REGULATORY DOCKET FILE COPY

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

June 19, 1979

Dockets Nos. 50-269
50-270
and 50-287

Mr. William O. Parker, Jr.
Vice President - Steam Production
Duke Power Company
422 South Church Street
P. O. Box 2178
Charlotte, North Carolina 28242

Dear Mr. Parker:

The Commission has issued the enclosed Amendments Nos. 72, 72, and 69 for Licenses Nos. DPR-38, DPR-47 and DPR-55 for the Oconee Nuclear Station, Units Nos. 1, 2 and 3. These amendments consist of changes to the Station's common Technical Specifications and are in response to your request dated February 2, 1979, as supplemented April 20 and May 2, 1979.

These amendments allow an increase in the spent fuel storage capacity from 336 to a maximum of 750 fuel assemblies in the Unit 1/2 common spent fuel pool through the use of high capacity spent fuel racks.

Your February 2, 1979 submittal stated that an additional cooler and pump is anticipated to be added to the Unit 1/2 spent fuel pool cooling system in the first quarter of 1980. Inform NRC if these modifications cannot be performed when promised.

Copies of the Safety Evaluation, Environmental Impact Appraisal, and Notice of Issuance/Negative Declaration are also enclosed.

Sincerely,

Robert W. Reid

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Cmdr
ccp

Enclosures and cc:
See next page

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Enclosures:
1. Amendment No. 72 to DPR-38
2. Amendment No. 72 to DPR-47
3. Amendment No. 69 to DPR-55
4. Safety Evaluation
5. Environmental Impact Appraisal
6. Notice/Negative Declaration

cc w/enclosures: See next page

Duke Power Company

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cc w/enclosure(s) and incoming
dtd.: 2/2, 4/20 & 5/2, 1979

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

DUKE POWER COMPANY

DOCKET NO. 50-269

OCONEE NUCLEAR STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 72
License No. DPR-38

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

   A. The application for amendment by Duke Power Company (the licensee) dated February 2, 1979, as supplemented April 20 and May 2, 1979, 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-38 is hereby amended to read as follows:

   3.B <u>Technical Specifications</u>

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 72 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

Brian Grimes

Brian K. Grimes, Assistant Director
for Engineering & Projects
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 19, 1979

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

DUKE POWER COMPANY

DOCKET NO. 50-270

OCONEE NUCLEAR STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 72
License No. DPR-47

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

   A. The application for amendment by Duke Power Company (the licensee) dated February 2, 1979, as supplemented April 20 and May 2, 1979, 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- 47 is hereby amended to read as follows:

   3.B <u>Technical Specifications</u>

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 72 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

Brian K. Grimes, Assistant Director
for Engineering & Projects
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 19, 1979

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

DUKE POWER COMPANY

DOCKET NO. 50-287

OCONEE NUCLEAR STATION, UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 69
License No. DPR-55

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

   A. The application for amendment by Duke Power Company (the licensee) dated February 2, 1979, as supplemented April 20 and May 2, 1979, 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- 55 is hereby amended to read as follows:

   3.B <u>Technical Specifications</u>

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 69 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

Brian Grimes

Brian K. Grimes, Assistant Director
for Engineering & Projects
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 19, 1979

ATTACHMENTS TO LICENSE AMENDMENTS

AMENDMENT NO. 72 TO DPR-38

AMENDMENT NO. 72 TO DPR-47

AMENDMENT NO. 69 TO DPR-55

DOCKETS NOS. 50-269, 50-270, AND 50-287

Revise Appendix A as follows:

Remove Pages	Insert Pages
3.8-1 thru 3.8-3	3.8-1 thru 3.8-3
5.4-1	5.4-1
5.4-1a	5.4-2

Changes on the revised pages are indicated by marginal lines.

3.8 FUEL LOADING AND REFUELING

Applicability

Applies to fuel loading and refueling operations.

Objective

To assure that fuel loading and refueling operations are performed in a responsible manner.

Specification

3.8.1 Radiation levels in the reactor building refueling area shall be monitored by RIA-2 and RIA-3. Radiation levels in the spent fuel storage area shall be monitored by RIA-6. If any of these instruments becomes inoperable, portable survey instrumentation, having the appropriate ranges and sensitivity to fully protect individuals involved in refueling operation, shall be used until the permanent instrumentation is returned to service.

3.8.2 Core subcritical neutron flux shall be continuously monitored by at least two neutron flux monitors, each with continuous indication available, whenever core geometry is being changed. When core geometry is not being changed, at least one neutron flux monitor shall be in service.

3.8.3 At least one low pressure injection pump and cooler shall be operable.

3.8.4 During reactor vessel head removal and while loading and unloading fuel from the reactor, the boron concentration shall be maintained at not less than that required to shutdown the core to a $k_{eff} \leq 0.99$ if all control rods were removed.

3.8.5 Direct communications between the control room and the refueling personnel in the reactor building shall exist whenever changes in core geometry are taking place.

3.8.6 During the handling of irradiated fuel in the reactor building at least one door on the personnel and emergency hatches shall be closed. The equipment hatch cover shall be in place with a minimum of four bolts securing the cover to the sealing surfaces.

3.8.7 Both isolation valves in lines containing automatic containment isolation valves shall be operable, or at least one shall be closed

3.8.8 When two irradiated fuel assemblies are being handled simultaneously within the fuel transfer canal, a minumum of 10 feet separation shall be maintained between the assemblies at all times.

Irradiated fuel assemblies may be handled with the Auxiliary Hoist provided no other irradiated fuel assembly is being handled in the fuel transfer canal.

3.8.9 If any of the above specified limiting conditions for fuel loading and refueling are not met, movement of fuel into the reactor core shall cease; action shall be initiated to correct the conditions so that the specified limits are met, and no operations which may increase the reactivity of the core shall be made.

3.8.10 The reactor building purge system, including the radiation monitor, RIA-45, which initiates purge isolation, shall be tested and verified to be operable immediately prior to refueling operations.

3.8.11 Irradiated fuel shall not be moved from the reactor until the unit has been subcritical for at least 72 hours.

3.8.12 Two trains of spent fuel pool ventilation shall be operable with the following exceptions:

a. With one train of spent fuel pool ventilation inoperable, fuel movement within the storage pool or crane operation with loads over the storage pool may proceed provided the operable spent fuel pool ventilation train is in operation and discharging through the Reactor Building purge filters.

b. With no spent fuel pool ventilation filter operable, suspend all operations involving movement of fuel within the storage pool or crane operations with loads over the storage pool until at least one train of spent fuel pool ventilation is restored to operable status.

3.8.13 a. Prior to spent fuel cask movement in the Unit 1 and 2 spent fuel pool, spent fuel stored in the first 28 rows of the pool closest to the spent fuel cask handling area shall be decayed a minimum of 55 days.

b. Prior to spent fuel cask movement in the Unit 3 spent fuel pool, spent fuel stored in the first 20 rows of the pool closest to the spent fuel cask handling area shall be decayed a minimum of 43 days.

3.8.14 No suspended loads of more than 3000 lb_m shall be transported over spent fuel stored in either spent fuel pool.

3.8.15 No fuel which has an enrichment greater than 3.5 weight percent U^{235} (46 grams of U^{235} per axial centimeter of fuel assembly) will be stored in either spent fuel pool.

Bases

Detailed written procedures will be available for use by refueling personnel. These procedures, the above specifications, and the design of the fuel handling equipment as described in Section 9.7 of the FSAR incorporating built-in interlocks and safety features, provide assurance that no incident could occur during the refueling operations that would result in a hazard to public health and safety. If no change is being made in core geometry, one flux monitor is sufficient. This permits maintenance on the instrumentation.

Continuous monitoring of radiation levels and neutron flux provides immediate indication of an unsafe condition. The low pressure injection pump is used to maintain a uniform boron concentration. (1) The shutdown margin indicated in Specification 3.8.4 will keep the core subcritical, even with all control rods withdrawn from the core. (2) The boron concentration will be maintained above 1,800 ppm. Although this concentration is sufficient to maintain the core $k_{eff} \leq 0.99$ if all the control rods were removed from the core, only a few control rods will be removed at any one time during fuel shuffling and replacement. The k_{eff} with all rods in the core and with refueling boron concentration is approximately 0.9. Specification 3.8.5 allows the control room operator to inform the reactor building personnel of any impending unsafe condition detected from the main control board indicators during fuel movement.

The specification requiring testing of the Reactor Building purge isolation is to verify that these components will function as required should a fuel handling accident occur which resulted in the release of significant fission products.

Specification 3.8.11 is required, as the safety analysis for the fuel handling accident was based on the assumption that the reactor had been shutdown for 72 hours.(3)

The off-site doses for the fuel handling accident are within the guidelines of 10CFR100; however, to further reduce the doses resulting from this accident, it is required that the spent fuel pool ventilation system be operable whenever the possibility of a fuel handling accident could exist.

Specification 3.8.13 is required as the safety analysis for a postulated cask handling accident was based on the assumptions that spent fuel stored as indicated has decayed for the amount of time specified for each spent fuel pool.

Specification 3.8.14 is required to prohibit transport of loads greater than a fuel assembly with a control rod and the associated fuel handling tool(s).

REFERENCES

(1) FSAR, Section 9.7
(2) FSAR, Section 14.2.2.1
(3) FSAR, Section 14.2.2.1.2

5.4 NEW AND SPENT FUEL STORAGE FACILITIES

Specification

5.4.1 New Fuel Storage

5.4.1.1 New fuel will normally be stored in the spent fuel pool serving the respective unit.

In the spent fuel pool serving Units 1 and 2, the fuel assemblies are stored in racks in parallel rows, having a nominal center-to-center distance of 13.75 inches in both directions. This spacing is sufficient to maintain a $K_{eff} \leq 0.95$ when flooded with unborated water, based on fuel with an enrichment of 3.5 weight percent U^{235}.

In the spent fuel pool serving Unit 3, the fuel assemblies are stored in racks consisting of stainless steel cavities which maintain a minimum edge-to-edge spacing of 3.95 inches between adjacent fuel assemblies. The neutron poisoning effect of the storage cavity material combined with the minimum 3.95 inches edge-to-edge spacing between adjacent fuel assemblies is sufficient to maintain a $K_{eff} \leq 0.95$ when flooded with unborated water based on fuel with an enrichment of 3.5 weight percent U^{235} or the equivalent.

