January 20, 1987

Docket No. 50-261

DISTRIBUTION

Docket File	J. Partlow
NRC PDR	T. Barnhart (4)
Local PDR	W. Jones
PAD#2 Rdg	E. Butcher
T. Novak	N. Thompson
D. Miller	V. Benaroya
G. Requa	Tech Branch
OGC-Bethesda	ACRS (10)
L. Harmon	C. Miles, OPA
E. Jordan	L. Tremper, LFMB
B. Grimes	Gray File

Mr. E. E. Utley, Senior Executive Vice President
Power Supply and Engineering & Construction
Carolina Power and Light Company
Post Office Box 1551
Raleigh, North Carolina 27602

Dear Mr. Utley:

The Commission has issued the enclosed Amendment No. 112 to Facility Operating License No. DPR-23 for the H. B. Robinson Steam Electric Plant Unit No. 2. This amendment consists of changes to the Technical Specifications in response to your request dated October 13, 1986, as supplemented by letter dated December 11, 1986.

The amendment revises Technical Specification Section 5.3.13 to: increase the fuel enrichment from 3.5 w/o to 3.9 w/o; reformat and rewrite section 5.4 to mention the previously approved 21-inch center-to-center spacing of the new fuel storage racks; allow storage of fuel with a maximum axial plane enrichment of 3.9 w/o in both new and spent fuel racks; inclusion of the design k_{eff} for worst accident conditions; adding boron concentration for the spent fuel pit during fuel handling; and revising Table 4.1-2 to correct an error and specify a sampling requirement prior to new fuel movement in the spent fuel storage pit.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular bi-weekly Federal Register notice.

Sincerely,

/s/

Glode Requa, Project Manager
PWR Project Directorate #2
Division of PWR Licensing-A
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 112 to DPR-23
2. Safety Evaluation

cc: w/enclosures
See next page

LA:PAD#2	PM:PAD#2	OGC	PD:PAD#2
DMiller	GRequa:hc	RBachmann	LRubenstein
1/9/87	1/9/87	1/9/87	1/26/87

Mr. E. E. Utley
Carolina Power & Light Company

H. B. Robinson 2

cc:
Thomas A. Baxter, Esquire
Shaw, Pittman, Potts and Trowbridge
2300 N Street, N.W.
Washington, DC 20037

Mr. McCuen Morrell, Chairman
Darlington County Board of Supervisors
County Courthouse
Darlington, South Carolina 29535

Mr. H. A. Cole
Special Deputy Attorney General
State of North Carolina
P.O. Box 629
Raleigh, North Carolina 27602

Mr. D. E. Hollar
Associate General Counsel
Carolina Power and Light Company
P.O. Box 1551
Raleigh, North Carolina 27602

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
H. B. Robinson Steam Electric Plant
Route 5, Box 413
Hartsville, South Carolina 29550

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
Suite 2900
101 Marietta Street
Atlanta, Georgia 30303

Mr. R. Morgan
General Manager
H. B. Robinson Steam Electric Plant
Post Office Box 790
Hartsville, South Carolina 29550

Mr. Dayne H. Brown, Chief
Radiation Protection Branch
Division of Facility Services
Department of Human Resources
701 Barbour Drive
Raleigh, North Carolina 27603-2008

Mr. Robert P. Gruber
Executive Director
Public Staff - NCUC
P.O. Box 29520
Raleigh, North Carolina 27626-0520

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

CAROLINA POWER AND LIGHT COMPANY

DOCKET NO. 50-261

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 112
License No. DPR-23

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Carolina Power and Light Company (the licensee) dated October 13, 1986, as supplemented by letter dated December 11, 1986 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Facility Operating License No. DPR-23 is hereby amended to read as follows:

(B) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 112 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Lester S. Rubenstein, Director
PWR Project Directorate #2
Division of PWR Licensing-A
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications

Date of Issuance: January 20, 1987

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 112 FACILITY OPERATING LICENSE NO. DPR-23

DOCKET NO. 50-261

Revise Appendix A as follows:

Remove Pages	Insert Pages
4.1-10	4.1-10
5.3-1	5.3-1
5.4-1	5.4-1
---	5.4-2

TABLE 4.1.2

FREQUENCIES FOR SAMPLING TESTS

	Check	Frequency	Maximum Time Between Tests
1. Reactor Coolant Samples	- Gross Activity (1)	Minimum 1 Per 72 hrs.	3 days
	- Radiochemical (2)	Monthly	45 days
	- Radiochemical for $\bar{E}$ Determination	1 per 6 mos. (6)(7)	6 months
	- Isotopic Analysis for Dose Equivalent I-131 Concentration	1 per 14 days (7)	14 days
	- Isotopic Analysis for Iodine Including I-131, I-133 and I-135	a) Once per 4 hours (8) b) One sample (9)	
	- Tritium Activity	Weekly	10 days
	- Cl & O_2	5 day/week	3 days
2. Reactor Coolant Boron	Boron concentration	Twice/week	5 days
3. Refueling Water Storage Tank Water Sample	Boron concentration	Weekly	10 days
4. Boric Acid Tank	Boron concentration	Twice/week	5 days
5. Spray Additive Tank	NaOH concentration	Monthly	45 days
6. Accumulator	Boron concentration	Monthly	45 days
7. Spent Fuel Pit	Boron concentration	Prior to Refueling or New Fuel Movement in the Spent Fuel Pit	NA*
8. Secondary Coolant	Gross activity	Minimum 1 Per 72 hrs.	3 days
	Isotopic Analysis for Dose Equivalent I-131 Concentration	a) 1 per 31 days (10) b) 1 per 6 months (11)	
9. Stack Gas Iodine & Particulate Samples	I-131 and particulate radioactivity releases	Weekly (3)	10 days
10. Steam Generator Samples	Primary to secondary tube leakage	5 days/week	3 days

5.3 REACTOR

5.3.1 REACTOR CORE

5.3.1.1 The reactor core contains approximately 68 metric tons of uranium in the form of natural or slightly enriched uranium dioxide pellets. The pellets are encapsulated in Zircaloy-4 tubing to form fuel rods which are all pre-pressurized. The reactor core is made up of 157 fuel assemblies. Each fuel assembly contains 204 fuel rod locations occupied by rods consisting of natural or slightly enriched uranium pellets, solid inert materials, or a combination of the aforementioned.(1)

5.3.1.2 Deleted

5.3.1.3 Reload fuel will be similar in physical design to the initial core. The enrichment of reload fuel will be no more than 3.9 weight percent of U-235.

5.3.1.4 Deleted

5.3.1.5 There are 45 full-length RCC assemblies in the reactor core. The full-length RCC assemblies contain 144-inch segments of silver-indium-cadmium alloy clad with stainless steel.(2)

5.3.1.6 Deleted

5.3.2 REACTOR COOLANT SYSTEM

5.3.2.1 The design of the Reactor Coolant System complies with the code requirements.(3)

5.4 FUEL STORAGE

5.4.1 SPENT FUEL PIT

The new and spent fuel pit structures are designed to withstand the anticipated earthquake loadings as Class I structures. The spent fuel pit has a stainless steel liner to ensure against loss of water.(1)

5.4.2 CRITICALITY

5.4.2.1 NEW FUEL STORAGE RACKS

Due to the new fuel storage rack design, a nominal 21-inch center-to-center distance is maintained between fuel assemblies. To permit storage of fuel with a maximum assembly axial plane enrichment of 3.9 weight percent U-235, additional separation is maintained by use of any of the storage rack location options below(2) in order to establish a geometry which ensures that k_{eff} is less than 0.95 assuming the new fuel storage racks are flooded with unborated water and which assures that k_{eff} is less than 0.98 in an optimum moderation event.

The four listed options provide fuel storage locations which are secured to prevent fuel storage in those locations

OPTION A: B4,6,8,10 / C3,5,7,9 / D4,6,8,10 / E3,5,7,9 / F4,6,8,10 / G3,5,7,9
H4,6,8,10 / J3,5,7,9

OPTION B: C4,5,6,7,8,9 / D4,5,6,7,8,9, / E4,5,6,7,8,9, / F4,5,6,7,8,9
G4,5,6,7,8,9 / H4,5,6,7,8,9

OPTION C: C4,5,6,7,8,9 / D4,5,6,7,8,9 / E4,5,8,9 / F4,5,8,9 / G4,5,6,7,8,9
H4,5,6,7,8,9

OPTION D: C4,5,6,7,8,9 / D4,5,8,9 / E4,5,8,9 / F1,4,5,8,9 / G1,4,5,8,9
H1,4,5,6,7,8,9 / J1 / K1

5.4.2.2 SPENT FUEL STORAGE PIT

A combination of nominal assembly spacing and neutron absorbent material between stored assemblies is maintained to ensure that k_{eff} is less than 0.95 when flooded with unborated water based on a maximum assembly axial plane enrichment of 3.9 weight percent U-235.

