

May 10, 1988

Docket No. 50-389

**DISTRIBUTION**

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Dear Mr. Conway:

SUBJECT: ST. LUCIE UNIT 2 - ISSUANCE OF AMENDMENT RE: TRANSFER OF SPENT FUEL (TAC NOS. 61938 AND 61939)

The Commission has issued the enclosed Amendment No. 30 to Facility Operating License No. NPF-16 for the St. Lucie Plant, Unit No. 2. This amendment consists of changes to the license in response to your application dated July 2, 1986, as supplemented by letters dated February 6 and 9, March 2 and 27 and April 28, 1987.

This amendment permits Unit No. 1 spent fuel to be transferred from the Unit No. 1 spent fuel pool to the Unit No. 2 spent fuel pool.

Your application proposed a change in the license to permit possession of Unit No. 1 byproduct and special nuclear materials (in the form of Unit No. 1 spent fuel assemblies) at Unit 2. The enclosed amendment reflects your proposed license change. In addition, we have added a license condition that permits the transfer up until the time that the Unit No. 1 spent fuel pool is reracked. This added license condition is based upon our "need" evaluation and is contained in the Environmental Assessment that was forwarded to you by letter dated February 22, 1988. The license condition was discussed with and agreed to by your staff.

Lastly, our review concludes that (1) shipping cask NAC-1 is unsuitable for use in transferring St. Lucie 1 fuel assemblies, (2) shipping cask NLT-1/2 is suitable as long as the initial uranium-235 enrichment is less than or equal to 3.7%, and (3) placement of St. Lucie Unit No. 1 fuel assemblies in either Region I or Region II racks of the St. Lucie Unit No. 2 spent fuel pool is acceptable when the provisions of St. Lucie Unit No. 2 Technical Specification 5.6.1.a.3 are met.

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PDR

Mr. W. F. Conway

- 2 -

May 10, 1988

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

Sincerely,

Original signed by

E. G. Tourigny, Project Manager  
Project Directorate II-2  
Division of Reactor Projects-I/II  
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 30 to NPF-16
2. Safety Evaluation

cc w/enclosures:  
See next page

\*SEE PREVIOUS CONCURRENCES

LA:PDII-2  
DMi  
03/10/88

\*PM:PDII-2  
ETourigny:bd  
03/18/88

\*D:PDII-2  
HBerkow  
03/18/88

\*SPLB  
JCraig  
03/20/88

\*PRPB  
LCunningham  
03/22/88

\*OGC  
04/04/88

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Florida Power & Light Company

St. Lucie Plant

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

FLORIDA POWER & LIGHT COMPANY  
ORLANDO UTILITIES COMMISSION OF  
THE CITY OF ORLANDO, FLORIDA  
AND  
FLORIDA MUNICIPAL POWER AGENCY  
DOCKET NO. 50-389  
ST. LUCIE PLANT UNIT NO. 2  
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 30  
License No. NPF-16

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Florida Power & Light Company, et al. (the licensee), dated July 2, 1986, as supplemented February 6 and 9, March 2 and 27, and April 28, 1987, 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.

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2. Accordingly, Facility Operating License No. NPF-16 is amended as follows:

A. Section 2.B.5 is changed to read:

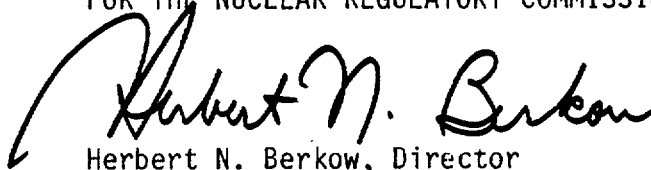
5. Pursuant to the Act and 10 CFR Parts 30, 40, and 70, FP&L to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of St. Lucie, Units 1 and 2.

B. License Condition 2.C(19) is added as follows:

19. Unit No. 1 spent fuel may be transferred from the Unit No. 1 spent fuel pool to the Unit No. 2 spent fuel pool, as necessary, until completion of all activities related to the increase in capacity of the Unit No. 1 spent fuel pool to 1706 spent fuel assemblies. Spent fuel assemblies transferred from the Unit 1 spent fuel pool to the Unit 2 spent fuel pool may remain in the Unit 2 spent fuel pool or be transferred back to the Unit 1 spent fuel pool.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Herbert N. Berkow, Director  
Project Directorate II-2  
Division of Reactor Projects-I/II  
Office of Nuclear Reactor Regulation

Date Of Issuance: May 10, 1988

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATING TO THE TRANSFER OF UNIT NO. 1 SPENT FUEL  
BETWEEN UNIT NO. 1 AND UNIT NO. 2 OF THE ST. LUCIE PLANT  
RELATING TO AMENDMENT NO. 30  
TO FACILITY OPERATING LICENSE NO. NPF-16  
FLORIDA POWER & LIGHT COMPANY, ET AL.  
ST. LUCIE PLANT, UNIT NOS. 1 AND 2  
DOCKET NOS. 50-335 AND 50-389

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Attachment: Technical Evaluation Report  
by Franklin Research Center

## 1.0 INTRODUCTION

By letter dated July 2, 1986, Florida Power and Light Company (FP&L, the licensee) requested approval to transfer spent fuel from the Unit 1 spent fuel pool to the Unit 2 spent fuel pool. Additional information was submitted by letters dated February 6 and 9, 1987, March 2 and 27, 1987, and April 28, 1987 and in telecons on February 19 and 23, 1987 in response to staff requests.

