



Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10 CFR 50.55a

March 12, 2009
3F0309-03

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Crystal River Unit 3 – Response to Request for Additional Information Regarding Relief Request #08-002-RR, Revision 0, Dissimilar Metal Weld Overlay Repair During the Fourth 10-Year Inservice Inspection Interval (TAC NO. ME0023)

- References: (1) NRC letter dated February 12, 2009, "Request for Additional Information, Regarding Relief Request 08-002-RR, Revision 0, Dissimilar Metal Weld Overlay Repair During the Fourth 10-Year Inservice Inspection Interval (TAC NO. ME0023)"
- (2) Crystal River Unit 3 to NRC letter, 3F1008-03, dated October 29, 2008, "Crystal River Unit 3 – Relief Request #08-002-RR, Revision 0," Accession No. ML083080296

Dear Sir:

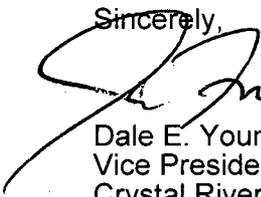
Pursuant to 10 CFR 50.55a(a)(3)(i), Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc., is hereby submitting the response to a Nuclear Regulatory Commission (NRC) request for additional information (RAI) received by letter dated February 12, 2009 (Reference 1). This request for additional information is based on Crystal River Unit 3 (CR-3) Relief Request #08-002-RR, Revision 0 (Reference 2). Enclosure A of this letter includes responses to the RAI.

This submittal contains proprietary information. Enclosure A, Attachment 1, contains an affidavit prepared by AREVA NP, Inc. That affidavit identifies the documents contained in Enclosure A, Attachments 2 through 5, as proprietary and states that they are to be withheld from public disclosure in accordance with 10CFR2.390(a)(4).

This submittal contains Regulatory Commitments as identified in Enclosure B.

If you have any questions regarding this submittal, please contact Mr. Dan Westcott, Supervisor, Licensing and Regulatory Programs at (352) 563-4796.

Sincerely,


Dale E. Young
Vice President
Crystal River Unit 3

DEY/dwh

- Enclosures: A. Response to Request for Additional Information
B. List of Regulatory Commitments

xc: NRR Project Manager
Regional Administrator, Region II
Senior Resident Inspector

Progress Energy Florida, Inc.
Crystal River Nuclear Plant
15760 W. Power Line Street
Crystal River, FL 34428

A047
NRC

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50 - 302 / LICENSE NUMBER DPR - 72

ENCLOSURE A

Response to Request for Additional Information

Response to Request for Additional Information

NRC Request

- 1) In Attachment 1, paragraph 5.1, SWOL [Structural Weld Overlay] Design, the licensee states that there may be small remnants of austenitic weld overlay material remaining on the nozzle/dissimilar metal weld (DMW)/pipe surface that may not be removed prior to the new SWOL.
 - a. Please provide detailed information on the prior weld overlay and the reason for its removal, along with its composition particularly its sulfur content, its physical area and thickness, and the type and location of its substrate material (on which the overlay is welded).

FPC Response

Prior Weld Overlay Information

The original SWOL, using a gas tungsten-arc welding (GATW) machine, with ERNiCrFe-7 (Alloy 52M) with a sulfur content of 0.001 percent, covered the original DMW and extended from the DMW onto the ferritic steel nozzle to its shoulder and onto the austenitic stainless steel piping as depicted in Figure 1.

The original DMW consists primarily of Alloy 182 (ENiCrFe-3), the ferritic carbon steel nozzle is ASTM A 105 Grade II and the attached austenitic stainless steel pipe is ASTM A 376 TP316 as depicted in Figure 1.

Since the attached stainless steel pipe had a relatively high sulfur content, a single layer barrier weld using ER309L, with a sulfur content of 0.01 percent, was welded onto the stainless steel pipe near the DMW using the machine GTAW process prior to welding the overlay. A single layer of Alloy 82, with a sulfur content of 0.003 percent, was then welded over the DMW to a stainless steel pipe interface and "tied in" with the ER309L, also using the machine GTAW process. The barrier weld covered the entire portion of the stainless steel pipe where the weld overlay was to be deposited, as depicted in Figure 1, in accordance with Weld Procedure Specification (WPS) 55-WP1/8/43/F43OLTBSCa3-003 (see Attachment 2 to this Enclosure).

