April 10, 1995

Mr. John J. Barton
Vice President and Director
GPU Nuclear Corporation
Oyster Creek Nuclear Generating Station
Post Office Box 388
Forked River, NJ 08731

SUBJECT: ISSUANCE OF AMENDMENT (TAC NO. M90999)

Dear Mr. Barton:

The Commission has issued the enclosed Amendment No. 179 to Facility Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station, in response to your application dated November 25, 1994, as supplemented February 15, 1995.

The amendment revises Technical Specification 5.3.1.E to allow 2645 fuel assemblies to be stored in the fuel pool. This is an increase of 45 fuel assemblies from the current limit of 2600 fuel assemblies. The 45 additional storage locations currently exist in the racks in the fuel pool.

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

Sincerely,

Original signed by

Alexander W. Dromerick, Senior Project Manager
Project Directorate I-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-219

Enclosures: 1. Amendment No. 179 to DPR-16
2. Safety Evaluation

cc w/encls: See next page

DISTRIBUTION:

Docket File	GHill (2)	KParczewski
PUBLIC	CGrimes	JMinns
PDI-3 Plant	ACRS (4)	
SVarga	OPA	
JZwolinski	OC/LFDCB	
PMcKee	JRogge, RGI	
ADromerick	LKopp	
SNorris	DShum	
OGC	SKim	

DFO1/1, cp-1

COPY

DOCUMENT NAME: G:\DROMERICK\M90999.AMD

OFFICE	LA:PDI-3	PM:PDI-3	D:PDI-3	OGC		
NAME	SNorris	ADromerick:bf	PMcKee			
DATE	03/20/95	03/21/95	03/21/95	03/30/95	03/ /95	

OFFICIAL RECORD COPY

4/03/95

9504140042 950410
PDR ADOCK 05000219
P PDR

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 10, 1995

Mr. John J. Barton
Vice President and Director
GPU Nuclear Corporation
Oyster Creek Nuclear Generating Station
Post Office Box 388
Forked River, NJ 08731

SUBJECT: ISSUANCE OF AMENDMENT (TAC NO. M90999)

Dear Mr. Barton:

The Commission has issued the enclosed Amendment No. 179 to Facility Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station, in response to your application dated November 25, 1994, as supplemented February 15, 1995.

The amendment revises Technical Specification 5.3.1.E to allow 2645 fuel assemblies to be stored in the fuel pool. This is an increase of 45 fuel assemblies from the current limit of 2600 fuel assemblies. The 45 additional storage locations currently exist in the racks in the fuel pool.

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

Sincerely,

Alexander W. Dromerick

Alexander W. Dromerick, Senior Project Manager
Project Directorate I-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-219

Enclosures: 1. Amendment No. 179 to DPR-16
2. Safety Evaluation

cc w/encls: See next page

cc:

Ernest L. Blake, Jr., Esquire
Shaw, Pittman, Potts & Trowbridge
2300 N Street, NW.
Washington, DC 20037

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

BWR Licensing Manager
GPU Nuclear Corporation
1 Upper Pond Road
Parsippany, New Jersey 07054

Mayor
Lacey Township
818 West Lacey Road
Forked River, New Jersey 08731

Licensing Manager
Oyster Creek Nuclear Generating Station
Mail Stop: Site Emergency Bldg.
Post Office Box 388
Forked River, New Jersey 08731

Resident Inspector
c/o U.S. Nuclear Regulatory Commission
Post Office Box 445
Forked River, New Jersey 08731

Kent Tosch, Chief
New Jersey Department of
Environmental Protection
Bureau of Nuclear Engineering
CN 415
Trenton, New Jersey 08625

Mr. Paul Gunter, Director
Reactor Watchdog Project
Nuclear Information and Resource Service
1424 16th Street, NW., Suite 601
Washington, DC 20036

Mr. William deCamp, Jr.
Founding Trustee
Oyster Creek Nuclear Watch
P.O. Box 243
Island Heights, NJ 08732

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

GPU NUCLEAR CORPORATION

AND

JERSEY CENTRAL POWER & LIGHT COMPANY

DOCKET NO. 50-219

OYSTER CREEK NUCLEAR GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 179
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 November 25, 1994, as supplemented February 15, 1995, 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-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.179 , 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 as of the date of issuance, to be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Phillip F. McKee, Director
Project Directorate I-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: April 10, 1995

ATTACHMENT TO LICENSE AMENDMENT NO. 179

FACILITY 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.

