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U. S. Nuclear Regulatory Commission

ATTN: Document Control Desk

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BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324/LICENSE NOS. DPR-71 AND DPR-62
RESPONSE TO REQUEST FOR INFORMATION REGARDING THIRD 10-YEAR
INSERVICE INSPECTION PROGRAM RELIEF REQUEST FOR INSPECTION OF
PIPING WELD OVERLAYS (NRC TAC NOS. MB5631 AND MB5632)

Ladies and Gentlemen:

By letter dated July 16, 2002 (i.e., Serial: BSEP 02-0119), Progress Energy Carolinas, Inc. (i.e., Carolina Power & Light Company) submitted a request for relief for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The request involves relief from certain requirements of American Society of Mechanical Engineers (ASME) Code, Section XI, Appendix VIII, Supplement 11, regarding qualification requirements for inspecting piping weld overlays using ultrasonic testing (UT). The requested relief is applicable to the third 10-year interval Inservice Inspection (ISI) Program.

In a telephone discussion on December 17, 2002, the NRC requested that Progress Energy Carolinas, Inc. provide additional information regarding the relief request. Specifically, the NRC requested that Progress Energy Carolinas, Inc. address the same questions referenced in an October 4, 2002, letter submitted by the Southern Nuclear Operating Company (SNC) for the Edwin I. Hatch Nuclear Plant (i.e., ADAMS Accession Number ML0228200260). The Electric Power Research Institute (EPRI) assisted SNC with the responses to those questions by coordinating with the Performance Demonstration Initiative (PDI) representatives. The Progress Energy Carolinas, Inc.'s responses to these same NRC questions are provided in Enclosure 1. Progress Energy Carolinas, Inc.'s July 16, 2002, letter included a comparison of the ASME Code, Section XI, Appendix VIII, Supplement 11 to both ASME Code Case N-653 and the EPRI PDI alternative. Enclosure 2 provides an updated version of this comparison using the revised PDI alternative.

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Please refer any questions regarding this submittal to Mr. Leonard R. Beller, Supervisor - Licensing/Regulatory Programs, at (910) 457-2073.

Sincerely,



Edward T. O'Neil
Manager - Support Services
Brunswick Steam Electric Plant

WRM/wrm

Enclosures:

1. Response to Request for Additional Information
2. Revised Comparison of the ASME Code, Section XI, Supplement 11 to ASME Code Case N-653 and the EPRI PDI Program Alternative

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Response to Request for Additional Information

By letter dated July 16, 2002 (i.e., Serial: BSEP 02-0119), Progress Energy Carolinas, Inc. (i.e., Carolina Power & Light Company) submitted a request for relief for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The request involves relief from certain requirements of American Society of Mechanical Engineers (ASME) Code, Section XI, Appendix VIII, Supplement 11, regarding qualification requirements for inspecting piping weld overlays using ultrasonic testing (UT). The requested relief is applicable to the third 10-year interval Inservice Inspection (ISI) Program.

In a telephone discussion on December 17, 2002, the NRC requested that Progress Energy Carolinas, Inc. provide additional information regarding the relief request. Specifically, the NRC requested that Progress Energy Carolinas, Inc. address the same questions referenced in an October 4, 2002, letter submitted by the Southern Nuclear Operating Company (SNC) for the Edwin I. Hatch Nuclear Plant (i.e., ADAMS Accession Number ML0228200260). The Electric Power Research Institute (EPRI) assisted SNC with the responses to those questions by coordinating with the Performance Demonstration Initiative (PDI) representatives. The following are Progress Energy Carolinas, Inc.'s responses to these NRC questions, for BSEP, Units 1 and 2.

NRC Question 1

Item 1.1(b) - This item concerns the maximum thickness for which a procedure may be qualified. The appendix VIII position is that qualification for the range of overlay thickness is valid when at least one specimen is used whose overlay thickness is within -0.10 inch to +0.25 inch of the maximum nominal overlay thickness for which the procedure is applicable. The PDI program implies that qualification may be performed on any specimens that are greater than -0.25 inches of the maximum overlay for the procedure. This appears to be a relaxation of requirements. Please provide a justification.

