



May 24, 2011

L-2011-200  
10 CFR 50.90

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

Re: St. Lucie Plant Unit 1  
Docket No. 50-335  
Renewed Facility Operating License No. DPR-67

Response to NRC Fire protection Branch Request for Additional Information  
Regarding Extended Power Uprate License Amendment Request

References:

- (1) R. L. Anderson (FPL) to U.S. Nuclear Regulatory Commission (L-2010-259), "License Amendment Request for Extended Power Uprate, November 22, 2010, Accession No. ML103560419.
- (2) Email from T. Orf (NRC) to C. Wasik (FPL), "St. Lucie Unit 1 EPU – request for additional information (Fire Protection)," April 27, 2011, Accession No. ML111170274.

By letter L-2010-259 dated November 22, 2010 [Reference 1], Florida Power & Light Company (FPL) requested to amend Renewed Facility Operating License No. DPR-67 and revise the St. Lucie Unit 1 Technical Specifications (TS). The proposed amendment will increase the unit's licensed core thermal power level from 2700 megawatts thermal (MWt) to 3020 MWt and revise the Renewed Facility Operating License and TS to support operation at this increased core thermal power level. This represents an approximate increase of 11.85% and is therefore considered an Extended Power Uprate (EPU).

By email from the NRC Project Manager dated April 27, 2011 [Reference 2], additional information related to fire protection was requested by the NRC staff in the Fire Protection Branch (AFPB) to support their review of the EPU LAR. The request for additional information (RAI) identified four questions. The response to these RAIs is provided in Attachment 1 to this letter.

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In accordance with 10 CFR 50.91(b)(1), a copy of this letter is being forwarded to the designated State of Florida official.

This submittal does not alter the significant hazards consideration or environmental assessment previously submitted by FPL letter L-2010-259 [Reference 1].

This submittal contains no new commitments and no revisions to existing commitments.

Should you have any questions regarding this submittal, please contact Mr. Christopher Wasik, St. Lucie Extended Power Uprate LAR Project Manager, at 772-429-7138.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed on *24-May-2011*

Very truly yours,



Richard L. Anderson  
Site Vice President  
St. Lucie Plant

Attachment

cc: Mr. William Passetti, Florida Department of Health

### **Response to Request for Additional Information**

The following information is provided by Florida Power & Light in response to the U. S. Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI). This information was requested to support Extended Power Uprate (EPU) License Amendment Request (LAR) for St. Lucie Nuclear Plant Unit 1 that was submitted to the NRC by FPL via letter (L-2010-259), dated November 22, 2010, Accession Number ML103560419.

In an email dated April 27, 2011 from NRC (Tracy Orf) to FPL (Chris Wasik), Accession Number ML111170274, Subject: St. Lucie Unit 1 EPU – request for additional information (Fire Protection), the NRC requested additional information regarding FPL's request to implement the EPU. The RAI consisted of four (4) questions from the NRC's Fire Protection Branch (AFPB). These four RAI questions and the FPL responses are documented below.

#### **AFPB-1**

**Attachment 1 to Matrix 5 ("Supplemental Fire Protection Review Criteria, Plant Systems"), of NRR RS-001, Revision 0, Review Standard for Extended Power Uprates, states that "power uprates typically result in increases in decay heat generation following plant trips. These increases in decay heat usually do not affect the elements of a fire protection program related to (1) administrative controls, (2) fire suppression and detection systems, (3) fire barriers, (4) fire protection responsibilities of plant personnel, and (5) procedures and resources necessary for the repair of systems required to achieve and maintain cold shutdown. In addition, an increase in decay heat will usually not result in an increase in the potential for a radiological release resulting from a fire. However, the licensee's LAR should confirm that these elements are not impacted by the extended power uprate."**

The NRC staff notes that license amendment request (LAR), Attachment 5, to L-2010-259, "Licensing Report," Section 2.5.1.4.2.3, on page 2.5.1.4-4, specifically addresses only items (1) through (3) above. Provide statements to address items (4) and (5).

#### **Response**

##### **Item (4): Fire protection responsibilities of plant personnel:**

As addressed in Licensing Report (LR) Section 2.5.1.4.1, the Fire Protection Plan establishes the procedures, equipment, and personnel required to implement the Fire Protection Program at St. Lucie Unit 1. The Fire Protection Plan also describes the fire protection responsibilities of plant management personnel, the Shift Manager, the Fire Protection Supervisor, the Fire Protection Coordinator, the Fire Inspector, the Fire Brigade Leader, and the Fire Brigade. Procedures are provided in the emergency plans to define responsibilities of other plant personnel during a fire. The fire protection responsibilities of the above-identified plant personnel are not affected by the EPU.