Facility Operating License No. DPR-67 for the St. Lucie Plant, Unit 1, currently permits storage of Unit 1 spent fuel in the Unit 1 spent fuel pool located in Fuel Handling Building Number 1. Similarly, Facility Operating License No. NPF-16 for the St. Lucie Plant, Unit 2, currently permits storage of Unit 2 spent fuel in the Unit 2 spent fuel pool located in Fuel Handling Building Number 2. The Unit 1 spent fuel pool has a maximum capacity of 728 fuel assemblies. As a result of the Unit 1 refueling outage which ended in April 1987, there is no longer enough storage space in the pool to completely off-load the Unit 1 reactor core. The next Unit 1 refueling outage is scheduled for the summer of 1988. Additional spent fuel assemblies will be added to the pool at that time, compounding the problem. By letter dated June 12, 1987, the licensee proposed a license amendment to rerack the Unit 1 spent fuel pool, which would significantly increase the storage capacity of the pool. The reracking was authorized on March 11, 1988; it will take several months to complete. The completion of reracking of the spent fuel pool will obviate the need to transfer Unit 1 fuel to the Unit 2 spent fuel pool. However, as described above and in the staff's Environmental Assessment issued on February 22, 1988, spent fuel will have to be transferred if the rerack cannot be completed over the next few months.

The Unit 2 spent fuel pool has a maximum licensed capacity of 1076 fuel assemblies. Since Unit 2 was licensed in 1983 and is currently in its fourth operational cycle, there is a considerable amount of excess capacity in the Unit 2 spent fuel pool at this time.

The Fuel Handling Buildings are approximately 300 feet apart. The spent fuel pools do not communicate with each other. In order to store Unit 1 spent fuel in the Unit 2 spent fuel pool, a fuel shipping cask would have to be used to transfer the spent fuel between the fuel pools. The licensee plans to use an approved shipping cask to transfer one fuel assembly at a time from Unit 1 to Unit 2.

The licensee does not have the authority to transfer spent fuel between units and store Unit 1 fuel in the Unit 2 spent fuel pool. Thus, the licensee submitted an application for Commission review and approval. The licensee proposed the Unit 2 license be amended as follows: "Pursuant to the Act and 10 CFR Parts 30, 40 and 70, FP&L to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of St. Lucie, Units 1 and 2."



On October 20, 1986, a notice was published in the Federal Register (51 FR 37242), which described the licensee's application for amendment. The notice also stated that any person whose interest might be affected by the proceeding might file a written petition to intervene by November 19, 1986. By letter dated November 6, 1986, Mr. John Paskavitch requested a hearing on the licensee's application. An Atomic Safety and Licensing Board was subsequently convened. The staff's discussion related to this matter is part of the following safety evaluation (Section 3.0).

Mr. Paskavitch's hearing request was dismissed by the ASLB in a Memorandum and Order dated January 16, 1987. 25 NRC 32. See discussion in a 3.0 infra.

In a separate but related matter, the Board wrote a letter of concern to the Counsels for the NRC staff and licensee dated December 9, 1986. The letter raised a concern in regard to General Design Criterion (GDC) 5, Appendix A, 10 CFR Part 50. GDC 5 states the following:

Sharing of Structures, Systems, and Components. Structures, systems, and components important to safety shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units.

The licensee addressed the Board's concern in a letter dated February 6, 1987. This letter is considered by the staff to be part of the amendment application. The staff's discussion related to the Board's concern is part of the following safety evaluation (Section 2.10).

The following contains the staff's evaluation of the licensee's request for amendment. The licensee determined that the only change needed was an authorization in the license itself to allow Unit 1 spent fuel to be possessed at Unit 2.

## 2.0 EVALUATION

### 2.1 Criticality

The two areas of the criticality aspects of transferring fuel from the St. Lucie Unit 1 spent fuel pool to the St. Lucie Unit 2 spent fuel pool that require evaluation are: (1) the removal of fuel from the St. Lucie Unit 1 spent fuel pool and its placement in a shipping cask, and (2) the placement of St. Lucie Unit 1 spent fuel assemblies in the St. Lucie Unit 2 spent fuel pool.

By letter dated February 9, 1987, the licensee stated that shipping cask Model Nos. NAC-1 and NLI-1/2 are the only casks that meet the 25 ton Technical Specification 3.9.13 limit for the St. Lucie Unit 1 cask crane. These two casks can each hold only one PWR fuel assembly. However, shipping cask NAC-1 is currently approved for use with natural uranium fuel only. The Certificate of Compliance No. 9183, Revision No. 4 dated July 30, 1986, also imposes other restrictions on the radioactive material that may be transported in shipping cask NAC-1. The PWR fuel assemblies stored in the St. Lucie Unit 1 spent fuel pool do not meet the limitations imposed on the shipping cask. Therefore, the staff concludes that shipping cask NAC-1 is not acceptable for the purpose of transporting spent fuel assemblies from the St. Lucie Unit 1 spent fuel pool to the St. Lucie Unit 2 spent fuel pool.

Shipping cask NLI-1/2 has been approved for the shipment of a PWR fuel assembly whose average initial enrichment is no greater than 3.7 weight percent uranium-235. Other restrictions are noted in Certificate of Compliance No. 9010, Revision 17, dated August 28, 1986. Technical Specification 5.6.1.a.3 permits the storage of fuel assemblies in the St. Lucie Unit 1 spent fuel pool whose average initial enrichment can be up to 4.0 weight percent uranium-235.