The approximate surface areas to be covered by the weld overlay were 160 square inches over the ferritic carbon steel nozzle, 90 square inches over the DMW (Alloy 182 buttering and pipe to buttering weld) and 110 square inches over the stainless steel pipe. The final overlay thickness was approximately 5/8 inch over the ferritic carbon steel nozzle and the outer portion of the overlay over the stainless steel pipe, with slightly larger thicknesses in the area near and on portions of the DMW. The general profile is shown in Figure 1.

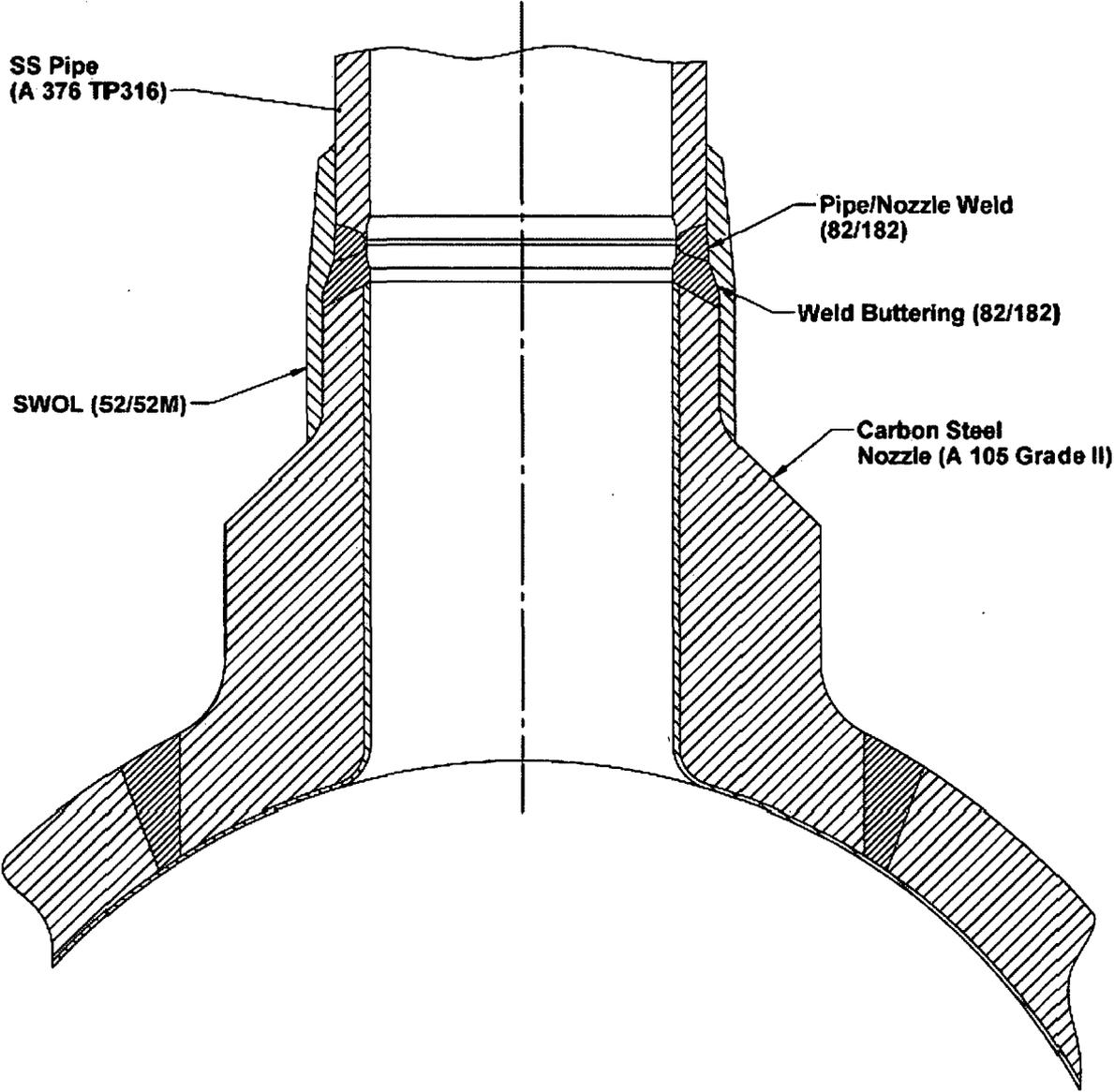


Figure 1

Reason for Overlay Removal

The overlay was removed because rejectable flaws were detected using ultrasonic examination in the vicinity of the 3 o'clock and 9 o'clock azimuthal positions. The sketches shown in Figure 2 are an approximation of the portion of the replacement weld, including Alloy 52M and the ER309L/Alloy 82 barrier layer, that was not removed. Furthermore, as shown in Figure 2, some of the original DMW and carbon steel nozzle base material were removed. The final "as left" configuration was prepared suitable for performing ultrasonic examination of the DMW in accordance with the Performance Demonstration Initiative (PDI).

