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

February 17, 2017

Mr. Daniel G. Stoddard
President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Blvd.
Glenn Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION, UNIT NO 2 – REQUESTS FOR RELIEF LMT-R01, LMT-SS01, LMT-CS01, LMT-P01, LMT-C01, LMT-C02, LMT-C03, AND LMT-C04 – FOR LIMITED COVERAGE EXAMINATIONS PERFORMED IN THE FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL (CAC NOS. MF7718, MF7719, MF7720, MF7721, MF7722, MF7723, MF7724 AND MF7725)

Dear Mr. Stoddard:

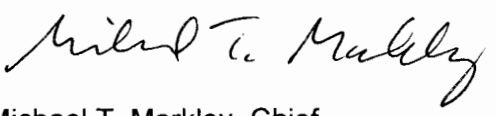
By letter dated May 5, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16131A635), as supplemented by letter dated October 27, 2016 (ADAMS Accession No. ML16309A036), Virginia Electric and Power Company (Dominion), the licensee, submitted relief requests (RRs) Nos. LMT-R01, LMT-SS01, LMT-CS01, LMT-P01, LMT-C01, LMT-C02, LMT-C03, and LMT-C04 to the U.S. Nuclear Regulatory Commission (NRC) for Surry Power Station (Surry), Unit 2. Dominion is seeking relief from certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) requirements specifically related to ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1," for the fourth 10-year ISI interval, which commenced on May 10, 2004 and ended, as extended, on May 9, 2015. The examinations of certain components conducted during the fourth interval received less than the required examination coverage.

The request for relief was proposed pursuant to the provisions of paragraph 50.55a(g)(6)(i) of Title 10 of the *Code of Federal Regulations* (10 CFR). Based on the information you provided in your request for relief, the NRC staff determined that the ASME Code Requirement is impractical and that reasonable assurance of structural integrity of the subject components has been provided by the examinations performed. Granting the request for relief is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Therefore, request for relief RR Nos. LMT-R01, LMT-SS01, LMT-CS01, LMT-P01, LMT-C01, LMT-C02, LMT-C03, and LMT-C04 is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the fourth 10-year ISI interval.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact the Project Manager, Karen Cotton Gross, at 301-415-1438 or by e-mail at Karen.Cotton@nrc.gov.

Sincerely,



Michael T. Markley, Chief
Plant Licensing Branch 2-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-281

Enclosure:
Safety Evaluation

cc w/enclosure: Distribution via Listserv

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUESTS LMT-R01, LMT-SS01, LMT-CS01, LMT-P01, LMT-C01, LMT-C02, LMT-C03, AND LMT-C04

RELATED TO LIMITED COVERAGE EXAMINATIONS PERFORMED IN THE FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL

VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION, UNIT NO. 2

DOCKET NO. 50-281

1.0 INTRODUCTION

By letter dated May 5, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16131A635), as supplemented by letter dated October 27, 2016 (ADAMS Accession No. ML16309A036), Virginia Electric and Power Company (Dominion), the licensee, submitted relief request (RR) Nos. LMT-R01, LMT-SS01, LMT-CS01, LMT-P01, LMT-C01, LMT-C02, LMT-C03, and LMT-C04 to the U.S. Nuclear Regulatory Commission (NRC) for the fourth ten-year inservice inspection (ISI) interval of the Surry Power Station (Surry), Unit 2. Dominion requested relief from certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) requirements specifically related to ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1," for the fourth 10-year ISI interval, which commenced on May 10, 2004 and ended, as extended, on May 9, 2015. The examinations of certain components conducted during the fourth interval received less than the required examination coverage.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(6)(i), the licensee requested relief from the required examination coverage and to use alternative requirements (if necessary), ISI of the welds on the basis that the ASME Code requirement is impractical.

2.0 REGULATORY EVALUATION

The regulations in to 10 CFR 50.55a(g)(4), *Inservice inspection standards requirement for operating plants*, state, in part, that:

> Throughout the service life of a boiling or pressurized water-cooled nuclear power facility, components (including supports) that are classified as ASME Code Class 1, Class 2, and Class 3 must meet the requirements, except design and access provisions and preservice examination requirements, set forth in Section XI of editions and addenda of the ASME BPV [Boiler and Pressure Vessel] Code (or ASME OM Code for snubber examination and testing) that become effective subsequent to editions specified in paragraphs (g)(2) and (3) of this section and that are incorporated by reference in paragraph (a)(1)(ii) or (iv) for snubber examination and testing of this section, to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The regulations in 10 CFR 50.55a(g)(4)(ii), *Applicable ISI Code: Successive 120-month intervals:*

> Inservice examination of components and system pressure tests conducted during successive 120-month inspection intervals must comply with the requirements of the latest edition and addenda of the Code incorporated by reference in paragraph (a) of this section 12 months before the start of the 120-month inspection interval (or the optional ASME Code Cases listed in NRC Regulatory Guide [RG] 1.147, Revision 17, when using Section XI, or Regulatory Guide 1.192, Revision 1, when using the OM Code, that are incorporated by reference in paragraphs (a)(3)(ii) and (iii) of this section), subject to the conditions listed in paragraph (b) of this section. However, a licensee whose inservice inspection interval commences during the 12 through 18-month period after July 21, 2011, may delay the update of their Appendix VIII program by up to 18 months after July 21, 2011.

The regulations in 10 CFR 50.55a(g)(5)(iii), *ISI Program Update: Notification of impractical ISI Code requirements:*

> If the licensee has determined that conformance with a Code requirement is impractical for its facility the licensee must notify the NRC and submit, as specified in §50.4, information to support the determinations. Determinations of impracticality in accordance with this section must be based on the demonstrated limitations experienced when attempting to comply with the Code requirements during the inservice inspection interval for which the request is being submitted. Requests for relief made in accordance with this section must be submitted to the NRC no later than 12 months after the expiration of the initial or subsequent 120-month inspection interval for which relief is sought.

The regulations in 10 CFR 50.55a(g)(6)(i), *Impractical ISI requirements: Granting of relief:*

> The Commission will evaluate determinations under paragraph (g)(5) of this section that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines are

authorized by law, will not endanger life or property or the common defense and security, and are otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Based on the above, and subject to the following technical evaluation, the NRC staff concludes that regulatory authority exists for the licensee to request, and the NRC to grant the relief requested by the licensee.

3.0 TECHNICAL EVALUATION

The information referenced hereafter as "stated by the licensee" is from incoming letters dated May 5, 2016, and supplemented October 27, 2016.

Applicable Code Edition and Addenda

The code of record for the fourth 10-year ISI interval is the 1998 Edition through 2000 Addenda of the ASME Code, Section XI.

Duration of Relief Request

The licensee submitted this relief request for the fourth 10-year ISI interval which commenced on May 10, 2004, and ended, as extended, on May 9, 2015. The licensee stated that an extension of one year was applied to the fourth 10-year ISI interval in accordance with ASME Section XI IWA-2430, and all applicable requirements in IWA-2430 have been met.

ASME Code Requirements

The ASME Code requirements applicable to Class 1 piping welds in relief requests LMT-R01 and LMT-P01 originate in Section XI, Table IWB-2500-1. As an alternative to the ASME Code requirements the licensee uses its RI-ISI program, which was developed in accordance with the NRC approved methodology in WCAP-14572, Revision 1-NP-A (ADAMS Accession No. ML012630349), and that was authorized by the NRC in a safety evaluation dated August 8, 2005 (ADAMS Accession No. ML052080006). In the Surry RI-ISI program, the welds under this request are required to be volumetrically examined during each 10-year ISI interval, and 100 percent coverage of the required examination volume must be achieved. The extent of required examination coverage is reduced to essentially 100 percent by ASME Code Case N-460. This code case has been incorporated by reference into 10 CFR 50.55a by inclusion in RG 1.147, Revision 17.

The ASME Code requirements applicable to Class 2 piping welds in relief requests LMT-SS01, LMT-CS01, and LMT-P01 originate in Section XI, Table IWC-2500-1 (Examination Category C-F-1, Item Nos. C5.11 and C5.21 and Category C-F-2, Item Nos. C5.51, C5.61, and C5.81). The welds under this RR with Code Item Nos. C5.11, C5.21, C5.51 and C5.61 are required surface and volumetric examinations, and with Code Item Nos. C5.81 is required surface examination, every 10-year ISI interval, and 100 percent coverage of the required examination surface and volume must be achieved.

- The extent of required volumetric and surface examination coverage is reduced to essentially 100 percent by ASME Code Case N-460.

- The extent of required surface examination coverage is reduced to areas susceptible to outside surface attack by ASME Code Case N-663 "Alternative Requirements for Classes 1 and 2 Surface Examinations Section XI, Division 1." Code Case N-663 has been incorporated by reference into 10 CFR 50.55a by inclusion in RG 1.147, Revision 17.

The examination requirements for the Class 1 welds in RR LMT-C01 are specified in Table IWB-2500-1, "Examination Categories" of the ASME Code, Section XI, Examination Category B-B. The examination requirement for longitudinal weld 1-02 (Item No. B2.12) is volumetric examination of one foot of the weld. The examination requirement for circumferential weld 1-07 (Item No. B2.11) is volumetric examination of essentially 100 percent of the weld length. When 100 percent of the required volume cannot be examined due to interferences, obstructions, or geometrical configuration, ASME Code Case N-460, allows reduction of the examination volume to greater than 90 percent of the required volume.

The examination requirements for the Class 1 welds in RR LMT- C02 are specified in Table IWB-2500-1, "Examination Categories" of the ASME Code, Section XI, Examination Category B-D. The examination requirement for the nozzle inner radius (NIR) 14NIR is volumetric examination of the nozzle inner radius volume of the applicable figure in Figures IWB-2500-7(a) through IWB-2500-7(d), "Nozzle in Shell of Head" of the ASME Code, Section XI, as specified in Table IWB-2500-1, "Examination Categories" of the ASME Code, Section XI, Examination Category B-D. As noted above, Item No. B3.120 is applicable to 14NIR, which has been removed from the 2000 addenda to the 1998 Edition of the ASME Code, Section XI but is included as a condition in 10 CFR 50.55a(b)(2)(xxi)(A). When 100 percent of the required volume cannot be examined due to interferences, obstructions, or geometrical configuration, ASME Code Case N-460 allows reduction of the examination volume to greater than 90 percent of the required volume.

