



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

December 13, 2012

Mr. Mano Nazar  
Executive Vice President, Nuclear and  
Chief Nuclear Officer  
Florida Power and Light Company  
P.O. Box 14000  
Juno Beach, Florida 33408-0420

SUBJECT: TURKEY POINT PLANT, UNITS 3 AND 4 - REQUEST FOR ADDITIONAL  
INFORMATION REGARDING LICENSE RENEWAL COMMITMENT, SUBMITTAL  
OF PRESSURIZER SURGE LINE WELDS INSPECTION PROGRAM  
(TAC NOS. ME8717 AND ME8718)

Dear Mr. Nazar:

By letter dated May 16, 2012, Florida Power and Light Company submitted to the U.S. Nuclear Regulatory Commission (NRC) for review and approval an inspection program for managing the effects of environmentally assisted fatigue of the Turkey Point Units 3 and 4 pressurizer surge line welds. This submittal addresses a commitment made by the licensee during the staff's review of the license renewal application.

The NRC staff is reviewing your submittal and has determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). As previously discussed with members of your staff, we are requesting a response to this RAI by Monday, December 24, 2012.

Sincerely,

A handwritten signature in black ink, appearing to read "Tracy J. Orf".

Tracy J. Orf, Project Manager  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosure:  
Request for Additional Information

cc w/enclosure: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION (RAI)

LICENSE RENEWAL COMMITMENT,

SUBMITTAL OF PRESSURIZER SURGE LINE WELDS INSPECTION PROGRAM

TURKEY POINT, UNIT NOS. 3 AND 4

DOCKET NOS. 50-250 AND 50-251

**RAI 1**

**Background**

Section 3.0 of Attachment 1 to the licensee's submittal states that the scope of the Turkey Point Units 3 and 4 Pressurizer Surge Line Weld Inspection Program includes five pressurizer surge line welds in Unit 3 and seven pressurizer surge line welds in Unit 4, as listed in Table 3 of the attachment.

**Issue**

The commitment addressed by the licensee's submittal is captured in updated final safety analysis report (UFSAR) Section 16.3.2.5. This section states that the licensee will inspect all pressurizer surge line welds on both units during the fourth inservice inspection interval and prior to entering the period of extended operation and the results of these inspections will be used to assess environmentally assisted fatigue of the pressurizer surge lines, to include management of the effects of this aging mechanism through an inspection program.

By letter dated March 11, 2004 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML040860092), the licensee transmitted its inservice inspection program for the fourth inservice inspection interval. Enclosure 3 (ADAMS Accession No. ML041040234) of this letter provides the inservice inspection plan and schedule specific to Unit 3. The staff found that page 75 lists six pressurizer surge line welds in Unit 3, but the licensee's submittal only describes five pressurizer surge line welds. The apparent discrepancy concerns a pipe-to-pipe weld, "12"-RC-1301-7."

The commitment concerns environmentally assisted fatigue of all the pressurizer surge line welds. However, since this particular weld is not addressed in the submittal, the staff could not determine whether the scope of the Turkey Point Units 3 and 4 Pressurizer Surge Line Weld Inspection Program is consistent with the scope of the commitment. The commitment also states that all the welds will be inspected and the results will be considered in the approach for managing the effects of environmentally assisted fatigue. The licensee's submittal does not describe the inspection results for this particular weld. Therefore, it is unclear whether the licensee assessed these results, consistent with the commitment, in order to demonstrate that the Turkey Point Units 3 and 4 Pressurizer Surge Line Weld Inspection Program will adequately manage the effects of environmentally assisted fatigue.

Enclosure

### Request

- (a) For Unit 3, clarify whether the "12"-RC-1301-7" weld is part of the pressurizer surge line. If it is, include it within the scope of the program and provide information on it consistent with that in Table 3 of Attachment 1 to the submittal (i.e., the last examination date and results, allowable operating period, inspection type, and inspection frequency). Otherwise, justify why this weld is not within the scope of the program.
- (b) For both Units 3 and 4, indicate whether there are any additional pressurizer surge line welds that are not listed in Table 3 of Attachment 1 to the submittal. If there are any additional welds, include them within the scope of the program and provide information on them consistent with that in Table 3 of Attachment 1 to the submittal (i.e., the last examination date and results, allowable operating period, inspection type, and inspection frequency). Otherwise, justify why these additional welds are not within the scope of the program.

### RAI 2

#### Background

Attachment 2 to the submittal describes the flaw tolerance evaluation performed in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," Division 1, "Rules for Inspection and Testing of Components of Light Water Cooled Plants" (Section XI), Appendix L, which was used to determine the successive examination interval for the pressurizer surge line welds. Section 3.3 of this attachment states that crack growth in the Type 316 and Type 304 stainless steel welds was calculated using the formulation in W. J. Mills publication, "Critical Review of Fatigue Crack Growth Rates for Stainless Steel in Deaerated Water – Parts 1 and 2," EPRI [Electric Power Research Institute] MRP-2010 Conference and Exhibition: Materials Reliability in PWR [Pressurized Water Reactor] Nuclear Power Plants, Colorado Springs, CO, June 28 – July 01, 2010."