Figure 2, Sheet 1

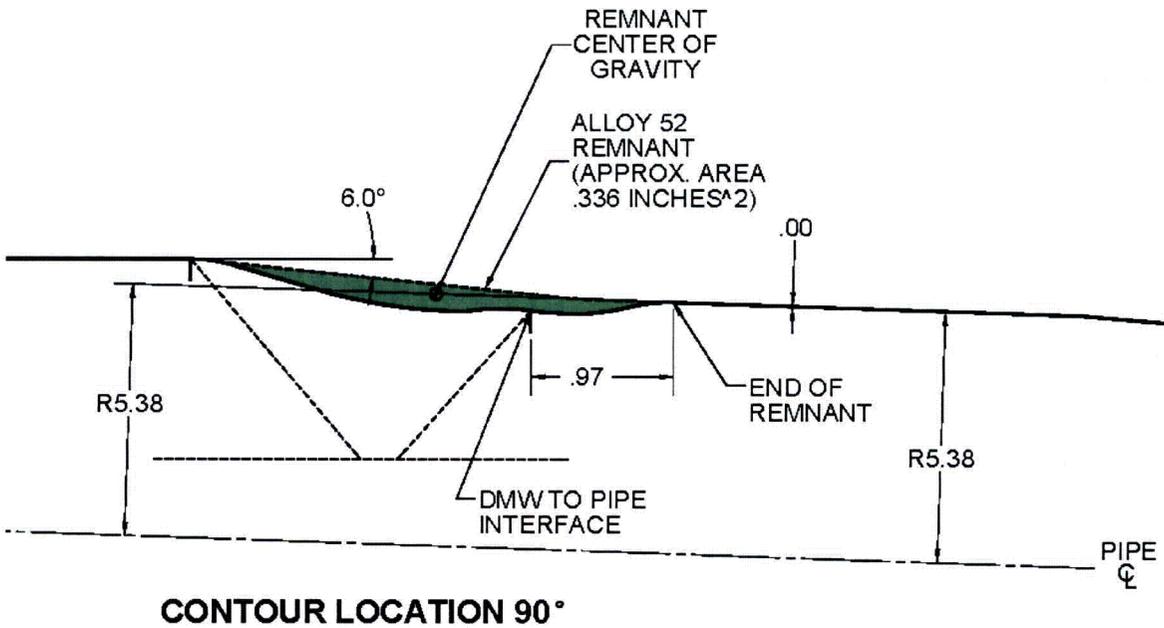
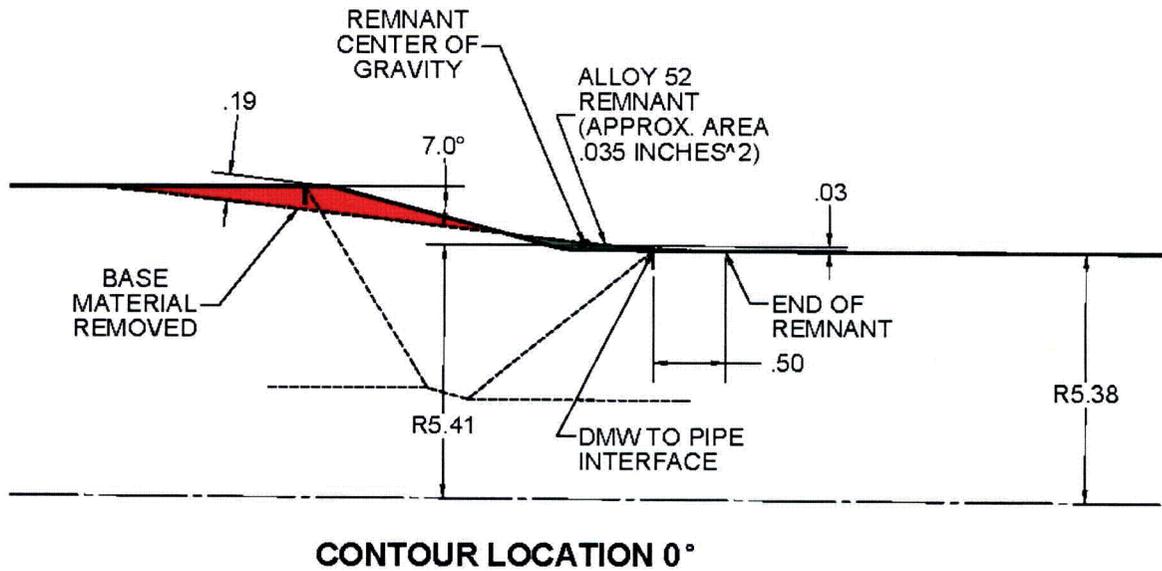
