

Enclosure 3
Staff Responses to Public Comments on Draft Regulatory Guide DG-1167
(Proposed Revision 1 of Regulatory Guide 1.71)

Comments			NRC Comment Resolution
Originator	DG-1167 Section	Specific Comments	
<p>Nuclear Energy Institute (NEI) 12/08/2006 letter (ML063470344)</p>	<p>General (comment 1)</p>	<p>“The proposed Regulatory Guide is very vague and the industry believes that this additional guidance could have a significant impact on the cost of performing repair and replacement activities while not providing appreciable improvement in public safety. Revision 1 of Regulatory Guide 1.71 applies to welder qualification and has no bearing on the examination requirements and acceptance criteria for welds regardless of accessibility. Thus, all welds are examined in accordance with the appropriate ASME Code rules to ensure quality that are endorsed by NRC in 10CFR50.55a.”</p> <p>NEI Recommendation: None</p>	<p>Maintaining the integrity of welds in nuclear power plants helps to ensure public safety. Welding performance and procedure qualifications in conjunction with nondestructive examination (NDE) are required as part of a welding program to better ensure the integrity of welds. Experience in the shipbuilding, petroleum, and chemical industries has shown increases in weld quality from welder qualification testing under simulated position, access, and visibility limitations. Experience has also shown that the probability of detecting weld flaws using NDE is less than 100% and that reducing the number of weld repairs through better control of the welding process may result in increased weld quality. Section IX, “Welding and Brazing Qualifications,” of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code does not address the issue of limited welder accessibility. Regulatory Guide (RG) 1.71, “Welder Qualification for Areas of Limited Accessibility,” addresses welder qualification for areas of limited accessibility to better ensure the integrity of welds.</p>
<p>NEI</p>	<p>General (comment 2)</p>	<p>“Revision 1 of Regulatory Guide 1.71 would have limited bearing on current plants but would be an issue for future plants due to current FSAR commitments pursuant to Draft Regulatory Guide 1145 ‘<i>Combined License Applications for Nuclear Power Plants</i>’ Section C.I.5. Few current licensees have committed to RG 1.71 although it has been in place since 1973.”</p> <p>NEI Recommendation: None</p>	<p>This guide describes a method that the NRC staff considers acceptable for implementing the agency’s requirements regarding the control of welding for nuclear components.</p>

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NEI	General (comment 3)	<p>“In light of modifications to Section III of the ASME code, (specifically section 4622.9) the industry believes that this issue is suitably addressed in the ASME code and a separate Regulatory Guide on this topic is unnecessary. Consistent with Public Law 104-113, ‘<i>National Technology Transfer and Advancement Act of 1995</i>’, Section 12-d, NEI recommends NRC utilize consensus technical standards in lieu of regulatory guidance.”</p> <p>NEI Recommendation: “...NEI recommends NRC utilize consensus technical standards in lieu of regulatory guidance.”</p>	<p>Section III of the ASME Boiler and Pressure Vessel Code, “Rules for Construction of Nuclear Facility Components,” paragraph NB-4622.9(i), does require simulated accessibility conditions for welder qualification, but only for temper bead welding. The issue of limited welder accessibility is not addressed in the ASME Boiler and Pressure Vessel Code, Section IX. The NRC meets all of the requirements and intentions of Public Law 104-113 with respect to welding codes and standards by endorsement of consensus technical standards (i.e., the ASME Boiler and Pressure Vessel Code) in Title 10, Section 50.55a, of the <i>Code of Federal Regulations</i> (10 CFR 50.55a). RG 1.71 describes a method that the NRC staff considers acceptable for implementing the agency’s requirements contained in 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities.”</p>
NEI	General (comment 4)	<p>“This Regulatory Guide applies only to low alloy steel, high alloy steel, nickel based alloy base metals, in wrought or cast forms, and dissimilar metal welds. However, the wording of the first sentence is confusing and leads the reader to believe that perhaps plain carbon steels are also included in ‘...or other materials...’ To clarify the scope of this Reg Guide, the first sentence of the first paragraph need to be revised.”</p> <p>NEI Recommendation: “Revise first sentence to read, ‘Weld fabrication and repair of low-alloy steel, high alloy steel, and nickel-base alloy materials (either cast or wrought), and dissimilar metal welds, should comply with the fabrication standards specified in Sections III and IX of the ASME Code, supplemented by the following:’”</p>	<p>The staff proposes to revise the first sentence of part C as follows:</p> <p>Weld fabrication and repair for wrought low-alloy and high-alloy steels (including nickel-base alloys) or other materials (such as static and centrifugal castings and bimetallic joints) should comply with the fabrication standards specified in Sections III and IX of the ASME Code, supplemented by the following:...</p>

