

Mr. T. F. Plunkett
 President - Nuclear Division
 Florida Power and Light Company
 P.O. Box 14000
 Juno Beach, Florida 33408-0420

April 23, 1999

SUBJECT: ST. LUCIE PLANT, UNIT 2 - ENVIRONMENTAL ASSESSMENT REGARDING
 SPENT FUEL POOL STORAGE CAPACITY; SOLUBLE BORON CREDIT
 (TAC NO. MA0666)

Dear Mr. Plunkett:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for amendment dated December 31, 1997, as supplemented May 15, September 15, November 25, 1998, and January 28, 1999. The May 15, 1998, supplement was a result of an U.S. Nuclear Regulatory Commission request for additional information dated April 8, 1998. The proposed amendment would modify the St. Lucie Plant, Unit 2, Technical Specifications by changing the criticality requirements for the design of the spent fuel storage racks, referencing new tables that specify the reactivity effects of fuel assembly burnup and decay time, and increasing the listed capacity of the spent fuel pool. These changes will allow Florida Power & Light to increase the capacity of the spent fuel storage pool.

The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Original signed by:

William C. Gleaves, Project Manager, Section 2
 Project Directorate II
 Division of Licensing Project Management
 Office of Nuclear Reactor Regulation

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Docket No. 50-389

Enclosure: Environmental Assessment

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

April 23, 1999

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William C. Gleaves, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-389

Enclosure: Environmental Assessment

cc w/encl: See next page

UNITED STATES NUCLEAR REGULATORY COMMISSIONFLORIDA POWER & LIGHT COMPANY, INC.DOCKET NO. 50-389ST. LUCIE PLANT, UNIT 2ENVIRONMENTAL ASSESSMENT AND FINDING OFNO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (NRC or the Commission) is considering issuance of an amendment to Facility Operating License No. NPF-16, issued to Florida Power & Light Company, Inc., (the licensee), for operation of the St. Lucie Plant, Unit 2, located in St. Lucie County, Florida.

ENVIRONMENTAL ASSESSMENTIdentification of the Proposed Action:

The proposed amendment would modify the St. Lucie Plant, Unit 2, Technical Specifications by changing the criticality requirements for the design of the spent fuel storage racks, referencing new tables that specify the reactivity effects of fuel assembly burnup and decay time, and increasing the listed capacity of the spent fuel pool. These changes would allow the use of credit for soluble boron in the spent fuel criticality analyses. This would allow Florida Power & Light to increase the capacity of the spent fuel storage pool. The proposed action is in accordance with the licensee's application for amendment dated December 31, 1997, as supplemented May 15, September 15, November 25, 1998, and January 28, 1999.

The Need for the Proposed Action:

The proposed action would increase the allowed storage capacity of the St. Lucie Plant, Unit 2, spent fuel pool (SFP) to 1360 fuel assemblies, allowing the licensee to continue to operate beyond 2001. The Unit 2 SFP at St. Lucie Plant contains 1584 spent fuel storage cells, of which 1076 are currently allowed for storage by the technical specifications. The licensee estimates that, by the year 2001, St. Lucie Plant, Unit 2, will have filled all SFP storage locations not reserved for a full-core off-load of fuel. The projected loss of capability to store spent fuel from future operation of St. Lucie Plant, Unit 2, would affect the licensee's ability to operate St. Lucie Plant, Unit 2. The proposed amendment is needed in order to ensure the capability to perform a full-core off-load to the SFP until approximately 2007.

Environmental Impacts of the Proposed Action

Thermal Impact

The licensee's thermal analysis on the effects of the proposed change revealed that the proposed increase in storage capacity will change the maximum decay heat load for a partial core offload from 16.9E6 Btu/hr to 19.76E6 Btu/hr and for full core offload conditions from 31.7E6 Btu/hr to 35.22E6 Btu/hr. This increased heat load results in an increase of approximately 3°F in the maximum fuel pool water temperature for the partial core offload case, and an increase of approximately 5°F in water temperature for storage of the limiting full core offload (note: maximum fuel pool temperature will be maintained less than or equal to 150°F). The total heat load rejected to the environment by St. Lucie Plant, Unit 2, is about 6.2E9 Btu/hr. The percentage increase in the heat rejected to the environment due to the increase in spent fuel storage capacity is on the order of 0.05% for partial core discharges and 0.06% for fuel storage following a full core offload. This heat rejection to the environment is not considered a significant increase from current heat rejection levels.