Remove	Insert
5.3-1	5.3-1
5.3-2	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 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 2645. I

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 FSAR Section 9.1.2.3.9. Any fuel stored in the fuel storage facilities shall I 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 has 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 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. Deleted

7590-01

UNITED STATES NUCLEAR REGULATORY COMMISSION

GPU NUCLEAR CORPORATION

DOCKET NO. 50-219

NOTICE OF ISSUANCE OF AMENDMENT TO

FACILITY OPERATING LICENSE

The U.S. Nuclear Regulatory Commission (Commission) has issued Amendment No. 179 to Facility Operating License No. DPR-16 issued to GPU Nuclear Corporation (the licensee), which revised the Technical Specifications for operation of the Oyster Creek Nuclear Generating Station located in Ocean County, New Jersey. The amendment is effective as of the date of issuance, to be implemented within 30 days of issuance.

The amendment revises Technical Specification 5.3.1.E to allow 2645 fuel assemblies to be stored in the fuel pool. This is an increase of 45 fuel assemblies from the current limit of 2600 fuel assemblies. The 45 additional storage locations currently exist in the racks in the fuel pool.

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment.

Notice of Consideration of Issuance of Amendment and Opportunity for Hearing in connection with this action was published in the FEDERAL REGISTER on December 20, 1994 (59 FR 65542). No request for a hearing or petition for leave to intervene was filed following this notice.

The Commission has prepared an Environmental Assessment related to the action and has determined not to prepare an environmental impact statement. Based upon the environmental assessment, the Commission has concluded that the issuance of the amendment will not have a significant effect on the quality of the human environment (60 FR 17373).

For further details with respect to the action see (1) the application for amendment dated November 25, 1994, as supplemented February 15, 1995, and (2) Amendment No. 179 to License No. DPR-16, (3) the Commission's related Safety Evaluation, and (4) the Commission's Environmental Assessment. All of these items are available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street NW., Washington DC, and at the local public document room located at the Ocean County Library, Reference Department, 101 Washington Street, Toms River, NJ 08753.

Dated at Rockville, Maryland, this 10th day of April 1995.

FOR THE NUCLEAR REGULATORY COMMISSION

Alexander W. Dromerick

Alexander W. Dromerick, Sr. Project Manager
Project Directorate I-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 179

TO FACILITY 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

During the spent fuel pool expansion project in 1983, GPU Nuclear Corporation (GPUN or the licensee) of the Oyster Creek Nuclear Generating Station (OCNGS) designed and installed 10 free standing high density spent fuel racks in the spent fuel pool to increase the spent fuel storage capacity from 1800 to 2645 spent fuel assemblies. However, the licensee elected to impose a technical specification (TS) limit of 2600 spent fuel assemblies (approved by the staff in License Amendment No. 76, dated September 17, 1984) to be stored in the spent fuel pool at the time. The increased capacity from 1800 to 2600 spent fuel assemblies would meet anticipated spent fuel storage requirements through 1992. The additional 45 fuel assembly storage locations were not licensed with License Amendment No. 76 because it was believed that they would not be needed for spent fuel storage. (It was anticipated that an off-site spent fuel storage facility would be available after 1992.) These additional storage locations were, therefore, used for the storage of miscellaneous equipment such as fuel channels.

As the result of the recent refueling (Cycle 15R), which took place in December 1994, and the present unavailability of an off-site spent fuel storage facility, OCNGS has lost the capability to completely offload the reactor core. The licensee is in the process of installing a dry storage facility on-site which is scheduled to be operational in 1996. This provision of a dry storage facility on-site will allow full core offload beyond the current operating cycle (Cycle 15) until such time as an off-site spent fuel storage facility is available. Consequently, the licensee proposed to use the additional 45 fuel assembly storage locations for spent fuel storage.

By letter dated November 25, 1994, as supplemented February 15, 1995, the licensee submitted a request to amend the OCNGS TS. The proposed TS change will allow 2645 fuel assemblies to be stored in the spent fuel pool, thus restoring the full core offload capability throughout the current operating Cycle 15.

In addition, GPUN performed a new criticality analysis for fuel assemblies enriched to 4.0 weight percent (w//o) U-235 with 3 w/o gadolinia in at least seven burnable poison pins. This reanalysis also considered the effects of Boraflex gaps. The spent fuel storage racks have previously been analyzed for a maximum enrichment of 3.8 w/o U-235 with at least seven burnable poison pins containing at least 3 w/o gadolinia.

The February 15, 1995, letter provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

2.0 EVALUATION

2.1 Criticality Consideration

The analysis of the reactivity effects of fuel storage in the spent fuel storage racks was performed with the CASMO-3 integral transport theory code which has been extensively qualified for such analyses in particular by the performers of the present calculation. In addition, previous comparisons of the CASMO-3 code to the KENO5a Monte Carlo code for the OCNGS storage racks agreed to within the statistical uncertainty in the KENO5a calculation, confirming the validity of the calculational methodology. The staff concludes that acceptable analysis methods have been used.