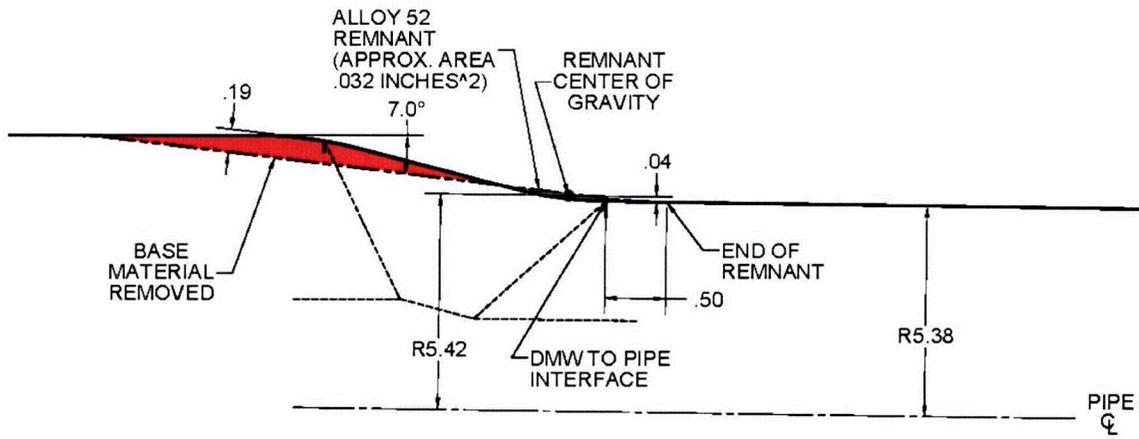
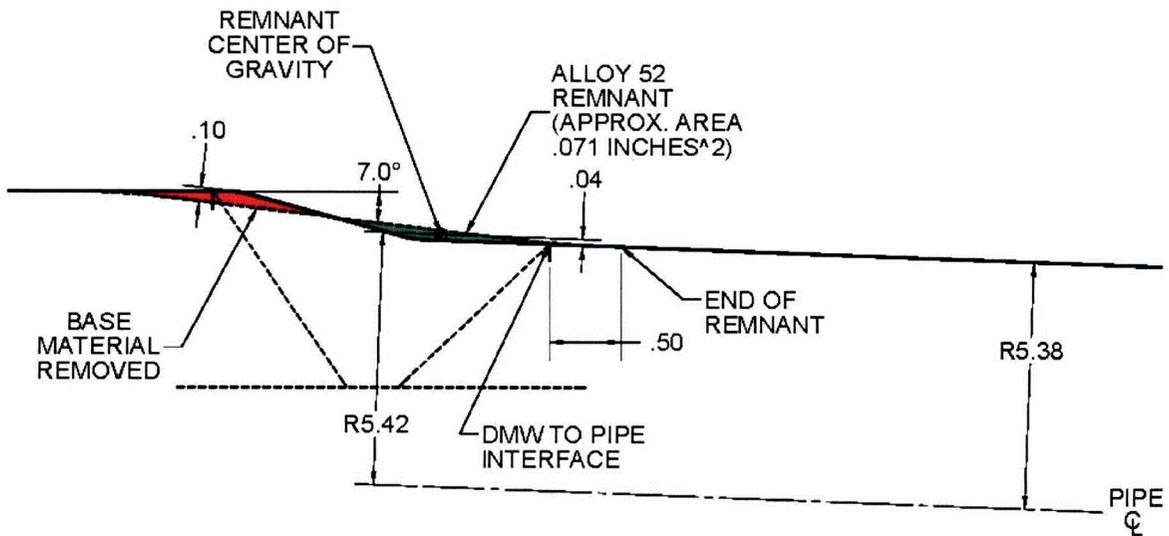


