



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 143 TO FACILITY OPERATING LICENSE NO. DPR-72
FLORIDA POWER CORPORATION, ET. AL.
CRYSTAL RIVER UNIT NO. 3 NUCLEAR GENERATING PLANT
DOCKET NO. 50-302

1.0 INTRODUCTION

By letter dated February 13 1992, Florida Power Corporation (FPC or the licensee) requested an amendment to the Technical Specifications (TS) appended to Facility Operating License No. DPR-72 for the Crystal River Unit No. 3 Nuclear Generating Plant (CR-3). The proposed amendment would revise the description of fuel assemblies in TS 5.3.1 to permit the use of stainless steel rods to replace defective fuel rods. A footnote, added by the NRC staff after discussions with the licensee, restricts the use of reconstituted fuel assemblies to a specific arrangement for Cycle 9 operation only. Licensee letters dated May 6, 1992 and June 4, 1992 provided additional information which did not change the initial no significant hazards consideration determination.

The change involves the use of nine stainless steel dummy rods replacing nine fuel rods in five fuel assemblies in the CR-3 Cycle 9 core. Some fuel assemblies were reconstituted with two stainless steel rods, however, each stainless steel rod was surrounded by fuel-bearing rods, i.e., there were no stainless steel rods sharing a common coolant subchannel. In order to justify the use of stainless steel dummy rods in the core, the licensee performed cycle-specific reload analyses. The staff's evaluation follows.

2.0 EVALUATION

Dummy rods (Zircaloy-4 or stainless steel rods) were originally used in fuel assemblies to replace those fuel rods damaged by the baffle jetting problem in Westinghouse reactors. The concept was extended further to replace failed rods during reconstitution of fuel assemblies in other locations. However, in order to satisfy generic fuel design criteria as described in the Standard Review Plan, the dummy rods require mechanical, nuclear, and thermal-hydraulic analyses to demonstrate that inclusion of the dummy rods in fuel assemblies with the specific configurations and core locations chosen for a specific fuel cycle is acceptable with respect to the overall fuel performance and safety significant conclusions.

2.1 Mechanical Evaluation

The licensee stated that, based on a Babcock & Wilcox (B&W) structural evaluation, the stainless steel filler rods would not adversely affect the performance of a fuel assembly during a combined loss-of-coolant accident (LOCA) and safe shutdown earthquake (SSE). Since the total number of filler rods is limited to nine stainless steel rods in five assemblies, the staff concludes that there is reasonable assurance that the reconstituted assemblies will have no adverse effects on the CR-3 Cycle 9 core.

2.2 Nuclear Evaluation

The licensee provided a core map showing beginning-of-cycle (BOC-9) power distributions for Cycle 9 which showed that the reconstituted assemblies at the proposed core locations have substantial margin to the limiting peak power. Thus, the staff considers the nuclear design acceptable for Cycle 9.

2.3 Thermal-Hydraulic Evaluation

The licensee analyzed the reconstituted assemblies' departure from nucleate boiling ratio (DNBR) margin assuming a 10% DNBR penalty on the fuel rods adjacent to the stainless steel rod. The results showed that the most limiting reconstituted assemblies met the DNBR requirement. Based on the DNBR conservative assumption, the staff considers the thermal hydraulic analysis acceptable.

3.0 TS CHANGES

Section 5.3.1, Reactor Core

In Section 5.3.1, Reactor Core, Fuel Assemblies, the revised TS should indicate the use of nine dummy rods in five fuel assemblies based on the analyses approved by this Safety Evaluation for CR-3 Cycle 9 operation only. The proposed TS limits the use of dummy rods to those fuel designs that have been analyzed with staff-approved methods. Since this approval is limited to Cycle 9, the licensee has agreed to the following footnote to the TS:

"*For Cycle 9 operation only, up to five recaged fuel assemblies, one that has been reconstituted with a single replacement stainless steel filler rod and four that have been reconstituted with two replacement stainless steel filler rods, arranged such that each stainless steel rod is fully surrounded by fuel rods, may be used as approved by the NRC safety evaluation for Amendment No. 143."

The staff finds the modified TS change acceptable.

4.0 SUMMARY

The staff has reviewed the licensee's submittal, including the results of the safety analyses, to assure that the fuel assembly design changes will not result in failure to meet the pertinent design safety criteria. The staff concludes that the proposed TS revisions, as modified, are acceptable and that

the cycle-specific evaluation is acceptable for CR-3 Cycle 9 when the use of the dummy rods is limited as described in TS 5.3.1, as modified.

The application of these methods to cores with more extensive use of dummy rods will require further justification, such as that contained in the B&W Topical Report BAW-2149, "Evaluation of Replacement Rods in BWFC Fuel Assemblies," currently under separate review by the NRC. In addition, the DNB evaluation methods described herein are not approved for generic applications.

3.0 STATE CONSULTATION

Based upon the written notice of the proposed amendment, the Florida State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding (57 FR 11109). Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Date: June 25, 1992