FEB 0 2 2017

L-2017-017
10 CFR 50.4
10 CFR 50.55a

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Re: St. Lucie Unit 1
Docket No. 50-335
Renewed Facility Operating Licenses DPR-67
Inservice Inspection Plan
Fourth Ten-Year Interval Unit 1 Relief Request No. 14, Revision 0

Pursuant to 10 CFR 50.55a(z)(2), Florida Power & Light (FPL) requests relief from the examination requirements of the ASME Code, Section XI, 2001 Edition through 2003 Addenda, for the subject 1B2 Reactor Coolant Pump lower seal heat exchanger weld repair. FPL requests that this relief be approved prior to entering Mode 4 during the restart from the Unit 1 Forced Outage, currently scheduled to occur on February 4, 2017.

The attachment to this letter provides FPL's justification for this relief request.

Please contact Michael Snyder at (772) 467-7036 if there are any questions about this submittal.

Sincerely,

Michael J. Snyder
Licensing Manager
St. Lucie Plant

Attachment
MJS/KWF

cc: USNRC Regional Administrator, Region II
USNRC Senior Resident Inspector, St. Lucie Units 1 and 2

Proposed Alternative
in Accordance with 10 CFR 50.55a(z)(2)
--Hardship without a compensating increase in quality and safety—

1. ASME Code Component(s) Affected

Florida Power & Light (FPL) is proposing an alternative repair to the St. Lucie Unit 1, 1B2 Reactor Coolant Pump (RCP) seal heat exchanger cooling line tube base material.

The seal heat exchanger is a tube in tube type. The inner tube material is 1.5 inch outside diameter (OD) ASME Class 1, SA-213 Type 316 tubing. The minimum wall thickness is 0.125 inches. The location of the flaw is where the inner reactor coolant pressure boundary tube (2-2-4 in Figure 1 below) exits the outer tube of the heat exchanger (Item 2-2-3 in Figure 1 below) before returning to the pump cover.

ST LUCIE 1B2 RCP HEAT EXCHANGER FLAW

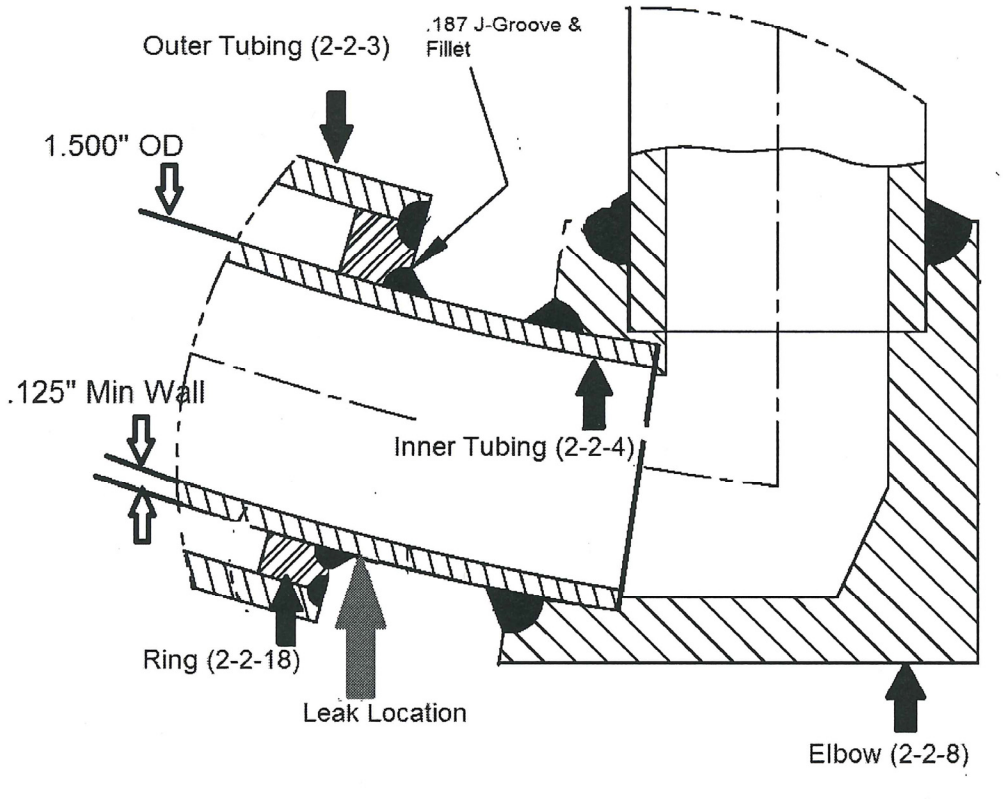

FIGURE 1

Design Information

Component: Reactor Coolant Pump 1B2 Seal Heat Exchanger

Manufacturer: Flowserve Corporation, Vernon, CA

Purchase Order: 02295699 Rev. 008

Flowserve Sales Order: RLCU00156

Design Conditions:

Design Pressure:	2500 PSI
Design Temperature:	650 °F

Operating Conditions:

Operating Pressure:	2250 PSIA	
Normal Operating Temperature	105-135°F	(Lower Cavity)

Heat Exchanger Tube (Inner 2-2-4))

Outside Diameter:	1.500”
Wall:	0.125” Minimum
Material:	ASME SA 213 TP 316 Annealed

Ring (2-2-18)

Material: ASME-SA-182 GR F316

Weld: 0.187 J-Groove and Fillet

Weld Material: ER 316L

NDE for Weld: Visual and Liquid Penetrant Exam

Hydrostatic Test Pressure: 3175 PSI

2. Applicable Code Edition and Addenda

The in-service inspection Code edition and addenda applicable to St. Lucie Unit 1 for the current inspection interval are ASME Section XI 2001 Edition with Addenda through 2003. St. Lucie Unit 1 is currently in the 4th interval that ends February 10, 2018.

The code of construction for the reactor coolant pump (RCP) seal tube material, which is part of the RCP cover and seal assembly, is ASME Section III Class 1, 1971 Edition through Summer 1973 Addenda.

3. Applicable Code Requirement

The repair of the seal cooling tube base material is being performed in accordance with ASME Section XI, IWA-4000, "Repair/Replacement Activities," and specifically IWA-4422.2.2, "Defect Removal Followed by Welding or Brazing." The required examination following the base metal repair is per ASME Section XI, IWA-4520, Examination which states, "Welding or brazing areas and welded joints made for installation of items shall be examined in accordance with the Construction Code identified in the repair and replacement plan".

Since the repair is in the tube base material the examination is per ASME Section III, NB-2550, "Examination and Repair of Seamless and Welded (without filler metal) Tubular Products and Fittings." NB-2559, "Repair by Welding" refers to NB-2539 where the examination requirements are specified in NB-2539.4, "Examination of Repair Welds" and states, "Each repair weld shall be examined by the magnetic particle method in accordance with the requirements of NB-2545 or by the liquid penetrant method in accordance with the requirements of NB-2546. In addition , repair cavities, the depth of which exceeds the lesser of 3/8 inch or 10 percent of the section thickness shall be radiographed after repair in accordance with NB-5110 and to the acceptance standards of NB-5320……."

4. Reason for Request

On January 31, 2017, St. Lucie Unit 1 was shut down to investigate leakage in the 1B2 RCP shroud. The investigation revealed that the 1B2 RCP seal cooler heat exchanger tubing was leaking. The leak is located in the tube material near the toe of the fillet weld that joins the seal cooler tube (Figure 1, Item 2-2-4) and the heat exchanger ring (Figure 1 Item 2-2-18). Based on the location and apparent orientation of the leak/defect the likely cause is OD initiated fatigue. The flaw orientation and size will be further characterized as part of the initial surface visual and dye penetrant examinations prior to defect excavation to assure defect removal and will validate the initial cause. The cause and extent of condition will be determined by the station's corrective action program.

Florida Power & Light (FPL) is proposing an alternative to the NB-2539.4 radiographic examination requirement.

The geometry of the RCP seal cooling line and heat exchanger assembly as shown in Figure 1, does not allow for in-situ radiographic examination. Specifically, the design of the assembly in this location does not use full penetration welds, has various diameters/thicknesses and has multiple access obstructions which does not allow for a radiographic examination of the repair weld in the tube material.

The heat exchanger assembly is of all welded construction and disassembly to allow radiographic examination or replacement of a portion of the tube would require cutting and replacing numerous welds and portions of the heat exchanger. Disassembly of the heat exchanger assembly for repair or replacement of the pump cover assembly would be a hardship and require considerable personal radiation exposure without a compensating increase in quality or safety. The most recent RCP motor and pump assembly replacement resulted in a personnel exposure of approximately 10 Rem. For this reason FPL is requesting alternative examination as described below.

5. Proposed Alternative and Basis for Use

Proposed Alternative

FPL proposes to fully remove the flaw and perform a weld repair to restore the tube wall in accordance with the applicable ASME Code. An alternative is requested to the ASME Code nondestructive examination requirements as described below.

As an alternative to performing radiographic examination of the repair weld to the seal cooler tube material (NB-2539), FPL proposes that progressive dye penetrant examinations be performed.

