UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 18, 2015

Mr. C. R. Pierce
Regulatory Affairs Director
Southern Nuclear Operating Company, Inc.
P. O. Box 1295, Bin - 1295
Birmingham, AL 35201-1295

SUBJECT: EDWIN I. HATCH NUCLEAR PLANT, UNIT NO. 1 - RELIEF FROM THE REQUIREMENTS OF THE ASME CODE (CAC NO. MF6453)

Dear Mr. Pierce:

By letter dated July 2, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15183A354), as supplemented by letter dated September 15, 2015 (ADAMS Accession No. ML15258A551), Southern Nuclear Operating Company, Inc., submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for the use of alternatives to certain American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code), Section XI requirements at Edwin I. Hatch Nuclear Plant, Unit 1. The licensee requested to use an in-service inspection (ISI) alternative to install full structural weld overlays on four welds at HNP-1 during the Spring 2016 refueling outage.

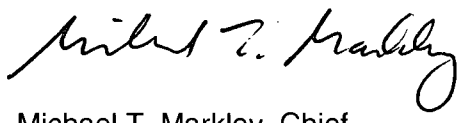
Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(1), the licensee requested to use the proposed alternative on the basis that the alternative provides an acceptable level of quality and safety.

The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that Southern Nuclear Operating Company, Inc. has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC authorizes the use of ISI Alternative HNP-ISI-ALT-15-01 at HNP-1 for the 4th ISI Interval which extending from January 1, 2006, through March 31, 2016, by extending the ISI Interval to include the 1R27 outage.

All other requirements of ASME Code, Section XI, for which relief was not specifically requested and authorized by the NRC staff remain applicable, including the third party review by the Authorized Nuclear In-service Inspector.

If you have any questions, please contact the Project Manager, Bob Martin at 301-415-1493 or via e-mail at robert.martin@nrc.gov.

Sincerely,



Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-321

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

# ALTERNATIVE REQUEST NO. HNP-ISI-ALT-15-01 REGARDING APPLICATION OF DISSIMILAR WELD FULL-STRUCTURAL WELD OVERLAYS

# EDWIN I. HATCH NUCLEAR PLANT, UNIT NO. 1

# SOUTHERN NUCLEAR OPERATING COMPANY, INC.

# DOCKET NO. 50-321

## 1.0 INTRODUCTION

By letter dated July 2, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15183A354), as supplemented by letter dated September 15, 2015 (ADAMS accession No. ML15258A551), Southern Nuclear Operating Company Inc. (the licensee), requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code) at Hatch Nuclear Plant Unit 1 (HNP-1). The licensee requested to use an in-service inspection (ISI) alternative to install full structural weld overlays (FSWOL) on four welds at HNP-1 during the spring 2016 refueling outage. As an alternative to the ASME Code requirements, the licensee proposed to implement a FSWOL repair in accordance with ASME Code Cases N-638-1, "Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW [Gas tungsten arc welding] Temper Bead Technique, Section XI, Division 1," and Code Case N-504-3, "Alternative Rules for Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping, Section XI, Division 1," as modified by the licensee in its July 2, 2015 submittal.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(z)(1), the licensee requested to use the proposed alternative on the basis that the alternative provides an acceptable level of quality and safety.

## 2.0 REGULATORY REQUIREMENTS

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The ISI of the ASME, Code, Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable editions and addenda as required by the 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 10 CFR 50.55a(z)(1) states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee

demonstrates that the proposed alternatives would provide an acceptable level of quality and safety.

The licensee proposed an alternative to the implementation of the ASME Code, Section XI requirements based on ASME Code Cases N-638-1 and N-504-3 as modified by the licensee for the deposition of a FSWOL for the remaining service life of the identified components.

Use of ASME Code Case N-504-3 has been accepted in Regulatory Guide (RG) 1.147, Revision 15, with the following limitation, as providing an acceptable level of quality and safety: The provisions of Section XI, Non-Mandatory Appendix Q, "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments," must also be met.

Use of ASME Code Case N-638-1 has been accepted in RG 1.147, Revision 15, with the following limitation, as providing an acceptable level of quality and safety:

Ultrasonic Testing (UT) examinations shall be performed with personnel and procedures qualified for the repaired volume and qualified by demonstration using representative samples which contain construction type flaws. The acceptance criteria of NB-5330 in the 1998 Edition through 2000 Addenda of Section III apply to all flaws identified in the repair volume.

