#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
1	Section 3.1 Page 3	The RPVHPNs also included the in-core instrumentation nozzles, J-groove head vent nozzles, J-groove auxiliary head adapter nozzles, "butt-weld" type head vents, and "butt-weld" type auxiliary head adapter nozzles.	The "butt-weld" type head vents and "butt-weld" type auxiliary head adapter nozzles are not connected to the head using J-groove attachment welds and thus fall outside the scope of ASME Code Case N-729-1. They also are understood to fall outside the scope of N-722-1 (which does not apply to the reactor vessel closure head) and N-770-1 (which does not apply to locations with normal operating temperatures of less than 525°F (274°C)). Thus, the alternative requirements of the topical report and the Safety Evaluation should not apply to those nozzles if peened. Section B.1.2 of MRP-335R2 states that: "*The conclusions of the probabilistic calculations are considered to extend to the full set of RPVHPNs attached using J-groove (i.e., partial penetration) welds…* *Finally, the small number of "butt-weld" type nozzles noted above were not assessed as part of this study. These nozzles explicitly fall outside of the scope of ASME Code Case N-729-1 [4]. Thus, the technical basis of this report for inspection requirements for use with peening is not applicable to such nozzles not attached to the head with J-groove (i.e., partial penetration) welds.*" Thus, "butt-weld" type head vents and "butt-weld" type auxiliary head adapter nozzles should not be listed in Section 3.1 of the SE.	MRP-335 Revision 2, Section B.1.2 ASME Code Case N-729-1	The NRC has revised the draft SE to read: "...The RPVHPNs also included the in-core instrumentation nozzles, J-groove head vent nozzles, and J-groove auxiliary head adapter nozzles. MRP noted that the butt-weld" type head vents and "butt-weld" type auxiliary head adapter nozzles are not covered by MRP-335R2 and are not considered in this safety evaluation..."
2	Section 3.3 Page 4	…and bare metal examinations.	This text should be revised to state: "*… and bare metal **visual** examinations.*"	Missing Word	The NRC staff has revised the draft SE accordingly.
3	Section 3.3 Page 5	MRP-335R2, Table 4-1, footnote 19(c)(2), states that "...if a surface-connected flaw is not removed, the weld may be peened while acceptability for continued service in accordance with -3132.3(a) is determined. If the weld is acceptable for continued service in accordance with -3132.3(a), the weld shall be placed into Inspection Items A-1, A-2, or B, and shall be re-examined in accordance with Table 4-1. The flaw may subsequently be made acceptable for continued service in a subsequent outage..."	MRP-335R2, Table 4-1, footnote 19(c)(2) is incorrectly quoted. This footnote states: "***If the*** ~~***a surface-connected***~~ *flaw is not removed, the weld may be peened while acceptability for continued service in accordance with -3132.3(a) is determined. If the weld is acceptable for continued service in accordance with -3132.3(a), the weld shall be placed into Inspection Items A-1, A-2, or B, and shall be re-examined in accordance with* ***Note (5) of Table 1 of N-770-1*** ~~***Table 4-1***~~*. The flaw may subsequently be made acceptable for continued service in a subsequent outage* ***in accordance with (3)****.*"	MRP-335 Revision 2, Table 4-1	The NRC staff has revised the draft SE accordingly.
4	Section 3.3 Page 5	MPR stated that prior to peening…	MRP is spelled incorrectly. This text should be revised to state: "***MRP*** ~~***MPR***~~ *states that prior to peening…*"	Typo	The NRC staff has revised the draft SE accordingly.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
5	Section 3.4 Page 6	The beneficial effect of peening is to prevent initiation and growth of PWSCC.	This statement is misleading in that it implies that prevention of growth of shallow flaws is necessary to demonstrate the effectiveness of peening. The analyses of MRP-335, Revision 2 demonstrate that peening mitigation is effective because it prevents new PWSCC initiations. The pre-peening and follow-up examinations address pre-existing flaws that may have initiated prior to peening being performed. In practice, the actual stress profiles produced by peening will be more compressive than the bounding profiles meeting the performance criteria and thus often result in arrest of shallow flaws, but this benefit does not need to be credited to conclude that the inspection requirements in Section 4 of MRP-335, Revision 2 are acceptable.	MRP-335 Revision 2, Sections 1.3, 2.3, and 6	MRP-335R2, Page 5-33 states that "...The deterministic results show that peening slows the growth of cracks with depths just beyond the compressive stress layer" MRP-335R2, Page A-58, states that "... This case supports the conclusion that the majority of the benefit of peening comes from preventing further cracks from initiating and arresting shallow flaws within the compressive stress region..." Based on the above examples and others, the NRC staff does not plan to revise the subject sentence unless MRP-335R2 is revised.