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NEI	General (comment 5)	<p>“The draft is very vague and provides no guidance on what ranges of variables a particular test might qualify for (e.g., if this qualifies a welder for 2G pipe butt welds with restricted access, does this also qualify for fillets? Does a particular restricted access test qualify indefinitely or does it lapse after 6 months? etc.). Also, the words, ‘awkward position’ open up a whole new realm of possible restricted access qualifications. As written, it would be almost impossible to anticipate every possible circumstance and we could end up testing a welder before just about every field weld.”</p> <p>NEI Recommendation: “Clarify the scope and specific qualification periods.”</p>	<p>The staff agrees with this comment and proposes to revise part C as follows:</p> <p>(2) Requalification should be necessary when (a) the use of an indirect means is required to view the weld pool (such as a mirror) during production welding and the welder or welding operator did not qualify for welding in areas of limited accessibility using that indirect means of weld pool observation position, access, and visibility conditions for production welding is significantly more limiting than the physical conditions present during qualification, or (b) any of the essential welding variables for welders (QW-350) or welding operators (QW-360) listed in Section IX change, or (c) the qualification expires per QW-320.</p>
NEI	Section B (comment 6)	<p>“The test includes ‘Procedure AND Performance’ Limited access qualification. ‘Procedure’ should be deleted as this is a Performance ONLY document and procedure qualification for limited access areas would be counterproductive and of no benefit.”</p> <p>NEI Recommendation: “Delete ‘procedure’ qualification as noted.”</p>	<p>The staff agrees with the comment and proposes to revise the RG as suggested.</p>
NEI	Section B (comment 7)	<p>“Page 3, Para B: Utilization of a mock up coupon with one specimen removed from the least favorable position followed by RT per QW-191 & 302.2 must assume that the test was a groove weld in order to get a viable RT exam. The last sentence in this paragraph recommends ‘This test should also be sectioned for macro examination (QW-184) and hardness evaluation...’. QW-184 refers the user to QW-462.4.(b) or (c). The figures in both of those paragraphs show fillets in plate or socket welds or pipe to plate fillets.”</p> <p>NEI Recommendation: “If a macro examination and hardness evaluation are desired, two coupons would be required. It</p>	<p>The staff agrees with this comment and proposes to revise the RG as follows:</p> <p>As a preferred alternative, the structure to be welded (including its actual access limits) may be simulated. Using this mockup, one test specimen should be taken from the weld location representing the least favorable position imposed on the welder, and this specimen should be evaluated in accordance with Article III, “Welding Performance Qualifications,” of Section IX. the radiographic criteria of Section IX, paragraphs QW-191 and QW-302.2. This test specimen should also be sectioned for</p>

