

January 28, 2008

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: TURKEY POINT UNITS 3 AND 4 - ISSUANCE OF AMENDMENTS REGARDING TECHNICAL SPECIFICATIONS 3.1.3.2, "POSITION INDICATING SYSTEMS - OPERATING," TO ALLOW FOR THE USE OF AN ALTERNATE METHOD TO MONITOR ROD POSITION FOR A ROD WITH AN INOPERABLE ANALOG ROD POSITION INDICATION (TAC NO. MD7349 AND MD7350)

Dear Mr. Stall:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 237 to Renewed Facility Operating License No. DPR-31 and Amendment No. 232 to Renewed Facility Operating License No. DPR-41 for the Turkey Point Plant, Units Nos. 3 and 4, respectively.

The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated November 12, 2007. The amendments revise TS 3.1.3.2, "The Analog Rod Position Indication System - Operating," to allow for the use of an alternate method, other than the movable incore detectors, to monitor the position of a control rod or shutdown rod in the event of a problem with the analog rod position indication (analog RPI) system. The use of this alternate method will reduce the required frequency of flux mapping using the movable incore detectors to determine the position of the non-indicating rod, thus reducing the wear on the movable incore detector system that is also used to complete other required TS surveillances.

A copy of the related safety evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

**/RA/**

Brenda L. Mozafari, Senior Project Manager  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosures: 1. Amendment No. 237 to DPR-31  
2. Amendment No. 232 to DPR-41  
3. Safety Evaluation

cc w/enclosures: See next page



Florida Power and Light Company

**TURKEY POINT PLANT, UNITS 3 & 4**

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FLORIDA POWER AND LIGHT COMPANY

DOCKET NO. 50-250

TURKEY POINT PLANT UNIT NO. 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 237  
Renewed License No. DPR-31

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Florida Power & Light Company (the licensee) dated November 12, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.



2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Renewed Facility Operating License No. DPR-31 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 237, are hereby incorporated into this renewed license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into this renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

**/RA/**

Thomas H. Boyce, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Operating License and  
Technical Specifications

Date of Issuance: January 28, 2008



FLORIDA POWER AND LIGHT COMPANY

DOCKET NO. 50-251

TURKEY POINT PLANT UNIT NO. 4

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 232  
Renewed License No. DPR-41

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Florida Power & Light Company (the licensee) dated November 12, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.



2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Renewed Facility Operating License No. DPR-41 is hereby amended to read as follows:

(B) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 232, are hereby incorporated in the license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into the license.

The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

**/RA/**

Thomas H. Boyce, Chief  
Plant Licensing Branch II-2  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Technical Specifications

Date of Issuance: January 28, 2008



ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 237 RENEWED FACILITY OPERATING LICENSE NO. DPR-31

AMENDMENT NO. 232 RENEWED FACILITY OPERATING LICENSE NO. DPR-41

DOCKET NOS. 50-250 AND 50-251

Replace Page 3 of Renewed Operating License DPR-31 with the attached Page 3

Replace Page 3 of Renewed Operating License DPR-41 with the attached Page 3.

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

Remove pages

3/4 1-20  
3/4 1-20a

Insert pages

3/4 1-20  
3/4 1-20a



SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 237 TO 232  
RENEWED FACILITY OPERATING LICENSE NO. DPR-31 AND  
AMENDMENT NO. 232 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-41  
FLORIDA POWER AND LIGHT COMPANY  
TURKEY POINT UNIT NOS. 3 AND 4  
DOCKET NOS. 50-250 AND 50-251

1.0 INTRODUCTION

By application dated November 12, 2007, the Florida Power and Light Company (FPL, the licensee) requested changes to the Technical Specifications (TSs) for the Turkey Point Plant, Units 3 and 4 (TP). The requested amendments would revise TS 3.1.3.2, "The Analog Rod Position Indication System - Operating," to allow for the use of an alternate method, other than the movable incore detectors, to monitor the position of a control rod or shutdown rod in the event of a problem with the analog rod position indication (analog RPI) system. The use of this alternate method will reduce the required frequency of flux mapping using the movable incore detectors to determine the position of the non-indicating rod, thus reducing the wear on the movable incore detector system that is also used to complete other required TS surveillances.

2.0 REGULATORY EVALUATION

The objectives of the rod control system and rod position indication system are to ensure that control rod alignment and insertion limits are maintained. Operators utilize the analog RPI system to monitor the positions of the rods to establish that the plant is operating within the bounds of the accident analysis assumptions. Operability, including position indication, of the control rods and shutdown rods is an initial condition assumption in all safety analyses that assume rod insertion upon a reactor trip. Maximum rod misalignment is an initial condition assumption in the safety analysis that directly affects core power distributions and assumptions of available shutdown margin (SDM). Control rod inoperability or misalignment may cause increased power peaking due to the asymmetric reactivity distribution and a reduction in the total available rod worth for reactor shutdown.