The NRC criterion for spent fuel storage requires that k_{eff} of the storage rack be no greater than 0.95 when flooded by unborated water, including all appropriate uncertainties at a 95% probability/95% confidence (95/95) level. Each storage location contains a sheet of Boraflex on all four walls sandwiched between the stainless steel support material. Based on blackness test measurements made on the racks, a maximum gap of 2.42 inches was observed in the Boraflex panels due to shrinkage caused by accumulated gamma radiation. Although additional shrinkage is expected with increased gamma exposure, industry-wide data indicates that shrinkage is expected to saturate at exposure levels between 1-2 x 10^{10} rads and gap growth cease at a point less than 3.9 inches (2.8% shrinkage) for the type of racks installed at OCNGS. The OCNGS analysis assumed that a total gap size of 3.9 inches occurs in each panel at the same axial level, thereby increasing neutron coupling. Since actual measurements have shown that less than half of the Boraflex panels have gaps and also have an axial distribution (not at the same axial level), the gap assumption used for the OCNGS analysis is conservative and acceptable. In addition, the licensee will maintain a Boraflex surveillance program to ensure the assumptions used in the analysis remain valid.

Reactivity calculations for the spent fuel racks completely loaded with fuel assemblies having uniform enrichment up to 4.0 w/o U-235 and containing 3 w/o gadolinia in seven fuel rods in each assembly resulted in a k_{eff} of 0.9174. This value included all appropriate biases and uncertainties due to methods and mechanical and manufacturing tolerances at the 95/95 probability/ confidence level. However, because of the observed Boraflex shrinkage and

gap formation mentioned above, an additional penalty factor of 0.028 Δk was included to account for a maximum gap of 3.9 inches in each panel, resulting in a maximum k_{eff} of 0.945. This meets the NRC and TS acceptance criterion of k_{eff} no greater than 0.95 and is, therefore, acceptable.

The following TS change has been proposed as a result of the requested enrichment increase:

TS 5.3.1 is changed to increase the number of spent fuel assemblies allowed in the spent fuel storage pool to 2645 from 2600. Since the criticality analysis evaluated above was performed with an infinite array of fuel assemblies, it is valid for a spent fuel pool capacity of 2645 fuel assemblies.

2.1.1 Conclusions

Based on the above review, the staff concludes that the storage of OCNGS fuel assemblies enriched to 4.0 w/o U-235 with at least seven gadolinia bearing rods (3 w/o) in each assembly meets the requirements of General Design Criterion 62 with regard to criticality. This fuel is acceptable for storage in each of the 2645 storage locations of the OCNGS spent fuel pool.

Because of the continuing concern of gap formation due to Boraflex shrinkage, the licensee has committed to maintaining a Boraflex surveillance program to ensure the assumptions in the criticality analysis remain valid.

2.2 Spent Fuel Pool Cooling and Make-up

The spent fuel pool cooling (SFPC) system consists of the original system comprised of two SFPC pumps and heat exchangers and an augmented system (installed during the first spent fuel pool expansion project in 1977) comprised of two augmented fuel pool cooling pumps and one heat exchanger, a filter, a demineralizer, two surge tanks, associated piping and valves, and interconnections to the condensate demineralizers and the condensate system. The heat removal capacity of the original SFPC system is approximately 5,5X x 10^6 Btu/hr. The licensee stated (in a letter to NRC dated June 4, 1984, during the License Amendment No. 76 application process) that existing analyses used for the design of the SFPC system were performed based on a maximum heat load (17.845 x 10^6 Btu/hr) generated from 2,732 spent fuel assemblies including a full core discharge.

Based on its review, the staff finds that the spent fuel pool heat loads, decay heat rate, evaporation from boiling and the associated consequences will increase slightly due to plant operations with the additional 45 spent fuel assemblies stored in the spent fuel pool. However, they will remain well below the design capacity of the SFPC system. Therefore, the staff concludes that plant operations with additional 45 spent fuel assemblies stored in the spent fuel pool will have an insignificant or no impact on the SFPC system at OCNGS.