5.4.1.2 New fuel may also be stored in the fuel transfer canal. The fuel assemblies are stored in five racks in a row having a nominal center-to-center distance of 2' 1-3/4". One rack is oversized to receive a failed fuel assembly container. The other four racks are normal size and are capable of receiving new fuel assemblies.

5.4.1.3 New fuel may also be stored in shipping containers.

5.4.1.4 New fuel of enrichment not exceeding 2.9 weight percent U^{235} or the equivalent may be placed in dry storage in Unit 3 fuel storage racks in a checkerboard pattern, with fuel assemblies occupying only diagonally adjacent storage locations. Unused storage locations in a fuel storage module shall be covered by inserting a metal plate in the lead-in to prevent incorrect placement of fuel assemblies. This configuration is sufficient to assure a $K_{eff} \leq 0.9$ at all times.

5.4.2 Spent Fuel Storage

5.4.2.1 Irradiated fuel assemblies will be stored, prior to offsite shipment, in a stainless steel lined spent fuel pool.

The spent fuel pool serving Units 1 and 2 is sized to accommodate a full core of irradiated fuel assemblies in addition to the concurrent storage of the largest quantity of new and spent fuel assemblies predicted by the fuel management program.

Provisions are made in the Unit 1, 2 spent fuel pool to accommodate up to 750 fuel assemblies and in the Unit 3 spent fuel pool up to 474 fuel assemblies.

5.4.2.2 Spent fuel may also be stored in storage racks in the fuel transfer canal when the canal is at refueling level.

5.4.3 Except as provided in Specification 5.4.1.4, whenever there is fuel in the pool, the spent fuel pool is filled with water borated to the concentration that is used in the reactor cavity and fuel transfer canal during refueling operations.

5.4.4 The spent fuel pool and fuel transfer canal racks are designed for an earthquake force of 0.1g ground motion.

REFERENCES

FSAR, Section 9.7

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATING TO THE MODIFICATION OF THE OCONEE UNITS 1/2 COMMON SPENT FUEL STORAGE POOL

FACILITY OPERATING LICENSES NOS. DPR-38, DPR-47 AND DPR-55

DUKE POWER COMPANY

OCONEE NUCLEAR STATION, UNITS NOS. 1, 2 AND 3

DOCKETS NOS. 50-269, 50-270 AND 50-287

Dated: June 19, 1979

INTRODUCTION

By letter dated February 2, 1979, as supplemented April 20 and May 2, 1979, Duke Power Company (DPC or the licensee) requested an amendment to Facility Operating Licenses Nos. DPR-38, DPR-47 and DPR-55 for the Oconee Nuclear Station, Units Nos. 1, 2 and 3. The request would revise the provisions in the Station's common Technical Specifications (TS) to allow an increase in Units Nos. 1 and 2 common spent fuel pool (SFP) storage capacity from 336 to a maximum of 750 fuel assemblies through the use of high capacity spent fuel storage racks.

The expanded storage capacity would allow the Oconee units to operate until about 1981 while still maintaining the capability for a full core discharge.

The major safety considerations associated with the proposed expansion of the SFP storage capacity for the Oconee Station are addressed below. A separate environmental impact appraisal has been prepared as part of this licensing action.

DISCUSSION AND EVALUATION

Criticality Considerations

The proposed spent fuel racks are to be made up of individual containers which are approximately nine inches square by 16 feet long. These containers are to be fabricated from 0.250 inch thick, type 304 stainless steel. The rack structure is designed to hold these square containers on a 13.75 inch pitch under safe shutdown earthquake accelerations. Thus, there will be over three inches of water between neighboring containers. The 13.75 inch pitch combined with the overall dimension of the fuel assembly, which is 8.52 inches, gives a fuel region volume fraction of 0.38 for the storage lattice.

DPC states that the highest anticipated U-235 enrichment is 3.5%. This value was used in the neutron multiplication factor calculations. This enrichment in the present fuel assemblies results in a fuel loading of 46.0 grams of U-235 per axial centimeter of fuel assembly.

As stated in DPC's February 2, 1979 submittal, the fuel pool criticality calculations are based on unirradiated fuel assemblies with no burnable poisons which have a fuel enrichment of 3.5 weight percent U-235. This corresponds to a fuel loading of 46.0 grams of U-235 per axial centimeter of these fuel assemblies. For the criticality calculations, it was also assumed that the water in the pool was pure, i.e., unborated.

Combustion Engineering's (CE's) CEPAK computer program was used to get the multi-group cross sections for the criticality analysis. The NUTEST computer program was used to calculate the self-shielding and flux advantage factors for the material heterogeneity, and the DOT-2W discrete ordinates transport program was used for the overall storage lattice cell calculations. These computer programs were first used to calculate the neutron multiplication factor for an infinite array of fuel assemblies in the nominal storage lattice. The maximal effects of the stainless steel thickness tolerance, fabrication tolerances, fuel assembly positioning uncertainties, and water temperature were then calculated. The accuracy of these methods was checked by calculating the following sets of experiments:

1. The criticality of five, cold, clean pressurized water reactors (PWR's).
2. Stainless steel clad UO_2-H_2O lattice experiments.
3. The LaCrosse Boiling Water Reactor critical experiments with stainless steel shrouds.
4. The reactivity worths of stainless steel reflectors on a uranyl fluoride solution reactor.

The results of these calculations indicate that the total uncertainty in the storage lattice cell calculations might be as large as 1.8% Δk; so DPC allowed this amount of margin in the design.

The above described results compare conservatively with the results of parametric calculations made with other methods for similar fuel pool storage lattices. By assuming new, unirradiated fuel with no burnable poison or control rods, these calculations yield the maximum neutron multiplication factor that could be obtained throughout the life of the fuel assemblies. This includes the effect of the plutonium which is generated during the fuel cycle.

We conclude that all factors that could affect the neutron multiplication factor in this pool have been conservatively accounted for and that the maximum neutron multiplication factor in this pool with the proposed racks will not exceed 0.95. This is NRC's acceptance criterion for the maximum (worst case) calculated neutron multiplication factor in a SFP. This 0.95 acceptance criterion is based on the uncertainties associated with the calculational methods and provides sufficient margin to preclude criticality in the fuel. Accordingly, there is a TS which results in a limitation of the effective neutron multiplication factor in the SFP to 0.95.

Conclusion on Criticality

We conclude that when any number of the fuel assemblies, which DPC described in their submittals, having no more than 46.0 grams of uranium-235 per axial centimeter of fuel assembly or equivalent are loaded into the proposed racks, the k_{eff} in the fuel pool will be less than the acceptance criteria of 0.95. We also conclude that in order to preclude the possibility of the K_{eff} in the fuel pool from exceeding this 0.95 limit without being detected, the use of fuel assemblies that contain more than 46.0 grams of uranium-235, or equivalent, per axial centimeter of fuel assembly will be prohibited. On the basis of the information submitted and the K_{eff} and fuel loading limits stated above, we conclude that the criticality calculations are acceptable.

Spent Fuel Cooling

The licensed thermal power for Oconee Units Nos. 1 and 2 is 2568 MWt each. DPC plans to refuel these reactors every 18 months at which times about 70 of the 177 fuel assemblies in the cores will be replaced. To calculate the maximum heat loads in the SFP, DPC assumed a 168-hour time interval between reactor shutdown and the time when either the 70 fuel assemblies in the normal refueling or the 177 fuel assemblies in the full core offload are placed in the SFP. For this cooling time, DPC used the method given in NRC Standard Review Plan 9.2.5 to calculate maximum heat loads of 19.6 x 10^6 BTU/hr for a normal refueling and 31.7 x 10^6 BTU/hr for a full core offload.

The spent fuel cooling system presently consists of two pumps and two heat exchangers. Each pump is designed to pump 1000 gpm (5.0 x 10^5 lbs./hr.), and each heat exchanger is designed to transfer 7.75 x 10^6 BTU/hr from 125°F fuel pool water to 90°F Recirculating Cooling Water (RCW), which is flowing through the heat exchanger at a rate of 5.0 x 10^5 lbs./hr.

DPC states that this system will be sufficient to keep the SFP water temperature below 150°F, the pool design temperature, until the first quarter of 1980 when an additional SFP cooling pump and heat exchanger of the same capacity will be installed. We find this acceptable.

Using the method given on pages 9.2.5-8 through 14 of the November 24, 1975 version of the NRC Standard Review Plan, with the uncertainty factor, k, equal to 0.1 for decay times longer than 10^7 seconds, we calculate that the maximum peak heat load during the refueling which would fill the pool could be 20 x 10^6 BTU/hr and that the maximum peak heat loads for a full core offload that essentially fills the pool could be 34 x 10^6 BTU/hr. This full core offload was assumed to be a fully irradiated core which was taken out of its reactor vessel 35 days after the other Oconee unit, which shares this SFP, had been refueled. We also find that the maximum incremental heat load that could be added by increasing the number of spent fuel assemblies in the pool from 336 to 750 is 1.9 x 10^6 BTU/hr. This is the difference in peak heat loads for the present and the modified pools.

We conclude that with the three pumps operating, as DPC has committed to provide by the first quarter of 1980, the cooling system can maintain the fuel pool outlet water temperature below 125°F for the normal refueling offload that fills the pool and below 136°F for the full core offload that fills the pool. In the highly unlikely event that all three SFP cooling systems were to fail at the time when there was a peak heat load from a full core in the pool, we calculate that the maximum heatup rate of the SFP water would be 9.0°F/hr. Thus, if the water were initially at an average temperature of 125°F/hr it would be more than nine hours before boiling would start. We also calculate that after boiling starts the required water makeup rate will be less than 70 gpm. We conclude that nine hours will be sufficient time to establish a 70 gpm makeup rate.

Conclusion on Spent Fuel Cooling

We conclude that the cooling capacity of the three loop system proposed by DPC for the Oconee Nuclear Station Units 1 and 2 SFP cooling system will be sufficient to handle the heat load that will be added by the proposed modifications. We also conclude that the incremental heat load due to this modification will not alter the safety considerations of spent fuel cooling from that which we previously reviewed and found to be acceptable.

Installation of Racks and Fuel Handling

In their February 2, 1979 proposal, DPC states that at the time of the installation of the new racks there will be 140 spent fuel assemblies in the pool. Initially, these will all be placed in existing racks at the south end of the pool. This will allow the removal of approximately one third of the existing racks, which are at the north end of the pool, and the installation of two new racks without getting close to the spent fuel. For the installation of the rest of the racks, DPC has developed a detailed procedure for redistributing the 140 fuel assemblies between the south end of the pool and the new racks in the north end of the pool so there will be a minimum of 14 feet of open space between the work area and racks with fuel in them. Also, the plan is to move the racks in the pool at an elevation which is lower than the top of any stored fuel assemblies, such that there will be no movement of racks over stored fuel.

