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SUBJECT: Forwards description of status of actions completed per GL 96-04 & revised schedule for completion for actions. Catawba Nuclear Station's spent fuel racks do not contain boraflex.

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December 22, 1997

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Generic Letter 96-04, "Boraflex Degradation in Spent Fuel Storage Racks"
Duke Energy Corporation Response
Oconee Nuclear Station
Docket Numbers 50-269, -270, and -287
McGuire Nuclear Station
Docket Numbers 50-369, and -370
Catawba Nuclear Station
Docket Numbers 50-413, and -414

By letter dated October 22, 1996, Duke Energy Corporation (Duke) provided its response to the subject Generic Letter which requested affected licensees to provide an assessment of the physical condition of Boraflex used in spent fuel racks. In that letter, Duke described certain assessment actions that would be completed in the future. Attached is a description of the status of those actions and a revised schedule for their completion.

Note that Catawba Nuclear Station's spent fuel racks do not contain Boraflex and the Generic Letter is, therefore, not applicable to Catawba.

Please address any questions to Lee A. Keller at (704) 382-5826.

Very truly yours,

M.S. Tuckman

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U.S. Nuclear Regulatory Commission

December 22, 1997

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Background

By letter of October 22, 1996, Duke provided information to the NRC in its response to Generic Letter 96-04, "Boraflex Degradation in Spent Fuel Storage Racks." In addition to providing the requested information, five specific commitments were made. These are as follows:

1. "A RACKLIFE assessment of all four Oconee and McGuire spent fuel pools will be completed in 1997, and plans for future in-situ testing will be developed based upon those results." (ref. Response to Request 2)
2. "The Oconee spent fuel storage racks will be analyzed during 1997, taking reduced or no credit for Boraflex." (ref. Response to Request 2)
3. "Demonstration of the EPRI Boraflex Boron Areal Density Gage (BADGER) is currently planned for the Unit 2 spent fuel racks in January 1997. The purpose of this demonstration will be to verify the capability of the equipment to determine Boraflex B¹⁰ areal density in a borated PWR spent fuel. The results will be compared to the areal density predicted by the RACKLIFE computer code, and the RACKLIFE McGuire model will be adjusted, as required." (ref. Response to Request 2)
4. "Demonstration of the BADGER assay equipment is planned for the McGuire Unit 2 pool in January 1997. The need/schedule for future in-situ examinations at McGuire will be based upon the BADGER test results and RACKLIFE predictions for the McGuire pools." (ref. Response to Request 3)
5. "The significance of the silica levels present in the Oconee and McGuire spent fuel pools and how it relates to Boraflex performance is currently under evaluation. ... This assessment, as well as an assessment of the storage rack reactivity, will be completed in 1997." (ref. Response to Request 4)

Due to a vendor delay in reporting the BADGER testing results and additional work now needed to resolve questions related to the BADGER testing, it is necessary to reschedule completion of these items. Additional information and a revised schedule are provided below.

Discussion

BADGER testing (commitments 3 and 4) was performed by Northeast Technology Corporation (NETCO) in the McGuire 2 spent fuel pool in January 1997, and the results were provided to Duke in a September 1997 pre-publication test report, "BADGER Development and Demonstration". The intent in performing this test was to both

"calibrate" the RACKLIFE model for predicting Boraflex degradation, and to demonstrate the BADGER equipment in a PWR pool.

The report showed little degradation had occurred in the Region 2 storage racks (burnup credit region for discharged fuel) and that the design basis was met. However, significant degradation was reported for the Region 1 racks (fresh fuel storage and core offload area) such that the design basis was not being met for many of the Boraflex panels.

Subsequently, both McGuire pools were declared "operable, but degraded", and compensatory measures were implemented. These measures consisted of more stringent burnup/enrichment requirements for fuel assemblies stored in Region 1, and they consider the as-reported BADGER results, plus additional degradation that would have occurred after the BADGER testing through February 12, 1998.

As discussed in the September 1997 pre-publication report, there is some indication that BADGER may be biased towards under-reporting the remaining Boraflex (i.e. reports less Boraflex than actual). This was based upon the following observations:

- a. The Region 1 Boraflex was relatively uniform in density while previous examinations showed significant degradation to be characterized by some areas of remaining Boraflex and some areas of complete erosion.
- b. A RACKLIFE model was completed for McGuire 2 in which the rack escape coefficient was adjusted to force RACKLIFE predictions to match the BADGER results. According to NETCO, the escape coefficient necessary to achieve this match is significantly larger than the typical values used by other utilities with similar storage racks.

To resolve the question of bias in the BADGER testing, NETCO recommended that the MCNP computer code be used to model the BADGER/spent fuel rack geometry and compare MCNP-predicted neutron count rates to the BADGER actual count rates.

By letter of October 10, 1997, Duke requested that EPRI authorize NETCO to perform this additional work on an expedited basis to address the question of BADGER bias. EPRI subsequently authorized this work, and NETCO is presently working towards completion in early 1998.

Duke believes it is prudent to resolve the question of BADGER bias, and thus determine the correct escape coefficient for the storage racks before RACKLIFE is used for future estimates of degradation and before any long-term surveillance plans are developed for McGuire. It should be noted the construction of the Oconee 3 spent fuel racks is virtually identical to the McGuire Region 1 racks, and the Oconee 1/2 are similar in construction. Therefore, the escape coefficients determined for McGuire Region 1 should be used as a

basis for Oconee and any RACKLIFE predictions for Oconee should await resolution of the McGuire issues.

In the September pre-publication report, NETCO made an additional recommendation that McGuire perform a test to determine the actual silica removal rate for the spent fuel pool demineralizers, given that Duke chemistry personnel and the resin manufacturer report different values. This removal rate is a key parameter in the RACKLIFE model, and an incorrect value could result in incorrect predictions for Boraflex degradation.

Conclusions

As noted in the Generic Letter response, Duke intends to use the RACKLIFE computer code to assess Boraflex in the McGuire and Oconee spent fuel pools, and to develop plans for future testing based on those assessments. Inputs to these RACKLIFE models will be based upon the results observed in the McGuire 1 BADGER testing. Since additional computer modeling of the BADGER test technique is required, these assessments and future testing plans will be rescheduled for completion in 1998.

These schedule revisions are necessary for the following reasons:

- a. BADGER results had been expected in April, but were not received until September.
- b. Suspicion of BADGER bias requires additional work by NETCO that will be completed in 1998.
- c. The recommended demineralizer test at McGuire will be complete in 1998.
- d. Completion of the Boraflex assessments for the four spent fuel pools, cannot be completed until appropriate values for the RACKLIFE escape coefficients are derived, based upon the corrected or validated BADGER results.

Revised Schedule

The following is the revised schedule for the commitments contained in the October 22, 1996 response to Generic Letter 96-04:

1. A RACKLIFE model of all four Oconee and McGuire spent fuel pools will be completed by December 31, 1998, and plans for testing will be developed based upon those results by December 31, 1998.
2. The Oconee spent fuel storage racks will be analyzed by December 31, 1998, taking reduced or no credit for Boraflex.

3. The in-situ testing phase of the EPRI Boron Areal Density Gage (BADGER) demonstration was completed in January 1997 and the results were reported to Duke in September 1997. Additional computer validation of those results will be performed and the BADGER results will be adjusted as necessary by December 31, 1998.
4. In-situ testing complete. See Commitment 3, above.
5. The significance of the silica levels present in the Oconee and McGuire spent fuel pools and how it relates to Boraflex performance will be completed with the RACKLIFE assessments by December 31, 1998.