Response

The PDI has made the following clarification to the PDI Program alternative:

The specimen set shall include specimens with overlays not thicker than 0.1 inch more than the minimum thickness nor thinner than 0.25 inch of the maximum nominal overlay thickness for which the examination procedure is applicable.

According to the PDI, their intent has always been to provide an allowance to examine overlays that were slightly larger than the maximum that was qualified. Also, according to the PDI, the Appendix VIII Committee concluded that 0.25 inch was adequate and any deviation greater than

that would require additional qualification. Progress Energy Carolinas, Inc. agrees with the PDI clarification and will adopt the change made to the PDI Program alternative.

NRC Question 2

Item 1.1(d)(1)(a) - In Appendix VIII, it is stated that all flaws must be cracks and IGSCC when available. In Code Case N-653 there is an opportunity to use alternative flaws when implantation of cracks precludes obtaining a realistic UT response. It is unclear what a "realistic" UT response may encompass. Also, in the PDI program, the wording has been changed to "precludes obtaining an effective UT response." This is also unclear. Please provide the actions you propose to implement in this area.

Response

The PDI has made the following clarification to the PDI Program alternative:

- (a) The use of alternative flaws shall be limited to when the implantation of cracks produces spurious reflectors that are uncharacteristic of actual flaws.

Progress Energy Carolinas, Inc. agrees with the PDI clarification and will adopt the change made to the PDI Program alternative.

NRC Question 3

Items 1.1(e)(2)(a)(1) and (b)(1) - The PDI program states that grading units must be at least 1 inch. There needs to be additional clarification as to the directions of the length and width of the grading units and whether they will all be the same size.

Response

The PDI has made the following clarification to the PDI Program alternative:

- (a)(1) The base metal grading unit includes the overlay material and outer 25% of the overlaid weld. The base metal grading unit shall extend circumferentially for at least 1 inch and shall start at the weld centerline and be wide enough in the axial direction to encompass one half of the original weld crown and a minimum of 0.50 inches of the adjacent base material.

According to the PDI, base material flaws are located in the base material contained within the original weld heat affected zone. Because the width of the weld crown and heat affected zone vary from pipe to pipe, latitude must be given in the Code to allow the user to vary the width of the grading units. Therefore, the PDI has concluded that the words provided above allow

sufficient latitude. Progress Energy Carolinas, Inc. agrees with the PDI clarification and will adopt the changes made to the PDI Program alternative.

NRC Question 4

Item 2.3 - The candidate shall determine the maximum depth of the flaw in each grading unit, as stated in both the Code Case and the PDI program. It is not clear as to what the candidate must do. The term grading unit has been associated with some surface area. Will the candidate be provided with a template and told to size the largest flaw in a surface area? Or on a volume? Clarification is required.

Response

The PDI has made the following clarification to the PDI Program alternative:

2.3 Depth Sizing Test

- (a) The depth sizing test may be conducted separately or in conjunction with the detection test.
- (b) When the depth sizing test is conducted in conjunction with the detection test and the detected flaws do not satisfy the requirements of 1.1(f), additional specimens shall be provided to the candidate. The regions 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.
- (c) For a separate depth sizing test, 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.

Grading units are not associated with length or depth sizing. Candidates are instructed to find the maximum flaw height in a specific region of the sample. The region is large enough to encompass the flaw to be sized but small enough that they do not size the wrong flaw. Progress Energy Carolinas, Inc. agrees with the PDI clarification and will adopt the changes made to the PDI Program alternative.

