SAFETY EVALUATION REPORT
OCONEE UNIT 1
CYCLE 3 CORE RELOAD ANALYSIS
DOCKET NO. 50-269

1.0 Introduction

On December 1, 1975 Duke Power Company submitted proposed changes to the Oconee Nuclear Power Station Unit 1 Technical Specifications[1]. The purpose of this submittal was to seek approval to operate with the cycle ? core reload which is scheduled to be installed during the period late January to early March 1976. B&W Report BAW-1427, "Oconee Unit 1, Cycle 3 Reload Report"[2] was submitted for review along with the proposed Technical Specification changes.

2.0 General Description

The cycle 3 core consists of 177 fuel assemblies, each of which is a 15 x 15 array with 208 fuel rods, 16 control rod guide tubes and one in-core instrument tube. There are 56 twice burned Batch 3 fuel assemblies, 61 once burned Batch 4 assemblies and 60 fresh Batch 5 assemblies in the cycle 3 core. All three batches are B&W fuel and are mechanically and hydraulically similar. There are slight differences in enrichment and fuel density.

3.0 Thermal-Hydraulic Analysis

The thermal hydraulic calculations for the cycle 3 reload core were made using previously approved models and methods. There were nc differences due to mechanical differences since the new fuel elements are mechanically similar and flow resistances are identical to the previously analyzed cycle 2 core.

Reactor coolant flow was measured previously on Oconee 1 and the measured flow is used for thermal hydraulic analysis instead of the design flow. The measured flow was 107.8 $\pm$ .82 percent of design flow or 140.34 x 10^6 lbm/hr. with an error level of $\pm$ 1.146 x 10^6 lbm/hr. The basis of the flow calculation is a heat balance around the two steam generators. Thermal-hydraulic data was monitored for an hour on July 29, 1973 with the reactor at 75% of full power. Precision caliometric and flow measurements were made and averaged. An error analysis was performed resulting in the above flow tolerances, the flow test and error analysis is reported in reference 3.

The flux/flow trip setpoint previously determined for cycle 1 (reference 4) was reevaluated for the cycle 3 core. The procedure was revised to use the measured flow instead of the previously used design flow rate. Because of the higher system flow rate, most of the orifice plugs were removed from peripheral fuel assemblies which increases predicted core bypass flow from 6.04% to 8.3% and

results in a 5.3% predicted increase in core flow resulting from the measured 7.6% excess system flow rate. In addition a 4.6% flow penalty for an assumed stuck open valve was used in the analysis. A flux/flow trip setpoint of 1.07 was determined to give a satisfactory minimum DNBR of 1.31 under two pump coastdrawn conditions starting from 108% power.

On January 30 a letter was sent from the staff to Duke Power Company[6] stating that B&W report. "B&W Operating Experience of Reactor Internals Vent Valves" has been reviewed and that sufficient evidence has been presented to assure that the vent valves will remain closed during normal operation." Based on this conclusion the flow penalty can be eliminated at the request of the utility. The removal of this flow penalty will add conservatism to flow calculations. In addition Duke Power Company has committed to making a confirmatory measurement of primary system flow at or near 100% power to verify that system flow has not changed from cycle 2. (See reference 7.)

Two further changes reflected in the cycle 3 reload report and the accompanying technical specifications are:

(1) The use of the B&W2 CHF correlation down to pressures of 1750 psi instead of the previous lower pressure limit of 2,000 psi and

(2) A reduction in the minimum allowable DNBR from 1.32 to 1.30.

Both of these items have been under review by the NRC staff and have been recently approved. This approval is documented in reference 5.

4.0 Accident and Transient Analysis

Accident and Transient analyses reported in paragraphs 7.2 through 7.4 in the Oconee 1 cycle 3 reload report are not required to be redone for the cycle 3 core reload because the core is hydraulically similar and of the same design and manufacture as the cycle 2 core and reactivity coefficients and other input data is the same as, or is bounded by previous analyses.

5.0 Fuel Rod Bow Evaluation

The effect of rod bowing on DNBR was considered. A review of reference 8 indicated that the licensee calculated a 2.1% peaking penalty due to rod bowing. A staff calculation to verify the penalty indicated that this penalty was appropriately conservative. The penalty accepted by the licensee was applied without a reduction in DNBR by flattening the allowable radial power profile which maintains the same margin between operating heat flux and critical heat flux.

References

1. Letter from William O. Parker Jr. to Mr. Benard C. Rusche dated December 1, 1975.

2. Oconee Unit 1 Cycle 3 Core Reload Report, BAW-1427, December 1975.

3. Letter from Mr. A. C. Thies to Mr. Angelo Giambusso dated August 23, 1973.

4. Docket 50-269, -270, and 287, FSAR Supplement 17, February 15, 1974.

5. Letter from D. F. Ross to Darrell Eisenhut dated February 23, 1976.

6. Letter from Robert A. Purple to Mr. William O. Parker Jr. dated January 30, 1976.

7. Letter, William O. Parker Jr. to Benard C. Rusche, dated February 24, 1976.

8. Letter, William O. Parker Jr. to Benard C. Rusche, dated February 27, 1976.