



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

August 10, 2015

Mr. Mano Nazar  
President and Chief Nuclear Officer  
Nuclear Division  
NextEra Energy  
P.O. Box 14000  
Juno Beach, FL 33408-0420

SUBJECT: ST. LUCIE PLANT, UNIT NO 2. - RELIEF REQUEST NO. 7 FOR USE OF AN  
ALTERNATIVE TO THE REQUIREMENTS OF THE ASME CODE  
(TAC NO. MF5046)

Dear Mr. Nazar:

By letter dated October 24, 2014 (Agencywide Documents Access and Management System Accession No. ML14295A196), Florida Power and Light (the licensee) submitted Relief Request No. 7 (RR-7) to the Nuclear Regulatory Commission (NRC) for the use of alternatives to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI requirements at St. Lucie Plant, Unit No. 2, during the fourth 10-year inservice inspection (ISI) interval.

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(i), the licensee requested to use the proposed alternative on the basis that the alternative provides an acceptable level of quality and safety. By *Federal Register* Notice 79 FR 65776, dated November 5, 2014, which became effective on December 5, 2014, the paragraph heading in 10 CFR 50.55a were revised. Accordingly, relief requests that had been previously covered by 10 CFR 50.55a(a)(3)(i) are now covered under the equivalent 10 CFR 50.55a(z)(1).

Specifically, the licensee requested NRC authorization to convert the risk-informed inservice inspection (RI-ISI) program for Class 1 piping welds to the program plan described in Electric Power Research Institute Topical Report 112657, and to add a process for Class 2 piping welds using the same RI-ISI. The licensee proposed the alternative RI-ISI program for the Class 1 and 2 piping on the basis that the alternative provides an acceptable level of quality and safety.

The NRC staff has reviewed the subject request and concludes that, as set forth in the enclosed safety evaluation, the five key principles of risk-informed decisionmaking are ensured by the licensee's proposed fourth 10-year RI-ISI program. Therefore, the licensee's proposed fourth 10-year RI-ISI program is acceptable. The NRC staff finds that the proposed alternative provides an acceptable level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(z)(1), and is in compliance with the ASME Code's requirements. Therefore, the NRC authorizes RR-7 for the use of the alternative RI-ISI program at St. Lucie Plant, Unit No. 2, for

M. Nazar

- 2 -

the fourth 10-Year ISI interval, which commenced on August 8, 2013, and will end on August 7, 2023.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the staff remain applicable, including the third party review by the Authorized Nuclear In service Inspector.

If you have any questions, please contact the Project Manager, Farideh Saba at 301-415-1447 or via e-mail at [Farideh.Saba@nrc.gov](mailto:Farideh.Saba@nrc.gov).

Sincerely,



Shana R. Helton, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No.: 50-389

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via ListServ



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELIEF REQUEST NO. 7 REGARDING RISK INFORMED INSERVICE INSPECTION  
PROGRAM FOR THE CLASS 1 AND 2 PIPING  
FLORIDA POWER AND LIGHT COMPANY  
ST. LUCIE PLANT, UNIT NO. 2  
DOCKET NO. 50-389

1.0 INTRODUCTION

By letter dated October 20, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14295A196), Florida Power and Light (the licensee) submitted Relief Request No. 7 (RR-7) for the use of an alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) for the risk-informed inservice inspection (RI-ISI) of Class 1 and Class 2 piping at St. Lucie Plant, Unit No. 2 (St. Lucie Unit 2).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i), the licensee requested U.S. Nuclear Regulatory Commission (NRC) authorization to convert the RI-ISI program for Class 1 piping welds to the program plan described in Electric Power Research Institute Topical Report 112657 (EPRI TR-112657), Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure" (ADAMS Accession No. ML013470102), and to add a process for Class 2 piping welds using the same RI-ISI. The licensee proposed the alternative RI-ISI program for the Class 1 and 2 piping on the basis that the alternative provides an acceptable level of quality and safety.

