

## **DRAFT REQUEST FOR ADDITIONAL INFORMATION**

### **RELIEF REQUEST 2**

#### **WELD OVERLAY OF DISSIMILAR METAL WELDS**

##### **ST. LUCIE, UNIT 1**

By letter dated April 29, 2008, Florida Power & Light proposed an alternative Relief Request 2 (RR-2) to the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, for mitigating primary water stress corrosion cracking on dissimilar metal welds using full structural weld overlays (SWOL) at St. Lucie, Unit 1 (SL-1). Currently, the U.S. Nuclear Regulatory Commission (NRC) staff has approved the use of Code Case N-504-3, "Alternative Rules for Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Section XI, Division 1,;" and N-638-1, "Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique Section XI, Division 1."

The NRC staff used the requirements of Code Cases N-504-3 and N-638-1 as NRC-approved criteria associated with similar full SWOL applications to aid in the evaluation of the SL-1, RR-2 Attachment 2. To complete its review, the staff is requesting the following additional information:

1. Discuss whether the subject nozzles have been ultrasonically examined under the Inservice Inspection (ISI) program or Electric Power Research Institute (EPRI) report, MRP-139 in previous refueling outages. If so, discuss whether flaws have been detected in the subject nozzles.
2. Section 1.1, page 1. The Examination Category for the subject welds is identified as R-A. This is a risk-informed ISI examination category.
  - (A) Discuss whether after the weld overlay installation, will the ISI examinations be based on the RI-ISI program or the proposed RR-2?
  - (B) Discuss whether the subject welds will be removed from the RI-ISI program after the weld overlay installation.
3. Paragraph 2(a) of Attachment 2 of RR-2 states that the size of all flaws detected or postulated in the original weldment shall be projected to the end of the expected life of the overlay. Provide/describe the expected life of the overlay.
4. Paragraphs g(2) and g(3) of Code Case N-504-3 require evaluations of residual stresses and flaw growth of the repaired weldments. Similar evaluations are required by Section 2 of Attachment 2 to RR-2. Section 2(b)7 of Attachment 2 states that effects of any changes in applied loads, as a result of weld shrinkage from the entire SWOL on other items in the piping system, shall be evaluated.
  - (A) Confirm that the analysis will be performed to show that the requirements of Subarticles NB-3200 and NB-3600 of the ASME Code, Section III are satisfied.
  - (B) Confirm that the analysis includes the crack growth calculations to demonstrate that crack growth in the weld overlay or base metal is acceptable and residual stress distribution in the weld overlay and original weld demonstrate favorable stress distribution.
  - (C) The staff requests that the licensee submit the preliminary results of the

evaluations prior to entry into Mode 4 from the refueling outage and the final evaluations within 60 days of the plant restart.

5. Paragraphs 1(c)(1), 1(c)(1)(a), 1(c)(1)(b) of Attachment 2 of RR-2 provide the alternative to the post weld heat treatment (PWHT) of the Construction Code and Owner's Requirements. The alternative eliminates PWHT for weld overlays when the overlay is applied to P-No.1 base material. The staff still has not decided the acceptability of the elimination of post weld heat treatment in paragraphs 1(c)(1)(a) and 1(c)(1)(b). Please provide justification for the proposed alternative in these paragraphs.
6. Paragraph I-2.1(g)(2) of Mandatory Appendix I of Attachment 2 to RR-2 provides a means of determining an Adjustment Temperature for the welding procedure qualification. This Adjustment Temperature was not a part of Code Case N-638-1 and, therefore, has not been approved by the staff. Explain the technical basis of this requirement.
7. Section 5.2 of RR-2, states that a barrier layer of austenitic stainless steel filler metal across the austenitic stainless steel base metal to reduce the risk of cracks.
  - (A) Discuss whether paragraph (e) of Code Case N-504-3 is applicable to the barrier layer if austenitic stainless steel filler metal is applied. Paragraph (e) requires existence of certain delta ferrite content in the welded metal when austenitic stainless steel weld metal is used.
  - (B) Identify the austenitic stainless steel weld filler metal that will be used for the butter layer.
  - (C) Confirm that the Certified Material Test Report (CMTR) for the austenitic stainless steel filler wire shows a minimum delta ferrite of a specified amount. Provide the maximum and minimum delta ferrite content for the heat of austenitic stainless steel filler wire to be used, as stated on the CMTR.
8. What are the beginning and end dates for the fourth 10-year ISI interval at SL-1?
9. The following typographical errors were identified in the proposed alternative and should be corrected:
  - (A) On page 6, on the second line of the first full paragraph 2(b)(6) should be 2(b)(5), on the third line of the same paragraph 2(b)(7) should be 2(b)(6), on the eighth line of the paragraph 2(a)(2)(b) should be 2(a)(2)(a).
  - (B) On page 25, Section 2(a)(2)(b) in the third line "(b) or (c) above" should be deleted.
  - (C) On page 26, Section 2(b)(6) in the sixth line 2(b)(4), (5), or (6) should be 2(b)(3), (4), or (5).
  - (D) On page 36, Section I-2.1(f) should be changed to I-2.1(f)(4).
10. Mandatory Appendix I to Attachment 2 of RR-2 Section I-3(e) lists a number of methods that can be used in the welding procedure to determine interpass temperature. The staff's position is that the temperature measurement in 1-3(e)(1) should be used. If 1-3(e)(1) cannot be performed, 1-3(e)(2) or 1-3(e)(3) may be used. Please describe the method that will be used at SL-1 and provide a discussion of its acceptability.

11. Section 3(c)2 of Attachment 2 of RR-2 states no credit can be given in any portion of the examination volume where the ultrasonic beam passes through the cast stainless steel material.
  - (A) Provide the weld overlay thickness.
  - (B) Provide reduction in ultrasonic testing (UT) volume coverage for the weld overlay locations which involve cast stainless steel safe-ends, including estimated total UT examination coverage for preservice and inservice inspection per sections 3(b) and 3(C) of RR-2. Discuss why reduction in examination coverage is acceptable.
  - (C) Discuss whether a phased-array UT technique will be used in the volumetric examination.
  
12. Attachment 2 of RR-2, page 23, first paragraph, states that, "...All Section XI references are to the 2004 Edition with the 2006 Addenda..." This statement is not applicable to SL-1 and should be eliminated because the code of record for the SL-1 fourth 10-year ISI interval in which RR-2 is applicable is the 2001 Edition thru 2003 Addenda. In addition, Table 1 of Attachment 2 can be deleted since the additional code references do not apply. The staff notes that the NRC has not incorporated by reference the 2005 and 2006 Addenda of the ASME Code in Title 10, *Code of Federal Regulations*, Section 50.55a.
  
13. Section 2.0 of Attachment 2 of RR-2 states that the code of record for the current ISI 10-year interval is, "...Section XI, 2001 Edition including Addenda through 2003 and 2001 with 2001 Addenda for Appendix VIII..." Please clarify the ASME Code Edition and Addenda that will be used for PDI examination per the ASME Code, Section XI, Appendix VIII because the 2001 Addenda of the ASME Code do not exist.