Item (5): Procedures and resources necessary for the repair of systems required to achieve and maintain cold shutdown:

St. Lucie Unit 1 does not credit any repairs in order to achieve and maintain cold shutdown at current conditions. No repairs are credited in order to achieve and maintain cold shutdown at EPU conditions; therefore, no repair procedures are required.

**AFPB-2**

LAR, Attachment 5, to L-2010-259, Section 2.5.1.4.2.3., on page 2.5.1.4-5, states that, *“...The impact of plant modifications being implemented in support of EPU (e.g., upgrade of main transformers with new coolers) on the FPP will be addressed in accordance with the plant change/modification process...”*

**Are there fire protection program plant modifications planned (e.g., adding new cable trays, or re-routing of existing cables, or increases in combustible loading affecting fire barrier ratings, or changes to administrative controls) at EPU conditions? Clarify whether this request involves plant modifications, or changes to the fire protection program. If any, identify proposed modifications and discuss the impact of these modifications on the plant’s compliance with the fire protection program licensing basis, Title 10 of the Code of Federal Regulations (10 CFR), Section 50.48, or applicable portions of 10 CFR 50, Appendix R.**

**Response**

There are no fire protection program (FPP) plant modifications planned in support of EPU that impact compliance with the FPP licensing basis, 10 CFR50.48 or applicable portions of 10 CFR 50 Appendix R. This license amendment request does not involve changes to the fire protection program.

Modifications being implemented for EPU are evaluated in accordance with the engineering change process to assure continued compliance with the site’s fire protection program licensing basis. Although features of the fire protection program, such as combustible material loading, fire barrier rating, and administrative controls, may be impacted by a proposed design change, the engineering change process requires that proposed modifications be evaluated against and comply with fire protection program requirements.

EPU modifications do not reduce the effectiveness of fire protection for facilities, systems, and equipment, and do not adversely affect the capability of existing fire protection features and safe-shutdown following a fire. The EPU modifications do not result in adverse changes to the fire protection program’s compliance with 10 CFR 50.48, or applicable portions of 10 CFR 50, Appendix R.

### AFPB-3

The staff notes that Attachment 5, to L-2010-259, Section 2.5.1.4.2.3., on page 2.5.1.4-13, states that *"...The above manual actions and manual action time limits following a fire have been reviewed and are not affected for EPU conditions, which include increased decay heat loads. Assumptions of time response considered in performing these operator actions do not change as a result of EPU. No new operator actions are required to be added to the SSA in support of the EPU . . ."*

Discuss (1) the operator action response time, including any assumptions that may have been made in determining that the operator manual actions are feasible and reliable and can be accomplished to achieve and maintain hot and then cold shutdown conditions and (2) how additional heat in the plant environment from the EPU will not interfere with required operator manual actions being performed at their designated time.

### Response

#### 1. Operator Manual Actions

The primary affect of operating at uprate conditions is the increased decay heat in the reactor core post plant trip. Therefore, operator manual actions with allowable times that are affected by decay heat levels are the actions that need to be reviewed for the impact from operating at uprated power conditions. Operator manual actions reviewed are as follows:

- Establishing auxiliary feedwater (AFW);
- Power operated relief valve (PORV) closure;
- Letdown isolation; establishing charging flow;
- Tripping of the reactor coolant pumps (RCPs);
- Main feedwater isolation; and
- Steam generator isolation.

The following discussion addresses the above-listed manual actions and associated operator action response times based on the current analysis for both alternate and normal shutdown, and the impact of the EPU on these response times.

#### Establishing AFW

Establishment of AFW is directly impacted by the amount of decay heat and is therefore impacted by power uprate. The current analysis determined that the maximum allowed time for the establishment of AFW for both alternate and normal shutdown was 30 minutes. A thermal hydraulic analysis performed to validate the EPU conditions (referred to in this discussion as the "EPU analysis") determined that for both the normal and alternate shutdown cases a 30-minute delay in establishing AFW was still acceptable at the uprated conditions.

#### PORV Closure

Due to the significant affect an open PORV can have on reactor coolant system parameters, the closure time of the PORV is included in the current analysis. The current analysis

establishes a time for PORV closure of 4 minutes for alternate shutdown and 2 minutes for normal shutdown. The change in parameters for operating at uprated conditions is expected to have little effect on this timing. This timing was incorporated into the EPU analysis. The results of the EPU analysis were acceptable.

#### Letdown Isolation; Establishing Charging Flow

Isolation of letdown and establishment of charging are actions that affect pressurizer level. For a shutdown from the control room the current analysis established the maximum time to isolate letdown as 20 minutes; for alternate shutdown, time to isolate letdown is 15 minutes. The current analysis established a maximum time of 60 minutes to establish charging (normal and alternate shutdown).

