

Charles R. Pierce
Regulatory Affairs Director

**Southern Nuclear
Operating Company, Inc.**
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201

Tel 205.992.7872
Fax 205.992.7601

Proprietary Information
Withhold Under 10 CFR 2.390

May 24, 2013



Docket Nos.: 50-348
50-364

NL-13-1073

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

Joseph M. Farley Nuclear Plant
Response to Request for Additional Information Concerning the Deferral of
Inservice Inspection of Reactor Pressure Vessel Cold Leg Nozzle Dissimilar
Metal Weld – Questions 2, 4, and 6

Ladies and Gentlemen:

By letter dated October 1, 2012, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12276A110), Southern Nuclear Operating Company (SNC), submitted for the U.S. Nuclear Regulatory Commission (NRC) approval, the request for alternative (RFA) FNP-ISI-ALT-13, Version 1. SNC proposed an alternative to certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. RFA FNP-ISI-ALT-13 relates to the inservice inspection requirements for the reactor pressure vessel (RPV) cold leg dissimilar metal welds at Joseph M. Farley Nuclear Plant (FNP), Units 1 and 2, for the fourth 10-year interval, which commenced on December 1, 2007, and will end on November 30, 2017.

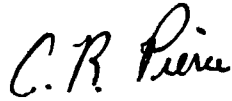
By letter dated April 11, 2013 (ADAMS Accession No. ML13036A261), the NRC issued a Request for Additional Information (RAI) containing six questions. Based on discussions with the NRC, SNC is submitting the response to RAI Questions 2, 4, and 6 in Enclosures 2 and 3. Responses to the RAI Questions 1, 3, and 5 were submitted to the NRC via SNC letter NL-13-0948 dated May 6, 2013.

Enclosure 1 contains the Westinghouse Electric Company (Westinghouse) Affidavit and the authorization to apply for its withholding. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information, which is proprietary to Westinghouse, be withheld from public disclosure in accordance with 10 CFR 2.390 of the Commission's regulations. Enclosure 2 contains information proprietary to Westinghouse, which is supported by the affidavit. Enclosure 3 contains the nonproprietary version of Enclosure 2.

A047
NRR

This letter contains no NRC commitments. If you have any questions, please contact Ken McElroy at (205) 992-7369.

Sincerely,



C. R. Pierce
Regulatory Affairs Director

CRP/RMJ/md

- Enclosures:
1. Westinghouse Electric Company Affidavit
 2. SNC Response to Request for Additional Information – Questions 2, 4, and 6 (Proprietary)
 3. SNC Response to Request for Additional Information – Questions 2, 4, and 6 (Non-Proprietary)

cc: Southern Nuclear Operating Company
Mr. S. E. Kuczynski, Chairman, President & CEO
Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer
Mr. T. A. Lynch, Vice President – Farley
Mr. B. L. Ivey, Vice President – Regulatory Affairs
Mr. B. J. Adams, Vice President – Fleet Operations
RTYPE: CFA04.054

U. S. Nuclear Regulatory Commission
Mr. V. M. McCree, Regional Administrator
Ms. E. A. Brown, NRR Project Manager – Farley
Mr. P. K. Niebaum, Senior Resident – Farley
Mr. J. R. Sowa, Senior Resident – Farley

**Joseph M. Farley Nuclear Plant
Response to Request for Additional Information Concerning the Deferral of
Inservice Inspection of Reactor Pressure Vessel Cold Leg Nozzle Dissimilar
Metal Weld – Questions 2, 4, and 6**

Enclosure 1

Westinghouse Electric Company Affidavit



Westinghouse Electric Company
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-4643
Direct fax: (724) 720-0754
e-mail: greshaja@westinghouse.com
Proj letter: ALA-13-48

CAW-13-3723

May 22, 2013

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

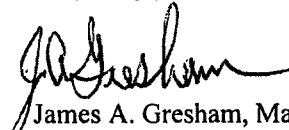
Subject: Southern Nuclear Operating Company Letter NL-13-1073, Enclosure 2, "Response to Request for Additional Information Concerning the Deferral of Inservice Inspection of Reactor Pressure Vessel Cold Leg Nozzle Dissimilar Metal Weld – Questions 2, 4, and 6" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-13-3723 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Southern Nuclear Operating Company (SNC).

