

December 2, 2004

Mr. J. A. Stall  
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SUBJECT: ST. LUCIE UNITS 1 AND 2 - SAFETY EVALUATION REGARDING THE  
RADIOLOGICAL EMERGENCY PLAN ACTION LEVEL CHANGE  
(TAC NOS. MC3926 AND MC3927)

Dear Mr. Stall:

By a letter dated August 2, 2004, Florida Power and Light Company (FPL) submitted a proposed change to the St. Lucie Plant Radiological Emergency Plan. The proposed change relates to the Initiating Condition (IC) for the Notification of Unusual Event classification due to reactor coolant system leakage. This change, submitted for the U.S. Nuclear Regulatory Commission (NRC) staff review pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(q), was proposed to resolve an unintended consequence of a 1996 IC change, and to add the condition "ability to isolate" when determining the occurrence of reactor coolant system leakage.

The NRC staff has reviewed FPL's proposed change and has concluded that the revised emergency classification scheme meets the requirements of 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50. Therefore, the proposed emergency plan change is acceptable, and may be implemented after concurrence from the State and local government has been obtained by FPL.

Further details on the bases for the NRC staff's conclusions are contained in the enclosed safety evaluation. If you have any questions regarding this issue, please feel free to contact me at 301-415-3974.

Sincerely,  
**/RA/**

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

Docket Nos.: 50-335 and 50-389

Enclosure: As stated

cc w/enclosures: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR SAFETY AND INCIDENT RESPONSE

RELATED TO CHANGE TO THE RADIOLOGICAL EMERGENCY PLAN

FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-335 AND 50-389

1.0 INTRODUCTION

By letter dated August 2, 2004, Florida Power and Light Company (FPL) submitted a proposed change to the St. Lucie Plant Radiological Emergency Plan. The proposed change relates to the Initiating Condition (IC) for the Notification of Unusual Event (NOUE) classification due to reactor coolant system (RCS) leakage. The change was proposed to resolve an unintended consequence of a 1996 IC change.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.47(b)(4) states: "A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determination of minimum initial offsite response measures."

Section IV.B of Appendix E to 10 CFR Part 50, states, in part: ". . . These emergency action levels shall be discussed and agreed on by the applicant and State and local governmental authorities and approved by the NRC . . . ."

Section IV.C of Appendix E to 10 CFR Part 50, states, in part: ". . . Emergency action levels (based not only on onsite and offsite radiation monitoring information but also on readings from a number of sensors that indicate a potential emergency, such as pressure in the containment and response of the Emergency Core Cooling System) for notification of offsite agencies shall be described . . . ."

Regulatory Guide (RG) 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," Revision 2, states, in part: "The criteria and recommendations contained in Revision 1 of NUREG-0654/FEMA-REP-1 are considered by the Nuclear Regulatory Commission (NRC) staff to be acceptable methods for complying with the standards in 10 CFR 50.47 that must be met in onsite and offsite emergency response plans."

Enclosure

NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," (NUREG-0654) includes the following criteria:

Section II.D.1 - An emergency classification and emergency action level scheme as set forth in Appendix 1 must be established by the licensee.

Section II.D.2 - The initiating conditions shall include the example conditions found in Appendix 1 [of NUREG-0654] . . . .

### 3.0 TECHNICAL EVALUATION

#### 3.1 FPL's Justification

St. Lucie currently uses the NUREG-0654 scheme for emergency classification. The NRC approved changes to the IC for RCS leakage in a safety evaluation (SE) dated October 17, 1996. The SE allowed the RCS leakage for an NOUE to be characterized as greater than 10 gpm in an effort to avoid the time-consuming evolution of doing a mass balance prior to determining if an emergency condition exists. When that Emergency Action Level (EAL) was changed, the reference to Technical Specifications (TSs) was removed, since the TS RCS leakage definition was no longer used. That deletion resulted in the EAL no longer bounding RCS leakage to the operating modes described in TSs, and inadvertently resulted in the EAL being applicable in all reactor operating modes.

