October 22, 2001

Mr. J. A. Stall
Senior Vice President, Nuclear and
Chief Nuclear Officer
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: ST. LUCIE PLANT, UNIT NO. 2 - ISSUANCE OF AMENDMENT REGARDING CONTAINMENT DOORS OPEN DURING CORE ALTERATIONS (TAC NO. MB2275)

Dear Mr. Stall:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 120 to Facility Operating License No. NPF-16 for the St. Lucie Plant, Unit No. 2. This amendment consists of changes to the Technical Specifications (TS) in response to your application dated June 22, 2001, as supplemented August 24, 2001.

This amendment revises TS 3.9.4, “Containment Building Penetrations,” to allow the containment equipment door and the airlock doors to be open during core alterations and movement of irradiated fuel under administrative controls.

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

The Bases for TS 3.9.4 should be revised to reflect this change in accordance with the St. Lucie TS Bases Control Program.

Sincerely,

/RA/

Brendan T. Moroney, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-389

Enclosures:
1. Amendment No. 120 to NPF-16
2. Safety Evaluation

cc w/enclosures: See next page

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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. 120
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 June 22, 2001, as supplemented August 24, 2001, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, Facility Operating License No. NPF-16 is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and by amending paragraph 2.C.2 to read as follows:

   2. Technical Specifications

      The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 120, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of the date of issuance.

4. The licensee shall submit the revised Fuel Handling Accident analysis described in the request for amendment dated June 22, 2001, as supplemented August 24, 2001, with the next update of the Updated Final Safety Analysis Report, in accordance with 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 22, 2001

ATTACHMENT TO LICENSE AMENDMENT NO. 120

TO FACILITY OPERATING LICENSE NO. NPF-16

DOCKET NO. 50-389

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages	Insert Pages
3/4 9-4	3/4 9-4
	3/4 9-4a

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 120 TO FACILITY OPERATING LICENSE NO. NPF-16

FLORIDA POWER AND LIGHT COMPANY, ET AL.

ST. LUCIE PLANT, UNIT NO. 2

DOCKET NO. 50-389

1.0 INTRODUCTION

By letter dated June 22, 2001, as supplemented August 24, 2001, Florida Power and Light Company, et al. (the licensee), requested to amend Operating License NPF-16 for St. Lucie Unit 2, by revising Technical Specification (TS) 3.4, "Containment Building Penetrations." The proposed amendment would allow the equipment door and the airlock doors to be open during core alterations or movement of irradiated fuel under administrative controls.

The licensee's supplementary submittal dated August 24, 2001, did not affect the original proposed no significant hazards determination, or expand the scope of the request as noticed in the *Federal Register* on September 19, 2001 (66 FR 48287).

2.0 BACKGROUND

Containment barriers are provided for nuclear power plants as the final barrier of the defense-in-depth concept to protect against uncontrolled release of radioactivity to the environs. The containment function, in combination with other fission product barriers and accident mitigating systems, limits the radiological dose consequence of design-basis transients and accidents to less than the regulatory limits defined by Title 10 of the *Code of Federal Regulations* (10 CFR), Part 100.

Historic development of regulatory requirements for commercial nuclear power plant operations was based on the premise that most potential risk was due to operations at power. Consequently, protection of the public could be assured by designs and operations that conservatively bounded all conditions by achieving defense-in-depth for power operation. Fuel movement was recognized as a situation for which there was no corresponding power operation scenario and was judged as an area where additional regulatory protection was necessary. This is reflected in the TS, in that there are many containment requirements during power operation, but few requirements apply during Cold Shutdown and Refueling Modes outside of fuel handling and core alterations.

During the late 1980s and early 1990s, the U.S. Nuclear Regulatory Commission (NRC) staff and the nuclear industry realized that significant risk reduction could be achieved during shutdown operation. The staff responded with a rulemaking effort, and industry implemented voluntary initiatives to realize risk improvements. In recognition of these efforts, work to improve the TS was concentrated on power operation specifications, with the intention to

address shutdown once a rule was in place. The Commission, however, subsequently declined to issue a shutdown rule for comment.