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		may not be representative of the production butt joint to do a fillet weld test. The same is true for the reverse condition.”	macro examination (paragraph QW-184) and hardness evaluation of the composite weldment, with particular attention to the root fusion and weld toe conditions.
NEI	Section B (comment 8)	<p>“Page 3, Para 2: The testing required for the alternative mockup (including its actual access limits) should not stipulate a radiograph with a macro examination and hardness evaluation. The testing for this mockup should be in accordance with the requirements of Sec IX for welder performance testing. That is, for groove welds, the required testing should be visual examination with either radiographic exam or transverse bend tests. For fillet welds, the required testing should be a visual examination, a macro, and a break test. There are no hardness evaluations required for welder performance qualifications.”</p> <p>NEI Recommendation: “The second sentence should read ‘...and this specimen should be evaluated in accordance with one of the following criteria of Section IX; For groove welds, a visual examination in accordance with QW-194 and either a radiographic examination in accordance with QW-302.2, or guided bend specimens in accordance with QW-302.1. For fillet welds, a visual examination in accordance with QW-194, a fracture test in accordance with QW-182 and a macro examination in accordance with QW-184.’ Delete the entire last sentence of this paragraph.”</p>	The staff agrees with this comment and proposes to revise the RG as described in Comment 7.
NEI	Section B (comment 9)	<p>“Page 4, 1 para: This paragraph states: (such as static and centrifugal castings and bimetallic joints)... I do not believe it is the intent to include bimetallic joints. These are not typical joints used in ASME piping and vessel fabrication. I believe the intent was to call out dissimilar metal joints.”</p> <p>NEI Recommendation: “Revise ‘bimetallic joints’ to read ‘dissimilar metal joints’.”</p>	The staff agrees with this comment and proposes to revise the RG as described in Comment 4.

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NEI	Section B (comment 10)	<p>“The ‘12 inch’ criterion is problematic. A piece of conduit/rod hanger within 12 inches of the weld area may not affect welder performance. ‘Qualification’ should not be used here but mockup testing to the satisfaction of the Welding Engineer.”</p> <p>NEI Recommendation: “The criteria should be amended to ‘Only interferences within 12 inches of the joint AND which would hinder welder access, bead progression or require indirect means of puddle observation shall require Limited Access Mock-up training to reflect the accessibility limitations.’”</p>	<p>The staff agrees with this comment and proposes to revise part C as follows:</p> <p>(1) Performance qualification should provide for testing the welder or welding operator under simulated position, access, and visibility limitations when any of these physical conditions restrict the welder’s access to a production weld to less than 30 centimeters (12 inches) in any direction from the joint and which would affect electrode manipulation, or bead progression, or require an indirect means of weld pool observation (such as a mirror). or when visibility of the weld pool is limited or the welder must assume an awkward position.</p>
NEI	Section B (comment 11)	<p>“Limited access is an issue for welder performance qualifications (that is welders using manual or semiautomatic processes). This is not a welding procedure issue. The references to essential variables in the Reg Guide should be clarified to indicate they are ‘welder performance’ essential variables.”</p> <p>NEI Recommendation: “Last sentence of 3rd paragraph should read ‘However, requalification would not be required for various restricted accessibility conditions unless the welder performance essential variables of Section IX are changed.’”</p>	<p>The staff agrees and proposes to revise the RG as follows:</p> <p>However, Requalification would not be required for various restricted accessibility conditions unless the welder performance qualification essential variables of Section IX are QW-350 change or the qualification expires per QW-320.</p>
NEI	Section B (comment 12)	<p>“The provision to use the 6G position with a corner structural enclosure, in lieu of the 2G and 5G positions, to provide for an all position qualification should be recognized.”</p> <p>NEI Recommendation: “Second sentence should read, ‘Positions 2G and 5G, or 6G, with a corner structural enclosure....’”</p>	<p>The staff agrees and proposes to revise the RG as follows:</p> <p>Welding in both positions 2G and 5G, or welding in the 6G position, with a corner structural enclosure that limits access to within 30 centimeters (12 inches) on two sides and overhead, may provide an acceptable simulation of welder accessibility for certain cases.</p>

