FPL

March 29, 2016

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555-0001

L-2016-063
10 CFR 54

St. Lucie Unit 2
Docket No. 50-389
License Renewal One-Time Inspection of Class I Small Bore Piping Inspection Plan Submittal

References:

1. Safety Evaluation Report Related to the License Renewal of St. Lucie Nuclear Plant, Units 1 and 2, NUREG-1779, September 2003.

2. Letter from Joseph Jensen (FPL) to U.S. Nuclear Regulatory Commission (L-2014-059), "License Renewal One-Time Inspection of Class 1 Small Bore Piping Revised Commitments," March 19, 2014, ADAMS Accession Number ML14087A007.

3. Generic Aging Lessons Learned (GALL) Report, NUREG-1801, Rev. 2, December 2010.

4. NRC Safety Evaluation, St. Lucie Unit No. 1 - One-Time Inspection Small-Bore Piping Inspection Plan, May 11, 2015 (TAC MF4754, Adams Accession Number ML15069A172).

5. Letter from Christopher Costanzo (FPL) to U.S. Nuclear Regulatory Commission (L-2015-126), "License Renewal One-Time Inspection of Class 1 Small Bore piping Revised Commitments and Revised Inspection Plan," May 11, 2015, (Adams Accession Number ML15140A394).

Florida Power and Light Company (FPL) has License Renewal (LR) commitments for St. Lucie Units 1 and 2 to perform a one-time inspection of Class 1 Small Bore Piping prior to the end of the initial operating license term. For St. Lucie Unit 2 specifically, this inspection was originally addressed by Commitment 5 listed in Appendix D, Table 2 of Reference 1. The Unit 2 small bore piping inspection requirements were revised in Reference 2, such that this one-time inspection will follow the guidance provided in the Reference 3, Section AMP XI.M35, "One-Time Inspection of ASME Code Class 1 Small- Bore Piping."

Approval of a similar plan for St. Lucie Unit 1 was recorded in Reference 4 with the exception of the commitment change request for destructive examination of full penetration welds, which was addressed in Reference 5.

A047

The Unit 2 small bore piping inspection requirements were also revised in References 2 and 5, such that this one-time inspection will follow the guidance provided in the Reference 3, Section AMP XI.M35, "One-Time Inspection of ASME Code Class 1 Small Bore Piping", with the exception that opportunistic destructive examination may be used for butt welds.

Commitment 5 listed in Appendix D, Table 2 of Reference 1 and St. Lucie Unit 2 Updated Final Safety Analysis Report (UFSAR), Section 18.1.4, "Small Bore Class I Piping Inspection" states that a report describing the details of the one-time inspection plan will be submitted prior to the implementation of the inspection. To comply with UFSAR Section 18.1.4 requirements, the one-time Class 1 Small Bore Piping Program Inspection Plan is provided herein in the Attachment.

Should you have any questions, please contact Mr. Mike Snyder, Licensing Manager, at 772-467-7036.

Very truly yours,

Christopher Costanzo
Site Vice President
St. Lucie Plant

Attachment

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, St. Lucie Nuclear Plant
USNRC Senior Resident Inspector, St. Lucie Nuclear Plant

St. Lucie Unit 2
ASME Code Class 1 Small-Bore Piping
One-Time Inspection Plan, Revision 0

Plan Description

This plan augments the requirements in American Society of Mechanical Engineers (ASME) Code, Section XI, 1998 edition with Addenda through 2000, and is applicable to small-bore ASME Code Class 1 piping and systems less than 4 inches nominal pipe size (less than NPS 4) and greater than or equal to NPS 1. The plan includes pipes, fittings, branch connections, and all full and partial penetration (socket) welds. This plan was developed using the Generic Aging Lessons Learned (GALL) Report, NUREG-1801, Rev. 2 XI.M35; One-Time Inspection of ASME Code Class1 Small-Bore Piping as guidance with the exception that destructive testing may be performed on full penetration (butt) welds as an alternate to volumetric examination.

A one-time inspection to detect cracking resulting from thermal and mechanical loading, vibration, or intergranular stress corrosion of full penetration welds will be performed by volumetric or destructive examination. A one-time inspection to detect cracking in socket welds will be performed by either volumetric or destructive examination. The number of welds to be examined will be on a sample basis as described in Section 4 of this plan. The sample of welds to be examined will be selected using the risk-informed approach as approved by the NRC for St. Lucie Nuclear Plant, Units No. 1 and 2 –Fourth 10-Year Interval Inservice Inspection Program Plan Relief Request No. 1 (TAC NO. MD7739)

These inspections will provide additional assurance that either aging of small-bore ASME Code Class 1 piping is not occurring or the aging is insignificant, such that a plant-specific Aging Management Program (AMP) is not warranted. Should evidence of cracking be revealed by the one-time inspection, a periodic inspection plan will be developed and implemented using a plant-specific AMP.

GALL XI.M35 Element 4, Detection of Aging Effects identifies two sample sizes which is determined based on whether or not an applicant has never experienced a failure in its ASME Code Class 1 piping.

A search of the St. Lucie Corrective Action system and the ASME Section XI, Repair and Replacement Reports over the operating history of St. Lucie Unit 2 was performed to determine if any ASME Code Class 1 Small-Bore Piping greater than or equal to NPS 1 and less than NPS 4 had experienced cracking.

Condition Report 01980340 identified a weld leak on pipe SI-237 between 2B1 SIT and V3811. This failure was reported on July 25, 2014 by Licensee Event Report (LER), St. Lucie Unit 2, Docket 05000389, LER Number 2014-001-00 and later on LER 2014-001-01 on January 30, 2015 Unit Shutdown Due to Leak on Safety Injection Tank Vent Valve Piping.

