August 23, 1990

Docket No. 50-302

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Mr. Percy M. Beard, Jr.
Senior Vice President,
Nuclear Operations
Florida Power Corporation
ATTN: Manager, Nuclear Operations
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P. O. Box 219-NA-2I
Crystal River, Florida 32629

Dear Mr. Beard:

SUBJECT: CRYSTAL RIVER UNIT 3 - ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT - SPENT FUEL POOL EXPANSION (TAC NO. 75305)

By letter dated October 31, 1989, as supplemented January 25, 1990, March 8, 1990, and June 21, 1990, you requested a license amendment to change the Technical Specifications to accommodate a proposed spent fuel pool expansion at Crystal River Unit 3. Enclosed is our Environmental Assessment related to this proposed action. Based on our assessment, we have concluded that there are no significant radiological or nonradiological impacts associated with the proposed spent fuel pool expansion and it will have no significant impact on the quality of the human environment.

We have also enclosed a Notice of Issuance of Environmental Assessment and Finding of No Significant Impact. This notice is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Original signed by

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

Enclosures:
1. Environmental Assessment
2. Notice

cc w/enclosures:
See next page

LA:PDII-2	PE:PDII-2	PM:PDII-2	D:PDII-2	OGC
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8/14/90	8/16/90	8/16/90	8/17/90	8/19/90

EA FOR CR-3

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Florida Power Corporation

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Generating Plant

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ENVIRONMENTAL ASSESSMENT

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO THE EXPANSION OF THE SPENT FUEL POOL

FACILITY OPERATING LICENSE DPR-72

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3 NUCLEAR GENERATING PLANT

DOCKET NO. 50-302

1.0 INTRODUCTION

1.1 Description of Proposed Amendment

By letter dated October 31, 1989, and supplemented January 25, 1990, March 8, 1990, and June 21, 1990, Florida Power Corporation (FPC or the licensee) requested an amendment to the Technical Specifications (TS) appended to facility operating license DPR-72 for the Crystal River Unit 3 Nuclear Generating Plant. The amendment would increase the combined number of spent fuel storage locations in spent fuel pools A and B from 1153 to 1357. The increase in spent fuel pool capacity would be accomplished by removing the existing storage racks and replacing them with free-standing, high-density fuel racks. The new racks are not double-tiered, and will rest on either the fuel pool floor or pool floor plates.

1.2 Need for Increased Storage Capacity

The staff's Safety Evaluation supporting Amendment No. 36, dated November 17, 1980, approved a reracking to expand fuel pool capacity from 240 assemblies to 1153 assemblies. The pool lost full discharge capability following Refuel VII, which ended in June 1990. Therefore, the licensee has proposed to expand its spent fuel storage capacity to 1357 assemblies.

The proposed reracking would meet the objective of keeping radiation exposure as low as reasonably achievable. Shielding from the spent fuel assemblies will be assured by maintaining the water level in the pool at or above a minimum level. Protective clothing and respirators will be worn as required by the Radiation Work Permit. The station radiation protection staff will closely monitor and control all aspects of the work.

1.3 Alternatives

Commercial reprocessing of spent fuel has not developed as originally anticipated. In 1975, the Commission directed the staff to perform a Generic Environmental Impact Statement (GEIS) on spent fuel storage. The Commission directed the staff to evaluate alternatives for the handling and storage of spent light water

power reactor fuel with particular emphasis on developing long-range policy. The GEIS was to consider alternative methods of spent fuel storage as well as the possible restrictions on termination of the generation of spent fuel through reactor shutdown.

A "Final Generic Environmental Impact Statement (FGEIS) on Handling and Storage of Spent Light Water Power Reactor Fuel" (NUREG-0575, Volumes 1-3) was issued by the Commission in August 1979. The finding of the FGEIS is that the environmental costs of interim storage are essentially negligible, regardless of where such spent fuel is stored. A comparison of the impact costs of various alternatives reflects the advantage of continued generation of nuclear power versus its replacement by coal-fired power generation. Continued generation of nuclear power versus its replacement by oil-fired generation provides an even greater economic advantage. In the bounding case considered in the FGEIS, that of shutting down the reactor when the existing spent fuel storage capacity is filled, the cost of replacing nuclear stations before the end of their normal lifetime makes this alternative uneconomical. The storage of spent fuel as evaluated in NUREG-0575 is considered to be an interim action, not a final solution to permanent disposal.