The examination requirements for the Class 2 welds in RR LMT- C03 and LMT-C04 are specified in Table IWC-2500-1, "Examination Categories" of the ASME Code, Section XI, Examination Category C-C. ASME Section XI, Examination Category C-C, Item C3.20, requires surface examination on 100 percent of the weld area selected for examination. The alternative requirements of ASME Section XI, Code Case N-460, allows credit for essentially 100 percent coverage of the weld provided greater than 90 percent of the required volume or area has been examined.

3.1 Relief Request LMT-R01, Category R-A, Class 1 Stainless Steel Risk Informed Welds

Background

By letter dated August 8, 2005 (ADAMS Accession No. ML052080006), the NRC approved the Surry, Unit 2, risk informed inservice inspection (RI-ISI) program covering the Class 1 piping welds (Examination Category B-F and B-J) for the fourth 10-year ISI interval. The licensee developed the RI-ISI program in accordance with the NRC approved methodology of the Westinghouse Owners Group Topical Report WCAP-14572, Revision 1-NP-A, "Application of Risk-Informed Methods to Piping Inservice Inspection" (ADAMS Accession No. ML012630349).

By letter dated February 18, 1994 (ADAMS Accession No. ML012740218), the NRC issued Amendment No. 187 to the Surry, Unit 2, operating license, to add to the plant Technical Specification (TS) an augmented inspection program for sensitized stainless steel. This

augmented inspection was added to assure piping integrity because some of the piping materials used during original construction of Surry, Units 1 and 2, were later identified as sensitized stainless steel.

Components Affected

In this relief request, the affected components are ASME Code Class 1 piping welds. The licensee identified these welds in Tables 4a, 4b, and 4c of its May, 05, 2016, relief request application.

- The welds listed in Table 4a are the pipe to cold leg loop stop valve welds from the three reactor coolant pumps (RCP). These welds are classified as Examination Category R-A, Item No. R1.11 (elements subject to thermal fatigue) in accordance with WCAP-14572, Revision 1-NP-A, (Table 4.1-1 in Supplement 2 to WCAP-14572, Revision 1-NP-A, dated August 10, 2004, ADAMS Accession No. ML042390336).

  For each weld, the licensee provided the diameter, nominal wall thickness, and material of construction of the pipe in Table 4a of the May 5, 2016, submittal. In the October 27, 2016, letter, the licensee stated that review of design specifications and original construction specifications verified that the materials of construction of each weld and the associated components are austenitic stainless steel. In addition, the licensee provided operating temperature and pressure for each weld.

- The welds listed in Table 4b are: Weld ID No. 1-12BW which is the pipe to reducer weld in the safety injection system, and Weld ID No. 2-35 which is identified in the October 27, 2016, letter, as the pipe to nozzle safe-end weld in the RCS piping.

  - Weld ID No. 1-12BW is classified as Examination Category R-A, Item No. R1.11 (elements subject to thermal fatigue) in accordance with WCAP-14572, Revision 1-NP-A, (Table 4.1-1 in Supplement 2).
  - Weld ID No. 2-35 is classified as Examination Category R-A, Item Nos. R1.11 (elements subject to thermal fatigue) and R1.16 (elements subject to intergranular stress corrosion cracking (IGSCC)) in accordance with WCAP-14572, Revision 1-NP-A, (Table 4.1-1 in Supplement 2).

  For each weld, the licensee provided the diameter, nominal wall thickness, and material of construction of the pipe in Table 4b of the submittal. In the October 27, 2016, letter, the licensee stated that Weld ID No. 2-35 and its associated components (safe-end, weld filler metal, and pipe) are made of austenitic stainless steel. The materials of construction of Weld ID No. 1-12BW and its associated components are also austenitic stainless steel. In addition, the licensee provided operating temperature and pressure for each weld.

- The welds listed in Table 4c are the pipe to valve, elbow to weldolet, elbow to nozzle, pipe to weldolet, and elbow to valve in the RCS piping. These welds are classified as Examination Category R-A, Item No. R1.11 (elements subject to thermal fatigue) in accordance with WCAP-14572, Revision 1-NP-A, (Table 4.1-1 in Supplement 2).

  In the October 27, 2016, letter, the licensee corrected the item number for three welds (Weld ID Nos. 1-09 and 1-11 on Line No. 6-RC-321 and Weld ID No. 1-01BC on Line No. 6-RC-318), and stated that during the fourth 10-year ISI interval, the assigned

degradation mechanism for these three welds was thermal fatigue (Item No. 1.11). However, Item No. 1.20 has been assigned to these three welds according to the Surry's updated RI-ISI program (ASME Code Case N-716-1 "Alternative Classification and Examination Requirements, Section XI, Division 1") in the fifth 10-year ISI interval.

For each weld, the licensee provided the diameter, nominal wall thickness, and materials of construction for the pipe in Table 4c of the May 5, 2016, submittal. In the October 27, 2016, letter, the licensee stated that review of design specifications and original construction specifications verified that the materials of construction of each weld and the associated components are austenitic stainless steel. In addition, the licensee provided operating temperature and pressure for each weld.

Impracticality of Compliance

The licensee stated that it was not possible to obtain greater than 90 percent of the required examination volume of each weld (welds listed in Tables 4a, 4b, and 4c to Attachment 1 of the submittal dated May 5, 2016) because of the geometric configurations (i.e., pipe to valve, pipe to reducer, pipe to nozzle, elbow to weldolet, valve to elbow, elbow to nozzle, and pipe to weldolet). These geometrical configurations confine meaningful ultrasonic examination to one side of the weld only. In addition, the welds listed in Table 4a have identification plates that interfered with the scanning.

The licensees stated that the welds listed in Tables 4a, 4b, and 4c to Attachment 1 of the submittal dated May 5, 2016, were only scanned from one side of the weld (single sided scan). The schematic diagram provided for each weld in Attachment 1 to the RR illustrates the geometrical difficulties associated with dual-sided scan, and impracticality of compliance with the ASME Code examination coverage requirement.

The licensee stated that compliance with the ASME Code requirements would need extensive design modification or replacement of components. The redesign and replacement of components would create an unnecessary burden.

Basis for Relief

The licensee stated that the ISI requirements for the Class 1 piping welds are governed by the Surry, Unit 2, RI-ISI program in the fourth 10-year ISI interval. The welds in this submittal were selected for volumetric examination by the RI-ISI program due to potential susceptibility to thermal fatigue and/or IGSCC. In the submittal, the licensee discussed in detail, the process for selecting the welds listed in Tables 4a, 4b, and 4c of Attachment 1 to the submittal dated May 5, 2016, for the volumetric examinations, and whether suitable alternative and/or additional welds existed that could provide greater coverage of the ASME Code required volume. Alternative and/or additional welds examined are as follows:

Alternative and/or additional welds to the welds listed in Table 4a – The licensee stated that one alternate weld (Weld ID No. 1-12 which is the RCP to pipe weld) exists on each of the individual segment RC-010, RC-011, and RC-012 for the RCS Loop A, B, and C, respectively. The ultrasonic testing (UT) scanning area would be restricted to one side of these alternative welds due to the pump to pipe configuration, and would provide approximately 50 percent coverage similar to the welds listed in Table 4a. Due to the excessively high dose rates in this area, it is not practical to attempt examination of these alternative welds (Weld ID Nos. 1-12), which would offer at best only 50 percent coverage.

Similarly, the Surry, Unit 1, RCP to pipe welds (Weld ID Nos. 1-12) were examined on similar segments in Unit 1 during the fourth 10-year ISI interval, and only 48 percent coverage obtained for each weld. No recordable indications were detected in any of the alternative welds examined.

Alternative and/or additional welds to the welds listed in Table 4b – The licensee stated that Weld ID No. 1-11 on Segment ECC-008 was UT examined with full coverage and no recordable indications. The five remaining welds assigned to this Segment ECC-008 are ASME Code Class 1, 2 socket welds, and are subjected to the visual examination (VT-2) during pressure test every refueling outage. On Segment RC-051, Weld ID Nos. 2-29, 2--30, 2-33, 2-34 on Line 4"-RC-315-1502 were also volumetrically examined during the fourth 10-year ISI interval with full coverage and no recordable indications.

Alternative and/or additional welds to the welds listed in Table 4c – The licensee stated that Weld ID No 1-08 on Segment ECC-005 was volumetrically examined with full coverage and no recordable indications. Weld ID No. 1-04B on Segment RC-041, Line 6-RC-317, was also volumetrically examined, and met the coverage requirement with no recordable indications. Weld ID Nos. 1-05, 1-06, and 1-07 on Segment RC-018, Line 6-RC-321, were also UT examined, and met coverage requirement with no recordable indications. Weld ID No. 1-10 on Segment ECC-007 was also volumetrically examined with full coverage and no recordable indications. Weld ID Nos. 1-06, 1-07, and 1-08 on Segment RC-017, Line 6--RC-318, were also examined and met the coverage requirement with no recordable indications.

The licensee stated that the welds listed in Tables 4a and 4b are not within scope of augmented inspection program under Materials Reliability Program (MRP)-146 "Management of Thermal Fatigue in Normally Stagnant Non-isolable Reactor Coolant System Branch Lines" because this guidance addresses thermal fatigue only on normally stagnant non-isolable reactor coolant lines.

The licensee stated that Weld ID No. 2-35 in Table 4b with mode of degradation of IGSCC is within scope of the augmented program for sensitized stainless steel, and received a surface examination during fourth 10-year ISI interval in addition to the UT. Since Weld ID No. 2-35 is made of austenitic stainless steel, it is not part of an augmented program for managing PWSCC susceptibility.

The licensee stated that the welds in Table 4c with mode of degradation of thermal fatigue are within the scope of the industry guidelines in MRP-146 during the fourth 10-year ISI interval. The areas determined most susceptible to thermal stratification were examined in November 2009, before the end of the fourth interval. The examinations resulted in no recordable indications. Evaluation of the unexamined volumes due to physical limitations was not required as part of the MRP-146 guidance in 2009. Therefore, an analysis of the unexamined area with regard to the potential risk of cracking was not required.