Conclusion on Fuel and Rack Handling

We conclude that DPC's plan will insure than no racks will be moved over the spent fuel assemblies in the pool. After the racks are installed in the pool, the fuel handling procedures in and around the pool will be the same as those procedures that were in effect prior to the proposed modifications. On this basis we conclude that the fuel and rack handling procedures are acceptable.

Structural and Mechanical

The proposed modification consists of replacing the existing fuel assembly racks with the CE supplied High Capacity (Hi-Cap) Fuel Assembly Rack, without changing the basic structural geometry of the SFP. Fourteen independent Hi-Cap fuel assembly storage rack modules are to be installed in the pool. Each fuel assembly storage module is composed of an array of rectangular storage cavities or tubes, fabricated from one-quarter inch thick stainless steel plate, with each tube capable of accepting one fuel assembly. The fuel assembly storage tubes have lead-in surfaces in top castings to provide guidance for insertion of fuel assemblies. The tubes are open at the top and bottom to provide a flow path for convective cooling of the fuel assemblies by natural circulation. The fuel assembly storage tubes are structurally connected to a chevron grid structure to form the modules. The chevron grid structure, placed at the bottom and upper elevations of the module, limits structural deformations and assures that a nominal center-to-center spacing of 13.75 inches is maintained between adjacent tubes for all design loading conditions, including seismic. Each storage rack module is self-supporting, and is supported by four U-channels, connected along the outer periphery of the base of the module, which in turn rest on bearing pads placed on the pool floor liner. All welded construction is used in the fabrication of the spent fuel rack assembly. Load transfer to the pool structure from the fuel racks occurs only at the base of the racks, and consists of transmitting the vertical compression loading and horizontal shear forces due to frictional restraint at both the module/pad and pad/liner interfaces.

The supporting arrangements of the modules, including their restraint, design, fabrication, and installation procedures; the structural design and analysis procedures for all loadings, including seismic and impact loadings; the load combinations; the structural acceptance criteria; the quality assurance requirements for design, fabrication, and installation; and applicable industry codes were all reviewed in accordance with the applicable portions of the current Position for Review and Acceptance of Spent Fuel Pool Storage and Handling Applications, April 1978, including errata, January 1979.

The SFP is located in the Auxiliary Building. Seismic analysis was performed using pool floor response time histories which conform to those approved in the original plant design. The pool floor response time histories were determined in the seismic analysis of the Auxiliary Building using a base acceleration time-history compatible with smoothed response spectra which conform to the positions in Regulatory Guide 1.60, "Design Response Spectra for Seismic Design of Nuclear Power Plants," and structural damping values which conform to the positions in Regulatory Guide 1.61, "Damping Values for Seismic Design of Nuclear Power Plants." The pool floor horizontal time histories were then used as input to perform non-linear time history analyses of the lateral motion of the fuel racks. The pool floor vertical time history was converted to a response spectrum for use in a vertical linear response spectrum analysis. The use of non-linear time history analyses in the horizontal directions was necessitated by the non-linear characteristics of the fuel racks in the lateral directions. The methods of analyzing and combining responses for the racks in the three component directions are in accordance with Regulatory Guide 1.92, "Combining Modal Responses and Spatial Components in Seismic Response Analyses."

In the spent fuel rack horizontal dynamic analysis, the effects of a gap between a storage cavity and a fuel assembly, and the effects of submergence in water on the motion of the fuel racks were accounted for. The analysis was performed in two steps: In the first step, a modal extraction analysis of a detailed finite element model of the empty rack module in air was performed to determine its dynamic characteristics (e.g., natural frequency and mode shapes). In the second step, the modal parameters of the rack module were used to derive a dynamically equivalent spring-mass model of the module which was then incorporated into a lateral non-linear model which included the rack and contained fuel assemblies, and the water surrounding and contained within the cavities. This model considered the rack module, the fuel assemblies, the effect of impacting between the two; the hydrodynamic mass and coupling among the fuel, racks, and pool walls, friction between the fuel racks and pool floor; and rocking of the modules on their supports. The analysis was then performed to determine the dynamic response due to the effects of fuel impacting, hydrodynamic action, and the acceleration time history of the pool floor.

Non-linear time-history sliding base analyses were also performed to determine any potential impacting between adjacent fuel racks and between the racks and the SFP structure. Using the dynamic model discussed above, the motion of the racks relative to the pool floor was determined. The coefficients of friction used in the analysis, between the racks and the pool floor, were based on test data for stainless steel in water provided in a report by P. Hoffman, "Wear Behavior of Friction Materials and Protective Layers with Regard to their Application Possibilities in Water Cooled Nuclear Reactors," Forderungsvorhaben BMFT-Inv. Reakt. 72/711, Kraftwerk Union, August 1973. This analysis resulted in conservative values for the rack sliding, and indicated that the ratios of horizontal displacement to the minimum available gaps between adjacent racks and between the racks and the nearest SFP structure are less than 0.11 and 0.22, respectively, and that the actual sliding distance will not exceed 0.133 inch. An additional analysis was made using an infinite friction coefficient to obtain a conservative value for the peak structural loading of the rack members and pool interfaces. These seismic loadings on the racks and the embedments, along with the maximum deflections, the maximum fuel assembly impact loadings, and the normal and thermal loads were considered in the design of the fuel racks.

Rack material properties used in the analysis of the spent fuel racks are in accordance with the requirements of Subsection NF and Appendix I of Section III of the ASME Boiler and Pressure Vessel Code.

Results of the seismic analysis show that the racks are capable of withstanding the loads associated with all the design loading conditions without exceeding allowable stresses.

An analysis was performed to calculate the consequences of a fuel cask drop accident. The worst case was considered to be an eccentric drop onto the fuel pool wall from the design height of six feet. In this case the cask, yoke, and load block could be deflected onto the spent fuel. The licensee has stated that the results of this accident would be that a maximum of 205 fuel cans could potentially suffer a total loss of integrity before the total energy of the falling cask is absorbed. The radiological consequences of the cask drop are mitigated by limiting the age of fuel stored in the first 28 rows of the pool closest to the spent fuel cask handling area. Therefore, the proposed TS revision requires that no cask movement will be allowed until fuel in these locations has decayed a minimum of 55 days. Also, the licensee has indicated that the maximum possible drop height will be physically limited to four feet. In addition, the modified TS, Section 3.8.14, prohibits the transport of loads greater than a fuel assembly with a control rod and the associated fuel handling tool(s).

The SFP is constructed of concrete walls and floor lined with one-half inch stainless steel clad plate. The fuel pool concrete reinforcing steel, liner plate, and welds are analyzed to account for any additional loads resulting from the proposed increase in pool storage capacity. The design criteria were in compliance with Oconee Final Safety Analysis Report (FSAR) Appendix 5A for Class I structures. Results of an analysis for the most severe loading conditions indicate that the maximum loads are within the allowables, and that the fuel pool floor is adequate to withstand the effects of the new racks and additional fuel.

Installation procedures for the new racks have also been reviewed. Based on handling procedures described to prevent damage to the stored fuel and to prevent interaction between old and new racks, the installation procedures have been found to be acceptable to the NRC staff.

Materials

The Type 304 stainless steel (ASTM Specification A-240) used in the new spent fuel storage racks is compatible with the storage pool environment, which is demineralized borated water controlled to a maximum 150°F temperature. Based on our review of previous operating experience with similar materials approved and in use, we have concluded that there is reasonable assurance that no significant corrosion of the racks, the fuel cladding, or the pool liner will occur over the lifetime of the units.

Conclusion on Structural, Mechanical and Materials

The analysis, design, fabrication, and installation of the proposed new spent fuel rack storage system are in conformance with accepted codes and criteria. The analysis of the structural loads imposed by dynamic, static, seismic and thermal loadings; and the acceptance criteria for the appropriate loading conditions are in accordance with the appropriate portions of the NRC Position for Review and Acceptance of Spent Fuel Pool Storage and Handling Applications, April 1978, including errata, January 1979.

The mechanical properties for the materials used in the rack design are consistent with the normal and accident pool conditions. The quality assurance procedures for the materials, fabrication, installation, and examination of the new racks are in accordance with the accepted requirements of ASME Code, Section III, Subsection NF, Articles NF-2000, NF-4000, and NF-5000.

In addition, the design, procurement, and fabrication of the spent fuel racks comply with the pertinent requirements of Appendix B to 10 CFR 50, and delineated in Regulatory Guide 1.29, "Seismic Design Classification."

The effects of the additional loads on the existing pool structure due to the high capacity storage racks have been examined. The pool structure integrity is assured by conformance with the original FSAR acceptance criteria.

There is no evidence at this time to indicate that corrosion of the fuel assemblies, the stainless steel rack structures, or the fuel pool liner will occur over the lifetime of the plant, at the temperatures and quality of the demineralized borated water to be maintained in the pool.

We conclude that the subject modification proposed by the licensee is acceptable and satisfies the applicable requirements of the General Design Criteria 2, 4, 61, and 62 of 10 CFR, Part 50, Appendix A.

Spent Fuel Cask Movement and Fuel Handling Accidents

By letter dated April 20, 1979, the licensee proposed changes to Section 3.8 of the TS for Oconee Nuclear Station Units Nos. 1, 2 and 3. The licensee proposed specifications which restrict (1) the age of spent fuel stored near the cask handling area prior to spent fuel cask movement in the SFP and (2) the weight of loads that can be carried over spent fuel. The current restrictions on the age of spent fuel stored near the cask laydown area in the Oconee Units 1 and 2 and Oconee 3 SFP's result from the Safety Evaluation (SE) dated September 1976. The licensee's proposal would (1) restrict the age of significantly more spent fuel than required in the 1976 analysis SE (even accounting for the increased density of a modified Oconee Units 1 and 2 SFP) and (2) specify a minimum age for spent fuel in the modified Oconee 1 and 2 SFP which maintains constant the potential consequences of a spent fuel shipping cask falling into the Oconee 1 and 2 SFP over the values given in the 1976 SE.

In our SE dated September 1976, we assumed that 76 spent fuel assemblies may be damaged if a spent fuel shipping cask fell into the Oconee Unit 3 SFP and the minimum age for this damaged fuel was 43 days. The proposed specification 3.8.13.b requires that more than 76 spent fuel assemblies have a minimum of 43 days decay before spent fuel cask movement in the Oconee Unit 3 SFP. Based on this, and in that the potential consequences for the postulated accident are well within the exposure guidelines of 10 CFR Part 100, we conclude that the proposed Specification 3.8.13.b is acceptable.

