AUG 3 1 1989

Docket No. 50-302

DISTRIBUTION
See attached sheet

Mr. W. S. Wilgus
Vice President, Nuclear Operations
Florida Power Corporation
ATTN: Manager, Nuclear Operations
Licensing
P. O. Box 219-NA-2I
Crystal River, Florida 32629

Dear Mr. Wilgus:

SUBJECT: CRYSTAL RIVER UNIT 3 - ISSUANCE OF AMENDMENT RE: STORAGE OF FUEL (TAC NO. 71815)

The Commission has issued the enclosed Amendment No. 119 to Facility Operating License No. DPR-72 for the Crystal River Unit No. 3 Nuclear Generating Plant (CR-3). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated December 23, 1988, as supplemented July 12, 1989.

This amendment revises the TSs to allow for the storage of fuel up to 4.5% enrichment in both the dry fuel storage racks and storage pool A.

Minor changes have been made for clarity. These have been discussed with and agreed to by members of your staff.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Original signed by

Harley Silver, Project Manager
Project Directorate II-2
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 119 to DPR-72
2. Safety Evaluation

cc w/enclosures:
See next page

[ISS. OF AMENDMENT/CR-3] *SEE PREVIOUS CONCURRENCE

*LA:PDII-2	*PM:PDII-2	*PE:PDII-2	*D:PDII-2	*SPLB	*SRXB
DMiller	HSilver	GWunder:jd	HBerkow	JCraig	HHodges
03/14/89	03/14/89	03/14/89	03/17/89	03/17/89	03/16/89
OGC	PRPB				
08/22/89	LCunningham 08/14/89				

Mr. W. S. Wilgus
Florida Power Corporation

Crystal River Unit No. 3 Nuclear
Generating Plant

cc:
Mr. A. H. Stephens
General Counsel
Florida Power Corporation
MAC - A5D
P. O. Box 14042
St. Petersburg, Florida 33733

Mr. P. F. McKee, Director
Nuclear Plant Operations
Florida Power Corporation
P. O. Box 219-NA-2C
Crystal River, Florida 32629

Mr. Robert B. Borsum
Babcock & Wilcox
Nuclear Power Generation Division
1700 Rockville Pike, Suite 525
Rockville, Maryland 20852

Resident Inspector
U.S. Nuclear Regulatory Commission
15760 West Powerline Street
Crystal River, Florida 32629

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta Street N.W., Suite 2900
Atlanta, Georgia 30323

Mr. Jacob Daniel Nash
Office of Radiation Control
Department of Health and
Rehabilitative Services
1317 Winewood Blvd.
Tallahassee, Florida 32399-0700

Administrator
Department of Environmental Regulation
Power Plant Siting Section
State of Florida
2600 Blair Stone Road
Tallahassee, Florida 32301

Attorney General
Department of Legal Affairs
The Capitol
Tallahassee, Florida 32304

State Planning and Development
Clearinghouse
Office of Planning and Budget
Executive Office of the Governor
The Capitol Building
Tallahassee, Florida 32301

Chairman
Board of County Commissioners
Citrus County
110 North Apopka Avenue
Inverness, Florida 32650

Mr. Rolf C. Widell, Director
Nuclear Operations Site Support
Florida Power Corporation
P.O. Box 219-NA-2I
Crystal River, Florida 32629

Mr. Gary L. Boldt
Vice President, Nuclear Production
Florida Power Corporation
P. O. Box 219-SA-2C
Crystal River, Florida 32629

DATED: August 31, 1989

AMENDMENT NO. 119 TO FACILITY OPERATING LICENSE NO. DPR-72-CRYSTAL RIVER UNIT 3

[redacted]
NRC & Local PDRs
PDII-2 Reading
S. Varga, 14/E/4
G. Lainas, 14/H/3
H. Berkow
D. Miller
H. Silver
OGC-WF
D. Hagan, 3302 MNBB
E. Jordan, 3302 MNBB
B. Grimes, 9/A/2
T. Meek(4), P1-137
Wanda Jones, P-130A
J. Calvo, 11/F/23
J. Miller, 11/F/23
ACRS (10)
GPA/PA
OC/LFMB
M. Sinkule, R-II

cc: Plant Service list

OF01
1/1

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

FLORIDA POWER CORPORATION
CITY OF ALACHUA
CITY OF BUSHNELL
CITY OF GAINESVILLE
CITY OF KISSIMMEE
CITY OF LEESBURG
CITY OF NEW SMYRNA BEACH AND UTILITIES COMMISSION, CITY OF NEW SMYRNA BEACH
CITY OF OCALA
ORLANDO UTILITIES COMMISSION AND CITY OF ORLANDO
SEBRING UTILITIES COMMISSION
SEMINOLE ELECTRIC COOPERATIVE, INC.
CITY OF TALLAHASSEE