6	Section 3.4.1 Page 6	To demonstrate the effectiveness of compressive surface stress to slow or stop crack growth, MRP calculated crack growth based on stress profiles it proposed as representative of those present in components before and after peening.	The purpose of the crack growth calculations was to show how the crack growth time is affected by peening, not in particular "to demonstrate the effectiveness of compressive surface stress to slow or stop crack growth." This represents a key misinterpretation of the MRP-335, Revision 2 topical report. The topical report is clear that the inspection credit for peening is due to prevention of future PWSCC initiations. Pre-existing flaws are addressed by the pre-peening and follow-up examinations. It is not necessary for the post-peening stress to arrest shallow pre-existing flaws to support the alternative inspection requirements. Crack growth calculations assuming the bounding stress effect meeting the performance criteria are applied in the probabilistic calculations to demonstrate the acceptability of the inspection requirements of Section 4 of MRP-335, Revision 2. In practice, the actual stress profiles produced by peening will be more compressive than the bounding profiles meeting the performance criteria and thus often result in arrest of shallow flaws, but this benefit does not need to be credited to conclude that the inspection requirements in Section 4 of MRP-335, Revision 2 are acceptable. Section 5.1 of MRP-335R2 states that: "*The deterministic analyses specifically investigate the effect of the surface stress improvement on PWSCC crack growth versus time.*"	MRP-335 Revision 2, Sections 1.3, 2.3, 5.1, and 6	The NRC staff has revised the draft SE to read: "…MRP calculated crack growth based on stress profiles which it proposed to be representative of those present in components before and after peening..."
7	Section 3.4.4 Page 9	MRP used an integrated model similar to that of the probabilistic software used in the Extremely Lower Probability of Rupture (xLPR) program	The xLPR acronym stands for the Extremely Low Probability of Rupture. The text should be revised to state: "*MRP used an integrated model similar to that of the probabilistic software used in the Extremely* ***Low*** *~~Lower~~ Probability of Rupture (xLPR) program*"	Editorial Correction	The NRC staff has revised the draft SE accordingly.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
8	Section 3.4.4 Page 9	MRP assumed that after the peening application, no new cracks initiate and existing cracks contained within the peened depth do not grow.	MRP did not assume that "existing cracks contained within the peened depth do not grow." The term "peened depth" is not used in the topical report, but in Table 1 of the draft SE it is identified with the nominal depth of the peening compressive residual stress. In the MRP modeling, crack arrest is only modeled if the stress intensity factor at the crack tip is calculated to be zero or negative when both residual and normal operating stress are considered. This is an important distinction as Condition 5.3.1 in the draft SE appears to be based on the misconception that the topical report is taking credit for arrest of flaws more shallow than the "peened depths" listed in Table 1 of the draft SE.	MRP-335 Revision 2, Sections 1.3, 2.3, and 6	The NRC staff has revised the draft SE to read: "...MRP assumed that after the peening application, no new cracks will initiate..."
9	Section 3.4.4 Page 10	MRP further stated that the dependence of PWSCC on component loading (i.e., stresses near and orthogonal to the crack) requires the calculation of stress intensity factors at the crack points of interest based on a finite element analysis solutions of circumferential and axial cracks and the superposition method of linear-elastic fracture mechanics.	The text should be clarified to state: "MRP further stated that the dependence of PWSCC on component loading (i.e., stresses near and orthogonal to the crack) requires the calculation of stress intensity factors at the crack points of interest based on **published** ~~a~~ finite element analysis **solutions for** ~~of~~ circumferential and axial cracks and the superposition method of linear-elastic fracture mechanics."	MRP-335 Revision 2, Section A.5	The NRC staff has revised the draft SE accordingly.