In the letter dated October 27, 2016, the licensee stated that Weld ID No. 1-03A was replaced in 2006 because the adjacent valve was cut out and replaced, which created the need to rework this weld.

The licensee stated that it performed the UT of each weld to the maximum extent possible utilizing personnel qualified and procedures demonstrated in accordance with Appendix VIII of Section XI. The UT of each weld was only possible from one side of the weld (single sided

scan). In Tables 4a, 4b, and 4c, and the figures provided in Attachment 1 to the submittal, the licensee documented the ultrasonic probe angles and the ultrasonic wave modes (e.g., refracted shear and longitudinal waves) utilized for scanning each weld. The licensee did not detect any unacceptable indications in the welds under consideration during the fourth 10-year ISI interval.

The licensee stated that when the examination by the UT is limited to one side of an austenitic weld, claiming coverage for the volume on the opposite side of the weld centerline (far-side) requires meeting the 10 CFR 50.55a(b)(2)(xv)(A)(2) far-side UT qualifications, which has not been demonstrated in any qualification attempts to date. Therefore, full coverage credit cannot be claimed. The licensee also stated that, as applicable, it performed the "Best Effort" examination to investigate the far-side of the weld. The "Best Effort" examination is neither an ASME Code nor a regulatory requirement; however, it provides an extra effort on the part of a licensee to examine the far-side of the weld for any indication. To scan the far-side of the weld, the refracted longitudinal (L)-waves is generally utilized for welds with wall thickness greater than 0.5 inch and the 70 degree refracted shear waves was generally used for welds with wall thickness equal or less than 0.5 inch. The licensee did not claim credit for any coverage past the weld centerline (on the far-side) from the "Best Effort" examination. From the examinations performed, the licensee did not identify any indication. Table 4a, 4b, and 4c of the May 5, 2016, RR documents the licensee's "Best Effort" percent coverage achieved.

The licensee stated that there are no primary water stress corrosion cracking (PWSCC) concerns and no known failures of the subject welds. The licensee further stated that the performance of VT-2 visual examinations during system leakage testing in accordance with IWB-2500 (Examination Category B-P in Table IWB-2500-1) provides additional assurance that a through wall flaw would be detected.

Proposed Alternative

In Tables 4a, 4b, and 4c of Attachment 1 to the RR dated May 5, 2016, the licensee reported the percentage of coverage achieved by the UT in the examination performed (single-side scan).

Volumetric examination coverage:

- For three welds in Table 4a that are classified as Examination Category R-A, Item No. R1.11, the volumetric coverage achieved was:

Weld ID No. 1-13 in Segment RC-012 "C" Loop	49.5 percent
Weld ID No. 1-13 in Segment RC-011 "B" Loop	49 percent
Weld ID No. 1-13 in Segment RC-010 "A" Loop	47 percent

- For one weld in Table 4b that is classified as Examination Category R-A, Item No. R1.11, the volumetric coverage achieved was:

Weld ID No. 1-12BW in Segment ECC-008	75 percent

  For one weld in Table 4b that is classified as Examination Category R-A, Item No. R1.16/R1.11, the volumetric coverage achieved was:

Weld ID No. 2-35 in Segment RC-051	50 percent.

- For seven welds in Table 4c that are classified as Examination Category R-A, Item No. R1.11, the volumetric coverage achieved was:

Weld ID No. 1-09 in Segment ECC-005	50 percent
Weld ID No. 1-02 in Segment RC-042	50 percent
Weld ID No. 1-03A in Segment RC-042	50 percent
Weld ID No. 1-03 in Segment RC-041	50 percent
Weld ID No. 1-02 in Segment RC-043	50 percent
Weld ID No. 1-03B in Segment RC-043	50 percent
Weld ID No. 1-08 in Segment RC-018	50 percent

- For three welds in Table 4c that are classified as Examination Category R-A, Item No. R1.20, the volumetric coverage achieved was:

Weld ID No. 1-09 in Segment ECC-007	50 percent
Weld ID No. 1-11 in Segment ECC-007	50 percent
Weld ID No. 1-01BC in Segment RC-017	50 percent

The licensee proposed this alternative coverage for the volumetric examination of the subject welds in lieu of the ASME Code required essentially 100 percent coverage.

NRC Staff Evaluation

The NRC staff has evaluated this RR pursuant to 10 CFR 50.55a(g)(6)(i). The NRC staff's evaluation focused on: (1) whether a technical justification exists to support the determination that the ASME Code requirement is impractical; (2) that imposition of the Code required inspections would result in a burden to the licensee; and (3) that the licensee's proposed alternative (accepting the reduced inspection coverage in this case) provides reasonable assurance of structural integrity and leak tightness of the subject welds. The NRC staff concludes that if these three criteria are met, and that the requirements of 10 CFR 50.55a(g)(6)(i), (i.e., granting the requested relief will not "endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility") will also be met.

Impracticality of compliance

As described in Attachment 1 of the submittal dated May 5, 2016, the predominant limitations that prevented the licensee's UT to achieve essentially 100 percent coverage of the ASME Code required volume was design and configuration of the welds and associated components (e.g., pipe to valve, pipe to reducer, pipe to nozzle, elbow to weldolet, valve to elbow, elbow to nozzle, and pipe to weldolet) that restricted the UT to a single sided scanning only. The NRC staff concludes that this scanning from both sides of the welds, as is required to achieve the required coverage, is impractical.

Burden of compliance

The licensee proposed that making the welds in this submittal accessible for inspection from both sides would require replacement or significant modification of the weld and associated components. The NRC staff concludes that replacing or reconfiguring the components is the

only reasonable means to achieve dual sided coverage of these welds and that replacement or reconfiguration of the components constitutes a burden on the licensee.

Structural integrity and leak tightness

The NRC staff considered whether the licensee's proposed alternative provided reasonable assurance of structural integrity and leak tightness of the subject welds based on: (1) the examination coverage achieved and (2) safety significance of unexamined volumes - unachievable coverage (i.e., the presence or absence of known active degradation mechanisms, the significance of a leak and/or structural failure of the subject welds, and essentially 100 coverage achieved for similar welds in similar environments subject to similar degradation mechanisms).

Examination coverage achieved

In evaluating the licensee's proposed alternative, the NRC staff assessed whether it appeared that the licensee obtained as much coverage as reasonably possible and the manner in which the licensee reported the coverage achieved. From review of Attachment 1 to the submittal dated May 5, 2016, the NRC staff confirms that:

- The welds were examined using the appropriate equipment, ultrasonic modes of propagation, probe angles, frequencies, and scanning directions to obtain maximum coverage;
- The coverage was calculated in a reasonable manner;
- The UT procedures used were qualified as required by the regulation;
- The coverage was limited by physical access (i.e., the configuration of one side of the weld did not permit access for scanning);
- No unacceptable indications were identified.

Therefore, the NRC staff concludes that the licensee made every effort to obtain as much coverage as reasonably possible with the ASME Code required UT.

Safety significance of unexamined volumes - unachievable coverage

In addition to the coverage analysis described above, the NRC staff evaluated the safety significance of the unexamined volumes of weld - unachievable coverage. From review of submittal and the sketches in Attachment 1 to the RR dated May 5, 2016, the NRC staff verified that:

- The UT has examined the required volume to the extent possible;
- The ultrasonic scans have covered the weld root and the heat affected zone (HAZ) of the base material near the ID surface of the joint that are typically susceptible to higher stresses and, therefore, potential degradation;
- The far-side volume has been inspected by the "Best Effort" examination. For the stainless steel weld, the coverage obtained for axial scans was limited to the volume up to the weld centerline (near-side), because claiming coverage for the volume on the opposite side of the weld centerline (far-side) requires meeting the 10 CFR 50.55a(b)(2)(xv)(A)(2) far-side UT qualifications, which has not been demonstrated in any qualification attempts to date. Thus, no credit was taken for the coverage achieved from the "Best Effort" examination;

- Similar welds in similar environments subject to similar degradation mechanisms were also inspected, essentially 100 percent coverage was achieved, and no unacceptable indications were detected in the volume inspected. The NRC staff concludes that the examination of similar welds provide additional assurance that any pattern of degradation in the welds under consideration, if it were to occur, would be detected;
- The results of the UT showed no unacceptable indications in any of the welds the licensee inspected.

Therefore, the NRC staff determined that based on the coverage achieved by the qualified UT, the examination of the weld root and its HAZ to the extent possible, examination of similar welds with full coverage, and no unacceptable indications in any of the examined welds, it is reasonable to conclude that if significant service induced degradation had occurred, evidence of it would have been detected by the examinations that the licensee performed.

The NRC staff also concludes that, in addition to the required volumetric examinations, these welds have received the required system leakage test according to the ASME Code, Section XI, IWB-2500 (Table IWB-2500-1, Examination Category B-P) during each refueling outage. Despite reduced coverage of the required examination volume, the NRC staff concludes that this inspection will provide additional assurance that any pattern of degradation, if it were to occur, would be detected and the licensee will take appropriate correction actions.

Therefore, the NRC staff concludes that the volumetric examinations performed to the extent possible provide a reasonable assurance of structural integrity and leak tightness of the subject welds. Compliance with the ASME Code requirements for these welds would be a burden on the licensee and is, therefore, impractical.

3.2 Relief Request LMT-SS01, Category C-F-1, Stainless Steel Pipe Welds

Background

By letter dated February 18, 1994 (ADAMS Accession No. ML012740218), the NRC issued Amendment No. 187 to the Surry, Unit 2, operating license, to add to the plant Technical Specification (TS) an augmented inspection program for the sensitized stainless steel. This augmented inspection was added to assure piping integrity because some of the piping materials used during original construction of Surry, Units 1 and 2, were later identified as sensitized stainless steel.

Component Affected

In this relief request, the affected components are ASME Code Class 2 welds in the austenitic stainless steel piping. The licensee identified these welds in Tables 4a of Attachment 2 of the RR dated May 5, 2016.

- The welds are the elbow to valve, valve to tee, elbow to tee, pipe to valve, reducer to valve, pipe to pump, pipe to flange, elbow to flange, and pipe to elbow in the safety injection system, residual heat removal system, containment spray, recirculation spray, and charging system. The welds are classified as Examination Category C-F-1, Item Nos. C5.11 and C5.21 (Table IWC-2500).