In our SE dated September 1976, we assumed that less than 76 spent fuel assemblies may be damaged if a spent fuel shipping cask fell into the Oconee Units 1 and 2 SFP and the minimum age for this damaged fuel was 43 days. The licensee has determined that up to 205 assemblies may be damaged in the modified SFP. This is more assemblies than were assumed to be damaged based on the evaluation given in the SE for the increased capacity of the modified Oconee Units 1 and 2 SFP. Based on 205 assemblies being damaged, we would calculate a minimum age of 55 days for these damaged assemblies for the potential consequences of a postulated cask falling into the Oconee Units 1 and 2 SFP to not be greater than the values given in the SE dated September 1976. We have asked the licensee to specify 55 days as the minimum age of spent fuel stored near the cask handling area in Oconee Units 1 and 2 SFP in proposed Specification 3.8.13.a. The licensee has agreed to this change. Based on this and on the potential consequences for the postulated accident of a cask falling into the Oconee Units 1 and 2 SFP being within the exposure guidelines of 10 CFR Part 100, we conclude that the proposed Specification 3.8.13.a is acceptable as modified by the NRC staff and agreed to by the licensee.

The licensee has proposed Specification 3.8.14 to prohibit the transport of loads greater than a fuel assembly with control rod and associated handling tool over spent fuel in either the Oconee Units 1 and 2 SFP or Oconee Unit 3 SFP. This restriction on loads allowed over spent fuel will ensure that in the event the load is dropped, the activity release will be limited to that contained in the equivalent of a single fuel assembly. We concluded, therefore, that the proposed Specification 3.8.14 of the Oconee TS is acceptable as written.

The NRC staff has under way a generic review of load handling operations in the vicinity of SFP's to determine the likelihood of a heavy load impacting fuel in the pool and, if necessary, the radiological consequences of such an event. Because Oconee Units 1 and 2 will be required to prohibit loads greater than 3000 pounds (the nominal weight of a fuel assembly, control rod and handling tool) to be transported over spent fuel in the SFP, we have concluded that the likelihood of any other heavy load handling accident is sufficiently small that the proposed modification is acceptable and no additional restrictions on load handling operations in the vicinity of the SFP are necessary while our review is under way.

The consequences of fuel handling accidents in the SFP are not changed from those presented in the SE dated June 1973 for the SFP at Oconee Units 1 and 2 and are acceptable.

Occupational Radiation Exposure

We have reviewed the licensee's plan for the removal and disposal of the low density racks and the installation of the high density racks with respect to occupational radiation exposure. The occupational exposure for this operation is estimated by the licensee to be about 75 man-rem. This estimate is based on the licensee's detailed breakdown of occupational exposure for each phase of the modification. The licensee considered the number of individuals performing a specific job, their occupancy time while performing this job, and the average dose rate in the area where the job was being performed. In several instances, the licensee is conservative in his estimation of dose-rate and man-hours to perform a specific operation. For example, although dose rates used to establish the collective (man-rem) exposure to many work groups is based on measurements that average 10 to 15 mrem/hr, the licensee is planning on reducing, or has already reduced, these dose rates by the following methods: (1) by adding two feet of water to the SFP to shield the crud "ring" around the pool; (2) by cleaning the walls of the pool near the pool water surface to remove the buildup of this crud "ring;" and (3) by using a skimmer and filter system to remove insoluble activity that is on the surface of the pool water. Based on the above, the staff concludes that the SFP modifications will be performed in a manner that will ensure as low as is reasonably achievable (ALARA) exposures to occupational workers.

The licensee is considering two methods of disposal of the old racks: (1) cutting the old racks into small sections to significantly reduce the volume to be shipped to the burial site or (2) crating the racks whole which will reduce the man-rem exposure involved with disposing of these racks. Cutting the old racks into small sections will permit more efficient packaging in the shipping containers. This will result in a smaller volume of radioactive waste to be disposed of, with resulting economic and environmental benefits, e.g., fewer waste shipments and conservation of low level waste burial site space. This will also require that the licensee expend effort to cut the old racks and will result in an increase in occupational exposure. The licensee has estimated that the occupational exposure to decontaminate the old racks and dispose of them whole would be 0.5 man-rem, while to decontaminate and cut the old rack into small sections would be two man-rem. the licensee has estimated that the burial costs for the old racks would be

$50,700 if they are crated whole (13,950 cubic feet, 28 boxes) and $3,500 if they are cut into small sections (720 cubic feet). Therefore, in burial costs alone and not considering additional savings in shipping costs, cutting the racks into small sections represents a savings of over $47,000 for an estimated additional exposure of 1.5 man-rem. The licensee has stated that he will estimate the exposures associated with the different ways to dispose of the old racks from measurements of the dose rates from the old racks when he has the racks outside the SFP, decontaminated and ready for disposal. At this time, taking into account alternative disposal costs and exposures, the licensee will make the final decision as to the choice of method of disassembly and disposal of the old racks so that exposures will be kept to levels that are as low as is reasonably achievable (ALARA).

We have estimated the increment in onsite occupational dose resulting from the proposed increase in stored fuel assemblies on the basis of information supplied by the licensee for dose rates in the spent fuel area from radionuclide concentrations in the SFP water and deposited on the SFP walls. The spent fuel assemblies themselves will contribute a negligible amount to dose rates in the pool area because of the depth of water shielding the fuel. The occupational radiation exposure resulting from the additional spent fuel in the pool represents a negligible burden. Based on present and projected operations in the SFP area, we estimate that the proposed modification should add less than 1% to the total annual occupational radiation exposure burden at this station. The small increase in additional exposure will not affect the licensee's ability to maintain individual occupational doses to as low as in reasonably achievable and within the limits of 10 CFR Part 20. Thus, we conclude that storing additional fuel in the SFP will not result in any significant increase in doses received by occupational workers.

Radioactive Waste Treatment

The station contains waste treatment systems designed to collect and process the gaseous, liquid and solid wastes that might contain radioactive material. The waste treatment systems were evaluated in the SE dated December 1970 for Oconee Unit 1 and in the SE dated July 1973 for Oconee Unit 2. There will be no change in the waste treatment systems or in the conclusions of the evaluations of these systems because of the proposed modification.

Conclusion on Cask Movement Fuel Handling, Occupational Exposure and Radioactive Waste Treatment

Our evaluation supports the conclusion that the proposed modification to the Oconee Units 1 and 2 SFP is acceptable because:

1. The increase in occupational radiation exposure to individuals due to the storage of additional fuel in the SFP would be negligible.

2. The potential consequences of the postulated design basis accident for the SFP, i.e., the rupture of the fuel pins in the equivalent of one fuel assembly and the subsequent release of the radioactive inventory within the gap, are acceptable.

3. The likelihood of an accident involving heavy loads in the vicinity of the SFP is sufficiently small that no additional restrictions on load movement are necessary while our generic review of the issues is under way.

Based on the above, we conclude that the proposed Specifications 3.8.13 and 3.8.14 are acceptable with the minimum age of spent fuel near the cask handling area in the Oconee Units 1 and 2 SFP being 55 days. Based on the above, we also conclude that the proposed modification of the Oconee Units 1 and 2 SFP is acceptable.

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 that the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: June 19, 1979

ENVIRONMENTAL IMPACT APPRAISAL

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO THE MODIFICATION OF THE

SPENT FUEL POOL

FACILITY OPERATING LICENSES NOS. DPR-38, DPR-47 AND DPR-55

DUKE POWER COMPANY

OCONEE NUCLEAR STATION, UNITS NOS. 1, 2 AND 3

DOCKETS NOS. 50-269, 50-270 AND 50-287

1.0 DESCRIPTION OF PROPOSED ACTION

By letter dated February 2, 1979 and as supplemented April 20, 1979 and May 2, 1979, Duke Power Company (DPC or the licensee) requested amendments to Facility Operating Licenses Nos. DPR-38, DPR-47 and DPR-55 for the Oconee Nuclear Station, Units 1, 2 and 3 respectively. This request was made to obtain authorization to provide additional storage capacity in the Oconee Station Common Unit 1/2 spent fuel pool (SFP).

The Oconee Nuclear Station was designed and constructed with two spent fuel storage pools--one associated with Units 1 and 2 and one with Unit 3. The design was such that the pools would be capable of storing 1 2/3 and 1 1/3 cores respectively. The original design capacity for each pool was 336 and 216 locations. In 1975 DPC desired to increase the storage capacity at the Oconee site. The Unit 1 and 2 pool contained spent fuel from the initial Unit 1 refueling. The Unit 3 pool did not contain any spent fuel; thus, DPC decided to increase the capacity of the Unit 3 pool. A request to amend the Unit 3 Operating License was submitted on September 12, 1975 and was approved, as License Amendment No. 17, on December 22, 1975. The completed modification increased the Unit 3 SFP capacity to 474 locations. The proposed modification would increase the capacity of the common Unit 1/2 SFP from the present design capacity of 336 fuel assemblies to a capacity of 750 fuel assemblies. The total capactiy for both pools would become 1224 locations.

2.0 NEED FOR STORAGE CAPACITY

The NRC issued the Oconee Unit 1, 2 and 3 operating licenses on February 8, 1973, October 8, 1973 and July 19, 1974 respectively. Commercial operation began on July 18, 1973, September 9, 1974 and December 16, 1974 for Units 1, 2, and 3 respectively. To date, Unit 1 has had four refuelings, Unit 2 has had three refuelings and Unit 3 has had four refuelings. For each of these refuelings, about 1/3 of the core (between 56 and 72 fuel assemblies) has been removed and transferred to the spent fuel pools. The current storage capacity of the Unit 1/2 spent fuel pool is 336 fuel assemblies and there are 209 assemblies presently in the spent fuel pool. A full core consists of 177 fuel assemblies per reactor. Under the current fuel management plan, each reactor is scheduled to be refueled annually. After the 1980 refueling outages, neither spent fuel pool would have sufficient capacity for another reload cycle.