Therefore, the licensee will need to develop procedural controls for the transfer of fuel assemblies from the St. Lucie Unit 1 spent fuel pool to a shipping cask so that the enrichment limit, in particular, and other limits, in general, for shipping cask NLI-1/2 are met. On the basis of appropriate procedural controls for the transfer of fuel assemblies from the St. Lucie Unit 1 spent fuel pool to shipping cask NLI-1/2, the staff concludes that the criticality aspects of this shipping cask, with one St. Lucie Unit 1 spent fuel assembly having an average initial enrichment of less than or equal to 3.7 weight percent uranium-235, are acceptable.

The staff's Safety Evaluation Report dated October 16, 1984 on the St. Lucie Unit 2 spent fuel pool states that Combustion Engineering (CE) 14x14 fuel assembly designs with uranium-235 enrichment up to 4.5 weight percent may be stored in the Region I racks. The evaluation further states that Region II racks can be used to store fuel which has experienced sufficient burnup such that storage in Region I racks is not required. The Advanced Nuclear Fuels Corporation (ANFC), formerly the EXXON Nuclear Company, 14x14 fuel assembly design for St. Lucie Unit 1 is mechanically, thermal-hydraulically, and neutronically similar to the CE 14x14 fuel assembly design. Both the CE and ANFC fuel assemblies have uranium-235 enrichment of less than or equal to 4.0 weight percent uranium-235. Therefore, the staff concludes that the transfer of St. Lucie Unit 1 fuel assemblies from the shipping cask to the St. Lucie Unit 2 spent fuel pool is acceptable with regard to criticality limitations as follows: (1) the fuel assemblies may be placed in the Region I rack without further consideration, or (2) the fuel assemblies may be placed in the Region II racks provided that the initial uranium-235 enrichment and the assembly burnup meet the enrichments of St. Lucie Unit 2 Technical Specification 5.6.1.a.3.

As discussed above, the staff has made the following conclusions concerning the criticality aspects of transferring fuel assemblies from the St. Lucie Unit 1 spent fuel pool to the St. Lucie Unit 2 spent fuel pool:

- (1) Shipping cask NAC-1 is not acceptable for shipping St. Lucie Unit 1 fuel assemblies.
- (2) Shipping cask NLI-1/2 is acceptable for shipping St. Lucie Unit 1 fuel assemblies with initial uranium-235 enrichment less than or equal to 3.7% weight percent.
- (3) The placement of St. Lucie Unit 1 fuel assemblies in the St. Lucie Unit 2 spent fuel pool Region I racks is acceptable; placement in Region II racks is acceptable when the provisions of St. Lucie Unit 2 TS 5.6.1.a.3 are met.

## 2.2 Spent Fuel Assembly Storage Arrangements

The St. Lucie Unit 1 spent fuel pool currently contains a mixture of CE and ANFC fuel. The use of ANFC fuel at St. Lucie 1 was approved by the staff in a letter dated March 1, 1984. St. Lucie Unit 2 has used only CE fuel during its first two cycles of operation. In a letter dated March 13, 1984, the licensee stated that the Unit 2 spent fuel racks are designed to accommodate storage of Unit 1 fuel. These racks were approved by the staff in a letter dated October 16, 1984.

In a letter dated February 9, 1987, the licensee provided the following additional information regarding the spent fuel transfer:

- a. The initial batch of Unit 1 spent fuel assemblies to be transferred to the Unit 2 spent fuel pool would be that batch offloaded during the first refueling outage (April-May 1978).
- b. It is expected that only 15 to 25 spent fuel assemblies would be subject to transfer to Unit 2 should a Unit 1 full core off-load be necessary.
- c. The Unit 1 spent fuel assemblies would be put into the Unit 2 rack positions closest to the cask laydown area in order to be consistent with Unit 2 Technical Specification (TS) 5.6.1.
- d. The shipping cask to be used to transfer Unit 1 spent fuel assemblies will meet the 25 ton limit per TS 3.9.13 for the Unit 1 cask crane.
- e. Transfer of Unit 1 spent fuel back to Unit 1 will follow the identical path from Unit 2.

The staff concludes that the spent fuel assembly storage arrangements described above are acceptable. It should be noted that the licensee's statement, that only 15 to 25 spent fuel assemblies would be subject to transfer, assumes that the transfer takes place before the 1988 refueling outage and that the spent fuel pool is not reracked before that time. Considering the possibility that the pool will not be reracked in 1988, the staff, in its Environmental Assessment, used an upper limit of 100 spent fuel assemblies to be transferred in evaluating occupational dose.

## 2.3 Cask Movement and Path of Travel Inside Units 1 and 2

Unit 1 spent fuel assemblies will be transferred into the Unit 2 spent fuel pool in a fuel shipping cask having a nominal weight of 25 tons or less when fully loaded. This conforms with Unit 1 TS 3.9.13, which limits the load that may be handled by the spent fuel cask crane to a maximum of 25 tons. The corresponding limit for the Unit 2 crane (Unit 2 TS 3.9.12) is 100 tons. Loads in excess of 2,000 pounds are prohibited from travel over irradiated fuel in the Unit 1 spent fuel pool per Unit 1 TS 3.9.7. A corresponding load limit for Unit 2 of 1600 pounds is indicated in Unit 2 TS 3.9.7. A Unit 1 spent fuel assembly weighs less than 1,300 pounds (less than the above TS limit for either unit), and therefore, Unit 1 spent fuel assembly travel over either spent fuel pool is acceptable.