The defect will be completely removed by mechanical means. The repair area will be excavated and prepared suitable for welding. The prepared excavation will be cleaned as complete as possible. As the repair is an open root weld, the back side of the joint (tube ID) will be purged to eliminate moisture and provide a backing gas for the root pass. The root pass will be dye penetrant examined to assure weld quality. Subsequent weld layers, until the minimum tube wall is restored, will also be dye penetrant examined to assure the weld quality. As an added level of assurance, additional weld metal overlay layer(s) will be applied to the repair area and incorporated into the existing fillet weld to provide a smooth transition between the fillet weld and the tube. This transition will resemble a 2:1 fillet weld configuration as much as physical access to the repair region permits. The final weld repair area will receive a dye penetrant examination to assure the quality of the completed repair. Since the flaw will be completely removed, and the Code compliant repair restores the full thickness of the tube, the original design requirements will be met and the repair will be a life time repair. The progressive dye penetrant examinations are expected to provide a comparable level of quality as the partial penetration and fillet welds used in the RCP seal cooler tube connection welds which are not volumetrically examined.

An alternate volumetric examination using ultrasonic examination is also not feasible due to the geometry of the heat exchanger.

Basis for use

The integrity of the tube base metal repair is assured by the use of ASME Section IX Code qualified weld procedures and qualified welders. The welding will be performed in accordance with the FPL Weld Control Program which incorporates multiple industry best practices. By following these welding requirements, elimination of the through wall defect in the tube material, restoring the pipe wall to the full thickness, including the addition of an overlay in the area of the repair, and performing the final dye penetrant testing, this repair will be Code compliant with the exception of a radiographic examination addressed by the alternative. The alternative of performing progressive dye penetrant examinations of the repair weld will assure that the repair does not introduce any major flaws. The application of an additional weld overlay/buildup in the repair area will provide a reasonable level of assurance that the weld repair will maintain its integrity and the examinations provide the same level of quality as performed on the seal cooler tube connection welds.

Following the progressive and final dye penetrant examinations, the seal heat exchanger tube will be pressure tested in accordance with ASME Section XI IWB-5000, System Pressure Tests to demonstrate leak tightness.

Although there are no in-service inspection requirements for this 1.5 inch seal cooler tube, a Reactor Coolant System Leak Test is performed every outage during both shutdown and startup. The Reactor Coolant System Leak Test is performed in accordance with plant procedures to verify the integrity of the reactor coolant system (RCS) by identifying any evidence of RCS leakage or boric acid residue. This procedure is credited as part of the site Boric Acid Corrosion Control Program and includes specific inspection areas including the reactor coolant pump seals, which is the specific area of the repair. The Reactor Coolant System ASME Leakage Test procedure is also performed every outage to detect leakage and verify integrity as required by ASME Section XI and plant Technical Specifications for Class 1 piping and components. Both of these procedures will continue to be invoked in future outages and shutdowns and will ensure the continued integrity of the 1B2 RCP seal cooler tube welded repair. These inspections also address the extent of condition.

FPL has determined that this proposed alternative is the only one available to be taken without creating a hardship or unusual difficulty without a compensating increase in the level of quality or safety.

6. Duration of Proposed Alternative

The St. Lucie Unit 1 ISI 4th interval ends February 10, 2018. Since the flaw will be completely removed, and replaced with a full penetration full thickness weld the duration of the proposed alternative is for the remaining service life of St. Lucie Unit 1. The St. Lucie Unit 1 Renewed Facility Operating License No. DPR-67 expires March 1, 2036.

7. Precedents

A flaw was identified at Millstone Nuclear Power Station Unit 2, in the same location that is being addressed by this relief request. The flaw was repaired by performing a similar flaw removal and through wall weld repair. The weld repair cavity and every pass of the applied weld repair were dye penetrant examined. Relief request RR-89-67 was submitted to the NRC by Dominion Nuclear Connecticut (ADAMS Accession ML 092710151) and received an NRC approval (ADAMS Accession ML 093570237) based upon the staff's determination that Code compliance would result in hardship without a compensating increase in the level of quality and safety. Specifically, a satisfactory radiographic examination could not be obtained due to poor accessibility and weld configuration which made it impossible to perform an acceptable Code required radiographic examination. The RCP was replaced in November 1992 and the flaw was identified in July 2009. The flaw was repaired in July 2009, over 7 years ago, and has been in-service since then with no signs of leakage.

The St. Lucie Unit 1 repair is essentially in the same location on the RCP seal cooling line as the repair identified in the Millstone RR-89-67 relief request.