10	Section 3.4.4 Page 11	MRP predicted that for the reactor vessel outlet nozzle (hot leg), the cumulative probability of leakage after peening (1.6×10^{-3} to 2.5×10^{-3}) would be reduced by a factor of between 60 and 150, as compared to cumulative leakage probabilities on the same span of time for an unmitigated reactor vessel outlet nozzle (1.5×10^{-1}) as shown in Figure A-20 of MRP-335R2.	The values used to calculate the "factor between 60 and 150" come from MRP-335R2, Figure A-17, and not from Figure A-20. In this figure, the cumulative probability of leakage after peening ranges from 1.0×10^{-3} to 2.5×10^{-3}.	MRP-335 Revision 2, Figure A-17	The NRC staff has revised the draft SE accordingly.
11	Section 3.4.4 Page 11	For the reactor vessel inlet nozzle (cold leg), MRP predicted that the cumulative probability of leakage after peening (2.3×10^{-4} to 5.4×10^{-4}) is reduced by a factor of between 8 and 24, as compared to cumulative leakage probabilities on the same span of time for an unmitigated reactor vessel inlet nozzle (2.1×10^{-3}).	The values used to calculate the "factor between 8 and 24" come from MRP-335R2, Figure A-18. In this figure, the cumulative probability of leakage after peening ranges from 8.8×10^{-5} to 2.3×10^{-4}.	MRP-335 Revision 2, Figure A-18	The NRC staff has revised the draft SE accordingly.
12	Section 3.4.4 Page 12	The MRP proposes that the large reduction in leakage probability with peening (approximately between a factor of 10 and 100 for the probabilistic base cases as discussed in Section 4 of MRP-335R2) supports the conclusion that rupture frequency (and boric acid wastage potential) is also reduced through peening application with inspection relaxation.	The original text from Section 5.4 of MPR-335R2 is: "*The large reduction in leakage probability with peening (approximately between a factor of 10 and 100 for the probabilistic base cases as discussed in Section* **5** ~~4~~ *of MRP-335R2) supports the conclusion that rupture frequency (and boric acid wastage potential) is also reduced through the program of peening with the reduced frequency inspections specified in Section 4.*" Inspection requirements and the stress effect for the probabilistic base cases are defined in Section 4 of MRP-335R2. The probabilistic base cases themselves are not discussed in Section 4.	MRP-335 Revision 2, Sections 4 and 5	The NRC staff has revised the draft SE accordingly.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
13	Section 3.4.5 Page 12	For the deterministic analysis, the MRP used a wall thickness of 0.62 in. (15.2 mm) for the RPVHPN, nozzle outer diameter of 4 in. (10.2 cm), a reactor vessel head thickness of 6.0 in. (15.2 cm), a hot head temperature is 605 degrees F (318 degrees C) and cold head temperature is 561 degrees F (294 degrees C).	The text should be revised to state: "*For the deterministic analysis, the MRP used a wall thickness of 0.622 inches for the RPVHPN, nozzle outer diameter of 4 inches, a reactor vessel head thickness of 5.984 inches, a hot head temperature* ***of*** ~~*is*~~ *605 degrees F and cold head temperature* ***of*** ~~*is*~~ *561 degrees F.*"	Editorial	The NRC staff has revised the draft SE accordingly.
14	Section 3.4.5 Page 13	…and a residual stress value that results in a net stress of 0 ksi (0 MPa) for the outside diameter surface of the nozzle and the J-groove weld because the operation stress in those regions is small.	This text should be revised to state: "*…and a residual stress value that results in a net stress of 0 ksi (0 MPa) for the outside diameter surface of the nozzle and the J-groove weld because the* ***operating*** ~~***operation***~~ *stress in those regions is small.*"	Editorial	The NRC staff has revised the draft SE accordingly.