NRC Question 5

Item 3.1 - Appendix VIII calls for procedures, personnel, and equipment to meet the acceptance criteria in Table VIII-S2-1 for both detection and false calls. The Code Case and the PDI program break-out procedure qualification separately and state that all flaws must be detected (by each inspector or in sum for all those qualifying the procedure) and must satisfy the

acceptance criteria of Table VIII-S2-1 for false calls. This is unclear and very ambiguous. Does each inspector have to pass the detection test? How many inspectors are needed to qualify a procedure? How many test sets must be inspected and to what level of performance? Why is this wording different than the wording for the draft code case (BC01-150, ISO 01-03) Supplement 4, 1.0(g) "For initial procedure qualification, the detection set shall include the equivalent of three personnel qualification sets (and the performance demonstration must detect all flaws and not exceed the false calls in Table VIII-S2-1.) To qualify new values of essential variables, at least one personnel qualification set is required."

Response

The PDI has made the following clarification to the PDI Program alternative:

3.1 Detection Acceptance Criteria

- (a) Examination procedures are qualified for detection when:
 - (1) All flaws within the scope of the procedure are detected and the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for false calls.
 - (2) At least one successful personnel demonstration has been performed meeting the acceptance criteria defined in (b).
- (b) Examination 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.
- (c) The criteria in (a), (b) shall be satisfied separately by the demonstration results for base metal grading units and for overlay fabrication grading units.

The three times procedure qualification requirements identified above are in addition to the ASME Code; a request for relief is not required for its use. Except as noted elsewhere in the request for relief (e.g., alternative flaws, etc.), the proposed PDI Program alternative for personnel and equipment qualifications is identical to and in full compliance with the current Code requirements for procedures, personnel, and equipment.

Progress Energy Carolinas, Inc. agrees with the PDI clarification and will adopt the changes made to the PDI Program alternative.

NRC Question 6

Item 3.2(a) the RMS error of the flaw length measurements, as compared to the true flaw lengths, is less than or equal to 0.75 inch. With the minimum grading unit length being 1.0 inch circumferential, examiners could potentially use this information to satisfy the length sizing criteria, i.e., for a 1.0 inch circumferential grading unit, a sized length of 0.5 inch will always satisfy the RMS no matter what the true length. Please explain how this will be avoided.

Response

The PDI has made the following clarification to the PDI Program alternative:

(1.1)(f)(1) Sizing Specimens

- (1) The minimum number of flaws shall be ten. At least 30% of the flaws shall be overlay fabrication flaws. At least 40% of the flaws shall be open to the inside surface. Sizing sets shall contain a distribution of flaw dimensions to assess sizing capabilities. For initial procedure qualification, sizing sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.

Grading units are not associated with length or depth sizing. Flawed grading units are a minimum of one inch, but the flaw can be shorter than the size of the grading unit. For flaws greater than one inch, the grading unit includes the entire flaw. The examination contains many flaws greater than 3 or 4 inches long. The inclusion of too much detail on the minimum and maximum size of the flaws could encourage testmanship, not stop it. Progress Energy Carolinas, Inc. agrees with the PDI clarification and will adopt the changes made to the PDI Program alternative.

Revised Comparison of the ASME Code, Section XI, Supplement 11 to ASME Code Case N-653 and the EPRI PDI Program Alternative		
American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11	ASME Code Case N-653 (Provided for Information Only)	Performance Demonstration Initiative Program
1.0 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, weld joint configuration, access limitations). The same specimens may be used to demonstrate both detection and sizing qualification.	No Change	No Change
1.1 General. The specimen set shall conform to the following requirements.	No Change	No Change
(a) Specimens shall have sufficient volume to minimize spurious reflections that may interfere with the interpretation process.	No Change	No Change
(b) The specimen set shall consist of at least three specimens having different nominal pipe diameters and overlay thicknesses. They shall include the minimum and maximum	No Change	(b) The specimen set shall consist of at least three specimens having different nominal pipe diameters and overlay thicknesses. They shall include the minimum and maximum