Radiological Evaluation

Solid Radioactive Waste

The net effect of increasing the St. Lucie, Unit 2, spent fuel pool storage capacity is that older fuel elements will be retained in wet storage beyond the time when they would have otherwise been loaded into casks for dry storage on-site. Retaining already-aged fuel in wet storage for an additional period of time will not appreciably increase the activity in the fuel pool water or the amount of solid radioactive waste which must be disposed of because the short-lived isotopes associated with these fuel bundles will have had an opportunity to decay. Therefore, increasing the fuel pool storage capacity as proposed for St. Lucie, Unit 2, will have no significant effect on the quantity of radioactive waste collected.

Gaseous Radioactive Waste

Storage of additional quantities of spent fuel in the SFP will not significantly increase the release of gaseous fission products such as Krypton-85 and Iodine-131. Experience has demonstrated that during the period between refueling outages, there is no longer a significant release of fission products, including Krypton-85, from stored spent fuel containing cladding defects. Iodine-131 released from spent fuel assemblies to the SFP water will not be significantly increased as a result of the expansion of the fuel storage capacity since the Iodine-131 inventory in the fuel will decay to negligible levels in the period between refueling outages. The licensee has stated that fuel rod integrity at St. Lucie, Unit 2, has been very good, with most fuel cycles evidencing no leaking fuel rods. Additionally, the rod pressure, which tends to act as driving force for fission product release, is substantially decreased after long periods of fuel cooling.

The increased heat load on the SFP from the storage of additional spent fuel assemblies could potentially result in an increase in the SFP evaporation rate, which may result in a slight

increase in the amount of gaseous tritium released from the pool. However, the overall release of radioactive gases from St. Lucie Plant, Unit 2, will remain a small fraction of the limits of 10 CFR Part 20, and is therefore considered insignificant.

Radioactive Releases Due to Accidents

The existing analyses of record pertaining to the radiological consequences of a fuel handling accident within the St. Lucie Plant, Unit 2, Fuel Handling Building (FHB) and the postulated drop of a spent fuel cask just outside the FHB have been examined to assess the impact of the proposed license amendment. The assumptions and parameters previously employed in evaluating the fuel mishandling accident were consistent with NRC Regulatory Guides 1.13 and 1.25. The previously analyzed consequences of dropping a spent fuel cask were based on the guidelines provided in Section 15.7.5 of the Standard Review Plan. The licensee's review of the existing analysis of the fuel handling accident has concluded that the gap activities provided in the analysis of record for the fuel handling accident conservatively bound those values expected to occur at assembly discharge burnups of up to 60,000 MWD/MTU. As defined by Section 15.7.4 of the Standard Review Plan, calculated dose values are well within the guidelines if the calculated whole body dose is less than or equal to 6 rem and the calculated thyroid dose is less than or equal to 75 rem.

The proposed license amendment does not involve any changes to the method of operating or range of motion of the spent fuel cask handling crane. No movement of loads in excess of the nominal weight of a fuel assembly, control element assembly, and associated handling tool is permitted over other fuel assemblies in the storage pool. Protection against dropping the spent fuel cask into the spent fuel storage pool is provided by the basic layout of the FHB. As noted in updated final safety analysis report, Section 9.1.4.3.2, additional protection is afforded by the trolley bumpers and a set of limit switches that work together with bridge and

trolley brakes to prevent movement of the crane hook into the restricted area.

The proposed amendment will not involve any changes in the operation or range of motion of the spent fuel handling machine. During movement of a fuel assembly, the load on the hoist cable is monitored to ensure that movement is not restricted. Installed interlocks will continue to restrict movement of the handling machine when the hoist is withdrawing or inserting an assembly.

The licensee has also examined the existing analysis of an accident involving the drop of a spent fuel cask containing ten irradiated fuel assemblies. This review has determined that conservative input assumptions were used and that the results of the existing analysis are well within the acceptance criteria for a Limiting Fault-2 event.

Increasing the storage capacity of the St. Lucie, Unit 2, SFP as described in this proposed license amendment will have no effect on the radiological consequences of an assumed fuel mishandling event or on the consequences of dropping a loaded spent fuel cask. For each of these events, the calculated doses are small relative to the guideline values.

The impact of the proposed increase in St. Lucie, Unit 2, spent fuel storage capacity and the implications of the use of reactivity credit for fuel pool soluble boron have been examined in the above discussion. Each of the impacts of the proposed change has been quantified and determined to be within acceptable limits by comparison to established acceptance criteria.

Accordingly, the Commission concludes that there are no significant environmental impacts associated with the proposed action.