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference CAW-13-3723, and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, Suite 310, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,


James A. Gresham, Manager
Regulatory Compliance

Enclosures

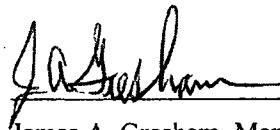
AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

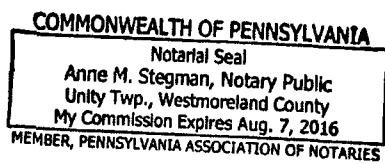
COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared James A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:



James A. Gresham, Manager
Regulatory Compliance

Sworn to and subscribed before me
this 22nd day of May 2013


Notary Public

- (1) I am Manager, Regulatory Compliance, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.
- (2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.
- (3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.
- (4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.
 - (i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.
 - (ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

 - (a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

- (b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.
- (c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.
- (d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.
- (e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.
- (f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

- (a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.
- (b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.
- (c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.
- (d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component

may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

- (e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.
 - (f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.
- (iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.
- (iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.
- (v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in NL-13-1073, Enclosure 2, "Response to Request for Additional Information Concerning the Deferral of Inservice Inspection of Reactor Pressure Vessel Cold Leg Nozzle Dissimilar Metal Weld – Questions 2, 4, and 6" (Proprietary), for submittal to the Commission, being transmitted by Southern Nuclear Operating Company (SNC) letter NL-13-1073 and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as prepared by Westinghouse is that associated with providing information requested by the NRC for their confirmatory flaw evaluation analysis, and may be used only for that purpose.

This information is part of that which will enable Westinghouse to:

- (a) Extend the Reactor Vessel Cold Leg Nozzle Inspection Intervals
- (b) Assist the customer to obtain NRC approval

Further this information has substantial commercial value as follows:

- (a) Westinghouse plans to sell the use of the information to its customers for the purpose of extending the inservice inspection of the reactor vessel cold leg nozzles.
- (b) Westinghouse can sell support and defense of extending the reactor vessel cold leg nozzle inservice inspection intervals.
- (c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar technical evaluation justifications and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests associated with providing information requested by the NRC for their confirmatory flaw evaluation analysis.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

COPYRIGHT NOTICE

The reports transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies of the information contained in these reports which are necessary for its internal use in connection with generic and plant-specific reviews and approvals as well as the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, order, or regulation subject to the requirements of 10 CFR 2.390 regarding restrictions on public disclosure to the extent such information has been identified as proprietary by Westinghouse, copyright protection notwithstanding. With respect to the non-proprietary versions of these reports, the NRC is permitted to make the number of copies beyond those necessary for its internal use which are necessary in order to have one copy available for public viewing in the appropriate docket files in the public document room in Washington, DC and in local public document rooms as may be required by NRC regulations if the number of copies submitted is insufficient for this purpose. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

**Joseph M. Farley Nuclear Plant
Response to Request for Additional Information Concerning the Deferral of Inservice
Inspection of Reactor Pressure Vessel Cold Leg Nozzle Dissimilar Metal Weld –
Questions 2, 4, and 6**

Enclosure 3

**SNC Response to Request for Additional Information – Questions 2, 4 and 6 (Non-
Proprietary)**

NRC RAI #2

Provide a flaw evaluation for axial flaw growth for 10-years. Provide the bounding residual hoop stress profiles used in the analysis.

SNC Response to RAI #2

An axial crack growth analysis was performed to demonstrate the structural integrity of the reactor vessel inlet nozzle dissimilar metal (DM) welds subjected to the Primary Water Stress Corrosion Cracking (PWSCC) mechanism. An axial flaw aspect ratio (flaw length/flaw depth) of 2 is assumed in the crack growth analysis, since axial flaw growth due to PWSCC is limited to the width of the DM weld.