Since that time, however, in response to industry proposals, the staff has had an opportunity to re-examine its policy on the need for containment closure during shutdown operations such as fuel handling. Several plants have issued amendments modifying the requirements on containment penetrations during core alterations or fuel movement. In an attempt to incorporate these changes uniformly into the Standard TS, the TS Task Force (TSTF) has proposed several TSTF items. For example, TSTF-68 would update the Standard TS to allow the containment personnel airlock doors to be open during core alterations and fuel movement, based on confirmatory dose calculations of a fuel handling accident as approved by the NRC staff, which indicate acceptable radiological consequences, and implementation of acceptable administrative procedures. These procedures would ensure that in the event of a refueling accident the open airlock can and will be promptly closed following containment evacuation. The time to close the door(s) shall be included in the confirmatory dose calculations. TSTF-312 would allow penetration flow paths providing direct access from the containment atmosphere to the outside atmosphere to be unisolated under administrative controls, which ensure that appropriate personnel are aware of the open status and specified individuals are designated and readily available to isolate the flow path in the event of a fuel handling accident (FHA). Finally, TSTF-51 would require containment closure only when moving recently irradiated fuel (i.e., fuel which has occupied part of a critical reactor within a period of days prior to the movement). The number of days would be determined by a plant-specific analysis.

In its submittal dated June 22, 2001, as supplemented August 24, 2001, the licensee proposes to revise the St. Lucie Unit 2 TS regarding Containment Building Penetrations. Specifically, TS 3.9.4.a. would be revised to read (with the proposed new requirements in bold):

a. The equipment door closed and held in place by a minimum of four bolts, **or the equipment door may be open if:**
   1) it is capable of being closed with four bolts within 30 minutes,
   2) the plant is in MODE 6 with at least 23 feet of water above the reactor pressure vessel flange, and
   3) a designated crew is available at the equipment door to close the door.

Also, TS 3.9.4.b. would be revised to read:

b. A minimum of one door in each airlock is closed, **or both doors of each containment airlock may be open if:**
   1) at least one door of each airlock is capable of being closed,
   2) the plant is in MODE 6 with at least 23 feet of water above the reactor pressure vessel flange, and
   3) a designated individual is available outside each open airlock to close the door.

The capability to close a containment airlock door or the equipment door includes the requirement that the door is capable of being closed and that any cables or hoses across the door have quick-disconnects to ensure the door is capable of being closed in a timely manner. Administrative requirements will be established for the responsibilities and appropriate actions of the designated individuals in the event of an FHA inside containment. These requirements will include the responsibility to be able to communicate with the control room, to ensure that the doors are capable of being closed, and to close the doors in the event of an FHA. These administrative controls will ensure containment closure would be established in a timely manner in the event of an FHA inside containment.

The licensee has provided a revised design-basis analysis for the FHA to include the effects of an FHA inside containment. Dose calculations have been provided to show that adherence to the proposed conditions will not result in radiological releases in excess of regulatory limits.

The revision to TS 3.9.4.b is identical to that approved by the NRC for St. Lucie Unit 1 in TS Amendment No. 172, issued February 27, 2001. Both changes are consistent with TS amendments previously approved by the NRC for other plants. Since St. Lucie Unit 2 does not have Standard TS, the amendment request did not request consideration in accordance with any TSTF items. However, the proposed changes are consistent with the conditions of TSTF-68 and TSTF-312, and they are more restrictive than TSTF-51, because they place restrictions on movement of all irradiated fuel, not just recently irradiated fuel.

3.0 EVALUATION

The evaluation of the licensee's proposed TS change focused on the dose calculations associated with the revised FHA analysis, and the adequacy of the administrative controls proposed.