## 3.0 TECHNICAL EVALUATION

### 3.1 The Licensee's Alternative Request

The licensee has identified certain welds that may have leakage or unacceptable indications and the proposed alternative would be used as: (1) contingency overlay repair which requires a repair of an unacceptable indication; or (2) preemptive overlay repair which would be used where ultrasonic testing (UT) is determined to be limited.

Nickel alloy welds (i.e., 182 welds, specifically), are prone to experience intergranular stress corrosion cracking (IGSCC) when exposed to BWR reactor coolant system (RCS) water. ASME Code, Section XI does not provide rules for the design of weld overlays without removal of flaws. Code Case N-504-3, provides rules for reducing the flaw to an acceptable size and deposit weld overlay on the outside surface of the pipe. However, the Code Case N-504-3 does not provide rules for performing weld overlay with Nickel alloy welds. To facilitate the usage of Nickel alloy welds for this FSWOL, the licensee has proposed to implement Code Case N-638-1.

The affected components are

- Residual Heat Removal (RHR) Welds: 1E11-1RHR-24A-R-12 and 1E11-1RHR-24A-R-13; and
- Reactor Recirculation (RC) welds: 1B1-1RC-12BR-C-5 and 1B1-1RC-12BR-E-5.

The applicable ISI code of record for HNP-1 for the fourth ten-year ISI interval is the ASME Code, Section XI 2001 Edition, including Addenda through 2003 with an exception. The exception is that for ASME Code, Section XI, Appendix VIII, the 2001 Edition of ASME Code will

be used. This exception is based on 10 CFR 50.55a(b)(2)(xxiv) which states, "The use of Appendix VIII and the supplements to Appendix VIII and Article I-3000 of the ASME Code, 2002 Addenda through 2006 Addenda, is prohibited.

This Alternative Request for HNP-1 is applicable to its fourth ten-year ISI interval which begins January 1, 2006, and will end on March 31, 2016.

3.2 NRC Staff Evaluation

The NRC staff evaluation consisted of three parts:

- Alternatives to N-504-3;
- Alternatives to N-638-1; and
- The licensee's proposed alternatives and basis for use in design and flaw evaluation

Staff Evaluation of Alternatives to N-504-3

Under the rules of ASME Code, Section XI, IWA-4220, repairs shall be performed in accordance with the licensee's design specification and the original Construction Code. Later editions and addenda of the Construction Code or of ASME Code, Section III, either in their entirety or portions thereof, and ASME Code Cases may be used. In addition to the above, defects shall be removed or reduced in size in accordance with ASME Code, Section XI, IWA-4400. ASME Code Case N-504-3 was conditionally approved by the staff for use under RG 1.147, Revision 15. Therefore, the use of Code Case N-504-3 as an alternative to the mandatory ASME Code repair provisions is acceptable to the staff, provided that all conditions and provisions specified in RG 1.147, Revision 15 are complied with.

ASME Code Case N-504-3 Limitation:

The provisions of Section XI, Non-Mandatory Appendix Q, "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments," must also be met.

The first proposed modification to the ASME Code Case N-504-3 provisions involves the use of a Nickel-based alloy weld material rather than the low carbon austenitic stainless steel. The licensee stated that Paragraph (b) of Code Case N-504-3 requires that the reinforcement weld material shall be low carbon (0.035% maximum) austenitic stainless steel. In lieu of the stainless steel weld material, Nickel base Alloy 52M, which is highly resistant to SCC, was proposed for the overlay weld material. The staff notes that the use of 52M material is consistent with weld materials used to perform similar FSWOLs at other operating boiling water reactor (BWR) facilities. The staff also notes that the licensee is performing the subject FSWOL on dissimilar metal welds made of Alloy 82/182 material which was used in original fabrication. Alloy 52M contains about 28 percent Chromium which would provide excellent resistance to SCC if exposed to the reactor coolant environment. This material is identified as F-No. 43 Grouping for Ni-Cr-Fe, classification UNS N06052 filler metal and has been previously approved by the staff for similar applications. Therefore, the licensee's proposed the use of Alloy 52M for the FSWOL as a modification to the requirements of Code Case N-504-3, Paragraph (b), is acceptable as it will provide an acceptable level of quality and safety.