Crane and cask movement arrangements are described in Section 9.1 of the Unit 1 and Unit 2 Final Safety Analysis Reports (FSARs). The staff previously concluded that St. Lucie Units 1 and 2 are in conformance with the heavy loads handling criteria of NUREG-0612 "Control of Heavy Loads at Nuclear Power Plants," Sections 5.1.1 and 5.3 by letters dated March 4, 1985 (St. Lucie Unit 1) and April 2, 1985 (St. Lucie Unit 2). This review included movement of a 25-ton cask within the Units 1 and 2 buildings, and thus a further review in this regard is unnecessary. Thus, the staff concludes that the cask movements and path of travel inside the buildings of both units are acceptable for the proposed transfer of Unit 1 spent fuel to Unit 2.

#### 2.4 Cask Movement and Path of Travel Outside Units 1 and 2

In their submittals dated February 9, 1987 and March 2, 1987, the licensee stated that an evaluation had been performed for a spent fuel trans-shipment utilizing a 25-ton cask along a path starting at the Unit 1 cask loading area and traveling to the Unit 2 cask loading area. This path coincides with a portion of the intermodal cask transporter path previously evaluated for effects upon underground structures and utilities. The spent fuel trans-shipment path road surface is paved with Portland cement concrete or asphaltic concrete. Two transport vehicles were considered in the evaluation. The reactions of the two transport vehicles were compared to the maximum reactions of the intermodal cask transporter that was previously evaluated. Since the reactions of the intermodal cask transporter were greater than the reaction for either of the two transport vehicles, the intermodal cask transporter evaluation is considered to be an enveloping evaluation. The stress analysis which was performed indicated that safety-related (Category 1) components located beneath the path of travel, including missile protection slabs, underground facilities (pipes and conduits), manholes and manhole covers, have the capability to withstand the prescribed sustained and live loads with an acceptable margin of safety.

The licensee also indicated that to reduce the likelihood of a cask drop accident, the roadway will be inspected for general deterioration so that it can be repaired, if necessary, prior to the transport of spent fuel. The shipping cask will also be adequately secured to the transport vehicle. To further reduce the possibility of a cask drop, the following additional features are provided:

- a. Conservative design margins in the lifting components.
- b. Redundant braking systems for hoists.
- c. Periodic tests and inspections of the cranes.
- d. Use of qualified crane operators and riggers.
- e. Use of specific operating and administrative procedures.

The licensee's evaluation concerning the structural integrity of the spent fuel trans-shipment path has also been reviewed by the staff and is addressed in Section 2.9 of this safety evaluation. The licensee has also evaluated the

potential radiological effects of a cask drop outside the fuel handling building in the Unit 1 FSAR, Section 9.1.4. The staff evaluation of this issue is contained in Section 2.8. Thus, the staff concludes that the cask movement and path of travel outside Units 1 and 2 are in accordance with staff guidelines and are, therefore, acceptable.

## 2.5 Integrity of Spent Fuel Storage Pool Cooling

The ability of the spent fuel storage pool to maintain an adequate water level following damage to the pool floor resulting from a postulated free fall drop of a fuel shipping cask was considered by the licensee in the St. Lucie Units 1 and 2 FSARs. The licensee stated the following in their submittal dated February 9, 1987:

- "a. For both Units 1 and 2, the cask is physically prevented and administratively prohibited from traveling over the spent fuel pool outside the cask storage area.
- b. Section 9.1.4.3 of the Unit 1 FSAR postulates two cask drop accidents for the Unit 1 spent fuel pool, a vertical and tipped cask drop. The vertical cask drop into the cask storage area has been analyzed to determine if the leak-tight barrier of the pool can be breached. The results of the analysis indicate that the leak-tight integrity is maintained for a 25 ton cask drop. Technical Specification 3/4.9.13, "Spent Fuel Cask Crane," provides assurance that the Unit 1 fuel cask crane does not handle loads in excess of 25 tons. A tipped cask drop has also been considered and the analysis results found to be acceptable.
- c. A concrete wall to the top of the Unit 1 spent fuel pool separates the cask storage area from the spent fuel storage area. The wall prevents a water level reduction over the spent fuel assemblies even if a dropped fuel cask causes damage to the pool or pool liner in the cask storage area.
- d. Unit 1 spent fuel assemblies would be transferred to Unit 2 spent fuel pool rack positions in conformance with Unit 2 TS 5.6.1."

The staff previously concluded in Supplement No. 2 to the St. Lucie Unit 1 SER dated March 1, 1976, that the cask drop accident for a cask not exceeding 25 tons will not result in a breach of the leak-tight integrity of the fuel pool, and a 25-ton single element spent fuel cask drop anywhere along its travel path will not result in unacceptable release of radioactivity or damage to safety-related equipment. Further, the staff evaluation concerning the St. Lucie Unit 1 spent fuel pool reracking (Amendment No. 22) dated March 29, 1978 stated that the consequences of fuel handling accidents in the spent fuel pool are not changed from those presented in the earlier safety evaluation, and are acceptable. Thus, the staff evaluations for St. Lucie Unit 1 dated March 29, 1978 (Amendment No. 22), May 8, 1975 (Supplement 1 to SER) and November 8, 1974 (original SER), which found the spent fuel cooling system to be acceptable, are still valid. The staff acceptance of the St. Lucie Unit 2 spent fuel pool cooling and spent fuel handling systems is contained in the evaluations dated October 1981 (original SER), April 1983 (Supplement 3 to SER) and October 16, 1984 (Amendment No. 7). Thus, the staff concludes that the integrity of spent fuel pool cooling capability will be maintained during the spent fuel transfer.