DOCKET NO. 50-302

CRYSTAL RIVER UNIT 3 NUCLEAR GENERATING PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 119
License No. DPR-72

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

   A. The application for amendment by Florida Power Corporation, et al. (the licensees) dated December 23, 1988, as supplemented July 12, 1989 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 2.C.(2) of Facility Operating License No. DPR-72 is hereby amended to read as follows:

   Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 119, are hereby incorporated in the license. Florida Power Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective immediately and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 31, 1989

ATTACHMENT TO LICENSE AMENDMENT NO. 119

FACILITY OPERATING LICENSE NO. DPR-72

DOCKET NO. 50-302

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Remove	Insert
VIII	VIII
XIII	XIII
--	3/4 9-13
--	3/4 9-14
B3/4 9-3	B3/4 9-3
5 - 4	5 - 4
5 - 5	5 - 5

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LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

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BASES

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BASES

REFUELING OPERATIONS

3/4.9.13 FUEL ASSEMBLY STORAGE

LIMITING CONDITION FOR OPERATION

3.9.13 Fuel assemblies shall be stored in locations in accordance with conditions as specified below:

LOCATION	CONDITION
1. Dry fuel storage racks	New fuel with initial enrichment $\leq$ 4.5 weight percent U-235
2. Storage Pool A	Fuel with initial enrichment and burnup in accordance with Figure 3.9-1 but $\leq$ 4.5 weight percent U-235
3. Storage Pool B	Fuel with initial enrichment $\leq$ 4.0 weight percent U-235

APPLICABILITY: Whenever fuel assemblies are in the fuel storage locations.

ACTION:

a. With the requirements of the above specification not satisfied, suspend all other movement of fuel assemblies and crane operations with loads in the fuel storage areas and move the non-complying fuel assemblies to their proper designated locations. In addition, with the requirements of the above specification for storage pools A or B not satisfied, boron concentration of the spent fuel pools shall be verified to be greater than or equal to 1925 ppm at least once per 8 hours.