The next proposed modification to the ASME Code Case N-504-3 provisions involves Paragraph (e) of ASME Code Case N-504-3 which requires as-deposited delta ferrite measurements of at least 7.5 ferrite number (FN) for the weld reinforcement. The licensee proposed that delta ferrite measurements will not be performed for this overlay because the deposited Alloy 52M material is 100% austenitic and contains no delta ferrite due to the high Nickel composition (approximately 60% Nickel). ASME Code Case N-504-3 allows the use of FSWOL repair by deposition of weld reinforcement on the outside surface of the pipe in lieu of mechanically reducing the defect to an acceptable flaw size. However, ASME Code Case N-504-3 is designed for FSWOL repair of austenitic stainless steel piping. Therefore, the material requirements regarding the delta ferrite content of at least 7.5 FN, as delineated in ASME Code Case N-504-3, Paragraphs (b) and (e), apply only to austenitic stainless steel FSWOL materials to ensure its resistance to SCC. These requirements are not applicable to Alloy 52M, a Nickel-based material that would be used for the FSWOL. Therefore, the staff agrees with the technical basis for the requested alternative.

Staff Evaluation of Alternatives to N-638-1

The licensee has proposed to apply a 360-degree FSWOL on the subject three welds: 1B31-1RC-12BR-C-5, 1B31-1RC-12BR-E-5 and 1E11-1RHR-24A-R-12. The purpose of the FSWOL is to reduce the susceptibility of the initiation and growth of SCC in these welds and, ultimately, to maintain weld integrity. The FSWOL will fulfill all structural requirements, independent of the existing weld. Operational experience has also shown that SCC in Alloy 82/182 will blunt at the interface with stainless steel base metal, carbon steel base metal, or Alloy 52M weld metal, if cracking were to occur.

To eliminate the need for preheat and post-weld heat treatment under the construction code, the industry developed requirements for implementation of a temperbead welding technique which were published in ASME Code Case N-638-1 and were endorsed by the staff in RG 1.147, Revision 15. The temperbead technique carefully controls heat input and bead placement, which allows subsequent welding passes to temper the heat affected zones (HAZs) of the base material and preceding weld passes. The welding is performed with low hydrogen filler material under a blanket of inert gas. The inert gas shields the molten metal from moisture and hydrogen. Therefore, the need for preheat and post-weld heat treatment specified by the ASME Construction Code is not necessary to produce a sound weld using a temper bead welding process.

Use of ASME Code Case N-638-1 has been accepted in RG 1.147, Revision 15, with the following limitation, as providing an acceptable level of quality and safety.

UT examinations shall be performed with personnel and procedures qualified for the repaired volume and qualified by demonstration using representative samples which contain construction type flaws. The acceptance criteria of NB-5330 in the 1998 edition through 2000 Addenda of Section III apply to all flaws identified in the repair volume.

ASME Code Case N-638-1, Paragraph 3.0(d) specifies the maximum interpass temperature for production welding. The licensee stated that the interpass temperatures shall be determined by temperature measurement (e.g., pyrometers, temperature indicating crayons, thermocouples). These tools will be used to verify preheat temperature and interpass temperature of every weld

pass of the first three layers. If it was not possible to measure temperature by the aforementioned tools, as an alternative, heat flow calculations in conjunction with a measurement of maximum interpass temperature on a test coupon will be used to determine the interpass temperature. The test coupon will be made using maximum heat input of the welding procedure to be used in production and the thickness of the test coupon shall be equal to or less than the thickness of the item to be welded. The staff determined that the large mass of the nozzle coupled with the low heat input GTAW process helps to ensure that the maximum interpass temperature will not be exceeded. Additionally, the alternate heat flow calculations, which take into account weld heat input, thickness of the weld joint, and thermal conductivity of the materials, will provide a good estimate of the interpass temperature. The staff previously accepted this method of assessing the maximum interpass temperature in its SE for Farley Nuclear Plant and the Vogtle Electric Generating Plant, dated April 3, 2007, ADAMS Accession No. ML070790240. Therefore, the staff concludes that this type of monitoring of the interpass temperature provides an acceptable level of quality and safety.