St. Lucie has historically focused on the RCS as a liquid in lieu of the physical system, making it difficult to determine if a challenge to the RCS barrier had occurred. As such, it was necessary to establish a clear definition of the physical system called the RCS. To that end, a review of relevant documents was performed as indicated below.

Section 5.1 of the St. Lucie Updated Final Safety Analysis Report (UFSAR) states that, the Reactor Coolant System (RCS) circulates water in a closed cycle,

to remove heat from the reactor core and transfers it to a secondary (steam generating) system. . . . The major components of the system are the reactor vessel; two parallel heat transfer loops, each containing one steam generator and two reactor coolant pumps; a pressurizer connected to one of the reactor vessel outlet pipes; and associated piping. All components are located inside containment.

NUREG-1432, "The Standard Technical Specifications [STSS] for Combustion Engineering Plants," defines the RCS as components that contain or transport the coolant to or from the reactor core and the TS covers Modes 1 through 4 specifically.

With regard to RCS leakage, the STS states:

In Modes 1, 2, 3, and 4, the potential for reactor coolant pressure boundary leakage is greatest when the RCS is pressurized. In Modes 5 and 6, leakage limits are not required because the reactor coolant pressure is far lower, resulting in low stresses and reduced potentials for leakage.

The definition of Reactor Coolant Pressure Boundary (RCPB) in 10 CFR 50.2 is:

Reactor coolant pressure boundary means all those pressure-containing components of boiling and pressurized water-cooled nuclear power reactors, such as pressure vessels, piping, pumps, and valves, which are:

- (1) Part of the reactor coolant system, or
- (2) Connected to the reactor coolant system, up to and including any and all of the following:
  - (i) The outermost containment isolation valve in system piping which penetrates primary reactor containment,
  - (ii) The second of two valves normally closed during normal reactor operation in system piping which does not penetrate primary reactor containment,
  - (iii) The reactor coolant system safety and relief valves.

The St. Lucie TS for RCS leakage (TS 3.4.6.2) contains the following Limiting Condition for Operation for Modes 1, 2, 3, and 4 (Unit 2 specific is in brackets):

Reactor Coolant System leakage shall be limited to:

- a. No PRESSURE BOUNDARY LEAKAGE,
- b. 1 GPM UNIDENTIFIED LEAKAGE,
- c. 1 GPM total primary-to-secondary leakage through steam generators,
- d. 10 GPM IDENTIFIED LEAKAGE from the Reactor Coolant System, and
- e. Leakage as specified in Table 3.4.6-1 for each Reactor Coolant System Pressure Isolation Valve identified in Table 3.4.6-1. [1 gpm leakage (except as noted in Table 3.4-1) at a Reactor Coolant System pressure of 2235 + 20 psig from any Reactor Coolant System Pressure Isolation Valve specified in Table 3.4-1.]

Based on the review of the above references, St. Lucie has developed the following definition of RCS for St. Lucie Radiological Emergency Plan use:

RCS includes any component (pipe, vessel, valve, etc.) which is used to contain or transport the reactor coolant to or from the reactor core. This definition includes any component beyond the RCS pressure boundary, which remains open to the RCS.

The concept of isolating secondary systems from the physical RCS is evident in the initial NRC guidance provided to the industry in NUREG-0818, "Emergency Action Levels for Light Water Reactors." In the category of RCS TS leakage for the NOUE EAL (NUREG-0818 page 24), the NRC found the draft EAL submitted by the V.C. Summer Plant acceptable for meeting the NUREG-0654 EAL (allowing for the timeframe provided in TS for returning the leak into conformance with the specification), as documented in an NRC letter dated July 11, 1997. This concept is also in place elsewhere in the industry.

FPL agrees that isolating interfacing systems is a primary means of determining if there is a true challenge to the RCS barrier. Furthermore, allowing a reasonable amount of time to isolate those interfacing systems is prudent. The initial steps that plant operators take in response to excess RCS leakage would be considered an appropriate timeframe.