Figure 2, Sheet 2



CONTOUR LOCATION 180°



CONTOUR LOCATION 270°

- b. Discuss any changes that are being applied to the previous (existing) weld overlay design, procedures and materials to ensure that the upcoming weld overlay will be sound.**

FPC Response

Orbital welding was used at Crystal River Unit 3 (CR-3). Subsequent to the outage, additional welding on mockups simulating the 5G position of the hot leg surge nozzle was performed. The same procedure and technique was used on the mockup as was used at CR-3. Flaws were detected at similar locations with similar characteristics in the mockup with respect to welding progression as those detected on the nozzle at CR-3. The rejectable lack of fusion type flaws were biased at locations where downhill weld progression was performed.

The lack of fusion type defects appear to be due to problems encountered with welding Alloy 52M filler material in the vertical down progression.

A full mockup will be welded with the same weld materials and processes that will be used to apply the new SWOL at CR-3. Vertical up weld progression will be used to conclusively show that eliminating vertical down weld progression will mitigate the problems encountered at CR-3.

- c. Please discuss the possible implications of the effects of the chemistry of the existing overlay on the new overlay or barrier layer.**

FPC Response

The underlying chemistry of the previous overlay will not adversely affect the quality of the new replacement overlay. The only potential concern is the surface where the ER309L portion of the barrier layer will be applied. Care will be taken, such as etching if necessary, to assure complete removal of the remaining Alloy 52M overlay material and Alloy 82 barrier layer material in areas where the stainless steel ER309L barrier layer will be deposited. Stainless steel welding onto nickel alloy materials must be avoided since the resulting alloy will exhibit cracking due to the resulting microstructure susceptibility to solidification cracking.

Surface examination was performed on the surfaces where the overlay had been deposited and substantially removed, and no rejectable indications were observed. As discussed above, ultrasonic examination of the DMW was also performed with acceptable results.

NRC Request

- 2) American Society of Mechanical Engineers Code Cases N-638-1, N-638-2 and N-638-4 are cited in the relief request (e.g., Pages 6, 7 and 8 of Attachment 1). Please clarify which version of the code case is being applied.**

FPC Response

Attachment 3 of the Relief Request specifies the applicable requirements for the new weld overlay on the hot leg surge nozzle at CR-3, which is primarily based on N-638-1, with the following clarifications. Appendix I of Attachment 3 specifies the requirements for ambient temperature temper bead machine GTAW which is primarily based on N-638-4.

Attachment 1, Section 5.2, 4th paragraph, 1st sentence:

Ambient temperature temper bead welding is used for application of the weld overlay at CR-3. N-638-1 is shown here, since it is related to ambient temperature temper bead welding and to clarify that the ½ cavity depth does not apply to the weld overlay addressed in the Relief Request. NRC has previously reviewed N-638-1 and it is conditionally approved for use in this manner in Regulatory Guide (RG) 1.147, Revision 15, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1."

