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March 16, 1984

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

Attention: Ms. E. G. Adensam, Chief
Licensing Branch No. 4

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

Dear Mr. Denton:

On February 9, 1984 representatives from Duke Power Company and the NRC staff met to discuss the environmental qualification of D. G. O'Brian electrical penetrations. Attached are responses to the follow-up questions from that meeting.

Very truly yours,

H.B. Tucker 1/BD

Hal B. Tucker

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Attachment

cc: Mr. James P. O'Reilly, Regional Administrator
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CATAWBA NUCLEAR STATION

Response to NRC Request for Additional Information
Concerning D.G. O'Brien Electrical Penetrations

The following information is provided in response to five specific questions raised by the NRC Staff concerning the environmental qualification of D.G. O'Brien electrical penetrations. To ensure proper perspective, two aspects of the environmental qualification of these penetrations should be noted.

First, the environmental qualification program including the manufacturer's test, the Sandia tests, and the Duke tests was an evolutionary process. Lessons were learned from each test not only in terms of equipment capability, but also in terms of good practices for conducting meaningful qualification tests. The objective of the Duke qualification program was to incorporate the lessons learned from previous testing into a program to establish reasonable assurance that the penetrations/connectors are capable of performing their safety function.

Secondly, conservatisms in the qualification program must be considered when reviewing the results of the program. Specifically, conservatism in the Duke program exists in the test profiles (which included margin), in the fact that two LOCA simulations were run on the same penetration, and in the IR measuring technique.

Question 1

Provide justification as to why it was not necessary to repeat the 340°F excursion in the extended LOCA test in order to determine qualification of the type K penetration.

Response

The penetration test setup included a provision for measuring the penetration connector temperature during each test. Section 7, page 44 of the first Wyle test shows the maximum temperature of the connector due to the heat transfer characteristics of the assembly to be 250°F. Therefore, the second Wyle test was designed to simulate the same temperature effects at the connector as measured in the first Wyle test without the need to repeat the initial transient excursion. Section 3, page 31 of the second Wyle test confirms that the temperature effects at the connector surface were as severe in the second test as in the first test.

Question 2

Provide justification that the insulation resistance measurements for the type K penetration shown in the qualification test report are acceptable in regard to maintaining required instrument loop accuracy.

Response

The insulation resistance measurements taken during the Wyle tests were made in an extremely conservative manner. By measuring IR from one connector pin to all other pins in the connector which were tied together and to ground, the actual IR measurement represents many parallel paths to ground. Based on Duke's review of the actual IR measuring setup, it was determined that the instrument used to make this measurement during the Wyle tests was not capable of reading below 500KΩ resistance. Therefore, any measurements indicating below 500KΩ are inconclusive.* However, a review of the original D.G. O'Brien test results showed a corellation to the Wyle test results in regard to the behavior of the type K module. Further, the D.G. O'Brien test employed an instrument capable of measuring below 500KΩ. From the D.G. O'Brien test results, it can be confirmed that the IR did drop below 500KΩ with a minimum measured resistance of 200KΩ. It should also be noted that the test results demonstrate the IR dip to be a long term phenomena (48 hours per the second Wyle report) which does not affect the required short term trip function accuracies.

The effect of a 200KΩ insulation resistance has been analyzed for all Catawba safety circuits which must remain functional in the long term post accident utilizing a type K module. The results indicate that the required long term circuit accuracies can be maintained at a penetration assembly insulation resistance of 200KΩ.

In summary, the Wyle tests alone do not provide sufficient data to address the decrease in insulation resistance below 500KΩ. However, there is similarity in all three tests (D.G. O'Brien, Wyle Tests 1 and 2) in regard to a long term phenomena resulting in a decrease and subsequent increase of insulation resistance. Based on this similarity, the extremely conservative method of measuring the insulation resistance (i.e., the measurement represents multiple parallel paths to ground), and the Catawba circuit analyses, it is concluded that the tests verify the adequacy of the type K module for their Catawba applications.

Question 3

Address the significance of the insulation measurements of "less than 0.5 megohms" for the type K penetration at the 42 hour point of the extended test. (Reference: Table III-3.VI)

Response

This issue is addressed in the response to Question 2.

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* The same instrument used in the penetration test program was demonstrated to be erratic below 500KΩ during a recent Duke visit to the Wyle facilities. Therefore, all readings in the Wyle test giving a specific value less than 500KΩ are in error. The test report will be corrected to read "<500KΩ" for all these cases.

Question 4

Address the leakage currents of "greater than 5000 microamps" for the high potential tests performed on the type K penetration at the 178 hour point of the extended test. (Reference: Table III-3.VI)

Response

All leakage currents noted in the Wyle tests were taken with AC potential which is not applicable to the Catawba applications. The applicable parameter is DC insulation resistance which is addressed in the response to Question 2.

Question 5

Address the reasons for or significance of the low insulation resistance readings in the first test on the type K penetration.

Response

The primary reason for the type K module low insulation resistance readings during the first Wyle test is attributed to cable insulation breakdown. This cable insulation breakdown was due to mishandling of the cable test specimen after thermal and radiation aging. The significance of low readings is addressed in the response to Question 2.

Additional Information

In addition to the review of the Type K modules noted above, one additional instrumentation module (Type H-Triax) has been identified that is intended to remain functional in the long term post accident environment. This penetration module serves the high range containment radiation monitor. This instrumentation performs a monitoring function only and provides no automatic protection actions. It should be noted that the original Catawba design did not require this module to be environmentally qualified. However, as a result of NRC mandated plant modifications stemming from TMI, it became necessary to employ this module in conjunction with the containment high range radiation monitor (NUREG 0737, Item II.F.1). Based on penetration data then available, the performance of the Type H module was expected to be similar to the other modules. This was the basis of the initial application. Additional evaluation is ongoing to determine final acceptability and will include current leakage considerations. This evaluation will be completed by the March 31, 1985 date of the environmental qualification rule (10CFR 50.49).