**Revised Comparison of the ASME Code, Section XI, Supplement 11
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American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11	ASME Code Case N-653 (Provided for Information Only)	Performance Demonstration Initiative Program
<p>nominal pipe diameters 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. If the procedure is applicable to pipe diameters of 24 inch or larger, the specimen set must include at least one specimen 24 inch or larger but need not include the maximum diameter. The specimen set must include at least one specimen with overlay thickness within -0.1 inch to +0.25 inch of the maximum nominal overlay thickness for which the procedure is applicable.</p>		<p>nominal pipe diameters 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. If the procedure is applicable to pipe diameters of 24 inch or larger, the specimen set must include at least one specimen 24 inch or larger but need not include the maximum diameter. The specimen set shall include specimens with overlays not thicker than 0.1 inch more than the minimum thickness nor thinner than 0.25 inch of the maximum nominal overlay thickness for which the examination procedure is applicable.</p>
<p>(c) The surface condition of at least two specimens shall approximate the roughest surface condition for which the examination procedure is applicable.</p>	<p align="center">No Change</p>	<p align="center">No Change</p>

**Revised Comparison of the ASME Code, Section XI, Supplement 11
 to ASME Code Case N-653 and the EPRI PDI Program Alternative**

<p align="center">American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11</p>	<p align="center">ASME Code Case N-653 (Provided for Information Only)</p>	<p align="center">Performance Demonstration Initiative Program</p>
<p>(d) Flaw Conditions</p>		
<p>(1) Base metal flaws. All flaws must be cracks in or near the butt weld heat-affected zone, open to the inside surface, and extending at least 75% through the base metal wall. Flaws may extend 100% through the base metal and into the overlay material; in this case, intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the cracking. Specimens containing IGSCC shall be used when available.</p>	<p>(1) Base metal flaws. All flaws must be in or near the butt weld heat-affected zone, open to the inside surface, and extending at least 75 percent through the base metal wall. Intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the cracking. Specimens containing IGSCC shall be used when available. At least 70 percent of the flaws in the detection and sizing tests shall be cracks. Alternative flaw mechanisms, if used, shall provide crack-like reflective characteristics and shall be limited by the following:</p> <p>(a) Flaws shall be limited to when implantation of cracks precludes obtaining a realistic ultrasonic response.</p> <p>(b) Flaws shall be semi-elliptical with a tip width of less than or equal to 0.002 inches.</p>	<p>(1) Base metal flaws. All flaws must be in or near the butt weld heat-affected zone, open to the inside surface, and extending at least 75 percent through the base metal wall. Intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the base metal flaws. Specimens containing IGSCC shall be used when available. At least 70 percent of the flaws in the detection and sizing tests shall be cracks and the remainder shall be alternative flaws. Alternative flaw mechanisms, if used, shall provide crack-like reflective characteristics and shall be limited by the following:</p> <p>(a) The use of alternative flaws shall be limited to when the implantation of cracks produces spurious reflectors that are uncharacteristic of actual flaws.</p>

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American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11	ASME Code Case N-653 (Provided for Information Only)	Performance Demonstration Initiative Program
		(b) Flaws shall be semi-elliptical with a tip width of less than or equal to 0.002 inches.
(2) <i>Overlay fabrication flaws.</i> At least 40% of the flaws shall be non-crack fabrication flaws (e.g., sidewall lack of fusion or laminar lack of bond) in the overlay or the pipe-to-overlay interface. At least 20% of the flaws shall be cracks. The balance of the flaws shall be of either type.	No Change	No Change
(e) <i>Detection Specimens</i>		
(1) At least 20% but less than 40% of the flaws shall be oriented within ± 20 deg. of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access. The rules of IWA-3300 shall be used to determine whether closely spaced flaws should be treated as single or multiple flaws.	(1) At least 20% but less than 40% of the base metal flaws shall be oriented within ± 20 deg. of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access.	(1) At least 20% but less than 40% of the base metal flaws shall be oriented within ± 20 deg. of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access.

