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K. R. Goller, Assistant Director for Operating Reactors, DOR

OCONEE 1 - PROPOSED CHANGES TO TECHNICAL SPECIFICATIONS (TAR-4168)

Plant Name:	Oconee Unit 1
DockettNumber:	50-269
Responsible Branch and Project Manager	ORB-1 Gary Zech
Technical Review Branch:	Coss Performance Branch
Review Status:	Complete

The Core Performance Branch has reviewed the request by Duke Power Company to change the Technical Specifications of Unit 1 of the Oconee Nuclear Station. The changes are required to permit operation of Oconee 1 in its third cycle.

We find the proposed changes to be acceptable.

Original signed by
D. F. Ross

D. F. Ross, Assistant Director
for Reactor Safety
Division of Systems Safety
Office of Nuclear Reactor Regulation

Enclosure:
Review

S. Hanauer
F. Schroeder
R. Boyd
R. A. Purple
G. Zech
P. Check
W. Brooks
W. McDonald

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

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Fuel Mechanical Design

The Oconee 1, Cycle 3 reload fuel consists of 60 Mk-B4, Batch 5 fuel assemblies. There are also 61 once-burned (batches 4A and 4B) assemblies and 56 twice-burned (batch 3) fuel assemblies in the core loading for cycle 3 operation,for a total of 177 fuel assemblies, each of which is a 15 by 15 array containing 208 fuel rods, 16 control rod guide tubes, and one incore instrument guide. Pertinent fuel design parameters are listed in Table 4.2.1-1.

Creep collapse calculations were performed for three-cycle assembly power histories for Oconee I, using the approved Babcock and Wilcox computer code, CROV (Refs. 1, 2). The calculations included conservative treatment of effects of fission gas (no credit taken), cladding thickness (lower tolerance limit), initial cladding ovality (upper tolerance limit) and cladding temperature (assembly outlet temperature) on collapse time. The most limiting assembly was found to have a collapse time greater than the maximun projected cycle 3 life of 21,500 hours.

With respect to fuel rod bowing, the model which B&W presented to us on September 8, 1975 (Ref. 3) has been reviewed and is acceptable. This model may be used to predict bow magnitude until further information becomes available. Based on Oconee 1 first cycle data, the total rod bow magnitude will be smaller than other PWR fuel designs.

Fuel thermal analysis calculations that account for the effects of fuel densification have been performed with our approved version of the B&W analytical model TAFY (Ref. 4). Fuel densification results in increases in stored energy, linear thermal output, and the probability of local power spikes from axial gaps. During Cycle 3 operation, the highest relative assembly power levels occur in batches 4 and 5 fuel. The fuel temperature analysis for batches 1, 2, and 3 fuel is documented in the Oconee Fuel Densification Report (Ref. 5). This analysis is also applicable to batches 4 and 5 because they have the same linear heat rate capabilities to centerline melt (Ref. 6).

The batch 5 fuel assemblies are not new in concept and they do not utilize different component materials. Therefore, on the bases of the analysis presented in the cited reports, we conclude that for Oconee 1, Reload 2:

1. the fuel rod mechanical design provides acceptable safety margins for normal operation, and
2. the effects of fuel densification have been acceptably accounted for in the fuel design.

1. A. F. J. Eckert, H. W. Wilson, and K. E. Yoon, "Program to Determine In-Reactor Performance of B&W Fuels-Cladding Creep Collspse," BAW-10084, May 1974.

2. A Generic Review of the B&W Cladding Creep Collapse Analysis Topical Report BAW-10084, USNRC, August 9, 1974.

3. USNRC memorandum, S. Kim to D. Ross, "Babcock and Wilcox Rod Bow Model, November 26, 1975.

4. C. D. Morgan and H. S. Kao, "TAFY - Fuel Pin Temperature and Gas Pressure Analysis," BAW-10044, May 1972.

5. "Oconee 1 Fuel Densification Report," BAW-1388, Rev. 1, July 1973.

6. "Oconee Unit 1 Cycle 3 Reload Report," BAW-1427, December, 1975.

Table 4.2.1-1 Fuel Design Parameters

	Residual Fuel Assembly		New Fuel Assembly
	Batch 3	Batch 4	Batch 5
1. Fuel Assembly Type	Mk-B2	Mk-B3	Mk-B4
2. Number	56	61	60
3. Initial Fuel Enrichment	2.15	3.20/2.60	2.75
4. Initial Fuel Density, % Theoretical	93.5	>94.5	93.5
5. Fuel Rods			
O.D. Inches	.430	.430	.430
I.D. Inches	.377	.377	.377
6. Fuel Pellet			
O.D. Inches	.370	.3685 (mean)	.370

Technical Specification Changes

By letter dated December 1, 1975, Duke Power Company requested Technical Specification changes to permit operation of Oconee Nuclear Power Station, Unit 1 during its third fuel cycle. To support this request Duke Power Company also submitted a Cycle 3 Reload Report for Oconee Unit 1, and by letter dated February 27, 1976, a supplement to this report which treated the effects of fuel rod bowing on power peaking in the core.

We have reviewed these submittals. The analyses were performed by the design methods used by Babcock and Wilcox (B&W). The 10 CFR Part 50, Appendix K criteria were applied, making use of an approved calculation model. Fuel rod bowing distributions were calculated with a B&W model based on PIE results from operation of Oconee Unit 1 during its first cycle. This model has been tentatively approved while awaiting more data from operation of Oconee Unit 1 and other B&W reactors. The peaking factor effects have been calculated with an appropriate statistical model. The calculated maximum local power increase is 2.15% The applicant has proposed to accommodate this by reducing the allowable azimuthal tilt during operation by 1.2% (excore measurement) which reduces the peaking factor by 2.21%.

The applicant has provided values for core physics parameters for the Cycle 3 loading including reactivity coefficients, potential ejected rod worth, shutdown margin, boron worth, neutron lifetime, and delayed neutron fraction. We have reviewed these values and find them acceptable.

The applicant has examined each FSAR accident analysis with respect to changes in Cycle 3 parameters to determine the effects of the reload and to ensure that thermal performance during hypothetical transients is not degraded. The analysis shows that in most cases the consequences of transients are less severe and in no case are they more severe.

On the basis of our review we conclude that the proposed Technical Specification changes are acceptable.