The welded connection which failed was installed in March of 2014 as part of Engineering Change (EC) 279581, Replace Unit 2 V3811 with a Flowserve model valve.

The connection failed within six (6) months of the installation. As identified in the LER the cause of the event was determined that the repair and replacement of vent valve V3811 was not performed as prescribed in the work order documents utilized by plant maintenance. This resulted in a number of adverse factors which ultimately resulted in the failure of the pipe nipple upstream of the vent valve due to outside diameter initiated, high cycle, low stress fatigue.

The installation was not representative of an acceptable installation as such the failure is not meaningful with respect to the objective of GALL Program XI.M35 which is to detect cracking resulting from thermal and mechanical loading or intergranular stress corrosion of full-penetration and partial penetration socket welds. Therefore the smaller sample size for plants which have not experience cracking of Class 1 piping as described in GALL XI.M35 Attribute 4, Detection of Aging effects is applicable.

Evaluation and Technical Basis

1. ***Scope of Plan:*** This plan is a one-time inspection of a sample of ASME Code Class 1 piping less than NPS 4 and greater or equal to NPS 1. This plan includes measures to verify that degradation is not occurring, thereby confirming that there is no need to manage age-related degradation. The one-time inspection plan for ASME Code Class 1 small-bore piping includes locations that are susceptible to cracking. The sample of welds will be selected using the risk-informed approach as approved by the NRC for St. Lucie Nuclear Plant, Unit No. 2 -Fourth 10-Year Interval Inservice Inspection Program.

   All ASME Class 1 pipe segments less than 4-inch NPS and greater than equal to 1-inch NPS have the same Low Safety Significance Risk Ranking and, as such, all welds were given the same level of consideration.

2. ***Preventive Actions:*** This plan is a condition monitoring activity independent of methods to mitigate or prevent degradation.

3. ***Parameters Monitored/Inspected:*** This inspection is intended to detect potential cracking in ASME Code Class 1 small-bore piping.

4. ***Description of Aging Effects:*** This one-time inspection is designed to provide assurance that aging of ASME Code Class 1 small-bore piping is not occurring, or that the effects of aging are not significant. The one-time inspection to detect cracking in socket welds will be either a volumetric or destructive examination. The inspection to detect cracking resulting from thermal and mechanical loading, vibration, or intergranular stress corrosion of full penetration welds will be a volumetric or destructive examination. Volumetric examination will be performed using demonstrated techniques from the ASME Code that are capable of detecting the aging effects in the examination volume of interest. The inspection will be performed at a sufficient number of locations to ensure an adequate sample. This number, or sample size, is based on susceptibility, accessibility, dose considerations, operating experience, and limiting locations of the total population of ASME Code Class 1 small-bore piping inspections.

The inspection sample size will be at least 3%, up to a maximum of 10 welds, of each weld type, for each operating unit using a methodology to select the most susceptible and risk-significant welds from the risk-informed approach as described above. For socket welds, destructive examination may be performed in lieu of volumetric examinations. Because more information can be obtained from a destructive examination than from nondestructive examination, credit will be taken for each weld destructively examined equivalent to having volumetrically examined two welds.

St. Lucie Unit 2					
Weld Type	Approx. Number	3%	Sample Size (Max 10 Welds Each Type)		
			Volumetric	OR	Destructive
Socket (NPS-2 and smaller)	440	14	N/A		5
Full Penetration (NPS-2 and less than NPS-4)	137	5	5 Less any destructive		See Note 1

Note(s)
1) A destructive examination may be performed on a butt weld instead of a volumetric examination, if an opportunity presents itself.

Destructive Examination (DE) provides more information on the potentially developing cracks than a volumetric examination. DE is useful in a determination of a specific flaw mechanism, if a flaw is present in the weld. This has been proven previously, when a DE was performed on the retired pressurizer nozzles from St. Lucie Unit 1 pressurizer. (Ref. EPRI Letter MRP 2008-053, "St. Lucie Unit 1 Retired PZR Safety "A" Nozzle DM Weld Destructive Examination Report, pbadupws.nrc.gov ML0824480225).

5. ***Monitoring and Trending:*** This is a one-time inspection to determine whether cracking in ASME Code Class 1 small-bore piping resulting from stress corrosion, cyclical (including thermal, mechanical, and vibration fatigue) loading, or thermal stratification and thermal turbulence (MRP 146 and MRP 146S) is an issue. Evaluation of the inspection results may indicate the need for additional or periodic examinations (i.e., a plant-specific AMP for Class 1 small-bore piping using volumetric inspection methods consistent with ASME Code, Section XI, Subsection IWB).

6. ***Acceptance Criteria:*** If flaws or indications exceed the acceptance criteria of ASME Code, Section XI, Paragraph IWB-3400, they are evaluated in accordance with ASME Code, Section XI, Paragraph IWB-3131; additional inspections are performed in accordance with ASME Code, Section XI, Paragraph IWB-2430. Evaluation of flaws identified during a volumetric examination of socket welds will be in accordance with IWB-3600.

7. ***Corrective Actions:*** The site corrective action program, quality assurance procedures, site review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. Should evidence of cracking be revealed by the one-time inspection, a periodic inspection will be developed and implemented, using a plant-specific AMP.

8. ***Confirmation Process:*** The requirements of 10 CFR Part 50, Appendix B are used to address the confirmation process.

9. ***Administrative Controls:*** The requirements of 10 CFR Part 50, Appendix B are used to address the administrative controls.

10. ***Operating Experience:*** This one-time inspection plan uses volumetric inspection techniques with demonstrated capability and a proven industry record and/or destructive examinations to detect cracking in piping weld and base material. Currently, an industry proven volumetric technique for detection, sizing and performing analytical evaluation of flaws in socket welds has not been established; therefore, a destructive examination will be performed.