#### Issue

Section XI, Paragraph L-3331, states that the evaluation procedures in Section XI, Appendix C, shall be used. Section XI, Subsubarticle C-8410, describes the parameters for the fatigue crack growth behavior of austenitic stainless steel and states that the crack growth behavior is affected by temperature, the ratio of the minimum stress intensity factor to the maximum stress intensity factor associated with the transient stress range, and the environment. This subsubarticle does not provide reference fatigue crack growth rates for austenitic stainless steels exposed to pressurized water reactor environments. The licensee referenced a formulation based on the W. J. Mills publication to calculate the fatigue crack growth rate; however, the licensee did not provide a technical basis to justify application of this method to the flaw tolerance evaluation for the pressurizer surge line welds.

### Request

Provide a technical basis to justify that use of the referenced formulation is conservative with respect to the calculation of the fatigue crack growth rate in a pressurized water reactor environment. Describe how this formulation takes into account the parameters discussed in Section XI, Subarticle C-8410, including temperature, ratio of the minimum stress intensity factor to the maximum stress intensity factor associated with the transient stress range, and the environment.

### **RAI 3**

#### Background

Section 3.3 of Attachment 2 to the submittal indicates that the pressurizer surge line welds are austenitic stainless steel. According to Section 3.2.1.1 of the license renewal application (ADAMS Accession No. ML003749654), Class 1 stainless steel piping components in the reactor coolant systems are subject to cracking due to flaw growth as well as stress corrosion cracking. Therefore, stress corrosion cracking is an aging effect requiring management for the period of extended operation.

#### Issue

As stated in Section 3.2 of Attachment 2 to the submittal, per the recommendations of Section XI, Appendix L, the analytical procedures of Section XI, Appendix C, were used to determine the critical flaw sizes for the postulated axial and circumferential flaws in the pressurizer surge and hot leg surge nozzle welds. Section XI, Subsubarticle C-3230, states that if the service loading, material, and environmental conditions are such that the flaw is subjected to both fatigue and stress corrosion cracking growth, as may occur in austenitic piping components, then the final flaw size depth and length are to be obtained by adding the increments in flaw size due to fatigue and stress corrosion cracking. The license renewal application indicates that the pressurizer surge line piping components are subject to stress corrosion cracking, but the staff could not determine whether stress corrosion cracking was considered in the flaw growth calculation in accordance with Section XI, Subsubarticle C-3230.

#### Request

Describe how, and justify that, the flaw growth evaluation accounted for the effects of stress corrosion cracking. Alternatively, provide the basis for not considering the effects of stress corrosion cracking in the evaluation.

### **RAI 4**

#### Background

Section 3.0 of Attachment 1 to the submittal describes the key attributes of the Turkey Point Units 3 and 4 Pressurizer Surge Line Weld Inspection Program. The "operating experience" attribute describes plant-specific operating experience relevant to the program.

### Issue

The attributes of the licensee's program align with the 10 elements of an aging management program as described in Section A.1.2.3 of NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR), dated December 2010 (ADAMS Accession No. ML103490036). SRP-LR Section A.1.2.3.10 addresses operating experience for aging management programs and was revised in Final License Renewal Interim Staff Guidance (LR-ISG), LR-ISG-2011-05, "Ongoing Review of Operating Experience," dated March 16, 2012 (ADAMS Accession No. ML12044A215). SRP-LR Section A.1.2.3.10, as revised, states that consideration of future plant-specific and industry operating experience relating to the aging management program should be discussed because the ongoing review of operating experience may identify areas where the program should be enhanced or new programs developed. Although the licensee discussed currently available operating experience relevant to the Turkey Point Units 3 and 4 Pressurizer Surge Line Weld Inspection Program, it did not describe how future plant-specific and industry operating experience concerning aging management and age-related degradation will be used to ensure that the effects of aging will be adequately managed.

### Request

Describe the programmatic activities that will be used to continually identify plant-specific and industry aging issues, evaluate them, and, as necessary, enhance the Turkey Point Units 3 and 4 Pressurizer Surge Line Weld Inspection Program or develop new program(s) in order to manage the effects of aging for the pressurizer surge lines. Indicate whether these activities are consistent with the guidance described in LR-ISG-2011-05, Appendix A, Itemized Change No. 7. Otherwise, provide a basis for the conclusion that the activities will ensure the adequate evaluation of operating experience on an ongoing basis to address age-related degradation and aging management.

### RAI 5

#### Background

Section 3.0 of Attachment 1 to the submittal, under "administrative controls," states that the plant inservice inspection program will document the environmentally assisted fatigue inspection requirements for the pressurizer surge line welds. Section 4.0 states that, upon approval of the proposed inspection program, the related aging management program basis and implementing documents and the associated UFSAR sections will be updated accordingly.