The input required for the axial crack growth analysis is basically the information necessary to calculate the crack tip stress intensity factor (K_I), which depends on the geometry of the crack, its surrounding structure and the applied loadings. The loadings considered are those due to normal operating steady state pressure as well as the welding residual stress. The welding residual stresses used in the PWSCC crack growth analysis are obtained from the finite element residual stress analysis (Reference 1) for the Joseph M. Farley Nuclear Plant (FNP), Units 1 and 2, plant specific reactor vessel inlet nozzle DM weld configurations (References 2 through 5). The finite element residual stress analysis was performed in accordance with the guidance given in MRP-287 (Reference 6) and MRP-317 (Reference 7). A two-dimensional axisymmetric model of the inlet nozzle dissimilar metal weld region is used in the finite element analysis which includes a portion of the low alloy steel nozzle, the stainless steel safe end, a portion of the stainless steel piping, the DM weld attaching the nozzle to the safe end followed by the stainless steel weld attaching the safe end to the piping. The distance between the centerlines of the DM weld and stainless steel weld is 4.7 inches which bounds the as-built safe end lengths of both FNP Units 1 and 2. The residual stress analysis includes the effects of a full circumferential 360° inside surface weld repair with a repair depth of 50% through the original dissimilar metal weld thickness. The bounding residual hoop stress profile used in the PWSCC crack growth analysis is shown in Figure 1.

Using the applicable loadings at the inlet nozzle dissimilar metal weld, the crack tip stress intensity factor is determined using the stress intensity factor expressions from API-579 (Reference 8) for a semi-elliptical axial flaw with a through-wall stress distribution profile represented by a 4th order polynomial. Once K_I is calculated, PWSCC crack growth is calculated using the applicable crack growth rate for the nickel-base alloy material (Alloy 182) from MRP-115 (Reference 9) based on a bounding normal operating temperature of 541°F for FNP, Units 1 and 2, reactor vessel inlet nozzles.

The resulting PWSCC crack growth curve is shown in Figure 2 starting with an initial flaw depth which is 5% of the original wall thickness. The horizontal axis displays service life in Effective Full Power Years (EFPY), and the vertical axis shows the flaw depth to wall thickness ratio (a/t). The maximum allowable end-of-evaluation period flaw depth for FNP, Units 1 and 2, is also shown in Figure 2. The maximum end-of-evaluation period allowable flaw size was determined in accordance with the ASME Section XI IWB-3600 evaluation procedure and acceptance criteria (Reference 10). Based on the PWSCC crack growth curve shown in Figure 2, an undetected flaw in a baseline inspection with a flaw depth of 0.24 inch, which is 7.5% of the original weld thickness, would not reach the maximum end-of-evaluation period allowable flaw depth of 75% of the original wall thickness in less than 10.5 Effective Full Power years.

References:

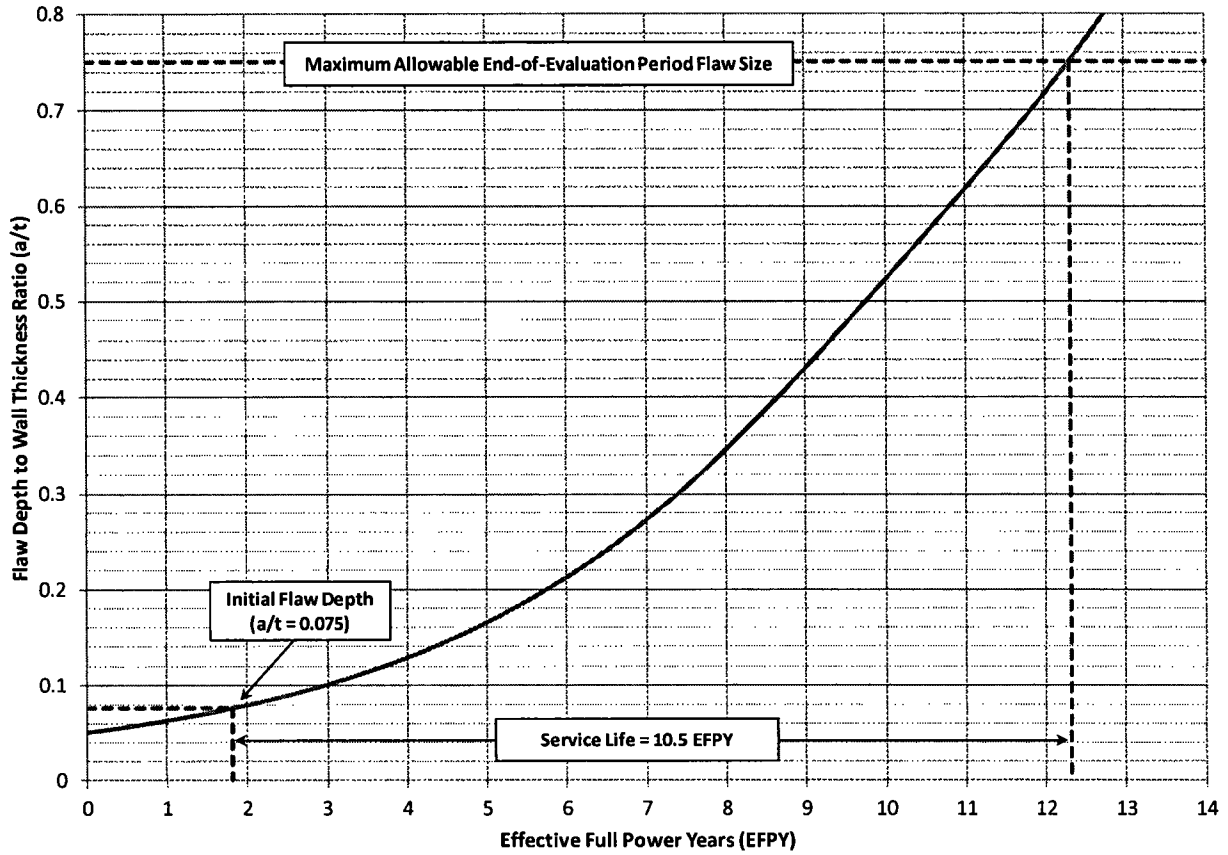
1. Dominion Engineering Calculation C-8869-00-01, Rev. 0. "Welding Residual Stress Calculation for Farley Units 1 and 2 RPV Inlet Nozzle DMW." (Dominion Engineering Inc. Proprietary)
2. Combustion Engineering Drawing E-233-896, "Pressure Vessel Final Machining For: Westinghouse Electric Corp., 157 I.D. P.W.R.," Revision 7. (Westinghouse Proprietary)
3. Combustion Engineering Drawing E-233-897, "Nozzle Details For: Westinghouse Electric Corp., 157" I.D. P.W.R.," Revision 2. (Westinghouse Proprietary)
4. Combustion Engineering Drawing E-233-943, "Pressure Vessel Final Machining – Sections, Westinghouse Electric Corporation, 157" I.D. P.W.R.," Revision 3. (Westinghouse Proprietary)
5. Combustion Engineering Drawing E-233-926, "Nozzle Details For: Westinghouse Electric Corp., 157" I.D. P.W.R.," Revision 4. (Westinghouse Proprietary)
6. Materials Reliability Program: Primary Water Stress Corrosion Cracking (PWSCC) Flaw Evaluation Guidance (MRP-287). EPRI, Palo Alto, CA: 2010. 1021023.
7. Materials Reliability Program: Welding Residual Stress Dissimilar Metal Butt-Weld Finite Element Modeling Handbook (MRP-317). EPRI, Palo Alto, CA: 2011. 1022862.
8. American Petroleum Institute, API 579-1/ASME FFS-1 (API 579 Second Edition), "Fitness-For-Service," June 2007.
9. Materials Reliability Program: Crack Growth Rates for Evaluating Primary Water Stress Corrosion Cracking (PWSCC) of Alloy 82, 182, and 132 Welds (MRP-115), EPRI, Palo Alto, CA: 2004. 1006696. (EPRI Proprietary)
10. Rules for Inservice Inspection of Nuclear Power Plant Components, ASME Boiler & Pressure Vessel Code, Section XI, 2001 Edition through 2003 Addenda.