15	Section 3.4.5 Page 13	Section 4.3.1 of MRP-335R2 states that the required peening coverage is the full wetted area of the susceptible material where the surface stress (residual plus normal operating stress) of at least +20 ksi (+140 MPa) (tensile). MRP chose this value because it was identified to be the threshold for PWSCC initiation over plant time scales…	The statement states that +20 ksi is identified as the threshold for PWSCC initiation over plant time scales (i.e., plant service life). This is an important misinterpretation of the technical basis in MRP-335, Revision 2. Section 2.3.1 of MRP-335, Revision 2 clearly states that +20 ksi is a "conservative lower bound" of the threshold for PWSCC initiation over plant time scales. For the large majority of Alloy 600/82/182 locations, the yield strength is substantially greater than the minimum yield strength allowed by the ASME Code for Alloy 600 base metal. The +20 ksi stress corresponds to about 80% of the lower bound yield strength for Alloy 600 materials at operating temperatures. Hence, the draft SE ignores an additional layer of conservatism between the post-peening stress effect and the stress necessary to cause a new PWSCC initiation. The text should be revised to state: "*Section 4.3.1 of MRP-335R2 states that the required peening coverage is the full wetted area of the susceptible material where the surface stress (residual plus normal operating stress)* ~~***of***~~ ***is*** *at least +20 ksi (+140 MPa) (tensile). MRP chose this value because it was identified to be* ***a conservative lower bound for*** *the threshold for PWSCC initiation over plant time scales…*"	MRP-335, Revision 2, Sections 2.3.1, 2.4, and 4.3.1	The NRC staff has revised the draft SE accordingly.
16	Section 3.4.5 Page 14	MRP stated that for an axial crack on the penetration nozzle inner diameter with an initial through-wall flaw depth of 1 percent (0.010 in. or 0.16 mm), the effect of peening is predicted to delay through-wall growth by approximately 5 EFPY.	The original text from Section 5.2.2.2 of MRP-335R2 is: "*Figure 5-18 shows the growth vs. time calculation for an axial crack on the penetration nozzle ID with an initial through-wall fraction of 1% (0.16 mm). At this initial through-wall fraction, the effect of peening is predicted to be considerable, delaying through-wall growth by approximately 5 EFPY.*" 0.16 mm is equivalent to 0.006 inch, not 0.010 inch. These quoted results are specific to the case evaluated in Figure 5-18 of MRP-335, Revision 2 (an uphill ID axial crack with an initial through-wall fraction of 1% and aspect ratio ($2c_0/a_0$) of 4.5).	Unit Conversion	The NRC staff has revised the draft SE accordingly.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
17	Section 3.4.5 Page 14	Figure 5-19 of MRP-335R2 showed that for an unmitigated RPVHPN the axial crack on the outside diameter surface took approximately 4.2 EFPY to reach the outside diameter annulus region (leakage occurs) and the peened nozzle took approximately 5.2 EFPY to 8 EFPY to reach the outside diameter annulus region.	The text should be revised to state: "*Figure 5-19 of MRP-335R2 showed that for an unmitigated RPVHPN the axial crack on the outside diameter surface took approximately* ***4.4*** ***~~4.2~~*** *EFPY to reach the outside diameter annulus region (leakage occurs) and the peened nozzle took approximately* ***~~5.2 EFPY to~~ 8*** *EFPY to reach the outside diameter annulus region.*" Through-wall growth times for balloon growth were not reported for DMWs. For consistency, they should either be reported for both or for neither of the components.	MRP-335 Revision 2, Figure 5-19	The NRC staff has revised the draft SE accordingly.
18	Section 3.4.5 Page 14	MRP concluded that an axial crack on the penetration nozzle outside diameter with an initial nozzle through-wall depth of approximately 10 percent, delaying leakage by 1 to 4 EFPY for flaws up to about 30 percent (0.20 in. or 5 mm) through-wall at the time of peening.	This text is not grammatically correct. The text should be revised to state: "*MRP concluded that* ***peening has a large effect on growth of*** *an axial crack on the penetration nozzle outside diameter with an initial nozzle through-wall depth of approximately 10 percent****. The time to leakage was delayed*** ***~~, delaying leakage~~*** *by 1 to 4 EFPY for flaws up to about 30 percent (0.20 in. or 5 mm) through-wall at the time of peening.*" These quoted results are specific to the cases evaluated in Figure 5-19 and Figure 5-23 of MRP-335, Revision 2 (an uphill OD axial crack with an initial aspect ratio ($2c_0/a_0$) of 4.5).	MRP-335 Revision 2, Figures 5-19 and 5-23	The NRC staff has revised the draft SE accordingly.
