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SCHWENCER,A. OPERATING REACTORS BRANCH 1

SUBJECT: CP&L WILL PERFROM EXTENDED BURNUP TEST FOR 4 FUEL ASSEMBLIES DURING CYCLE 7 & FORWARDS PROGRAM DESCRIPTION.

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Carolina Power & Light Company

FILE: NG-3514(R) April 23, 1979 SERIAL: GD-78-1082

Office of Nuclear Reactor Regulation
ATTENTION: Mr. Albert Schwencer, Chief
Operating Reactors Branch No. 1
United States Nuclear Regulatory Commission
Washington, D. C. 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
EXTENDED BURNUP TEST DURING CYCLE 7 OPERATIONS

Dear Mr. Schwencer:

Our letter of March 14, 1979, stated that Carolina Power & Light Company was considering an extended burnup test for four fuel assemblies during Cycle 7. After reviewing the program in detail and conducting the required analyses, CP&L has decided to conduct the test and, therefore, carry over four selected fuel assemblies for a fourth cycle. The attached program description gives the details of the test.

Our analysis of the extended burnup test has shown that no unreviewed safety questions are involved and that no Technical Specification changes will be required. This refueling and the test will, therefore, be conducted under the provisions of 10CFR50.59(a). If, during the refueling, the inspection of the fuel reveals that candidate assemblies are not suitable for conducting the test, the test will be cancelled and the refueling will be as originally described in our March 14, 1979, letter. Fresh fuel is available onsite to allow for this contingency.

If you have any questions concerning this item, please contact our staff.

Yours very truly,

E. E. Utley
Senior Vice President
Power Supply

JJS/mf

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H. B. ROBINSON UNIT 2
EXTENDED BURNUP DEMONSTRATION PROGRAM

I. INTRODUCTION

There are economic and resource conservation incentives to increase the discharge burnup in light water reactors such as the H. B. Robinson Unit 2. Fuel assemblies in the H. B. Robinson Unit 2 nuclear reactor are normally irradiated for three annual cycles before being discharged at an average assembly burnup of approximately 30,000 MWD/MTU. The peak assembly burnup in such discharged assemblies is typically about 33,000 MWD/MTU. An Extended Burnup Demonstration Program (EBDP) for H. B. Robinson Unit 2 has been developed and represents a first step in developing a technological base for increasing the fuel assembly average discharge exposure beyond 30,000 MWD/MT and is focused toward an assembly average discharge exposure of 40,000 MWD/MT.

II. EXTENDED BURNUP OF FOUR ASSEMBLIES

On April 11, 1979, the H. B. Robinson nuclear reactor completed operating Cycle 6. During Cycle 6, the core was fueled with three regions of Exxon Nuclear Company (ENC) fuel assemblies. One region, initially loaded in November, 1975, will have achieved a normal discharge burnup of approximately 30,000 MWD/MTU at EOC 6. As the key part of the Extended Burnup Demonstration Program, four assemblies with symmetrical operation from that 52 assembly region will be irradiated for an additional operating cycle, i.e., Cycle 7.

The purpose of extending four fuel assemblies for an extra operating cycle is to obtain detailed fuel performance data before and after this additional cycle. The following inspections are planned during the outage that precedes Cycle 7: 1) Television visual inspection of all four sides of each assembly, rod-to-rod spacing measurements and assembly length measurements; and 2) The removal of the upper tie plate from one of the assemblies, allowing approximately 20 fuel rods to be removed such that full length characterization with a profilometer and an eddy current inspection can be performed.

At the completion of Cycle 7, a poolside examination will be performed, to quantitatively determine if any changes have occurred to the fuel during the extended burnup cycle. If appropriate, more detailed destructive examination will be performed.

III. SUPPORTING ANALYSIS

The four demonstration assemblies will have achieved an exposure of 32,000 MWD/MTU at BOC 7. The EOC 7 average exposure for these assemblies is projected to be approximately 40,000 MWD/MTU, with a maximum rod exposure of approximately 41,000 MWD/MTU. The current Plant Transient and ECCS Analyses have been reviewed and found to be valid for the Cycle 7 core with the four extended burnup assemblies. The safety analysis has shown that the characteristics of the fuel and of the reloaded core are in conformance with existing Technical Specifications and that there are no unreviewed safety questions associated with the extended burnup assemblies.

Analysis confirmed that the maximum internal fuel rod pressure will not exceed the system pressure for all fuel during Cycle 7 operation. Other material characteristics such as hydrogen pickup in the cladding, irradiation-induced cladding elongation, and cladding fatigue have all been evaluated and are within acceptable limits during the extension of burnup for the four demonstration assemblies.

IV. CONCLUSIONS

The proposed Extended Burnup Demonstration Program at the H. B. Robinson Plant will provide a valuable data base on irradiated fuel performance between 30,000 and 40,000 MWD/MTU. The suitability of the current fuel design for large scale extended burnup operation in PWRs, in general, and H. B. Robinson Unit 2 in particular, will be significantly better understood upon completion of this program. The adequacy of the mechanical design for operating these fuel assemblies to extended burnup has been evaluated and is judged to be fully acceptable with respect to both safe and fuel failure free operation of the core.