The EPU analysis also used 20 minutes for letdown isolation from the control room and 15 minutes to accomplish letdown isolation for alternate shutdown. For each of these cases the EPU analysis used 60 minutes to establish charging. With these values, the results of the EPU analysis were acceptable.

#### Trip Reactor Coolant Pumps

The current analysis establishes two times for tripping of the RCPs.

The first time is determined by the requirement to trip an RCP within 10 minutes after the loss of RCP seal cooling (alternate shutdown). This is an RCP seal requirement and not dictated by thermal hydraulic requirements. As such, operation at uprate conditions will not affect this time requirement.

The second time requirement is to trip two of the four RCPs at 30 minutes if not already tripped (normal shutdown). The time allowed for continued operation of the RCPs impacts the amount of heat to be removed from the RCS and thereby impacts the success criteria for establishment of AFW. The EPU analysis used 30 minutes to trip two of the 4 RCPs with all parameters being acceptable. Therefore, the 30-minute maximum time to trip two of four RCPs for shutdown from the control room after a fire remain valid for the EPU conditions.

#### Main Feedwater Isolation

The current Appendix R safe shutdown analysis allots 10 minutes to accomplish the action to isolate main feedwater in the event that a fire causes a spurious loss of steam generator level control resulting in overfill of the steam generators.

Operating at EPU conditions will increase normal main feedwater flow and also increase the amount of decay heat immediately following reactor trip; however, the safety relief valves will still be capable of relieving a significant amount of steam. Therefore, increased feedwater flow at EPU conditions will not significantly impact the time allowed to isolate main feedwater, and the 10 minute time to isolate main feedwater remains adequate at EPU conditions.

Actions to isolate main feedwater are among the first accomplished. In the event of a need to evacuate the control room the feedwater pumps are tripped (if possible) prior to leaving the control room. As a contingency, tripping the feedwater pump breakers is one of the first

actions assigned to one of the Reactor Control Room Operators (RCOs) once the control room is evacuated.

### Steam Generator Isolation

Isolation of the steam generators accomplishes several purposes; however, the purpose that directly affects the Appendix R acceptance criteria is overcooling of the RCS, which lowers pressurizer level below 0 percent due to RCS shrinkage. The manual action associated with steam generator isolation is isolation of a spuriously open atmospheric dump valve (ADV).

The current Appendix R safe shutdown analysis includes operator manual actions to isolate and close / operate a spuriously open ADV within 30 minutes for a fire in fire areas outside the steam trestle fire area (ADVs are located in the steam trestle fire area), and within 60 minutes for a fire in the steam trestle fire area.

The thermal hydraulic analyses addressing a spuriously open ADV for 60 minutes at current conditions shows that the core remains covered, but that the Appendix R acceptance criterion of maintaining pressurizer level on scale was not met. The thermal hydraulic analysis addressing a spuriously open ADV for 30 minutes at EPU conditions shows that the core remains covered, but that the Appendix R acceptance criterion of maintaining pressurizer level on scale is not met. FPL notes that an Action Request (Condition Report) addressing Appendix R compliance for this issue was generated. The issue was determined not to be an operability concern based on plant design features and fire protection program compensating actions.

Other operator manual actions, which are not affected by decay heat and which do not affect lowering of pressurizer level, are addressed in Attachment 5, Section 2.5.1.4, of the License Amendment Report.

In conjunction with the review / response to NRC Regulatory Issue Summary (RIS) 2006-10, FPL performed a review of the St. Lucie Unit 1 worst case fire areas for feasibility of manual actions. Issues considered in the feasibility evaluation included accessibility, habitability, emergency lighting, and procedural guidance. Equipment walk-downs and time-line walk-downs for manual actions outside the control room were performed for each of the fire areas reviewed. The evaluation concluded that the majority of components were readily accessible, with proper emergency lighting, in habitable areas, and with the proper procedural guidance. The results of the timeline walk-downs for manual actions outside the control room validated the actual transit times and estimated component operation time to be within the overall expectations in achieving post-fire safe shutdown control of St. Lucie Unit 1.

FPL has committed to transition the St. Lucie Unit 1 fire protection licensing basis to NFPA 805. In a letter to the NRC dated September 11, 2008, FPL stated that the feasibility of operator manual actions has been reviewed and that any such action being considered as a compensatory measure is considered feasible and in compliance with RIS 2005-07. In a letter to FPL dated December 19, 2008 the NRC extended enforcement discretion for St. Lucie Unit 1, based in part on FPL's documentation of the feasibility and reliability of operator manual actions put in place as compensatory measures.