5.4.3 BORON CONCENTRATION - SPENT FUEL STORAGE PIT

The spent fuel storage pit is filled with borated water at a concentration of greater than or equal to 1500 ppm during refueling operations or new fuel movement in the spent fuel storage pit. This minimum boron concentration ensures subcriticality under worst case design events.

5.4.4 STORAGE CAPACITY - SPENT FUEL STORAGE PIT

The spent fuel storage pit provides a storage location for 544 fuel assemblies.

Reference

(1) FSAR Section 9.1

(2) XN-NF-86-100, "Final Report, Criticality Safety Analysis, H. B. Robinson New Fuel Storage Vault with 4.2 Percent Enriched 15 x 15 Fuel Assemblies, August, 1986"

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 112 TO FACILITY OPERATING LICENSE NO. DPR-23

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NO. 50-261

I. INTRODUCTION

By letter to L. S. Rubenstein (NRC) from A. B. Cutter (CP&L) dated October 13, 1986, Carolina Power and Light Company (the licensee) requested revision of the Technical Specifications for H. B. Robinson Unit 2. The changes concern the storage and handling of fuel with an increased enrichment to 3.9 w/o of U-235. At our request, the licensee revised the content of one of the changes to specifically designate acceptable fuel storage locations in the new fuel storage vault. This was done in a letter to L. S. Rubenstein (NRC) from A. B. Cutter dated December 11, 1986. In support of the requested changes the licensee provided the following Exxon reports with his initial submittal:

1) "Final Report, Criticality Safety Analysis, H. B. Robinson New Fuel Storage Vault with 4.2 Percent Enriched 15 x 15 Fuel Assemblies," August 1986, Exxon Report No. XN-NF-86-100.

2) "Final Report, Criticality Safety Analysis, H. B. Robinson Spent Fuel Storage Rack (Unpoisoned, Low Density) with 4.2 Percent Enriched 15 x 15 Fuel Assemblies," August 1986, Exxon Report No. XN-NF-86-107.

II. EVALUATION

The analyses contained in the above Exxon Reports were performed for an enrichment of 4.2 w/o U-235. The value in the proposed Technical Specification change, however, is a more limiting enrichment of 3.9 w/o, which was previously submitted and approved for the high-density, poisoned spent fuel racks. The scope of the requested changes is limited to the handling and storage of more highly enriched new fuel elements. Operation with the increased enrichment will be addressed in subsequent reload analyses.

The specific proposed Technical Specification changes are:

1. Page 5.3.7, Section 5.3.13 - Reactor Core Design Specification. The enrichment of the reload fuel is changed from 3.5 w/o to 3.9 w/o.

2. Pages 5.4-1 and 2, Section 5.4 - Fuel Storage Design Specification. This section has been rewritten and reformatted to include mention of the nominal 21-inch center-to-center spacing of the new fuel storage racks, allow storage of fuel with a maximum axial plane enrichment of 3.9 w/o of U-235 in both the new and spent storage racks, the design k_{eff} for worst accident conditions, and boron concentration for the spent fuel pit during fuel handling.

3. Page 4.1-10, Table 4.1-2 - Frequency for Sampling Tests. Changes include correction of a typographical error and specification of a sampling requirement prior to new fuel movement in the spent fuel storage pit.

The analysis supporting the proposed changes for the new fuel storage vault is contained in Exxon Topical Report XN-NF-86-100 (referenced above). The report describes the model used for the new storage vault analysis, the assumed input parameter values, the methods used for the analysis, and presents some of the results of the methods verification.