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

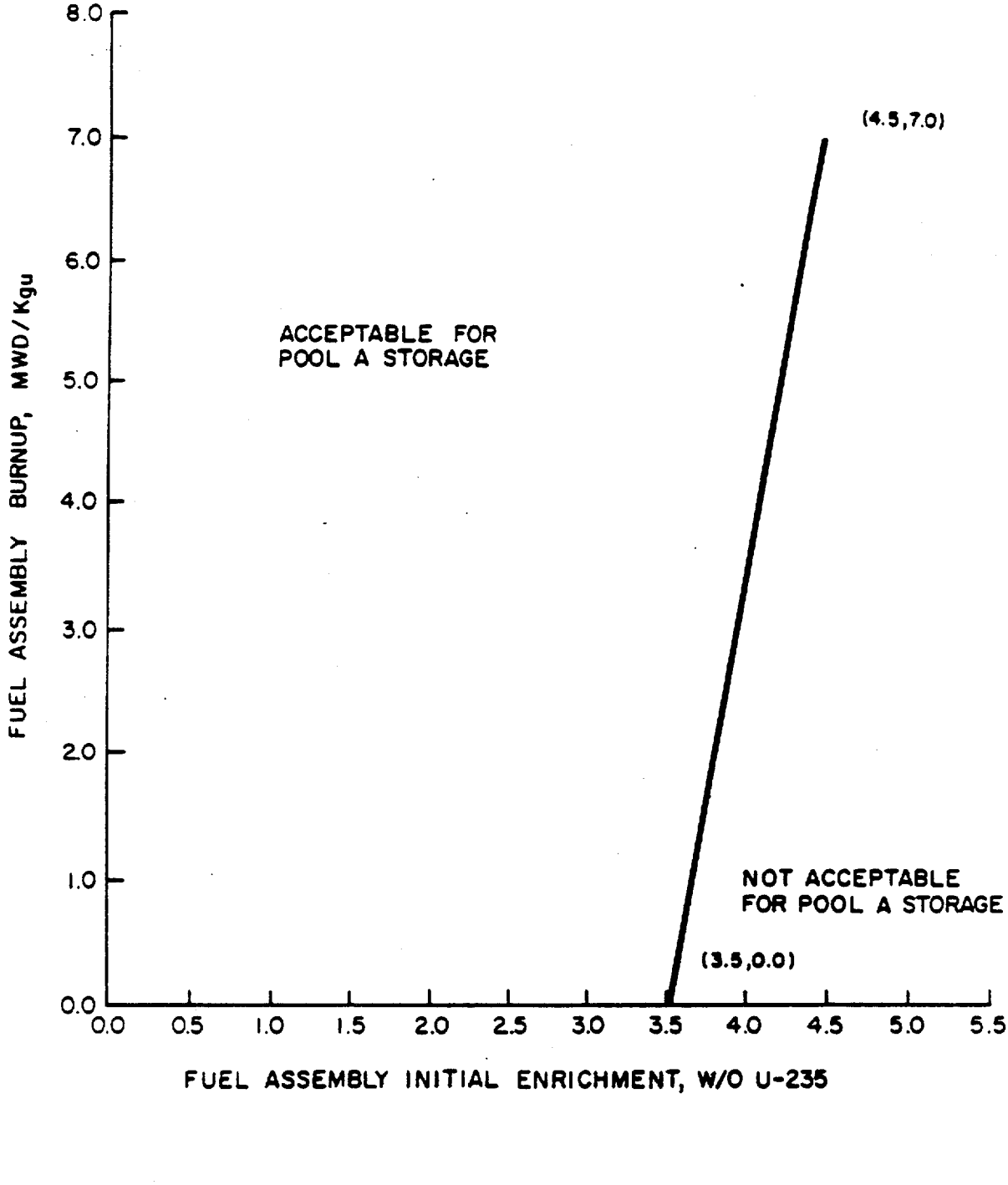
SURVEILLANCE REQUIREMENTS

4.9.13.1 Verify the initial enrichment of new fuel assemblies $\leq$ 4.5 weight percent U-235 prior to storage in the dry fuel storage racks.

4.9.13.2 Perform an INDEPENDENT VERIFICATION of the initial enrichment and burnup of fuel assemblies in accordance with Figure 3.9-1, prior to storage in the pool A storage racks. A complete record of such analysis shall be kept for the time period that the fuel assembly remains in the pool A storage racks.

4.9.13.3 Verify the initial enrichment of fuel assemblies $\leq$ 4.0 weight percent U-235 prior to storage in pool B storage racks.

Figure 3.9-1
Minimum Required Fuel Assembly Burnup as a Function of Initial Enrichment to Permit Storage in Pool A



3/4.9.10 WATER LEVEL - REACTOR VESSEL WATER LEVEL

The restrictions on minimum water level ensure that sufficient water depth is available to remove 99% of the assumed 10% iodine gap activity released from the rupture of an irradiated fuel assembly. The minimum water depth is consistent with the assumptions of the safety analysis.

3/4.9.11 STORAGE POOL

The requirement for missile shields to be installed over the storage pool ensures that the tornado missile protection assumptions are satisfied.

The restrictions on minimum water level ensure the sufficient water depth is available to remove 99% of the assumed 10% iodine gap activity released from the rupture of an irradiated fuel assembly. The minimum water depth is consistent with the assumptions of the safety analysis.

3/4.9.12 STORAGE POOL VENTILATION

The requirement for the auxiliary building ventilation exhaust system servicing the storage pool are to be OPERABLE ensures that all radioactive material released from an irradiated fuel assembly will be filtered through the HEPA filters and charcoal absorber prior to discharge to the atmosphere. The OPERABILITY of this system and the resulting iodine removal capacity are consistent with the assumptions of the safety analyses.

3/4.9.13 FUEL ASSEMBLY STORAGE

The restrictions placed on fuel assembly storage ensure inadvertent criticality will not occur.

DESIGN PRESSURE AND TEMPERATURE

5.2.2 The Reactor Containment building is designed and shall be maintained for a maximum internal pressure of 55 psig and a temperature of 281°F.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 177 fuel assemblies with each fuel assembly containing 208 fuel rods clad with Zircaloy - 4. Each fuel rod shall have a nominal active fuel length of 144 inches and contain a maximum total weight of 2253 grams uranium. The initial core loading shall have a maximum enrichment of 2.83 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have an enrichment less than or equal to 4.2 nominal weight percent U-235.

