



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

October 13, 2016

Mr. Mano Nazar
President and Chief Nuclear Officer
Nuclear Division
Florida Power & Light Co.
Mail Stop: NT3/JW
15430 Endeavor Drive
Jupiter, FL 33478

SUBJECT: ST. LUCIE PLANT, UNIT NOS. 1 AND 2 - REVIEW OF LICENSE RENEWAL
COMMITMENT FOR PRESSURIZER SURGE LINE WELDS INSPECTION
PROGRAM (CAC NOS. MF7026 AND MF7027)

Dear Mr. Nazar:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated October 29, 2015, Florida Power & Light Company (the licensee) requested NRC staff review and approval of an inspection program for managing the effectiveness of environmentally assisted fatigue of the pressurizer surge line welds at St. Lucie Plant, Unit Nos. 1 and 2. The licensee's submittal addresses a commitment described in Appendix D of NUREG 1779, "Safety Evaluation Report Related to the License Renewal of St. Lucie Nuclear Plant, Units 1 and 2," dated September 2003.

The enclosure to this letter documents the NRC staff's review and assessment of the licensee's request. The NRC staff finds the proposed inspection program acceptable. The NRC staff also finds that the licensee determined an appropriate approach for addressing environmentally assisted fatigue of the pressurizer surge lines and thus fulfilled the aforementioned commitment.

M. Nazar

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Please contact Perry Buckberg at (301) 415-1383 if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read 'Perry Buckberg', with a long, sweeping flourish extending upwards and to the right.

Perry Buckberg, Senior Project Manager
Plant Licensing Branch II-2
Division of Operator Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-335 and 50-389

Enclosure: Safety Evaluation

cc w/enclosures: Distribution via Listserv



UNITED STATES
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STAFF EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

LICENSE RENEWAL COMMITMENT NO. 20

SUBMITTAL OF PRESSURIZER

SURGE LINE WELDS INSPECTION PROGRAM

ST. LUCIE PLANT, UNIT NOS. 1 AND 2

DOCKET NOS. 50-335 AND 50-389

CAC NOS. MF7026 AND MF7027

1.0 INTRODUCTION AND BACKGROUND

By letter dated October 29, 2015 (Agency Documents Access and Management System (ADAMS) Accession No. ML15314A160), Florida Power & Light (the licensee) submitted a document titled "License Renewal Commitment Submittal of Pressurizer Surge Line Welds Inspection Program," for St. Lucie Unit Nos. 1 and 2 (St. Lucie 1 & 2) to the U.S. Nuclear Regulatory Commission (NRC), for review and approval. The licensee submitted the inspection program for NRC review and approval to address License Renewal Commitment No. 20, documented in NUREG-1779, "Safety Evaluation Report Related to the License Renewal of St. Lucie Nuclear Plant, Units 1 and 2, (ADAMS Accession No. ML032940205)," dated September 2003. Commitment No. 20, addresses concerns related to environmentally assisted fatigue (EAF) of the pressurizer surge line welds during the period of extended operation (PEO).

2.0 REGULATORY EVALUATION

2.1 Background Information

By letter dated November 29, 2001 (ADAMS Accession No. ML013400155), the licensee submitted a license renewal application for St. Lucie 1 & 2. Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," addresses the requirements for plant license renewal. Pursuant to 10 CFR 54.21, each application for license renewal must contain an integrated plant assessment (IPA) and an evaluation of time limited aging analyses (TLAAs). The plant-specific IPA shall identify and list those structures and components subject to an aging management review and demonstrate that the effects of aging (e.g., cracking, loss of material, loss of fracture toughness, dimensional changes, and loss of preload) will be adequately managed so that their intended

Enclosure

functions will be maintained consistent with the current licensing basis (CLB) for the PEO as required by 10 CFR 54.29(a). In addition, 10 CFR 54.21(d) requires that the final safety analysis report (FSAR) supplement for the facility must contain a summary description of programs and activities for managing the effects of aging and TLAAAs for the PEO.

By letter dated October 2, 2003 (ADAMS Accession No. ML032870081), the NRC issued renewed facility operating licenses to St. Lucie 1 & 2. The technical basis for the NRC staff's issuance of the renewed operating facility licenses was documented in NUREG-1779. As stated above, NUREG-1779 included the licensee's Commitment No. 20 regarding future activities to be completed by the licensee related to the aging management of St. Lucie 1 & 2, pressurizer surge line welds. The licensee committed to address EAF for the pressurizer surge line welds during the PEO, using one or more of the following approaches:

1. Further refinement of its fatigue analysis of the cumulative usage factor (CUF) to below 1, or
2. Repair the subject locations, or
3. Replace the subject locations, or
4. Manage the effects of fatigue by an NRC approved inspection program.