General Design Criterion (GDC) 13 in Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Appendix A, specifies that instrumentation shall be provided to monitor variables and systems over their operating ranges during normal operation, anticipated operational occurrences, and accident conditions. TP TS 3.1.3.2 requires operability of the shutdown and control rod analog RPI system and the bank demand position indication system, and thereby

ensures compliance with the control rod alignment and insertion limits. The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the licensee's license amendment request (LAR) to verify that the licensing basis criteria stated in the Updated Final Safety Analysis Report (UFSAR) continues to be met with the proposed changes.

### 3.0 TECHNICAL EVALUATION

The licensee proposed the following changes to TS 3.1.3.2, Action a:

- Existing Action a.2 will be renumbered to become Action a.3. This is an editorial change which is acceptable to the NRC staff.
- Introduce a new Action a.2 as the alternate means for rod position monitoring. The proposed alternate means described in Action a.2 is composed of three elements; a.2.a), a.2.b), and a.2.c), as follows:
  2. a) Determine the position of the non-indicating rod indirectly by the movable incore detectors within 8 hours and once every 31 Effective Full Power Days thereafter, and within 1 hour if rod control system parameters indicate unintended movement, or if the rod with an inoperable position indicator is moved greater-than 12 steps, and
  - b) Review the parameters of the rod control system for indications of unintended rod movement for the rod with an inoperable position indicator within 8 hours and once per 8 hours thereafter, and
  - c) Determine the position of the non-indicating rod indirectly by the movable incore detectors prior to increasing THERMAL POWER above 50% RATED THERMAL POWER and within 8 hours of reaching 100% RATED THERMAL POWER, or
- Add the following footnote regarding the proposed alternate method a.2:

Rod position monitoring by Actions 2.a), 2.b), and 2.c) may only be applied to one inoperable rod position indicator per unit and shall only be allowed until an entry into MODE 3.

Action a.2.a) includes four distinct requirements for verification of the non-indicating rod position using the movable incore detectors: (1) initial verification within 8 hours of the inoperability of the analog RPI, (2) re-verification once every 31 Effective Full Power Days thereafter, (3) verification within 1 hour if rod control system parameters indicate unintended rod movement, and (4) verification within 1 hour if the rod with an inoperable position indicator is intentionally moved greater than 12 steps. An unintended rod movement would be defined as the release of the stationary gripper when no action was demanded either manually or automatically from the rod control system, or a rod motion in a direction other than the direction demanded by the rod control system. An intended rod movement occurs when either an operator manually demands motion from the rod control system, or a temperature or power mismatch demands motion while the rod control system is being controlled automatically. Therefore, any indication of intentional rod movement of greater than 12 steps or unintentional rod movement will require verification of the rod position using the movable incore detectors within 1 hour, which ensures that any rod movement of a non-indicating rod is identified in a timely manner, and that the position of the

non-indicating rod is identified during power changes that result from unit trips or power reductions. The 8-hour completion time for initial verification of rod position remains the same as required by the existing method using the movable incore detector specified in Action a.1. With respect to the 31 Effective Full Power Days verification time interval, the licensee cites the concern over the potential wear and failure of the movable incore detector system caused by repeated use over a long period of time, and therefore the 31-day interval is chosen to coincide with the frequency of other surveillance requirements using the movable incore detectors. The 31-day verification interval is also supplemented by Action a.2.b), using an alternate means to monitor the parameters of the rod control system for indications of rod movement.

Action a.2.b) uses an alternate means to monitor whether the non-indicating rod has moved from the position last determined using the movable incore detectors within 8 hours and once per 8 hours thereafter. The November 12, 2007, LAR provided a detailed description of the alternate method, including components relied upon in the alternate monitoring method. The alternate method, at present, will monitor the rod control system stationary gripper coil current for indications of rod movement for the non-indicating rod.

The current rod control power cabinet design uses a resistor to monitor the coil current. The gripper coil current, measured as an equivalent voltage, will be monitored on an existing control room multi-channel recorder mounted on a vertical panel within the control room surveillance area. A spare channel will be used to display the gripper coil current for a non-indicating rod. The recorder has alarm indication in the form of a display window, which will be programmed for a high and low voltage alarm. Additionally, the recorder high and low voltage alarm will provide an output to a control room annunciator window to indicate a potential rod unintended movement. The recorder and annunciator are indicative of gripper coil change of state. The alternate method is an improvement over the periodic movable in-core detector method because it provides continuous monitoring and alarming capabilities in addition to the once per 8-hour review of the rod control system parameters for unintended rod movement; thus, this provides the opportunity for improved operator response time.