The values of fuel parameters selected for the analysis were chosen in the conservative direction. Thus, fuel pellet density was chosen to be slightly greater than the design value, the fuel pellet dish volume was neglected, and the fuel stack length was taken as 144 inches whereas the fuel design stack length is 132 inches (enriched). There is a minimum of 12 inches of natural uranium in all fuel rods, and some have a larger section of natural uranium. Most importantly, no Gd_2O_3 content was assumed in the model fuel. Nominal values were used for remaining fuel geometry and composition parameters. Because of the conservative assumptions indicated above, we conclude the fuel model used in the calculations is acceptable.

Conservative assumptions were made concerning the fuel storage rack, geometry and composition. The modeled storage rack pitch is 20.857 inches, whereas the actual rack value is nominally 21 inches. The vault was reflected within 30 cm of concrete at the 4 walls, the floor and at 14 feet above the ceiling. All rack materials of construction were neglected in the model. Thus the model is conservative in geometry, reflection and neutron absorption effects, and is therefore acceptable.

The calculation methods use KENO-IV or XSDRNPM for k_{inf} and k_{eff} calculations. Suitable cross section libraries were used. The report presents the results of comparison of the criticality factors for four sets of critical experiments. The results show good agreement with the measured criticalities. We therefore conclude the calculation model used is acceptable.

The calculation of the actual new fuel vault criticality with fuel bundles modeled in all 105 locations indicated that the criterion of k_{eff} =0.98 with optimum moderation of the fuel rack would not be met. This criterion and one requiring k_{eff} to be =0.95 for the rack fully flooded (or for the worst credible accident) must be met according to the Standard Review Plan, NUREG-0800. In view of unacceptability of the criticality of the new fuel storage racks when fully loaded, the report presents the results of four alternative loadings of fuel in the rack with empty locations interspersed between fuel locations. These allow loading of 69-73 fuel bundles.

The alternative loading patterns all show an acceptable k_{eff} for optimum moderation. At our request the licensee amended his original submittal to specify which fuel locations must be locked out in order to ensure conformance with the optimum moderation criticality requirements. With these changes, we find the proposed changes to Specification 5.4.1, New Fuel Storage Racks, acceptable. The Specification also defines the maximum enrichment to be stored as 3.9 w/o U-235. This is conservative because the analysis shows acceptable criticality results with an enrichment of 4.2 w/o U-235.

The change to Specification 5.3.1.3 (Item 1 above) is acceptable because it merely indicates that fuel enrichments up to 3.9 w/o U-235 can be used in the core design. Determination of the acceptability of an actual core design must be verified in the calculation of physics parameters and accident analysis in the reload design evaluation.

Topical Report XN-NF-86-107 (referenced above) provides the results of a criticality analysis of the spent fuel pit using fuel with a maximum enrichment of 4.2 w/o U-235. The conservative assumptions concerning fuel and rack geometry described above for the new fuel vault calculations were also used for the spent fuel pit calculations except the more conservative assumption of an infinite array of infinite length assemblies was used for the spent fuel pit calculations. The same computer code methods were used. The results indicate that k_{eff} =0.95 for the worst condition of the pit fully flooded with pure water. A spectrum of accidents was evaluated which show that the above case is limiting except for closer edge to edge fuel assembly placement during a fuel handling accident. The analysis shows that a minimum boron concentration of 500 ppm during fuel handling will prevent exceeding the k_{eff} criterion of =0.95. The proposed change to Specification 5.4.3, BORON CONCENTRATION-SPENT FUEL STORAGE PIT, which requires a boron concentration of =1500 ppm during refueling operations or new fuel movement in the spent fuel storage pit is much more conservative than the value used in the analysis and is, therefore, acceptable.

III. SUMMARY

We conclude that the Technical Specification changes proposed by CP&L for H. B. Robinson Unit 2 above are acceptable. The change in item 1 above is acceptable because the cycle specific reload analysis will demonstrate the safety of the actual reload enrichment. The changes in item 2 above are acceptable because they conform with our requirements for fuel storage criticality and were calculated as discussed above with conservative fuel parameter and storage rack assumptions and with acceptable computer models. The changes in item 3 above are acceptable because the first is an administrative change (correction of a typographical error) and the other represents a suitable requirement to prevent an approach to criticality when moving fuel in the spent fuel pit.

IV. ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The 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. 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.

V. CONCLUSION

We have 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.

Dated: January 20, 1987

Principal Contributors:

M. Dunenfeld