Summary

The Commission has completed its evaluation of the proposed action. The proposed action will not increase the probability or consequences of accidents, no changes will be made in the types of any effluents that may be released off-site, and there will be no significant increase

in occupational or public radiation exposure. Accordingly, the Commission concludes that there are no significant radiological environmental impacts associated with the proposed action.

With regard to potential non-radiological impacts, the proposed action involves features located entirely within the restricted area as defined in 10 CFR Part 20. It will not affect non-radiological plant effluents and has no other environmental impact. The proposed action does not involve any historic sites. Therefore, there are no significant non-radiological environmental impacts associated with the proposed action. Accordingly, the Commission concludes that there are no significant environmental impacts associated with the proposed action.

Alternatives to the Proposed Action:

Shipping Fuel to a Permanent Federal Fuel Storage/Disposal Facility

Shipment of spent fuel to a high-level radioactive storage facility is an alternative to increasing the onsite spent fuel storage capacity. However, the U.S. Department of Energy's (DOE's) high-level radioactive waste repository is not expected to begin receiving spent fuel until approximately 2010 at the earliest. In October 1996, the Administration did commit DOE to begin storing waste at a centralized location by January 31, 1998. However, no location has been identified and an interim federal storage facility has yet to be identified in advance of a decision on a permanent repository. Therefore, shipping spent fuel to the DOE repository is not considered an alternative to increased onsite spent fuel storage capacity at this time.

Shipping Fuel to a Reprocessing Facility

Reprocessing of spent fuel from the St. Lucie Plant, Unit 2, is not a viable alternative since there are no operating commercial reprocessing facilities in the United States. Spent fuel would have to be shipped to an overseas facility for reprocessing. This approach has never been used and it would require approval by the U.S. Department of State as well as other

entities. Additionally, the cost of spent fuel reprocessing is not offset by the salvage value of the residual uranium and reprocessing represents an added cost. Therefore, this alternative is considered unacceptable.

Shipping Fuel to Another Utility or Site or to St. Lucie, Unit 1, for Storage

Shipment of irradiated fuel from St. Lucie, Unit 2, to Turkey Point or to the St. Lucie, Unit 1, fuel pool would provide short-term relief from the storage problem at St. Lucie, Unit 2, but this transfer of fuel between units would create no additional storage locations for irradiated fuel. As a result, any fuel transfer would accelerate the loss of fuel pool storage at the receiving unit and give no benefit to the facility. Currently, the Turkey Point site has installed fuel pool storage capacity sufficient to handle site requirements for irradiated fuel storage until approximately the end of licensed life in 2012 (for Unit 3) and 2013 (for Unit 4). Further expansion of the storage capacity of the Turkey Point spent fuel pools is not feasible. Unlike the situation at Turkey Point, the St. Lucie site will require development of an Independent Spent Fuel Storage Facility (ISFSI) to permit operation to the end of licensed life. As a result, shipment of irradiated fuel from St. Lucie to Turkey Point would require the early development of an ISFSI at Turkey Point without eliminating the requirement to subsequently develop an ISFSI at the St. Lucie site. Additionally, the design of the Turkey Point fuel pool storage racks has been optimized for storage of fuel with a different lattice and different reactivity characteristics than that used at St. Lucie, Unit 2; thus, storage of Unit 2 fuel at Turkey Point would both limit storage of future discharged Turkey Point fuel and represent a less than optimal use of the existing Turkey Point storage capability.

Likewise, the shipment of irradiated fuel from St. Lucie, Unit 2, to St. Lucie, Unit 1, for storage does not eliminate the need to develop additional spent fuel storage capability at the St. Lucie site in the future. FPL knows of no other utility that is prepared to accept shipments of

irradiated fuel from St. Lucie, Unit 2, for long-term storage at its site.

For these reasons, and considering the increased fuel handling and additional occupational radiation exposure incurred during the shipment of irradiated fuel, the alternative of shipping St. Lucie, Unit 2, fuel to Turkey Point or to St. Lucie, Unit 1, for storage is not an acceptable alternative to the proposed action.

Alternatives Creating Additional Storage Capacity

A variety of alternatives to increase the storage capacity of the St. Lucie, Unit 2, spent fuel pool were considered prior to developing the proposed license amendment based on soluble boron credit. Fuel rod consolidation was examined as a potential alternative and was eliminated because of the limited industry experience in disassembling irradiated fuel and because of the potential for fission product release due to rod breakage during disassembly. Additionally, because the Department of Energy (DOE) considers consolidated fuel to be a non-standard waste form, FPL was concerned that the presence of fuel in this form would cause the DOE to delay its acceptance of waste from St. Lucie, Unit 2.