## 2.6 Integrity of Critical Safety Systems and Equipment

As noted previously, the staff concluded in Supplement No. 2 to the St. Lucie Unit 1 SER dated March 1, 1976 that "a 25-ton single element spent fuel cask drop can be tolerated anywhere along its travel path without resulting in an unacceptable release of radioactive or damage to safety-related equipment. Since a cask drop accident can be tolerated without unacceptable consequences, the applicant's approach to cask drop protection is, therefore, acceptable." In addition, the staff subsequently concluded in its evaluation dated March 29, 1978 concerning the reracking of St. Lucie Unit 1 that the above conclusion remains unchanged.

The staff SER dated October 1981 for initial licensing of St. Lucie Unit 2 stated that "the cask travel within the fuel handling building is limited to the opening in the building roof through which the hoist cables must pass, thus preventing cask travel over any portion of the spent fuel pool and over any safety-related equipment. A cask drop is very unlikely due to the cask crane design features such as upper hoisting limit switches, dual stopping and event of a cask drop, the cask would fall into the cask pool which could damage the floor of the cask pool but would not damage the spent fuel pool and therefore, the requirements of General Design Criterion 61, 'Fuel Storage and Handling and Radioactivity Control,' and the guidelines of Regulatory Guide 1.13, 'Spent Fuel Storage Facility Design Basis,' are satisfied for handling of the spent fuel cask." The staff SER dated October 16, 1984 concerning the reracking of the St. Lucie Unit 2 spent fuel pool stated that this conclusion remains unchanged.

As mentioned in Section 2.4, the staff evaluation of the integrity of safety-related components buried under the cask path of travel between Units 1 and 2 is addressed elsewhere (Section 2.9). Thus, the staff concludes that the integrity of critical safety systems and equipment is not compromised for the proposed spent fuel transfer.

## 2.7 Occupational Radiation Exposure

The staff has reviewed the licensee's plan to transfer spent fuel assemblies between Units 1 and 2 with respect to occupational radiation exposure and concludes that design and operational considerations are in accordance with the ALARA policy. This conclusion is based on the licensee having considered the requirements of 10 CFR 20.101 and 20.103, and the guidelines of Regulatory Guides 8.8 and 8.10. The occupational exposure for the spent fuel transfer operation is estimated by the licensee to be less than 0.4 person-rem per spent fuel assembly. This estimate is based on the licensee's detailed breakdown of occupational exposure for each phase of the transfer. 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 is being performed. The spent fuel assemblies themselves contribute a negligible dose rate in the spent fuel pool area because of the depth of water in the spent fuel pool. One potential source of radiation is radioactive activation of corrosion products, called crud. Crud may be released to the spent fuel pool water because of fuel movement during the spent fuel assemblies' transfer. This could increase radiation levels in the vicinity of both spent fuel pools. The licensee expects that crud of the spent fuel pool walls for either unit will not present a significant contribution to exposure. Further, the spent fuel pool cleanup system will remove deposits in the spent fuel pool water and thereby reduce crud levels.

During the spent fuel assembly transfer, occupational exposure will be limited by the existing ALARA procedures and guidelines. The staff previously reviewed these ALARA procedures as part of its evaluation for the St. Lucie Unit 1 license extension and concluded that these procedures as described in the updated FSAR (radiation protection plans) are in accordance with 10 CFR Part 20 and are consistent with the criteria of Regulatory Guide 8.8.

The licensee also plans to use operating experience gained from previous spent fuel assembly transfers at Turkey Point Units 3 and 4 to further minimize collective doses to workers. Further, NRC inspectors will monitor implementation of the procedures, surveillance and radiation protection program (conference call with Region II on May 7, 1987). Therefore, the staff concludes that the radiation protection program is adequate for ensuring that occupational radiation exposure during the spent fuel transfer will be maintained in accordance with ALARA guidelines, including Regulatory Guide 8.8, and the requirements of 10 CFR Part 20.

## 2.8 Radiological Accident Analysis Evaluation

The staff has reviewed the potential consequences of three postulated design basis accidents which involve spent fuel as part of the review of the acceptability of the licensee's request to transport spent fuel from the St. Lucie Unit 1 spent fuel pool (SFP) to that of St. Lucie Unit 2. These accidents are the fuel handling, cask drop, and cask transport accidents. The radiological consequences of these accidents were previously analyzed by the staff and reported in SERs dated November 8, 1974, March 1, 1976, and March 29, 1978 for St. Lucie Unit 1, and October 1981 and October 16, 1984 for Unit 2. The previous fuel handling and cask drop accidents do not require reevaluation because the operations potentially involved with these accidents are not modified by the proposed license amendment. The cask transport accident previously involved the transport of 10 spent fuel assemblies following a 90 day cooldown period. The proposed license amendment would permit only the transport of a single fuel assembly which could occur at the earliest with a 1490 hour cooldown (according to TS 3/4.9.14, the earliest decay time of spent fuel, before a shipping cask would be allowed into the cask compartment in the area of the SFP with greater than a third of the core in storage, is 1490 hours).