3.1 Dose Calculation

The containment airlock doors and containment equipment door are parts of the containment pressure boundary. The current St. Lucie TS require the containment equipment door and a minimum of one door in each airlock to be closed during core alterations and movement of irradiated fuel assemblies within the containment. The requirements on containment airlock and equipment door closure ensure that any potential release of fission products from the containment to the environment as a result of a postulated design-basis accident is minimized. During core alterations or movement of irradiated fuel assemblies within containment, the most limiting radiological consequences from a design-basis accident consideration result from an FHA.

The licensee submitted a radiological consequence analysis resulting from an FHA with the containment equipment door and containment airlock doors open during core alterations and movement of irradiated fuel in containment, and concluded that the release of fission products will result in doses that are well within the dose guidelines specified in 10 CFR Part 100 for the exclusion area boundary (EAB) and within the acceptable dose criteria specified in Standard Review Plan (SRP) Section 6.4 and in 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 19 for the control room operator.

The licensee reached this conclusion:

(1) assuming one whole fuel assembly with the highest radial peaking factor of 1.65 is damaged releasing its entire fission products in the fuel gap into the spent fuel pool and reactor cavity water,
(2) using a fission product decay period of 72 hours (time period from the reactor shutdown to the first fuel movement) consistent with TS Section 3.9.3,
(3) assuming an overall effective decontamination factor of 100 for the iodine isotopes in the spent fuel pool and reactor cavity with minimum water depth of 23 feet,
(4) using conservative Murphy and Campe method referenced in SRP Section 6.4 in determining control room atmospheric relative concentrations (χ/Q values),
(5) using the conservative guidance provided in Regulatory Guide 1.25, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors," for the fuel gap activity in the damaged fuel rods,
(6) using the bounding fission product inventory in a peak-power fuel assembly with 58 gigawatt days per metric ton of uranium, and
(7) using conservative dose conversion factors published in International Commission on Radiation Protection (ICRP) Publication II, "Recommendations of the International Commission on Radiation Protection," A Report of Commission 11 on Permissible Dose for Internal Radiation (1959).

To verify the licensee's analyses, the staff performed a confirmatory radiological consequence calculation. In its dose calculation, the staff assumed all fission products are released to the environment from the containment within 2 hours following the postulated FHA. Neither the licensee nor the staff calculation took credit for the closure of containment airlock doors or the containment equipment door during the release period. The staff's analysis confirmed the licensee's conclusion that the radiological consequences would be well within the dose guideline values specified in 10 CFR Part 100 for the EAB and within the dose acceptance criteria specified in SRP 6.4 for the control room.

The licensee used a maximum average core burnup of 41.35 gigawatt days per metric ton of uranium (GWD/MTU) in determining the fission product inventory (noble gases, iodine, and alkali metals) in the fuel gap. The licensee stated that this value corresponds to a maximum average discharge fuel burnup of 55 GWD/MTU and the peak assembly fuel burnup of approximately 58 GWD/MTU. To be more conservative, the licensee added 30 percent to the bounding fission product inventory in a peak-power fuel assembly with 58 GWD/MTU in calculating the radiological consequences of the postulated FHA. The staff finds that the conservative fission product inventory values used by the licensee for the postulated FHA are acceptable.

For the control room habitability assessment, the licensee assumed without verification, an unfiltered control room air inleakage rate of 100 standard cubic feet per minute (scfm). In its radiological consequence analyses, the licensee used the most conservative dose conversion factors provided in ICRP Publication II instead of those listed in Federal Guidance Report (FGR) No.11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose

Conversion Factors for Inhalation, Submersion, and Ingestion (1988)." The dose conversion factors in FGR No. 11 are acceptable to the staff and they are lower than those listed in ICRP Publication 2. The staff's confirmatory assessment indicates that the control room operator dose will still be within the dose acceptance criteria specified in SRP Section 6.4, with a much greater control room unfiltered air inleakage rate (up to 500 scfm) using the dose conversion factors in FGR. Therefore, the staff finds the 100 scfm unfiltered inleakage rate assumed by the licensee to be acceptable. However, the staff's acceptance of 100 scfm unfiltered inleakage rate is only limited to the design-basis FHA.