ASME Code Case N-638-1, Paragraph 2.0 references the ASME Code, Section IX for weld procedure qualifications. One of the essential variables (QW-406.3) in ASME Code, Section IX is interpass temperature during the welding process. ASME Code, Section IX requires that the interpass temperature of the welding procedure qualification specimens be greater than that of the production weld to avoid the need for requalification. However, ASME Code Case N-638-1 is inconsistent with this requirement as it allows the interpass temperature during production welding to be significantly higher than that of the specimens used to qualify the temper bead welding process. This inconsistency was reviewed by the code committee members and it was concluded that the ASME Code, Section IX essential variable QW-406.3 is not applicable for temperbead welding qualifications. This criterion was developed by the Code Committee members because the members determined not to reduce the interpass temperature from the existing temperature of 350F. This criterion is addressed in Code Case N-638-4 which was approved by the staff, and it was addressed in RG 1.147, Revision 16. Therefore, the staff concludes that the ASME Code, Section IX essential variable stated above is not applicable to the ASME Code Case N-638-1.

ASME Code Case N-638-1, Paragraph 2.1(j) requires that the average Charpy V notch values of the HAZ test coupon shall exceed the average value of the base metal test coupon. If this criterion was not met, either the weld procedure would be re-qualified (Option 1) or the licensee would implement the existing requirements in NB-4335.2 of ASME Code, Section III which allows the use of an adjustment temperature for weld procedure qualifications at which the average HAZ Charpy V notch value exceeds the average value of the base metal test coupon. The lowest service temperature is increased by a temperature equivalent to that of the adjustment temperature (Option 2). Based on its review of this criterion, the staff requested information regarding the implementation of the criterion at HNP-1. In a letter dated August 18, 2015 (ADAMS Accession No. ML15224B464), the staff, in a request for additional information (RAI) No.15, requested that the licensee confirm whether Option 1 or Option 2 is applicable for HNP-1. If Option 2 is applicable, the licensee was requested to provide the value of the adjustment temperature and how this value is considered in the evaluation of the reactor vessel integrity analyses. In its response, dated September 15, 2015, the licensee stated that the procedure qualification coupon testing resulted in HAZ impact samples that exhibited higher or equal to the average lateral expansion value in the base metal. Therefore, neither Option 1 nor

Option 2 are required to be implemented. The staff agrees with this assessment and considers this issue to be resolved adequately by the licensee.

ASME Code Case N-638-1, Paragraph 4.0(b) specifies that the final weld surface shall be examined using surface and UT methods no sooner than 48 hours after the weld reaches ambient temperature. As an alternative, the licensee, in Appendix 7 of the July 2, 2015, submittal proposed to perform surface and volumetric examinations 48 hours after the third layer is installed. Electric Power Research Institute (EPRI), in its technical basis paper ADAMS Accession No. ML070790679, concluded that there is sufficient delay time to facilitate detection of potential hydrogen cracking when UT is performed 48 hours after completion of the third weld layer. In addition, EPRI stated that hydrogen can be introduced only on the first weld layer as it is in contact with ferritic base metal (nozzle). Since second and subsequent weld layers are not in contact with ferritic materials, hydrogen cracking is unlikely to occur in austenitic Alloy 52M welds. Unlike shielded metal arc welding (SMAW), GTAW process does not use flux, and therefore, concentration of hydrogen in the weld metal is negligible. Furthermore, the solubility of hydrogen in Alloy 52M weld metal is higher than ferritic (nozzle and valve) material and therefore, the hydrogen diffuses from ferritic base metal to the 52M weld metal. This hydrogen diffusion process is enhanced by the heat supplied in subsequent weld layers. Therefore, the staff concludes that performing surface and UT examinations 48 hours after the completion of the third weld layer would provide reasonable assurance that hydrogen related cracking, if it were going to occur, will be detected. Therefore, the staff approved this provision in Code Case N-638-4 and this approval was addressed in RG 1.147, Revision 16. Based on the aforementioned evaluation the staff concludes that surface and UT examinations can be performed 48 hours after the completion of the third weld layer at HNP-1.

In Section 1.0 (b) on page 4 of July 2, 2015 submittal, the licensee stated that Alloy 152 would be used for the deposition of weld reinforcement. ASME Code Case 638-1 allows only GTAW process for the application of temperbead welding on the vessel nozzle. Since Alloy 152 would not be used for the temperbead welding, the staff accepts the licensee's proposal for using Alloy 152 only for the deposition of the weld reinforcement (final cap layer). Application of Alloy 152 would be acceptable provided the licensee complies with the qualification requirements of ASME Code Case 638-1. Alloy 152 shall not be used for the temperbead welding and for the welding of ferritic base metal.