Figure 1

Bounding Residual Hoop Stress Profile used in the PWSCC crack growth analysis



Figure 2
PWSCC Crack Growth Curve for Farley Units 1 and 2 Reactor Vessel Inlet Nozzle Dissimilar Metal Weld



NRC RAI #4

Justify why the time to grow an assumed axial initial flaw to the ASME Code, Section XI, IWB-3600 allowable 75 percent through-wall was not used as the basis for this request.

SNC Response to RAI #4

The initial justification for the request was based on the tolerance to circumferential flaw growth which is considered the primary safety significant scenario due to the potential for pipe rupture. Axial flaw growth can lead to undesirable leakage and, therefore, an axial flaw tolerance evaluation has also been completed. It includes the time to grow an assumed initial axial flaw to the ASME Section XI IWB-3600 allowable of 75% through-wall and is provided in the response to RAI #2.

NRC RAI #6

The FNP, Units 1 and 2, fourth 10-year ISI interval began on December 1, 2007, and will end on November 30, 2017. Subsequently, the FNP, Units 1 and 2, fifth 10-year ISI interval will begin on December 1, 2017, and will end on November 30, 2027. The results in Figures 5-2 and 5-3 MRP-349 to FNP-ISI-ALT-13 showed that a postulated through-wall flaw would be acceptable for 10 years. However, the excerpt below taken from Enclosure 1 to FNP-ISI-ALT-13 stated:

SNC is requesting extension of the requirements of Code Case N-770-1, Inspection Item B for the RPV CL DM Welds from every second inspection period to once per 10 year interval.

Specifically, this proposed alternative would permit the deferral of the CL volumetric examinations currently scheduled for fall of 2013 for Unit 1 (baseline exams performed in fall of 2007) to be moved to the fall of 2017 (\pm 1-year as allowed by ASME IWA-2430 to allow inspections to coincide with the plant outage). Exams would occur during or before the spring 2018 outage. For Unit 2, this would allow examinations currently scheduled for the spring of 2016 (baseline exams performed in the spring of 2010) to be moved to the spring of 2020 (\pm 1-year as allowed by ASME IWA-2430 to allow inspections to coincide with the plant outage). Exams would occur during or before the fall 2020 outage.

NRC RAI #6a

Discuss why the results shown in Figures 5-2 and 5-3 of MRP-349 to FNP-ISI-ALT-13 justify deferral of examination to 11 (10+1) years.

SNC Response to RAI 6a

The deferral requested is to extend the re-examination interval of the RPV cold leg nozzle DM welds to 10.5 years. The results in Figures 5-2 and 5-3 of MRP-349 are not directly applicable to FNP-ISI-ALT-13. The purpose of Figures 5-2 and 5-3 is to justify longer examination intervals when examination coverage limitations are present, specifically for the Reactor Coolant Pump inlet and outlet nozzle DM welds. Deferral is not requested for these welds. Although these results are not directly applicable to this request, they help provide the strong technical basis

established for the RPV cold leg nozzle DM welds examination deferral, specifically for the FNP configuration and conditions discussed in the response to RAI #1.

The figure directly relevant to FNP-ISI-ALT-13 from MRP-349 is Figure 5-4, which depicts four safe-end length and RV inlet temperature combinations. Based on the circumferential crack growth results shown in Figure 5-4, the bounding combined case of a 25% inner diameter repair, higher cold leg temperature (565°F), and longer safe end, a circumferential flaw will not propagate from an initial depth/thickness ratio of 15% to an unacceptable depth/thickness ratio (57%) per IWB-3600 of Section XI in ten years of continued operation. For the temperatures (535 °F) most closely related to FNP (537°F, 538°F nominal), in neither the short or long safe end case does a circumferential flaw propagate from 15% to an unacceptable depth/thickness ratio in less than 20 years. The technical basis developed for FNP based on the generic analysis in MRP-349 is further discussed in the response to RAI #1.

NRC RAI #6b

Clarify whether the deferral of examination is proposed to be moved to the fall of 2017 outage for Unit 1 and to the spring of 2020 outage for Unit 2, or to once per 10 year interval.

SNC Response to RAI 6b

The deferral will allow an inspection interval not to exceed 10.5 years. This corresponds to a FNP Unit 1 refueling outage in the Spring of 2018, and a FNP Unit 2 refueling outage in the Fall of 2020.