2.0 REGULATORY EVALUATION

By *Federal Register* (FR) Notice 79 FR 65776, dated November 5, 2014, which became effective on December 5, 2014, the paragraphs headings in 10 CFR 50.55a were revised. Accordingly, relief requests that had been previously covered by 10 CFR 50.55a(a)(3)(i) are now covered under the equivalent 10 CFR 50.55a(z)(1).

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, "except design and access provisions and pre-service

Enclosure

examination requirements,” set forth in the ASME Code to the extent practical within the limitations of the design, geometry, and materials of construction of the components. Paragraph (g) of 10 CFR 50.55a also states that inservice inspection (ISI) of the ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the NRC. The regulations in 10 CFR 50.55a(g)(4) also require that during the first 10-year ISI interval and during subsequent intervals the licensee’s ISI program must comply with the requirements in the latest edition and addenda of the ASME Code incorporated by reference into 10 CFR 50.55a(b). The ISI program must comply with the ASME code requirement 12 months before the start of the 120-month inspection interval, subject to the conditions listed in 10 CFR 50.55a(b). St. Lucie Unit 2, is currently in its fourth 10-year ISI interval.

Pursuant to 10 CFR 50.55a(z), alternatives to the ASME Code requirements referenced in paragraph (g) of 10 CFR 50.55a may be used when authorized by the Director, Office of Nuclear Reactor Regulation. A proposed alternative must be submitted and authorized prior to implementation. The licensee must demonstrate (1) the proposed alternative would provide an acceptable level of quality and safety; or (2) compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

In the current submittal, the licensee requested NRC authorization to use, as an alternative to the ASME Code, the RI-ISI program for Class 1 piping welds described in EPRI TR-112657, and to add a process for Class 2 piping welds using the same RI-ISI program. The licensee proposed the alternative provides an acceptable level of quality and safety pursuant to 10 CFR 50.55a(z)(1).

The current requirements of Table IWC-2500-1 of the 2007 Edition with 2008 Addenda of ASME Code Section XI specify that a certain percentage of ASME Code Category B-F, B-J, C-F-1, and C-F-2 pressure retaining piping welds must receive ISI during each 10-year ISI interval. The ASME Code requires 100 percent of B-F welds and 25 percent of B-J welds greater than 1-inch nominal pipe size be selected for volumetric or surface examination, or both, on the basis of existing stress analyses. For Categories C-F-1 and C-F-2 piping welds, 7.5 percent of non-exempt welds are selected for volumetric or surface examination, or both.

The NRC staff evaluated the proposed alternative RI-ISI programs using the following guidance documents:

- Regulatory Guide (RG) 1.174, Revision 2, “An Approach for Using Probabilistic Risk Assessment In Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis” (ADAMS Accession No. ML100910006);
- RG 1.178, Revision 1 “An Approach for Plant-Specific Risk-Informed Decisionmaking – Inservice Inspection of Piping” (ADAMS Accession No. ML032510128);
- RG 1.200, Revision 2, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities” (ADAMS Accession No. ML090410014);

- NUREG-0800, Chapter 3.9.8, "Standard Review Plan for the Review of Risk-Informed In-service Inspection of Piping" (SRP 3.9.8) (ADAMS Accession No. ML032510135); and
- EPRI Topical Report (TR)-1021467-A, "Nondestructive Evaluation: Probabilistic Risk Assessment Technical Adequacy Guidance for Risk-Informed Inservice Inspection Programs" (ADAMS Accession No. ML12171A450).

RG 1.174 provides guidance on the use of probabilistic risk assessment (PRA) findings and risk insights in support of licensee requests for changes to a plant's current licensing basis (CLB). RG 1.174 also defines an acceptable approach to analyzing and evaluating proposed CLB changes. The approach includes traditional engineering evaluations supported by insights derived from the use of PRA methods about the risk significance of the proposed changes. In implementing risk-informed decisionmaking, the NRC expects CLB changes to meet the acceptance guidelines and key principles of risk-informed regulation specified in RG 1.174.