The staff has reevaluated the consequences of the single fuel assembly cask transport accident. The accident assumptions are tabulated in Table 1. The calculated thyroid doses at the exclusion area and low population zone boundary were 18.4 and 7.2 rem, respectively. The whole body doses at both locations were less than 0.1 rem. These calculated doses are well below the guideline values stated in 10 CFR Part 100, i.e., 300 rem to the thyroid and 25 rem to the whole body. Thus, the staff concludes that the consequences of postulated design basis accidents for the spent fuel transfer are acceptable.

Table 1 - Assumptions Used In The Fuel Transport Accident Analysis

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Power Level	2754 Mwt
Number of Fuel Rods Damaged	236
Total Number of Fuel Rods in Core	51,212
Radiation Peaking Factor of Damaged Rods	1.65
Shutdown Time	1490 hours
Inventory Released from Damaged Rods	10% (iodines)
	10% (noble gases other than Kr-85)
	30% (Kr-85)
Atmospheric Diffusion Factors (seconds per cubic meter)	
0-2 hour X/Q Value at 1560 meters	1.6 E-4
0-8 hour X/Q Value at 1610 meters	6.3 E-5

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### 2.9 Spent Fuel Handling and Load Path Structural Integrity

The following evaluation addresses spent fuel handling and load path structural integrity. Franklin Research Center (FRC) assisted the staff in its review and prepared a Technical Evaluation Report (TER) in support of the staff's evaluation. The TER is attached and is considered a part of this safety evaluation.

The licensee's July 2, 1986 submittal stated that the proposed license amendment does not alter the type or amount of reactor fuel which can be received, used, and possessed at the site for operation of St. Lucie Units 1 and 2. In the proposed license amendment for fuel pool reracking, dated March 13, 1984, it was stated that the St. Lucie Unit 2 spent fuel racks would be designed to accommodate the storage of Unit 1 fuel assemblies. The St. Lucie Unit 2 racks were approved by the NRC on October 16, 1984 (Amendment No. 7). Therefore, storage of St. Lucie Unit 1 spent fuel in the Unit 2 racks is acceptable.

The licensee's July 2, 1986 submittal also stated that spent fuel from St. Lucie Unit 1 will be transferred to Unit 2 in a fuel shipping cask having a nominal weight of 25 tons or less when loaded. This statement conforms with Unit 1 TS 3.9.13, which limits the load that may be handled by the spent fuel cask crane to a maximum of 25 tons. The corresponding limit for the Unit 2 spent fuel cask crane is 100 tons (Unit 2 TS 3.9.12). Thus, the spent fuel cask cranes of both units are capable of handling the spent fuel transfer load safely.

The method of handling of St. Lucie Unit 1 spent fuel assemblies during the transfer from Unit 1 to Unit 2 is described in the licensee's letter of March 2, 1987. FRC has evaluated the method and concluded that the method is adequate.



There are two possible cask transporter vehicles to be used for the proposed spent fuel transport between St. Lucie Units 1 and 2: the Rogers Vehicle (RV) and the other vehicle (O). The transport vehicle is only allowed to cross a designated path. The path affects a roadway, missile protection slabs, and underground facilities (i.e., pipes, electric conduit, manholes, and catch basins), all of which were originally designed for the load of an intermodal cask transporter. Wheel arrangements and the weight of the two cask transporters (RV and O) proposed to be used and of the original intermodal transporter were provided by the licensee. The information provided was sufficient to evaluate the safety of structures that would be affected by the loads of the transporter vehicles. The licensee reported that the stress analysis results indicated that all Category I structural components within the load path of the transporter vehicles have the capability to withstand prescribed loads for the intermodal cask transporters with an acceptable margin of safety and for the RV and O transporters with an even higher margin of safety than that of the intermodal transporter. The weight and wheel arrangements were reviewed and evaluated by FRC, which concluded that the RV and O transporters, which were proposed to be used, would produce less stress for the Category I structures than would the intermodal transporter, which was used originally for the design of Category I structures. Therefore, the roadway, missile protection slabs, and underground facilities (i.e., pipes, electric conduit, manholes, and catch basins) all have the capability to withstand the loads of transport vehicles that would cross over them.

The licensee's July 2, 1986 submittal stated that the proposed amendment will not significantly increase the probability or consequences of an accident previously evaluated since the configuration and operation of the plant remain essentially the same. What is not the same is that only a certain number of Unit 1 spent fuel assemblies may be transferred to the Unit 2 spent fuel pool. The Unit 1 assemblies that may be transferred have essentially the same mechanical design, enrichments, and burnup histories as those of the Unit 2 fuel assemblies evaluated and stipulated in the Unit 2 FSAR. Furthermore, the Unit 2 spent fuel racks were designed to accommodate the storage of the Unit 1 fuel. Since the previously approved designs of the two pools and the associated operating and accident analysis assumptions have not been changed, the NRC and its consultant, FRC, agree with the licensee that the proposed amendment will not significantly increase the probability or consequences of an accident previously evaluated.

The licensee's July 2, 1986 submittal also stated that the proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated since the change does not modify the configuration or operation of the plant. It also stated that a spent fuel shipping cask that meets the packaging and transportation requirements of 10 CFR Part 71 will be used to transfer spent fuel assemblies, and potential fuel handling and cask drop accidents were evaluated in the FSARs of both units, including the potential drop of a cask outside the fuel handling building. Since the accidents of load handling and transport of the spent fuel have been evaluated and accepted by the previous accident analyses, the NRC and its consultant, FRC, agree with the licensee that the proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated and will not involve a significant reduction in the margin of safety of the plant.