One spent fuel storage alternative considered in detail in the FGEIS is the expansion of the onsite fuel storage capacity by modification of the existing spent fuel pools. Over 100 applications for spent fuel pool expansion have either been approved or are under consideration by the Commission. The finding in each case has been that the environmental impact of such increased storage capacity is negligible. Since there are variations in storage design and limitations caused by spent fuel already in storage, however, the FGEIS recommends that licensing reviews be done on a case-by-case basis, so as to resolve plant-specific concerns.

The continuing validity and site-specific applicability of the conclusions in NUREG-0575 have been confirmed in the Environmental Assessments for the Surry and H.B. Robinson plants' independent spent fuel storage installations.

The licensee has considered several alternatives to the proposed action of the spent fuel pool expansion. The staff has evaluated these and certain other alternatives with respect to the need for proposed action as discussed in Section 1.2 of this assessment. The following alternatives were considered by the staff:

(1) Shipment of fuel to a permanent federal fuel storage/disposal facility.

(2) Shipment of fuel to a reprocessing facility.

(3) Shipment of fuel to another utility or site for storage.

(4) Reduction of spent fuel generation.

(5) Construction of a new independent spent fuel storage installation.

(6) No action taken.

Each of these alternatives is discussed below.

(1) Shipment of Fuel to a Permanent Federal Fuel Storage/Disposal Facility

Shipment of fuel to a permanent federal fuel storage disposal facility is an alternative to increasing the onsite spent fuel storage capacity. The U.S. Department of Energy (DOE) is developing a repository under the Nuclear Waste Policy Act of 1982 (NWPA). The facility, however, is not likely to be able to receive spent fuel until approximately 2010, at the earliest. The existing Crystal River Unit 3 spent fuel storage pool lost full core offload capability following Refuel VII, which ended in June 1990. Therefore, spent fuel acceptance and disposal by DOE is not an alternative to increased onsite pool storage capacity.

As an interim measure, shipment to a Monitored Retrievable Storage (MRS) facility is another alternative to increasing the onsite spent fuel storage capacity. DOE, under the NWPA, has recently submitted its MRS proposal to Congress. Because Congress has not authorized an MRS, and because one is not projected to be available before 1998, this alternative does not meet the near-term storage needs of Crystal River Unit 3.

Under the NWPA, the federal government has the responsibility to provide not more than 1900 metric tons capacity for the interim storage of spent fuel. The impacts of storing spent fuel at a Federal Interim Storage (FIS) facility fall within those already assessed by the Commission in NUREG-0575. In enacting NWPA, Congress found that the owners and operators of nuclear power stations have the primary responsibility for providing interim storage for spent nuclear fuel. In accordance with the NWPA and 10 CFR Part 53, shipping of spent fuel to an FIS facility is considered a last resort alternative. At this time the licensee cannot take advantage of FIS because existing storage capacity is not maximized.

(2) Shipment of Fuel to a Reprocessing Facility

Reprocessing of spent fuel from Crystal River Unit 3 is not viable because there is no operating commercial reprocessing facility in the United States, nor is there the prospect of one in the foreseeable future.

(3) Shipment of Fuel to Another Utility or Site for Storage

The shipment of fuel from Crystal River Unit 3 to the storage facility of another utility would provide short-term relief from the storage problem. The NWPA and 10 CFR Part 53, however, clearly place the responsibility for the interim storage of spent nuclear fuel with each owner or operator of a nuclear power plant. The shipment of the fuel to another site is not possible since Crystal River Unit 3 is the only nuclear power plant operated by the licensee.