The staff is currently working toward resolving the generic issues related to control room habitability, with a particular focus on the validity of the control room unfiltered air infiltration rates that are commonly assumed in licensees' analyses of control room habitability. Therefore, the staff's acceptance of the licensee's unfiltered air inleakage assumption of 100 scfm for the postulated FHA does not preclude any future generic regulatory actions that may result from the forthcoming resolution of generic control room habitability issues.

For the atmospheric relative concentrations (χ/Q values) for the EAB and control room air intake, the licensee used the current design-basis values in the St. Lucie Updated Final Safety Analysis Report (UFSAR). The licensee used the conservative Murphy and Campe method to develop the control room χ/Q values in the St. Lucie UFSAR. The staff finds that the licensee's χ/Q values used in the radiological consequence analyses are acceptable.

The staff reviewed the licensee's analysis and finds that the major parameters and assumptions used for the radiological consequence analysis for the postulated FHA are conservative and consistent with the guidelines provided in Regulatory Guide 1.25 and SRP Section 6.4. Table 1 summarizes the results of the licensee's radiological consequence analyses for the EAB and control room. Table 2 lists the major assumptions and parameters used by the licensee in its radiological consequence calculations and by the staff in its confirmatory dose calculations. Although the staff performed independent calculations to confirm the licensee's results, the staff's acceptance is based on the licensee's analyses.

The radiological consequences calculated by both the licensee and the staff for the EAB are well within the dose acceptance criteria specified in 10 CFR Part 100. The dose to the control room operator calculated by the staff and the licensee are also within the acceptable dose criteria specified in SRP Section 6.4 and in GDC 19. Although the staff performed independent calculations to confirm the licensee's results, the staff's acceptance is based on the licensee's analyses. Based on radiological dose consequences, the staff concludes that the license amendment requested by the licensee to have both doors of each containment airlock and the containment equipment door open during core alterations or movement of irradiated fuel in containment is acceptable.

3.2 Administrative Controls

The licensee has provided the following justifications for the use of the proposed administrative controls. The proposed change contains restrictions on allowing the containment equipment door and both doors of each containment airlock to be open, provided that at least one door on each open containment airlock and the equipment door will be available to perform its safety function.

The restriction to be in MODE 6 with at least 23 feet of water above the fuel provides sufficient time to respond to a loss of shutdown cooling, ensures a minimum water level exists to provide sufficient shielding during fuel movement, and reduces the radioactivity released in the event of a fuel handling accident. The capability to close the containment equipment door and a door of each open containment airlock includes the requirement that the doors are capable of being closed and that any cables or hoses crossing through the doors have quick-disconnects to ensure the doors are capable of being closed in a timely manner. Dedicated personnel must be assigned to close the doors. The containment equipment door will have a closure crew available to close this door. The closure crew is trained for timely equipment door closure. The door can be closed without electrical power available and within 20 minutes of notification. The equipment door closure crew currently provides this function during Reactor Coolant System reduced inventory operations in accordance with the licensee's commitments made in response to Generic Letter (GL) 88-17. Additionally, individuals will be stationed at the airlock doors. They will use controls and procedures similar to those already in place for St. Lucie Unit 1, to allow both doors of the personnel airlock to be open during core alterations, as approved by the NRC in Amendment No. 172 (February 27, 2001).