  In Table 4a of the submittal dated May 5, 2016, the licensee provided the diameter, nominal wall thickness, and material of construction of the pipe. In the October 27,

2016, letter, the licensee stated that the materials of construction of each weld and the associated components are austenitic stainless steel. In addition, the licensee provided operating temperature and pressure for each weld.

Impracticality of Compliance

The licensee stated that it was not possible to obtain greater than 90 percent of the required examination volume of each weld by UT because of the geometric configurations (i.e., elbow to valve, valve to tee, elbow to tee, pipe to valve, reducer to valve, pipe to pump, pipe to flange, elbow to flange, and pipe to elbow). The welds under consideration were only scanned from one side of the weld (single sided scan). Table 4a and the schematic diagram provided for each weld in Attachment 2 to the submittal dated May 5, 2016, illustrate the geometrical difficulties associated with dual-sided scan, and impracticality of compliance with the ASME Code examination coverage requirement.

The licensee stated that it was not possible to obtain greater than 90 percent of the required examination surface of Weld ID Nos. 0-03 and 0-05 on Line 12-SI-201 by the penetrant testing (PT) because of proximity to concrete wall obstructing the examination surface.

The licensee stated that compliance with the ASME Code requirements would need extensive design modification or replacement of components. The redesign and replacement of components would create unnecessary burden.

Basis for Relief

The licensee stated that it performed the ultrasonic testing (UT) of each weld to the maximum extent possible utilizing personnel qualified and procedures demonstrated in accordance with Appendix VIII of Section XI. The UT of each weld was only possible from one side of the weld (single sided scan). In Table 4a and the figures provided in Attachment 2 to the submittal, the licensee documented the ultrasonic probe angles (insonification angles) and the ultrasonic wave modes (e.g., refracted shear and longitudinal waves) utilized for scanning each weld. The licensee did not detect any unacceptable indications in the welds under consideration during the fourth 10-year ISI interval.

The licensee stated that when the examination by the UT is limited to one side of an austenitic weld, claiming coverage for the volume on the opposite side of the weld centerline (far-side) requires meeting the 10 CFR 50.55a(b)(2)(xv)(A)(2) far-side UT qualifications, which has not been demonstrated in any qualification attempts to date. Therefore, full coverage credit cannot be claimed.

The licensee also stated that, as applicable, it performed the "Best Effort" examination to investigate the far-side of the weld. The "Best Effort" examination is neither an ASME Code nor a regulatory requirement; however, it provides an extra effort on the part of a licensee to examine the far-side of the weld for any indication. To scan the far-side of the weld, refracted longitudinal (L)-waves are generally utilized for welds with wall thickness greater than 0.5 inch and 70 degree refracted shear waves are generally used for welds with wall thickness equal or less than 0.5 inch. The licensee did not claim credit for any coverage past the weld centerline (on the far-side) from the "Best Effort" examination. From the examinations performed, the licensee did not identify any indications. Table 4a of the RR dated May 5, 2016, documents the licensee's "Best Effort" percent coverage achieved.

The licensee stated that the surface examinations were performed in addition to the volumetric examinations, except where Code Case N-663 was determined to be applicable. As documented in Table 4a of Attachment 2 dated May 5, 2016, the licensee stated that:

- In accordance with provisions of Code Case N-663, it was determined that no surface examinations was required for 29 welds.
- The surface examination was performed on the remaining 13 welds, essentially 100 percent coverage was achieved for 11 welds, and limited coverage was achieved for 2 welds (Weld ID Nos. 0-03 and 0-05 on Line 12-SI-201). The surface examinations did not identify any unacceptable surface indications.

The licensee stated that two welds (Weld ID Nos. 1-03 and 1-12 on Line 3-CH-303) in Table 4a are within scope of the augmented program for sensitized stainless steel, and will be inspected accordingly.

In the letter dated October 27, 2016, the licensee provided the following additional information:

- No known degradation mechanisms were assigned to the welds under consideration.
- According to the plant's risk-informed (RI)-ISI program for the fifth 10-year ISI interval, the licensee has ranked the 12 welds with coverage less than 50 percent (Table 4a of RR) as low safety significant, therefore, the volumetric examination is not required for the 12 welds in the fifth 10-year ISI interval.
- There were no cumulative fatigue usage (CFU) factor calculated for these welds because the CFU calculation was not required for the Class 2 welds.
- During the fourth 10-year ISI interval, there have been 129 welds (Examination Category C-F-1) inspected at Unit 2, and no unacceptable indications were detected in any of the welds.

The licensee stated that there are no primary stress corrosion cracking (PWSCC) concerns because none of the welds in this RR is constructed with Alloy 600/82/182. There are also no known through-wall failures on the welds in this RR.

The licensee stated that the performance of VT-2 visual examinations during system leakage testing in accordance with Table IWC-2500-1, Examination Category C-H, provides additional assurance that a through wall flaw would be detected.

Proposed Alternative

In Table 4a of Attachment 2 to the RR dated May 5, 2016, the licensee reported the percentage of coverage achieved by the UT and PT in the examination performed.

Volumetric coverage by UT

For twenty three welds that are classified as Examination Category C-F-1, Item No. C5.11, the volumetric coverage achieved was between minimum of 19 percent and maximum of 50 percent.

For nineteen welds that are classified as Examination Category C-F-1, Item No. C5.21, the volumetric coverage achieved was between minimum of 43 percent and maximum of 85.5 percent.

Surface coverage by PT

Weld ID No. 0-03 on Line 12-SI-201	80 percent
Weld ID No. 0-05 on Line 12-SI-201	77.5 percent

The licensee proposed the above alternative coverage for the volumetric and surface examination of the subject welds in lieu of the ASME Code required essentially 100 percent coverage.

NRC Staff Evaluation

The NRC staff has evaluated this submittal pursuant to 10 CFR 50.55a(g)(6)(i). The NRC staff's evaluation focused on: (1) whether a technical justification exists to support the determination that the ASME Code requirement is impractical; (2) that imposition of the Code required inspections would result in a burden to the licensee; and (3) that the licensee's proposed alternative (accepting the reduced inspection coverage in this case) provides reasonable assurance of structural integrity and leak tightness of the subject welds. The NRC staff concludes that if these three criteria are met that the requirements of 10 CFR 50.55a(g)(6)(i), (i.e., granting the requested relief will not "endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility") will also be met.

Impracticality of compliance

As described and demonstrated in Attachment 2 to the submittal dated May 5, 2016, the predominant limitations that prevented the licensee's UT to achieve essentially 100 percent coverage of the ASME Code required volume was design and configuration of the weld and associated components (e.g., pipe to valve, pipe to reducer, pipe to nozzle, elbow to weldolet, valve to elbow, elbow to nozzle, and pipe to weldolet) that restricted the UT examinations to single sided scanning only. The NRC staff concludes that scanning from both sides of the weld, as is required to achieve the required coverage, is impractical.

As described and demonstrated in Attachment 2 to the submittal, the predominant limitations that prevented the licensee's PT from achieving essentially 100 percent coverage of the ASME Code required surface was that the concrete wall obstructed the examination surface. The NRC staff concludes that achieving the required coverage without removal of this concrete wall is impractical.

Burden of compliance

For the UT, the licensee proposed that making the weld accessible for inspection from both sides would require replacement or significant modification of the weld and associated components. The NRC staff concludes that replacing or reconfiguring the components is the only reasonable means to achieve dual sided coverage of these welds, and that replacement or reconfiguration of the components constitutes a burden on the licensee.

For the PT, the licensee proposed that making the required surface of the weld accessible for inspection would require removal of the concrete wall or significant design modifications to the components. The NRC staff concludes that removing the wall or reconfiguring the components

is the only reasonable means to achieve the required coverage, and that removal of the wall or reconfiguration of the components is a burden on the licensee.

Structural integrity and leak tightness

The NRC staff considered whether the licensee's proposed alternative provided reasonable assurance of structural integrity and leak tightness of the subject welds based on: (1) the examination coverage achieved and (2) safety significance of unexamined volumes or areas - unachievable coverage (i.e., the presence or absence of known active degradation mechanisms, the significance of a leak and/or structural failure of the subject welds, and essentially 100 coverage achieved for similar welds in similar environments subject to similar degradation mechanisms).

Examination coverage achieved

In evaluating the licensee's proposed alternative, the NRC staff assessed whether it appeared that the licensee obtained as much coverage as reasonably possible and the manner in which the licensee reported the coverage achieved. From review of Attachment 2 to the submittal dated May 5, 2016, the NRC staff confirms that:

- The welds were examined by the UT using the appropriate equipment, ultrasonic modes of propagation, probe angles, frequencies, and scanning directions to obtain maximum coverage;
- The UT procedures used were qualified as required by the regulation;
- For the UT, the coverage was limited by physical access (i.e., the configuration of one side of the weld did not permit access for scanning); dated May 5, 2016.
- For the PT, the coverage was limited due to proximity of examination surface to concrete wall;
- The coverage was calculated in a reasonable manner;
- No unacceptable indications were identified during volumetric and surface examinations.

Therefore, the NRC staff concludes that the licensee made every efforts to obtain as much coverage as reasonably possible with the ASME Code required UT and PT.

Safety significance of unexamined volumes - unachievable coverage

In addition to the coverage analysis described above, the NRC staff evaluated the safety significance of the unexamined volumes or areas of weld - unachievable coverage. From a review of the submittal and the sketches in Attachment 2 to the RR dated May 5, 2016, the NRC staff verified that:

- The UT has examined the required volume to the extent possible;
- The ultrasonic scans have covered the weld root and the heat affected zone (HAZ) of the base material near the inside diameter (ID) surface of the joint that are typically susceptible to higher stresses and, therefore, potential degradation;
- The far-side volume has been inspected by the "Best Effort" examination. For the stainless steel weld, the coverage obtained for axial scans was limited to the volume up to the weld centerline (near-side), because claiming coverage for the volume on the opposite side of the weld centerline (far-side) requires meeting the 10 CFR 50.55a(b)(2)(xv)(A)(2) far-side UT qualifications, which has not been demonstrated in

any qualification attempts to date. No credit was taken for the coverage achieved from the "Best Effort" examination. Thus, the licensee did not take any credit for the coverage achieved from the "Best Effort" examination;

- The UT of similar welds performed during the fourth 10-year ISI interval revealed no unacceptable indications. The NRC staff concludes the results of these examinations provide additional assurance that any pattern of degradation in the welds under consideration, if it were to occur, would be detected;
- The PT has examined the required area to the extent possible;
- The results of the UT and the PT showed no unacceptable indications in any of the welds the licensee inspected.