3.0 FUEL REPROCESSING HISTORY

Currently, spent fuel is not being reprocessed on a commercial basis in the United States. The Nuclear Fuel Services (NFS) plant at West Valley, New York, was shut down in 1972 for alterations and expansion; on September 22, 1976, NFS informed the Commission that they were withdrawing from the nuclear fuel reprocessing business. The Allied General Nuclear Services (AGNS) proposed plant in Barnwell, South Carolina, is not licensed to operate. The General Electric Company (GE) Midwest Fuel Recovery Plant in Morris, Illinois, now referred to as the Morris Operation (MO), is in a decommissioned condition. Although no plants are licensed for reprocessing fuel, the MO storage pool and the NFS plant storage pool (on land owned by the State of New York and leased to NFS through 1980) are licensed to store spent fuel. The storage pool at West Valley is not full but NFS is presently not accepting any additional spent fuel for storage. Construction of the AGNS plant receiving and storage station has been completed. AGNS has applied for but has not been granted a license to receive and store irradiated fuel assemblies there, prior to a decision on the licensing action relating to the separation facility.

4.0 THE FACILITY

The Oconee Nuclear Station Units 1, 2 and 3 (the facilities) are described in the Final Environmental Statement (FES) related to operation of these facilities. The FES was issued by the Commission in March 1972. Each facility has a pressurized water reactor (PWR) rated at 2568 megawatts thermal (MWt) core power and 899 megawatts gross electrical (MWe) output. Pertinent descriptions of principal features related to the SFP of each facility as it currently exists are summarized below to aid the reader in following the evaluations in subsequent sections of this appraisal.

4.1 Station Service Water Systems

The Class I (seismic) service water system consists of a low pressure service water (LPSW) system and a high pressure service water (HPSW) system. The station has two LPSW systems. One is shared by Units 1 and 2 and the other, of almost identical design, services Unit 3. The principal safety related use of the LPSW systems is to provide cooling to the low pressure injection and decay heat coolers outside containment and to the reactor building coolers inside containment. Each LPSW system takes its water supply from the condenser circulating water system through three 15,000 gpm pumps. The LPSW removes heat from the Spent Fuel Cooling System, which in turn rejects its heat to the condenser circulating water system for discharge into Lake Keowee.

4.2 Radioactive Wastes

The station contains waste treatment systems designed to collect and process the gaseous, liquid and solid waste that might contain radioactive material. The waste treatment systems are evaluated in the Final Environmental Statement (FES). There will be no change in the waste treatment systems described in Section III.D.2 of the Final Environmental Statement because of the proposed modification.

4.3 Purpose of Spent Fuel Pool

The spent fuel pool is designed to receive irradiated fuel assemblies removed from the reactor either to accomplish a core refueling or to allow for inspection or modification of core internals. The latter purpose may require space in the pool for up to a full core. When first removed from the reactor, assemblies are initially intensely radioactive (due to their fresh fission product content) and have a high thermal output. The spent fuel pool provides shielding and cooling.

The major portion of the radioactivity and its associated heat decays in the first 150 days following removal from the reactor core. After this period, the spent fuel assemblies can be placed into a heavily shielded fuel cask and shipped offsite. Space permitting, spent fuel assemblies may be stored for an additional period allowing continued fission product decay and thermal cooling prior to shipment.

4.4 Spent Fuel Pool Cleanup System

The spent fuel pool cooling and cleanup system for each pool consists of two circulation pumps, two heat exchangers, two filters, an ion exchanger, and the required piping, valves and instrumentation. This equipment is in two separate loops. The pumps draw water from the pool. This flow is passed through the heat exchangers and then returned to the pool. Approximately 100 gpm in each loop is bypassed through the filter and ion exchanger to maintain the clarity and purity of the water.

Because we expect only a small increase in radioactivity released to the pool water as a result of the proposed modification, as discussed in Section 4.2, we conclude that the spent fuel pool purification system will keep concentrations of radioactivity in the pool water to levels which have existed prior to the modification.

5.0 ENVIRONMENTAL IMPACTS OF PROPOSED ACTION

5.1 Land Use

The proposed modification will alter only the Unit 1/2 spent fuel storage racks. It will not alter the external physical geometry of the spent fuel pool structure. The spent fuel pool was designed to store spent fuel assemblies under water for a period of time to allow shorter-lived radioactive isotopes to decay and to reduce the associated thermal heat output. The Commission has never set a limit, other than the length of the license, on how long spent fuel assemblies could be stored onsite. The longer the fuel assemblies decay, the less radioactivity they contain. The proposed modification will not change the basic land use of the spent fuel pool. The pool is presently designed to store the spent fuel assemblies for up to 6 normal refuelings. The proposed modification would provide storage for up to 13 normal refuelings. The pool was intended to store spent fuel. This use will remain unchanged by the proposed modification.

5.2 Water Use

There will be no significant change in plant water consumption or use as a result of the proposed modification. As discussed subsequently, storing additional spent fuel in the spent fuel pool will slightly increase the heat load on the spent fuel pool cooling system. This heat is transferred in turn to the Spent Fuel Cooling system and to the low pressure service water system. The modification will not change the flow rate within these cooling systems.

5.3 Radiological

5.3.1 Introduction

The potential offsite radiological environmental impacts associated with the expansion of the spent fuel storage capacity were evaluated and determined to be environmentally insignificant as addressed below.

The additional spent fuel which would be stored due to the expansion is the oldest fuel which has not been shipped from the plant. This fuel should have decayed at least 4 years. During the storage of the spent fuel under water, both volatile and nonvolatile radioactive nuclides may be released to the water from the surface of the assemblies or from defects in the fuel cladding. Most of the material released from the surface of the assemblies consists of activated corrosion products such as cobalt-58, cobalt-60, iron-59 and manganese-54, which are not volatile. The radionuclides that might be released to the water through defects in the cladding, such as cesium-134, cesium-137, strontium-89 and strontium-90, are also predominantly nonvolatile.

The primary impact of such nonvolatile radioactive nuclides is their contribution to radiation levels to which workers in and near the spent fuel pool would be exposed. The volatile fission product nuclides of most concern that might be released through defects in the fuel cladding are the noble gases (xenon and krypton), tritium, and the iodine isotopes.

Experience indicates that there is little radionuclide leakage from spent fuel stored in pools after the fuel has cooled for several months. The predominance of radionuclides in the spent fuel pool water appears to be radionuclides that were present in the reactor coolant system prior to refueling (which becomes mixed with water in the spent fuel pool during refueling operations) or crud dislodged from the surface of the spent fuel during transfer from the reactor core to the spent fuel pool. During and after refueling, the spent fuel pool cleanup system reduces the radioactivity concentrations considerably. It is theorized that most failed fuel contains small, pinhole-like perforations in the fuel cladding at the clad operating temperature of approximately 800°F. A few weeks after refueling, the spent fuel cools in the spent fuel pool so that fuel clad temperature is relatively cool, approximately 180°F. This substantial temperature reduction should reduce the rate of release of fission products from the fuel pellets and decrease the gas pressure in the gap between pellets and clad, thereby tending to retain the fission products within the gap.

In addition, most of the gaseous fission products have short half-lives and decay to insignificant levels within a few months. Based on the operational reports submitted by the licensee or discussions with the operators, there has not been any significant leakage of fission products from spent light water reactor fuel stored in the Morris Operation (MO) (formerly Midwest Recovery Plant) at Morris, Illinois, or at the Nuclear Fuel Services (NFS) storage pool at West Valley, New York. Spent fuel has been stored in these two pools which, while it was in a reactor, was determined to have significant leakage and was therefore removed from the core. After storage in the onsite spent fuel pool, this fuel was later shipped to either the MO or NFS for extended storage. Although the fuel exhibited significant leakage at reactor operating conditions, there was no significant leakage from this fuel in the offsite storage facility, nor has there been subsequent significant leakage from the assemblies.*

5.3.2 Radioactive Material Released to Atmosphere

With respect to gaseous releases, the only significant noble gas isotope attributable to storing additional assemblies for a longer period of time would be krypton-85. As discussed previously, experience has demonstrated that after spent fuel has decayed 4 to 6 months, there is no significant release of fission products from defective fuel. However, we have conservatively estimated that an additional 84 Curies per year of krypton-85 may be released from the SFP when the modified pool is completely filled. This increase would result in an additional total body dose of less than 0.002 mrem per year to an individual at the site boundary. This dose is insignificant when compared to the approximately 100 mrem per year that an individual receives from natural background radiation. The additional total body dose to the estimated population within a 50-mile radius of the plant is less than 0.005 man-rem per year. This is small compared to the fluctuations in the annual dose this population would receive from natural background radiation. These exposures represent an increase of less than 0.2 percent of the exposures from the plant evaluated in the Final Environmental Statement. Thus, we conclude that the proposed modification will not have any significant impact on exposures offsite.

Assuming that the spent fuel will be stored onsite for several years, iodine-131 releases from spent fuel assemblies to the spent fuel pool water will not be significantly increased because of the expansion of the fuel storage capacity, since the iodine-131 inventory in the fuel will decay to negligible levels between refuelings.

Storing additional spent fuel assemblies is not expected to increase the bulk water temperature during normal refuelings above the 120°F used in the design analysis. Therefore, it is not expected that there will be any significant change in the annual release of tritium or iodine as a result of the proposed modification from that previously evaluated in the Final Environmental Statement.

Most airborne releases from the plant result from leakage of reactor coolant which contains tritium and iodine in higher concentrations than the spent fuel pool. Therefore, even if there were a slightly higher evaporation rate from the spent fuel pool, the increase in

*NEDO-21326-I, January 1977, "Consolidated Safety Analysis Report for Morris Operations," Morris, Illinois, Vol. I.

ASME Publication (Morris Operations) 77-JPGC-NE-15 by L. L. Denio, et al., "Control of Nuclear Fuel Storage Basin Water Quality by Use of Powered Ion Exchange Resins and Zeolites," June 19, 1977.

tritium and iodine released from the plant as a result of the increase in stored spent fuel would be small compared to the amount normally released from the plant and that which was previously evaluated in the Final Environmental Statement. If levels of radioiodine become too high, the air will be diverted to charcoal filters for the removal of radioiodine before release to the environment. In addition, the plant radiological effluent Technical Specifications, which are not being changed by this action, restrict the total releases of gaseous activity from the plant, including the spent fuel pool.

5.3.3 Solid Radioactive Wastes

The concentration of radionuclides in the pool is controlled by the filters and ion exchanger and by decay of short-lived isotopes. The activity is high during refueling operations while reactor coolant water is introduced into the pool, and decreases as the pool water is processed through a filter and ion exchanger. The increase of radioactivity, if any, should be minor because the additional spent fuel to be stored is relatively cool, thermally, and radionuclides in the fuel will have decayed significantly.