19	Section 3.4.5 Page 14	MRP noted that some initial crack depths leakage occurs in the peened component faster than in the unmitigated component.	The text should be revised to state: "*MRP noted that* ***for*** *some initial crack depths leakage occurs in the peened component* ***slightly*** *faster than in the unmitigated component.*"	MRP-335 Revision 2, Section 5.2.2.2	The NRC staff has revised the draft SE accordingly.
20	Section 3.4.6 Page 16	There is no known precedent for applying a stress-adjustment when modeling initiation of PWSCC on RPVHPNs.	It should be clarified in the SE that this statement refers to the particular approach of modeling multiple initiation of different locations on individual nozzles. Other approaches to modeling PWSCC initiation for top heads have explicitly included the surface stress.	MRP-335 Revision 2, Sections A.4.3 and B.4.3	The subject statement was taken from Section B.4, page B-17, of MRP-335R2 verbatim. If the subject statement is incorrect, MRP needs to revise the statement in Section B.4 on page B-17. The NRC does not plan to revise the subject statement.
21	Section 3.4.6 Page 16	MRP stated that total stresses and operational stresses (i.e., those stresses caused by loads present during operation) are derived from finite element analysis results and welding residual stresses are attained from the difference between the total and operational stresses. After peening is applied, the post-peening residual stress profile is superimposed with the operational stresses to attain the total stress profiles used to predict crack growth.	The draft SE should make clear that this was the method applied in the MRP-335R2 probabilistic model to simulate the bounding stress profiles meeting the performance criteria. This is not the approach that peening vendors must apply to demonstrate that the performance criteria are met.	MRP-335 Revision 2, Sections 4.3.8.1 and B.3.5	The subject paragraph does not require that peening vendors must apply to demonstrate that the performance criteria are met. The NRC staff does not plan to change the subject paragraph.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
22	Section 3.4.6 Page 16	A peening compressive residual stress depth of 0.04 inch (1.02 mm) is assumed for the wetted nozzle outside diameter and surface attachment area susceptible to PWSCC initiation, whereas a compressive residual stress depth of 0.010 in. (0.25 mm) is assumed for the nozzle inside surface.	The peening compressive residual stress depth has a mean of 1.0 mm (0.039 inch) on the wetted nozzle outside diameter and surface attachment area susceptible to PWSCC initiation. The peened compressive residual stress depth has a mean of 0.25 mm (0.010 inch) on the nozzle inside surface. These are applied as distributed inputs for the probabilistic model. The quoted text from the draft SE implies that constant stress depths are applied.	MRP-335 Revision 2, Tables A-10 and B-10	The paragraph in the draft SE, page 16, reads: "…MRP further stated that for RPVHPNs, the compressive residual stress depths are sampled from separate distributions for the inside diameter locations, as compared to the outside diameter and weld locations. A peening compressive residual stress depth of 0.04 in. (1.02 mm) is assumed for the wetted nozzle outside diameter and surface attachment area susceptible to PWSCC initiation, whereas a compressive residual stress depth of 0.010 in. (0.25 mm) is assumed for the nozzle inside surface…" The NRC has already recognized that the compressive residual stress depths are sampled as stated in the first sentence. The remaining sentences were taken from page 5-3 of the MRP-335R2. The NRC does not plan to revise the subject paragraph.