In the October 29, 2015, submittal, the licensee chose to manage the effects of EAF for the St. Lucie 1 & 2 pressurizer surge line welds by inspection. The licensee's submittal provides details of its inspection program for the pressurizer surge line welds for NRC staff review and approval.

2.2 Regulatory Review

Pursuant to 10 CFR 54.21(d), the most recent Updated FSAR (UFSAR) Sections 18.3.2.3 applicable to both St. Lucie 1 & 2, include a summary of Commitment No. 20, which states in part that the licensee will address EAF of the pressurizer surge line welds using one or more of the approaches below:

1. Further refinement of its fatigue analysis of the CUF to below 1, or
2. Repair the subject locations, or
3. Replace the subject locations, or
4. Manage the effects of fatigue by an NRC approved inspection program.

Additionally, St. Lucie 1 & 2 Renewed Facility Operating License Nos. DPR-67 and NPF-16, Section C, states that the licensee shall complete certain future activities as described in the licensee's UFSAR supplement, submitted pursuant to 10 CFR 54.21(d), prior to the period of extended operation.

Based on the above, the NRC staff finds that regulatory authority exists for the licensee to request and the NRC to review and approve, subject to the following technical evaluation, the licensee's aging management program for St. Lucie 1 & 2. The scope of this review is limited to St. Lucie 1 & 2, "Pressurizer Surge Line Welds Inspection Program," which was submitted as an aging management program to satisfy the licensee's License Renewal Commitment No. 20.

Revision 2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR) dated December 2010 (ADAMS Accession No. ML103490036), provides guidance for NRC staff review of aging management programs for license renewal. Section A.1.2.2 of the SRP-LR states that an acceptable aging management program should consist of these ten elements:

- (1) scope of program
- (2) preventive actions
- (3) parameters monitored or inspected
- (4) detection of aging effects
- (5) monitoring and trending
- (6) acceptance criteria
- (7) corrective actions
- (8) confirmation process
- (9) administrative controls
- (10) operating experience

3.0 SUMMARY OF INFORMATION IN SUBMITTAL

3.1 Description of Aging Management Program

The licensee stated that for the St. Lucie 1 & 2 pressurizer surge line there are a total of 21 weld locations that are subject to the effects of environmentally assisted fatigue (10 in Unit 1 and 11 in Unit 2). The most limiting weld location is the elbow that is directly attached to the hot leg of the pressurizer surge nozzle. The calculated CUF was determined to exceed the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) allowable usage factor of 1.0, when EAF is considered. The licensee selected to manage the effects of EAF on the pressurizer surge line welds using an inspection program in combination with a flaw tolerance evaluation (ADAMS Accession No. ML15314A161). The licensee used the approach and methodology documented in Non-Mandatory Appendix L, "Operating Plant Fatigue Assessment," of ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components."

The licensee also stated that it used the flaw tolerance valuation to determine operability and also to determine the needed inspection frequency for susceptible weld locations. The evaluation used a postulated surface flaw and the two most limiting locations, which were determined to be the hot leg surge nozzle-to-pipe weld and the adjacent elbow base metal. Using the methodology outlined above, the licensee determined that the allowable operating period is 252 months. Based on these results and the guidelines of ASME Code Appendix L, Table L-3420-1, the licensee determined that the surge line welds for St. Lucie 1 & 2 will be examined at the end of each inspection interval.

The licensee submittal included 10 key attributes of St. Lucie 1 & 2 Pressurizer Surge Line Welds Inspection Program that are used to describe the aging management program. These 10 attributes match the 10 program elements/attributes in NUREG-1800, Revision 2 as stated above.

4.0 TECHNICAL EVALUATION

4.1 Summary of Staff's Review

The staff reviewed St. Lucie 1 & 2, Pressurizer Surge Line Welds Inspection Program, to determine if the proposed program would be adequate in managing the effects of aging so that the components' intended functions would be maintained consistent with the CLB during the PEO, in accordance with 10 CFR 54.21(a)(3). The staff notes that all ASME Code, Section XI, Inservice Inspection and 10 CFR 50.55a requirements continue to apply during the term of a renewed license, unless a relief request is submitted by the licensee and subsequently approved by NRC staff in accordance with 10 CFR 50.55a.

In this section, the staff reviewed program elements one through six, and ten of the licensee's submitted inspection program against the acceptance criteria for the corresponding elements as stated in SRP-LR Section A.1.2.3, "Aging Management Program Elements." The staff's review focused on how the applicant's program manages aging effects through the effective incorporation of these program elements. The staff's review of program elements seven through nine, "corrective actions," "confirmation process," and "administrative controls" were previously documented in Section 3.0.4 of NUREG-1779

4.1.1 Scope of the Program

The staff reviewed the scope of the St Lucie 1 & 2 Pressurizer Surge Line Welds Inspection Program which includes the weld locations identified in the licensee's submittal in Table 2 for St. Lucie Unit 1, and Table 3 for St. Lucie Unit 2. These welds will be examined in accordance with the requirements of ASME Code, Section XI, Subsection IWB, Requirements for Class 1 Components of Light-Water Cooled Plants.