(4) Reduction of Spent Fuel Generation

Improved usage of fuel in the reactor and/or operation at a reduced power level would extend the life of the fuel in the reactor. In the case of extended burnup of fuel assemblies, the fuel cycle would be extended, and fewer offloads would take place. Through increasing the enrichment of the fuel, the licensee is already working toward extended fuel cycles. As discussed in item 1, however,

full offload capability is lost. Operations at reduced power would not make effective use of available resources, and would cause unnecessary economic hardship. Therefore, reduction of the amount of spent nuclear fuel generated is not a practical alternative for Crystal River Unit 3.

(5) Construction of a New Independent Spent Fuel Storage Installation (ISFSI)

Additional storage capacity could be developed by building a new ISFSI. This facility could be either a pool, similar to the existing facility, or a dry storage area. The staff has generically assessed the impacts of the pool alternative and found, as reported in NUREG-0575, that the storage of spent light water reactor fuel in water pools has an insignificant impact on the environment. The staff has not made a generic assessment of the dry storage area; however, assessments for the dry cask ISFSI at the Surry Power Station and the dry modular concrete ISFSI at the H.B. Robinson Steam Electric Plant and the Oconee Nuclear Station resulted in findings of no significant impact.

While these alternatives are environmentally acceptable, such a new storage facility, either at Crystal River Unit 3 or offsite, would require new site-specific engineering and design, including equipment for the transfer of spent fuel. Commission review, evaluation, and licensing of such a facility would also be required. It is not likely that this entire effort would be completed in time to meet the need for additional capacity as discussed in item (1). Furthermore, such construction would not use the existing expansion capacity of the existing pool, and thus would waste resources.

(6) No Action Taken

If no action were taken, the storage capacity would become exhausted in the near future and Crystal River Unit 3 would have to shut down. This alternative is considered a waste of an available resource, Crystal River Unit 3 itself, and is not considered viable.

SUMMARY OF ALTERNATIVES

The only long-term alternative solution to the licensee's spent fuel storage problem is the construction of an ISFSI; however, it is not likely that the construction of such a facility could be completed in a timely manner. Furthermore, construction of such a facility would be a waste of available resources.

1.4 Fuel Reprocessing History

Currently, commercial fuel is not being reprocessed in the United States. The Nuclear Fuel Services (NFS) plant at West Valley, New York, was shut down in 1972 for alterations and expansion. In September 1976, NFS informed the Commission that it was withdrawing from the nuclear fuel reprocessing business.

The proposed Allied General Nuclear Services (AGNS) plant in Barnwell, South Carolina, is not yet licensed to operate. The General Electric Company (GE) Morris operation in Morris, Illinois, has been decommissioned.

In 1977, the President issued a policy statement on commercial reprocessing of spent nuclear fuel that effectively eliminated reprocessing as part of the near-term nuclear fuel cycle.

Although no plants are licensed for reprocessing fuel, the storage pools at Morris and West Valley are licensed to store spent fuel. The storage pool at West Valley is not full, but the licensee is not presently accepting any additional spent fuel for storage. On May 4, 1982, the license held by GE for spent fuel storage activities at its Morris operation was renewed for another 20 years; however, GE is committed to accept only limited quantities of additional spent fuel for storage at this facility from Cooper and San Onofre Unit 1.

2.0 RADIOACTIVE WASTES

Crystal River Unit 3 contains waste treatment systems designed to collect and process the gaseous, liquid, and solid waste that might contain radioactive material. The radioactive waste treatment systems are evaluated in the Final Environmental Statement (FES) dated May 1973. The proposed rerack will not involve any change in the waste treatment systems described in the FES.