Therefore, the NRC staff determined that based on (a) the coverage achieved by the qualified UT and the examination of the weld root and its HAZ to the extent possible, and (b) the coverage achieved by the PT, it is reasonable to conclude that if significant service induced degradation had occurred, evidence of it would have been detected by the examinations that the licensee performed.

In this analysis, the NRC staff also concludes that, in addition to the required volumetric and surface examinations, these welds have received the required system leakage test according to the ASME Code, Section XI, IWC-2500 (Table IWC-2500-1, Examination Category C-H). Despite reduced coverage of the required examination volume and surface, the NRC staff concludes that this inspection will provide additional assurance that any pattern of degradation, if it were to occur, would be detected and the licensee will take appropriate correction actions.

Therefore, the NRC staff concludes that the volumetric and surface examinations performed to the extent possible provide a reasonable assurance of structural integrity and leak tightness of the subject welds. Compliance with the ASME Code requirements for these welds would be a burden on the licensee and is, therefore, impractical.

3.3 Relief Request LMT-CS01, Category C-F-2, Carbon Steel Pipe Welds

Component Affected

In this relief request, the affected components are ASME Code Class 2 piping welds. The licensee identified these welds in Table LMT-CS01 of Attachment 3 to the submittal dated May 5, 2016:

- The welds are branch connection, valve to elbow, pipe to flange, and pipe to tee welds in the main steam and the auxiliary feedwater piping systems. The welds are classified as Examination Category C-F-2, Item No. C5.51, 5.61 and, C5.81 (Table IWC-2500-1).

  For each weld, the licensee provided the diameter, nominal wall thickness, and materials of construction for the pipes (carbon steel) in Table LMT-CS01 of this RR. In the October 27, 2016, letter, the licensee stated that the materials of construction of each weld and the associated components are carbon steel. In addition, the licensee provided operating temperature and pressure for each weld.

Impracticality of Compliance

The licensee stated that compliance with the required examination coverage was determined to be impractical. The details are as follows:

- For the welds under Code Item No. C5.51 and C5.61, it was not possible to obtain greater than 90 percent of the required examination volume of the weld by the ultrasonic testing (UT) because of the geometric configurations (i.e., branch connection, valve to elbow, pipe to flange, and pipe to tee). These welds were only scanned from one side of the weld (single sided scan). Table LMT-CS01 and the schematic diagram provided for each weld in Attachment 3 to the RR illustrate the geometrical difficulties associated with dual-sided scan, and impracticality of compliance with the ASME Code examination coverage requirement.

- For the weld under Code Item No. C5.81, it was not possible to obtain greater than 90 percent of the required examination area of the weld by the magnetic particle testing (MT) because of interference from geometric configurations and attachments.

The licensee stated that compliance with the ASME Code requirements would need extensive design modification, replacement of components, or removal of attachments. These activities (redesign and replacement of components or removal of attachments) would create an unnecessary burden.

Basis for Relief

The licensee stated that it performed the UT to the maximum extent possible utilizing personnel qualified and procedures demonstrated in accordance with Appendix VIII of Section XI. The UT of each weld (Weld Nos. 0-17, 0-02A, 0-108, and 0-109 in Table LMT-CS01) was only possible from one side of the weld. In Table LMT-CS01, and the figures provided in Attachment 3 to the submittal dated May 5, 2016, the licensee documented the ultrasonic probe angles (insonification angles) and the ultrasonic wave modes (e.g., refracted shear and longitudinal waves) utilized for scanning each weld. The licensee did not detect any unacceptable indications in the volume examined during the fourth 10-year ISI interval.

The licensee stated that the surface examinations were performed in addition to the volumetric examinations, except where Code Case N-663 was determined to be applicable. As documented in Table LMT-CS01, the licensee stated that:

- In accordance with provisions of Code Case N-663, it was determined that no surface examinations was required for the 4 welds (Weld Nos. 0-17, 0-02A, 0-108, and 0-109 in Table LMT-CS01).
- The surface examination was performed on the remaining weld (Weld No. 1-22BC in Table LMT-CS01), and limited coverage was achieved. The surface examinations did not identify any unacceptable surface indications on the area inspected during the fourth 10-year ISI interval.

The licensee stated that none of the pipe or weld material is constructed with Alloy 600/82/182 materials, therefore, there are no primary stress corrosion cracking (PWSCC) concerns.

In the October 27, 2016, letter, the licensee provided the following additional information.

- The licensee stated that the lines in this relief request were evaluated for the flow-accelerated corrosion (FAC) under the FAC program. However, it was determined that the welds in Table LMT-CS01 in the auxiliary feedwater lines are stagnant (non-flowing) piping during normal operation, consequently, they do not typically exhibit FAC. It was also determined that the weld in the main steam line (Line 30-SHP-122) is the header for the main steam safety valves, and normally does not experience flow, therefore, FAC is not a concern.
- The licensee stated that there are no other degradation mechanisms assigned to the welds in this submittal.
- The licensee stated that there were no cumulative fatigue usage (CFU) factor calculated for the welds in this submittal because the CFU calculation was not required for the Class 2 welds.

The licensee stated that the VT-2 visual examinations that accompanied the system leakage test (Examination Category C-H in Table IWC-2500-1) provides additional assurance that a through wall flaw would be detected in the welds in this submittal. Furthermore, the visual examinations required weekly for the high energy lines by the Surry augmented program provides additional assurance that a through wall flaw would be detected in the weld.

Proposed Alternative

In Table LMT-CS01 of Attachment 3 to the RR dated May 5, 2016, the licensee reported the percentage of coverage achieved by the UT and MT in the examination performed.

Volumetric examination coverage:

- For three welds that are under Code Item No. C5.61, the volumetric coverage achieved was:

Weld No. 0-17	40.17 percent
Weld No. 0-108	66.7 percent
Weld No. 0-109	65.2 percent

- For one weld that is under Code Item No. C5.51, the volumetric coverage achieved was:

Weld No. 0-02A	88.6 percent

Surface examination coverage:

- For one weld that is under Code Item No. C5.81, the surface coverage achieved was:

Weld No. 1-22BC	80.80 percent

The licensee implemented the provisions of Code Case N-663 and determined that no surface examinations was required for the 4 welds (Weld Nos. 0-17, 0-02A, 0-108, and 0-109 in Table LMT-CS01).

The licensee proposed the above alternative coverage for the volumetric and/or surface examination of the welds in this relief request in lieu of the ASME Code required essentially 100 percent coverage.

NRC Staff Evaluation

The NRC staff has evaluated this RR pursuant to 10 CFR 50.55a(g)(6)(i). The NRC staff's evaluation focused on: (1) whether a technical justification exists to support the determination that the ASME Code requirement is impractical; (2) that imposition of the Code required inspections would result in a burden to the licensee; and (3) that the licensee's proposed alternative (accepting the reduced inspection coverage in this case) provides reasonable assurance of structural integrity and leak tightness of the subject welds. The NRC staff concludes that if these three criteria are met that the requirements of 10 CFR 50.55a(g)(6)(i), (i.e., granting the requested relief will not "endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility") will also be met.

Impracticality of compliance

As described and demonstrated in Attachment 3 to the submittal dated May 5, 2016, the predominant limitations that prevented the licensee's UT from achieving essentially 100 percent coverage of the ASME Code required volume for four welds was the design and configuration of the weld and associated components (e.g., valve to elbow, pipe to flange, and pipe to tee) that restricted the UT examinations to single sided scanning only. The NRC staff concludes that scanning from both sides of the weld, as is required to achieve the required coverage, is impractical.

As described and demonstrated in Attachment 3 to the submittal, the predominant limitations that prevented the licensee's MT from achieving essentially 100 percent coverage of the ASME Code required area for Weld No. 1-22BC was interference from integral attachments to the weld. The NRC staff concludes that full access to the required area to conduct MT, as is required to achieve the required coverage, is impractical.

Burden of compliance

For the UT, the licensee proposed that making the welds fully accessible for inspection from both sides would require replacement or significant modification of the welds and associated components. The NRC staff concludes that replacing or reconfiguring the components is the only reasonable means to achieve dual sided coverage of these welds and that replacement or reconfiguration of the components constitutes a burden on the licensee.

For the MT, the licensee proposed that making the required surface of the weld accessible for inspection would require removal of the integral attachments or significant design modifications to the components. The NRC staff concludes that removing the attachments or reconfiguring the components is the only reasonable means to achieve the required coverage, and that removal or reconfiguration of the components is a burden on the licensee.

Structural integrity and leak tightness

The NRC staff considered whether the licensee's proposed alternative provided reasonable assurance of structural integrity and leak tightness of the subject welds based on: (1) the

examination coverage achieved and (2) safety significance of unexamined volumes - unachievable coverage (i.e., the presence or absence of known active degradation mechanisms, the significance of a leak and/or structural failure of the subject welds, and essentially 100 coverage achieved for similar welds in similar environments subject to similar degradation mechanisms).

Examination coverage achieved

In evaluating the licensee's proposed alternative, the NRC staff assessed whether it appeared that the licensee obtained as much coverage as reasonably possible and the manner in which the licensee reported the coverage achieved. From a review of Attachment 3 to the submittal dated May 5, 2016, the NRC staff confirms that:

- The welds were examined using the appropriate equipment, ultrasonic modes of propagation, probe angles, frequencies, and scanning directions to obtain maximum coverage;
- The UT procedures used were qualified as required by the regulation;
- For the UT, the coverage was limited by physical access (e.g., the configuration of one side of the weld did not permit access for scanning);
- For the MT, the coverage was limited by physical access (e.g., interference from integral attachments);
- The coverage for surface and/or volumetric examinations was calculated in a reasonable manner;
- No unacceptable indications were identified during volumetric and surface examinations.

Therefore, the NRC staff concludes that the licensee made every effort to obtain as much coverage as reasonably possible with the ASME Code required UT and/or MT.