CONTROL RODS

5.3.2 The reactor core shall contain 60 safety and regulating (including extended life control rods) and 8 axial power shaping (APSR) control rods. Except for the extended life control rods, the safety and regulating control rods shall contain a nominal 134 inches of absorber material. The extended life control rods shall contain a nominal 139 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium, and 5 percent cadmium. Except for the extended life control rods, all control rods shall be clad with stainless steel tubing. The extended life control rods shall be clad with Inconel. The APSRs shall contain a nominal 63 inches of absorber material at their lower ends. The absorber material for the APSRs shall be 100% Inconel.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained.

a. In accordance with the code requirements specified in Section 4.1.2 of the FSAR, with allowance for normal degradation pursuant to applicable Surveillance Requirements.

b. For a pressure of 2500 psig, and

c. For a temperature of 650°F, except for the pressurizer and pressurizer surge line, which is 670°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 12,180 ± 200 cubic feet at a nominal T_{avg} of 525°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY

5.6.1 The dry fuel storage racks and spent fuel storage racks are designed and shall be maintained with:

a. A K_{eff} less than or equal to 0.95 when flooded with unborated water, which includes a conservative allowance for uncertainties. This is based on new fuel with a maximum initial enrichment of 4.5 weight percent U-235 in dry fuel storage racks, on fuel with combinations of initial enrichment and discharge burnup as shown in Figure 3.9-1 in storage pool A, and on fuel with a maximum initial enrichment of 4.0 weight percent in storage pool B;

b. A nominal 10.5 inch center-to-center distance between fuel assemblies placed in the high density storage racks in pool A; and

c. A nominal 21.125 inch center-to-center distance between fuel assemblies placed in the dry fuel storage racks and storage racks in pool B.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 138 feet 4 inches.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 119 TO FACILITY-OPERATING LICENSE NO.-DPR-72

FLORIDA POWER CORPORATION, ET AL.

CRYSTAL RIVER UNIT NO. 3 NUCLEAR GENERATING PLANT

DOCKET NO. 50-302

INTRODUCTION

By letter dated December 23, 1988, as supplemented dated July 12, 1989, 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 add TS Sections 3.9.13, 4.9.13.1, 4.9.13.2, and 4.9.13.3, along with their associated bases, to increase the allowable percentage of enrichment of fuel to be stored in the dry fuel storage racks and storage pool A to 4.5% Uranium-235. This enriched fuel may be irradiated in excess of 33 GWD/MT but not to exceed 60 MWD/MT. The current allowable percentage of enrichment is 4.0% for fuel in the dry storage racks and 3.5% for fuel in storage pool A. In addition, the proposed amendment would revise Sections 5.3.1 and 5.6.1 of the TS, which refer to the maximum percentage enrichment of the fuel.

By letter dated July 12, 1989, the licensee provided their environmental assessment in support of the proposed license amendment. This information did not change the action noticed or the proposed determination by the staff that the proposed amendment did not involve significant hazards considerations.

In addition, the NRC staff made minor changes to the licensee's proposed changes to TS 5.6.1. These changes provide clarity and were discussed with and agreed to by members of the licensee's staff.

EVALUATION

Dry Fuel Storage Racks

The purpose of limiting the allowable enrichment of assemblies in the dry fuel storage racks is to prevent inadvertent criticality. To assure criticality safety of the new fuel storage vault, it is necessary to meet the following criteria as defined in NUREG-0800:

1. When fully loaded with fuel of the highest anticipated reactivity and flooded with clean unborated water, the maximum reactivity, including uncertainties, shall not exceed a keff of 0.95.

2. With fuel of the highest anticipated reactivity in place and assuming the optimum hypothetical low density moderation (i.e., fog or foam), the maximum reactivity shall not exceed a keff of 0.98.

The new fuel storage vault consists of a 6x11 array of storage cells with center-to-center spacing of 21.125 inches. Since this spacing is identical to that in storage pool B, the calculations performed for keff as function of enrichment for storage pool B are applicable to the case of the fuel storage vault flooded with clean unborated water. These calculations, performed using the CASMO-2E calculational model, arrived at an infinite multiplication factor of 0.9393. Taking uncertainties into account, it was determined that the maximum infinite multiplication factor is 0.9436. This is less than the limiting keff value of 0.95 and is therefore acceptable.