While we believe that there should not be an increase in solid radwaste from the spent fuel pool operations due to the modification, as a conservative estimate we have assumed that the amount of solid radwaste may be increased by 51 cubic feet of resin per year from the ion exchanger (an additional resin bed per year) and the filters (two additional filters per year). The estimated annual average amount of solid waste shipped from the Oconee Station from 1973 to 1977 was about 37,000 cubic feet per year. The annual average amount of solid waste shipped from Oconee 1/2 would be about 24,000 cubic feet per year. If the storage of additional spent fuel does increase the amount of solid waste from the SFP purification systems by about 51 cubic feet per year, the increase in total waste volume shipped would be less than 0.3% and would not have any significant environmental impact.

The present spent fuel racks to be removed from the SFP are contaminated and will be disposed of as low level solid waste. The licensee has estimated that less than 14,000 cubic feet of solid radwaste will be removed from the SFP because of the proposed modification. If the old racks are cut up, the amount of solid waste should be less than 800 cubic feet. Averaging the 14,000 cubic feet over an assumed remaining plant life of 30 years results in about 470 cubic feet per year; this 470 in comparison to the annual average of 37,000 cubic feet per year represents an increase of less than 1.5% annually. This will not have any significant environmental impact.

5.3.4 Radioactivity Released to Receiving Waters

There should not be a significant increase in the liquid release of radionuclides from the plant as a result of the proposed modification. The amount of radioactivity on the spent fuel pool filter and demineralizer might slightly increase due to the additional spent fuel in the pool, but this increase of radioactivity should not be released in liquid effluents from the plant. The plant radiological effluent technical specifications, which are not being changed by this action, restrict the total releases of liquid radioactivity from the plant.

The cartridge filter removes insoluble radioactive matter from the SFP water. This is periodically removed to the waste disposal area in a shielded cask and placed in a shipping container. The insoluble matter will be retained on the filter or remain in the SFP water.

The demineralizer resins are periodically flushed with water to the spent resin storage tank. The water used to transfer the spent resin is decanted from the tank and returned to the liquid radwaste system for processing. The soluble radioactivity will be retained on the resins. If any activity should be transferred from the spent resin to this flush water, it would be removed by the liquid radwaste system.

Leakage from the SFP is collected in the leak collection system which consists of stainless steel channels imbedded in the concrete structure. The leakage is transferred to one of the waste storage tanks in the liquid radwaste system and is processed by the system before any water is discharged from the plant. Before the waste storage tank, the leakage flows through an open basin where the flow could be observed. The basin is inspected periodically for signs of pool leakage. There have not been signs of leakage from the pool. Any leakage from the pool that could occur during the modification of the pool could also be detected through an increase in make-up water to the pool or an unusual increase in the level in a waste storage tank.

5.3.5 Occupational Exposures

We have reviewed the licensee's plan for the removal and disposal of the low density racks and the installation of the high density racks with respect to occupational radiation exposure. The occupational exposure for the entire operation is estimated by the licensee to be about 75 man-rem. We consider this to be a reasonable conservative estimate because it is based on conservative dose rates and occupancy factors for individuals performing a specific job during the modification. This operation is expected to be a small fraction of the total man-rem burden from occupational exposure.

We have estimated the increment in onsite occupational dose resulting from the proposed increase in stored fuel assemblies on the basis of information supplied by the licensee for occupancy times and dose rates in the spent fuel pool area. The spent fuel assemblies themselves will contribute a negligible amount to dose rates in the pool area because of the depth of water shielding the fuel. The occupational radiation exposure resulting from the proposed action represents a negligible burden. Based on present and projected operations in the spent fuel pool area, we estimate that the proposed modification should add less than one percent to the total annual occupational radiation exposure burden at this facility. Thus, we conclude that storing additional fuel in the SFP will not result in any significant increase in doses received by occupational workers.

5.3.6 Impacts of Other Pool Modifications

As discussed above, the additional radiological environmental impacts in the vicinity of Oconee 1/2 resulting from the proposed modification are very small fractions (less than 1%) of the impacts evaluated in the Oconee 1/2 FES. These additional impacts are too small to be considered anything but local in character.

Based on the above, we conclude that a SFP modification at any other facility should not significantly contribute to the environmental impact of the Oconee 1/2 SFP and that the Oconee 1/2 SFP modification should not contribute significantly to the environmental impact of any other facility.

5.3.7 Evaluation of Radiological Impact

As discussed above, the proposed modification does not significantly change the radiological impact evaluated in the Final Environmental Statement.

5.3.8 Nonradiological Effluents

There will be no change in the chemical or biocidal effluents from the plant as a result of the proposed modification. However, the plant thermal discharge will be increased somewhat by the proposed modification. At present, each pool has the ability and would be permitted to contain, as a maximum heat load, 1/3 of a recently discharged core plus a subsequent offloading of one full core plus prior spent fuel reload discharges totaling up to 1224 assemblies. Prior discharges contribute little to the total heat load. This heat load is to be discharged to Lake Keowee via heat exchangers in the spent fuel pool cooling system and the cooling water systems discussed in Section 4.1.

With the proposed modification, an additional maximum heat load could be present in the pool due to accumulating the spent fuel from the first 30 refueling cycles with the final 3 being discharged simultaneously as a full core offload. This additional heat load would be 1.9×10^6 Btu per hour, which represents the difference in peak heat loads for full core offloads that essentially fill the present and the modified pools.

The total station thermal discharge to Lake Keowee without the proposed modification is approximately 17.6×10^9 Btu per hour. With the proposed modification, it would be increased by no more than 1.9×10^6 Btu per hour, which is less than 0.02 percent of the estimated total thermal discharge to Lake Kewaunee. This would not have a significant environmental impact.

5.3.9 Impacts on the Community

The new storage racks will be fabricated offsite and shipped to the facility. No environmental impacts on the environs outside the spent fuel storage building are expected during removal of the existing racks and installation of the new racks. The impacts within this building are expected to be limited to those typically associated with normal metal working activities.

No environmental impact on the community is expected to result from the fuel rack conversion or from the subsequent operation with the increased storage of spent fuel in the spent fuel pool.

6.0 ENVIRONMENTAL IMPACT OF POSTULATED ACCIDENTS

Although the new high density racks will accommodate a larger inventory of spent fuel, we have determined that the installation and use of the racks will not change the radiological consequences of a postulated fuel handling accident or spent fuel cask drop accident in the SFP area from those values reported in the FES for Oconee 1/2 dated March 1972.

The environmental impact of a spent fuel shipping cask falling into the Oconee 1/2 SFP or Oconee 3 SFP is given in the Environmental Impact Appraisal dated September 10, 1976. These impacts are not changed because of the proposed modification of the Oconee 1/2 SFP.

Additionally, the NRC staff has underway a generic review of load handling operations in the vicinity of spent fuel pools to determine the likelihood of a heavy load impacting fuel in the pool and, if necessary, the radiological consequences of such an event. Because Oconee 1/2 will be required to prohibit loads greater than 3000 pounds (the normal weight of a fuel assembly, control rod and handling tool) to be transported over spent fuel in the SFP, we have concluded that the likelihood of any other heavy load handling accident is sufficiently small that the proposed modification is acceptable and no additional restrictions on load handling operations in the vicinity of the SFP are necessary while our review is underway.

7.0 ALTERNATIVES

With respect to the Oconee Station Unit 1/2 spent fuel pool, we have considered the following spent fuel storage alternatives:

(1) Increase storage capacity as proposed.

(2) Reprocessing of spent fuel.

(3) Storage at independent spent fuel storage installations (ISFSI).

(4) Offsite storage in spent fuel pools of other reactors.

(5) Shutdown of facility (storage in reactor pressure vessel).

7.1 Increase the Storage Capacity of the Spent Fuel Pool, as Proposed

The total estimated installed capital cost of the proposed Oconee Station Unit 1/2 new storage racks is about $3,426,000. This equates to about $8,300 for each additional proposed fuel assembly storage space. The estimated cost of each of the alternatives considered is discussed in the following sections, where applicable, and summarized in Table 7.0.

7.2 Reprocessing of Spent Fuel

As discussed earlier, none of the three commercial reprocessing facilities in the United States is currently operating. The Morris Operation (MO) is in a decommissioned condition. On September 22, 1976, Nuclear Fuel Services, Inc. (NFS), informed the Nuclear Regulatory Commission that it was "withdrawing from the nuclear fuel processing business." The Allied General Nuclear Services (AGNS) reprocessing plant received a construction permit on December 18, 1970. In October 1973, AGNS applied for an operating license for the separation facility (construction of which is essentially complete). On July 3, 1974, AGNS applied for a materials license to receive and store up to 400 metric tonnes of uranium (MTU) in spent fuel in the completed onsite storage pool. Hearings have not been completed on the materials license application. However, even if AGNS decides to proceed with operation of the Barnwell facility in light of the President's policy statement of April 7, 1977, discussed below, the separation plant will not be licensed until the issues presently being considered in the GESMO proceedings are resolved and the GESMO proceedings are complete.

On April 7, 1977, the President issued a statement outlining his policy on continued development of nuclear energy in the United States. The President stated that: "We will defer indefinitely the commercial reprocessing and recycling of the plutonium produced in the U.S. nuclear power programs. From our own experience, we have concluded that a viable and economic nuclear power program can be sustained without such reprocessing and recycling."

On December 30, 1977, the NRC ordered (42 FR 65334) the termination of the pending fuel cycle licensing actions involving GESMO (Docket No. RM-50-5), Barnwell Nuclear Fuel Plant Separations Facility, Uranium Hexafluoride Facility, and Plutonium Product Facility (Docket Nos. 50-332, 70-1327 and 70-1821, respectively), Exxon's NFRRC (Docket No. 50-564), the Westinghouse Electric Corporation Recycle Fuel Plants (Docket No. 70-1432), and the Nuclear Fuel Services, Inc., West Valley Reprocessing Plant (Docket No. 50-201). The Commission also announced that it would not at this time consider any other applications for commercial facilities for reprocessing spent fuel, fabricating mixed-oxide fuel, or related functions. At this time, any consideration of these or comparable facilities has been deferred for the indefinite future. Reprocessing is not a reasonable alternative to the proposed expansion of the Oconee Station spent fuel pool. Accordingly, no estimate of cost is considered appropriate.

7.3 Storage at Independent Spent Fuel Storage Installations

An alternative to expansion of onsite spent fuel pool storage would be the construction of new "independent spent fuel storage installations" (ISFSI). Such installations could provide storage space in excess of several thousand metric tonnes of uranium of spent fuel. This is far greater than the capacities of onsite storage pools such as at Oconee.