Action a.2.c) consists of two distinct requirements for verification of non-indicating rod position using the movable incore detectors: (1) prior to increasing thermal power above 50-percent rated thermal power (RTP), and (2) within 8 hours after reaching 100 percent RTP. These two requirements will verify the non-indicating rod position prior to power exceeding 50 percent RTP and after reaching 100-percent RTP. Therefore, Action a.2.c) confirms the position of the non-indicating rod to ensure that power distribution requirements are not violated and to establish a starting point for the proposed alternate monitoring actions.

The rod misalignment event is not analytically presented in the Turkey Point's UFSAR; however, the NRC staff reviewed the rod misalignment event, from the UFSAR, of another pressurized-water reactor plant similar in configuration to Turkey Point. With the assumption that the reactor is at rated full power steady state condition with no occurrence of excursion for core temperature, pressure, or flow, the two most bounding rod misalignment events were analyzed: Case 1 where a single rod cluster control assembly (RCCA) is stuck fully withdrawn out of the core and Case 2 where a single RCCA is stuck fully inserted in the core.

In addition, it was assumed for Case 1 that the most reactive bank RCCA is fully withdrawn from the core and that the most reactive bank RCCA is fully inserted in the core for Case 2. Analytical results indicate that Case 2 represents the most limiting case. The peak pellet linear heat

generation was below the threshold limit so that fuel centerline melt does not occur. Since no fuel failures were calculated to occur, there is no radiological release consequent to this event.

Thus, the result of the analysis is in conformance with the acceptance criteria for Condition II events, which are faults of moderate frequency expected to occur on a frequency of once per year during plant operation. Therefore, the NRC staff finds the results applicable and acceptable to TP.

The staff evaluated the effect of using the alternate monitoring method on the design basis events of a rod drop or rod misalignment event during power operation. The ability to immediately detect a rod drop or misalignment is not directly provided by the movable incore detectors used in current Action a.1, or by the alternate monitoring method by monitoring the rod control system parameters. However, should there be a full-rod drop of a control or shutdown rod, it will be immediately detectable by means other than the position indication system.

Independent indication of a dropped rod is obtained using the excore power range signals. Additionally, a negative reactivity insertion corresponding to the reactivity worth of a full-rod drop will cause a change in core parameters including core average temperature and axial flux. Rod misalignment will also be detectable by other means, such as axial flux deviations or a channel deviation alarm. Therefore, the likelihood of an undetected rod drop or misalignment is considered negligible while using the alternate monitoring method.

In addition, the limits of Limiting Condition for Operation (LCO) 3.1.3.1 on shutdown or control rod alignment of 12 steps ensure that the assumptions in the safety analyses will remain valid and that the assumed negative reactivity will be available to be inserted during a plant shutdown. Therefore, the NRC staff finds that the design basis analyses of a rod drop or misalignment remain acceptable.

While operating in Modes 1 and 2, the shutdown margin (SDM) is ensured by verifying compliance with the control rod bank limits of TS 3.1.3.6. The surveillance requirement is performed with the Rod Insertion Limit Monitor, which relies on the group step counter demand position indication and is unaffected by an inoperable analog RPI for a control rod. However, whenever the Rod Insertion Limit Monitor is inoperable, the analog RPI for individual rods can be used to demonstrate compliance with TS 3.1.3.6 consistent with the surveillance requirement.

The alternate monitoring method, which will monitor the stationary gripper coil for the control rod with an inoperable analog RPI, will provide assurance that the position has not changed and remains within the allowed misalignment for the affected control rod and the control rod bank insertion limits of TS 3.1.3.6. In addition, while in Modes 1 and 2, verification of compliance with the required shutdown margin relies upon the rods being capable of insertion. This is verified by periodic rod exercise consistent with TS surveillance requirements. During the performance of the rod exercise with the affected rod, flux traces will be performed after rod insertion and withdrawal to confirm the position of the rod with an inoperable analog RPI. Therefore, insertion status will be confirmed and the affected rod can continue to be credited in the verification of the SDM. Thus, the NRC staff concludes that there are adequate controls, while operating in Modes 1 and 2, to provide reasonable assurance that the plant will continue to achieve subcriticality during a reactor trip.