**Revised Comparison of the ASME Code, Section XI, Supplement 11
 to ASME Code Case N-653 and the EPRI PDI Program Alternative**

American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11	ASME Code Case N-653 (Provided for Information Only)	Performance Demonstration Initiative Program
<p>(2) Specimens shall be divided into base and over-lay grading units. Each specimen shall contain one or both types of grading units.</p>	<p>(2) Specimens shall be divided into base metal and overlay fabrication grading units. Each specimen shall contain one or both types of grading units. Flaws shall not interfere with ultrasonic detection or characterization of other flaws.</p>	<p>(2) Specimens shall be divided into base metal and overlay fabrication grading units. Each specimen shall contain one or both types of grading units. Flaws shall not interfere with ultrasonic detection or characterization of other flaws.</p>
<p>(a)(1) A base grading unit shall include at least 3 in. of the length of the overlaid weld. The base grading unit includes the outer 25% of the overlaid weld and base metal on both sides. The base grading unit shall not include the inner 75% of the overlaid weld and base metal overlay material, or base metal-to-overlay interface.</p>	<p>(a)(1) A base metal grading unit shall include at least 1 in. of the length of the overlaid weld. The base metal grading unit includes the outer 25% of the overlaid weld and base metal on both sides. The base metal grading unit shall not include the inner 75% of the overlaid weld and base metal overlay material, or base metal-to-overlay interface.</p>	<p>(a)(1) The base metal grading unit includes the overlay material and outer 25% of the overlaid weld. The base metal grading unit shall extend circumferentially for at least 1 inch and shall start at the weld centerline and be wide enough in the axial direction to encompass one half of the original weld crown and a minimum of 0.50 inches of the adjacent base material.</p>
<p>(a)(2) When base metal cracking penetrates into the overlay material, the base grading unit shall include the overlay metal within 1 in. of the crack location. This portion of the overlay material shall not be used as part of</p>	<p>(a)(2) When base metal cracking penetrates into the overlay material, the base metal grading unit shall not be used as part of any overlay fabrication grading unit.</p>	<p>(a)(2) When base metal flaws penetrate into the overlay material, the base metal grading unit shall not be used as part of any overlay fabrication grading unit.</p>

Revised Comparison of the ASME Code, Section XI, Supplement 11 to ASME Code Case N-653 and the EPRI PDI Program Alternative		
American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11	ASME Code Case N-653 (Provided for Information Only)	Performance Demonstration Initiative Program
any overlay grading unit.		
(a)(3) When a base grading unit is designed to be unflawed, at least 1 in. of unflawed overlaid weld and base metal shall exist on either side of the base grading unit. The segment of weld length used in one base grading unit shall not be used in another base grading unit. Base grading units need not be uniformly spaced around the specimen.	(a)(3) Sufficient unflawed overlaid weld and base metal shall exist on all sides of the grading unit to preclude interfering reflections from adjacent flaws.	(a)(3) Sufficient unflawed overlaid weld and base metal shall exist on all sides of the grading unit to preclude interfering reflections from adjacent flaws.
(b)(1) An overlay grading unit shall include the overlay material and the base metal-to-overlay interface of at least 6 sq. in. The overlay grading unit shall be rectangular, with minimum dimensions of 2 inch.	(b)(1) An overlay fabrication grading unit shall include the overlay material and the base metal-to-overlay interface for a length of at least 1 inch.	(b)(1) An overlay fabrication grading unit shall include the overlay material and the base metal-to-overlay interface for a length of at least 1 inch.
(b)(2) An overlay grading unit designed to be unflawed shall be surrounded by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 in. around its entire perimeter. The specific area used in	(b)(2) Overlay fabrication grading units designed to be unflawed shall be separated by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 in. at both ends. Sufficient unflawed overlaid weld	(b)(2) Overlay fabrication grading units designed to be unflawed shall be separated by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 in. at both ends. Sufficient unflawed overlaid weld

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 to ASME Code Case N-653 and the EPRI PDI Program Alternative**