23	Section 3.4.6 Page 17	MRP showed that peening mitigation with proposed inspections results in an average nozzle ejection frequency of roughly 1.7×10^{-5} per reactor year or less.	The draft SE states these results but does not place them in context by stating the specific analysis case that gave these results. This result corresponds to the peened hot head base case (follow-up examinations at the 1st and 2nd cycles after peening; 5-cycle ISI interval). The SE should be revised to cite the analysis case.	MRP-335 Revision 2, Figures B-35, B-36, and B-37	The subject statement in the draft SE was taken from page 5-33 of MRP-335R2. Page 5-33 did not mention that the result of 1.7×10^{-5} per reactor year came from the hot head base case. The subject statement is a summary. Referencing the hot head base case in the subject statement does not add value to the SE. The NRC would revise the statement if MRP revises page 5-33. However, at this time, the NRC does not find a compelling reason to revise the subject statement.
24	Section 3.4.6 Page 17	MRP reported that the peening cases were shown to approximately maintain the average nozzle ejection frequency compared to the case of no mitigation and inspection performed per the requirements of ASME Code Case N-729-1 as conditioned in 10 CFR 50.55a.	This statement is accurately quoted from page 5-33 of MRP-335, Revision 2. However, it is clarified that the probabilistic results for the Revision 2 report in fact show a reduced average nozzle ejection frequency compared to the case of no mitigation per standard intervals. The conclusion of a reduced effect on nuclear safety for the MRP alternative is cited in several other locations in the topical report (Sections 2.5, 2.5.2, 2.5.3, 5, and 6.2), including in the overall report conclusions in Section 6.2. The NRC staff should be aware that the inspection requirements for peened heads operating at temperatures significantly above T_{cold} were made more restrictive for Revision 2 of MRP-335, resulting in a clearly lower calculated risk for the peened heads compared to the unmitigated heads.	MRP-335 Revision 2, Sections 2.5, 2.5.2, 2.5.3, 5, and 6.2	The NRC staff appreciate the comment. The NRC staff does not plan to revise the subject statement. If MRP wishes to revise page 5-33, the NRC will consider the merits of that revision.

25	3.4.6 Page 17	MRP predicted that, on average, two nozzles in each hot head and one nozzle in approximately two cold heads would have unrepaired cracks after the pre-peening inspection.	The text should be clarified to state: "*MRP predicted that, on average, two nozzles in each hot head and one nozzle in approximately two cold heads would have unrepaired cracks after the pre-peening inspection **under the PWSCC initiation assumptions made**.*" Within MRP-335, Revision 2, it is conservatively assumed that one third of the crack initiations occur on the wetted surface of the weld metal, and that the part-depth weld flaws have a zero chance of being detected via UT performed from the nozzle inside surface. Thus, these flaws are modeled to remain undetected and unrepaired after a pre-peening inspection. This is a conservative analysis approach.	MRP-335 Revision 2, Section B.9.2	The NRC staff has revised the draft SE accordingly.
26	Section 3.4.6 Page 17	However, the same interval with a follow-up inspection both one and two cycles after peening resulted in an ejection risk lower than 83 percent of the unmitigated case.	The original text from Section 5.3.2 of MRP-335, Revision 2 is: "*However, the same interval with a follow-up inspection both one and two cycles after peening resulted in an ejection risk lower than (83 percent of) the unmitigated case.*"	MRP-335 Revision 2, Section 5.3.2	The NRC staff has revised the draft SE accordingly.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
27	Section 4.1 Page 18	The use of peening in the U.S. nuclear industry on safety related components, to date, has been limited to steam generator tubes. Peening of these tubes has been successful in helping to ensure the tubes remain structurally sound and leak-tight between inspections. The NRC has not approved any reduction in inspection frequency as a result of peening these components, however.	This first statement is not true. Peening in the U.S. nuclear power industry on safety-related components has not been limited to steam generator tubing. Experience with abrasive water jet (AWJ) peening of CRDM nozzle repairs is discussed in Section 2.3 of MRP-335, Revision 2. Section 3 of MRP-267, Revision 1 discusses the AWJ peening experience, as well as experience in the U.S. with peening of Alloy 600 pressurizer heater sheaths and Alloy 718 fuel assembly screws. At least two repaired CRDM nozzles treated with AWJ have been in service for over a decade with multiple inspections and no cracking detected. It is true that no reduction in the base inspection frequencies has been approved by NRC as a result of peening of steam generator tubes. However, a key distinction is that peening of steam generator tubes covers only a limited portion of the area susceptible to cracking, whereas the MRP-335, Revision 2 requirement is for peening of 100% of the area that is susceptible to PWSCC initiation.	MRP-335 Revision 2, Section 2.3 MRP-267 Revision 1, Section 3	The NRC staff has revised the subject paragraph to read: "…The use of peening in the US nuclear industry on safety related components, to date, has been applied to steam generator tubes and repaired reactor vessel closure head penetration nozzles (e.g., abrasive water jet peening). The NRC has not approved reduction in inspection frequency as a result of peening these components, however…"
