



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 153 TO FACILITY OPERATING LICENSE NO. DPR-62

CAROLINA POWER & LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2

DOCKET NO. 50-324

1.0 INTRODUCTION

By letter dated September 4, 1987, as supplemented October 2, 1987, the Carolina Power & Light Company (the licensee), submitted requests for Technical Specification (TS) changes and safety evaluations to support operation of Fuel Cycle 8 for the Brunswick Steam Electric Plant, Unit 2. Amendment No. 149 was issued in April 8, 1988, authorizing operation only up to an average fuel bundle burnup of 33,000 MWD/MT. This restriction was applied because the staff had not completed its review of the environmental effects of either operation at higher burnups or transportation of higher burnup fuel. Nor had the staff fully addressed the impact of higher burnup fuel on the radiological consequences of design basis accidents. The staff has completed its review of the environmental effects of operation with and transportation of fuel with burnups exceeding 33,000 MWD/MT, as well as its review of the potential impact on design basis accident evaluations.

2.0 EVALUATION

The licensee has requested authorization to allow fuel burnup up to 60,000 MWD/MT. The staff and licensee evaluated the potential impact of this change on the radiological assessment of design basis accidents (DBA) which were previously analyzed in the licensing of Brunswick Unit 2.

The licensee in their submittals of September 4, September 25, and October 2, 1987 concluded that the design basis accidents previously analyzed by the licensee in their FSAR bound any potential radiological consequences of DBA that could result with the extended burnup fuel.

The staff reviewed the licensee's submittals and also reviewed a publication which was prepared for the NRC entitled, "Assessment of the Use of Extended Burnup Fuel in Light Water Reactors," NUREG/CR 5009, February 1988. The NRC contractor, the Pacific Northwest Laboratory (PNL) of Battelle Memorial Institute examined the changes to NRC DBA assumptions (described in the various appropriate SRP sections and/or Regulatory Guides) that could result from the use of extended burnup fuel (up to

60,000 MWD/MT). The staff agrees that the only DBA that could be affected by the use of extended burnup fuel, even in a minor way, would be the potential thyroid doses that could result from a fuel handling accident. PNL estimates that I-131 fuel gap activity in the peak fuel rod with 60,000 MWD/MT burnup could be as high as 12%. This value is approximately 20% higher than the value normally used by the staff in evaluating fuel handling accidents (Regulatory Guide 1.25, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling and Storage Facilities for Boiling and Pressurized Water Reactors").

The staff, therefore, reevaluated the fuel handling accidents for the Brunswick Unit 2 facility with an increase in iodine gap activity in the fuel damaged in a fuel handling accident. Table 1 presents the fuel handling accident thyroid doses as shown in the operating licensing Safety Evaluation Report dated November 1973 and the recalculated thyroid doses (increased by 20%) possible with extended burnup fuel.

Table 1

Thyroid Doses as a Consequence of a DBA Fuel Handling Accident

	<u>Exclusion Area</u>		<u>Low Population Zone</u>	
	Thyroid Dose (Rem)		Thyroid Dose (Rem)	
	A*	B**	A*	B**
Fuel Handling Accident	2	2.4	1.5	1.8

*A SER dose

**B Extended burnup fuel dose

The staff concludes that the only potential increased dose potentially resulting from DBA with extended fuel burnup to 60,000 MWD/MT is the thyroid dose resulting from fuel handling accidents. This small calculated increase is insignificant, in that these doses remain well within the 300 Rem thyroid exposure guideline values of 10 CFR Part 100.

3.0 SUMMARY

The staff has completed its review of the information submitted by the licensee to support proposed Technical Specification changes required for the operation of Cycle 8 and concludes that the proposed amendment to allow extended fuel burnup to 60,000 MWD/MT is acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact have been prepared and published in the Federal Register (53 FR 34357) on September 6, 1988. Accordingly, based upon the environmental assessment, the Commission has determined that the issuance of this amendment will not have a significant effect on the quality of the human environment.

5.0 CONCLUSION

The Commission made a proposed determination that this amendment involves no significant hazards consideration which was published in the Federal Register (53 FR 2310) on January 27, 1988, and consulted with the State of North Carolina. No public comments or requests for hearing were received, and the State of North Carolina did not have any comments.

The staff 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Dated: September 20, 1988