The addition of poison inserts to the Unit 2 fuel pool was examined and later rejected because the large quantity of inserts necessary to adequately control the fuel pool reactivity had a significantly greater initial cost than the alternative selected. Additionally, use of poison inserts increases the volume of radioactive waste that must be disposed of or decontaminated during decommissioning of the spent fuel pool, making this alternative unacceptable.

The early implementation of dry cask storage for irradiated fuel at the St. Lucie site was also considered. Dry cask storage involves transferring irradiated fuel, after several years of storage in the Unit 2 fuel pool, to high capacity casks with passive heat dissipation features. After loading, these casks would be placed on a concrete pad at an outdoor location on the St. Lucie site. This alternative was rejected by FPL because each of the alternatives discussed

above would provide additional storage locations for irradiated fuel at lower cost and with less environmental impact.

As a result, FPL concluded that none of the alternative technologies that could create additional spent fuel storage capacity at St. Lucie, Unit 2, could do so with an environmental impact less than the impacts associated with the chosen option.

Reduction of Spent Fuel Generation

To minimize the quantities of irradiated fuel generated during full power operation at St. Lucie, FPL has developed efficient fuel loading patterns that maximize the utilization of fissile material within each assembly consistent with license limits on the integrated fuel rod exposure. Batch discharge burnups for St. Lucie, Unit 2, fuel regularly approximate 45 GWD/MTU with peak assembly burnups reaching 50 GWD/MTU by the time of discharge. St. Lucie, Unit 2, consistently depletes fuel assemblies to these burnups without experiencing cladding perforations so that the fission product inventory present in the spent fuel pool water remains low. The high values of batch average and peak assembly discharge burnup ensure that the electricity generated by St. Lucie, Unit 2, yields the minimum possible amount of spent fuel.

The fuel assembly design used at St. Lucie, Unit 1, and at Turkey Point is not compatible with the St. Lucie, Unit 2, core. As a result, partially irradiated fuel from other FPL nuclear units can not be used at Unit 2 (or vice versa) to reduce the rate of spent fuel discharge.

Operation of St. Lucie, Unit 2, at a reduced power level for long periods of time would extend the existing spent fuel pool storage capacity. However, to compensate for the reduced generation by St. Lucie, Unit 2, another power generation facility would be required to increase its power output, possibly resulting in an increase in airborne pollution and greenhouse gas emissions. The adverse environmental impact of increased airborne pollution and greenhouse gas emissions resulting from a long-term derate of St. Lucie, Unit 2, generating capacity is

significantly greater than the environmental impact associated with increasing the storage capacity of the existing Unit 2 spent fuel pool.

The No-Action Alternative

As an alternative to the proposed action, the NRC staff considered denial of the proposed action (i.e., the "no-action" alternative). Denial of the application would result in no significant change in current environmental impacts. The environmental impacts of the proposed action and the alternative action are similar.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the Final Environmental Statement for St. Lucie, Unit 2.

Agencies and Persons Consulted:

By Letter dated March 8, 1991, Mary E. Clark of the State of Florida, Department of Health and Rehabilitative Services, informed Deborah A. Miller, Licensing Assistant, U.S. NRC, that the State of Florida does not desire notification of issuance of license amendments. Thus, the State official had no comments.

Finding of No Significant Impact

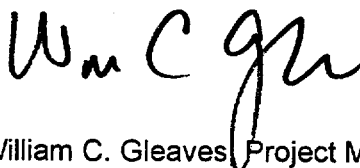
On the basis of the environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the Commission has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letter dated December 31, 1997, as supplemented May 15, 1998, September 15, 1998, November 25, 1998, and January 28, 1999. The May 15, 1998 supplement was a result of an U.S. Nuclear Regulatory Commission request for additional information dated April 8, 1998. All of these

Regulatory Commission request for additional information dated April 8, 1998. All of these documents are available for public inspection at the Commission's Public Document Room, The Gelman Building, 2120 L Street, NW., Washington, DC, and at the local public document room located at the Indian River Community College Library, 3209 Virginia Avenue, Fort Pierce, Florida 34981-5596.

Dated at Rockville, Maryland, this 23rd day of April 1999.

FOR THE NUCLEAR REGULATORY COMMISSION

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William C. Gleaves, Project Manager, Section 2
Project Directorate II
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