For the hypothetical condition of low density moderation, criticality analyses were performed with the AMPX-KENO computer package using the 123-group GAM-THERMOS cross-section library and the NITAWL routine for U-238 resonance shielding. Preliminary calculations indicated that with all of the fuel vault locations filled, the reactivity would not provide an adequate shutdown margin at optimum moderation. Through trial and error it was determined that if every fourth row were left empty, the shutdown margin would be acceptable. Rows 4 and 8 were subsequently blocked to prevent fuel from being stored in them. The analysis of the new fuel storage configuration showed that optimum moderation occurred at a water density of .075 grams/cc and yielded a keff of 0.9412. Taking uncertainties into account, a maximum value for keff of 0.9524 was determined. This value is acceptable since it does not exceed the staff's criterion of a maximum value of 0.98.

Since the staff's criteria for the storage of 4.5% U-235 enriched fuel are met, the storage of this fuel in dry storage racks is acceptable.

Storage Pool A

The purpose of limiting the combination of allowable fuel enrichment and burnup of assemblies stored in pool A is to assure a sufficient safety margin to prevent inadvertent criticality. Values for initial enrichment and burnup are selected to maintain a keff less than or equal to 0.95. The spent fuel racks in storage pool A at CR-3 are currently licensed to store new fuel of 3.5% enrichment. The licensee presented an analysis to determine the minimum discharge burnup required for fuel of higher initial enrichment to be safely stored in the pool A storage racks. Calculations for initial enrichments ranging from 3.5% to 4.5% were performed and a curve defining the acceptable burnup domain was generated.

In performing the criticality safety calculations, the CASMO-2E and 123-group AMPX-KENO methods were used. The CASMO-2E proved to be slightly more conservative and yielded a maximum keff of 0.9474 for fuel of 4.5% initial enrichment and burned to a minimum of 7.0 Mwd/kg-U. In addition, calculations show that, in the long-term, after decay of xenon, reactivity decreases as Plutonium-241 decays.

CASMO-2E burnup calculations were confirmed by the B&W NULIF code and EPRI-CELL code methods of analysis. Agreement between the three methods was good, and CASMO-2E gave the more conservative value for the infinite multiplication factor. The uncertainty applied was 5% of the total burnup reactivity

change. Several other criticality safety analyses of spent fuel storage racks have used 5% of the total reactivity change as the uncertainty in burnup calculations and it is believed to be a conservative estimate.

The effect of axial burnup was also assessed. Initially, fuel will accumulate a higher than average burnup in the central, more reactive region. As burnup progresses, the axial distribution tends to flatten. For the relatively low fuel burnup considered, the axial power distribution will have retained much of its original cosine shape; therefore, calculations submitted by the licensee are conservative.

The difference in the amount of decay heat generated by the 4.5% enriched fuel, as opposed to that generated by 3.5% enriched fuel, is not significant and is well within the heat removal capabilities of the storage pool cooling system.

Since the storage of fuel of initial concentration of 4.5% enrichment and burned to 7.0 Mwd/kg-U will not result in a keff of greater than 0.95 in storage pool A, and since the decay heat generated by this fuel is within the heat removal capability of the storage pool cooling system, storage of this fuel in storage pool A is acceptable.

Effect on Design Basis Accidents

The licensee analyzed the effects of the increased enrichment and irradiation of the fuel on a fuel handling accident. In performing this analysis it was determined that I-131 fuel gap activity in the peak fuel rod with 60 GWD/MT could be as high as 12%, a value 2% higher than that assumed in Regulatory Guide 1.25 (Assumptions Used for Evaluating the Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors). All other fuel rod gap release activities would be lower than those assumed in the Regulatory Guide. The limiting results of the licensee's analysis of the postulated fuel handling accident are presented below.

Dose Type	Design Basis	Extended Fuel Burnup
Thyroid Exclusion Boundary (REM)	40.6	48.7

These results show that the thyroid doses that would be received at the exclusion area boundary are well within the 300 rem limit of 10 CFR Part 100. They also show that the increases in dose that would result from the increased enrichment and irradiation of the fuel are only a small fraction of the limits of 10 CFR Part 100.

The staff agrees that the proposed increases in fuel enrichment and irradiation will not result in doses exceeding the limits of 10 CFR Part 100. Furthermore, the staff concludes that, although the isotopic mix in expended fuel may change due to increased burnup, any such change will be small in comparison to the limits of 10 CFR Part 100. Therefore, the staff finds that the proposed changes will have no significant radiological impact.

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 (54 FR 35954) on August 30, 1989. 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.

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: August 31, 1989

Principal Contributor:
G. Wunder