RG 1.178 describes methods acceptable to the NRC for integrating insights from PRA techniques with traditional engineering analyses into ISI programs for piping. RG 1.178 describes a RI-ISI program as one that incorporates risk insights that can focus inspections on more important locations while at the same time maintaining or improving public health and safety.

RG 1.200 describes one acceptable approach for determining whether the technical adequacy of the PRA, in total or the parts that are used to support an application, is consistent with accepted practices and sufficient to provide confidence in the results such that the PRA can be used in regulatory decisionmaking.

SRP Chapter 3.9.8 describes review procedures and acceptance guidelines for NRC staff reviews of proposed plant-specific, risk-informed changes to a licensee's ISI program for piping.

Based on the review of the above regulatory guidance, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request, and the NRC to authorize, the alternative requested by the licensee.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Component Affected

The ASME Code Class 1 and 2 piping are affected. In accordance with ASME Code, Section XI, IWB-2500 (Table IWB-2500-1), the Class 1 pressurizer nozzle to pipe dissimilar metal (DM) welds are classified as Examination Category B-F, Item Nos. B5.40 and B5.50, and the Class 1 piping similar and DM welds are classified as Examination Category B-J, Item Nos. B9.11, B9.21, B9.31, B9.32, and B9.40. In accordance with IWC-2500 (Table IWC-2500-1), the Class 2 austenitic stainless steel or high alloy piping welds are classified as Examination Category C-F-I, Item Nos. C5.11, C5.21, C5.30, and C5.41, and the Class 2 carbon or low alloy steel piping welds are classified as Examination Category C-F-2, Item Nos. C5.51, C5.61, and C5.81. The licensee identified these welds in the table in Section 1 of RR-7.

### 3.2 Applicable Code Edition and Addenda

The code of record for the fourth 10-year ISI interval for St. Lucie Unit 2 is the 2007 Edition through 2008 Addenda of the ASME Code.

### 3.3 Duration of Relief Request

The licensee submitted this relief request for the fourth 10-year ISI interval that commenced on August 8, 2013, and will end on August 7, 2023.

### 3.4 ASME Code Requirement

Table IWB-2500-1, Examination Category B-F and B-J, requires that Class 1 welds be subjected to volumetric or surface examination, or both, during successive 120-month (10-year) intervals. According to the requirements referenced in Table IWB-2500-1, 100 percent of all nozzle to pipe DM welds in Examination Category B-F, and 25 percent of all piping welds with more than 1-inch nominal diameter in Examination Category B-J shall be inspected.

Table IWC-2500-1, Examination Category C-F-1 and C-F-2, requires that Class 2 piping welds be subjected to volumetric or surface examination, or both, during successive 120-month (10-year) intervals. According to above requirements, 7.5 percent of non-exempt piping welds in Examination Categories C-F-1 and C-F-2 shall be inspected.

### 3.5 Background

St. Lucie Unit 2 had previously implemented an RI-ISI program for Class 1 piping welds (ADAMS Accession No. ML050340312). The previous RI-ISI program had been developed in accordance with the NRC-authorized methodology described in Westinghouse Owners Group TR WCAP-14572, Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report" (ADAMS Accession No. ML012630349).

### 3.6 The Licensee's Proposed Alternative

For the fourth 10-year ISI interval, the licensee submitted RR-7 for NRC authorization of an alternative to the requirements of the ASME Code for Class 1 and 2 piping. In RR-7, the licensee requested to change its earlier RI-ISI program to a plant-specific RI-ISI program for Class 1 piping (i.e., welds classified as Examination Category B-F and B-J welds) and Class 2 piping (i.e., welds classified as Examination Category C-F-1 and C-F-2) that is consistent with EPRI TR-112657, Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure" (ADAMS Accession No. ML013470102).

The licensee proposed an alternative to the ASME Code Table IWB-2500-1 (Examination Category B-F and B-J) and Table IWC-2500-1 (Examination Category C-F-1 and C-F-2) required inservice inspection of welds.