<p align="center">American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11</p>	<p align="center">ASME Code Case N-653 (Provided for Information Only)</p>	<p align="center">Performance Demonstration Initiative Program</p>
<p>one overlay grading unit shall not be used in another overlay grading unit. Overlay grading units need not be spaced uniformly about the specimen.</p>	<p>and base metal shall exist on both sides of the overlay fabrication grading unit to preclude interfering reflections from adjacent flaws. The specific area used in one overlay fabrication grading unit shall not be used in another overlay fabrication grading unit. Overlay fabrication grading units need not be spaced uniformly about the specimen.</p>	<p>and base metal shall exist on both sides of the overlay fabrication grading unit to preclude interfering reflections from adjacent flaws. The specific area used in one overlay fabrication grading unit shall not be used in another overlay fabrication grading unit. Overlay fabrication grading units need not be spaced uniformly about the specimen.</p>
<p>(b)(3) Detection sets shall be selected from Table VIII-S2-1. The minimum detection sample set is five flawed base grading units, ten unflawed base grading units, five flawed overlay grading units, and ten unflawed overlay grading units. For each type of grading unit, the set shall contain at least twice as many unflawed as flawed grading units.</p>	<p>(b)(3) Detection sets shall be selected from Table VIII-S2-1. The minimum detection sample set is five flawed base metal grading units, ten unflawed base metal grading units, five flawed overlay fabrication grading units, and ten unflawed overlay fabrication grading units. For each type of grading unit, the set shall contain at least twice as many unflawed as flawed grading units. For initial procedure qualification, detection sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification</p>	<p>(b)(3) Detection sets shall be selected from Table VIII-S2-1. The minimum detection sample set is five flawed base metal grading units, ten unflawed base metal grading units, five flawed overlay fabrication grading units, and ten unflawed overlay fabrication grading units. For each type of grading unit, the set shall contain at least twice as many unflawed as flawed grading units. For initial procedure qualification, detection sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification</p>

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American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11	ASME Code Case N-653 (Provided for Information Only)	Performance Demonstration Initiative Program
	set is required.	set is required.
<i>(f) Sizing Specimen</i>		
(1) The minimum number of flaws shall be ten. At least 30% of the flaws shall be overlay fabrication flaws. At least 40% of the flaws shall be cracks open to the inside surface.	(1) The minimum number of flaws shall be ten. At least 30% of the flaws shall be overlay fabrication flaws. At least 40% of the flaws shall be cracks open to the inside surface. For initial procedure qualification, sizing sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.	(1) The minimum number of flaws shall be ten. At least 30% of the flaws shall be overlay fabrication flaws. At least 40% of the flaws shall be open to the inside surface. Sizing sets shall contain a distribution of flaw dimensions to assess sizing capabilities. For initial procedure qualification, sizing sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.
(2) At least 20% but less than 40% of the flaws shall be oriented axially. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access.	No Change	No Change

Revised Comparison of the ASME Code, Section XI, Supplement 11 to ASME Code Case N-653 and the EPRI PDI Program Alternative		
American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11	ASME Code Case N-653 (Provided for Information Only)	Performance Demonstration Initiative Program
(3) Base metal cracking used for length sizing demonstrations shall be oriented circumferentially.	No Change	(3) Base metal flaws used for length sizing demonstrations shall be oriented circumferentially.
(4) Depth sizing specimen sets shall include at least two distinct locations where cracking in the base metal extends into the overlay material by at least 0.1 inch in the through-wall direction.	No Change	(4) Depth sizing specimen sets shall include at least two distinct locations where a base metal flaw extend into the overlay material by at least 0.1 inch in the through-wall direction.
2.0 CONDUCT OF PERFORMANCE DEMONSTRATION		
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.	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. The overlay fabrication flaw test	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. The overlay fabrication flaw test