2.1 Radioactive Material Released to the Atmosphere

With respect to releases of gaseous materials to the atmosphere, the only radioactive gas of significance that could be attributable to storing additional spent fuel assemblies for a longer time is the radionuclide Krypton-85 (Kr-85). Experience has demonstrated that after spent fuel has decayed 4 to 6 months, there is no longer a significant release of fission products, including Kr-85, from stored spent fuel containing cladding defects. To determine the average annual release of Kr-85, it was assumed that all of the Kr-85 released from any defective fuel discharged to the spent fuel pool would be released before the next refueling. Enlarging the storage capacity of the spent fuel pool has no effect on the calculated average annual quantities of Kr-85 released to the atmosphere. There may be some small change in the calculated quantities due to a change in fuel burnup; however, this is expected to be a small fraction of the calculated annual quantities. To account for this potential increase, the staff conservatively assumed an additional release of 125 curies/year of Kr-85.

Iodine-131 releases from spent fuel assemblies to the spent fuel pool water will not increase significantly since Iodine-131 will decay to negligible levels between refuelings.

Most of the tritium in the spent fuel pool water results from activation of boron and lithium in the primary coolant and this will not be affected by the proposed changes. A relatively small amount of tritium is contributed during reactor operation by fissioning of reactor fuel and subsequent diffusion of the tritium through the fuel and cladding. Tritium releases from the fuel assemblies occur mainly during reactor operations and, to a limited extent, shortly after shutdown. Thus, expanding the spent fuel pool capacity will not increase the tritium activity in the pool.

Storing additional spent fuel assemblies is not expected to increase the bulk water temperature during normal refueling above the value 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 modifications from that previously evaluated in the FES. Most airborne releases of tritium and iodine result from evaporation of reactor coolant, which contains tritium and iodine in higher concentrations than the spent fuel pool. Therefore, even if there were a higher evaporation rate from the spent fuel pool, the resulting tritium and iodine releases would be small in comparison to the amount already evaluated in the FES. The spent fuel pool exhaust system must be operating and discharging through both HEPA and charcoal filters whenever spent fuel is stored in the pool, whenever fuel is being moved, and whenever loads are being carried over the pool.

2.2 Solid Radioactive Wastes

Currently, approximately 42 cubic feet of solid radioactive waste per year is generated by the spent fuel pool cleanup system. No significant increase in volume of solid radioactive wastes is expected as a result of the expansion of the capacity of the spent fuel pool.

There are six spent fuel storage rack modules that will be removed from the spent fuel pool. The total weight of the racks is approximately 20,300 pounds. The racks will be decontaminated and disposed of at a Westinghouse facility near Madison, Pennsylvania. The facility is licensed to transport, receive, store, and process radioactively contaminated equipment and material for the purpose of decontamination, volume reduction, and burial of radioactive waste.

Westinghouse will provide strong, tight containers to be used for shipment of the spent fuel racks. Westinghouse will also provide transportation of the spent fuel racks from Crystal River Unit 3 to the disposal facility.

It is not expected that either the rerack or the disposal of the existing spent fuel storage racks will have a significant effect on the environment.

2.3 Radioactive Material 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 modifications. Since the spent fuel pool cooling and cleanup systems operate as a closed system, only water originating from cleanup of pool floors and resin sluice water need be considered as potential sources of radioactivity.

It is expected that neither the flow rate nor the radionuclide concentration of the floor cleanup water will change as a result of these modifications. The pool demineralizer resin removes soluble radioactive materials from the spent fuel pool water. These resins are periodically sluiced to the spent resin storage tank. The amount of activity in the resin may increase slightly due to

the increased amount of spent fuel in the pool; however, after processing by the liquid radwaste system, the amount of activity released to the environment as a result of the proposed change would be negligible.