### Issue

Concerning the "administrative controls" element of an aging management program, SRP-LR Section A.1.2.3.9 states that the administrative controls should provide a formal review and approval process. The applicant did not describe the review and approval process for the inservice inspection program. SRP-LR Section A.1.2.3.9 also states that any informal programs relied on to manage aging for license renewal must be administratively controlled and included in the UFSAR supplement. Since the proposed program is informal (i.e., it is not subject to an existing requirement, for example, under a U. S. Nuclear Regulatory Commission (NRC)

regulation) it should have a summary in the UFSAR to provide administrative control of the program. The submittal does not provide a summary of the program for the UFSAR; therefore, the staff could not determine whether the administrative controls of the program are adequate.

### Request

Describe the review and approval process for the inservice inspection program.

Provide a summary description of the Turkey Point Units 3 and 4 Pressurizer Surge Line Weld Inspection Program to be included in the UFSAR. In this description, include details on the specific components within the scope of the program, the aging effects managed by the program, and the inspection methods and frequencies for detecting these aging effects.

### **RAI 6**

#### Background

Section 3.0 of Attachment 1 to the submittal states, under "detection of aging effects," that degradation of the pressurizer surge line welds is determined by volumetric examination in accordance with the requirements of plant inservice inspection program. Under "scope of the program," it states that the welds within the scope of the program will be examined in accordance with the risk-informed inservice inspection programs for Class 1 piping welds, an alternative to the requirements of Section XI that was approved by the NRC for the fourth inservice inspection interval as documented in a safety evaluation dated December 9, 2008 (ADAMS Accession No. ML083250173). It also states that the examination method for the Class 1 piping welds is volumetric only, as found in ASME Code Case N-577-1, "Risk-Informed Requirements for Class 1, 2, or 3 Piping, Method A Section XI, Division 1," Category R-A, Item R1.11.

#### Issue

The staff could not clearly determine the basis for the detection of aging effects. As stated in NRC Regulatory Guide 1.193, Revision 3, "ASME Code Cases Not Approved for Use," dated October 2010 (ADAMS Accession No. ML101800540), ASME Code Case N-577-1 is not approved for use. In addition, the NRC safety evaluation dated December 9, 2008, approves use of the risk-informed inservice inspection programs for Units 3 and 4 only for the fourth inservice inspection intervals. These intervals end in 2014 and, as such, it is not clear what the examination methods will be in the fifth and sixth inservice inspection intervals, which cover the periods of extended operation.

### Request

Clearly describe the examination methods and justify how they will detect the aging effects before there is a loss of the component intended functions. If the examination methods will be performed in accordance with Section XI, provide references to the applicable provisions in Section XI for these methods.

## **RAI 7**

### **Background**

Section 1.0 of Attachment 1 to the submittal states that the critical weld locations of concern are the pressurizer surge line nozzle-to-safe-end weld and the hot leg surge line nozzle-to-pipe weld. Section 1.0 of Attachment 2 to the submittal states that, based on a comparison of geometry, material properties, and applicable loads, the results of the detailed evaluation of these critical locations bound the other weld locations on the pressurizer surge lines.

### **Issue**

The inspection interval for all of the pressurizer surge line welds within the scope of the program is based on the flaw tolerance evaluations for the two critical weld locations. However, the licensee did not provide a justification as to why these two weld locations bound locations for all other welds in the pressurizer surge lines. Also, the critical weld locations were not analyzed separately for each unit. Therefore, it is not clear why the two critical locations are representative of those locations in each unit.

### **Request**

Justify that the flaw tolerance evaluations for the critical weld locations (i.e., the pressurizer surge line nozzle-to-safe-end weld and the hot leg surge line nozzle-to-pipe weld) bound all other welds in the pressurizer surge lines. In addition, justify why the two critical locations are representative of those locations in each unit.

## **RAI 8**

### **Background**

Table 1.0 of Attachment 2 to the submittal lists the bounding thermal transients included in the finite element analysis of the pressurizer surge nozzle weld. It identifies 600 cycles for both the plant heat-up transient and the plant cool-down transient.

### **Issue**

UFSAR Table 4.1-8 lists the 60-year transient design conditions and associated design cycles. It identifies 200 cycles for both the plant heatup transient and the plant cooldown transient, which equates to a 400-cycle difference between the licensing basis for the plants and the finite element analysis used as the basis for the Turkey Point Units 3 and 4 Pressurizer Surge Line Weld Inspection Program. The licensee did not provide a justification for this difference.

### **Request**

Provide the basis for including 600 cycles of plant heat-up and cool-down transients in the finite element analysis of the pressurizer surge nozzle weld.

December 13, 2012

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Executive Vice President, Nuclear and  
Chief Nuclear Officer  
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