2.2.1 Conclusion

Based on its review of the licensee's rationale and the evaluation described in the above, the staff concludes that the proposed TS change to increase the spent fuel stored in the spent fuel pool at OCNGS from 2600 to 2645 fuel assemblies is acceptable. This amendment request is a plant specific issue and should not be considered as a potential line-item improvement to the NRC's Standard Technical Specifications. However, an issue associated with spent fuel pool cooling adequacy was identified in NRC Information Notice No. 93-83, "Potential Loss of Spent Fuel Pool Cooling Following a Loss of Coolant Accident (LOCA)," dated October 7, 1993, and in a 10 CFR Part 21 notification, dated November 27, 1992. The staff will address this issue, as well as a 10 CFR 2.206 Petition regarding this matter, as part of the generic evaluation process.

2.3 Structural Evaluation

Previously, GPUN requested and the staff approved a license amendment for 2600 spent fuel assemblies to be stored in the OCNGS spent fuel pool. The Franklin Research Center reviewed the rerack design for the NRC and concluded that the rack and the concrete pool are all within allowable stress limits for various design loads including the safe shutdown earthquake. The racks had a capacity to receive a total of 2645 assemblies but 45 fuel cells have no fuel assemblies. Therefore, the racks which were approved previously are able to accommodate an additional 45 spent fuel assemblies without any modification or addition to the existing racks.

An addition of 45 fuel assemblies does not change our previous conclusion that the rack structural design is acceptable. The demand to the rack structural capacity does not increase for the following reasons. An individual rack was qualified for full load for the analysis. As a worst case calculation, the licensee assumed the racks to be fully loaded to their capacity with fuel assemblies and performed dynamic analyses to obtain maximum stresses in the rack and reactions of the rack supports. Adequacy of rack stresses and pool liner were based on this calculation. Therefore, the addition of 45 fuel assemblies does not constitute an unreviewed safety problem for the rack. Also, the proposed amendment does not affect the rack drop accident analysis or the fuel handling accident analysis previously reviewed and approved because the analysis involves a single fuel assembly and GPUN is not proposing to introduce any new racks.

The demand on the pool structural capacity is also not significant for the following reasons. At the time of the above mentioned 1984 staff approval, it was concluded that the margin to the design limit for the concrete structure was at least 1.5. This means that up to 50% of additional load can be accommodated without exceeding the limit. Additional load from 45 spent fuel assemblies constitutes less than 2% in load change and corresponding decrease in the margin is expected to be insignificant, on the order of 2%. Therefore, the structural capacity of the pool is sufficient to accept the additional 45 assemblies.

Based on the above, the staff concludes that the additional load of the 45 fuel assemblies does not change the staff's previous conclusion that the spent fuel rack and concrete pool would maintain structural integrity for all the loads including the safe shutdown earthquake.

2.3.1 Conclusion

Based on the discussion, the staff concludes that the increase of 45 spent fuel assemblies to the spent fuel pool at the OCNGS is within the design allowable limits of the spent fuel pool and the racks. Therefore, the request for the license amendment is acceptable since the spent fuel pool and racks would continue to maintain structural integrity for various loadings including the safe shutdown earthquake.

2.4 Materials

The spent fuel racks in the OCNGS are constructed of type 304-L stainless steel, except for the neutron absorbing material. The neutron absorbing material, known by its commercial name of Boraflex, consists of boron carbide particles imbedded in a polysiloxane matrix with additional silica filler. Boraflex neutron absorber, in form of long panels, surrounds each cell on all four sides, sandwiched in between an inner and outer angular subelement. This design ensures adequate coverage of the active length of each fuel assembly. Venting of gases generated during Boraflex irradiation is through the roof openings of the storage cell compartment corners. Stainless steel spacer straps hold the Boraflex panels in position. Dissimilar metal contact corrosion (galvanic attack) between the stainless steel pool liner, rack lattice structure, fuel storage tubes, and Inconel and Zircaloy in the spent fuel assemblies will not be significant because all of these materials are protected by highly passivating oxide films and are, therefore, at similar potentials. The Boraflex, being a non-metallic material, will not develop a galvanic potential in contact with the metal components. However, in radiation fields this material undergoes slow degradation. Cross-linking of polysiloxane chain molecules produces shrinkage with a corresponding increase of density of the material. The study performed by the Electrical Power Research Institute (EPRI), reported in EPRI-TR-101986, "Boraflex Test Results and Evaluation" February 1993, has indicated that the maximum shrinkage of Boraflex panels is less than 2.8% when exposed to saturation doses of gamma radiation. At higher radiation doses no further shrinkage is experienced. For the Boraflex panels in the OCNGS, this corresponds to formation of a 3.9 inch long gap. In the criticality calculation the licensee conservatively assumed existence of this size coplanar gaps in the Boraflex panels although actual maximum gap length, determined by blackness testing, is 2.42 inches.