3.0 RADIOLOGICAL IMPACT ASSESSMENT

Operating experience shows dose rates of 0.5 to 2.0 mrem/hour either at the edge of or above the center of the pools, regardless of the quantity of fuel stored. This is not expected to change with the proposed reracking because radiation levels above the pool are due primarily to activity in the water, which experience shows will return to an equilibrium value. Stored spent fuel is so well shielded by the water in the pool that dose rates at the top of the pool from this source are negligible. Additionally, there has been no crud built up along the sides of the pool. Should crud buildup ever be detected, it could easily be washed down. Furthermore, the water level in the spent fuel pool will be kept as high as possible in order to maintain exposure levels as low as reasonably achievable. Therefore, increased exposure due to this source is considered negligible. There is no noticeable concentration of airborne activity in the area of the spent fuel pool. The spent fuel pool ventilation system maintains a continuous sweep of air across the top of the spent fuel pools and cask loading pit. Additionally, a continuous exhaust flow is maintained from the enclosed top portion of the pools when the top enclosing shields are in place. The exhaust flow is directed to the main auxiliary building filter system where it is passed through roughing, HEPA and charcoal filters before being discharged to the plant vent. The proposed reracking is not expected to increase this activity. Therefore, the staff concludes that the proposed spent fuel pool expansion will not result in any significant long-term increases in doses received by workers.

4.0 NON-RADIOLOGICAL IMPACT

The only non-radiological effluent affected by the spent fuel pool expansion is the additional waste heat rejected from the plant. The total increase in heat load rejected to the environment will be small in comparison to the amount of total heat currently being released. No impact on aquatic life is expected. Thus, the increase in rejected heat will have a negligible effect on the environment.

The licensee has not proposed any change in the use or discharge of chemicals in conjunction with the expansion of the spent fuel pool. The proposed expansion will not require any change to the National Pollution Discharge Elimination System permit. Therefore, the staff concludes that the non-radiological environmental impacts of expanding the spent fuel pool will be insignificant.

5.0 SEVERE ACCIDENT CONSIDERATIONS

The staff, in its related Safety Evaluation to be published at a later date, has addressed both the safety and environmental aspects of a fuel handling accident. A fuel handling accident bounds the potential consequences of an accident attributable to operation of a spent fuel pool with high density

racks. A fuel handling accident may be viewed as a "reasonably foreseeable" design basis event which the pool and its associated structures, systems, and components (including the racks) are designed and constructed to prevent. The environmental impacts of the accident were found not to be significant.

The staff has considered accidents whose consequences might exceed a fuel handling accident, that is, beyond design basis events. An accident evaluated by the staff involves a structural failure of the spent fuel pool resulting in loss of all contained cooling water, followed by fuel heatup and a Zircaloy cladding fire. The details of this severe accident are discussed in NUREG/CR-4982, entitled "Severe Accidents in Spent Fuel Pools in Support of Generic Issue 82." Subsequently, the staff issued NUREG/CR-5176, entitled "Seismic Failure and Cask Drop Analysis of the Spent Fuel Pools at Two Representative Nuclear Power Plants." This report considers the structural integrity of the spent fuel pool and the pool response to the circumstances considered. More recently, the staff issued NUREG/CR-5281, "Value/Impact Analysis of Accident Preventive and Mitigative Options for Spent Fuel Pools" and NUREG-1353, "Regulatory Analysis for the Resolution of Generic Issue 82: Beyond Design Basis Accidents in Spent Fuel Pools." In NUREG-1353, the staff concluded that Generic Issue 82 concerning the possibility of Zircaloy cladding fires in spent fuel pools was resolved and required no further study.

The staff believes that the probability of severe structual damage occurring at Crystal River Unit 3 is extremely low. This belief is based upon the Commission's requirements for the design and construction of spent fuel pools and their contents, and on the licensee's adherence to approved industry codes and standards. For example, in the Crystal River Unit 3 case, the pool is an integral part of the auxiliary building, which is designed to Seismic Category 1 standards. The spent fuel storage racks are Seismic Category 1 and, thus, are required to remain functional during and after a safe shutdown earthquake. The cooling water system is extremely reliable. In the unlikely event of a total loss of the cooling system, makeup water sources are available.

The staff acknowledges that if the severe accidents occurred as above, the environmental impacts could be significant; however, these events are unlikely and are not reasonably foreseeable in light of the design of the spent fuel pool and racks. Therefore, further discussion of severe accidents is not warranted, and the staff concludes that an Environmental Impact Statement need not be prepared.