In Section 1 of the relief request, the licensee stated that it will implement the alternative RI-ISI program in accordance with EPRI TR-112657, Revision B-A (ADAMS Accession No. ML013470102), which was approved by NRC by letter dated October 28, 1999 (ADAMS

Accession No. ML993190460). The licensee also stated that they prepared the RI-ISI application for relief consistent with ASME Code Case N-578-1, "Risk-Informed Requirements for Class 1, 2, or 3 Piping, Method B, Section XI, Division 1," Copyright ASME, New York, New York, March 28, 2000. Similar requests for alternative programs based on EPRI TR-112657 have been approved by NRC staff for numerous other nuclear facilities, including:

Relief Request No. RR-III-02 for the V. C. Summer Nuclear Station, approved by letter dated September 6, 2005 (ADAMS Accession No. ML052300616);

Relief Request No. A-1 for the Comanche Peak Nuclear Power Plant, approved by letter dated October 5, 2006 (ADAMS Accession No. ML062750371);

Relief Request No. IR-3-01 for the Callaway Energy Center, approved by letter dated January 3, 2007 (ADAMS Accession No. ML063520007); and

Relief Request No. RI-ISI-INT3 for the Diablo Canyon Power Plant, approved by letter dated January 16, 2013 (ADAMS Accession No. ML12353A130).

### 3.7 The Licensee's Basis for Use

The licensee stated that its proposed RI-ISI program is based on the NRC-approved EPRI TR-112657, Revision B-A, methodology. EPRI TR-112657 provides technical guidance for selecting and categorizing piping components based on their risk significance as part of a plant-specific RI-ISI program, which will serve as an alternative to the ASME Code requirements for ISI of piping.

The licensee stated that its proposed RI-ISI program will replace the ISI requirements of the ASME Code for the Class 1 and 2 welds under consideration (Examination Categories B-F, B-J, C-F-1 and C-F-2). Other non-related portions of the ASME Code, Section XI, will be unaffected.

The licensee stated that its proposed RI-ISI program meets the intent of RG 1.174, RG 1.178, RG 1.200, and the defense-in-depth philosophy, and that the proposed RI-ISI program complies with the acceptance guidelines and the key principles of the risk-informed regulation specified in RG 1.174.

In Section 2.2 of RR-7, the licensee stated that during development of St. Lucie Unit 2, RI-ISI program, it considered augmented inspection programs to address generic piping degradation. These augmented inspections will not be affected by the proposed RI-ISI program and the licensee will continue to implement them.

The licensee stated that the existing flow-accelerated corrosion (FAC) augmented inspection program effectively manages degradation by the FAC mechanism, and that no additional credit will be taken for the FAC augmented examinations. There is also no credit taken for the pressurized water stress corrosion cracking (PWSCC) examinations performed in accordance with ASME Code Case N-770-1.

### 3.8 NRC Staff Evaluation

The NRC staff reviewed and evaluated the licensee's proposed RI-ISI program, including those portions related to the applicable risk-informed methodology and processes, according to the guidelines for acceptance provided in RGs 1.174 and 1.178, SRP 3.9.8, and EPRI TR-112657, Revision B-A. During the evaluation, NRC staff focused on whether the proposed alternative provides an acceptable level of quality and safety, pursuant to 10 CFR 50.55a(z)(1).

In support of this relief request, the licensee used the methodology of the NRC-approved EPRI TR-112657, Revision B-A, to develop the proposed St. Lucie Unit 2, RI-ISI program. In addition, the licensee utilized the guidance in RG 1.174, RG 1.178, and RG 1.200 to assess the nature and impact of the licensing basis change (i.e., the change to the ASME Code ISI program), which is supported with risk insights. EPRI TR-112657 provides technical guidance for selecting and categorizing the risk significance of piping components for the purpose of developing a plant-specific RI-ISI program which can serve as an alternative to the ISI program required by the ASME Code. In accordance with the NRC safety evaluation of EPRI TR-112657, Revision B-A, it is acceptable to use this technical guidance provided that it is supplemented by plant-specific information. The plant-specific information includes the scope of the proposed RI-ISI program, plant-specific engineering analysis, implementation and monitoring program.