28	Section 4.1 Page 18	Peening of nuclear reactor vessel internals and piping has been conducted outside the United States. Based on available post-peening inspection data, it appears that the peening has been effective in reducing component cracking. Communications between the NRC and regulators in other nations have not produced evidence that inspection credit has been given by regulatory authorities having jurisdiction for peening.	MRP understands that inspection credit has been approved by the Japanese regulator in response to utility request for peening mitigation performed meeting Japanese requirements.	Japanese Require-ments	The NRC staff does not have a document in house and has not seen a document in the public domain that show that the Japanese government regulator has officially approved the inspection credit for peening at nuclear plants in Japan. If MRP provides a document to show such an approval, the NRC staff would revise the subject paragraph in the draft SE accordingly.
29	Section 4.2 Page 20	…if the NRC staff discovered a deficiency in MRP's analysis to support for the proposed inspection interval…	The text should be revised to state: "*…if the NRC staff discovered a deficiency in MRP's analysis to support ~~for~~ the proposed inspection interval…*"	Editorial	The NRC staff has revised the draft SE accordingly.
30	Section 4.3.1 Page 20	The NRC notes that MRP-335R2 permits the post peening surface stress of the peened component to be 0 ksi (i.e., not to be in compression). Additionally, MRP-335 permits tensile stresses as depth increases to the required peening depth (i.e., 0.04 in. (1 mm) for DMWs. Furthermore, the NRC notes that compressive stresses from peening are expected to relax because of thermal cycling as the plant ages. This indicates that tensile stresses over the peened depth could increase by the end of the plant's life.	This is an important misinterpretation of the performance criteria and technical basis in MRP-335, Revision 2. The 0 ksi stress limit for DMWs at the surface including operating stress must include the effect of load cycling shakedown and thermal stress relaxation. Thus the tensile stresses that are allowed to exist below the surface in the bounding case meeting the performance criteria when the surface stress is 0 ksi already reflect changes over plant life. Any further changes would cause the surface stress criterion not to be met. The NRC discussion is not crediting the level of conservatism inherent in the MRP approach. Furthermore, because the operating stresses vary across the surface component, a peening process just meeting the bounding stress effect of the performance criteria would result in a significantly more compressive stress profile over most of the treated surface.	MRP-335 Revision 2, Sections 2.4, 4.2.1, and 4.2.8.2	The NRC staff does not plan to change the subject paragraph. However the NRC staff will add the following sentences to the original text. "...Notwithstanding the above, the NRC notes that the MRP has stated that the stated 0 ksi stress level exists at the end of plant life. The NRC notes that no information is provided in MRP-335R2 to determine what the required stress level will be at the time of peening or how that will change with time. The NRC does not consider this to be a serious deficiency as this information can be provided in plant specific documents..."

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
31	Section 4.3.1 Page 20	Section 5.2.2.1 states: For DMW, for an axial crack with an initial through-wall fraction of 0.7% (0.02 inches) through wall, the peening stresses are predicted to arrest growth entirely. Peening biases the stress intensity factor lower and this acts to slow or stop growth.	Section 5.2.2.1 actually states the following: ***~~For DMW, f~~ F****or an axial crack with an initial through-wall fraction of 0.7% (****0.5 mm*** ***~~0.02 inches~~****)* ***~~through wall~~****, the peening stresses are predicted to arrest growth entirely.* ***Figure 5-7 shows the stress intensity factor at the deepest crack point vs. through-wall fraction for the circumferential crack as it goes through-wall. Generally speaking, ~~P~~ p****eening biases the stress intensity factor lower and this acts to slow or stop growth.*	MRP-335 Revision 2, Section 5.2.2.1	The NRC staff has revised the draft SE accordingly.
