June 16, 2003

10 CFR 50.55a(a)(3)(i)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop: OWFN P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of	)	Docket Nos. 50-259
Tennessee Valley Authority	)	50-260
		50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 1, 2, AND 3 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI, APPENDIX VIII, SUPPLEMENT 10, QUALIFICATION REQUIREMENTS FOR DISSIMILIAR METAL PIPING WELDS - REQUESTS FOR RELIEF 1-ISI-17, 2-ISI-20, AND 3-ISI-16

Reference: NRC Regulatory Issue Summary 2003-01, Examination of Dissimilar Metal Welds, Supplement 10 to Appendix VIII of Section XI of the ASME Code, dated January 21, 2003.

In accordance with 10 CFR 50.55a(a)(3)(i), TVA is requesting relief from certain inservice inspection (ISI) requirements in Section XI of the ASME Boiler and Pressure Vessel Code related to the ultrasonic examination of dissimiliar metal welds at BFN. The enclosure to this letter contains BFN Units 1, 2, and 3 requests for relief 1-ISI-17, 2-ISI-20, and 3-ISI-16 for NRC review and approval.

The Final Rule, 64 FR 51370 [10 CFR 50.55a(g)(6)(ii)(C)], dated September 22, 1999, required TVA to implement a program to comply with ASME Section XI, Appendix VIII, Supplement 10 by November 22, 2002. Supplement 10 contains the qualification requirements for procedures, equipment, and personnel involved with examining dissimiliar metal (DSM) welds using ultrasonic

examination techniques. This scope is commonly referred as performance based criteria to improve the ability of an examiner to detect and characterize flaws during examination of components to provide more reliable examination results.

As described in NRC RIS 2003-01 (Reference), the NRC has concluded that facilities that do not have a program that implements Supplement 10 to Appendix VIII of Section XI of the ASME Code are noncompliant with 10 CFR 50.55a(g)(6)(ii)(C), irrespective of when the actual examination of dissimiliar metal welds must be conducted. The inability to meet the 10 CFR 50.55a(g)(6)(ii)(C) required schedule of November 22, 2002, to have a Supplement 10 program in place has not impacted safe operation of BFN because the program is intended for use during an outage for DSM weld examinations. Until regulatory compliance is achieved, any system operability issues arising from the inability to comply with Appendix VIII, Supplement 10 will be addressed consistent with Generic Letter 91-18.

The industry has implemented a Performance Demonstration Initiative (PDI) program and has developed an alternative program to implement Supplement 10. The alternative program has been submitted to the ASME Section XI for consideration and was approved by the ASME Section XI Subcommittee in February 2003. Final ASME Code approval is pending. TVA is a participant in the industry-sponsored program through the Nuclear Energy Institute and EPRI.

TVA will submit additional relief requests for NRC approval if the required examination coverage and/or flaw characterizations (i.e., sizing) are not achieved during the examinations in accordance with the alternative program. Additional relief requests, if required, would be submitted within 90 days of restart from the refueling outage in which the examinations were performed.

The proposed alternative program described in the enclosed relief requests for BFN Units 1, 2, and 3 follow the scope of Supplement 10, with the enhancements, clarifications, and refinements as approved by the ASME Section XI Subcommittee and provides an acceptable level of quality and safety in accordance with 10 CFR 50.55a(a)(3)(i).

For BFN Units 1, 2, and 3 there have been no DSM welds examined since November 22, 2002. However, there are two DSM welds scheduled for examination during the BFN Unit 3, Cycle 11 refueling outage (Spring 2004). TVA requests approval of this relief request by January 16, 2004, to support resource planning for the Unit 3, Cycle 11 (Spring 2004) refueling outage.

There are no new regulatory commitments in this letter. If you have any questions, please contact me at (256) 729-2636.