Licensee's Proposed Alternatives and basis for Use in Design and Flaw Evaluation

General Repair

The licensee stated that a new FSWOL is to be installed on RHR system weld 1E11-1 RHR-24A-R-12 during the 1R27 outage due to ultrasonic examination configuration limitations. The final configuration will provide a surface configuration to improve ultrasonic examination. RHR weld 1E11-1 RHR- 24A-R-13 has an existing weld overlay that was installed in 1984. Since the actual distance between original weld 12 and 13 centerlines is approximately 6-inches, the designer of the weld overlays (Structural Integrity Associates) has indicated that the weld overlay on weld 13 needs to be modified to support an adequate weld overlay installation on weld 12. One new FSWOL will be installed to encompass both welds. The surface of the existing weld overlay will be ground to prepare the surface for receipt of new Alloy 52M overlay. After performance of a satisfactory liquid penetrant surface examination, a stainless steel buffer

layer (ER308L) will be deposited over the stainless steel to facilitate effective deposition of the Alloy 52M overlay deposit. This buffer surface also will be required to exhibit a satisfactory liquid penetrant examination. This material will not be credited as part of the design overlay.

The remaining two welds, B31-1RC-12BR-C-5 and E-5, were repaired with Inconel weld overlays and the licensee has decide to upgrade to FSWOL weld overlays. The surface of the existing weld overlays will be ground to remove part of the weld overlays and prepare the surface for receipt of new Alloy 52M overlay. The addition of the stainless steel buffer layer is not needed for these welds since the existing stainless steel material already has a buffer layer that was installed previously. After the weld overlays are installed, both a surface and a volumetric examination are to be performed in accordance with the ISI alternative.

On the basis that the licensee provide a satisfactory examination and does not credit the buffer layer thickness in order to meet the weld reinforcement design thickness requirements, the staff concludes that the licensee's position is acceptable.

The licensee also states that the maximum area of an individual weld overlay on the finished surface of the ferritic material shall be no greater than 500 square inches. This maximum overlay area requirement is identified in Code Case N-638-4 which is accepted in RG 1.147. The staff reviewed the weld figures provided by the licensee and confirmed that the weld overlay area is within limit of 500 square inches. Therefore, the staff finds this acceptable.

Crack growth Considerations

Actual flaw sizes will be used in crack growth calculations for FSWOLs installed because unacceptable indications are detected during UT or a through-wall leak exists. The licensee does not plan on performing UT examinations of the weld prior to the application of the new overlays. If a FSWOL is installed and no through-wall leak exists and UT examinations were not performed, the FSWOL is considered to be a preemptive overlay. For a preemptive overlay, a flaw in the original weld with a depth of 75% that originated from the inside surface and a circumference of 360 degree is postulated for crack growth purposes. A 75% through-wall depth flaw is the largest flaw that could remain undetected during FSWOL preservice examination. This preservice examination will verify there is no cracking in the upper 25% of the original weld wall thickness. If any flaws are found during the preservice examination in the upper 25% of the original weld or base material, the as-found flaw (postulated 75% through-wall plus the portion of the flaw in the upper 25%) would be used for crack growth analysis. The staff determined that the licensee's approach is conservative. Therefore, use of a maximum depth with 360 degree circumferential flaw to perform the crack growth analysis will generate a conservative flaw size at the end of the design life of the overlay. The licensee will submit this crack growth analysis report within 90 days after plant startup. On the basis that the initial crack growth input of the analysis is conservative, the staff determines it is acceptable.

Design of the FSWOL

The licensee states that the design of the FSWOL weld shall be completed in accordance with IWA-4311. The licensee also states that a stress analysis will be performed that demonstrates that the pressure-retaining components will perform their intended design function with the FWSOL installed. The stress analysis report will include results showing that the requirements

of Subsections NB-3200 and NB-3600 of the ASME Code, Section III are satisfied. The stress analysis will also show that the requirements of IWB-3000 of the ASME Code, Section XI, are satisfied. The result will show that the postulated crack, including its growth, would not adversely affect the integrity of the overlaid welds and the report will be submitted within 90 days after plant startup.