Safety significance of unexamined volumes and/or areas - unachievable coverage

In addition to the coverage analysis described above, the NRC staff evaluated the safety significance of the unexamined volumes and/or areas of weld - unachievable coverage. From review of submittal and the sketches in Attachment 3 to the submittal dated May 5, 2016, the NRC staff verified that:

- The UT has examined the required volume to the extent possible;
- The ultrasonic scans have covered the weld root and the heat affected zone (HAZ) of the base material near the inside diameter (ID) surface of the joint that are typically susceptible to higher stresses and, therefore, potential degradation;
- The MT has examined the required area to the extent possible;
- The results of the UT (and/or the MT, as applicable) showed no unacceptable indications in any of the welds the licensee inspected;
- The welds are not subject to known service induced degradation mechanisms.

Therefore, the NRC staff determined that based on the coverage achieved by the qualified UT and the examination of the weld root and its HAZ to the extent possible (and/or the coverage achieved by the MT, as applicable), it is reasonable to conclude that if significant service induced degradation had occurred, evidence of it would have been detected by the examinations that the licensee performed.

In this analysis, the NRC staff also concludes that, in addition to the required volumetric examinations (and/or surface examination, as applicable), these welds have received the required system leakage test according to the ASME Code, Section XI, IWC-2500 (Table IWC-2500-1, Examination Category C-H). Despite reduced coverage of the required examination volume, the NRC staff concludes that this inspection will provide additional assurance that any pattern of degradation, if it were to occur, would be detected and the licensee will take appropriate correction actions.

Therefore, the NRC staff concludes that the volumetric examinations (and/or surface examination, as applicable) performed to the extent possible provide a reasonable assurance of structural integrity and leak tightness of the subject welds. Compliance with the ASME Code requirements for these welds would be a burden on the licensee and is, therefore, impractical.

3.4 Relief Request LMT-P01, Category C-F-1 And R-A Preservice Pipe Weld

Background

By letter dated August 8, 2005 (ADAMS Accession No. ML052080006), the NRC approved the Surry, Unit 2, risk informed inservice inspection (RI-ISI) program covering the Class 1 piping welds (Examination Category B-F and B-J) for the fourth 10-year ISI interval. The licensee developed the RI-ISI program in accordance with the NRC approved methodology of the Westinghouse Owners Group Topical Report WCAP-14572, Revision 1-NP-A, "Application of Risk-Informed Methods to Piping Inservice Inspection" (ADAMS Accession No. ML012630349).

Component Affected

In this relief request, the affected components are ASME Code Class 1 and 2 piping welds. The licensee identified these welds in Table LMT-P01 of Attachment 4 to this RR dated May 5, 2016.

- The two Class 2 pipe to valve welds in the safety injection system piping are classified as Examination Category C-F-1, Item No. C5.21 (Table IWC-2500-1 of Section XI to the ASME Code). For each weld, the licensee provided the diameter, nominal wall thickness, and materials of construction for the pipe (SA 312 TP 304) in Table LMT-P01.

- The Class 1 valve to elbow weld in the safety injection system piping is classified as Examination Category R-A, Item No. R1.11 (elements subject to thermal fatigue) in accordance with WCAP-14572, Revision 1-NP-A, (Table 4.1-1 in Supplement 2 – ADAMS Accession No. ML042390336). The licensee provided the diameter, nominal wall thickness, and materials of construction for the pipe (SA 376 TP 316) in Table LMT-P01.

In its letter dated October 27, 2016, the licensee stated that the materials of construction of each weld and the associated components are austenitic stainless steel. In addition, the licensee provided operating temperature and pressure for each weld.

Impracticality of Compliance

The licensee stated that it was not possible to obtain greater than 90 percent of the required examination volume of each weld because of the geometric configurations (i.e., pipe to valve and valve to elbow). The welds listed in Table LMT-P01 of Attachment 4 to this RR were only scanned from one side of the weld (single sided scan). The schematic diagram provided for

each weld in Attachment 4 to the RR dated May 5, 2016, illustrates the geometrical difficulties associated with dual-sided scan, and impracticality of compliance with the ASME Code examination coverage requirement.

The licensee stated that compliance with the ASME Code requirements would need extensive design modification or replacement of components. The redesign and replacement of components would create unnecessary burden.

Basis for Relief

The licensee stated that it performed the ultrasonic testing (UT) of each weld to the maximum extent possible utilizing personnel qualified and procedures demonstrated in accordance with Appendix VIII of Section XI. The UT of each weld was only possible from one side of the weld (single sided scan). In the figures provided in Attachment 4 to the submittal dated May 5, 2016, the licensee documented the ultrasonic probe angles (insonification angles) and the ultrasonic wave modes (e.g., refracted shear and longitudinal waves) utilized for scanning each weld. The licensee did not detect any unacceptable indications in the welds under consideration during the fourth 10-year ISI interval.

The licensee stated that when the examination by the UT is limited to one side of an austenitic weld, claiming coverage for the volume on the opposite side of the weld centerline (far-side) requires meeting the 10 CFR 50.55a(b)(2)(xv)(A)(2) far-side UT qualifications, which has not been demonstrated in any qualification attempts to date. Therefore, full coverage credit cannot be claimed.

The licensee also stated that it performed the "Best Effort" examination to investigate the far-side of the weld. The "Best Effort" examination is neither an ASME Code nor a regulatory requirement; however, it provides an extra effort on the part of a licensee to examine the far-side of the weld for any indication. To scan the far-side of the weld, refracted longitudinal (L)-waves are generally utilized for welds with wall thickness greater than 0.5 inch and 70 degree refracted shear waves are generally used for welds with wall thickness equal or less than 0.5 inch. The licensee did not claim credit for any coverage past the weld centerline (on the far-side) from the "Best Effort" examination. From the examinations performed, the licensee did not identify any unacceptable indications. Table LMT-P01 of Attachment 4 to the submittal dated May 5, 2016, documents the licensee's "Best Effort" percent coverage achieved.

The licensee stated that the welds under consideration were also subjected to radiographic testing (RT) and liquid penetrant testing (PT) before return to service as part of the Surry's Construction Code or Section III of the ASME Code requirement. The surface examination achieved 100 percent coverage of the required area, and no unacceptable surface indications were identified. No unacceptable indications were identified by the RT.

In the October 27, 2016, letter, the licensee provided the following additional information:

- Weld No. 1-03A on Line 6-SI-319 screened for thermal stratification as a result of the Materials Reliability Program (MRP)-146, Revision 1, "Management of Thermal Fatigue in Normally Stagnant Non-isolable Reactor Coolant System Branch Lines" analysis. This weld is part of the Surry augmented inspection program under MRP-146, and will be monitored for thermal stratification accordingly.
- In addition to Weld No. 1-03A, similar welds on two additional cold leg loops received an initial ultrasonic examination during the fall 2015 refueling outage due to concern of

thermal stratification under MRP-146. No unacceptable indications were identified in any of the welds examined. No leakage has been discovered to date in the weld population monitored in accordance with MRP-146 at Surry.

- In addition to the Class 2 welds in the safety injection system, the thirty-two small bore welds selected for inspection on the safety injection line during the fourth interval revealed no unacceptable indications.
- In this RR, the original welds were replaced due to replacement of the adjacent valves. There were no failures associated with the original welds.

The licensee stated that since there were no nickel based Alloy 600 and Alloy 82/182 materials used in any of the welds in this RR, these welds were not susceptible to the primary stress corrosion cracking (PWSCC).

The licensee stated that the performance of VT-2 visual examinations during system leakage testing in accordance with Table IWB-2500-1 (Examination Category B-P) and Table IWC-2500-1 (Examination Category C-H) provides additional assurance that a through wall flaw would be detected.

Proposed Alternative

In Table LMT-P01 of Attachment 4 to this submittal dated May 5, 2016, the licensee reported the percentage of coverage achieved by the UT in the examination performed (single-side scan).

Volumetric examination coverage:

- For two welds that are classified as Examination Category C-F-1, Item No. C5.21, the volumetric coverage achieved for each weld was:

Weld No. 2-08C	50 percent
Weld No. 2-09B	48 percent

- For one weld that is classified as Examination Category R-A, Item No. R1.11, the volumetric coverage achieved was:

Weld No. 1-03A	50 percent

The licensee proposed the above alternative coverage for the volumetric examination of the subject welds in lieu of the ASME Code required essentially 100 percent coverage.

NRC Staff Evaluation

The NRC staff has evaluated this RR pursuant to 10 CFR 50.55a(g)(6)(i). The NRC staff's evaluation focused on: (1) whether a technical justification exists to support the determination that the ASME Code requirement is impractical; (2) that imposition of the Code required inspections would result in a burden to the licensee; and (3) that the licensee's proposed alternative (accepting the reduced inspection coverage in this case) provides reasonable assurance of structural integrity and leak tightness of the subject welds. The NRC staff concludes that if these three criteria are met that the requirements of 10 CFR 50.55a(g)(6)(i), (i.e., granting the requested relief will not "endanger life or property or the common defense and

security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility") will also be met.

Impracticality of compliance

As described and demonstrated in Attachment 4 to the submittal dated May 5, 2016, the predominant limitations that prevented the licensee's UT to achieve essentially 100 percent coverage of the ASME Code required volume was design and configuration of the weld and associated components (e.g., pipe to valve and valve to elbow) that restricted the UT examinations to single sided scanning only. The NRC staff concludes that this scanning from both sides of the weld, as is required to achieve the required coverage, is impractical.

Burden of compliance

The licensee proposed that making the weld accessible for inspection from both sides would require replacement or significant modification of the weld and associated components. The NRC staff concludes that replacing or reconfiguring the components is the only reasonable means to achieve dual sided coverage of these welds and that replacement or reconfiguration of the components constitutes a burden on the licensee.

Structural integrity and leak tightness

The NRC staff considered whether the licensee's proposed alternative provided reasonable assurance of structural integrity and leak tightness of the subject welds based on: (1) the examination coverage achieved and (2) safety significance of unexamined volumes - unachievable coverage (i.e., the presence or absence of known active degradation mechanisms, the significance of a leak and/or structural failure of the subject welds, and essentially 100 coverage achieved for similar welds in similar environments subject to similar degradation mechanisms).