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American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11	ASME Code Case N-653 (Provided for Information Only)	Performance Demonstration Initiative Program
	and the base metal flaw test may be performed separately.	and the base metal flaw test may be performed separately.
2.1 Detection Test.		
Flawed and unflawed grading units shall be randomly mixed. Although the boundaries of specific grading units shall not be revealed to the candidate, the candidate shall be made aware of the type or types of grading units (base or overlay) that are present for each specimen.	Flawed and unflawed grading units shall be randomly mixed. Although the boundaries of specific grading units shall not be revealed to the candidate, the candidate shall be made aware of the type or types of grading units (base metal or overlay fabrication) that are present for each specimen.	Flawed and unflawed grading units shall be randomly mixed. Although the boundaries of specific grading units shall not be revealed to the candidate, the candidate shall be made aware of the type or types of grading units (base metal or overlay fabrication) that are present for each specimen.
2.2 Length Sizing Test		
(a) The length sizing test may be conducted separately or in conjunction with the detection test.	No Change	No Change
(b) When the length sizing test is conducted in conjunction with the detection test and the detected flaws do not satisfy the requirements of 1.1(f), additional specimens shall be	No Change	No Change

Revised Comparison of the ASME Code, Section XI, Supplement 11 to ASME Code Case N-653 and the EPRI PDI Program Alternative		
American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11	ASME Code Case N-653 (Provided for Information Only)	Performance Demonstration Initiative Program
provided to the candidate. 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.		
(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.	No Change	No Change
(d) For flaws in base grading units, the candidate shall estimate the length of that part of the flaw that is in the outer 25% of the base wall thickness.	(d) For flaws in base metal grading units, the candidate shall estimate the length of that part of the flaw that is in the outer 25% of the base metal wall thickness.	(d) For flaws in base metal grading units, the candidate shall estimate the length of that part of the flaw that is in the outer 25% of the base metal wall thickness.
2.3 Depth Sizing Test.		
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. For the remaining flaws, the	The candidate shall determine the depth of the flaw in each region.	(a) The depth sizing test may be conducted separately or in conjunction with the detection test.

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American Society of Mechanical Engineers (ASME) Code, Section XI, Supplement 11	ASME Code Case N-653 (Provided for Information Only)	Performance Demonstration Initiative Program
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 the detected flaws do not satisfy the requirements of 1.1(f), additional specimens shall be provided to the candidate. The regions 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.
		(c) For a separate depth sizing test, 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.

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3.0 ACCEPTANCE CRITERIA		
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. The criteria shall be satisfied separately by the demonstration results for base grading units and for overlay grading units.	Examination procedures are qualified for detection when all flaws within the scope of the procedure are detected and the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for false calls. Examination 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. The criteria shall be satisfied separately by the demonstration results for base metal grading units and for overlay fabrication grading units.	(a) Examination procedures are qualified for detection when;
		(1) All flaws within the scope of the procedure are detected and the results of the performance demonstration satisfy the

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		acceptance criteria of Table VIII-S2-1 for false calls.
		(2) At least one successful personnel demonstration has been performed meeting the acceptance criteria defined in (b).
		(b) Examination 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.
		(c) The criteria in (a), (b) shall be satisfied separately by the demonstration results for base metal grading units and for overlay fabrication grading units.
3.2 Sizing Acceptance Criteria.		
Examination procedures, equipment, and personnel are qualified for sizing when the	No Change	No Change

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results of the performance demonstration satisfy the following criteria.		
<i>(a)</i> The RMS error of the flaw length measurements, as compared to the true flaw lengths, is less than or equal to 0.75 inch. The length of base metal cracking is measured at the 75% through-base-metal position.	No Change	<i>(a)</i> The RMS error of the flaw length measurements, as compared to the true flaw lengths, is less than or equal to 0.75 inch. The length of base metal flaws is measured at the 75% through-base-metal position.
<i>(b)</i> All extensions of base metal cracking into the overlay material by at least 0.1 inch are reported as being intrusions into the overlay material.	This requirement is omitted.	This requirement is omitted.
<i>(c)</i> The RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 inch.	<i>(b)</i> The RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 inch.	<i>(b)</i> The RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 inch.

Changes shown in **bold**.