On the basis that the licensee's design and analysis of the FSWOL will meet the requirement of the ASME Code to demonstrate structural integrity, the staff concludes this is acceptable.

Examination and Inspection

The licensee states that nondestructive examination methods shall be conducted in accordance with IWA-2200, and nondestructive examination personnel will be qualified in accordance with IWA-2300. Specifically, ultrasonic examination procedures and personnel will be qualified in accordance with the ASME Code, Section XI, Appendix VIII, as implemented through the performance demonstration initiative. The licensee will perform ultrasonic examinations to the maximum extent achievable. In response to RAI No. 12, the licensee developed figures depicting the expected ultrasonic examination coverage. These figures indicate the licensee should be able to achieve ASME Code required coverage of essentially 100 percent.

The licensee also provided the details for pre-overlay examinations, post-overlay examination and examination acceptance criteria.

The staff finds that the proposed acceptance examination is acceptable because the licensee will perform the surface examination and ultrasonic testing to verify that the weld overlay contains no unacceptable fabrication defects and will disposition any possible fabrication defects in accordance with the ASME Code, Sections III and XI.

The licensee's preservice inspection provides ultrasonic examination and applies Section XI examination acceptance standards. The NRC staff finds that the proposed preservice examination is acceptable because, as a baseline examination, the licensee will perform the ultrasonic examination of required volume that includes the overlay itself and the upper 25 percent of the original weld and will disposition any possible fabrication defects in accordance with the ASME Code, Section XI.

The licensee's Inservice examinations of the FSWOLs will be performed in accordance with Q-4300 and 4310 of Appendix Q to the 2004 Edition of Section XI with Addenda through 2005 with modifications. The licensee proposed examination requirements are listed in Appendix 8 of the July 2, 2015 request. The original Appendix Q is for weld overlay repair of austenitic stainless steel piping weldment. However, the licensee's weld overlay material is Alloy 52/152 instead of austenitic stainless steel. Therefore, the licensee modified the flaw evaluation requirements of Q-4300. The modified Q-4300 flaw evaluation requirements state that flaws characterized as SCC in the Alloy 52/152 weld overlay are unacceptable and the use of IWB-3514-2 and IWB-3640 for SCC evaluation in the Class 1 overlay material is prohibited. ASME Code Section XI 2004 edition with 2005 and 2006 Addenda places limitations on the use of IWB-3514 and states that the acceptance standards of IWB-3514 do not apply to planar surface flaws in UNS N06600, N06082, or W86182 in BWR or PWR environments, or austenitic stainless steels and associated welds in BWR environments which are subject to stress

corrosion cracking. Alloy 52/52M/152 is a Nickel alloy similar to N06600 and W86182. Therefore, extending this prohibition if SCC is involved is appropriate. All other examination requirements of the Appendix Q will be met by the licensee as identified in Appendix 8 of the licensee's July 2, 2015 request. On the basis that the licensee's position is appropriate, the staff finds that the licensee approach following Section XI Code, Appendix Q requirements with modification is acceptable.

The licensee's pressure testing will apply a system leakage test in accordance with IWA-5000. The staff finds this acceptable.

In summary, the NRC staff concludes that the proposed ISI Alternative will provide reasonable assurance of the structural integrity and leak tightness of the subject welds because the propose alternative specifies adequate requirements on material selection, welding, weld overlay design, crack growth calculations, examinations, and pressure testing.

## 4.0 CONCLUSION

The staff concludes that ISI Alternative HNP-ISI-ALT-15-01 will provide reasonable assurance of the structural integrity of the subject welds. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC authorizes the use of ISI Alternative HNP-ISI-ALT-15-01 at HNP-1 for the 4th ISI Interval which extending from January 1, 2006, through March 31, 2016, by extending the ISI Interval to include the 1R27 outage.

All other requirements of ASME Code, Section XI, for which relief was not specifically requested and authorized by the NRC staff remain applicable, including the third party review by the Authorized Nuclear In-service Inspector.

Principal Contributors: G. Cheruvenki
R. Hsu

Date: December 18, 2015

If you have any questions, please contact the Project Manager, Bob Martin at 301-415-1493 or via e-mail at robert.martin@nrc.gov.

Sincerely,

**/RA/**

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-321

Enclosure:
Safety Evaluation

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