FPL

APR 2 1 2016

L-2016-096
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
Inservice Inspection Plan
RAI Reply for Fourth Ten-Year Interval Unit 1 Relief Request No. 10, Revision 0

References:

1. FPL letter L-2015-218 dated August 27, 2015, "Fourth Ten-Year Interval Unit 1 Relief Request No. 10, Revision 0." Accession No. ML15251A209

2. NRR E-mail Capture - Request for Additional Information - St Lucie Unit 1 Relief Request No. 10 - MF6685. Accession No. ML16068A041

In Reference 1, Pursuant to 10CFR50.55a(z)(2), Florida Power & Light (FPL) requested relief from the examination requirements of the ASME Code, Section XI, 2001 Edition through 2003 Addenda, for the subject CEDM welds. Per Reference 2, the NRC requested additional information to support the review of the relief request. The responses to the requested information are attached to this letter.

Please contact Ken Frehafer at (772) 467-7748 if there are any questions about this submittal.

Sincerely,

Michael J. Snyder

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

A047
NRR

REQUEST FOR ADDITIONAL INFORMATION
ST. LUCIE, UNIT 1
FACILITY OPERATING LICENSE NO. DPR-67
FOURTH TEN YEAR INTERVAL RELIEF REQUEST NO. 10 REV. 0
DOCKET NOS. 50-335
CAC MF6685

By letter dated August 27, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15251A209), Florida Power & Light (FPL) proposed an alternative to the examination requirements of the ASME Code, Section XI, 2001 Edition through 2003 Addenda, for the control element drive mechanism (CEDM) housing welds at St. Lucie Plant, Unit 1 (SL-1). The licensee submitted Relief Request Number 10 as a proposed alternative to the ASME Code requirements. To complete its review, the Nuclear Regulatory Commission (NRC) requests the following additional information.

RAI-MF6685-EPNB-01

On page 14 of 16 of the proposed relief request, the licensee states that bare metal visuals have been performed on the reactor vessel head (RVH) in 2010 and 2015, after the head was replaced in 2005. In addition to this, have any surface examinations of weld number 5 been performed since the RVH was replaced? If so, provide the inspection results, inspection dates, and the number of inspected CEDM weld number 5's. Also state during which previous refueling outages that the surface examinations were performed.

FPL Response: There have been no surface examinations performed of the weld number 5 on any of the CEDMs during the current interval (2/11/2008 – 2/10/2018).

RAI-MF6685-EPNB-02

On page 14 of 16 of the proposed relief request, the licensee states that "Although these welds are inaccessible for PT, there are VT-2 examinations in the area of the RV head and CEDMs." Clarify that the inaccessibility is referring to the surface examination of welds numbers 1 through 4, not the VT-2 examination of the subject CEDM housing welds. Also clarify which welds are accessible for VT-2 inspections.

FPL Response: The inaccessibility is referring to the surface examination of welds numbers 1 through 4 and not the VT-2 examination of the subject CEDM housings. As stated on page 15 of the relief request, the required VT-2 examination is performed for all CEDMs from the 62' containment elevation by looking down from the platform above the CEDM housings. There is no permanent ladder down into the upper cavity and the temporary access for the outage is removed during upper head re-assembly and outage

de-mobilization. During mode ascension following reactor vessel re-assembly there is a 4 hour hold with the Reactor Coolant System at NOP/NOT conditions prior to beginning the examination. The examination is performed by VT-2 qualified personnel.

RAI-MF6685-EPNB-03

On page 4 of 16 of the proposed relief request, the licensee states that weld numbers 1 and 2 of the upper housing are the same grade as previously used at SL-1 and that they had not had any service-related degradation. State how long these subject welds had been in service prior to replacement of the RVH.

FPL Response: The original RVH weld numbers 1 and 2 had been in service for approximately 29 years from the commercial service date of December 21, 1976 through the removal from service and replacement of the reactor vessel closure head in fall of 2005.

RAI-MF6685-EPNB-04

On page 6 of 16 of the proposed relief request, the licensee states that the CEDM's have a vent at the top of the assembly, near weld number 1. Please discuss if this vent is used to remove trapped oxygen in the CEDM after reinstallation of the RVH. If so, also discuss how removing the trapped oxygen will help prevent weld degradation in the CEDM.

FPL Response: As stated on page 6 of 16 of the proposed relief request, "the upper end of the housings is designed to allow venting (if required)." However, CEDM venting is not regularly performed during post refueling fill and vent operations. As stated on page 14 of 16 of the proposed relief request, "CEDM weld No. 1 is the only weld potentially not in contact with coolant during operation. As the RCS pressure increases during start-up, the trapped volume of air is squeezed until the remaining volume is reduced to a fraction of its original volume. Further, during start up there is control rod drop testing which results in a rapid exchange of RCS coolant with the coolant in the CEDM column to further reduce the air volume. Eventually, the gas pocket would be expected to nearly disappear during plant operations as the gas was forced into solution and exchanged with the bulk RCS coolant. If a postulated through wall crack were to occur in an area of the CEDM upper pressure housing (CEDM Weld No. 1) that is air filled, the less dense air would escape more easily than RCS, removing the gas volume and bringing the through wall crack in contact with RCS coolant. Although these welds are inaccessible for PT, there are VT-2 examinations in the area of the RV head and CEDMs." Although removing trapped oxygen prior to initial startup by venting each CEDM is not regularly performed, the combination of mechanical agitation with rod drop, reducing the trapped air volume with operating pressure, and dissolution of trapped air, removes trapped oxygen that could cause weld degradation in the CEDM near weld No. 1.

For SCC to occur in the CEDM housing weld No. 1, the following three conditions must exist simultaneously: high tensile stresses, susceptible material, and a corrosive environment. While residual stresses are always present as a result of welding, the ID stresses are minimized since all welding is performed from the component outside diameter and the small diameter precludes the possibility for inside diameter repairs. The CEDM housing materials adjacent to weld No. 1 are 316 austenitic stainless steel and are joined with 316L austenitic stainless steel weld material, which are materials resistant to SCC in controlled RCS conditions. The RCS chemistry is controlled to reduce oxygen by the Chemistry Control Program with a Steady State limit of ≤ 100 ppb and a normal value of < 5 ppb during normal operation. Contaminants known to increase the susceptibility of austenitic stainless steels are also strictly controlled in the RCS environment by the Chemistry Control Program. The low temperature of the CEDM column near Weld No. 1 where any trapped air could potentially exist also tends to decrease the susceptibility to SCC mechanisms (i.e., The CEDM Weld No. 1 has been measured to be below 140°F during operation on the St. Lucie Unit 2 and compared to the parameters in St. Lucie Unit 1 and determined to be bounding). Therefore, the conditions for SCC degradation to occur in the CEDM housing are extremely unlikely to occur.

In addition, the 29 years of operating experience with the original St. Lucie Unit 1 reactor vessel CEDM housings without pressure boundary leakage provides additional justification that SCC degradation is unlikely to occur.