting compound between the solenoid coil and the shell enclosure.

   (a) Materials of Construction - All materials utilized in the construction of the new coils are U.L. rated for continuous operation at 220°C (428°F) with the exception of a tape used to cover both the solder joints and the complete coil winding. The tape is classified as a 180°C (356°F) tape and is a U.L. recognized component.

   (b) Potting Compound - The potting material used is rated by Emerson and Cuming at 350°F.

4. The significance of the above design improvements are as follows:

   (a) The utilization of the higher temperature rated materials means that the new coils will be suitable for normally energized operation at normal and accident temperatures. The addition of the potting material allows the coil to dissipate more heat, and in normal operation, the coils will operate at a reduced temperature which extends the operating life. This has been proven by the additional testing described in interim test report MR70905-21-3-1.

   (b) Valcor has subjected six (6) prototype potted solenoid coils to on-going aging tests. The coils are energized such that the coil wire is at its rated material temperature of 220°C (428°F). Testing at this temperature is an accelerated aging. To date, no failures have been experienced and

the coils are qualified for normally energized operation in an ambient temperature of 140°F and nominal voltage for 4.07 years. The Catawba specification states a normal ambient temperature of 120°F, so the 20° difference between the test ambient and the specified ambient more than satisfies the 15°F margin recommended by IEEE-323 (1974) paragrpah 6.3.1.5.

(c) Based on test data obtained from valves at an equillibrium ambient temperature of 140°F, the coil temperature rose 91°F over ambient after 15 minutes of energization. Using 91°F as the coil temperature rise during a LOCA, the coil temperature would be 433°F. This is based on a constant ambient of 327°F plus the 15°F margin recommended by IEEE-323 (1974). The 433°F coil temperature figure is conservative for several reasons. First, the coils will be energized before and during a LOCA. Therefore, the only mechanism affecting the coil temperature rise will be the increase in the ambient temperature and not the change in state (energization) of the coil. The increase in the ambient temperature will not have as great an effect on the coil temperature rise as the change in state of the coil, because the coil saturation temperature before the onset of a LOCA averages 337°F. Second, as the coil temperature begins to rise, the resistance of the coil wire increases, thereby reducing the power required by the solenoid resulting in a reduction in the amount of heat to be dissipated by the valve. Third, the fifteen minute specified energization of the coil after the onset of the LOCA exceeds actual requirements by a factor of three (3), rather than the 10% margin recommended by IEEE-323 (1974).

5. The radiation and seismic qualification of the solenoid valve with the new coil is unaffected by the replacement of the coil and the addition of the potting compound for the following reasons:

   (a) All materials utilized in the new coil as well as the potting material are rated acceptable in a radiation environment of at least 2×10^8 rads, which meets the Catawba requirements.

   (b) The addition of the potting compound and the changes in the coil design increase the weight of the solenoid valve by less than 10%, and does not affect the response of the moving parts of the solenoid valve. The addition of the potting compound increased the rigidity of the solenoid coil, a seismic improvement over the original unpotted design.

Both Duke Power Company and Valcor agree that the preferred method of qualification for Class 1E equipment is testing; therefore, a complete qualification program will be pursued to further demonstrate the qualification of these solenoid valves. Valcor intends to submit a proposal to Duke by February 18, 1981, for additional qualification testing. Duke will review the Valcor proposal for applicability to Duke nuclear stations and determine whether Valcor and/or Duke will be responsible for the test program and when and where the testing will be conducted.