Attachment 1, Section 5.2, 5th paragraph, 2nd sentence (Welding Procedure Specification (WPS) maximum interpass temperature more than 100 degrees Fahrenheit greater than maximum interpass temperature used during the Procedure Qualification Record (PQR)):

Ambient temperature temper bead welding is used for application of the weld overlay at CR-3. N-638-1 is shown here, since it is related to ambient temperature temper bead welding. The intent of N-638-1 is clarified with respect to the maximum interpass temperature permitted on the WPS. The WPS permits exceeding the interpass temperature used during the PQR by more than 100 degrees Fahrenheit. Section IX, QW-406.3, in Table QW-256, specifies the maximum interpass temperature shall be no greater than 100 degrees Fahrenheit above that used in the WPQ as a supplementary essential variable. NRC has previously reviewed this version of the Code Case and it is conditionally approved in RG 1.147, Revision 15. N-638-2 is shown to advise the NRC that this version incorporated the clarification mentioned above.

Attachment 1, Section 5.3, 5th paragraph, 1st sentence (48 hour hold prior to non-destructive examination (NDE)):

Ambient temperature temper bead welding is used for application of the weld overlay at CR-3. N-638-1 is shown here since it is related to ambient temperature temper bead welding, and to show that the NDE of the temper bead portion of the weld overlay covering the ferritic steel base nozzle material may be performed 48 hours after completion of the third temper bead layer. N-638-1 specifies waiting until 48 hours after the weld overlay has returned to ambient temperature before performing NDE. NRC has previously reviewed this version of the Code Case and it is conditionally approved in RG 1.147, Revision 15.

Attachment 1, Section 5.3, 8th paragraph (48 hour hold prior to NDE):

N-638-4 is shown to advise the NRC that this version incorporated the revised hold time prior to performing NDE, as discussed in Attachment 1, Section 5.3, 5th paragraph, 48 hours after completing the third temper bead layer over the ferritic steel

nozzle base material that is being used for application of the temper bead portion of the weld overlay at CR-3.

Attachment 1, Section 5.3, 15th paragraph, 1st sentence (final NDE of 1.5T band):

Ambient temperature temper bead welding is used for application of the weld overlay at CR-3. N-638-1 is related to ambient temperature temper bead welding and requires final ultrasonic and surface examination be performed on the 1.5T band. As stated in Attachment 1, Section 5.3, 13th paragraph, ultrasonic and surface examination of the 1.5T band will not be performed. N-638-2 is shown to advise the NRC that this version deleted the requirement for the 1.5T examination band for ultrasonic and surface examination that is required in N-638-1.

Attachment 1, Section 5.3, 16th paragraph, 1st sentence (RG 1.147 Revision 15, ultrasonic testing (UT) requirement):

Ambient temperature temper bead welding is used for application of the weld overlay at CR-3. N-638-1 is related to ambient temperature temper bead welding and requires that ultrasonic examination be performed in accordance with Appendix I, Section XI. RG 1.147, Revision 15, specifies special requirements for repair weld ultrasonic examination as a condition of approval of N-638-1. This paragraph is intended to only clarify that the ultrasonic examination requirements specified in the RG are not applicable for weld overlays and that the ultrasonic examination requirements for the weld overlay at CR-3 are completely satisfactory.

NRC Request

- 3) Attachment 4 discusses the use of a barrier layer to prevent the hot cracking that occurs when Alloy 52 is deposited on high sulfur austenitic stainless steel and a barrier layer to prevent cracking between ER309L and Alloy 182.**
 - a. Please provide details of the geometry of the proposed barrier layers described in Attachment 4 and the details of the design of the interface between the Alloy 182 DMW, the barrier layer and the stainless steel pipe to prevent mixing of the ER309L barrier layer and Alloy 182 weld metal.**

FPC Response

See NRC Request #2 response above. As shown in Figure 1 of the WPS, the ER309L deposit extends from approximately 3/16 inch from the pipe to DMW fusion line on the pipe and extends away from the DMW to beyond the pipe end of the overlay. The Alloy 82 is then deposited and extends from approximately 3/16 inch on the DMW side of the pipe to the DMW fusion line to tie in with the ER309L portion of the barrier weld.

- b. Attachment 3, Section 1.1(c) states that the weld overlay will be deposited using a welding procedure specification (WPS) for groove welding. The Nuclear Regulatory Commission staff is concerned that chemical and physical interactions between the base metals, barrier layers and Alloy 52M overlay material might result in inadequate tensile properties of the final SWOR. Please submit the WPS and the associated procedure qualification record for the subject SWOR with barrier layers.**

FPC Response

The barrier weld layer is excluded from the minimum required thickness of the overlay. As discussed above, the ER309L portion of the barrier weld is only deposited on the stainless steel pipe whereas the Alloy 82 is deposited over the DMW to the stainless steel pipe interface.