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NEI	Section B (comment 13)	<p>“The wording of the second sentence in this paragraph has changed. RG 1.71 December 1973 considers the 12 inch structural enclosure as an acceptable simulation. The draft is written to indicate this enclosure is not always acceptable. There is no basis to limit the acceptability of the 12 inch structural enclosure test.”</p> <p>NEI Recommendation: “Second sentence should read, ‘Positions 2G and 5G, or 6G, with a corner structural enclosure that limits access to within 30 centimeters (12 inches) on two sides and overhead, provides an acceptable simulation of welder accessibility.’”</p>	The staff revised the RG to indicate that the enclosure test may be acceptable. However, the enclosure test described is not acceptable for production welds that do not meet the welder essential variables listed in QW-350.
NEI	Section B (comment 14)	<p>“The point of this Reg Guide is to ensure production welds with limited accessibility conform to the specified criteria. In cases where there is a concern, the additional welder testing (using bends or radiographic exam) along with infield monitoring is used to provide some assurance of the production weld quality. Volumetric examination of the production weld would provide actual proof of the quality of the production weld. Based on the adequacy of Section III volumetric examinations and the fact that Section IX provides for welder testing by radiography of production joints, this Reg Guide is really only applicable to those welds, with limited access conditions, that do not receive a Construction Code radiographic examination.”</p> <p>NEI Recommendation: “Add the following as the lead in sentence in paragraph C. ‘This Regulatory Guide does not apply to welds which receive radiographic examination in accordance with the Construction Code.’”</p>	Article III of Section XI of the ASME Boiler and Pressure Vessel Code allows for welder qualification on a production weld that passes radiographic examination of any accessibility or visibility condition. A welder following the guidance provided in RG 1.71 could qualify to weld in areas of limited accessibility for a certain process by testing on a production weld with limited accessibility that is radiographically examined per the requirements of Article III of Section IX of the ASME Boiler and Pressure Vessel Code. Therefore, it would be incorrect to state, “This Regulatory Guide does not apply to welds which receive radiographic examination in accordance with the Construction Code.”
NEI	Section B (Comment 15)	<p>“Utilization of a mock up coupon with one specimen removed from the least favorable position followed by RT per QW-191 & 302.2 must assume that the test was a groove weld in order to get a viable RT exam. The last sentence in this paragraph</p>	The staff agrees and proposes to revise the RG as described in Comment 7.

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		<p>recommends 'This test should also be sectioned for macro examination (QW-184) and hardness evaluation...'. QW-184 refers the user to QW-462.4.(b) or (c). The figures in both of those paragraphs show fillets in plate or socket welds or pipe to plate fillets."</p> <p>NEI Recommendation: "If a macro examination and hardness evaluation are desired, two coupons would be required. It may not be representative of the production butt joint to do a fillet weld test. The same is true for the reverse condition."</p>	
NEI	Section B (Comment 16)	<p>"The wording of the first sentence in this paragraph has changed. The draft indicates that a mockup with actual access limits is the preferred option to qualify welders for limit access welds. It is inappropriate for the NRC to state such a preference. The current Reg Guide indicates no such preference. Use of mockups with the actual access limitations will greatly increase the cost of welder qualification with no corresponding increase in quality or safety. The 12 inch structural enclosure has worked for the past 33 years, the decision to use an actual mockup or the 12 inch enclosure should be left to the Owner or certificate holder."</p> <p>NEI Recommendation: "First sentence should read 'As an alternative, the structure...'"</p>	<p>The use of a mockup that more accurately represents the accessibility limitations than a standard corner enclosure test is preferred. For example, some production welds may require the use of an indirect means (such as a mirror or camera) to view the weld pool and this may not be demonstrated during the standard welder qualification test for areas of limited accessibility.</p> <p>Therefore, the use of the word "preferred" when describing a weld mockup that more accurately represents the accessibility limitations is appropriate.</p>
NEI	Section B (Comment 17)	<p>"Page 3, para 2: Hardness testing as referenced has nothing to do with welder performance qualifications or by specific direction in a weld data card."</p> <p>NEI Recommendation: "Suggest 'This test specimen should also be bend tested in accordance with ASME Section IX to demonstrate weld soundness, fusion and ductility.'"</p>	<p>The staff agrees and proposes to revise the RG as described in Comment 7.</p>