Sincerely,

Original signed by:

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ENCLOSURE

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI,
APPENDIX VIII, SUPLEMENT 10,
QUALIFICATION REQUIREMENTS FOR DISSIMILIAR METAL PIPING WELDS,

REQUESTS FOR RELIEF 1-ISI-17, 2-ISI-20, AND 3-ISI-16

(See Attached)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI,
APPENDIX VIII, SUPLEMENT 10,
QUALIFICATION REQUIREMENTS FOR DISSIMILIAR METAL PIPING WELDS,

REQUESTS FOR RELIEF 1-ISI-17, 2-ISI-20, AND 3-ISI-16

EXECUTIVE SUMMARY:

In accordance with 10 CFR 50.55a(a)(3)(i), TVA is requesting relief from inservice inspection requirements of the 1995 Edition through the 1996 Addenda of Section XI, Appendix VIII, Supplement 10*, "Qualification Requirements For Dissimilar Metal Piping Welds", of the ASME Boiler and Pressure Vessel Code. The Performance Demonstration Initiative (PDI) Program for implementing the Supplement 10 qualification program for dissimilar metal welds is not in strict compliance with the requirements of Supplement 10 of the 1995 Edition through the 1996 Addenda. TVA proposes to use the PDI Program for implementation of Appendix VIII, Supplement 10 as amended in the Attachment of this enclosure. The amendments to Supplement 10 as shown in the Attachment were coordinated with PDI, and the NRC.

**10CFR50.55a(g)(6)(ii)(C) "Implementation of Appendix VIII to Section XI", mandates that all nuclear power plants comply with Section XI, Division 1, 1995 Edition with the 1996 Addenda to implement the requirements of Supplement 10, beginning November 22, 2002.*

SYSTEM/COMPONENT(S) FOR WHICH RELIEF IS REQUESTED:

Pressure Retaining Piping Welds subject to examination using procedures, personnel, and equipment qualified to ASME Section XI, Appendix VIII, Supplement 10 criteria.

CODE REQUIREMENTS:

The following paragraphs or statements are from ASME Section XI, Appendix VIII, Supplement 10 and identify the specific requirements that are included in this request for relief.

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 percent of the cracks shall be in austenitic material. At least 50 percent of the cracks in austenitic material shall be contained wholly in weld or buttering material. At least 10 percent 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 l/3 of the flaws, rounded to the next higher whole number, shall have depths between 10 percent and 30 percent of the nominal pipe wall thickness. Paragraph 1.4(b) distribution table requires 20 percent of the flaws to have depths between 10 percent and 30 percent.

Item 6 - Paragraph 2.0 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 percent 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.

RELIEF REQUESTED:

Relief is requested to use the following alternative requirements for implementation of Appendix VIII, Supplement 10 requirements. The alternative requirements will be implemented through the PDI Program.

A copy of the proposed revision to Supplement 10 is attached. It identifies the proposed alternatives and allows them to be viewed in context. It also identifies additional clarifications and enhancements for information. The proposed revisions to Supplement 10 have been submitted to the ASME Section XI for consideration and were approved by the ASME Section XI Subcommittee in February 2003. Final ASME Code approval is pending.

BASIS FOR RELIEF:

Item 1 - The proposed alternative to Paragraph 1.1(b) states:

"The specimen set shall include the minimum and maximum pipe diameters and thicknesses for which the examination procedure is applicable. Pipe diameters within 1/2 inches (13 mm) of the nominal diameter shall be considered equivalent. Pipe diameters larger than 24 inches (610 mm) shall be considered to be flat. When a range of thicknesses is to be examined, a thickness tolerance of $\pm$25 percent is acceptable."

Technical Basis - The change in the minimum pipe diameter tolerance from 0.9 times the diameter to within 1/2 inches 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 - The proposed alternative to Paragraph 1.1(d) states:

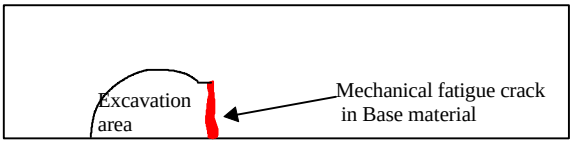
"At least 60 percent of the flaws shall be cracks, and the remainder shall be alternative flaws. Specimens with IGSCC shall be used when available. Alternative flaws, shall meet the following requirements:

(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 flaws shall have a tip width no more than 0.002 inches (.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 - As illustrated below, 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 percent 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 - The proposed alternative to Paragraph 1.1(d)(1) states:

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

Technical Basis - Under the current Code, as few as 25 percent of the flaws are contained in austenitic weld or buttering material. Recent experience has indicated that flaws contained within the weld are the likely scenarios. 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 Code.

Item 4 - The proposed alternative to Paragraph 1.2(b) states:

“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 times the number of flawed grading units."

Technical Basis - Table 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 times to reduce 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 competent personnel being successful and less skilled personnel being unsuccessful. The acceptance criteria for the statistical basis are in Table VIII-S10-1.

Item 5 - 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 percent of the flaws shall be in the range of 10 to 60 percent 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 - The proposed alternative to Paragraph 2.0 first sentence states:

"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 Code requires that the inside surface be concealed from the candidate. This makes

qualifications conducted from the inside of the pipe (e.g., PWR nozzle to safe end welds) impractical. The proposed alternative differentiates between ID and OD 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 - The proposed alternatives to Paragraph 2.2(b) and 2.2(c) state:

"... containing a flaw to be sized may be identified to the candidate."

Technical Basis - The current 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 - The proposed alternative to Paragraph 2.3(a) and 2.3(b) state:

"... regions of each specimen containing a flaw to be sized may be identified to the candidate."

Technical Basis - The current 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 - The proposed alternative modifies the acceptance criteria of Table VIII-S2-1 as follows:

Technical Basis - The proposed alternative is identified as new Table S10-1 (see attachment). It was modified to reflect the reduced number of unflawed grading units and allowable false calls. As a part of ongoing Code activities, Pacific Northwest National Laboratory has reviewed the statistical significance of these revisions and offered the revised Table S10-1.

ALTERNATIVE EXAMINATION:

In lieu of the requirements of ASME Section XI, 1995 Edition, 1996 Addenda, Appendix VIII, Supplement 10, the proposed alternative shall be used. The proposed alternative is described in the enclosure (Attachment).

The Attachment is a juxtaposition of the ASME Section XI, 1995 Edition with the 1996 Addenda, Appendix VIII, Supplement 10 requirements and the proposed changes to Supplement 10 that have been approved by ASME Section XI Subcommittee and form the basis for relief outlined above.

JUSTIFICATION FOR GRANTING RELIEF:

Pursuant to 10 CFR 50.55a(a)(3)(i), approval is requested to use the proposed alternatives described above in lieu of the ASME Section XI, Appendix VIII, Supplement 10 requirements. Compliance with the proposed alternatives will provide an adequate level of quality and safety for examination of the affected welds.

IMPLEMENTATION SCHEDULE:

This alternative will be used for BFN Units 1, 2, and 3 until the end of each unit's respective current ten-year ISI interval as follows:

BFN Unit 1 is currently in the third period of the first interval which extends from August 1, 1974 until 1-year after restart from the current extended outage.

BFN Unit 2 is currently in the first period of the third ten-year interval which extends from May 25, 2001 through May 24, 2011.

BFN Unit 3 is currently in the third period of the second ten-year interval which extends from November 19, 1996 through November 18, 2005.

ATTACHMENT: Table listing the proposed alternative to ASME Section XI, 1995 Edition, 1996 Addenda, Appendix VIII, Supplement 10.

Attachment

Supplement 10 - Qualification Requirements For Dissimilar Metal Piping Welds

Proposed Amendments

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS

Current Requirement	Proposed Change	Reasoning
	1.0 SCOPE	
	Supplement 10 is applicable to dissimilar metal piping welds examined from either the inside or outside surface. Supplement 10 is not applicable to piping welds containing supplemental corrosion resistant clad (CRC) applied to mitigate Intergranular Stress Corrosion Cracking (IGSCC).	A scope statement provides added clarity regarding the applicable range of each individual Supplement. The exclusion of CRC provides consistency between Supplement 10 and the recent revision to Supplement 2 (Reference BC 00-755). Note, an additional change identifying CRC as "in course of preparation" is being processed separately.
1.0 SPECIMEN REQUIREMENTS	**2.0 SPECIMEN REQUIREMENTS**	Renumbered
Qualification test specimens shall meet the requirements listed herein, unless a set of specimens is designed to accommodate specific limitations stated in the scope of the examination procedure (e.g., pipe size, weld joint configuration, access limitations). The same specimens may be used to demonstrate both detection and sizing qualification.	Qualification test specimens shall meet the requirements listed herein, unless a set of specimens is designed to accommodate specific limitations stated in the scope of the examination procedure (e.g., pipe size, weld joint configuration, access limitations). The same specimens may be used to demonstrate both detection and sizing qualification.	No Change
1.1 General. The specimen set shall conform to the following requirements.	**2.1 General.** The specimen set shall conform to the following requirements.	Renumbered
	(a) The minimum number of flaws in a specimen set shall be ten.	New, changed minimum number of flaws to 10 so sample set size for detection is consistent with length and depth sizing.
(a) Specimens shall have sufficient volume to minimize spurious reflections that may interfere with the interpretation process.	(**b**) Specimens shall have sufficient volume to minimize spurious reflections that may interfere with the interpretation process.	Renumbered
(b) The specimen set shall include the minimum and maximum pipe diameters and thicknesses for which the examination procedure is applicable. Pipe diameters within a range of 0.9 to 1.5 times a nominal diameter shall be considered equivalent. Pipe diameters larger than 24 in. shall be considered to be flat. When a range of thicknesses is to be examined, a thickness tolerance of $\pm$25% is acceptable.	(**c**) The specimen set shall include the minimum and maximum pipe diameters and thicknesses for which the examination procedure is applicable. Pipe diameters within **1/2 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 $\pm$25% is acceptable.	Renumbered, metricated, the change in pipe diameter tolerance provides consistency between Supplement 10 and the recent revision to Supplement 2 (Reference BC 00-755)

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS

Current Requirement	Proposed Change	Reasoning
(c) The specimen set shall include examples of the following fabrication condition:	(**d**) The specimen set shall include examples of the following fabrication condition**s**:	Renumbered, changed "condition" to "conditions"
(1) geometric conditions that normally require discrimination from flaws (e.g., counterbore or weld root conditions, cladding, weld buttering, remnants of previous welds, adjacent welds in close proximity);	(1) geometric **and material** conditions that normally require discrimination from flaws (e.g., counterbore or weld root conditions, cladding, weld buttering, remnants of previous welds, adjacent welds in close proximity**, weld repair areas**);	Clarification, some of the items listed relate to material conditions rather than geometric conditions. Weld repair areas were added as a result of recent field experiences.
(2) typical limited scanning surface conditions (e.g., diametrical shrink, single-side access due to nozzle and safe end external tapers).	(2) typical limited scanning surface conditions shall be included as follows: (a) for outside surface examination, **weld crowns,** diametrical shrink, single-side access due to nozzle and safe end external tapers **(b) for inside surface examination, internal tapers, exposed weld roots, and cladding conditions for inside surface examinations**). **(e) Qualification requirements shall be satisfied separately for outside surface and inside surface examinations.**	Differentiates between ID and OD scanning surface limitations. Requires that ID and OD qualifications be conducted independently (Note, new paragraph 2.0 (identical to old paragraph 1.0) provides for alternatives when "a set of specimens is designed to accommodate specific limitations stated in the scope of the examination procedure.").
(d) All flaws in the specimen set shall be cracks.		Deleted this requirement, because new paragraph 2.3 below provides for the use of "alternative flaws" in lieu of cracks.
(1) 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 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.	**2.2 Flaw Location.** 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.**	Renumbered and re-titled. Flaw location percentages redistributed because field experience indicates that flaws contained in weld or buttering material are probable and represent the more stringent ultrasonic detection scenario.
(2) At least 50% of the cracks in austenitic base material shall be either IGSCC or thermal fatigue cracks. At least 50% of the cracks in ferritic material shall be mechanically or thermally induced fatigue cracks.	**2.3 Flaw Type.** **(a) At least 60% of the flaws shall be cracks, and the remainder shall be alternative flaws. Specimens with IGSCC shall be used when available. Alternative flaws shall meet the following requirements:** **(1) Alternative flaws, if used, shall provide crack-**	Renumbered and re-titled. Alternative flaws are required for placing axial flaws in the HAZ of the weld and other areas where implantation of a crack produces metallurgical conditions that result in an unrealistic ultrasonic response. This is consistent with the recent revision to Supplement 2 (Reference BC 00-755).

Current Requirement	Proposed Change	Reasoning
	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 flaws shall have a tip width no more than 0.002 in. (.05 mm).**	The 40% limit on alternative flaws is needed to support the requirement for up to 70% axial flaws. Metricated
(3) At least 50% of the cracks shall be coincident with areas described in (c) above.	**(b)** At least 50% of the **flaws** shall be coincident with areas described in **2.1**(**d**) above.	Renumbered. Due to inclusion of "alternative flaws", use of "cracks" is no longer appropriate.
	2.4 Flaw Depth. All flaw depths shall be greater than 10% of the nominal pipe wall thickness. **F**law depths shall exceed the nominal clad thickness when placed in cladding. **Flaws in the sample set shall be distributed as follows:** **Flaw Depth (% Wall Thickness) / Minimum Number of Flaws** **10-30% — 20%** **31-60% — 20%** **61-100% — 20%** **At least 75% of the flaws shall be in the range of 10 to 60% of wall thickness.**	Moved from old paragraph 1.3(c) and 1.4 and re-titled. Consistency between detection and sizing specimen set requirements (e.g., 20% vs. 1/3 flaw depth increments, e.g., original paragraph 1.3(c))
1.2 Detection Specimens. The specimen set shall include detection specimens that meet the following requirements.		Renumbered and re-titled and moved to paragraph 3.1(a). No other changes
(a) Specimens shall be divided into grading units. Each grading unit shall include at least 3 in. of weld length. If a grading unit is designed to be unflawed, at least 1 in. of unflawed material shall exist on either side of the grading unit. The segment of weld length used in one grading unit shall not be used in		Renumbered to paragraph 3.1(a)(1). No other changes.

Current Requirement	Proposed Change	Reasoning
another grading unit. Grading units need not be uniformly spaced around the pipe specimen.		
(b) Detection sets shall be selected from Table VIII-S2-1. The number of unflawed grading units shall be at least twice the number of flawed grading units.		Moved to new paragraph 3.1(a)(2).
(c) Flawed grading units shall meet the following criteria for flaw depth, orientation, and type.		Flaw depth requirements moved to new paragraph 2.4, flaw orientation requirements moved to new paragraph 2.5, flaw type requirements moved to new paragraph 2.3, "Flaw Type".
(1) All flaw depths shall be greater than 10% of the nominal pipe wall thickness. 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. However, flaw depths shall exceed the nominal clad thickness when placed in cladding. At least 1/3 of the flaws, rounded to the next whole number, shall have depths greater than 30% of the nominal pipe wall thickness.		Deleted, for consistency in sample sets the depth distribution is the same for detection and sizing.
(2) At least 30% and no more than 70% of the flaws, rounded to the next higher whole number, shall be oriented axially. The remainder of the flaws shall be oriented circumferentially.	**2.5 Flaw Orientation.** **(a)** For other than sizing specimens at least 30% and no more than 70% of the flaws, rounded to the next higher whole number, shall be oriented axially. The remainder of the flaws shall be oriented circumferentially.	Note, this distribution is applicable for detection and depth sizing. Paragraph 2.5(b)(1) requires that all length- sizing flaws be oriented circumferentially.
1.3 Length Sizing Specimens. The specimen set shall include length sizing specimens that meet the following requirements.		Renumbered and re-titled and moved to new paragraph 3.2
(a) All length sizing flaws shall be oriented circumferentially.		Moved, included in new paragraph 3.2(a)
(b) The minimum number of flaws shall be ten.		Moved, included in new paragraph 2.1 above
(c) All flaw depths shall be greater than 10% of the nominal pipe wall thickness. At least l/3 of the flaws, rounded to the next higher whole number,		Moved, included in new paragraph 2.4 above after revision for consistency with detection distribution

shall have depths between 10% and 30% of the nominal pipe wall thickness. However, flaw depth shall exceed the nominal clad thickness when placed in cladding. At least 1/3 of the flaws, rounded to the next whole number, shall have depths greater than 30% of the nominal pipe wall thickness.		
1.4 Depth Sizing Specimens. The specimen set shall include depth sizing specimens that meet the following requirements.		Moved, included in new paragraphs 2.1, 2.3, 2.4
(a) The minimum number of flaws shall be ten.		Moved, included in new paragraph 2.1
(b) Flaws in the sample set shall not be wholly contained within cladding and shall be distributed as follows:		Moved, potential conflict with old paragraph 1.2(c)(1); "However, flaw depths shall exceed the nominal clad thickness when placed in cladding.". Revised for clarity and included in new paragraph 2.4

Current Requirement	Proposed Change	Reasoning
Flaw Depth (% Wall Thickness) / Minimum Number of Flaws 10-30% 20% 31-60% 20% 61-100% 20% The remaining flaws shall be in any of the above categories.		Moved, included in paragraph 2.4 for consistent applicability to detection and sizing samples.
	(b) Sizing Specimen sets shall meet the following requirements.	Added for clarity
	(1) Length-sizing flaws shall be oriented circumferentially.	Moved from old paragraph 1.3(a)
	(2) Depth sizing flaws shall be oriented as in 2.5(a).	Included for clarity. Previously addressed by omission (i.e., length, but not depth had a specific exclusionary statement)
2.0 CONDUCT OF PERFORMANCE DEMONSTRATION	**3.0 PERFORMANCE DEMONSTRATION**	Renumbered
The specimen inside surface and identification shall be concealed from the candidate. All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited.	**Personnel and procedure performance demonstration tests shall be conducted according to the following requirements.** **(a) 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".** All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited.	Differentiate between qualifications conducted from the outside and inside surface.

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS

Current Requirement	Proposed Change	Reasoning
2.1 Detection Test. Flawed and unflawed grading units shall be randomly mixed	**3.1 Detection Test.**	Renumbered, moved text to paragraph 3.1(a)(3)
	(a) The specimen set shall include detection specimens that meet the following requirements.	Renumbered, moved from old paragraph 1.2.
	(1) Specimens shall be divided into grading units. (a) Each grading unit shall include at least 3 in. **(76 mm)** of weld length. (b)The end of each flaw shall be separated from an unflawed grading unit by at least 1 in. **(25 mm)** of unflawed material. A flaw may be less than 3 in. in length. (c) The segment of weld length used in one grading unit shall not be used in another grading unit. (d) Grading units need not be uniformly spaced around the pipe specimen.	Renumbered, moved from old paragraph 1.2(a). Metricated. No other changes.
	(2) Personnel performance demonstration detection test sets shall be selected from Table VIII-S**10**-1. The number of unflawed grading units shall be at least 1-1/2 times the number of flawed grading units.	Moved from old paragraph 1.2(b). Table revised to reflect a change in the minimum sample set to 10 and the application of equivalent statistical false call parameters to the reduction in unflawed grading units. Human factors due to large sample size.
	(3) Flawed and unflawed grading units shall be randomly mixed.	Moved from old paragraph 2.1

Current Requirement	Proposed Change	Reasoning
	(b) Examination equipment and personnel are qualified for detection when **personnel demonstrations** satisfy the acceptance criteria of Table **VIII S10-1** for both detection and false calls.	Moved from old paragraph 3.1. Modified to reflect the 100% detection acceptance criteria of procedures versus personnel and equipment contained in new paragraph 4.0 and the use of 1.5X rather than 2X unflawed grading units contained in new paragraph 3.1(a)(2). Note, the modified table maintains the screening criteria of the original Table VIII-S2-1.
2.2 Length Sizing Test	**3.2 Length Sizing Test**	Renumbered
(a) The length sizing test may be conducted separately or in conjunction with the detection test.	(a) **Each reported circumferential flaw in the detection test shall be length-sized.**	Provides consistency between Supplement 10 and the recent revision to Supplement 2 (Reference BC 00-755).

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Current Requirement	Proposed Change	Reasoning
(b) When the length sizing test is conducted in conjunction with the detection test, and less than ten circumferential flaws are detected, additional specimens shall be provided to the candidate such that at least ten flaws are sized. The regions containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region.	(b) When the length-sizing test is conducted in conjunction with the detection test, and less than ten circumferential flaws are detected, additional specimens shall be provided to the candidate such that at least ten flaws are sized. The regions containing a flaw to be sized **may** be identified to the candidate. The candidate shall determine the length of the flaw in each region.	Change made to ensure security of samples, consistent with the recent revision to Supplement 2 (Reference BC 00-755). Note, 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.
(c) For a separate length sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region.	(c) For a separate length-sizing test, the regions of each specimen containing a flaw to be sized **may** be identified to the candidate. The candidate shall determine the length of the flaw in each region.	Change made to ensure security of samples, consistent with the recent revision to Supplement 2 (Reference BC 00-755).
	(d) Examination procedures, equipment, and personnel are qualified for length-sizing **when** the RMS error of the flaw length measurements, as compared to the true flaw lengths, do not exceed 0.75 in**. (19 mm).**	Moved from old paragraph 3.2(a) includes inclusion of "when" as an editorial change. Metricated.
2.3 Depth Sizing Test	**3.3 Depth Sizing Test**	Renumbered
(a) 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.	(a) **The depth-sizing test may be conducted separately or in conjunction with the detection test. For a separate depth-sizing test, the regions of each specimen containing a flaw to be sized may be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.**	Change made to ensure security of samples, consistent with the recent revision to Supplement 2 (Reference BC 00-755).
(b) 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.	(b) **When the depth-sizing test is conducted in conjunction with the detection test, and less than ten flaws are detected, additional specimens shall be provided to the candidate such that at least ten flaws are sized. T**he regions of each specimen	Change made to be consistent with the recent revision to Supplement 2 (Reference BC 00-755). Changes made to ensure security of samples, consistent with the recent revision to Supplement 2

	containing a flaw to be sized **may** be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.	(Reference BC 00-755).
	(c) Examination procedures, equipment, and personnel are qualified for depth sizing when the RMS error of the flaw depth measurements, as compared to the true flaw depths, do not exceed 0.125 in. **(3 mm).**	Moved from old paragraph 3.2(b). Metricated.
3.0 ACCEPTANCE CRITERIA		Delete as a separate category. Moved to new paragraph detection (3.1) and sizing 3.2 and 3.3
3.1 Detection Acceptance Criteria. Examination procedures, equipment, and personnel are qualified for detection when the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for both detection and false calls.		Moved to new paragraph 3.1(b), reference changed to Table S10 from S2 because of the change in the minimum number of flaws and the reduction in unflawed grading units from 2X to 1.5X.
3.2 Sizing Acceptance Criteria		Deleted as a separate category. Moved to new paragraph on length 3.2 and depth 3.3
(a) Examination procedures, equipment, and personnel are qualified for length sizing the RMS error of the flaw length measurements, as compared to the true flaw lengths, is less than or equal to 0.75 in.		Moved to new paragraph 3.2(d), included word "when" as an editorial change.
(b) Examination procedures, equipment, and personnel are qualified for depth sizing when the RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 in.		Moved to new paragraph 3.3(c)

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Current Requirement	**Proposed Change**	**Reasoning**
	4.0 PROCEDURE QUALIFICATION	New
	Procedure qualifications shall include the following additional requirements. **(a) The specimen set shall include the equivalent of at least three personnel performance demonstration test sets. Successful personnel performance demonstrations may be combined to satisfy these requirements.** **(b) Detectability of all flaws in the procedure qualification test set that are within the scope of the procedure shall be demonstrated. Length and depth sizing shall meet the requirements of paragraph 3.1, 3.2, and 3.3.** **(c) At least one successful personnel demonstration shall be performed.** **(d) To qualify new values of essential variables, at least one personnel qualification set is required. The acceptance criteria of 4.0(b) shall be met.**	New. Based on experience gained in conducting qualifications, the equivalent of 3 personnel sets (i.e., a minimum of 30 flaws) is required to provide enough flaws to adequately test the capabilities of the procedure. Combining successful demonstrations allows a variety of examiners to be used to qualify the procedure. Detectability of each flaw within the scope of the procedure is required to ensure an acceptable personnel pass rate. The last sentence is equivalent to the previous requirements and is satisfactory for expanding the essential variables of a previously qualified procedure

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Current Requirement	**Proposed Change**	**Reasoning**

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TABLE VIII-S~~2~~-1
PERFORMANCE DEMONSTRATION DETECTION TEST
ACCEPTANCE CRITERIA

Detection Test Acceptance Criteria		False Call Test Acceptance Criteria	
No. of Flawed Grading Units	Minimum Detection Criteria	No. of Unflawed Grading Units	Maximum Number of False Calls
~~5~~	~~5~~	~~10~~	~~0~~
~~6~~	~~6~~	~~12~~	~~1~~
~~7~~	~~6~~	~~14~~	~~1~~
~~8~~	~~7~~	~~16~~	~~2~~
~~9~~	~~7~~	~~18~~	~~2~~
10	8	~~20~~ 15	~~3~~ 2
11	9	~~22~~ 17	~~3~~ 3
12	9	~~24~~ 18	~~3~~ 3
13	10	~~26~~ 20	~~4~~ 3
14	10	~~28~~ 21	~~5~~ 3
15	11	~~30~~ 23	~~5~~ 3
16	12	~~32~~ 24	~~6~~ 4
17	12	~~34~~ 26	~~6~~ 4
18	13	~~36~~ 27	~~7~~ 4
19	13	~~38~~ 29	~~7~~ 4
20	14	~~40~~ 30	~~8~~ 5