#### Evaluation of Scope of the Proposed Plant-Specific RI-ISI program

From review of RR-7, the NRC staff verified that the scope of the licensee's proposed RI-ISI program is limited to Class 1 Examination Category B-F nozzle to pipe DM welds, Class 1 Examination Category B-J similar and DM piping welds, Class 2 Examination Category C-F-1 piping welds, and Class 2 Examination Category C-F-2 piping welds. The NRC staff also verified that the licensee followed the procedure and guidelines contained in the NRC-approved EPRI TR-112657, Revision B-A, to develop the proposed St. Lucie Unit 2, RI-ISI program. As an example, the licensee used industry operating experience (OE) and plant-specific piping failure information to identify piping degradation mechanisms and failure modes at St. Lucie Unit 2; performed consequence evaluations and pipe failure assessments to establish piping segment safety ranking; and determined inspection locations and risk significant welds. Therefore, the NRC staff determined that the scope of the proposed changes acceptable since it is consistent with the guidance in RG 1.147.

Furthermore, the NRC staff verified that the licensee implemented augmented inspection programs to address generic piping degradation problems, as required either by the NRC to preclude piping failure or by the industry's good practice guidelines. The augmented inspection programs that will not be changed by the proposed RI-ISI program and will continue to be implemented are as follows:

#### *Augmented inspection program for managing thermal stratification (NRC Bulletin 88-11):*

This program addresses monitoring the pressurizer surge line piping for unexpected movement attributed to thermal stratification. Since the proposed RI-ISI program does not address visual examination of these pipes for thermal stratification, this augmented inspection will remain in effect.



*Augmented inspection program for the PWSCC susceptible Alloy 600/82/182 DM butt welds pursuant to 10 CFR 50.55a(g)(6)(ii)(F):*

This program addresses examinations of Alloy 600/82/182 DM butt welds for PWSCC in accordance with the requirements of ASME Code Case N-770-1 subject to conditions in 10 CFR 50.55a(g)(6)(ii)(F)(1). The requirement of 10 CFR 50.55a(g)(6)(ii)(F)(1) takes precedence, even though the examination of Alloy 600/82/182 DM butt welds due to PWSCC is considered administratively in the RI-ISI program. The licensee will remove the Alloy 600/82/182 DM butt welds that are not susceptible to other degradation mechanism from the RI-ISI program. The licensee will consider the Alloy 600/82/182 DM butt welds that are susceptible to another degradation mechanism other than PWSCC in the RI-ISI program in the same population as those subject to the additional degradation mechanism. This augmented inspection will remain in effect.

*Augmented inspection program for managing thermal fatigue (MRP-146):*

This program addresses management of thermal fatigue in normally non-isolable reactor coolant system branch lines in accordance with MRP-146. Since the proposed RI-ISI program does not address all criteria specified in MRP-146, this augmented inspection will remain in effect.

*Augmented inspection program for the PWSCC susceptible Alloy 600/82/182 DM butt welds pursuant to 10 CFR 50.55a(g)(6)(ii)(E):*

This program addresses bare metal visual examination (VE) of Alloy 600/82/182 DM butt welds for PWSCC in accordance with the requirements of ASME Code Case N-722-1 subject to conditions in 10 CFR 50.55a(g)(6)(ii)(E)(1). The bare metal VEs are performed on these welds to monitor for the potential PWSCC. Since the proposed RI-ISI program does not address the bare metal VEs of Alloy 600/82/182 DM butt welds, this augmented inspection will remain in effect.

*Augmented inspection program for high energy main steam and main feedwater piping welds (NUREG-0800, SRP 3.6.2, Branch Technical Position MEB 3-1):*

This program addresses high energy line-breaks. Since the proposed RI-ISI program does not address the examination of welds due to high energy line-breaks, this augmented inspection will remain in effect.