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NEI	Section C (comment 18)	<p>“Performance qualifications for personnel who weld under conditions of limited access, as defined in Regulatory Position C.1, are maintained in accordance with the applicable requirements of ASME Sections III and IX. However, specific qualification for limited access welds will not be required. To assure that the required integrity level for a specific limited access weld is achieved, welding conducted in areas of limited access must pass the required nondestructive examination. No waiver or relaxation of examination methods or acceptance criteria because of the limited access will be permitted.”</p> <p>NEI Recommendation: “Respondents did not consider this change/update necessary as the current requirements for nondestructive evaluation is not relaxed or waived due to access limitations. Weld quality must be maintained and this requires that the end user take appropriate action during training/testing.”</p>	<p>Welding performance and procedure qualifications in conjunction with NDE are required as part of a welding program to better ensure the integrity of welds. Experience in the shipbuilding, petroleum, and chemical industries has shown increases in weld quality from welder qualification testing under simulated position, access, and visibility limitations. Experience has also shown that the probability of detecting weld flaws using NDE is less than 100% and that reducing the number of weld repairs through better control of the welding process may result in increased weld quality.</p>
NEI	Section C (comment 19)	<p>“Title vs. C. Regulatory Position 1st paragraph: The wording in Part C appears to exempt plain carbon steels. Was this by design or does ‘, or other materials’ address plain carbon steels?”</p> <p>NEI Recommendation: None</p>	<p>Plain carbon steels should be included in welder qualification for areas of limited accessibility.</p> <p>The staff proposes to delete the following from the first sentence of part C to clarify the intent:</p> <p>...for wrought low-alloy and high-alloy steels, nickel-base alloys, or other materials (such as static and centrifugal castings and bimetallic joints)...</p>
NEI	Section C (comment 20)	<p>“Paragraphs (1) and (2) have been revised to include the position of the weld when considering restricted access limitations. Position should not be included here as it is a Section IX welder performance essential variable. Including position implies that the welder can not be tested in an ‘all-position test’.”</p>	<p>The staff agrees with the comment.</p> <p>The staff proposes to revise part C(1) as described in Comment 10.</p> <p>The staff proposes to revise part C(2) as described in Comment 5.</p>

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		<p>“Delete the words added in regards to the welder’s awkward position. This is a Reg guide on limited access to the weld. Awkward position of the welder is subjective and varies by welder. Consideration of this issue is best left to the Owner or certificate holder who understands the physical size and flexibility concerns of his welders.”</p> <p>NEI Recommendation: “The first sentence of C (1) should read ‘Performance qualification should... ..under simulated access, and visibility... ..or when visibility of the weld pool is limited.’”</p> <p>“The first sentence of C (2) should read ‘Requalification should be necessary when (a) access, and visibility...’”</p>	
NEI	Section C (comment 21)	<p>“C. 1--In any direction from joint”</p> <p>NEI Recommendation: “Revise language to say ‘in two or more directions from joint.’”</p>	Restricted access to a weld joint from only one direction may be significant and production welding should be performed by personnel qualified to weld in areas of limited accessibility.
NEI	Section C (comment 22)	<p>“This section has two vague statements: ‘weld pool visibility is limited’ and ‘welder must assume a defined and are open to a wide degree of interpretation.’”</p> <p>NEI Recommendation: “Please clarify.”</p>	<p>The staff agrees with the comment.</p> <p>The staff proposes to revise part C as described in Comment Resolution 20.</p>
NEI	Section C (comment 23)	<p>“‘C.2 welding performance’ is unclear.”</p> <p>NEI Recommendation: “Last line of C (2) should read ‘...or (b) any of the welder performance essential welding variables....’”</p>	<p>The staff proposes to revise part C(2)(b) as follows:</p> <p>(b) any of the essential welding variables for welders (QW-350) or welding operators (QW-360) listed in Section IX change,...</p>

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NEI	Section C (comment 23)	<p>“Delete ‘or when visibility of the weld pool is limited or the welder must assume an awkward position.’ The additional wording is redundant and subjective. It could easily be argued that every weld is in an ‘awkward’ position.”</p> <p>NEI Recommendation: “Performance qualification should provide for testing the welder under simulated position, access, and visibility limitations when any of these physical conditions restrict the welder’s access to a production weld to less than 30 centimeters (12 inches) in any direction from the joint.”</p>	<p>The staff agrees with the comment.</p> <p>The staff proposes to remove “Awkward position” and to revise Section C as described in Comment Resolution 20.</p>