Based on the review of the submittals by the licensee and of the TER by FRC, the staff has concluded that (1) the handling of spent fuel assemblies that has been proposed by the licensee is adequate, and (2) the load path proposed in the license amendment for transporting spent fuel assemblies from Unit 1 to Unit 2 has been found safe.

#### 2.10 General Design Criterion 5 Concern - Sharing of Structures, Systems, and Components

By letter dated December 9, 1986, the Atomic Safety and Licensing Board raised a concern in regard to the General Design Criterion (GDC) 5. The Board noted that the staff's October 1981 Safety Evaluation Report (SER) for St. Lucie Plant, Unit 1 (NUREG-0843) stated that, because there was (at the time) no sharing of spent fuel facilities between the two St. Lucie Units, the requirements of General Design Criterion (GDC) 5 were not applicable. The Board also stated that it appeared that GDC 5 would become applicable if the proposed amendment were to be approved.

By letter dated February 6, 1987, the licensee addressed the Board's concern. The licensee stated that GDC 5 only applies to situations in which a single structure, system, or component performs a safety function for more than one unit. In general, the purpose of GDC 5 is to assure that an accident at one unit will not significantly impair the ability of the structure, system, or component to perform its safety function for the other unit. The licensee further stated that GDC 5 does not apply in situations in which a structure, system, or component is not being "shared" by more than one unit; i.e., where a structure, system, or component is not designed to perform a safety function for more than one unit at the same time. Thus, St. Lucie Units 1 and 2 will not share any structure, system, or component which performs a safety function associated with storage of spent fuel at St. Lucie. Lastly, the licensee stated that GDC 5 does not apply to the St. Lucie spent fuel transfer amendment, and the statement contained in the staff's SER of October 1981 will remain valid after issuance of the amendment.

The staff has reviewed the licensee's discussion above regarding the applicability of GDC 5 to the proposed transfer of Unit 1 spent fuel to the Unit 2 spent fuel pool. The staff cannot agree with the licensee that GDC 5 is not applicable for this practice because the Unit 2 spent fuel pool will now be shared for the purpose of storing spent fuel which is a safety function from the standpoint of protection against unacceptable radiological releases. However, the staff concludes from the review of the licensee's information that such sharing will not adversely affect the ability of the Unit 2 spent fuel pool to perform its function since adequate storage and cooling are provided for both Unit 1 and Unit 2 spent fuel. Therefore, the staff concludes that the requirements GDC 5 are met.

#### 2.11 Findings

The staff has concluded that the transfer of Unit 1 spent fuel between the St. Lucie Unit 1 and 2 spent fuel pools is acceptable subject to the following conditions:

- (1) Shipping cask NAC-1 is not acceptable for shipping St. Lucie Unit 1 fuel assemblies,

- (2) Shipping cask NLI-1/2 is acceptable for shipping St. Lucie Unit 1 fuel assemblies as long as the initial uranium-235 enrichment is less than or equal to 3.7 weight percent,
- (3) The placement of St. Lucie Unit 1 fuel assemblies in St. Lucie Unit 2 spent fuel pool Region I racks is acceptable; placement in Region II racks is acceptable when the provisions of St. Lucie Unit 2 TS 5.6.1.a.3 are met, and
- (4) Based on need, as described in the introduction section of the evaluation, Unit 1 fuel may be transferred from the Unit 1 spent fuel pool to the Unit 2 spent fuel pool until such time that the Unit 1 spent fuel pool is reracked.

### 3.0 PUBLIC COMMENTS

On October 20, 1986, a notice was published in the Federal Register (51 FR 37242), which described the licensee's application for amendment. The staff proposed that the application did not involve a significant hazards consideration. The notice also stated that any person whose interest might be affected by the proceeding might file a written petition to intervene by November 19, 1986. By letter dated November 6, 1986, Mr. John Paskavitch requested a hearing on the licensee's application. His letter consisted of one sentence which read: "My request is for a hearing in Florida Power and Light's application to move some fuel in the St. Lucie nuclear plant Unit #I to Unit #II." On November 20, 1986, an Atomic Safety and Licensing Board was established to rule on the request for hearing and to preside over the proceeding in the event that a hearing was ordered. The licensee filed a response dated December 1, 1986, in opposition to the hearing request. The NRC staff filed a response on December 8, 1986, also opposing the hearing request. By Memorandum and Order dated December 9, 1986, the Board permitted Mr. Paskavitch to file an amended petition by December 24, 1986, setting forth with particularity his interest in the proceeding, how that interest might be affected by the results of the proceeding, and the specific aspect(s) of the proceeding as to which he wished to intervene. On December 10, 1986, Mr. Paskavitch filed a document entitled, "Petitioner's Reasons for a Request for Hearing." Mr. Paskavitch's request included a number of questions regarding the license amendment application. It contained no statement concerning his interest in the proceeding. The licensee and the NRC staff filed responses, dated January 9, 1987 and January 5, 1987, respectively. By Memorandum and Order dated January 16, 1987, 25 NRC 32, the Board dismissed Mr. Paskavitch's hearing request and terminated the proceeding on the basis that Mr. Paskavitch's request failed to satisfy the intervention requirements of 10 CFR 2.714(a).

Even though the only request for hearing was denied and the proceeding was terminated, the staff reviewed Mr. Paskavitch's questions and provides the following responses.

Question 1: "What caused the need to shift spent fuel rods from one pool to another?"