*Augmented inspection program for feedwater piping (NRC Bulletin 79-13 and NRC Information Notice 93-20):*

This program addresses cracking of feedwater piping due to thermal fatigue. Since the proposed RI-ISI program does not address all criteria specified in NRC Bulletin 79-13 and NRC Information Notice 93-20, this augmented inspection will remain in effect.

*Augmented inspection program for erosion/corrosion induced pipe wall thinning (NRC Generic Letter 89-08):*

This program addresses examination of piping for FAC and will remain in effect.

Therefore, the NRC staff determined that the licensee's strategy to continue to implement the existing augmented inspection programs for management of specific piping degradation is acceptable, since these programs address either the NRC's requirements or the industry's good practice initiatives.

#### Evaluation of Plant-Specific Engineering Analysis

Consistent with the guidance in RG 1.174, an acceptable plant -specific engineering evaluation should include both traditional and probabilistic analyses; should be based on the as-built, as-operated, and maintained plant; and should reflect the OE at the plant. From the review of RR-7, the NRC staff verified that the licensee's plant-specific analysis included traditional engineering methods combined with insights from PRA. This is consistent with the guidance in RG 1.174 that requires an engineering evaluation of the proposed changes by using a traditional engineering analysis integrated with PRA. The outcome of the plant-specific engineering analysis aided the licensee in categorizing the risk significance of the piping segments at the plant, determination of the number of locations to be inspected, selection of the inspection locations, and determination of inspection methods.

The NRC staff found that the licensee's plant-specific engineering analysis included defining piping segments, determining failure potential of each segment, determining consequences of failure of piping segments, and risk characterization (as shown in Tables 3.1 - 3.6 and 5.1 - 5.2 of RR-7). In defining piping segments, the licensee identified the segments as continuous lengths of pipe whose failure leads to the same consequence due to exposure to the same degradation mechanisms. Some lengths of pipe whose failure would lead to the same consequences are split into more segments when different regions are exposed to different degradation mechanisms. In determining piping failure potential and failure degradation mechanism categories, the licensee utilized existing industrywide failure history, OE, and the actual service experience at St. Lucie Unit 2. In evaluating consequence of piping segment failure, the licensee included direct and indirect effects of the pipe failure. In risk characterization, the licensee evaluated the potential of failure and failure consequence of each run of piping to determine its impact in terms of the probability of core damage and large early release. Risk groups are then defined as welds within a single system potentially susceptible to the same degradation mechanism and whose failure would result in the same consequence. The licensee ranked risk groups based upon their safety significance. The licensee determined the number of weld inspections and the level of inspection from the safety significance. Therefore, the NRC staff determined that the process followed by the licensee to conduct plant-specific engineering analysis for the purpose of determining risk significant locations and locations where failure mechanisms are likely to be present is acceptable because the process is consistent with the procedure prescribed in EPRI TR-112657, Revision B-A, and the general guidance in RG 1.174 and RG 1.178.

In evaluating the licensee's proposed alternative, the NRC staff assessed compliance of the proposed changes to the ISI program with the key principles of the risk-informed regulation as discussed in RGs 1.174 and 1.178, SRP 3.9.8, and EPRI TR-112657. An acceptable RI-ISI program meets these five key principles of risk-informed decision-making as follows:

- Principle 1     The proposed change meets the current regulations unless it is explicitly related to a requested exemption (i.e., a specific exemption under 10 CFR 50.12, "Specific Exemptions").
- Principle 2     The proposed change is consistent with a defense-in-depth philosophy.
- Principle 3     The proposed change maintains sufficient safety margins.
- Principle 4     When proposed changes result in an increase in core damage frequency (CDF) or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.
- Principle 5     The impact of the proposed change should be monitored using performance measurement strategies.

The NRC staff determined that the licensee met Principle 1 of RG 1.174 because the proposed RI-ISI program is an alternative to the ASME Code ISI program, as may be requested for NRC authorization pursuant to 10 CFR 50.55a(z)(1). This affirms that an exemption request is not required because the licensee's proposed CLB change (i.e., using an alternative RI-ISI program) meets the current regulation.