The staff reviewed the licensee's "scope of program" program element against the criteria in SRP-LR Section A.1.2.3.1, which states that the scope of the program should include the specific structures and components that will be managed. The staff finds the "scope of program" program element to be adequate because the pressurizer line weld locations in-scope for this program have been identified.

Based on its review of the October 29, 2015, submittal, the staff confirmed that the licensee's "scope of program" program element satisfies the criterion defined in SRP-LR Section A.1.2.3.1 and, therefore, the staff finds it acceptable.

4.1.2 Preventive Actions

The staff reviewed the preventive actions program element, and noted that the program does not credit specific actions to prevent the effects of aging.

The staff reviewed the licensee's "preventive actions" program element against the criteria in SRP-LR Section A.1.2.3.2, which states that some condition monitoring programs do not rely on preventive actions and thus, this information need not be presented. The staff finds the "preventive actions" program element to be adequate because the program is a condition monitoring program that does not rely on preventive actions.

Based on its review, the staff confirmed that the licensee's "preventive actions" program element satisfies the criterion defined in SRP LR Section A.1.2.3.2 for condition monitoring programs and, therefore, the staff finds it acceptable.

4.1.3 Parameters Monitored or Inspected

The staff reviewed the parameters monitored and inspected program element and noted that the inspections for the pressurizer surge line welds will consist of volumetric examinations and can detect age related degradation, including cracking that may be caused by environmentally assisted fatigue.

The staff reviewed the licensee's "parameters monitored or inspected" program element against the criteria in SRP-LR Section A.1.2.3.3, which states that for a condition monitoring program, the parameters monitored or inspected should be capable of detecting the presence and extent of the aging effect, such as detection and sizing of cracks. The staff finds the "parameters monitored or inspected" program element to be adequate because the program is a condition monitoring program that will use volumetric examinations capable of detecting the aging effect.

Based on its review, the staff confirmed that the licensee's "parameters monitored or inspected" program element satisfies the criterion defined in SRP-LR Section A.1.2.3.3 for condition monitoring programs and, therefore, the staff finds it acceptable.

4.1.4 Detection of Aging Effects

The staff reviewed the detection of aging effects program element and noted that the licensee will use ASME Section XI, Inservice Inspection Program requirements of St. Lucie 1 & 2, to detect for degradation of surge line welds. The frequency and scope of these inspections were shown by flaw evaluations to be capable of detecting degradation prior to loss of intended function.

The staff reviewed the "detection of aging effects" program element against the criteria in SRP-LR Section A.1.2.3.4, which states that detection of aging effects should occur before there is a loss of structure, or loss of component intended function(s). Therefore, the "detection of aging effects" program element should describe: (a) how the program element will be capable of detecting the occurrence of age related degradation prior to the loss of the current licensing basis intended function(s) of in scope components; (b) the when, where, and how data is collected; (c) the basis of the sample size and location selection should be selected based on susceptibility or previous failure history; and (d) that the selection is biased towards locations most susceptible to the specific aging effect.

The staff finds the "detection of aging effects" program element to be adequate because the licensee will be performing periodic inspections to identify age related degradation during the PEO. In addition, selection of the examination locations is biased towards locations most susceptible. Finally, the frequency of inspections was determined to be adequate by flaw tolerance evaluations, and consistent with the requirements of ASME Code, Section XI, Appendix L.

Based on its review, the staff confirmed that the licensee's "detection of aging" program element satisfies the criterion defined in SRP LR Section A.1.2.3.4 and, therefore, the staff finds it acceptable.

4.1.5 Monitoring and Trending

The staff reviewed the monitoring and trending program element and noted that the licensee will use St. Lucie 1 & 2, ASME Section XI, Inservice Inspection Program requirements to maintain records of the examination results, corrective actions taken or recommended. In addition if flaws are identified, they will be evaluated to assess the impact on the program.

The staff reviewed the "monitoring and trending" program element against the criteria in SRP-LR Section A.1.2.3.5, which states that monitoring and trending activities should be described and the results should be evaluated against the acceptance criteria to effect timely corrective or mitigative actions. The staff noted that the program will use the acceptance criteria of ASME Code, Section XI, when flaws are identified during volumetric examinations. The staff also noted that adverse conditions would be entered in the licensee's corrective action program, and records of these actions as a result of the examinations (i.e., further actions, recommendations and engineering evaluations), will be maintained in accordance with the requirements of the St. Lucie 1 & 2, ASME Section XI, Inservice Inspection Program.