Radiation fields, in addition to producing shrinkage of Boraflex, are responsible for another form of degradation which is due to scission of the polysiloxane molecules. Boraflex panels which undergo this type of change become brittle and the material erodes when exposed to hydraulic forces of moving water. The eroded material starts losing its boron carbide and silica fillers. Presence of silica in the spent fuel water, in addition of having

deleterious effects on fuel, constitutes, therefore, an indication of depletion of boron carbide from Boraflex panels. Measurement of silica concentration in the spent fuel pool water is a highly recommended surveillance procedure for determining effectiveness of Boraflex as a neutron absorber.

As discussed in Section 2.1 the licensee has instituted a long-term fuel storage cell surveillance program. It consists of using surveillance coupons in the form of removable stainless steel clad Boraflex sheets which are prototypical of the fuel storage cell walls. These coupons, located in the pool close to the high gamma dose fuel assemblies, are periodically removed and examined for signs of Boraflex degradation. In addition, measurements of silicon concentration in the spent fuel pool water are performed. This provides the licensee with an early warning should an unusually large amount of boron carbide be lost from the Boraflex panels.

2.4.1 Conclusion

Based on the above evaluation, the staff finds that the structural and neutron absorbing (Boraflex) materials used in the spent fuel racks will not be affected by increase in the spent fuel pool capacity or higher enrichment of the fuel stored in the pool. Gap formation which may be caused by Boraflex shrinkage was considered in the licensee's criticality analysis. Any Boraflex degradation which may result in a loss of boron carbide will be detected by examination of the surveillance coupons and by measurement of the silica concentration in the spent fuel pool water. Based on the above the staff concludes that the proposed license amendment for the material used in the spent fuel pool expansion is acceptable.

2.5 Radiological Impact

As discussed previously, GPUN submitted an application for license amendment on August 20, 1982, as supplemented September 2 and December 20, 1983, to increase the storage capacity of the fuel pool from 1800 to 2600 fuel assemblies. GPUN letters dated May 30, June 4, and June 13, 1984, provided additional information in response to the staff requests. The staff issued Licensee Amendment No. 76 on September 17, 1984, approving the increased storage capacity. In the amendment the staff also supported the use of additional 45 storage locations which GPUN elected not to license at the time. The additional 45 storage locations were not licensed with the amendment because the licensee believed that they would be used for the storage of miscellaneous equipment such as fuel channels and sources.

With respect to radiological impact, the staff in its SE dated September 17. 1984, concluded that:

1. The spent fuel pool modifications can be performed in a manner that will limit exposures to workers to as low as is reasonably achievable levels and that the spent fuel assemblies themselves contribute a negligible amount to dose rates in the spent fuel pool area because of the depth of water shielding the fuel.

2. The OCNGS radioactive waste treatment systems is acceptable because the conclusions in the evaluation of the waste treatment systems as found in the SER supporting the issuance of the operation license are unchanged by the modification of the spent fuel pool.

3. The staff concludes that the likelihood of either a cask drop or a fuel pool gate drop onto irradiated fuel is sufficiently small that the offsite radiological consequences for these accidents need not be calculated. Additionally, the offsite radiological consequences from a postulated fuel handling accident would remain unchanged from that which was reported in the staff's SE dated June 21, 1983, that the fuel handling procedure net the requirements of Guideline 2, Section 5.1.1 of NUREG-0612. The staff's present analysis indicates a 0-2 in Exclusion Area Boundary (EAB) thyroid dose of 0.6 rem and whole body dose of 0.3 rem given an atmospheric transport and diffusion relative concentution value of 7.6×10^{-4} sec/m^3. These conservatively estimated doses are well within the 10 CFR Part 100 guideline values. Therefore, the staff concludes that the proposed modifications are acceptable.

The staff has reviewed the licensee's request and has concluded that with regard to radiological impact the addition of 45 fuel assemblies is consistent with the original SE in support of license Amendment No. 76 which bounds this amendment; therefore, the changes are acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Jersey State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, and environmental assessment and finding of no significant impact have been prepared and published in the Federal Register on April 5, 1995, (60 FR 17373) Accordingly, based upon the environmental assessment, the staff has determined that the issuance of the amendment will not have a significant effect on the quality of the human environment.

5.0 OVERALL CONCLUSION

Based on the review, the staff concludes that the licensee's proposal to increase the spent fuel pool capacity to 2645 fuel assemblies is acceptable. In addition the staff has determined that the conclusions reached in the staff's SE dated September 17, 1984 and the Environmental Assessment and Finding of No Significant Impact - Spent Fuel Pool Expansion dated September 13, 1984, remain applicable.

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.

Principal Contributors: L. Kopp
D. Shum
S. Kim
K. Parczewski
J. Minns

Date: April 10, 1995