UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DRAFT

Mr. H. B. Barron
Executive Vice President
Nuclear Generation
Duke Energy Corporation
526 South Church Street
Charlotte, NC 28202

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION RE: MIXED OXIDE LEAD FUEL ASSEMBLIES (TAC NOS. MB7863 AND MB7864)

Dear Mr. Barron:

By letter dated February 27, 2003, Duke Energy Corporation submitted an application for amendments to the operating licenses for Catawba Nuclear Station, Units 1 and 2. The proposed amendments would revise the Technical Specifications to allow the use of four mixed oxide fuel assemblies at the Catawba station. The Nuclear Regulatory Commission staff has reviewed the information provided and has determined that additional information is required as identified in the Enclosure.

We discussed these questions with your staff on _________, 2004. Your staff indicated that a response to these issues could be provided ___________. Please contact me at (301) 415-1493, if you have any other questions on these issues.

Sincerely,

Robert E. Martin, Senior Project Manager, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-413 and 50-414

Enclosure: Request for Additional Information

cc w/encl: See next page

DRAFT

REQUEST FOR ADDITIONAL INFORMATION

ON APPLICATION FOR MOX LEAD TEST ASSEMBLIES

DUKE POWER COMPANY

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

Radiological Consequences

1. In its submittal, the licensee established an increase of 9 percent in the iodine-131 (I-131) inventory of a mixed oxide (MOX) lead test assembly (LTA) over that in an "equivalent" low enrichment uranium (LEU) assembly. This factor is then applied to previously calculated results for the various design basis accidents to estimate what the dose could be with the MOX LTAs in place. This approach is accurate only if the I-131 concentration used in establishing the percentage increase is the same as that which was used to determine the previously calculated doses. The Nuclear Regulatory Commission (NRC) staff is concerned that the licensee's use of data for an equivalent LEU assembly in lieu of the current licensing basis data may have underestimated the impact on previously analyzed doses. The following examples are illustrative of the staff's concerns. They are based upon information that the staff has available. The licensee may be aware of other information, not provided to the NRC staff in the submittal or its supplements, that may be relevant to the NRC staff's concerns.

    - In Table Q3(f)-1, provided in the licensee's letter of November 3, 2003, the I-131 concentration of a 5% MOX assembly with fuel handling accident (FHA) peaking factors was identified as 8.81E+05 curies. In Attachment 6 of the licensee's letter dated December 20, 2001, an I-131 concentration of 7.46E+05 curies for an LEU assembly, including the radial peaking factor, was identified. The NRC staff questions whether the values in Attachment 6 are part of the current licensing basis for a FHA since that amendment request was approved based in part on those results. The increase in the I-131 concentration associated with the MOX LTA is 18.1 percent, double the value apparently assumed in the licensee's present comparative analysis.

    - Table 15.12 of the Catawba Updated Final Safety Analysis Report (UFSAR) provides a core inventory I-131 value of 8.9E+07 curies for a power level of 3636 megawatts thermal (MWt). This power level is 6.5 percent greater than the power level of 3411 MWt identified in Table 1 of the licensee's letter dated December 10, 2003. Since the core inventory is directly proportional to power level, the adjusted I-131 inventory would be 8.9E+07 / 1.065 = 8.36E+07 curies for the core or 8.36E+07 / 193 = 4.33E+05 curies for an average LEU assembly. Removing the peaking factor from the Table Q3(f)-1 I-131 value yields 8.81E+05

/ 1.65 = 5.34E+05 curies. The resulting increase from a current LEU assembly to the MOX LTA (4.33E+5 to 5.34E+05) is 23 percent rather than 9 percent.

For the accidents identified in Tables Q3(b)-1 through Q3(b)-4, please provide the following information:

(1) The quantity of I-131, in curies, that was utilized in the current analysis of record that provided the tabulated LEU dose

(2) The quantity of I-131, in curies, in the MOX LTA used for comparison.

(3) The rated power plus uncertainty that the LEU and MOX LTA radionuclide inventories were based upon.

(4) The percent increase in the I-131 concentrations identified in (1) and (2), adjusted for differences identified in (3)

If the resulting percent increases differ from those used in the licensee's analyses reported in Tables Q3(b)-1 through Q3(b)-4, please revise the submittal, or provide a justification of why the licensee's approach should be found acceptable.

2. In a recent teleconference, the licensee explained the basis for the Table Q3(a)-2 release fraction value of 1.96E-4. The NRC staff has determined that it will be relying on this information in preparing its safety evaluation. As such, this information is requested to be submitted by letter. Please explain the derivation of the release fraction value in the forthcoming submittal, as discussed in the teleconference.

The NRC staff reviewed the NUREG/CR-6410 method cited by the licensee in the teleconference (i.e., Section 3.3.4.8). This section discusses the crushing of small right cylinders of brittle materials by forces applied over the entire upper surface of the specimen by a component with an area greater in size than that of the impacted surface. It appears that the experimental data were obtained for individual pellets. Please provide a justification of the applicability of these data to fuel pellets contained within fuel pins that are part of a larger fuel assembly. For example, how is the momentum of the fuel assembly structural components reflected in the energy density calculated from the pellet density? Does friction between the pellet surface and the cladding reduce the compressive force represented by the energy density?