In operational Modes 3, 4, and 5, the rod with the inoperable analog RPI cannot be easily determined while using Required Actions a.1 (movable incore detector method) or a.2 (alternate

monitoring method). In addition, the rod bottom indication will not be available for the rod with an inoperable analog RPI to verify full rod insertion; thus, the non-indicating rod would be assumed to be incapable of providing negative reactivity following a reactor trip and would not be credited in the SDM calculation. Therefore, the SDM is ensured by considering Reactor Coolant System (RCS) boron concentration, rod position, RCS average temperature, fuel burnup, xenon concentration and samarium concentration. To compensate for the non-indicating rod, the boron concentration requirements will be increased to allow the withdrawn worth of the rod assuming this control rod has the highest reactivity allowance.

SDM calculations are performed in accordance with plant procedure 0-OP-028.2, which will be revised to ensure that the SDM limits continue to be met. Also, TP has procedures in place that address the condition in which more than one rod may not fully insert on a reactor trip to ensure that the reactor is safely shut down. In summary, the non-indicating rod would be treated as if it has not fully inserted on a reactor trip and operators will take actions as currently driven by procedures to safely shut down the reactor, including initiation of emergency boration if two or more rods are not indicating fully inserted. Therefore, while operating in Modes 3, 4, and 5, the NRC staff concludes that there are adequate controls to provide reasonable assurance that the plant will continue to achieve subcriticality upon a reactor shutdown.

As a result, the NRC staff concludes that the use of an alternate method for monitoring the non-indicating rod position provides an acceptable process for knowing the non-indicating rod position and therefore continues to meet GDC 13.

The footnote to TS LCO 3.1.3.2 Action a.2 clearly limits the conditions for the use of the alternate rod position monitoring provisions. It specifically limits the use of these provisions to only one inoperable rod position indicator, thus ensuring sufficient rod position monitoring on a real time basis to verify core conditions during normal operations and accident conditions. The duration for Action a.2 shall only be allowed until entry into Mode 3. Therefore, the repair of the analog RPI must be performed as soon as reasonable conditions exist to safely perform the activities and repeated use of this provision is not acceptable in lieu of the necessary repair.

The licensee will treat the proposed alternate monitoring method as a temporary alteration (TA) in accordance with plant approved procedures. A 10 CFR 50.59 screening review will be performed whenever the TA is implemented.

The NRC staff concludes that the alternate monitoring method, which provides continuous monitoring, and the incore detector method, which provides monitoring on an intermittent basis, in conjunction with each other, provides an overall improvement to the monitoring process associated with an inoperable analog RPI, which in turn should improve the operator response time to a rod movement event involving a rod with an inoperable analog RPI, thus, improving the margin of safety. Therefore, from the evaluation described above, the NRC staff has determined that the proposed LAR is acceptable based on the following reasons: (1) the TS changes provide adequate controls to ensure that the rod position is known, (2) any rod misalignment is detectable for the one rod with an inoperable analog RPI, (3) operators will take appropriate action to ensure that the rod stays within its alignment limit and that SDM is maintained, and (4) there is an improvement in the margin of safety associated with an inoperable analog RPI. Furthermore, the NRC staff agrees with the licensee that an inoperable analog RPI should be repaired during an entry into Mode 3 when the repair can be safely performed.

#### 4.0 STATE CONSULTATION

Based upon a letter dated May 2, 2003, from Michael N. Stephens of the Florida Department of Health, Bureau of Radiation Control, to Brenda L. Mozafari, Senior Project Manager, U.S. Nuclear Regulatory Commission, the State of Florida does not desire notification of issuance of license amendments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

These amendments involve a change in the 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 (72 FR 67323). Accordingly, these amendments meet 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 the amendments.

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

#### 7.0 REFERENCES

1. FPL, letter L-2007-175, "Turkey Point Units 3 and 4 Docket Nos. 50-250 and 50-251, Proposed License Amendment Request - LAR 194 Rod Position Indication Systems," dated November 12, 2007.
2. FPL, letter L-2006-209, "Turkey Point Unit 3 Docket No. 50-250, Proposed License Amendment Inoperable Rod Position Indication," dated September 8, 2006.
3. Updated Final Safety Analysis Report (UFSAR), Turkey Point Units 3 and 4, Docket Nos. 50-250 and 50-251.
4. NUREG-1431, "Standard Technical Specifications, Westinghouse Plants," Vol. 1 and 2, Revision 3.1, dated December 1, 2005.
5. Updated Final Safety Analysis Report (UFSAR), H. B. Robinson Steam Electric Plant, Unit 2, Docket No. 50-261.

Principal Contributor: John Budzynski

Date: January 28, 2008