May 17, 2005

Mr. Rick A. Muench
President and Chief Executive Officer
Wolf Creek Nuclear Operating Corporation
Post Office Box 411
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION - RELIEF REQUESTS I2R-29 THROUGH I2R-32 PERTAINING TO IMPLEMENTATION OF ASME CODE, SECTION XI REQUIREMENTS FOR EXAMINATION OF WELDS (TAC NO. MC6478)

Dear Mr. Muench:

By letter dated March 25, 2005 (WM 05-0013), you requested relief for use of alternatives to requirements in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (the ASME Code) at Wolf Creek Generating Station (WCGS). The four relief requests (RRs) I2R-29 through I2R-32 identify the proposed use of alternatives to the Section XI requirements for examination of the reactor vessel and connecting loop piping welds for the second 10-year inservice inspection (ISI) interval at WCGS, which ends on September 2, 2005.

The staff has evaluated the four relief requests against the requirements of Section XI of the 1989 Edition, with no addenda, of the ASME Code, which is the applicable ASME Code for WCGS. Based on the enclosed safety evaluation, the alternatives to the requirements in Section XI of the ASME Code in RRs I2R-29 through I2R-32 provide an acceptable level of quality and safety. Based on this, pursuant to 10 CFR 50.55a(a)(3)(i), the Commission authorizes the proposed alternatives in these RRs for the remainder of the second 10-year ISI interval at WCGS.

Sincerely,

/RA/

Robert A. Gramm, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-482

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUESTS I2R-29 THROUGH I2R-32

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

1.0 INTRODUCTION

By letter dated March 25, 2005 (WM 05-0013), you requested relief for use of alternatives to requirements in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (the ASME Code) at Wolf Creek Generating Station (WCGS). The four relief requests (RRs) I2R-29 through I2R-32 identify the proposed use of alternatives to the Section XI requirements for examination of the reactor vessel and connecting loop piping welds for the second 10-year inservice inspection (ISI) interval at WCGS, which started on September 3, 1995, and ends on September 2, 2005.

2.0 REGULATORY EVALUATION

In the Commission's regulations, 10 CFR 50.55a(g) specifies that ISI of nuclear power plant components shall be performed in accordance with the requirements of the ASME Code, Section XI, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Section 50.55a(g)(5)(iii) states that if the licensee has determined that conformance with certain code requirements is impractical for its facility, the licensee shall notify the Commission and submit relief requests, as specified in 10 CFR 50.4, to support the determinations.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI code of record for the WCGS second 10-year ISI interval is the 1989 Edition with no addenda.

3.0 TECHNICAL EVALUATION FOR RRs I2R-29 THROUGH I2R-32

In its application, the licensee requested relief from certain ASME Code, Section XI, requirements in RRs I2R-29 through I2R-32. These four RRs are addressed in Sections 3.1 through 3.4, respectively, in this safety evaluation (SE).

3.1 RR I2R-29

3.1.1 Component for Which Relief is Requested

The applicable piping welds in RR I2R-29 are pressure retaining piping welds subject to examinations using procedures, personnel, and equipment qualified to the 1989 Edition with no addenda of the ASME Code, Section XI, Appendix VIII, Supplement 10, "Qualification Requirements for Dissimilar Metal Piping Welds" for the remainder of the second 10-year ISI interval. A copy of the proposed revision to Supplement 10 was submitted as Enclosure I to the licensee's application. These applicable welds are listed in the licensee's application and given in Table 1 (Attachment 1 to this SE).

3.1.2 Applicable ASME Code Requirements

The following items are from ASME Code, Section XI, Appendix VIII, Supplement 10. They identify the specific requirements that are addressed in RR I2R-29. The following statements are taken from the licensee's application:

> Item 1 - Paragraph 1.1(b) states in part – Pipe diameters within a range of 0.9 to 1.5 times a nominal diameter shall be considered equivalent.
>
> Item 2 - Paragraph 1.1(d) states – All flaws in the specimen set shall be cracks.
>
> Item 3 - Paragraph 1.1(d)(1) states – At least 50% of the cracks shall be in austenitic material. At least 50% of the cracks in austenitic material shall be contained wholly in the weld or buttering material. At least 10% of the cracks shall be in ferritic material. The remainder of the cracks may be in either austenitic or ferritic material.
>
> Item 4 - Paragraph 1.2(b) states in part – The number of unflawed grading units shall be at least twice the number of flawed grading units.
>
> Item 5 - Paragraph 1.2(c)(1) and 1.3(c) state in part – At least 1/3 of the flaws, rounded to the next higher whole number, shall have depths between 10% and 30% of the nominal pipe wall thickness. Paragraph 1.4(b) distribution table requires 20% of the flaws to have depths between 10% and 30%.
>
> Item 6 - Paragraph 2.0 the first sentence states – The specimen inside surface and identification shall be concealed from the candidate.

Item 7 - Paragraph 2.2(b) states in part – The regions containing a flaw to be sized shall be identified to the candidate.

Item 8 - Paragraph 2.2(c) states in part – For a separate length sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate.

Item 9 - Paragraph 2.3(a) states – For the depth sizing test, 80% of the flaws shall be sized at a specific location on the surface of the specimen identified to the candidate.

Item 10 - Paragraph 2.3(b) states – For the remaining flaws, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.

Item 11 - Table VIII-S2-1 provides the false-call criteria when the number of unflawed grading units is at least twice the number of flawed grading units.

3.1.3 Licensee's Proposed Alternative

For each of the items listed above, the licensee has proposed, as stated in the application, the following alternatives to the selected paragraphs in the 1989 Edition with no addenda of the ASME Code, Section XI, Appendix VIII, Supplement 10, requirements for WCGS:

Item 1 - Paragraph 1.1(b) alternative:

The specimen set shall include the minimum and maximum pipe diameters and thicknesses for which the examination procedure is applicable. Pipe diameters within ½ in. (13 mm) of the nominal diameter shall be considered equivalent. Pipe diameters larger than 24 in. (610 mm) shall be considered to be flat. When a range of thicknesses is to be examined, a thickness tolerance of ±25% is acceptable.

Technical Basis - The change in the minimum pipe diameter tolerance from 0.9 times the diameter to within ½ inch of the nominal diameter provides tolerances more in line with industry practice. Though the alternative is less stringent for small pipe diameters they typically have a thinner wall thickness than larger diameter piping. A thinner wall thickness results in shorter sound path distances that reduce the detrimental effects of the curvature. This change maintains consistency between Supplement 10 and the recent revision to Supplement 2.

Item 2 - Paragraph 1.1(d) alternative:

At least 60% of the flaws shall be cracks, the remainder shall be alternative flaws. Specimens with IGSCC [intergranular stress corrosion cracking] shall be used when available. Alternative flaws shall meet the following requirements:

(1) Alternative flaws, if used, shall provide crack-like reflective characteristics and shall only be used when implantation of cracks would produce spurious reflectors that are uncharacteristic of service-induced flaws.

(2) Alternative flaw mechanisms shall have a tip width of no more than 0.002 in (.05 mm).

Note, to avoid confusion the proposed alternative modifies instances of the term "cracks" or "cracking" to the term "flaws" because of the use of alternative flaw mechanisms.

Technical Basis - ..., implanting a crack requires excavation of the base material on at least one side of the flaw. While this may be satisfactory for ferritic materials, it does not produce a useable axial flaw in austenitic materials because the sound beam, which normally passes only through base material, must now travel through weld material on at least one side, producing an unrealistic flaw response. In addition, it is important to preserve the dendritic structure present in field welds that would otherwise be destroyed by the implantation process. To resolve these issues, the proposed alternative allows the use of up to 40% fabricated flaws as an alternative flaw mechanism under controlled conditions. The fabricated flaws are isostatically compressed which produces ultrasonic reflective characteristics similar to tight cracks.

Item 3 - Paragraph 1.1(d)(1) alternative:

At least 80% of the flaws shall be contained wholly in weld or buttering material. At least one and no more than 10% of the flaws shall be in ferritic base material. At least one and no more than 10% of the flaws shall be in austenitic base material.

Technical Basis - Under the current [ASME] Code, as little as 25% of the flaws may be contained in austenitic weld or buttering material. Recent experience has indicated that flaws are most likely to be contained within the weld. The metallurgical structure of austenitic weld material is ultrasonically more challenging than either ferritic or austenitic base material. The proposed alternative is therefore more challenging than the current [ASME] Code.

Item 4 - Paragraph 1.2(b) alternative:

Personnel performance demonstration detection test sets shall be selected from Table VIII-S10-1. The number of unflawed grading units shall be at least 1-1/2 [one and a half] times the number of flawed grading units.

Technical Basis - Proposed Table VIII-S10-1 provides a statistically based ratio between the number of unflawed grading units and the number of flawed grading units. The proposed alternative reduces the ratio to 1.5, thus reducing the number of test samples to a more reasonable number from the human factors perspective. However, the statistical basis used for screening personnel and procedures is still maintained at the same level with regard to competent personnel being successful and less skilled personnel being unsuccessful. The acceptance criteria for the statistical basis are in new Table VIII-S10-1.

Item 5 - Paragraph 1.2(c)(1) and 1.3(c) alternative:

The proposed alternative to the flaw distribution requirements of Paragraph 1.2(c)(1) (detection) and 1.3(c) (length) is to use the Paragraph 1.4(b) (depth) distribution table (see below) for all qualifications.

Flaw Depth (% Wall Thickness)	Minimum Number of Flaws
10-30%	20%
31-60%	20%
61-100%	20%

Technical Basis - The proposed alternative uses the depth sizing distribution for both detection and depth sizing because it provides for a better distribution of flaw sizes within the test set. This distribution allows candidates to perform detection, length, and depth sizing demonstrations simultaneously utilizing the same test set. The requirement that at least 75% of the flaws shall be in the range of 10 to 60% of wall thickness provides an overall distribution tolerance yet the distribution uncertainty decreases the possibilities for testmanship that would be inherent to a uniform distribution. It must be noted that it is possible to achieve the same distribution utilizing the present requirements, but it is preferable to make the criteria consistent.

Item 6 - Paragraph 2.0 alternative to the first sentence:

For qualifications from the outside surface, the specimen inside surface and identification shall be concealed from the candidate. When qualifications are performed from the inside surface, the flaw location and specimen identification shall be obscured to maintain a 'blind test.'

Technical Basis - The current [ASME] Code requires that the inside surface be concealed from the candidate. This makes qualifications conducted from the inside of the pipe (e.g., PWR [pressurized water reactor] nozzle to safe end welds) impractical. The proposed alternative differentiates between ID [inner diameter] and OD [outer diameter] scanning surfaces, requires that they be conducted separately, and requires that flaws be concealed from the candidate. This is consistent with the recent revision to Supplement 2.

Items 7 and 8 - Paragraph 2.2(b) and 2.2(c) alternative:

> . . . containing a flaw to be sized may be identified to the candidate.
>
> Technical Basis - The current [ASME] Code requires that the regions of each specimen containing a flaw to be length sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region. (Note that length and depth sizing use the term "regions," while detection uses the term "grading units." The two terms define different concepts and are not intended to be equal or interchangeable.) To ensure security of the samples, the proposed alternative modifies the first "shall" to a "may" to allow the test administrator the option of not identifying specifically where a flaw is located. This is consistent with the recent revision to Supplement 2.

Items 9 and 10 - Paragraph 2.3(a) and 2.3(b) alternative:

> . . . regions of each specimen containing a flaw to be sized may be identified to the candidate.
>
> Technical Basis - The current [ASME] Code requires that a large number of flaws be sized at a specific location. The proposed alternative changes the "shall" to a "may" which modifies this from a specific area to a more generalized region to ensure security of samples. This is consistent with the recent revision to Supplement 2. It also incorporates terminology from length sizing for additional clarity.

Item 11 - Table VIII-S2-1 alternative:

> The proposed alternative modifies the acceptance criteria of Table VIII-S2-1 ... [which is shown in the attachment I, for RR I2R-29, to the licensee's application]
>
> Technical Basis - The proposed alternative is identified as new Table VIII-S10-1 ... It was modified to reflect the reduced number of unflawed grading units and allowable false calls. As a part of ongoing [ASME] Code activities, Pacific Northwest National Laboratory (PNNL) has reviewed the statistical significance of these revisions and offered the revised Table VIII-S10-1.

The licensee stated that the proposed alternatives will be implemented through the Performance Demonstration Initiative (PDI) Program. The PDI program is a nuclear industry group that was set up to develop rules to implement requirements in Appendix VIII or to develop alternatives to these requirements.

3.1.4 NRC Staff Evaluation

The licensee proposed to use the PDI program that is similar to the ASME Code requirements. The differences between the ASME Code and the PDI program are discussed item by item below.

Item 1 - Paragraph 1.1(b)

The ASME Code requirement of "0.9 to 1.5 times the nominal diameter are equivalent" was established for a single nominal diameter. When applying the ASME Code-required tolerance to a range of diameters, the tolerance rapidly expands on the high side. Under the current ASME Code requirements, a 5-inch OD pipe would be equivalent to a range of 4.5-inch to 7.5-inch diameter pipe. Under the proposed PDI guidelines, the equivalent range would be reduced to 4.5-inch to 5.5-inch diameter. With current ASME Code requirements, a 16-inch nominal diameter pipe would be equivalent to a range of 14.4-inch to 24-inch diameter pipe. The proposed alternative would significantly reduce the equivalent range of 15.5-inch to 16.5-inch diameter pipe. The difference between ASME Code and the proposed alternative for diameters less than 5 inches is not significant because of shorter metal path and beam spread associated with smaller diameter piping. The proposed alternative is considered more conservative overall than current ASME Code requirements. Based on this, the NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

Item 2 - Paragraph 1.1(d)

The ASME Code requires all flaws to be cracks. Manufacturing test specimens containing cracks free of spurious reflections and telltale indicators is extremely difficult in austenitic material. To overcome these difficulties, PDI developed a process for fabricating flaws that produce ultrasonic testing (UT) acoustic responses similar to the responses associated with real cracks. The PDI program presented its process for discussion at public meetings held June 12 through 14, 2001, and January 31 through February 2, 2002, at the Electric Power Research Institute (EPRI) Nondestructive Examination (NDE) Center, Charlotte, NC. The NRC staff attended these meetings and determined that the process parameters used for manufacturing fabricated flaws resulted in acceptable acoustic responses. Based on this, the NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

Item 3 - Paragraph 1.1(d)(1)

The ASME Code requires that at least 50 percent of the flaws be contained in austenitic material, and 50 percent of the flaws in the austenitic material shall be contained fully in weld or buttering material. This means that at least 25 percent of the total flaws must be located in the weld or buttering material. Field experience shows that flaws identified during ISI of dissimilar metal welds are more likely to be located in the weld or buttering material. The grain structure of austenitic weld and buttering material represents a much more stringent ultrasonic scenario than that of a ferritic material or austenitic base material. Flaws made in austenitic base material are difficult to create free of spurious reflectors and telltale indicators. The proposed alternative of 80 percent of the flaws in the weld metal or buttering material provides a challenging testing scenario reflective of field experience and minimizes testmanship associated with telltale reflectors common to placing flaws in austenitic base material. Therefore, the NRC staff considers the proposed alternative to be more conservative than current ASME Code requirements. Based on this, the NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

Item 4 - Paragraph 1.2(b) and Item 11 - Table VIII-S2-1

The ASME Code requires that detection sets meet the requirements of Table VIII-S2-1, which specifies the minimum number of flaws in a test set to be 5 with 100 percent detection. The current ASME Code also requires the number of unflawed grading units to be two times the number of flawed grading units. The proposed alternative would follow the detection criteria of the table beginning with a minimum number of flaws in a test set being 10, and reducing the number of false calls to 1½ times the number of flawed grading units. The changes to Table VIII-S2-1 are shown in Table VIII-S10-1. Therefore, the NRC staff finds that the proposed alternative satisfies the pass/fail objective established for Appendix VIII performance demonstration acceptance criteria. Based on this, the NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

<u>Item 5 - Paragraph 1.2(c)(1) and 1.3(c)</u>

For detection and length sizing, the ASME Code requires at least one third of the flaws be located between 10 and 30 percent through-wall thickness and one third located greater than 30 percent through-wall thickness. The remaining flaws would be located randomly throughout the wall thickness. The proposed alternative sets the distribution criteria for detection and length sizing to be the same as the depth sizing distribution, which stipulates that at least 20 percent of the flaws be located in each of the increments of 10-30 percent, 31-60 percent and 61-100 percent. The remaining 40 percent would be located randomly throughout the wall thickness. With the exception of the 10-30 percent increment, the proposed alternative is a subset of the current ASME Code requirements. The 10-30 percent increment would be in the subset if it contained at least 30 percent of the flaws. The change simplifies assembling test sets for detection and sizing qualifications and is more indicative of conditions in the field. Based on this, the NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

<u>Item 6 - Paragraph 2.0</u>

The ASME Code requires the specimen inside surface be concealed from the candidate. This requirement is applicable for test specimens used for qualification performed from the outside surface. With the expansion of Supplement 10 to include qualifications performed from the inside surface, the inside surface must be accessible while maintaining the specimen integrity. The proposed alternative requires that flaws and specimen identifications be obscured from candidates, thus maintaining blind test conditions. Therefore, the NRC staff considers this to be consistent with the intent of ASME Code requirements. Based on this, the NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

<u>Items 7 and 8 - Paragraph 2.2(b) and 2.2(c)</u>

The ASME Code requires that the location of flaws added to the test set for length sizing shall be identified to the candidate. The proposed alternative is to make identifying the location of additional flaws an option. This option provides an additional element of difficulty to the testing process because the candidate would be expected to demonstrate the skill of detecting and sizing flaws over an area larger than a specific location. Therefore, the NRC staff considers the proposed alternative to be more conservative than current ASME Code requirements. Based on this, the NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

Item 9 - Paragraph 2.3(a)

In paragraph 2.3(a), the ASME Code requires that 80 percent of the flaws be sized in a specific location that is identified to the candidate. The proposed alternative permits detection and depth sizing to be conducted separately or concurrently. In order to maintain a blind test, the location of flaws cannot be shared with the candidate. For depth sizing that is conducted separately, allowing the test administrator the option of not identifying flaw locations makes the testing process more challenging. Therefore, the NRC staff considers the proposed alternative to be more conservative than current ASME Code requirements. Based on this, the NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

Item 10 - Paragraph 2.3(b)

In paragraph 2.3(b), the ASME Code also requires that the location of flaws added to the test set for depth sizing shall be identified to the candidate. The proposed alternative is to make identifying the location of additional flaws an option. This option provides an additional element of difficulty to the testing process because the candidate would be expected to demonstrate the skill of finding and sizing flaws in an area larger than a specific location. The NRC staff considers the proposed alternative to be more conservative than current ASME Code requirements. Based on this, the NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

Item 11 - Table VIII-S2-1

See the previous discussion for Items 4 and 11 of this SE on the top of page 8 of this SE.

3.1.5 Conclusion

As discussed above, the NRC staff has determined that the proposed alternative in RR I2R-29 to Supplement 10, as administered by the PDI Program, will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the proposed alternative in RR I2R-29 for the remainder of the second 10-year ISI interval at WCGS. All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this RR remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

3.2 RR I2R-30

3.2.1 Components for Which Relief is Requested

The applicable reactor pressure vessel (RPV) piping welds in RR I2R-30 are Class 1 pressure retaining piping welds examined from the inside surface using procedures, personnel, and equipment qualified to ASME Code, Section XI, Appendix VIII, Supplement 2 or 10 criteria. These applicable welds are listed in the licensee's application and given in Table 2 [Attachment 2 to this SE].

3.2.2 Applicable ASME Code Requirements

The applicable ASME Code edition and addenda is ASME Section XI, 1989 Edition with no addenda. In addition, as required by 10 CFR 50.55a, ASME Section XI, 1995 Edition through 1996 Addenda, is used for Appendix VIII for performance demonstration of UT examination systems.

3.2.3 Licensee's Proposed Alternative

The licensee stated, pursuant to 10 CFR 50.55a(a)(3)(i), that, in lieu of the requirements of ASME Code, Section XI, 1995 Edition through 1996 Addenda, Appendix VIII, Table VIII-3110-1, the PDI program for implementation of Appendix VIII, Supplement 2 in coordination with Supplement 10 implementation, is requested to be used for the remainder of the second 10-year ISI interval at WCGS. The PDI program is a nuclear industry group that was set up to develop rules to implement requirements in Appendix VIII or to develop alternatives to these requirements. See the previous RR I2R-29 regarding the Supplement 10 implementation request.

The proposed program has been submitted to the ASME Code for consideration as a new Supplement 14 to Appendix VIII. Supplement 14 is entitled "Qualification Requirements for Coordinated Implementation of Supplement 10, 2, and 3 for Piping Examinations Performed from the Inside Surface," and is an attachment to RR I2R-30 in the licensee's application.

3.2.4 Licensee's Basis for Relief

The licensee stated in its application that the RPV nozzles to main coolant piping contain ferritic, austenitic, and cast stainless steel components and were assembled using austenitic and dissimilar metal welds. These austenitic and dissimilar metal welds are in close proximity to each other, which means the same ultrasonic essential variables would be employed (e.g., the ultrasonic examination process associated with a dissimilar metal weld would be applied to a ferritic or austenitic weld).

With regard to the qualification requirements for the inspection of such welds, separate qualifications to Supplements 2, 3, and 10 are redundant when done in accordance with the industry's PDI Program. For example, during personnel qualification to the PDI Program, a candidate would be exposed to a minimum of ten flawed grading units for each supplement and, therefore, the personnel qualification for Supplements 2, 3, and 10 would require a minimum of 30 flawed grading units. Test sets this large and tests of this duration are impractical. Additionally, a full procedure qualification (three personnel qualifications per supplement) to the PDI Program requirements for three supplements would require a minimum of 90 flawed grading units. This is burdensome for a procedure that will use the same essential variables or the same criteria for selecting essential variables for the three supplements.

The licensee stated that the PDI Program recognizes the Supplement 10 qualification as the most stringent and technically challenging ultrasonic application. The same Supplement 10 essential variables are used for the examinations subject to the requirements of Supplements 2, 3, and 10. A coordinated add-on implementation would be sufficiently stringent for qualification to the requirements of Supplements 2 and 3 if the requirements used for qualification to Supplement 10 are satisfied as a prerequisite. The basis for this conclusion is the fact that the majority of the flaws addressed in Supplement 10 are located in the austenitic weld material and this configuration is known to be challenging for ultrasonic techniques due to the variable dendritic structure of the weld material. Conversely, the flaws addressed in Supplements 2 and 3 initiate in fine-grained base materials.

The licensee further stated that, additionally, the use of the PDI Program for implementation of Supplement 2 requirements in coordination with Supplement 10 implementation would be more stringent than current ASME Code requirements for detection and length sizing qualifications. The current ASME Code, for example, would allow a detection procedure, personnel, and equipment to be qualified to Supplement 10 requirements with 5 flaws, Supplement 2 requirements with 5 flaws, and Supplement 3 requirements with 5 flaws, for a total of only 15 flaws. The proposed alternative of qualifying to Supplement 10 requirements using a minimum of 10 flaws and adding on Supplement 2 requirements with 5 flaws and Supplement 3 requirements with 3 flaws results in a total of 18 flaws which will be multiplied by a factor of 3 (PDI multiplier) for the minimum number of flaws in Supplements 10, 2 and 3 procedure qualification.

The licensee concluded, based on the above, that the use of a limited number of Supplement 2 or 3 flaws is sufficient to assess the capabilities of procedure and personnel who have already satisfied Supplement 10 requirements. The statistical basis used for screening personnel and procedures is still maintained to the same level with competent personnel being successful and less skilled personnel being unsuccessful. The proposed alternative is consistent with other coordinated qualifications currently contained in Appendix VIII.

3.2.5 NRC Staff Evaluation

The licensee requested relief from selected qualification requirements of ASME Code, Section XI, Appendix VIII, Supplements 2 and 3 for examinations performed from the inside surface. The ASME Code currently requires separate qualifications for austenitic piping (Supplement 2), ferritic piping (Supplement 3), and dissimilar metal piping (Supplement 10). Qualifications for each supplement would entail a minimum of 10 flaws for each supplement, requiring at least 30 flaws for the three supplements. The minimum number of flaws per supplement established a statistical-based pass/fail objective which is identified in the submittal as Table VIII-S10-1. The process of a single qualification for each supplement would greatly expand the minimum number of ferritic and austenitic flaws required to be identified which would also raise the pass/fail acceptance criteria specified in Table VIII-S10-1.

The ASME Code recognized that flaws in austenitic material are more difficult to detect and size than flaws in ferritic material. The prevailing reasoning concluded that a Supplement 3 qualification following a Supplement 2 qualification had diminished returns on measuring personnel skills and procedure effectiveness. Therefore, in lieu of separate Supplement 2 and Supplement 3 qualifications, the ASME Code applied the diminishing return logic in Supplement 12 which provides for a Supplement 3 add-on to a Supplement 2 qualification. The add-on consists of a minimum of three flaws in ferritic material. All of the flaws in the ferritic material must be detected with no false detections. A statistical evaluation of Supplement 12 acceptance criteria satisfied the pass/fail objective established for Appendix VIII performance demonstration acceptance criteria.

The proposed alternative builds upon the experiences associated with Supplement 12 by starting with the most challenging Supplement 10 qualifications, as implemented by the PDI program (see RR ISI-28 in Section 3.2 of this safety evaluation), and adding a sufficient number of flaws to demonstrate the personnel skills and procedure effectiveness of the less challenging Supplement 2 and Supplement 3 qualifications. A PDI Supplement 10 performance demonstration requires at least one flaw with a maximum of 10 percent of the total number of flaws being in the ferritic material. The rest of the flaws are in the more challenging austenitic material. When expanding the Supplement 10 qualification with an add-on Supplement 2 and Supplement 3 qualification, the proposed alternative would add a minimum of five flaws in austenitic material and three flaws in ferritic material to the performance demonstration. All of the add-on flaws must be detected with no false indications. Therefore, a combined Supplement 2 and Supplement 3, add-on to a Supplement 10 qualification requires a minimum of 8 flaws in the detection performance demonstration test in addition to the minimum of 10 flaws for a Supplement 10 qualification. For the sizing performance demonstration of the Supplement 2 and Supplement 3 results are added to the appropriate Supplement 10 results which must satisfy the acceptance criteria of the Supplement 10. A statistical evaluation performed by Pacific Northwest National Laboratories, an NRC contractor, showed that the proposed alternative acceptance criteria satisfied the pass/fail objective criteria specified in Table VIII-S10-1 of the licensee's application.

The NRC staff has determined that the use of a limited number of flaws to qualify personnel, procedures and equipment to Supplement 2 or Supplement 3 in coordination with the PDI developed implementation of Supplement 10 (see Section 3.2 of this safety evaluation), will provide equivalent flaw detection performance to that of the ASME Code. As such, the NRC staff concludes that the licensee's proposed alternative provides an acceptable level of quality and safety.

3.2.6 Conclusion

The NRC staff has determined that the proposed alternative to use the industry's PDI program for implementation of Appendix VIII, Supplements 2 and 3 as coordinated with the PDI program for implementation of Appendix VIII, Supplement 10, will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC authorizes the proposed alternative in RR I2R-30 for the remainder of the second 10-year ISI interval at WCGS.

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

3.3 RR I2R-31

3.3.1 Component for Which Relief is Requested

The applicable piping weld for RR I2R-31 is one of the ASME Code Class 1, Category B-A pressure retaining welds in the RPV, Item No. B1.30 upper shell to flange weld from flange inside diameter (ID). It is weld no. RV-101-121.

3.3.2 Applicable ASME Code Requirements

The applicable ASME Code edition and addenda is ASME Section XI, 1989 Edition with no addenda. In addition, as required by 10 CFR 50.55a, ASME Section XI, 1995 Edition through 1996 Addenda, is used for Appendix VIII for performance demonstration of UT examination systems.

3.3.3 Licensee's Proposed Alternative

The licensee proposed using qualified personnel and procedures for remote mechanized examination of the reactor vessel flange-to-shell weld in accordance with the 1995 Edition with 1996 Addenda of the ASME Code, Section XI, Appendix VIII, Supplements 4 and 6, in lieu of Section V, Article 4 requirements.

3.3.4 Licensee's Basis for Relief

The licensee stated in its relief request that, although Appendix VIII is not required for this weld, using an examination procedure and personnel qualified in accordance with Appendix VIII will provide an increased margin of safety and surpass the quality of the generic examination techniques specified by the referencing ASME Code edition. Compliance with these requirements will assure the requisite level of quality and safety is maintained.

The September 22, 1999, revision of 10 CFR 50.55a required implementation of ASME Code, Section XI, Appendix VIII, Supplement 4 (clad-base metal interface) and Supplement 6 (vessel welds other than clad-base metal interface). The reactor vessel shell welds are subject to examination in accordance with these supplements, however, the flange-to-shell weld is the only reactor vessel shell weld not included in Appendix VIII.

For the RPV examination planned for the current refueling outage, which started in April 2005, the licensee will be employing procedures, equipment, and personnel qualified by performance demonstration in accordance with ASME Code, Section XI, 1995 Edition through 1996 Addenda, as amended by 10 CFR 50.55a. The ASME Code requirements as amended by the final rule will be complied with by using Westinghouse Procedure PDI-ISI-254.

Appendix VIII was developed to ensure the effectiveness of UT examinations within the nuclear industry by means of a rigorous, item-specific performance demonstration. The performance demonstration was conducted on a RPV mockup containing flaws of various sizes and locations. The demonstration established the capability of equipment, procedures, and personnel to find flaws that could be detrimental to the integrity of the RPV.

A comparison between the ASME Code, Section V, Article 4 based UT methods and the procedures developed to satisfy PDI/Appendix VIII can be best described as a comparison between a compliance-based procedure (ASME Code, Section V, Article 4) and a results-based procedure (PDI Appendix VIII). ASME Code, Section V procedures use an amplitude-based technique and a known reflector. The proposed alternate UT method was established independently from the acceptance standards for flaw size found in ASME Code, Section XI.

Because the PDI qualified sizing method is considered more accurate than the method used in ASME Code, Section V, Article 4, the licensee stated that the proposed alternate UT examination technique will provide an acceptable level of quality and examination repeatability as compared to the Article 4 requirements.

The PDI Program's performance demonstration qualification sheet (PDQS) No. 407 attests that Westinghouse Procedure PDI-ISI-254 is in compliance with the detection and sizing tolerance requirements of Appendix VIII. The PDI qualification method is based on a group of samples, which validate the acceptance flaw sizes in ASME Code, Section XI. The sensitivity to detect these flaws is considered to be equal or greater than the sensitivity obtained through ASME Code, Section V, Article 4 because Procedure PDI-ISI-254 relies on a smaller scan index and a higher scan sensitivity for the detection of the UT signals.

The examination and sizing procedure uses echo-dynamic motion and tip diffraction characteristics of the flaw instead of the amplitude characteristics required by ASME Code, Section V, Article 4. The search units interrogate the same examination volume as depicted by ASME Code, Section XI, Figure IWB-2500-4, "Shell-to-Flange Weld Joint."

The use of procedures for satisfying the requirements of ASME Code Section V, Article 4 for the UT examination of the RPV shell-to-flange weld from the vessel shell has not received the same qualifications as a PDI qualified procedure.

The PDI qualification specimens are curved vessel shell plate sections and do not have a taper transition geometry; however, the procedure is used to examine reactor vessel shell welds, which have taper transitions at weld joints of dissimilar thickness. The PDI qualification for Supplements 4 and 6 allows for examination of material thickness up to 12.3 inches or a metal path distance of 17.5 inches in the case of the 45 degree transducer. This qualified test range bounds a significant percentage of the flange-to-shell weld examination volume even in the thicker portion of the weld centerline.

The RPV flange-to-shell weld was examined during the pre-service by remote automated inspection in accordance with Section XI. The pre-service examination was performed from the vessel ID surface, using Section XI techniques at 0 degree longitudinal and 45 and 60 degree shear beam angles. Examination from the flange surface was performed using 0, 8, and 19 degree longitudinal. For inservice examinations, during the first interval the weld examination from the flange surface was performed in accordance with Section XI using 0, 8, and 19 degree longitudinal. The weld ID surface examination was performed using 45 and 60 degree shear wave, and 0, 45, and 70 degree longitudinal beam angles by remote automated inspection in accordance with Section XI and Regulatory Guide (RG) 1.150, Revision 1. The licensee stated that no matters of concern were identified during the aforementioned examinations.

The use of Appendix VIII Supplements 4 and 6 for the completion of the RPV shell-to-flange weld from the shell ID side (which the PDI group has qualified) is expected to reduce personnel radiation exposure because of reduced examination time.

Additionally, the licensee stated that this relief would allow a smooth transition to the welds adjacent to the RPV circumferential and longitudinal welds (welds B1.11 and B1.12) which do require an examination in accordance with Appendix VIII, Supplements 4 and 6. This would eliminate the need to switch to the different calibrations, procedures, and technique required by ASME Code, Section V, Article 4 and RG 1.150, Revision 1. This would result in a reduction in transition time to the different calibration, procedure, and technique required which translates to reduced personnel radiation exposure.

3.3.5 NRC Staff Evaluation

The 1989 Edition of Section XI IWA-2232 states, "Ultrasonic examination shall be conducted in accordance with Appendix I." I-2100 of Appendix I states, "Ultrasonic examination of vessel welds greater than 2 in. thickness shall be conducted in accordance with Article 4 of Section V, as supplemented by this Appendix [Appendix I of Section XI]." Supplements identified in Table I-2000-1 shall be applied. Section V, Article 4 as supplemented by Appendix I provides a prescriptive-based process for qualifying ultrasonic testing (UT) procedures. In lieu of ASME Code, Section XI requirements, the licensee proposed using procedures and personnel qualified in accordance with the performance-based criteria as implemented by the PDI program for the examination of reactor pressure vessels, ASME Code, Section XI, Appendix VIII, Supplements 4 and 6. The licensee contracted the services of Westinghouse to perform the examinations using Westinghouse Procedure PDI-ISI-254.

When qualified prescriptive-based UT procedures are applied in a controlled setting containing real flaws in mockups of reactor vessels and the results are statistically analyzed according to the screening criteria in Appendix VIII of Section XI of the ASME Code, the procedures are equal to or less effective than UT Appendix VIII, Supplement 4 and 6 qualified procedures. A tabulation of the differences between the performance-based Westinghouse procedure PDI-ISI-254, Revision 5 and Section V, Article 4 requirements is shown in Table 1 submitted in the licensee's letter dated October 23, 2003. Whereas the performance-based UT uses fewer transducers than Section V, the performance-based UT is performed with higher sensitivity which increases the chances of detecting a flaw when compared to prescriptive-based Section V, Article 4 requirements. Also, flaw sizing is more accurately determined with the echo-dynamic motion and tip diffraction criteria used by performance-based UT as opposed to the less accurate amplitude criteria for prescriptive-based Section V, Article 4 requirements. Procedures, equipment, and personnel qualified through the PDI program have shown high probability of detection levels. Based on this, the NRC staff concludes that this has resulted in an increased reliability of inspections for weld configurations within the scope of the PDI program.

3.3.6 Conclusion

Based on the increased reliability of inspections within the scope of the PDI program, as discussed above, the NRC staff concludes that the licensee's proposed alternative in RR I2R-31 to use UT procedures and personnel qualified to the 1995 Edition with 1996 Addenda of Section XI of the ASME Code, Appendix VIII, Supplements 4 and 6 as modified by 10 CFR 50.55a(b)(2)(xv) for the RPV shell-to-flange weld, is acceptable. Based on this conclusion, the NRC staff has determined that the proposed alternative examination with PDI qualified procedures and personnel of the shell-to-flange weld would provide an equivalent or better examination than the current ASME Code requirements or the RG 1.150, Revision 1, recommendations. Therefore, the NRC staff concludes that the alternatives in RR I2R-31 will provide an acceptable level of quality and safety and that, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative in I2R-31 is authorized for the subject flange-to-vessel weld at WCGS for the remainder of the second 10-year ISI interval. All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

3.4 RR I2R-32

3.4.1 Component For Which Relief Is Requested

Relief is being requested for the eight ASME Code, Section XI, Class 1, RPV nozzle-to-vessel welds that are listed in the licensee's application and given in Table 3 attached to this SE.

3.4.2 Applicable ASME Code Requirements

The applicable ASME Code edition and addenda is ASME Section XI, 1989 Edition with no addenda. In addition, as required by 10 CFR 50.55a, ASME Section XI, 1995 Edition through 1996 Addenda, is used for Appendix VIII for performance demonstration of UT examination systems. ASME Code Section XI, 1989 Edition with no addenda, Table IWB-2500-1, Examination Category B-D, Item B3.90, Figure IWB-2500-7(a) requires volumetric examination of a minimum volume of base material on each side of the weld equal to a distance of one-half of the RPV shell thickness adjacent to the weld ($t_s/2$).

3.4.3 Licensee's Proposed Alternative

The licensee proposes to use a reduced UT examination volume, shown in Figure 1 of Code Case N-613-1, which extends to ½-inch from the widest part of the weld to ensure that the boundaries of the weld are covered by the UT beams, in lieu of the examination volume requirements of ASME Code, Section XI, Figure IWB-2500-7(a), which specify a UT volume extending to a distance of $t_s/2$ from the widest part of the weld.

3.4.4 Licensee's Basis for Relief

The required examination volume for the RPV nozzle-to-vessel welds extends far beyond the weld into the base material and is unnecessarily large. The ASME Code, Section XI examination volume for the pressure retaining nozzle-to-vessel welds extends from the edge of the weld on the nozzle side and includes a substantial portion of the nozzle forging (inward) and the RPV upper shell course (outward). This large volume causes a major increase in examination time with no resultant increase in quality or safety. The proposed alternative would define the examination volume as the weld and ½-inch of base material on each side of the widest portion of the weld. This base material examination volume was ultrasonically examined during preservice and subsequent ISIs. The examination results showed that there were no recordable indications outside of the volume defined in Code Case N-613-1.

As an alternative to the requirements of ASME Code, Section XI, Figure IWB-2500-7(a), the licensee proposes to reduce the examination volume as described by Code Case N-613-1 and as represented in illustrative vendor scan plans that were included as part of the licensee's submittal. The scan plans are derived from the vessel manufacturer design drawings which are the most dependable source for weld location, size, and thickness. Code Case N-613-1, Figure 1 will be used for the RPV main coolant loop nozzle-to-vessel welds. This is for both the outlet and inlet nozzles that are listed in Table 3 attached to this SE. As added conservatism, the vendor scan plans have included an additional ½-inch of scan path to ensure that the boundaries of the weld are covered by the ultrasonic beams.

Stresses caused by welding are concentrated at the weld and heat affected zone. Post weld heat treatment reduces these stresses and any residual stresses decrease as a function of the distance from the weld.

Operational stresses originate from internal pressure in the vessel and temperature changes occurring during transients. These stresses are limited by design to ensure that ASME Code stress limits are not exceeded. Additionally, a fatigue analysis is required by ASME Code, Section III, to ensure that flaws are unlikely to initiate during operation. Compared to the ASME Code limit of 1.0, the maximum fatigue usage in the nozzle-to-shell weld regions are 0.1104 for the inlet nozzles and 0.324 for the outlet nozzles.

Because stresses are reduced by post weld heat treatment and design requirements, the occurrence of flaws during service is unlikely.

During preceding UTs conducted in the first 10-year interval at WCGS, no recordable indications were found in the RPV nozzle-to-vessel weld examination volume excluded by Code Case N-613-1. These examinations were conducted from the inside surface of the RPV and the ID of the nozzle in accordance with ASME Code, Section V, Article 4, and RG 1.150, Revision 1. The previous UTs used an automated system to acquire, analyze and store data. The UTs scheduled for the current interval will use personnel, automated equipment, and procedures qualified in accordance with ASME Code, Section XI, Appendix VIII, Supplements 4, 6, and 7, 1995 Edition through the 1996 Addenda, as amended by 10 CFR 50.55a. The licensee is confident that satisfactory comparisons can be made between past and present examinations if necessary.

The licensee concluded that the use of the proposed alternative will provide an acceptable level of quality and safety.

3.4.5 NRC Staff Evaluation

The licensee has requested relief from the UT volume requirements specified in Table IWB-2500-1, Examination Category B-D, Code Item B3.90, Figures IWB-2500-7(a) through (d) pertaining to UT Examination of Full Penetration Nozzles in Vessels. The licensee proposes to use a reduced examination volume, extending to ½-inch from each side of the widest part of the nozzle-to-vessel weld in lieu of an examination volume extending to a distance equal to half the through-wall thickness from each side of the widest part of the nozzle-to-vessel weld, as required by Figures IWB-2500-7(a) through (d).

The licensee provided a sketch showing the configuration of the nozzle-to-vessel weld and the revised examination volume. The specific weld configurations and revised examination volumes are depicted in ASME Code Case N-613-1 and the figures attached to the relief request submittal for this relief request. The revised examination volume depicted in the figures extend to ½-inch from each side of the widest part of the nozzle-to-vessel weld and is, therefore, consistent with licensee's request for the reduced UT volume. All other aspects of the UT volumes for RPV nozzle-to-vessel welds remain unchanged in the licensee's request. The licensee provided a listing of all nozzle-to-vessel welds included within the scope of this relief request. This is Table 3 attached to this SE.

The acceptability of the reduced UT volume is based on prior full volumetric examinations of the welds and base metal, as well as the internal stress distribution near the weld. Prior full volumetric examinations of the nozzle-to-vessel welds included within the scope of this relief request cover the full volume of base metal, extending to a distance equal to half the through-wall thickness from each side of the widest part of the nozzle-to-vessel weld, as required by the ASME Code. This base metal region included in the original ASME Code volume was extensively examined during construction, preservice inspection, and prior ISIs. These examinations all show the ASME Code volume to be free of unacceptable flaws. The creation of flaws during plant service in the volume excluded from the proposed reduced examination volume is unlikely because of the low stress in the base metal away from the weld. The stresses caused by welding are concentrated at or near the weld. Cracks, should they initiate, occur in the highly-stressed area of the weld. The highly-stressed areas are within the volume included in the reduced examination volume proposed by the licensee. Because the highly stressed weld areas are likely to have flaws that are within the reduced UT volume and the weld volume outside the reduced UT volume is the base metal region which has been both extensively examined and is unlikely to have flaws, the NRC staff concludes that reducing the full volume examinations to the reduced UT volume will provide an acceptable level of quality and safety.

The weld volume and the adjacent base metal volume will be examined in accordance with Code Case N-613-1. The examinations shall consist of techniques and procedures qualified in accordance with the ASME Code, Section XI, Appendix VIII, Supplements 4, 6, and 7. The weld and base metal volumes will be interrogated from the nozzle bore using techniques and procedures specifically qualified to inspect the nozzle-to-vessel weld from the nozzle bore. These procedures were qualified in accordance with ASME Code, Section XI, Appendix VIII, Supplement 7, as administered by the PDI group.

The nozzle-to-vessel examination volume is accessible from the vessel ID surface and will be examined in four orthogonal directions for the first 15 percent of weld thickness with respect to the vessel ID surface using ASME Code, Section XI, Appendix VIII, Supplement 4, qualified techniques, in accordance with 10 CFR 50.55a(b)(2)(xv)(G)(1). The remaining 85 percent of weld volume accessible from the vessel ID surface will be examined in two opposing circumferential scanning directions using ASME Code, Section XI, Appendix VIII, Supplement 6, qualified techniques to interrogate for transverse defects in accordance with 10 CFR 50.55a(b)(2)(xv)(G)(2).

To ensure the extremities of the weld are included in the examination volume, a margin of 1/2-inch is conservatively added to the scanning path of all transducers in all directions as allowed by component geometry. This is standard practice for nozzle-to-shell, shell welds, and nozzle-to-pipe weld examinations. The sketches included in the licensee's relief request reflect this additional conservatism. Based on this review of the documentation and associated drawings for all RPV nozzle-to-vessel welds, the licensee determined that no weld repairs are encapsulated within the existing nozzle-to-vessel welds. Therefore, since there are no repairs in the area to be examined which could extend past the original weld boundaries, the examination will encompass the entire weld and the examination will provide an acceptable level of quality and safety.

3.4.6 Conclusion

The NRC staff finds that the proposed alternative to reduce the UT volume to ½-inch from the widest part of the nozzle-to-vessel weld on each side of the weld crown, in lieu of ½ the through-wall thickness from the widest part of the nozzle-to-vessel weld on each side of the weld crown will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative is authorized for ASME Code, Section XI, Class 1, RPV nozzle-to-vessel welds for the remainder of the second 10-year ISI interval at WCGS, unless during those intervals Code Case N-613-1 is published in a future version of RG 1.147, "Inservice Inspection Code Case Acceptability-ASME Section XI, Division 1." At that time, if the licensee intends to continue implementing this code case, it must follow all provisions of Code Case N-613-1 with limitations or conditions specified in RG 1.147, if any. All other requirements of the ASME Code, Sections III and XI, for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

4.0 CONCLUSION

The staff has evaluated RRs I2R-29 through I2R-32 against the requirements of Section XI of the 1989 Edition of the ASME Code, which is the applicable ASME Code for WCGS. Based on the above SE, as discussed in Sections 3.1.6, 3.2.6, 3.3.6, and 3.4.6 of this SE, respectively, the NRC staff concludes that the alternatives to the requirements in Section XI of the ASME Code in the four RRs provide an acceptable level of quality and safety. Based on this conclusion, pursuant to 10 CFR 50.55a(a)(3)(i), the Commission authorizes the proposed alternatives in RRs I2R-29 through I2R-32 for the remainder of the second 10-year ISI interval at WCGS, which began on September 3, 1995, and ends on September 2, 2005.

In addition, the requirements of 10 CFR 50.55a(b)(2)(G) and 10 CFR 50.55a(b)(2)(K)(2) for examinations performed from inside the vessel or the requirements of 10 CFR 50.55a(b)(2)(G) and 10 CFR 50.55a(b)(2)(K)(3) for examinations performed from the outside surface must still be met.

All other requirements of the ASME Code, Section XI, for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Attachments:
1. Table 1 – ASME Code Category B-F Safe-End Welds
2. Table 2 – Category B-F Safe-End Welds and Category B-J Safe-End Welds
3. Table 3 – Nozzle Welds Code Category B-D

Principal Contributor: Jack Donohew

Date: May 17, 2005

TABLE 1

ASME Code Category B-F Safe-End Welds

Code Item	Description	Weld Number
B5.10	Safe-end to Loop A RPV Inlet Nozzle	RV-302-121-A (Note 1)
B5.10	Safe-end to Loop A RPV Outlet Nozzle	RV-301-121-A (Note 1)
B5.10	Safe-end to Loop B RPV Inlet Nozzle	RV-302-121-B (Note 2)
B5.10	Safe-end to Loop B RPV Outlet Nozzle	RV-301-121-B (Note 2)
B5.10	Safe-end to Loop C RPV Inlet Nozzle	RV-302-121-C (Note 2)
B5.10	Safe-end to Loop C RPV Outlet Nozzle	RV-301-121-C (Note 2)
B5.10	Safe-end to Loop D RPV Inlet Nozzle	RV-302-121-D (Note 1)
B5.10	Safe-end to Loop D RPV Outlet Nozzle	RV-301-121-D (Note 2)

Note 1: These welds are selected for examination by the WCGS Risk-informed ISI Program Plan.

Note 2: Due to the V.C. Summer hot leg nozzle cracking, it was decided that all inlet and outlet dissimilar metal nozzle-to-safe end welds Category B-F welds are to be examined during Refuel Outage 14 (Spring 2005).

TABLE 2

Category B-F Safe-End Welds

Code Item	Description	Weld Number
B5.10	Safe-end to Loop A RPV Inlet Nozzle	RV-302-121-A (Note 1)
B5.10	Safe-end to Loop A RPV Outlet Nozzle	RV-301-121-A (Note 1)
B5.10	Safe-end to Loop B RPV Inlet Nozzle	RV-302-121-B (Note 2)
B5.10	Safe-end to Loop B RPV Outlet Nozzle	RV-301-121-B (Note 2)
B5.10	Safe-end to Loop C RPV Inlet Nozzle	RV-302-121-C (Note 2)
B5.10	Safe-end to Loop C RPV Outlet Nozzle	RV-301-121-C (Note 2)
B5.10	Safe-end to Loop D RPV Inlet Nozzle	RV-302-121-D (Note 1)
B5.10	Safe-end to Loop D RPV Outlet Nozzle	RV-301-121-D (Note 2)

Category B-J Safe-End Welds

Code Item	Description	Weld Number
B9.11	Elbow to Loop A RPV Inlet Safe-End Weld	BB-01-F102 (Note 1)
B9.11	Pipe to Loop A RPV Outlet Safe-End Weld	BB-01-F103 (Note 1)
B9.11	Elbow to Loop B RPV Inlet Safe-End Weld	BB-01-F202 (Note 3)
B9.11	Pipe to Loop B RPV Outlet Safe-End Weld	BB-01-F203 (Note 3)
B9.11	Elbow to Loop C RPV Inlet Safe-End Weld	BB-01-F302 (Note 3)
B9.11	Pipe to Loop C RPV Outlet Safe-End Weld	BB-01-F303 (Note 3)
B9.11	Elbow to Loop D RPV Inlet Safe-End Weld	BB-01-F402 (Note 3)
B9.11	Pipe to Loop D RPV Outlet Safe-End Weld	BB-01-F403 (Note 3)

Note 1: These welds are selected for examination by the WCGS Risk-informed ISI Program Plan.

Note 2: Due to the V.C. Summer hot leg nozzle cracking, it was decided that all inlet and outlet dissimilar metal nozzle-to-safe-end Category B-F welds are to be examined during Refuel Outage 14 (Spring 2005).

Note 3: These stainless steel Category B-J welds are being examined due to the proximity to the dissimilar metal nozzle-to-safe-end Category B-F welds being examined for reasons identified in Notes 1 and 2.

TABLE 3

NOZZLE WELDS CODE CATEGORY B-D

Code Item	Description	Weld Number
B3.90	Loop A Outlet Nozzle to Vessel Weld	RV-107-121-A
B3.90	Loop A Inlet Nozzle to Vessel Weld	RV-105-121-A
B3.90	Loop B Inlet Nozzle to Vessel Weld	RV-105-121-B
B3.90	Loop B Outlet Nozzle to Vessel Weld	RV-107-121-B
B3.90	Loop C Outlet Nozzle to Vessel Weld	RV-107-121-C
B3.90	Loop C Inlet Nozzle to Vessel Weld	RV-105-121-C
B3.90	Loop D Inlet Nozzle to Vessel Weld	RV-105-121-D
B3.90	Loop D Outlet Nozzle to Vessel Weld	RV-107-121-D

cc:
Jay Silberg, Esq.
Shaw Pittman, LLP
2300 N Street, NW
Washington, D.C. 20037

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-7005

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 311
Burlington, KS 66839

Chief Engineer, Utilities Division
Kansas Corporation Commission
1500 SW Arrowhead Road
Topeka, KS 66604-4027

Office of the Governor
State of Kansas
Topeka, KS 66612

Attorney General
120 S.W. 10th Avenue, 2nd Floor
Topeka, KS 66612-1597

County Clerk
Coffey County Courthouse
110 South 6th Street
Burlington, KS 66839

Vick L. Cooper, Chief
Air Operating Permit and Compliance
  Section
Kansas Department of Health
  and Environment
Bureau of Air and Radiation
1000 SW Jackson, Suite 310
Topeka, KS 66612-1366

Vice President Operations/Plant Manager
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, KS 66839

Supervisor Licensing
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, KS 66839

U.S. Nuclear Regulatory Commission
Resident Inspectors Office/Callaway Plant
8201 NRC Road
Steedman, MO 65077-1032