In accordance with RG 1.174, the engineering analysis should evaluate whether the impact of the proposed RI-ISI program (i.e., the proposed change to the ISI program) is consistent with the defense-in-depth philosophy. The NRC staff confirmed that as part of the RI-ISI process, the licensee performed a plant-specific engineering analysis according to the guidance in the NRC-approved EPRI TR-112657, Revision B-A; assessed susceptibility of each piping segment to a particular degradation mechanism that may be a precursor to leak or rupture; assessed consequence of failure of the segment independent of failure potential; and determined the risk significant locations and the number of locations to inspect. The NRC staff notes that the safety-significance categorization and the specification of the subsequent number and location of elements to inspect are to maintain the basic intent of the ISI, thus to ensure that defense-in-depth is maintained, as discussed in NRC-approved EPRI TR-112657, Revision B-A. Therefore, the NRC staff determined that the licensee met Principle 2 of RG 1.174 and the proposed change (St. Lucie Unit 2, RI-ISI program) is consistent with a defense-in-depth philosophy.

In accordance with RG 1.174, the engineering analysis should assess whether the impact of the proposed RI-ISI program (i.e., the proposed change to the ISI program) is consistent with the principle that sufficient safety margins are maintained. The NRC staff notes that there are no changes made by the RI-ISI process to the evaluation of design basis accidents in the final safety analysis report, as discussed in NRC-approved EPRI TR-112657, Revision B-A. Therefore, the NRC staff determined that the licensee met Principle 3 of RG 1.174 and the proposed change (St. Lucie Unit 2, RI-ISI program) maintains sufficient safety margins.

In accordance with RG 1.174, Principle 4, an acceptable alternative RI-ISI method will result in a net reduction in risk, as indicated by potential changes in CDF and large early release frequency (LERF). This determination requires an estimate of the change in risk due to the alternative method. The change in-risk estimate is dependent on the location of inspections in the proposed RI-ISI program compared to the location of inspections that would be performed using the requirements of the ASME Code, Section XI. The NRC staff has previously

determined that it is not necessary to develop a new deterministic ASME program for each new 10-year ISI interval. Instead, it is acceptable to compare the new proposed RI-ISI program with the last deterministic ASME program. A review of the table in Section 3.6.1 of RR-7 confirmed that the estimated cumulative change in CDF and LERF associated with the proposed alternative St. Lucie Unit 2, RI-ISI program resulted in a decrease in risk. In addition, in Section 3.6.1 of the relief request, the licensee stated that the change in risk of implementing the RI-ISI program was determined to meet the requirements of Section 3.7 "Risk Impact Assessment," in EPRI TR-112657, Revision B-A, which has already been accepted by NRC as an acceptable change in risk. Therefore, the NRC staff finds that implementation of the RI-ISI program will have a small and acceptable impact on risk consistent with the acceptance guidelines in RG 1.174.

The fourth key principle also requires demonstration of the technical adequacy of the PRA. As discussed in RGs 1.178 and 1.200, an acceptable change in risk evaluation (and risk-ranking evaluation used to identify the most risk significant locations) requires the use of a PRA of appropriate technical adequacy that models the as-built and as-operated plant. EPRI TR-1021467, Revision B-A provides guidance on the minimum acceptable quality requirement for a PRA used to support a risk-informed inservice inspection program. The licensee stated that the Combustion Engineering Owners Group conducted a peer review of the St. Lucie PRA and published the results in WCAP-16034 in February 2003. In December of 2005, St. Lucie underwent an independent peer review under MARACOR Software and Engineering. In October 2007, St. Lucie performed a self-assessment of the 2002 peer review and the 2005 assessment to identify gaps and to conform to RG 1.200 Revision 1. In July 2009, a focused peer review on LERF was performed by Pressurized-Water Reactor Owners Group (PWROG) using the ASME PRA Standard as clarified by RG 1.200 Revision 1. In August 2009, a focused peer review on St. Lucie's Common Cause Failure methodology and review data was performed using the ASME Standard as clarified by RG 1.200 Revision 2. In April 2011, a focused peer review on Data Analysis, Internal Flooding Analysis and Human Reliability Analysis was performed by PWROG using the ASME PRA Standard as clarified by RG 1.200 Revision 2.

