

December 18, 2000

Mr. M. S. Tuckman
Executive Vice President
Nuclear Generation
Duke Energy Corporation
526 South Church Street
P.O. Box 1006 (EC07H)
Charlotte, NC 28201-1006

SUBJECT: DUKE ENERGY CORPORATION RE: USE OF THE MARK B11 FUEL
LOADINGS AND POTENTIAL EFFECTS ON VESSEL AND REACTOR
INTERNALS IRRADIATION - OCONEE NUCLEAR STATION, UNITS 1, 2,
AND 3 (TAC NOS. MB0598, MB0599, AND MB0600)

Dear Mr. Tuckman:

By letter dated November 17, 2000, pursuant to Section 18.3.19 of the Oconee Nuclear Station Updated Final Safety Analysis Report, Duke Energy Corporation (Duke) submitted Framatome Technologies Incorporated (FTI) document 51-5010403-00, "Oconee Fuel Design Changes." The document describes the use of Mark B11 fuel assemblies for the initial (partial) fuel reloads in 2001 and the expected increase in fast neutron leakage as a result of core loadings with this fuel. Even though not requested by Duke, the staff has reviewed this information and, as a result, has generated several comments. We request that Duke address these comments prior to the use of the Mark B11 fuel.

The letter stated that the first batch of Mark B11 fuel assemblies will be loaded in the interior of the core and, therefore, will have an insignificant affect on the reactor pressure vessel integrity considerations. The analysis addressed only the impact of the initial (partial) core reload of Mark B11 fuel. However, Duke committed to perform a detailed analysis of the effects of a full core loading with the Mark B11 fuel in 2001. For the upcoming outages, Duke determined that if the Mark B11 fuel is not located in the peripheral assembly locations there would be no increase in impact on the reactor vessel materials.

The staff has previously received and approved the use of Mark B11 fuel design. The Mark B11 has a lower metal/water ratio. Therefore, for the same power level, a larger number of neutrons will escape from the core boundary and impinge on the vessel and the reactor internals. During the recent review to renew the operating licenses for the Oconee units for an additional 20 years, it was apparent that the projected fluence value could only be achieved with special measures such as very low leakage loadings.

Based on our review, the staff has the following comments:

1. The initial loadings for all three units show that eight assemblies (four on each quadrant) will be on the periphery in a diagonal manner. The FTI analysis states that the neutron mean free path is about 40 percent of the assembly width. This means that the eight assemblies will "see" outward for more than 50 percent of the assembly width. This does not seem to support the argument that the first loadings will be low

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leakage. The staff believes that the conclusion is contrary to the statement that no Mark B11 assemblies will be in peripheral assembly locations and that these fuel assemblies could have a significant effect on reactor vessel material exposure.

2. The staff has identified the following analytical weaknesses of the information used to support the analysis:
 - a. The analysis does not discuss the second loading, which is required before the equilibrium loading is achieved.
 - b. The analysis does not discuss the increased moderation and the effect it will have on the peripheral assemblies when the new B11 fuel assemblies are located in the second row.
 - c. The qualitative analysis assumes that the leakage neutrons originate in the peripheral assemblies in 95 percent of the cases. Staff calculations indicate that the proportion is more like 85 percent.
 - d. The analysis does not discuss any low leakage plans for the equilibrium core loadings.
 - e. The analysis does not discuss the anticipated effects on the reactor internals such as the baffle bolts.
3. While the licensee has concluded that no significant change would occur, the staff is not convinced that the first loading will have a negligible leakage effect. In addition the second loading is not discussed.

In addition, the staff requests that Duke submit for staff review the transition and long term loading schemes which show that at the end of the extended license, the vessel satisfies the 10 CFR 50.61(a)(8)(b) criteria.

Sincerely,

/RA/

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

Docket Nos. 50-269, 50-270, and 50-287

cc: See next page

leakage. The staff believes that the conclusion is contrary to the statement that no Mark B11 assemblies will be in peripheral assembly locations and that these fuel assemblies could have a significant effect on reactor vessel material exposure.

4. The staff has identified the following analytical weaknesses of the information used to support the analysis:
 - a. The analysis does not discuss the second loading, which is required before the equilibrium loading is achieved.
 - b. The analysis does not discuss the increased moderation and the effect it will have on the peripheral assemblies when the new B11 fuel assemblies are located in the second row.
 - c. The qualitative analysis assumes that the leakage neutrons originate in the peripheral assemblies in 95 percent of the cases. Staff calculations indicate that the proportion is more like 85 percent.
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 - e. The analysis does not discuss the anticipated effects on the reactor internals such as the baffle bolts.

5. While the licensee has concluded that no significant change would occur, the staff is not convinced that the first loading will have a negligible leakage effect. In addition the second loading is not discussed.

In addition, the staff requests that Duke submit for staff review the transition and long term loading schemes which show that at the end of the extended license, the vessel satisfies the 10 CFR 50.61(a)(8)(b) criteria.

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Oconee Nuclear Station

cc:

Ms. Lisa F. Vaughn
Legal Department (PBO5E)
Duke Energy Corporation
422 South Church Street
Charlotte, North Carolina 28201-1006

Anne W. Cottingham, Esquire
Winston and Strawn
1400 L Street, NW
Washington, DC 20005

Mr. Rick N. Edwards
Framatome Technologies
Suite 525
1700 Rockville Pike
Rockville, Maryland 20852-1631

Manager, LIS
NUS Corporation
2650 McCormick Drive, 3rd Floor
Clearwater, Florida 34619-1035

Senior Resident Inspector
U. S. Nuclear Regulatory
Commission
7812B Rochester Highway
Seneca, South Carolina 29672

Virgil R. Autry, Director
Division of Radioactive Waste Management
Bureau of Land and Waste Management
Department of Health and Environmental
Control
2600 Bull Street
Columbia, South Carolina 29201-1708

Mr. L. E. Nicholson
Compliance Manager
Duke Energy Corporation
Oconee Nuclear Site
7800 Rochester Highway
Seneca, South Carolina 29672

Ms. Karen E. Long
Assistant Attorney General
North Carolina Department of
Justice
P. O. Box 629
Raleigh, North Carolina 27602

Mr. C. Jeffrey Thomas
Manager - Nuclear Regulatory
Licensing
Duke Energy Corporation
526 South Church Street
Charlotte, North Carolina 28201-1006

Mr. Richard M. Fry, Director
Division of Radiation Protection
North Carolina Department of
Environment, Health, and
Natural Resources
3825 Barrett Drive
Raleigh, North Carolina 27609-7721

Mr. Steven P. Shaver
Senior Sales Engineer
Westinghouse Electric Company
5929 Carnegie Blvd.
Suite 500
Charlotte, North Carolina 28209