According to the class description in NUREG-0654, an NOUE indicates that “unusual events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.” Additionally, the NRC has stated in RG 1.45, “Reactor Coolant Pressure Boundary Leakage Detection Systems,” that “the safety significance of leaks from the reactor coolant pressure boundary can vary widely depending on the source of the leak as well as the leakage rate and duration.”

The two factors of concern regarding RCS leakage, as stipulated in RG 1.45, are: (1) leakage rate, which is addressed by the established threshold of 10 gpm in the current EAL of the IC; and (2) the duration of the leakage, which is addressed by requiring isolation of the leak in the proposed change to the IC. An additional concern stated in both the RG and the NUREG is the location of the leak. RCS leakage detection capabilities within containment are unchanged. Detection of RCS leakage outside of containment is what is impacted by this proposed change. The proposed IC for an NOUE due to RCS leakage addresses both the duration of leakage and RCS leakage outside of containment/RCPB. An RCS leak in excess of 10 gpm must be readily isolable within the bounds of initial operator action or an emergency is declared. A leak in an interfacing system that exceeds 10 gpm and is nonisolable requires an emergency declaration. The TS allows for isolating the high pressure portion of the system from the low pressure systems in an effort to understand the leakage. The expectation for isolation/termination of the leak is promptly, with promptly being within the bounds of initial operator actions in off-normal operating procedures or emergency operating procedures.

The proposed change seeks to revise the original acceptable alternative by reestablishing a link to the TSs and, therefore, mode dependence as originally defined in the NUREG-0654 RCS leakage IC. Implementation of this change would eliminate the basis for entry into the St. Lucie Radiological Emergency Plan for conditions (i.e., Mode 5 and 6) that, prior to this change, would have implemented the St. Lucie Radiological Emergency Plan. No RCS leakage TS is provided for the St. Lucie Plant for Modes 5 or 6. The current EAL scheme for St. Lucie addresses the low-mode conditions through the IC for the inability to maintain cold shutdown and the loss of subcooling margin. TS RCS leakage in excess of 10 gpm that is isolable does not “indicate a potential degradation of the level of safety of the plant.” FPL feels that this change to the St. Lucie Radiological Emergency Plan enhances the program in that it no longer unnecessarily focuses offsite emergency management attention on a nonemergency condition. The proposed revision of this IC remains in agreement with the NUREG-0654 scheme of emergency classification and the class description for an NOUE and continues to meet 10 CFR 50.47 (b) and Appendix E to 10 CFR Part 50. The revised IC will also continue to provide a logical transition to the IC for Alert within the classification table event/category, “Abnormal Primary Leak Rate.” If an RCS leak were in excess of 50 gpm and unisolable, then conditions would require declaration of Alert.

FPL also states that the proposed change provides an alternate to the existing IC/EAL that is more in line with NUREG-0654, but less restrictive than the current IC/EAL.

A table comparing the existing IC/EAL to the proposed IC/EAL is included as an Attachment.

### 3.2 NRC Staff Evaluation

FPL's analysis of the definition for the RCS and the proposed definition for St. Lucie Radiological Emergency Plan use are acceptable.

Even though the proposed change results in the removal of RCS leakage greater than 10 gpm in Modes 5 and 6 from the existing EAL, the NRC staff finds the proposed change acceptable based upon the following:

- The proposed RCS leakage classification scheme provides a logical transition to the Alert classification.
- St. Lucie currently uses the NUREG-0654 emergency classification scheme. In 1996, St. Lucie Plant requested and received NRC approval for the IC/EAL for an NOUE emergency classification. The NRC SE allowed the RCS leakage Unusual Event to be characterized as >10 gpm in an effort to avoid the time-consuming evolution of doing a mass balance prior to determining if an emergency condition exists. That change also allowed an NOUE, due to RCS leakage, to be determined solely on the basis of the quantity of the leak and not whether the leakage was identified or unidentified. As a consequence of that change, the RCS IC/EALs were no longer tied to the leak rates defined in the Unit 1 or Unit 2 TSs and, therefore, not dependent on the mode relationship within those specifications. The IC/EAL change approved in 1996 was an acceptable alternative to the NUREG-0654 IC/EAL previously in place. This proposed change seeks to revise the original acceptable alternative by reestablishing a link to the TSs and, therefore, mode dependence as originally defined in the NUREG-0654 RCS leakage IC/EAL.
- The St. Lucie plant UFSAR states that, in modes 5 and 6, leakage limits are not required because the reactor coolant pressure is far lower, resulting in low stresses and reduced potentials for leakage.
- The proposed change is consistent with the NUREG-0654 emergency class definition for an NOUE.

