April 11, 1988

Docket No. 50-219

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Mr. P. B. Fiedler
Vice President and Director
Oyster Creek Nuclear Generating Station
Post Office Box 388
Forked River, New Jersey 08731

Dear Mr. Fiedler:

SUBJECT: ISSUANCE OF AMENDMENT (TAC NO. 67080)

The Commission has issued the enclosed Amendment No.121 to Provisional Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station, in response to your application dated January 29, 1988 as supplemented in a letter dated March 16, 1988.

The amendment revised Section 5.3 and corresponding bases of the Technical Specification to allow fuel with higher enrichments to be stored in the fuel storage facilities on site.

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

Sincerely,

original signed by

Alexander W. Dromerick, Project Manager
Project Directorate I-4
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 121to DPR-16
2. Safety Evaluation

cc w/enclosures:
See next page

Please make changes noted

LA:PDI-4	PM:PDI-4	D:PDI-4	OGC
SNorris	ADromerick	JStolz	
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Mr. P. B. Fiedler
Oyster Creek Nuclear Generating Station

Oyster Creek Nuclear
Generating Station

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

GPU NUCLEAR CORPORATION

AND

JERSEY CENTRAL POWER & LIGHT COMPANY

DOCKET NO. 50-219

OYSTER CREEK NUCLEAR GENERATING STATION

AMENDMENT TO PROVISIONAL OPERATING LICENSE

Amendment No.121
License No. DPR-16

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

   A. The application for amendment by GPU Nuclear Corporation, et al., (the licensee), dated January 29, 1988, as supplemented March 16, 1988 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 Provisional Operating License No. DPR-16 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No.121 , are hereby incorporated in the license. GPU Nuclear Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective on issuance, to be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

John F. Stolz, Director
Project Directorate I-4
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 11, 1988

ATTACHMENT TO LICENSE AMENDMENT NO. 121

PROVISIONAL OPERATING LICENSE NO. DPR-16

DOCKET NO. 50-219

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

Remove	Insert
Page 5.3-1	Page 5.3-1
Page 5.3-?	Page 5.3-2

5.3 AUXILIARY EQUIPMENT

5.3.1 Fuel Storage

A. The fuel storage facilities are designed and shall be maintained with a K-effective equivalent to less than or equal to 0.95 including all calculational uncertainties.

B. Loads greater than the weight of one fuel assembly shall not be moved over stored irradiated fuel in the spent fuel storage facility.

C. The spent fuel shipping cask shall not be lifted more than six inches above the top plate of the cask drop protection system. Vertical limit switches shall be operable to assure the six inch vertical limit is met when the cask is above the top plate of the cask drop protection system.

D. The temperature of the water in the spent fuel storage pool, measured at or near the surface, shall not exceed 125°F.

E. The maximum amount of spent fuel assemblies stored in the spent fuel storage pool shall be 2600.

BASIS

The specification of a K-effective less than or equal to 0.95 in fuel storage facilities assures an ample margin from criticality. This limit applies to unirradiated fuel in both the dry storage vault and the spent fuel racks as well as irradiated fuel in the spent fuel racks. Criticality analyses were performed on the poison racks to ensure that a K-effective of 0.95 would not be exceeded. The analyses took credit for burnable poisons in the fuel and included manufacturing tolerances and uncertainties as described in Section 9.1 of the FSAR. Calculational uncertainties described in 5.3.1.A are explicitly defined in Reference 7. Any fuel stored in the fuel storage facilities shall be bounded by the analyses in these reference documents.

The effects of a dropped fuel bundle onto stored fuel in the spent fuel storage facility have been analyzed. This analysis shows that the fuel bundle drop would not cause doses resulting from ruptured fuel pins that exceed 10 CFR 100 limits (1,2,3) and that dropped waste cans will not damage the pool liner.

The elevation limitation of the spent fuel shipping cask to no more than 6 inches above the top plate of the cask drop protection system prevents loss of the pool integrity resulting from postulated drop accidents. An analysis of the effects of a 100 ton cask drop from 6 inches has been done (4) which

showed that the pool structure is capable of sustaining the loads imposed during such a drop. Limit switches on the crane restrict the elevation of the cask to less than or equal to 6 inches when it is above the top plate.

Detailed structural analysis of the spent fuel pool was performed using loads resulting from the dead weight of the structural elements, the building loads, hydrostatic loads from the pool water, the weight of fuel and racks stored in the pool, seismic loads, loads due to thermal gradients in the pool floor and the walls, and dynamic load from the cask drop accident. Thermal gradients result in two loading conditions; normal operating and the accident conditions with the loss of spent fuel pool cooling. For the normal condition, the containment air temperature was assumed to vary between 65°F and 110°F while the pool water temperature varied between 85°F and 125°F. The most severe loading from the normal operating thermal gradient results with containment air temperatures at 65°F and the water temperature at 125°F. Air temperature measurements made during all phases of plant operation in the shutdown heat exchanger room, which is directly beneath part of the spent fuel pool floor slab, show that 65°F is the appropriate minimum air temperature. The spent fuel pool water temperature will alarm in the control room before the water temperature reaches 120°F.

Results of the structural analysis show that the pool structure is structurally adequate for the loadings associated with the normal operation and the condition resulting from the postulated cask drop accident (5) (6). The floor framing was also found to be capable of withstanding the steady state thermal gradient conditions with the pool water temperature at 150°F without exceeding ACI Code requirements. The walls are also capable of operation at a steady state condition with the pool water temperature at 140°F (5).