Fuel storage pools at MO and NFS are functioning as independent spent fuel storage installations, although this was not the original design intent. Likewise, if the receiving and storage station at the AGNS reprocessing plant is licensed to accept spent fuel, it also would be functioning as an independent spent fuel storage installation. The license for MO was amended on December 3, 1975 to increase the storage capacity to about 750 metric tonnes of uranium; approximately 306 metric tonnes of uranium are now stored in the pool.

We have discussed the status of MO with GE personnel and have been informed* that GE is primarily using the storage space there for GE-owned fuel (which had been leased to utilities) or for fuel which GE had previously contracted to reprocess. We were informed that the present GE policy is not to store spent fuel unless GE has previously committed to do so.** There is no such commitment for Oconee.

The NFS facility has capacity for about 260 metric tonnes of uranium, with approximately 170 metric tonnes of uranium presently stored in

*GE letter to NRC dated May 27, 1977.

**An application for a 1,100 metric tonnes of uranium capacity addition is pending. Present schedule calls for completion in 1980 if approved. However, by motion dated November 8, 1977, General Electric Company requested the Atomic Safety and Licensing Board to suspend indefinitely further proceedings on this application. This motion was granted.

the pool. The storage pool at West Valley, New York, is on land owned by the State of New York and leased to NFS through 1980. Although the storage pool at West Valley is not full, NFS has indicated that it is not accepting additional spent fuel for storage even from those reactor facilities with which it had reprocessing contracts.

Based on the above, we conclude that these MO, NFS and AGNS facilities are not available to Oconee Station as independent spent fuel storage installations.

We also considered under this alternative the construction of new independent spent fuel storage installations. Regulatory Guide 3.24, "Guidance on the License Application, Siting, Design, and Plant Protection for an Independent Spent Fuel Storage Installation," issued in December 1974, recognized this alternative and provided regulatory guidance for water-cooled independent spent fuel storage installations. Pertinent sections of 10 CFR Parts 19, 20, 30, 40, 51, 70, 71 and 73 would also apply.

We estimated that at least 5 years would be required to construct an independent spent fuel storage installation. We assumed 1 year for preliminary design, 1 year in which to prepare the license application and environmental report, to obtain approval for construction licensing and to finalize the design, 2½ years for construction and to obtain an NRC operating license, and ½ year for plant and equipment testing and startup.

Industry proposals for independent spent fuel storage installations are scarce to date. In late 1974, E. R. Johnson Associates, Inc., and Merrill Lynch, Pierce, Fenner and Smith, Inc., issued a series of joint proposals to a number of electric utility companies with nuclear plants in or near operation, offering to provide independent storage services for spent nuclear fuel. A paper on this proposed project was presented at the American Nuclear Society meeting in November 1975 (ANS Transactions, 1975 Winter Meeting, Vol. 22, TANSAO 22-1-836, 1975). In 1974, E. R. Johnson Associates, Inc., estimated construction costs would approximate $9,000 per spent fuel assembly.

Several licensees have evaluated construction of a separate independent spent fuel storage installation. The Connecticut Yankee Atomic Power Company, for example, estimated that an independent spent fuel storage installation with a capacity of 1,000 metric tonnes of uranium would cost approximately $54 million and take about 5 years to construct and have ready for operation. The licensee, Duke Power Company, estimated the construction costs of an independent spent fuel storage installation at about $34,500 per spent fuel assembly.

On December 2, 1976, Stone & Webster Engineering Corporation submitted a topical report requesting NRC approval for a standard design independent spent fuel storage installation intended for siting near nuclear power facilities. Based on discussions with Stone & Webster, we estimated that the present day cost for such a fuel storage installation would be about $24 million, exclusive of site preparation costs. On July 12, 1978, we concluded that the proposed approach and conceptual design are acceptable.

Based on the above facts, on a short-term basis (i.e., prior to 1985), an independent spent fuel storage installation is not available as an alternative. One would not be available in time to meet the licensee's needs. It is also unlikely that the environmental impacts of this alternative, on a delayed availability basis, would be less than the minor impacts associated with the proposed Oconee modification. This is based on the fact that offsite transportation would be involved and a structure, pool, and supporting systems would have to be erected and installed for an independent spent fuel storage installation, whereas for the Oconee modification only new storage racks are involved.

On October 18, 1977, the U.S. Department of Energy announced a new "spent nuclear fuel policy." The Department of Energy will determine industry interest in providing interim fuel storage services on a contract basis. If adequate private storage services cannot be provided, the Government will provide interim fuel storage facilities for which utility companies would pay a fee for such services. This interim storage could not be expected to be available until at least 1983 or 1984. A National Waste Repository could be available in the 1988-1993 time frame. The Oconee Station spent fuel pool as presently designed would lose the ability to discharge a full core after the 1980 refuelings and would have to shut down instead of refueling in 1981, since the spent fuel pool would then be full. The lack of a precise date that such Government-sponsored interim storage would be available makes this an unreliable alternative to consider for the Oconee Station. Should such storage not be available when needed, Oconee as presently designed would be forced to shut down.

7.4 Offsite Storage in Spent Fuel Pools of Other Reactors

Another nuclear facility owned by the licensee and to be licensed in the very near future is McGuire Unit No. 1. DPC also has a construction permit for the Catawba Nuclear Station as well as McGuire Unit No. 2. The use of the already constructed storage pool at McGuire is under consideration by NRC. The McGuire Unit 1 spent fuel pool will be available for storage of spent fuel in 1979. The McGuire Unit 2 and Catawba pools (which have been expanded for this purpose) will be available sometime in the early 1980's. Duke Power Company by a letter dated March 9, 1978 requested approval of the use of the McGuire Unit No. 1 pool. A hearing before the Atomic Safety and Licensing Board on this issue is scheduled to start on June 19, 1979. The availability of this alternative is dependent upon favorable Board action.

According to a survey conducted and documented by the Energy Research and Development Agency, up to 46 percent of the operating nuclear power plants will lose the ability to refuel during the period 1975-1984 without additional spent fuel storage pool expansions or access to offsite storage facilities. Thus, the licensee cannot assuredly rely upon any other utility's power facility to provide additional storage capability except on a short-term emergency basis. If space were available in another reactor facility, the cost would probably be comparable to the cost of storage at a commercial storage facility. Based on the above facts, we have concluded that storage at another utility's reactor site is not a realistic alternative at this time, or in the foreseeable future.

7.5 Shutdown of Facility

Upon filling the Oconee spent fuel pool as presently designed, there would be no ability to reload any of the three units after the 1980 refueling outages. After the cycles following the 1980 refuelings, the Oconee Nuclear Station, Units 1, 2 and 3 would be forced to shut down in 1981 for lack of space to store spent fuel. There would be a resultant energy availability loss and an associated loss of economic benefit from the facility, a cost associated with the purchase of replacement energy and the cost of maintaining the facility in a standby condition.

The licensee has estimated that a shutdown of the three units (rated at 887 megawatts net electrical output each) would result in replacement power costs alone of $635,000 per day. This is based on the differential costs of producing energy from the Station as compared to production from other available units in and out of the DPC system.

We also have reviewed the differential costs of not operating the Oconee Station Units 1, 2 and 3. The costs involved would be far in excess of the costs associated with the proposed modification, i.e., $8,300 per assembly.

7.6 Summary of Alternatives

In summary, alternatives (2) and (3), above, are either presently not available to the licensee or could not be made available in time to meet the licensee's needs. Alternative (3) would be more expensive than the proposed modification. Alternative (4) in regard to using the McGuire Unit No. 1 pool, is dependent upon favorable Board action. Alternative (5), the shutdown of Oconee Units 1, 2 and 3 would be much more expensive than the proposed action because of the need to provide replacement power, if it could be found.

We have also determined that the expansion of the storage capacities of the Unit 1/2 spent fuel pool at the Oconee Station would have a negligible environmental impact. Accordingly, considering the economic advantages of the proposed action, deferral or severe restriction of the action here proposed would result in substantial harm to the public interest.

TABLE 7.0

SUMMARY OF COST VS. BENEFITS

Alternatives	Cost	Benefits
(1) Increase storage capacity of Oconee 1/2 spent fuel pool	$8,300 per assembly	Continued operation of station and production of electrical energy
(2) Reprocessing of spent fuel	Not Applicable	None; this alternative is not available either now or in the foreseeable future
(3) Storage at an independent spent fuel storage installation	$34,500	This alternative will not be available when needed
(4) Offsite storage in spent fuel pool of McGuire Unit No. 1	$2,100 per assembly	This alternative would be available only upon favorable Board action.
(5) Shutdown of Facility	$19 million per month	None; no production of electrical energy

8.0 EVALUATION OF PROPOSED ACTION

8.1 Unavoidable Adverse Environmental Impacts

8.1.1 Radiological Impacts

As discussed in Section 5.3, expansion of the storage capacity of the SFP will not create any significant additional radiological effects. The additional total body dose that might be received by an individual or the estimated population within a 50-mile radius is less than 0.002 mrem per year and 0.005 man-rem per year, respectively. These exposures are small compared to the fluctuations in the annual dose this population receives from background radiation. The population exposure represents an increase of less than 0.2% of the exposures from the plant evaluated in the FES. The occupational radiation exposure of workers during removal of the present storage racks and installation of the new racks is estimated by the licensee to be about 75 man-rem. This is a small fraction of the total man-rem burden from occupational exposure at the plant. Operation of the plant with additional spent fuel in the SFP is not expected to increase the occupational radiation exposure by more than one percent of the present total annual occupational exposure at this facility.

8.2 Relationships Between Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Expansion of the storage capacity of the spent fuel pool will not change the evaluation of long-term use of the land as described in the Final Environmental Statement for the Oconee Nuclear Station. In the short term, the proposed modification would permit the expected benefits (i.e., production of electrical energy and minimizing reliance upon foreign oil) to continue.

8.3 Irreversible and Irretrievable Commitments of Resources

8.3.1 Water, Land and Air Resources

The proposed action will not result in any significant change in the commitments of water, land and air resources as identified in the Final Environmental Statement for the Station. No additional allocation of land would be made. The land area now used for the spent fuel pool would be used more efficiently by adopting the proposed action.