From a practical standpoint, the current TS 3.9.4 will not prevent all radioactive releases from the containment following an FHA. During a refueling outage, other work inside containment does not stop during fuel movement or core alterations. There may be a number of people in containment during these activities. Licensed operators moving the reactor fuel are in constant communications with the control room and are procedurally required to inform the control room to sound the containment evacuation alarm in the event of an FHA. The personnel inside the reactor containment building will then evacuate. This requires that personnel operate the personnel airlock doors to exit the containment. The airlock doors would be cycled several times to evacuate personnel from containment. With each containment airlock cycle, more containment air would be released. Also, personnel waiting for access to the airlock would be exposed to adverse radiological conditions for a longer time. Under the proposed change, the containment could be evacuated more quickly with containment integrity being established subsequently in a timely manner. This could result in lower radiological releases and reduced dose to workers.

Based on the above, the staff finds that the proposed administrative controls provide reasonable assurance of timely closure of containment penetrations following an FHA, are consistent with administrative and procedural controls already in effect, provide the potential to limit radiological releases and personnel exposure, provide an adequate means for supporting the proposed TS change, and are, therefore, acceptable.

3.3 Bases for Section 3.9.4

The licensee proposes to revise the Bases for TS 3.9.4 to add the following paragraph:

> These restrictions include the administrative controls to allow the opening of both doors of each airlock (emergency and/or personnel) and the containment equipment door during CORE ALTERATIONS or movement of irradiated fuel in the containment provided that: a) at least one door of each airlock is capable of being closed; b) the plant is in MODE 6 with at least 23 feet of water above the reactor pressure vessel flange; c) a designated individual is available outside each open airlock to close the door; d) the

equipment door can be closed with four bolts within 30 minutes; and e) an equipment door closure crew is available to close the equipment door. The capability to close the containment equipment door or the open containment airlocks include requirements that the equipment door or one of the airlock doors of each open airlock is capable of being closed and that any cables or hoses across the opening have quick disconnects to ensure the door is capable of being closed in a timely manner. The 30-minute closure time for the equipment door is considered to start when the control room determines the need to establish containment integrity. This 30-minute assumption is significantly less than the 2-hour closure time assumed in the revised fuel handling accident analysis.

The proposed revision to the Bases accurately reflects the proposed changes to TS 3.9.4 and should be incorporated in accordance with the licensee's TS Bases Control Program.

4.0 STATE CONSULTATION

Based upon a letter dated March 8, 1991, from Mary E. Clark of the State of Florida, Department of Health and Rehabilitative Services, to Deborah A. Miller, Licensing Assistant, U.S. NRC, the State of Florida does not desire notification of issuance of license amendments.

5.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration and there has been no public comment on such finding (66 FR 48287, dated September 19, 2001). Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: J. Y. Lee
B. Moroney

Date: October 22, 2001

TABLE 1

Radiological Consequences for Fuel Handling Accident (rem)

	Thyroid	Whole body
Exclusion Area Boundary	61.6	0.75
Control Room	9.39	0.02
Dose Acceptance Criteria:		
Exclusion area boundary[1]	75	1.25
Control Room[2]	30	5

[1] From SRP Section 15.7.4
[2] From SRP Section 6.4

Table 2
Parameters and Assumptions Used in
Radiological Consequence Calculations
Fuel Handling Accident

Parameter	Value
Radial peaking factor	1.65
Fission product decay period	72 hours
Number of fuel assembly	1
Fuel pool/reactor cavity water depth	23 ft
Fuel gap fission product inventory	
Noble gases excluding Kr-85	10%
Kr-85	30%
Iodine except I-131	12%
I-131	10%
Fuel pool decontamination factors	
Iodine	100
Noble gases	1
Control room	
Unfiltered infiltration	100 scfm
Recirculation flow through charcoal adsorber	2000 scfm
Makeup air flow	350 scfm
Charcoal adsorber iodine removal efficiency	90%
Atmospheric relative concentrations (sec/m)	
Exclusion area boundary	
0 to 2 hours	1.64E-4
Control room	
0 to 8 hours	5.00E-4
8 to 24hours	3.00E-4
24 to 96 hours	1.17E-4
96 to 720 hours	3.35E-5
Duration of fission product release	2 hours