Since the cooled fuel pool water returns at the bottom of the pool and the heated water is removed from the surface, the average of the surface temperature and the fuel pool cooling return water is an appropriate estimate of the average bulk temperature; alternately the pool surface temperature could be conservatively used.

References

1. Amendment No. 78 to FDSAR (Section 7)
2. Supplement No. 1 to Amendment No. 78 to the FDSAR (Question 12)
3. Supplement No. 1 to Amendment 78 of the FDSAR (Question 40)
4. Supplement No. 1 to Amendment 68 of the FDSAR
5. Revision No. 1 to Addendum 2 to Supplement No. 1 to Amendment No. 78 of FDSAR (Questions 5 and 10)
6. FDSAR Amendment No. 79
7. Criticality Safety Analysis, Oyster Creek High Density Storage Racks With Increased Enrichment Fuel; Southern Science Report No. SS-166, Rev. 1; May 1987

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATIONS

RELATED TO AMENDMENT NO. 121

TO PROVISIONAL OPERATING LICENSE NO DPR-16

GPU NUCLEAR CORPORATION AND
JERSEY CENTRAL POWER & LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

1.0 INTRODUCTION

By letter dated January 29, 1988, as supplemented in a letter date March 16, 1988 GPU Nuclear Corporation (GPUN or the licensee) requested an Amendment to the Provisional Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station (Oyster Creek). The proposed amendment would revise Technical Specification 5.3.1 to permit an increase in the maximum enrichment of fuel assemblies stored in the Spent Fuel Storage Pool at Oyster Creek. The information submitted by letter dated March 16, 1988 referenced the report "Criticality Safety Analyses Oyster Creek High Density Storage Racks With Increased Enrichment Fuel" prepared by Southern Science dated May 1987. The supplemental information provided in the letter dated March 16, 1988 did not change the scope of the staff's notice for opportunity for hearing. The staff has reviewed the application and prepared the following evaluation.

2. EVALUATION

Currently, the Oyster Creek spent fuel pool is licensed to store fuel assemblies having U-235 enrichment of up to 3.01 weight percent. No credit was taken in the analysis for the presence of burnable poison, (gadolinium) in the fuel. But most reload fuel assemblies do contain such poison which reduces the k-effective value by several percent when compared to assemblies of the same enrichment without burnable poison. However, since the gadolinium is burned out as the fuel is exposed, the reactivity will increase with fuel exposure. Acting against this tendency is the fact that the U-235 is also burned out as the fuel is exposed. The result is that the pool k-effective value first rises with fuel exposure and then begins to decrease. Staff criteria require that the k-effective value of the pool be calculated for fuel having an exposure which yields the maximum value.

The licensee has re-evaluated the criticality aspects of the Oyster Creek spent fuel pool, including the effect of burnable poison. Fuel assemblies having uniform enrichment up to 3.8 weight percent U-235 and containing 3

weight percent gadolinia (Gd_2O_3) in seven fuel rods in each assembly were analyzed. For each enrichment, the assemblies were burned to the point of maximum reactivity. The maximum pool k_{eff} occurred for the 3.8 weight percent enrichment and was 0.908 with a 95% probability at a 95% confidence level. Since the reactivity of fuel is smaller for both smaller and larger burnups, such fuel assemblies may be stored at any point in their life.

A series of calculations was also performed for the pool k_{eff} value as a function of burnup and initial enrichment under the assumption of no burnable poison (gadolinia) in the fuel. From these calculations a curve of required burnup as a function of initial enrichment was constructed which ensures that the pool k_{eff} value will be less than 0.95 with a 95% probability at a 95% confidence level.

The analyses described above were performed with the CASMO-2E code which has been extensively qualified for such analyses in particular by the performers of the present calculation. In addition, for the present analyses, the CASMO-2E code was compared to the AMPX-KENO code with the 27-group SCALE cross-section library for the 3.19% enrichment case with zero burnup and no gadolinium. The two calculations agreed to within the statistical uncertainty in the KENO calculation. The staff concludes that acceptable analysis methods have been used for the analyses.

The uncertainties due to mechanical and manufacturing tolerances were assumed to be the same as those for the previous analysis. Since the KENO code was also used for that analysis, we find the assumption to be acceptable. Additional uncertainties due to the assumption of burnup were derived for the present analyses. Conservative assumptions made include the use of pool temperature yielding the largest k-effective value and the use of uniform enrichment in the fuel assemblies.

Based on the discussion presented above, we conclude that fuel assemblies having enrichments (in their highest enrichment segments) of up to 3.8 weight percent U-235 may be stored in the Oyster Creek spent fuel pool, provided that:

(1) at least 7 fuel rods contain at least 3 weight percent gadolinia (Gd_2O_3), or

(2) the discharge burnup lies within the "acceptable burnup domain" of Figure 2 of the licensee's submittal of January 29, 1988.

Technical Specification 5.3.1 has been altered to remove the 3.01 percent limit on assembly enrichment and replace it with a requirement to maintain a k-effective value less than 0.95. In response to our request, the licensee in a letter dated March 16, 1988 referenced the report "Criticality Safety Analyses Oyster Creek High Deposits Storage Racks With Increased Enrichment Fuel" prepared by Southern Science dated May 1987 in the bases of Technical Specification 5.3.1. We find this acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to 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, the 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.

4.0 CONCLUSION

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 the amendment will not be inimical to the common defense and security nor to the health and safety of the public.

Dated: April 11, 1988

Principal Contributor: W. Brooks