The fuel transfer has not yet taken place, as the transfer requires staff review and approval. One aspect of the staff review and approval is the need to transfer fuel from Unit 1 to Unit 2. This need was addressed in Section II of the staff's Environmental Assessment entitled "Identification of the Proposed Action" and in Section III entitled "Need for the Proposed Action."

Question 2: "How many rods will be relocated?"

The staff reviewed the licensee's application and assumed that for occupational dose calculation purposes, no more than 100 fuel assemblies would be moved from Unit 1 to Unit 2. The details of this evaluation are contained in Section IV.1 of the staff's Environmental Assessment entitled, "Occupational Radiation Exposure." Each fuel assembly contains a maximum of 176 fuel rods, and each assembly will be transferred as a whole.

Question 3: "How many hours will be needed and in what time period to make the shift?"

The staff does not evaluate how many people are needed and in what time period to make the shift. This is a licensee decision. The staff does evaluate the total dose to all personnel involved in the project in order to determine that the transfer meets ALARA dose guidelines. This evaluation is contained in Section IV.1 of the staff's Environmental Assessment entitled "Occupational Radiation Exposure."

Question 4: "What will be the cost of the move?"

The staff does not address cost to the licensee in making its determination as to the acceptability of the transfer. The staff does not know the answer to this question.

Question 5: "What will be the increase in radiation dosing to the workers moving the rods?"

This question was answered in Section IV.1 of the staff's Environmental Assessment entitled "Occupational Radiation Exposure."

Question 6: "What will be the increase in radiation dosing to the people living within 10 miles of the plant?"

This question was answered in Section IV.2 of the staff's Environmental Assessment entitled "Public Radiation Exposure" for a person standing at the site boundary under normal and accident conditions.

Question 7: "If (17 m/r) .017 REM is the allowable dose to the civilian population per year, should pregnant women and children be moved to the evacuation zone, the 10 mile limit during the move?"

No; no offsite actions by citizens are recommended or needed.

Question 8: "Should potassium iodide pills be distributed to all pregnant women and children in case of an accident during the transfer of the fuel rods?"

No; the staff does not see a need for distribution and use of potassium iodide pills.

#### 4.0 ENVIRONMENTAL CONSIDERATION

A Notice of Issuance of Environmental Assessment and Finding of No Significant Impact relating to the proposed transfer of spent fuel from St. Lucie Unit No. 1 to Unit No. 2 was published in the Federal Register on February 26, 1988 (53 FR 5845).

## 5.0 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 the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: May 10, 1988

### Principal Contributors:

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### Attachment:

Technical Evaluation  
Report

## 7.0 REFERENCES

1. FP&L letter No. L-86-250, July 2, 1986 from C. O. Woody (FP&L) to A. C. Thadani (NRC), Subject: Proposed License Amendment, Spent Fuel Transfer.
2. U.S. Nuclear Regulatory Commission, October 16, 1986, from A. C. Thadani (NRC) to C. O. Woody (FP&L), Subject: Notice of Consideration of Issuance of Amendment to Facility Operating License and Proposed No Significant Hazards Consideration and Opportunity for Hearing.  
  
Also: Federal Register Notice, 51 FR 37242, October 20, 1986.
3. Letter from Mr. J. Paskovitch to Commission, US NRC, November 6, 1986, Subject: Request for Hearing.
4. Letter from Mr. J. Paskovitch to Atomic Safety and Licensing Board, US NRC, December 10, 1986, Subject: Petitioner's Reasons for a Request for Hearing.
5. U.S. Nuclear Regulatory Commission, December 10, 1986, from E. G. Tourigny (NRC) to C. O. Woody (FP&L), Subject: Request for Additional Information.
6. U.S. Nuclear Regulatory Commission, January 23, 1987, from E. G. Tourigny (NRC) to C. O. Woody (FP&L), Subject: Request for Additional Information.
7. FP&L letter No. L-87-49, February 6, 1987 from C. O. Woody (FP&L) to US NRC, Subject: Spent Fuel Transfer - GDC 5 Applicability.
8. FP&L letter No. L-87-48, February 9, 1987 from C. O. Woody (FP&L) to US NRC, Subject: Spent Fuel Transfer.
9. FP&L letter No. L-87-104, March 2, 1987, from C. O. Woody (FP&L) to US NRC, Subject: Spent Fuel Transfer.
10. FP&L letter No. L-87-136, March 27, 1987, from C. O. Woody (FP&L) to US NRC, Subject: Spent Fuel Transfer.
11. U.S. Nuclear Regulatory Commission, March 29, 1987, from E. G. Tourigny (NRC) to C. O. Woody (FP&L), Subject: Request for Additional Information.
12. FP&L letter No. L-87-179, April 28, 1987, from C. O. Woody (FP&L) to US NRC, Subject: Spent Fuel Transfer - Occupational Exposures.
13. U.S. Nuclear Regulatory Commission, February 22, 1988, from H. N. Berkow (NRC) to C. O. Woody (FP&L), Subject: St. Lucie Units 1 and 2 - Environmental Assessment Regarding Transfer of Unit No. 1 Spent Fuel to Unit No. 2.

Also: Federal Register Notice, 53 FR 5845, February 26, 1988.

14. U.S. Nuclear Regulatory Commission, March 11, 1988, from E. G. Tourigny (NRC) to W. F. Conway (FP&L), Subject: St. Lucie, Unit No. 1 - Issuance of Amendment Re: Spent Fuel Pool Expansion.