## 2. Impact of Additional Heat due to EPU on Operator Manual Actions

As addressed in LR Section 2.7.5.2.2, the EPU does not result in additional equipment or heat loads being added to areas served by the reactor auxiliary building (RAB) ventilation systems. Therefore, the EPU does not impact the ability of operators to perform required manual actions in the RAB.

As addressed in LR Section 2.7.7.2.4, the containment air temperature for EPU increased 1.7°F, resulting in a post-EPU containment temperature of approximately 110°F, which is approximately 10°F below the bounding temperature of 120°F. Therefore, the EPU does not impact the ability of operators to perform required manual actions in the containment.

As addressed in LR Section 2.7.5.2.2, the increase in heat releases from the electrical equipment in the turbine switchgear room amounts to less than 1 percent of the existing total nameplate motor ratings supplied by the switchgear and load centers in the room, and that the existing ventilation system can accommodate this small increase. Therefore, the EPU does not impact the ability of operators to perform required manual actions (e.g., trip feedwater pump breakers) in the turbine switchgear room.

The steam trestle area provides natural ventilation with ambient conditions due to its location and construction. This area is essentially an open structure relying on natural ventilation, which minimizes temperature buildup around equipment in the area. Therefore, the EPU does not impact the ability of operators to perform required manual actions in the area.

In consideration of the above, additional heat load in the plant environment from EPU does not interfere with required manual actions.

### AFPB-4

**Some plants credit aspects of their fire protection system for other than fire protection activities (e.g., utilizing the fire water pumps and water supply as backup cooling or inventory for non-primary reactor systems). If St. Lucie Unit 1 credits its fire protection system in this way, identify the specific situations and discuss to what extent, if any, the extended power and measurement uncertainty recapture uprates affect these “non-fireprotection” aspects of the plant fire protection system. If St. Lucie Unit 1 does not take such credit, verify this as well.**

**Discuss how any non-fire suppression use of fire protection water will impact the need to meet the fire protection system design demands.**

### Response

St. Lucie Unit 1 does not credit the fire water pumps or the dedicated fire water supply for non-fire protection functions during normal plant operations. The fire protection system (FPS) is utilized to support the following two non-fire protection activities:

1. The FPS is capable of providing alternative makeup water service to the component cooling water surge tank if the demineralized water system (DWS) is not available.



2. The FPS can supply makeup water to the fuel pool to maintain an adequate fuel pool level in the event of complete loss of the fuel pool cooling system.

There is no impact to the FPS due to implementation of the EPU and measurement uncertainty recapture (MUR). As noted in Attachment 1 of the LAR, the requested 11.85% "EPU" includes the 1.7% MUR uprate; the term "EPU" is inclusive of the MUR. The available volume of fire protection water remains the same as prior to implementation of EPU.

Two separate storage tanks are provided for the plant fire suppression systems. Each storage tank contains an administratively controlled minimum volume of 300,000 gallons of water. Vertical standpipes are provided within the tanks for non-fire related connections which assure a minimum quantity of water (200,000 gallons) sufficient for a two hour supply. This is the maximum water demand required for protecting areas containing safe shutdown equipment. With respect to preventing significant loss of fuel storage coolant inventory under accident conditions, UFSAR Section 9.1.3.1 states that the fuel pool system is designed to remove decay heat from up to 1849 spent fuel assemblies stored in the pool and maintain pool water temperature less than 150°F. Per UFSAR Section 9.1.3.4.3.2, there are several sources of fresh water on the site that are available to the fuel handling building; namely, refueling water storage tank, city water storage tanks via the fire main, city water storage tanks via the portable fire pump connection, and the primary water tank. The concurrent loss of these sources and the fuel pool cooling system is remote. Due to the fuel pool's inventory boil-off rate, there is sufficient time to obtain makeup. A seismic Category I backup salt water supply is available from the intake cooling water (ICW) intertie. A standpipe on the fuel handling building is provided from grade to the operating deck elevation and hose connections are provided at both ends of the standpipe. Thus, via fire hose, the fuel pool makeup can be readily supplied by the ICW pumps. The ICW system connection via the hose connections can provide 150 gpm of makeup.

As presented in LR Section 2.5.4.1.2.2, the time to boil analysis results demonstrate that sufficient time exists to provide an alternate means of cooling prior to the onset of boiling in the racks. After the onset of boiling, makeup requirements remain well below the available 150 gpm makeup capability.

During off-normal or emergency conditions, St. Lucie Unit 1 employs features of the fire protection system as necessary to ensure the safe operation of the plant. Procedural guidance is provided to ensure the fire system remains capable of responding to a fire if applicable. Provisions for using fire water for off-normal or emergency evolutions are not changed as a result of EPU.