6.0 SUMMARY

The FGEIS on Handling and Storage of Spent Light Water Reactor Fuel concluded that the cost of the various alternatives reflects the advantage of continued generation of nuclear power with the accompanying spent fuel storage. Because of the differences in spent fuel pool designs, the FGEIS recommended environmental evaluation of spent fuel pool expansions on a case-by-case basis.

The occupational radiation dose for the proposed operation of the expanded spent fuel pool is extremely small compared to the annual occupational exposure for a facility of this type. The small increase in radiation dose should not affect the licensee's ability to maintain individual occupational doses at Crystal River Unit 3 within the limits of 10 CFR Part 20, and as low as reasonably achievable. Furthermore, the non-radiological impacts of expanding the spent fuel pool will be insignificant, and none of the alternatives are practical or reasonable.

6.1 Alternative Use of Resources

This action does not involve the use of resources not previously considered in connection with the Commission's Final Environmental Statement, dated May 1973, in connection with Crystal River Unit 3.

6.2 Agencies and Persons Consulted

The staff reviewed the licensee's request. No other agencies or persons were consulted.

7.0 BASIS AND CONCLUSIONS FOR NOT PREPARING AN ENVIRONMENTAL IMPACT STATEMENT

The staff has reviewed the proposed spent fuel pool modification to Crystal River Unit 3 relative to the requirements set forth in 10 CFR Part 51. Based upon the environmental assessment, the staff has concluded that there are no significant radiological or non-radiological impacts associated with the proposed action and that the proposed license amendment will not have a significant effect on the quality of the human environment. Therefore, the Commission has determined, pursuant to 10 CFR 51.31, not to prepare an environmental impact statement for the proposed amendment.

8.0 REFERENCES

1. Letter from Gary Bolt (FPC), "Technical Specification Change Request No. 175, Spent Fuel Pool Storage Capacity," dated October 31, 1989.

2. Letter from P.M. Beard (FPC), "Technical Specification Change Request No. 175, Revision 0, Supplement 1, Spent Fuel Pool Storage Capacity," dated January 25, 1990.

3. Letter from P. M. Beard (FPC), "Technical Specification Change Request No. 175 Revision 1, Spent Fuel Storage Capacity," dated March 8, 1990.

4. Letter from P.M. Beard (FPC), "Technical Specification Change Request No. 175, Revision 1, Supplement 1, Spent Fuel Pool Storage Capacity," dated June 21, 1990.

5. NUREG-0575, "Final Generic Environmental Impact Statement (FGEIS) on Handling and Storage of Spent Light Water Power Reactor Fuel," Volumes 1-3, August 1979.

6. NUREG/CR-4982, "Severe Accidents in Spent Fuel Pools in Support of Generic Issue 82," July 1987.

7. NUREG/CR-5176, "Seismic Failure and Cask Drop Analyses of the Spent Fuel Pools at Two Representative Nuclear Power Plants," January 1989.

8. NUREG/CR-5281, "Value/Impact Analyses of Accident Preventive and Mitigative Options for Spent Fuel Pools," April 1989.

9. NUREG/CR-1353, "Regulatory Analysis for the Resolution of Generic Issue 82: Beyond Design Basis Accidents," April 1989.

10. Regulatory Guide 8.8, Revision 3, "Information Relevant to Ensuring that Occupational Radiation Exposure at Nuclear Power Stations will be as Low as is Reasonably Achievable," June 1978.

11. "Environmental Assessment Related to the Construction and Operation of the Surry Dry Cask Independent Spent Fuel Storage Installation," 1985.

12. "Environmental Assessment Related to the Construction and Operation of the H.B. Robinson Independent Spent Fuel Storage Installation," 1986.

13. "Environmental Assessment Related to the Construction and Operation of the Oconee Nuclear Station Independent Spent Fuel Storage Installation," 1988.

14. "Final Environmental Statement Related to the Commission of Construction and Operation of Crystal River Unit 3," Docket No. 50-302, May 1973.

15. "Amendment to Operating License, Amendment No. 36," Docket No. 50-302, November 17, 1980.

Dated: August 23, 1990

Principal Contributor:
G. Wunder