Examination coverage achieved

In evaluating the licensee's proposed alternative, the NRC staff assessed whether it appeared that the licensee obtained as much coverage as reasonably possible and the manner in which the licensee reported the coverage achieved. From review of Attachment 4 to the submittal dated May 5, 2016, the NRC staff confirms that:

- The welds were examined using the appropriate equipment, ultrasonic modes of propagation, probe angles, frequencies, and scanning directions to obtain maximum coverage;
- The coverage was calculated in a reasonable manner;
- The UT procedures used were qualified as required by the regulation;
- The coverage was limited by physical access (i.e., the configuration of one side of the weld did not permit access for scanning);
- No unacceptable indications were identified.

Therefore, the NRC staff concludes that the licensee made every effort to obtain as much coverage as reasonably possible with the ASME Code required UT.

Safety significance of unexamined volumes - unachievable coverage

In addition to the coverage analysis described above, the NRC staff evaluated the safety significance of the unexamined volumes of weld - unachievable coverage. From a review of submittal and the sketches in Attachment 4 to the submittal dated May 5, 2016, the NRC staff verified that:

- The UT has examined the required volume to the extent possible;
- The ultrasonic scans have covered the weld root and the heat affected zone (HAZ) of the base material near the inside diameter (ID) surface of the joint that are typically susceptible to higher stresses and, therefore, potential degradation;
- The far-side volume has been inspected by the "Best Effort" examination. For the stainless steel weld, the coverage obtained for axial scans was limited to the volume up to the weld centerline (near-side), because claiming coverage for the volume on the opposite side of the weld centerline (far-side) requires meeting the 10 CFR 50.55a(b)(2)(xv)(A)(2) far-side UT qualifications, which has not been demonstrated in any qualification attempts to date. Thus, the licensee did not take any credit for the coverage achieved from the "Best Effort" examination.
- As part of the Construction Code or Section III of the ASME Code requirements, the licensee subjected the welds in this RR to RT and PT examinations after repair/replacement prior to return to service. The licensee did not detect any unacceptable indications in the welds during RT and PT.
- Additional or other similar welds in similar environments were also inspected, essentially 100 percent coverage was achieved, and no unacceptable indications were detected in the volume inspected. The NRC staff concludes that the examination of additional or other similar welds provide additional assurance that any pattern of degradation in the welds under consideration, if it were to occur, would be detected;
- The results of the UT showed no unacceptable indications in any of the welds the licensee inspected.

Therefore, the NRC staff determined that based on the coverage achieved by the qualified UT and the examination of the weld root and its HAZ to the extent possible, it is reasonable to conclude that if significant service induced degradation had occurred, evidence of it would have been detected by the examinations that the licensee performed.

In this analysis, the NRC staff also concludes that, in addition to the required volumetric examinations, these welds have received the required system leakage test according to the ASME Code, Section XI, Table IWB-2500-1 (Examination Category B-P) and Table IWC-2500-1 (Examination Category C-H). Despite reduced coverage of the required examination volume, the NRC staff concludes that this inspection will provide additional assurance that any pattern of degradation, if it were to occur, would be detected and the licensee will take appropriate correction actions.

Therefore, the NRC staff concludes that the volumetric examinations performed to the extent possible provide a reasonable assurance of structural integrity and leak tightness of the welds in this RR. Compliance with the ASME Code requirements for these welds would be a burden on the licensee and is, therefore, impractical.

3.5 Relief Request LMT-C01, ASME Code, Section XI, Examination Category B-B, Pressure Retaining Welds In Vessels Other Than Reactor Vessels

ASME Code Component Identification

ASME Code Class:	ASME Code Class 1
Examination Category:	B-B
Item Nos.:	B2.11 and B2.12
Component:	Pressurizer
Weld Nos.:	1-02 and 1-07

Licensee's Relief Request

For the subject welds 1-02 and 1-07 of the Surry, Unit 2 pressurizer vessel, the licensee achieved less than 90 percent coverage of the required examination volume as shown below, due to obstructions from the support ring of the insulation support framework. The burden for complying with the ASME Code requirements is described in the next paragraph.

Weld No.	Examination Category	Item No.	Component Description	Examination Coverage Achieved
1-02	B-B	B2.12	Longitudinal weld that intersects the circumferential head-to-shell weld	50%
1-07	B-B	B2.11	Circumferential head-to-shell weld	82%

Burden Caused by Compliance

Total removal of the support ring at the mechanical connections is considered impractical due to the extremely high dose rates in the pressurizer area. Total radiation dose to perform removal of the interfering support and to perform the examination was estimated to be 13.9 man-rem. This includes expended dose necessary for various crafts including mechanical maintenance, insulators, rigging crews, and the Non-destructive Examination (NDE) workers. Partial removal of the support ring could allow some increased coverage; however, the actual increase would be very small in relation to the entire weld length. This is not a viable effort when considering consequential disturbance of interconnected cross supports and the welded connections to safety and power operation relief valve supports. Any removal of the mechanical connections or forced spreading apart of components would create a risk of misalignment and possibly warp the structure. Furthermore, civil engineering proposed that cutting the support could be necessary for removal; thus, destroying the support ring.

Licensee's Alternative

The licensee did not propose an alternative inspection method. The licensee inspected welds 1-02 and 1-07 to the extent possible, achieving 50 percent and 82 percent coverage, respectively, as described above. No additional inspection would provide meaningful data and any effort to achieve greater coverage could lead to component damage and increased personnel radiation

dose. The licensee continues to perform pressure testing on the subject components as required by the ASME Code, which includes visual examination for evidence of leakage.

NRC Staff Evaluation

Welds 1-02 and 1-07 are welds in the upper portion of the pressurizer, in the head and upper shell. The staff verified in Surry's updated final safety analysis report that the pressurizer shell and head are made of ferritic materials. The staff therefore infers that welds 1-02 and 1-07 are ferritic welds. For these welds, the licensee achieved less than 90 percent examination coverage of the required examination due to obstructions from the support ring of the insulation support framework. As such, obtaining the ASME Code required examination volume would require modification of the insulation support framework and increased radiation dose to personnel, which impose a burden upon the licensee.

The data sheets provided in pages 6 and 7 of Attachment 5 "RR LMT-C01, Examination Category B-B, Pressurizer Shell-to-Head Circumferential and Longitudinal Welds" of the submittal dated May 5, 2016, indicate that the examination of welds 1-02 and 1-07 were performed with procedure ER-AA-NDE-UT-702. By letter dated October 27, 2016, in its response to the staff's RAI 1a, the licensee stated that the examinations were performed in accordance with paragraph I-2120 of Appendix I to Section XI of the ASME Code, which refers to the volumetric examinations in Article 4 of Section V of the ASME Code. The licensee stated that the volumetric examinations were supplemented by Supplements 4 and 5 of Table I-2001-1 "Required Supplements" of Appendix I. The staff accepts the licensee's responses and thus, RAI 1a is resolved with respect to RR LMT-C01.

The licensee examined welds 1-02 and 1-07 to the extent possible. By letter dated October 27, 2016, in its response to the staff's RAI 3, the license provided diagrams (or additional explanation where no diagram was available) that show that the examinations were performed from both sides of the weld, using 0-degree, 45-degree, and 60-degree transducers, scanning both parallel and perpendicular to the weld. Therefore, RAI 3 is resolved. The examination volumes included the weld and base materials near the inside surface of the weld joint, which are regions of high stress, and where one would expect degradation to be manifested should it occur.

The UT examinations of welds 1-02 and 1-07 revealed recordable no indications. By letter dated October 27, 2016, in its responses to the staff's RAI 2, the licensee stated that there has been no history of service-induced degradation on the pressurizer head-to-shell (circumferential) welds or longitudinal welds over the second and third ISI intervals. Thus, RAI 2 is resolved with respect to RR LMT-C01. Based on the examination coverage obtained for the subject welds, if significant service-induced degradation were occurring, the staff concluded there is reasonable assurance that evidence of degradation would be detected by the examination coverages achieved.

Based on the above, the staff determined that obtaining the ASME Code required examination volume for welds 1-02 and 1-07 is impractical because it would impose a burden upon the licensee. The staff concludes that the volumetric UT examination performed to the extent possible provides reasonable assurance of the structural integrity of the welds 1-02 and 1-07 for the following reasons:

- No recordable indications were detected.
- There has been no history of service-induced degradation of the welds.
- Evidence of service-induced degradation in either weld, if it were to occur, would be detected in the combined examination coverages achieved for both welds. In other words, degradation in one weld would imply degradation in the other weld since both welds are made of ferritic materials and exposed to the same environment in the upper portion of the pressurizer.

The licensee will continue to perform the required pressure testing, which includes visual examination for evidence of leakage.

3.6 Relief Request LMT-C02, ASME Code, Section XI, Examination Category B-D, Full Penetration Welded Nozzles In Vessels

ASME Code Component Identification

ASME Code Class:	ASME Code Class 1
Examination Category:	B-D
Item No.:	B3.110*
Component:	Pressurizer
Mark No.:	14NIR (not a weld)

*Note: The actual Item Number. for the pressurizer nozzle inside radius is B3.120, which has been removed from the 2000 addenda to the 1998 Edition of the ASME Code, Section XI but is included as a condition in 10 CFR 50.55a(b)(2)(xxi)(A).

Licensee's Relief Request

For the 14NIR volume of the Surry, Unit 2 pressurizer vessel, the licensee achieved 80 percent coverage, which is less than 90 percent coverage of the required examination volume, due to obstructions from the two beams of the insulation support framework, as clarified by the licensee in letter dated October 27, 2016, in its response to the staff's RAI 4. The burden for complying with the ASME Code requirements is described in the next paragraph.

Burden Caused by Compliance

Total removal of the support ring at the mechanical connections is considered impractical due to the extreme high dose rates in the pressurizer area. Furthermore, this is not a viable effort when considering consequential disturbance of interconnected cross supports and the welded connections to safety and power operation relief valve supports. Any removal of the mechanical connections or forced spreading apart of components would create a risk of misalignment and possibly warp the structure. Civil engineering proposed that cutting the support could be necessary for removal; thus, destroying the support ring.

Licensee's Alternative

The licensee did not propose an alternative inspection method. The licensee inspected the 14NIR volume to the extent possible, achieving 80 percent coverage as described above. Any effort to achieve greater coverage could lead to component damage and increased personnel radiation dose. The licensee continues to perform pressure testing on the subject component as required by the ASME Code, which includes visual examination for evidence of leakage.

NRC Staff Evaluation

For the 14NIR volume, the licensee achieved less than 90 percent examination coverage of the required examination due to obstructions from the two beams of the insulation support framework. As such, obtaining the ASME Code required examination volume would require modification of the insulation support framework and increased radiation dose to personnel, which impose a burden upon the licensee.

By letter dated October 27, 2016, in its response to the staff's RAI 1a, the licensee stated that the examinations were in accordance with paragraph I-2120 of Appendix I to Section XI of the ASME Code, which refers to the volumetric examinations in Article 4 of Section V of the ASME Code. The licensee stated that the volumetric examinations were supplemented by Supplements 4 and 5 of Table I-2001-1 "Required Supplements" of Appendix I. The staff accepts the licensee's response and thus, RAI 1a is resolved.

Nozzle inner radius 14NIR was examined to the extent possible. By letter dated October 27, 2016, in its response to the staff's RAI 2 and RAI 4, the licensee stated that there has been no history of service-induced degradation on the pressurizer nozzle inner radius sections over the second and third ISI intervals and that no recordable indications were detected in the areas that were examined. Thus, RAI 2 and RAI 4 are resolved. Based on the examination coverage obtained, if significant service-induced degradation were occurring, the staff concluded there is reasonable assurance that evidence of degradation would be detected by the examination coverage achieved.

Based on the above, the staff determined that obtaining the ASME Code required examination volume for nozzle inner radius 14NIR is impractical because it would impose a burden upon the licensee. The staff concludes that the volumetric UT examination performed to the extent possible provides reasonable assurance of the structural integrity of nozzle inner radius 14NIR for the following reasons:

- No recordable indications were detected.
- There has been no history of service-induced degradation in the pressurizer nozzle inner radius sections.
- Evidence of service-induced degradation, if it were to occur, would be detected in the examination coverage achieved in 14NIR and also in the other four similar pressurizer NIRs that met the ASME Code examination requirements. The licensee stated in the submittal that the examinations for 10NIR, 11NIR, 12NIR, and 13NIR met the ASME Code requirements and concludes no recordable indications.

The licensee will continue to perform the required pressure testing, which includes visual examination for evidence of leakage.

3.7 Relief Requests LMT-C03 And LMT-C04, ASME Code, Section XI, Examination Category C-C, Integrated Welded Attachments

ASME Code Component Identification

ASME Code Class:	ASME Code Class 2
Examination Category:	C-C
Item No.:	C3.20
Components:	Main Steam Integral Attachments
Weld Nos.:	H001-1 and H001-2

Licensee's Relief Request

The licensee was only able to achieve 60 percent coverage of both Main Steam Integral Attachments, which is less than the required 90 percent coverage of the examination volume. The licensee deems that performing the required examinations and obtaining essentially 100 percent coverage is impractical due to the geometric configuration and obstructions which limit the surface examination coverage.

The licensee provided pictures, schematics and measurements of the subject attachments detailing the difficulties in accessing certain parts of the weld. The integral attachment is part of a spring support system and a support rod extends to a spring can above the main steam pipe; examination of the interior welds was limited due to the interference of the support rod and the narrow opening of the integral attachment.

Burden Caused by Compliance

Obtaining greater coverage on the interior welds of the integral attachments would require disassembly of the spring can hanger and rod, which would require seismic support analysis and most likely mandate a temporary support system installation for the 30" main steam line while the support was rendered inoperable. The licensee also stated that, even if the support were disassembled, a meaningful surface examination would still be unlikely due to the narrow opening.

Licensee's Alternative

The licensee did not propose an alternative inspection method. The licensee suggested that the percentage of surface coverage obtained with no recordable indications, in addition to periodic visual (VT-2) examinations in accordance with Category C-H to detect any through-wall leakage in the inaccessible areas, should be considered as meeting Code requirements to the maximum practical extent.

NRC Staff Evaluation

Section XI of the ASME Code requires essentially 100 percent surface examination of integral attachment welds installed on Class 2 piping systems during each interval. However, the licensee made the claim that obtaining the required coverage for Surry Unit 2 was impractical. Particularly, pursuant to 50.55a(g)(4) the licensee attributed the impracticality to geometric configuration and obstructions of the subject main steam integral attachments.
By letter dated October 27, 2016, in its response to the staff's RAI 1b, the licensee stated that the examinations were in accordance with paragraph I-2221, "Magnetic Particle Examination."

The licensee stated that the magnetic particle examinations were conducted in accordance with ASME Section V, Article 7. The staff accepts the licensee's response and thus, RAI 1b is resolved.

Impracticality of compliance

The unexamined weld lengths of the attachments are diagrammed in figures 1 and 3 of attachments 7 and 8 of the licensee's submittal. There are two 11" vertical welds connected at the bottom by one 4" horizontal weld which leaves a narrow opening for surface inspection. Furthermore, a rod, which extends to a spring can above the main steam pipe, sits in the middle of the attachment which further prevents examination of the inner welds. Attempting to achieve greater coverage of these welds would first require removal of the spring can hanger and rod which would likely require a seismic support analysis and installation of a temporary support system. Even then, examination of the welds would prove difficult due to the narrow opening in the attachments. Therefore, the staff concludes that the ASME Code-required 100 percent examination of the subject integral attachments' welds are impractical.

Burden of compliance

The licensee proposed that obtaining greater coverage of the interior welds would require disassembly of the components; furthermore, the licensee stated that a meaningful examination would still be unlikely due to the narrow opening. The NRC staff concludes that the disassembly is the only reasonable means of obtaining greater coverage and that disassembly of the components constitutes a burden on the licensee.

Examination coverage achieved

The images of the attachments provided in the licensee's submittal demonstrate that examination of the welds are precluded both by the narrow opening of the attachments as well as the position of the rods. The licensee was able to obtain 100 percent surface coverage of the welds on the outside of the integral attachments for a total of 39 linear inches (comprised of two 13.5" vertical welds and two 6" horizontal welds). Therefore, 39 of the 64 total inches on each attachment were examined, for a total examination coverage of 60 percent. The NRC staff agrees that the licensee achieved the maximum practical coverage of the integral attachment welds.

Structural integrity and leak tightness

All of the welds are made of ferritic materials and exposed to the same environment, therefore if any service-induced degradation were to occur, it would be observed in the examined weld areas. Furthermore, the licensee reported that no recordable indications were found in the obtained coverage and stated that the components are subject to periodic VT-2 examinations in accordance with ASME Section XI, Examination Category C-H, which will detect any through-wall leakage in the inaccessible areas. In RAI 2 of the licensee's October 27, 2016, letter, the licensee addressed the plant-specific operating experience regarding potential degradation of the main steam integral attachments. The licensee stated that three main steam integral attachments in Surry Unit 1 and five in Unit 2, in addition to those discussed in the RR, were examined during the fourth inspection interval with no limitations noted and no indications identified. Additionally, in the second and third intervals, a total of forty main steam integral attachments in Unit 1 and eighteen in Unit 2 were examined. Three of the exams where listed

as limited in their historical inservice inspection databases and a linear indication resulted in the only required repair which was completed in 1988.

The NRC staff determined that the licensee adequately demonstrated that obtaining essentially 100 percent of the ASME Code-required examination is impractical for the main steam integral attachment welds. Furthermore, based on the above, the NRC staff concludes that there is reasonable assurance that the structural integrity and leak tightness of the welds will be maintained by the examination coverage achieved.

4.0 CONCLUSION

As set forth above, the staff determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the staff concludes that the licensee's examinations were performed to the extent possible and provide reasonable assurance of the structural integrity of the subject pressurizer welds and nozzle inside radius, and piping integral welded attachments at Surry, Unit 2. Accordingly, the staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC staff grants the following relief requests for the fourth ten-year ISI interval of Surry, Unit 2, which commenced May 10, 2004, and ended, as extended, on May 9, 2015.

LMT-R01	Category R-A, Class 1 Stainless Steel Pipe Risk Informed Welds
LMT-SS01	Category C-F-1 , Class 1 Stainless Steel Pipe Welds
LMT-CS01	Category C-F-2 , Class 1 Carbon Steel Pipe Welds
LMT-P01	Category C-F-1 and R-A Preservice Pipe Welds
LMT-C01	Category 8-8, Pressurizer Shell to Head Section
LMT-C02	Category 8-D, Pressurizer Nozzle Inner Radius Section
LMT-C03	Category C-C, Main Steam Integral Attachment H001-1
LMT-C04	Category C-C, Main Steam Integral Attachment H001-2

All other requirements of Section XI of the ASME Code for which relief was not specifically requested and approved in the subject RRs remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: Ali Rezai
Austin Young
David Dijamco

SURRY POWER STATION, UNIT NO 2 – REQUESTS FOR RELIEF LMT-R01, LMT-SS01, LMT-CS01, LMT-P01, LMT-C01, LMT-C02, LMT-C03, AND LMT-C04 – FOR LIMITED COVERAGE EXAMINATIONS PERFORMED IN THE FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL (CAC NOS. MF7718, MF7719, MF7720, MF7721, MF7722, MF7723, MF7724 AND MF7725) DATED FEBRUARY 17, 2017

DISTRIBUTION:

PUBLIC LPL2-1 R/F	RidsNrrLAKGoldstein Resource	RidsRgn2MailCenter Resource
RidsNrrDorlDpr Resource	RidsNrrPMSurry Resource	ARezai, NRR
RidsNrrDorlLpl2-1 Resource	RidsNrrDeEpnb Resource	DDimajic, NRR
RidsACRS_MailCTR Resource	RidsNrrDeEvib Resource	AYoung, NRR

ADAMS Accession No.: ML16365A118 *by e-mail SE

OFFICE	NRR/DORL/LPL2-1/PM	NRR/DORL/LPL2-1/LA	NRR/DE/EPN/BC*
NAME	KCotton	KGoldstein	DAlley
DATE	02/16/17	01/13/17 and 01/26/17	11/28/16
OFFICE	NRR/DE/EVIB/BC*	NRR/DORL/LPL2-1/BC	
NAME	DRuland	MMarkley	
DATE	12/16/16	02/17/17	

OFFICIAL RECORD COPY