The licensee provided its evaluation of all identified gaps and stated that the latest PRA model is adequate to support this RI-ISI application based on a review of the gaps and their significance. In Table B-1 of the licensee's submittal, they provided the open Facts and Observations (F&Os) and the impact to the RI-ISI application, but did not provide the F&O description and the Capability Category assigned by the peer review team. F&Os that did not appear to meet the EPRI table were evaluated using "St. Lucie Units 1 and 2, Transition to 10 CFR 50.48(c) – NFPA [National Fire Protection Association] 805 Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants, 2001 Edition" (ADAMS Accession No. ML13088A173). Based on the information in the NFPA 805 submittal, the staff determined that the resolutions were adequate for the RI-ISI program. The NRC staff finds that the licensee has assessed the technical adequacy of its PRA using an appropriate version of RG 1.200 and the PRA is consistent with the quality requirements in EPRI TR-1021467. Therefore, the NRC staff determined that the proposed St. Lucie Unit 2, RI-ISI program is consistent with the intent of the Commission's Safety Goal Policy Statement, and that Principle 4 of RG 1.174 is met.

#### Evaluation of Implementation and Monitoring Program

In accordance with RG 1.178 and RG 1.174, implementation and performance monitoring strategies should be planned to ensure that the engineering evaluation conducted to examine

the impact of the proposed changes continues to reflect the actual reliability and availability of systems that have been evaluated. When the examination of a weld under the proposed RI-ISI program is not practical, or is limited because of physical constraints or radiation hazards, alternative inspection intervals, scope, and methods should be developed to ensure that piping degradation is detected and structural integrity is maintained. From review of RR-7, the NRC staff found that the licensee has considered the proposed St. Lucie Unit 2, RI-ISI program as a living program. The licensee stated that its program implementation will require feedback of new relevant information to ensure the appropriate identification of high safety-significant piping locations. At a minimum, it will review the risk ranking of piping segments and update the St. Lucie Unit 2, RI-ISI program on the basis of periods that coincide with the inspection program requirements contained in the ASME Code. Significant changes may require updating the proposed RI-ISI program more frequently. Therefore, the NRC staff determined that the licensee demonstrated that its proposed RI-ISI program is a living RI-ISI program that will be periodically reviewed and updated, and that Principle 5 of RG 1.174 is met.

Based on the above, the NRC staff determined that the proposed RI-ISI program for the fourth 10-year ISI interval met the five key principles of risk informed regulation, therefore, provides an acceptable level of quality and safety.

#### 4.0 CONCLUSION

Based on the discussion in Section 3 of this safety evaluation, the NRC staff determines that the five key principles of risk-informed decisionmaking are ensured by the licensee's proposed fourth 10-year RI-ISI program. Therefore, the licensee's proposed fourth 10-year RI-ISI program is acceptable. The NRC staff finds that the proposed alternative provides an acceptable level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(z)(1), and is in compliance with the ASME Code's requirements. Therefore, the NRC authorizes the use of the alternative RI-ISI program at St. Lucie Unit 2 for the fourth 10-year ISI interval, which commenced on August 8, 2013, and will end on August 7, 2023.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the staff remain applicable, including the third party review by the Authorized Nuclear Inservice Inspector.

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Date: August 10, 2015

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- 2 -

the fourth 10-Year ISI interval, which commenced on August 8, 2013, and will end on August 7, 2023.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the staff remain applicable, including the third party review by the Authorized Nuclear In service Inspector.

If you have any questions, please contact the Project Manager, Farideh Saba at 301-415-1447 or via e-mail at [Farideh.Saba@nrc.gov](mailto:Farideh.Saba@nrc.gov).

Sincerely,

/RA/

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Docket No.: 50-389

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