8.3.2 Material Resources

It is not likely that the licensing action here proposed would constitute a commitment of resources that would tend to significantly foreclose the alternatives available with respect to any other individual licensing action designed to ameliorate a possible shortage of spent fuel storage capacity. The time frame under consideration is 3 to 4 months--our estimate of the time necessary to complete the generic environmental statement. The added spent fuel pool capacity proposed for the Oconee Station will not significantly affect the need for the total additional storage space presently planned at reprocessing facilities for which licensing actions are pending. In order to carry out the proposed modification, the licensee will require custom-made racks of stainless steel. This material is readily available in abundant supply. In the context of this criterion, we conclude that the amount of material required for the racks for Oconee is insignificant and does not represent an irreversible commitment of natural resources.

The longer-term storage of spent fuel assemblies withdraws the unburned fissionable material from the fuel cycle for a longer period of time. The usefulness of this material as a resource in the future, however, would not be changed. The provision of longer onsite storage would not result in any cumulative effects due to plant operation, since the throughput of materials would not change. Thus, the same quantity of radioactive material will have been produced when averaged over the life of the plant. This licensing action would not constitute a commitment of resources that would affect the alternatives available to other nuclear power plants or other actions that might be taken by the industry in the future to alleviate fuel storage problems. No other resources need be allocated because the other design characteristics of the spent fuel pool remain unchanged.

8.4 Commission Policy Statement Regarding Spent Fuel Storage

On September 16, 1975, the Commission announced (40 FR 42801) its intent to prepare a generic environmental impact statement on handling the storage of spent fuel from light-water reactors. In this notice, it also announced its conclusion that it would not be in the public interest to defer all licensing actions intended to ameliorate a possible shortage of spent fuel storage capacity pending completion of the generic environmental impact statement.

The Commission directed that in the consideration of any such proposed licensing action, the following five specific factors should be applied, balanced, and weighed in the context of the required environmental statement or appraisal.

(1) Is it likely that the licensing action here proposed would have a utility that is independent of the utility of other licensing actions designed to ameliorate a possible shortage of spent fuel capacity?

The reactor core for each Oconee unit contains 177 fuel assemblies. The projected schedule for refueling the Oconee units is provided in the February 2, 1979 report by the licensee. The facilities are scheduled to be refueled at approximately 18-month intervals with between 56 and 72 fuel assemblies generally scheduled to be replaced at each refueling.

With the present spent fuel storage racks, there will not be sufficient room to store an additional normal discharge of spent fuel after the 1980 refueling. If expansion of the storage capacity of the spent fuel pool is not approved, or if an alternate storage facility for the spent fuel is not located, the Oconee units will have to shut down in 1981.

The proposed licensing action (i.e., approve installing new racks of a design that permits storing more assemblies in the same space) would allow the Oconee Station to continue to operate beyond 1983 and until the proposed Federal repository is expected to be in operation. The proposed modification will also provide the licensee with additional flexibility which is desirable even if adequate offsite storage facilities hereafter become available to the licensee.

We have concluded that a need for additional spent fuel storage capacity exists at the Oconee Station which is independent of the utility of other licensing actions designed to ameliorate a possible shortage of spent fuel capacity.

(2) Is it likely that the taking of the action here proposed prior to the preparation of the generic statement would constitute a commitment of resources that would tend to significantly foreclose the alternatives available with respect to any other licensing actions designed to ameliorate a possible shortage of fuel storage capacity?

With respect to this proposed licensing action, we have considered commitment of both material and nonmaterial resources. The material resources considered are those to be used in the expansion of the spent fuel pool.

The increased storage capacity of the Oconee Station spent fuel pool was considered as a nonmaterial resource and was evaluated relative to proposed similar licensing actions within a 3- to 4-month period (the time we estimate necessary to complete the generic environmental statement) at other nuclear power plants, fuel reprocessing facilities and fuel storage facilities. We have determined that the proposed expansion in the storage capacity of the spent fuel pool is only a measure to allow for continued operation and to provide operational flexibility at the facilities, and will not foreclose similar licensing actions at other nuclear power plants. Similarly, taking this action would not commit the NRC to repeat this action or a related action in 1983, at which time the modified pool is estimated to be full if no fuel is removed.

We conclude that the expansion of the spent fuel pool at the Oconee Station, prior to the preparation of the generic statement, does not constitute a commitment of either material or nonmaterial resources that would tend to significantly foreclose the alternatives available with respect to any other individual licensing actions designed to ameliorate a possible shortage of spent fuel storage capacity.

(3) Can the environmental impacts associated with the licensing action here proposed be adequately addressed within the context of the present application without overlooking any cumulative environmental impacts?

We have considered the potential nonradiological and radiological impacts resulting from the fuel racks conversion and subsequent operation of the expanded spent fuel pool at this station.

We find that there will be very small environmental impacts on the environs outside the spent fuel storage building during removal of the existing racks and installation of the new racks. We conclude that the impacts within this building will be limited to those normally associated with metal working activities and with the occupational radiation attributable to these activities.

The potential nonradiological environmental impact attributable to the additional heat load in the spent fuel pool was determined by us to be negligible compared to the existing thermal effluents from the facility.

We have considered the potential radiological environmental impacts associated with the expansion of the spent fuel pool and have concluded that they would not result in radioactive effluent releases that significantly affect the quality of the human environment during either normal operation of the expanded spent fuel pools or under postulated fuel handling accident conditions allowed by the facility license.

(4) Have the technical issues which have arisen during the review of this application been resolved within that context?

Yes. We believe that this Environmental Impact Appraisal and the accompanying Safety Evaluation have responded to all technical issues concerning health, safety and the environment which have arisen during our review.

(5) Would a deferral or severe restriction on this licensing action result in substantial harm to the public interest?

We have evaluated the impact of deferral of the proposed action as it relates to the public interest. As we have seen, there are significant economic advantages associated with this proposed action, and expansion of the storage capacity of the spent fuel pool will have a negligible environmental impact. Therefore, it is clear that the proposed action itself is in the public interest.

Deferral of this action would not be in the public interest. While it is true that the Oconee Units 1, 2 and 3 do not face certain shutdown until 1981, there are other factors which weigh in favor of issuing the proposed amendments now. Following the 1980 refuelings, the existing spent fuel pool will not have sufficient room to accommodate a full core (177 assemblies) should this be necessary to effect repairs, for example, to return the unit to service. Therefore, after this point Oconee faces the possibility of shutdown at any time due to lack of a full core reserve in the spent fuel pool. While no serious adverse consequences to the public health and safety or the environment would likely result from this action itself, the reactor shutdown would, of course, remove the unit from service, and this in turn could adversely affect the licensee's ability to meet electrical energy needs, or force the operation of other plants which are less economical to operate or which have greater environmental impact, and thereby result in substantial harm to the public interest.

Based on the foregoing, we conclude that public interest consideration weighs in favor of taking the proposed action now.

We have applied, balanced, and weighed the five specific factors and have concluded that this action to expand the spent fuel pool is in the public interest.

9.0 COST-BENEFIT BALANCE

This section summarizes and compares the cost and the benefits resulting from the proposed modification to those that would be derived from the selection and implementation of alternatives. Table 7.0 presents a tabular comparison of these costs and benefits. The benefit from two of these alternatives, if available, would be the continued operation of Oconee Units 1, 2 and 3, or other production of demanded electrical energy. Additional storage capacity at McGuire Unit No. 1, if approved by the Board, would serve as an adjunct to expanding the Oconee 1/2 SFP capacity. The cost would be less than that, per assembly, of expansion at Oconee. However, the availability of this option is dependent upon favorable Board action. The one remaining alternative of reprocessing of the spent fuel is not possible at this time or in the foreseeable future.

From examination of the table, it can be seen that the most cost-effective readily available alternative is the proposed spent fuel pool modification. As evaluated in the preceding sections, the environmental impacts associated with the proposed modification would not be significantly changed from those analyzed in the Final Environmental Statement for Oconee Units 1, 2 and 3 issued in March 1972.

10.0 BASIS AND CONCLUSION FOR NOT PREPARING AN ENVIRONMENTAL IMPACT STATEMENT

We have reviewed this proposed facility modification relative to the requirements set forth in 10 CFR Part 51 and the Council of Environmental Quality's Guidelines, 40 CFR 1500.6, and have applied, balanced, and weighed the five factors specified by the Nuclear Regulatory Commission in 40 CFR 42801. We have determined that the proposed license amendments will not significantly affect the quality of the human environment and that there will be no significant environmental impact attributable to the proposed action other than that which has already been predicted and described in the Commission's Final Environmental Statement for the facility dated March 1972. Therefore, the Commission has found that an Environmental Impact Statement need not be prepared and that, pursuant to 10 CFR 51.5(c), the issuance of a negative declaration to this effect is appropriate.

Date: June 19, 1979

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKETS NOS. 50-269, 50-270 AND 50-287

DUKE POWER COMPANY

NOTICE OF ISSUANCE OF AMENDMENTS TO FACILITY OPERATING LICENSES AND NEGATIVE DECLARATION

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendments Nos. 72, 72, and 69 to Facility Operating Licenses Nos. DPR-38, DPR-47 and DPR-55, respectively, issued to Duke Power Company, which revised Technical Specifications for operation of the Oconee Nuclear Station, Units Nos. 1, 2 and 3, located in Oconee County, South Carolina. The amendments are effective as of the date of issuance.

These amendments revise the provisions of the Station's common Technical Specifications to allow an increase in the spent fuel storage capacity from 336 to a maximum of 750 fuel assemblies in the Unit 1/2 common spent fuel pool through the use of high capacity spent fuel racks.

The application for the amendments 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 amendments. Notice of the Proposed Issuance of Amendments to Facility Operating Licenses in connection with this action was published in the FEDERAL REGISTER on March 6, 1979 (44 F.R. 12303). No request for a hearing or petition for leave to intervene was filed following notice of the proposed action.

The Commission has prepared an environmental impact appraisal for this action and has concluded that an environmental impact statement for this particular action is not warranted because there will be no significant environmental impact attributable to the action other than that which has already been predicted and described in the Commission's Final Environmental Statement for the Station dated March 1972.

For further details with respect to this action, see (1) the application for amendment dated February 2, 1979, as supplemented April 20 and May 2, 1979, (2) Amendments Nos. 72, 72, and 69 to Licenses Nos. DPR-38, DPR-47 and DPR-55, respectively, (3) the Commission's related Safety Evaluation, and (4) the Commission's Environmental Impact Appraisal. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. and at the Oconee County Library, 201 South Spring Street, Walhalla, South Carolina. A copy of items (2), (3) and (4) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland, this 19th day of June 1979.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert W. Reid

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors