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SCE&G®
A SCANA COMPANY

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Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS)
DOCKET NO. 50/395
OPERATING LICENSE NO. NPF-12
RESUBMITTAL OF REQUEST TO USE ALTERNATIVES TO ASME BOILER AND PRESSURE VESSEL CODE, SECTION XI (0-C-03-0262)
RR-II-20 and RR-II-21

Reference:
1. S.A. Byrne (SCE&G) letter to Document control Desk (NRC) RC-03-0142, dated July 14, 2003, Request To Use Alternatives To ASME Boiler and Pressure Vessel Code, Section XI
RR-II-15, RR-II-16, RR-II-17, RR-II-18, RR-II-19, RR-II-20, RR-II-21
2. S.A. Byrne (SCE&G) letter to Document control Desk (NRC) RC-03-0193, dated September 19, 2003, Resubmittal of Request To Use Alternatives To ASME Boiler and Pressure Vessel Code, Section XI
RR-II-15, RR-II-16, RR-II-17, RR-II-19

In Reference 1 above, South Carolina Electric & Gas Company (SCE&G), submitted requests for using alternatives to the examination requirements of ASME Code, Section XI.

A meeting between the V. C. Summer Nuclear Station (VCSNS) NRR Project Manager, the NRC technical reviewer, and SCE&G was held on August 8, 2003, at NRR offices. Several issues with the requests were addressed by the NRC which resulted in the decision that SCE&G would resubmit RR-II-15, 16, 17, 19, 20, and 21. Reference 2 provided the resubmittal of RR-II-15, 16, 17, and 19. RR-II-18 was accepted as submitted.

This letter provides the resubmittal for RR-II-20 and RR-II-21.

RR-II-20 provides a base relief request and is accompanied by Addenda specific for VCSNS.

Detailed descriptions of these proposed alternatives, including bases for relief, are included as attachments to this letter. SCE&G requests NRC review and approval of this request by October 1, 2003, so that appropriate changes to the VCSNS Examination Program can be completed to support implementation during refueling outage 14 (RF14), currently scheduled for October 2003.

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SCE&G is submitting the attached relief requests in accordance with 10CFR50.55a(a)(3)(i). SCE&G has determined that the proposed alternatives will provide an acceptable level of quality and safety.

Should you have any questions, please call Mr. Ron Clary at (803) 345-4757.

Very truly yours,

Stephen A. Byrne

JWT/SAB/dr
Attachments (2)

c: N. O. Lorick
N. S. Carns
T. G. Eppink (w/o Attachments)
R. J. White
L. A. Reyes
K. R. Cotton
K. M. Sutton
A. R. Caban
NRC Resident Inspector
NSRC
RTS (0-C-03-0262)
File (810.19-2)
DMS (RC-03-0199)

South Carolina Electric & Gas Co. (SCE&G)
Virgil C. Summer Nuclear Station (VCSNS)
Relief Request

RR-II-20

Subject:

Request for relief for examination of dissimilar metal welds referenced in the ASME Code, Section XI, Appendix VIII, Supplement 10.

Components:

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

Code Requirement:

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% 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.

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 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.

Relief Request:

Relief is requested to use the following alternative requirements for implementation of Appendix VIII, Supplement 10 requirements. The alternate examination as described in the VCSNS request will be implemented through the PDI Program.

A copy of the proposed revision to Supplement 10 is included with this relief request. It identifies the proposed alternatives and allows them to be viewed in context. It also identifies additional clarifications and enhancements for information. It has been submitted to the ASME Code for consideration and as of September 2002 had been approved by the NDE Subcommittee.

Similar relief has previously been granted by the NRC on June 16, 2003, for TAC NOs MB 8142 through MB 8156 and on June 23, 2003, for TAC NOs MB 6951 and MB 6952.

Alternate 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 proposed revision to supplement 10 included with this relief request.

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 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."

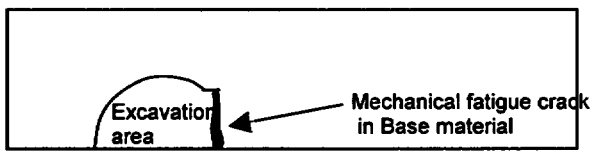
Technical Basis - The change in the minimum pipe diameter tolerance from 0.9 times the diameter to within 1/2 inch of the nominal diameter provides tolerances more in line with

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 - The proposed alternative to Paragraph 1.1(d) states:

> "At least 60% of the flaws shall be cracks, 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 flaw mechanisms shall have a tip width 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 - 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% 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% 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 Code, as few as 25% 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 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 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% 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 - 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:

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TABLE VIII-~~S2~~-1
PERFORMANCE DEMONSTRATION DETECTION TEST ACCEPTANCE CRITERIA

Detection Test Acceptance Critera		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

Technical Basis - The proposed alternative is identified as new Table VIII-S10-1 above. 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 Laboratories has reviewed the statistical significance of these revisions and offered the revised Table VIII-S10-1.

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:

Implementation period will be from October 1, 2003 to October 1, 2006.

SCE&G requests that this relief be in effect for 36 months for VCSNS. During that time period, SCE&G will closely monitor industry progress for the examination of dissimilar metal welds. If the 0.125" RMS value cannot be achieved, SCE&G will re-apply for relief. It is expected that conclusions regarding capabilities versus criteria in this particular qualification category can be made during that time period.

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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
	(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 ±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 ±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).
(c) The specimen set shall include examples of the following fabrication condition:	(d) The specimen set shall include examples of the following fabrication conditions:	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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(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-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).**	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). 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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
	2.4 Flaw Depth. All flaw depths shall be greater than 10% of the nominal pipe wall thickness. Flaw 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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(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 another grading unit. Grading units need not be uniformly spaced around the pipe specimen.		Renumbered to paragraph 3.1(a)(1). No other changes.
(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".

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(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 I/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 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.		Moved, included in new paragraph 2.4 above after revision for consistency with detection distribution.
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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(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.
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).

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
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-S10-1. 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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
	(3) Flawed and unflawed grading units shall be randomly mixed.	Moved from old paragraph 2.1.
	(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).
(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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(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).

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(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.** 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 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 (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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
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 inch.		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).
	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.**	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.

SUPPLEMENT 10 - QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
	(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.**	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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TABLE VIII-S2-1
PERFORMANCE DEMONSTRATION DETECTION TEST ACCEPTANCE CRITERIA

Detection Test Acceptance Critera		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

South Carolina Electric & Gas Co. (SCE&G)
Virgil C. Summer Nuclear Station (VCSNS)
Relief Request

RR-II-20-Addenda

Subject:

In addition to the base relief requested, SCE&G requests that this qualification specific relief be allowed for examination of dissimilar metal welds referenced in the ASME Code, Section XI, Appendix VIII, Supplement 10.

South Carolina Electric and Gas has been informed by its inspection vendor that procedures were not capable of being completely qualified to the Appendix VIII, Supplement 10 through-wall RMS sizing value of less than or equal to 0.125" RMS, (Ref. Par 3.2). Additionally, applicable to the VCSNS reactor nozzle to primary piping dissimilar metal field welds, the procedure is fully qualified only for the detection and length sizing of circumferential flaws.

During the qualification process, the ultrasonic examiners concluded that transducer contact could not be maintained in certain areas of the specimen during scanning for axial defects. In the procedure performance summary issued by PDI, a limitation is noted for the detection of axial flaws in Supplement 10 field weld configurations.

Components:

ASME Code Class 1 - Reactor Vessel to Primary Piping Dissimilar Metal Field Welds.

Code Requirement:

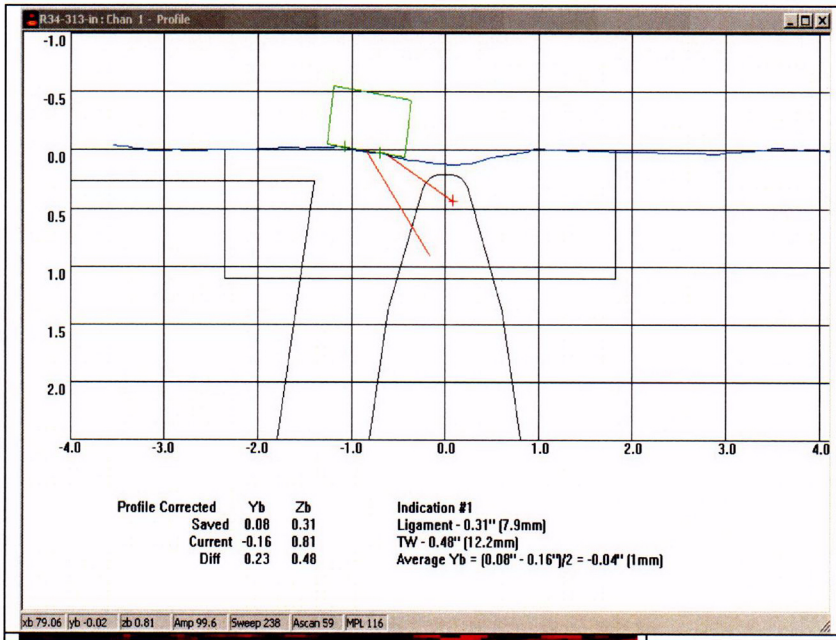
Procedures must be qualified to the Appendix VIII, Supplement 10 (Paragraph 3.2), sizing value of less than or equal to 1.25 inches RMS.

Alternative Approach/Basis for Relief:

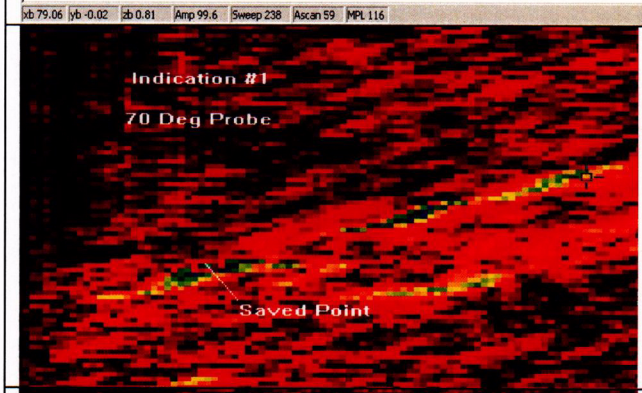
SCE&G proposes to evaluate the depth sizing performance of their selected vendor and determine the appropriate sizing error to consider during such flaw evaluations. SCE&G will consider the achieved performance of the vendor's procedure during evaluations of detected flaws. The difference between the achieved sizing error and the code required value of 0.125" RMS would be added to the size of flaws measured during the examination for the purpose of flaw evaluation. The vendor's achieved sizing error, in the PDI qualification process, will require the implementation of a 7.38% RMSP (root mean squared percentage) factor to be applied to all noted indications in the analysis process.

Additionally, as an alternative methodology to address the procedure detection limitation, the utility proposes to use advanced surface geometry profiling software to help the examiner confirm locations where the raw data indicates lack of transducer contact due to problematic surface geometry.

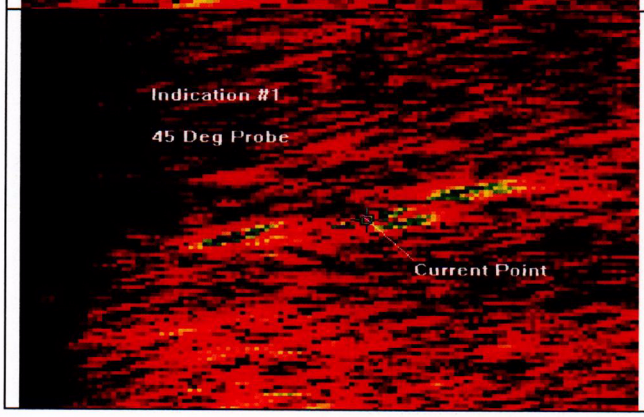
In this technique, a focused immersion transducers is positioned ahead of the transducer bundle on the examination array. This transducer location permits accurate profile data across the exam volume with minimal tilt and jitter from the array. In software this data is translated into a scale representation of the exam surface where specific points in the raw data can be imported as follows:



For Indication #1, the 70° probe data provided the best estimate of the upper planar flaw boundary and the 45° probe data provided the best estimate of the lower planar flaw boundary. Both points are shown in the beam plots in the Profile View and are documented (Yb and Zb positions) in the left table below the plot. The 'Diff' is the arithmetic difference between the 'Saved' and 'Current' coordinates. The 'Saved' Zb point is the ligament to the ID surface. The through-wall depth of the planar flaw is the 'Diff Zb'. The flaw location is the average between the 'Saved' and 'Current' positions.



The 70° probe data shows a target motion line at a depth shallower than the depth with the 45° probe data. Double left clicking on the mouse button with the cursor on the center of the target motion line displays the beam plot in the Profile View corrected for the ID surface contour. This point is then saved on the Profile View. The point is marked on the Profile View by an '+' and the corrected Yb and Zb coordinates are shown in the table below the beam plot as 'Saved'. This point is to be taken as the upper planar flaw boundary.

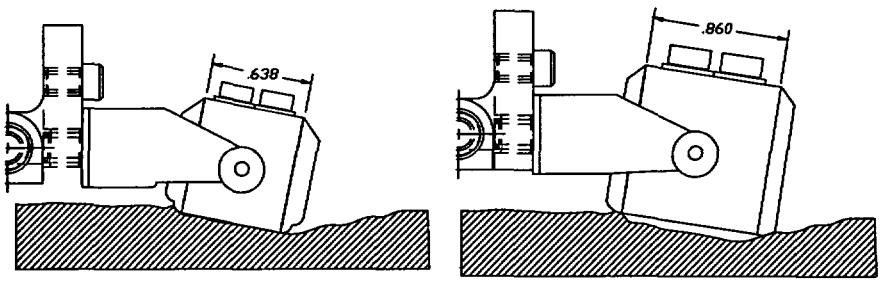


The 45° probe data shows a deeper target motion line indicative of the lower planar flaw boundary. Double left clicking on the mouse button with the cursor on the center of the target motion line displays the beam plot in the Profile View corrected for the ID surface contour. The point is marked as the end of the line emanating from the probe. The corrected Yb and Zb coordinates are shown in the table below the beam plot as 'Current'. This point is taken as the lower planar flaw boundary.

With this data the examiner can adjust flaw bounding dimensions, determine metal ligament if applicable and better judge if limitations apparent in the raw data can be supported by local surface profile data. This last feature is the more important capability of the process as it pertains directly to the anticipated surface geometry of the VCSNS primary loop DM welds. Procedures made specific to VCSNS will require the following:

1) Regular 22mm x 22mm transducers for detection of circumferential defects. This is the "standard technique" qualified for detection and length sizing. These transducers will also be used initially for axial defect scans.
2) 100% profiling of all nozzle to primary piping DM weld ID surfaces (Hot Leg and Cold Leg).
3) Evaluation of the raw data for transducer contact and profile data for supporting evidence.

The expected differences in transducer performance are illustrated:



.638" sq MINIATURE DETECTION AND SIZING TRANSDUCERS

.86" sq. STANDARD DETECTION AND SIZING TRANSDUCERS.

EXPECTED IMPROVEMENT IN SURFACE CONTACT: CW & CCW SCANS FOR AXIAL FLAWS.

Additionally SCE&G proposes to use Eddy Current examination techniques to interrogate the surface of the examination volume for all 6 primary loop DM field welds at V.C. Summer. Eddy current data will be used to provide assurance of detection of surface breaking defects in both circumferential and axial orientations and will serve to supplement the ultrasonic procedure in that regard. The eddy current probes are pencil-sized and spring loaded, allowing them to more closely follow the surface geometry of counter-bore, miss-match and root protrusions.

Eddy current acquisition techniques will be essentially the same as those used in the May 2002 examination according to procedure CGE-ISI-207-ET Revision 1. Two Plus-Point probes in the driver pickup mode are planned. The probes are oriented at 45 and 90 degrees for off-axis detection. The examination frequencies will be 100, 250 and 500 KHz. Acquisition will be conducted along with ultrasonic data at the ultrasonic exam increment distance of .125" axial or .080" circumferential; whichever is most beneficial for post exam data re-assembly.

The eddy current characterization criteria in this procedure were developed experimentally through investigations conducted on the V.C. Summer Alpha Loop dissimilar metal weld removed from service in 2000. From these investigations a minimum requirement of three successive "hits" or detections was decided upon as the identifying criteria for significant indications (at least 0.25" long). A correlation will be conducted between the eddy current and miniature ultrasonic probes in limited areas.

It is SCE&G's position that compensating for the flaw through-wall sizing error band in fracture mechanics evaluation and the procedure/equipment enhancements will assure detection will provide an acceptable margin of safety for the in-service examinations of V.C Summer reactor vessel nozzle to primary loop dissimilar metal field welds.

Implementation Schedule:

Implementation period will be from October 1, 2003 to October 1, 2006.

SCE&G requests that this relief be in effect for 36 months for VCSNS. During that time period, SCE&G will closely monitor industry progress for the examination of dissimilar metal welds. If the 0.125" RMS value cannot be achieved, SCE&G will re-apply for relief. It is expected that conclusions regarding capabilities versus criteria in this particular qualification category can be made during that time period.

South Carolina Electric & Gas Co. (SCE&G)
Virgil C. Summer Nuclear Station (VCSNS)
Relief Request

RR-II-21

Subject:

This relief request provides alternate requirements for Class 1 pressure retaining welds examinations from the inside surface of the reactor vessel required by Subsection IWA of ASME Code, Section XI, 1989 Edition (henceforth Section XI).

Components:

Class 1 Pressure Retaining Piping Welds examined from the inside surface of Pressurized Water Reactors using procedures, personnel, and equipment qualified to ASME Section XI, Appendix VIII, Supplement 2, 3, or 10 criteria.

Code Requirements:

Relief is requested from the qualification requirements for piping welds contained in Table VIII-3110-1 of Appendix VIII to ASME Section XI for:

A - Supplement 2 as applicable for Wrought Austenitic Piping Welds, and

B - Supplement 3 as applicable for Ferritic Piping Welds.

Relief Request:

Relief is requested to use the enclosed proposed alternative for implementation of Appendix VIII, Supplement 2 and 3 as coordinated with the proposed alternative for the Supplement 10 implementation program. **(Reference RR-II-20 for proposed relief to Supplement 10.)** The Performance Demonstration Initiative (PDI) will administer the alternative program.

Alternative Examination:

In lieu of the requirements of ASME Section XI, 1995 Edition, 1996 Addenda, Appendix VIII, Table VIII-3110-1, the PDI Program for implementation of Appendix VIII, Supplement 2 and 3 as coordinated with the alternative PDI Supplement 10 implementation program shall be used **(Reference RR-II-20 for proposed relief to Supplement 10.)** The PDI Program alternative is described in pages four through nine of this request.

Basis For Relief:

Depending upon the particular design, the nozzle to main coolant piping may be fabricated using ferritic, austenitic, or cast stainless components and assembled using ferritic, austenitic, or dissimilar metal welds. Additionally, differing combinations of these assemblies may be in close proximity, which typically means the same ultrasonic essential variables are used for each weld and the most challenging ultrasonic examination process is employed (e.g., the ultrasonic examination process associated with a dissimilar metal weld would be applied to a ferritic or austenitic weld. At V.C. Summer, the applicable weld joint is the reactor vessel nozzle to pipe dissimilar metal weld.

Separate qualifications to Supplements 2, 3, and 10 are redundant when done in accordance with the PDI Program. For example, during a personnel qualification to the PDI Program, the candidate would be exposed to a minimum of ten flawed grading units for each individual supplement. Personnel qualification to Supplements 2, 3, and 10 would therefore require a total of 30 flawed grading units. Test sets this large and tests of this duration are impractical. Additionally, a full procedure qualification (i.e. 3 personnel qualifications) to the PDI Program requirements would require 90 flawed grading units. This is particularly burdensome for a procedure that will use the same essential variables or the same criteria for selecting essential variables for all three supplements.

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

Additionally, the proposed alternative is more stringent than current Code requirements for a detection and length sizing qualification. For example, the current Code would allow a detection procedure, personnel, and equipment to be qualified to Supplement 10 with five flaws, Supplement 2 with five flaws, and Supplement 3 with five flaws, a total of only 15 flaws. The proposed alternative of qualifying Supplement 10 using ten flaws and adding on Supplement 2 with five flaws and Supplement 3 with three flaws results in a total of 18 flaws which will be multiplied by a factor of three for the procedure qualification.

Based on the above, the use of a limited number of Supplement 2 or 3 flaws is sufficient to access the capabilities of procedures and personnel who have already satisfied Supplement 10 requirements. 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 proposed alternative is consistent with other coordinated qualifications currently contained in Appendix VIII.

The proposed alternate program is attached and is identified as Supplement 14. It has been submitted to the ASME Code for consideration as new Supplement 14 to Appendix VIII and as of February 2002 has been approved by the Subcommittee on Nuclear Inservice Inspection.

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. Compliance with the proposed alternatives will provide an adequate level of quality and safety for examination of the affected welds.

Implementation Schedule:

Implementation period will be from October 1, 2003 to October 1, 2006.

SCE&G requests that this relief be in effect for 36 months for VCSNS.

SUPPLEMENT 14 - QUALIFICATION REQUIREMENTS FOR COORDINATED IMPLEMENTATION OF SUPPLEMENT 2, 3 AND 10 FOR PIPING EXAMINATIONS PERFORMED FROM THE INSIDE SURFACE	
Proposed Requirements	**Technical Basis**
1.0 SCOPE	
This Supplement is applicable to wrought austenitic, ferritic and dissimilar metal piping welds examined from the inside surface. This Supplement provides for expansion of Supplement 10 qualifications to permit coordinated qualification for Supplements 2 and 3.	There is currently no available Code action allowing for a coordinated implementation of the fundamental qualifications required for the typical examinations performed from the ID of PWR nozzles. Without this Code Case/Change, qualifications would require an excessive amount of flawed and unflawed grading units. This proposed supplement uses the more technically stringent Supplement 10 qualification as a base and then incorporates a limited number of Supplement 2 and Supplement 3 samples. This proposal is consistent with the philosophy of Supplement 12, the proposed changes to Supplement 10, and the approved changes to Supplement 2 and 11.
2.0 SPECIMEN REQUIREMENTS 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, access limitations). The same specimens may be used to demonstrate both detection and sizing qualification.	
2.1 General The specimen set shall conform to the following requirements:	
(a) Specimens shall have sufficient volume to minimize spurious reflections that may interfere with the interpretation process.	
(b) The specimen set shall include the minimum and maximum pipe diameters and thicknesses for which the examination procedure is applicable. Applicable	Tolerances are from the applicable Supplements because Supplement 2 and 3 dimensions and tolerances are typically based on wrought nominal pipe size that is

SUPPLEMENT 14 - QUALIFICATION REQUIREMENTS FOR COORDINATED IMPLEMENTATION OF SUPPLEMENT 2, 3 AND 10 FOR PIPING EXAMINATIONS PERFORMED FROM THE INSIDE SURFACE	
Proposed Requirements	**Technical Basis**
tolerances are provided in Supplements 2, 3, and 10.	not appropriate for DM welds that are typically associated with forged and machined safe ends.
(c) The specimen set shall include examples of the following fabrication conditions: (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, and weld repair areas); (2) typical limited scanning surface conditions (e.g., internal tapers, exposed weld roots, and cladding conditions).	
2.2 Supplement 2 Flaws (a) At least 70% of the flaws shall be cracks, the remainder shall be alternative flaws. (b) Specimens with IGSCC shall be used when available. (c) Alternative flaws, if used, shall provide crack-like reflective characteristics and shall comply with the following: (1) Alternative flaws shall be used only when implantation of cracks produces spurious reflectors that are uncharacteristic of service-induced flaws. (2) Alternative flaws shall have a tip width of less than or equal to 0.002 in. (0.05 mm).	
2.3 Supplement 3 Flaws Supplement 3 flaws shall be mechanical or thermal fatigue cracks.	
2.4 Distribution The specimen set shall contain a representative distribution of flaws. Flawed and unflawed grading units shall be randomly mixed.	Since the number of flaws will be limited words such as "uniform distribution" could lead to testmanship and are considered inappropriate.

SUPPLEMENT 14 - QUALIFICATION REQUIREMENTS FOR COORDINATED IMPLEMENTATION OF SUPPLEMENT 2, 3 AND 10 FOR PIPING EXAMINATIONS PERFORMED FROM THE INSIDE SURFACE	
Proposed Requirements	**Technical Basis**
3.0 PERFORMANCE DEMONSTRATION	
Personnel and procedure performance demonstration tests shall be conducted according to the following requirements. (a) The same essential variable values, or, when appropriate, the same criteria for selecting values as demonstrated in Supplement 10 shall be used. (b) The flaw location and specimen identification shall be obscured to maintain a "blind test". (c) 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.	
3.1 Detection Test	
(a) The specimen set for Supplement 2 qualification shall include at least five flawed grading units and ten unflawed grading units in austenitic piping. A maximum of one flaw shall be oriented axially.	
(b) The specimen set for Supplement 3 qualification shall include at least three flawed grading units and six unflawed grading units in ferritic piping. A maximum of one flaw shall be oriented axially.	
(c) Specimens shall be divided into grading units. (1) Each grading unit shall include at least 3 in. (76 mm) of weld length. (2) 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. (76 mm) in length.	

SUPPLEMENT 14 - QUALIFICATION REQUIREMENTS FOR COORDINATED IMPLEMENTATION OF SUPPLEMENT 2, 3 AND 10 FOR PIPING EXAMINATIONS PERFORMED FROM THE INSIDE SURFACE	
Proposed Requirements	**Technical Basis**
(3) The segment of weld length used in one grading unit shall not be used in another grading unit. (4) Grading units need not be uniformly spaced around the pipe specimen.	
(d) All grading units shall be correctly identified as being either flawed or unflawed.	
3.2 Length-sizing Test	
(a) The coordinated implementation shall include the following requirements for personnel length sizing qualification.	
(b) The specimen set for Supplement 2 qualification shall include at least four flaws in austenitic material.	Axial flaws are not length sized in Supplement 2.
(c) The specimen set for Supplement 3 qualification shall include at least three flaws in ferritic material.	
(d) Each reported circumferential flaw in the detection test shall be length sized. When only length-sizing is being tested, 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.	
(e) Supplement 2 or Supplement 3 examination procedures, equipment, and personnel are qualified for length-sizing when the flaw lengths estimated by ultrasonics, as compared with the true lengths, do not exceed 0.75 in. (19 mm) RMS, when they are combined with a successful Supplement 10 qualification.	
3.3 Depth-sizing Test	
The coordinated implementation shall include the following requirements for	

SUPPLEMENT 14 - QUALIFICATION REQUIREMENTS FOR COORDINATED IMPLEMENTATION OF SUPPLEMENT 2, 3 AND 10 FOR PIPING EXAMINATIONS PERFORMED FROM THE INSIDE SURFACE	
Proposed Requirements	**Technical Basis**
personnel depth-sizing qualification.	
(a) The specimen set for Supplement 2 qualification shall include at least four circumferentially oriented flaws in austenitic material.	Axial flaws are not depth sized in Supplement 2.
(b) The specimen set for Supplement 3 qualification shall include at least three flaws in ferritic material.	
(c) 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 depth of the flaw in each region.	
(d) Supplement 2 or Supplement 3 examination procedures, equipment, and personnel are qualified for depth-sizing when the flaw depths estimated by ultrasonics, as compared with the true depths, do not exceed 0.125 in. (3 mm) RMS, when they are combined with a successful Supplement 10 qualification.	
4.0 PROCEDURE QUALIFICATION	
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 3.1, 3.2, and 3.3.	

SUPPLEMENT 14 - QUALIFICATION REQUIREMENTS FOR COORDINATED IMPLEMENTATION OF SUPPLEMENT 2, 3 AND 10 FOR PIPING EXAMINATIONS PERFORMED FROM THE INSIDE SURFACE	
Proposed Requirements	**Technical Basis**
(c) At least one successful personnel demonstration shall be performed. (d) To qualify new values of essential variables, at least one personnel performance demonstration is required. The acceptance criteria of 4.0(b) shall be met.	