WPS WP1/8/43/F43OLTBSCa3-003 (Enclosure A, Attachment 2) and PQRs 5394, 7200, 7213 and 7214 (Enclosure A, Attachment 3) address the Alloy 82 deposit over the DMW to the stainless steel pipe interface. WPS WP8/8/F6AW3-07 (Enclosure A, Attachment 4) and PQR 7062 (Enclosure A, Attachment 5) only address the ER309L portion of the barrier weld.

WPS changes may occur based on current testing, but any revision is not expected to substantially change the parameters. Acceptable tensile properties are confirmed by testing of the PQR.

NRC Request

- 4) In the previously submitted weld overlay relief request (07-003-RR) dated September 13, 2007, the licensee committed to submit preliminary analysis results of the residual stress and flaw growth analysis of the repaired weldment, including crack growth calculation, prior to Mode 4 of restart, and the final analysis results within 60 days of plant restart. However, in the October 29, 2008 submittal, the previous commitments have been changed and it is not clear when and what analyses results will be submitted for the proposed overlay. Please clarify.**

FPC Response

The List Of Commitments contained in Enclosure B to this submittal are now the same as those regulatory commitments contained in the CR-3 to NRC letter dated September 13, 2007 (Accession No. ML072600188), with one exception, and completely supersede the regulatory commitments contained in the CR-3 to NRC letter dated October 29, 2008 (Accession No. ML083080296).

The CR-3 to NRC letter dated October 29, 2008, incorrectly identified the following statements of fact as a regulatory commitment: "The details surrounding the design analysis for the SWOL are being developed to support the CR-3 16th Refueling Outage. This vendor supplied analysis will be available for NRC review at the beginning of the CR-3 16th Refueling Outage." Although still accurate, these statements are no longer considered to be regulatory commitments.

ENCLOSURE A

ATTACHMENT 1

**AFFIDAVIT
(PROPRIETARY)**

5. These Documents have been made available to the U.S. Nuclear Regulatory Commission in confidence with the request that the information contained in these Documents be withheld from public disclosure. The request for withholding of proprietary information is made in accordance with 10 CFR 2.390. The information for which withholding from disclosure is requested qualifies under 10 CFR 2.390(a)(4) "Trade secrets and commercial or financial information."

6. The following criteria are customarily applied by AREVA NP to determine whether information should be classified as proprietary:

- (a) The information reveals details of AREVA NP's research and development plans and programs or their results.
- (b) Use of the information by a competitor would permit the competitor to significantly reduce its expenditures, in time or resources, to design, produce, or market a similar product or service.
- (c) The information includes test data or analytical techniques concerning a process, methodology, or component, the application of which results in a competitive advantage for AREVA NP.
- (d) The information reveals certain distinguishing aspects of a process, methodology, or component, the exclusive use of which provides a competitive advantage for AREVA NP in product optimization or marketability.
- (e) The information is vital to a competitive advantage held by AREVA NP, would be helpful to competitors of AREVA NP, and would likely cause substantial harm to the competitive position of AREVA NP.

The information in these Documents is considered proprietary for the reasons set forth in paragraphs 6(b) and 6(c) above.

7. In accordance with AREVA NP's policies governing the protection and control of information, proprietary information contained in these Documents have been made

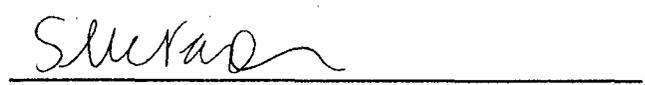
available, on a limited basis, to others outside AREVA NP only as required and under suitable agreement providing for nondisclosure and limited use of the information.

8. AREVA NP policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

9. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

A large, stylized handwritten signature in black ink, appearing to be 'A. P. N.', written over a horizontal line.

SUBSCRIBED before me this 9th
day of March, 2009.

A handwritten signature in black ink, appearing to be 'Sherry L. McFaden', written over a horizontal line.

Sherry L. McFaden
NOTARY PUBLIC, COMMONWEALTH OF VIRGINIA
MY COMMISSION EXPIRES: 10/31/10
Reg. # 7079129