Based on its review, the staff confirmed that the licensee's "monitoring and trending" program element satisfies the criterion defined in SRP LR Section A.1.2.3.5 and, therefore, the staff finds it acceptable.

4.1.6 Acceptance Criteria

The staff reviewed the acceptance criteria program element and noted that the licensee will use the acceptance standards identified and referenced in ASME Code, Section XI, Subsection IWB for Class 1 components. Additionally, the licensee will perform evaluations according to the requirements of ASME Code, Section XI, Appendix L, when flaws are identified in the surge line welds.

The staff reviewed the licensee's "acceptance criteria" program element against the criteria in SRP-LR Section A.1.2.3.6, which states in part that it is not necessary to justify any acceptance criteria that are taken from codes and standards incorporated by reference into NRC regulations, because these have been subject to prior NRC review process and have been approved or endorsed for use. The staff noted that the program will use the acceptance criteria of ASME Code, Section XI, Subsection IWB for Class 1 components. The staff further noted that the pressurizer surge line piping components subject to this aging management program are ASME Code Class 1 piping, therefore the use of the acceptance criteria of ASME Code Section XI, Subsection IWB, is applicable.

Based on its review, the staff confirmed that the licensee's "acceptance criteria" program element satisfies the criterion defined in SRP-LR Section A.1.2.3.6 and, therefore, the staff finds it acceptable.

4.1.7 Operating Experience

The licensee stated that a sample of the surge line welds have been examined volumetrically for both units in accordance with the requirements of AMSE Code, Section XI, Subsection IWB, during the first three in-service inspection intervals. The licensee also stated that to date no indications have been observed. The licensee further stated that it will perform ongoing review of operating experience related to age-related degradation and aging management of St. Lucie 1 & 2 Pressurizer Surge Line Weld Inspection Program, to assure adequate evaluation of operating experience.

The staff reviewed this information against the acceptance criteria in SRP-LR Section A.1.2.3.10, which states in part that currently available operating experience applicable to the program, as well as consideration of future operating experience relating to the aging management program should be discussed. SRP-LR Section A.1.2.3.10 also states that the information on the operating experience should provide objective experience to support a conclusion that the program will adequately manage the effects of aging during the period of extended operation.

The staff reviewed the operating experience provided in the licensee's submittal and did not identify any operating experience that would indicate that the licensee should consider modifying its proposed inspection program.

Based on its review of the the licensee's Pressurizer Surge Line Welds Inspection Program, the staff finds that the licensee has appropriately evaluated plant-specific and industry operating experience. The staff confirmed that the licensee's "operating experience" program element satisfies the criteria in SRP-LR Section A.1.2.3.10 and, therefore, the staff finds it acceptable.

4.1.8 Proposed UFSAR Update

The licensee's submittal includes a proposed UFSAR update, which provides a summary description of the St. Lucie 1 & 2 Pressurizer Surge Line Welds Inspection Program. The staff reviewed the proposed UFSAR update program description and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the licensee stated that upon NRC's approval of the proposed aging management program, they will update the St. Lucie 1 & 2 UFSARs, accordingly. The staff finds the information in the proposed UFSAR update an adequate description of the program.

Based on its technical review of licensee's St. Lucie 1 & 2 Pressurizer Surge Line Welds Inspection Program, the staff concludes that the licensee has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the proposed UFSAR update for this aging management program and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

5.0 CONCLUSION

The NRC staff reviewed the St. Lucie 1 & 2 Pressurizer Surge Line Welds Inspection Program to determine the acceptability of the proposed aging management program and to determine whether it contains sufficient information to demonstrate fulfillment of the licensee's License Renewal Commitment No. 20. Based on its review, the staff concludes that there is reasonable assurance that the licensee will manage the St. Lucie 1 & 2 pressurizer surge line weld aging effects as the proposed aging management program satisfies the ten acceptable aging management program elements as described in Section A.1.2.3 of the SRP-LR. Therefore, the NRC staff approves the St. Lucie 1 & 2 Pressurizer Surge Line Welds Inspection Program. Consequently, the licensee's implementation of the St. Lucie 1 & 2 Pressurizer Surge Line Welds Inspection Program will satisfy the St. Lucie 1 & 2 License Renewal Commitment No. 20.

Principal Contributors: Roger Kalikian
Perry Buckberg

M. Nazar

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Please contact Perry Buckberg at (301) 415-1383 if you have any questions.

Sincerely,

/RA/

Perry Buckberg, Senior Project Manager
Plant Licensing Branch II-2
Division of Operator Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-335 and 50-389

Enclosures: Safety Evaluation

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**by e-mail*

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