In their submittal FPL stated that: "The current EAL scheme for St. Lucie addresses low mode conditions through the IC for the inability to maintain cold shutdown and loss of subcooling margin." However, the NRC staff disagrees with FPL's statement, since the IC for the inability to maintain cold shutdown and loss of subcooling margin will not compensate for the lack of an IC for RCS leakage in Modes 5 and 6. Nevertheless, based upon the discussion above, FPL has proposed an acceptable alternative to the requirements of 10 CFR 50.47(b)(4) and Appendix E to 10 CFR Part 50. The NRC staff does agree that the existing Alert IC related to unisolable RCS leakage of greater than 50 gpm provides a logical transition in the RCS leakage emergency classification scheme.



#### 4.0 STATE AND LOCAL GOVERNMENTAL AGREEMENT

As required by 10 CFR Part 50, Appendix E, Subsection IV.B., FPL stated in the letter dated August 2, 2004, that it will obtain the concurrence of State and local governments prior to implementing this change.

#### 5.0 CONCLUSION

The NRC staff concludes that FPL's emergency plan change, as proposed in its letter dated August 2, 2004, is an acceptable alternative to the guidance provided in NUREG-0654, and that the proposed revised EAL meets the applicable requirements of 10 CFR 50.47(b)(4) and Appendix E to 10 CFR Part 50. Therefore, the proposed emergency plan is acceptable, and may be implemented after concurrence from the State and local government has been obtained by FPL.

Attachment: IC/EAL Comparison Chart

Principal Contributor: Robert E. Moody

Comparison of Current IC/EAL to Proposed IC/EAL		
NUREG-0654	Current IC/EAL	Proposed IC/EAL
<p>5. Exceeding either primary/secondary leak rate technical specification or primary system leak rate technical specification.</p> <p>6. Failure of a safety or relief valve in a safety related system to close following reduction of applicable pressure.</p>	<p><u>Reactor Coolant System (RCS) Leakage</u></p> <p>1. RCS leakage GREATER THAN 10 gpm as indicated by:</p> <p>A. Control Room observation <u>OR</u> B. Inventory balance calculation <u>OR</u> C. Field observation <u>OR</u> D. Emergency Coordinator Judgment <u>OR</u></p> <p>2. Indication of leaking RCS safety or relief valve which causes RCS pressure to drop below SIAS [safety injection actuation signal] set points: - Unit 1 - 1600 psia - Unit 2 - 1736 psia</p>	<p><u>Reactor Coolant System (RCS) Leakage</u></p> <p>1. Unisolable Technical Specification RCS leakage GREATER THAN 10 gpm as indicated by:</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• If the leak is from an interfacing system (e.g., SDC [shutdown cooling], LPSI [low-pressure safety injection], CVCS [chemical and volume control system], etc.) and the leak is readily isolable from the RCPB [reactor coolant pressure boundary], the leak should not be considered RCS leakage.</li> <li>• To be isolable, personnel must be able to promptly close the valve(s) which isolates the leak within the context of initial operator actions.</li> </ul> <p>A. Control Room Observation <u>OR</u> B. Inventory balance calculation <u>OR</u> C. Field observation <u>OR</u> D. Emergency Coordinator's judgment <u>OR</u></p> <p>2. Indication of leaking RCS safety or relief valve causes RCS pressure to drop below SIAS setpoints: - Unit 1 - 1600 psia - Unit 2 - 1736 psia</p>