32	Section 4.3.1 Page 21	While the NRC staff is aware of some data that indicate that PWSCC cracks may not initiate in the presence of low tensile stresses in a meaningful period of time, and it is conducting confirmatory research in this area, …	This is a misleading statement that implies that there is not consensus in the research community that sufficiently large tensile stresses are necessary for PWSCC initiation over plant time scales (i.e., plant service life). There are substantial data that demonstrate the sensitivity of the initiation time to the stress level, including data presented by Pacific Northwest National Laboratory (PNNL). Following are example references: • C. Amzallag, J. M. Boursier, C. Pages, and C. Gimond, "Stress Corrosion Life Assessment of 182 and 82 Welds used in PWR Components," *Proceedings of the 10th International Conference on Environmental Degradation in Nuclear Power Systems – Water Reactors*, NACE, 2001. • J. M. Boursier, F. Vaillant, P. Saulay, Y. Brechet, and G. Zacharie, "Effect of the Strain Rate on the Stress Corrosion Cracking in High Temperature Primary Water: Comparison between the Alloys 690 and 600," *Proceedings of the 11th International Conference on Environmental Degradation of Materials in Nuclear Power Systems – Water Reactors*, p. 199-207, NACE, 2003. • S. Le Hong, "Influence of Surface Condition on Primary Water Stress Corrosion Cracking Initiation of Alloy 600," *Corrosion*, v57, n4, p323-333, NACE International 2001. • R. S. Pathania, A. R. McIlree, and J. Hickling, "Overview of Primary Water Cracking of Alloys 182/82 in PWRs," *Proceedings of the International Symposium Fontevraud V, Contribution of Materials Investigation to the Resolution of Problems Encountered in Pressurized Water Reactors*, paper 025, SFEN September 2002. • F. Vaillant, et al., "Influence of a Cyclic Loading on the Initiation and Propagation of PWSCC in Weld Metal 182," *Proceedings of the 12th International Conference on Environmental Degradation of Materials in Nuclear Power Systems – Water Reactors*, p557-565, TMS, 2005. • EPRI *Materials Handbook for Nuclear Plant Pressure Boundary Applications (2013)*, EPRI 3002000122. • EPRI *Steam Generator Reference Book*, Revision 1, 1994, EPRI TR-103824-V1R1.	Papers and Reports by Various Investigators	The subject statement in the draft SE does not imply that the research community has no consensus that shows that sufficiently large tensile stresses are necessary for PWSCC initiation over plant time scales. The NRC is moving forward with confirmatory research in this topic. The NRC does not plan to revise the subject statement in the draft SE.

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33	Section 4.3.1 Page 21	Given that lack of crack growth in the peened region is an essential part of the MRP-335R2 analysis, and that to preventing crack growth requires compressive stresses throughout the peened depth, the NRC finds that the proposed residual stress field—and, therefore, the input variables concerning compressive stresses at the proposed depth of peening—do not support the proposed inspection intervals.	This is not the case and a key misunderstanding of the topical report. The MRP technical basis is not dependent on cracks being arrested by the peening effect. The benefit is provided through prevention of new PWSCC initiations, with pre-peening and follow-up inspections to address pre-existing flaws. This misunderstanding appears to be a key part of the basis for Condition 5.3.1.	MRP-335 Revision 2, Sections 1.3, 2.3, and 6	Section 4.3.1 of the SE quotes sections 2.3.2; 5.2; and 5.2.2.1 of MRP-335R2. Each of these quotations establishes the criterion that there is a depth to which compressive stresses exist and within which cracks will not propagate. These statements also establish the apparent conditions under which crack growth modeling was conducted. The NRC staff cannot ignore these statements in reaching its regulatory conclusions. The NRC does not plan to revise the subject statement.
34	Section 4.3.1 Page 21	Additionally, the NRC staff notes that there are significant uncertainties associated with the calculation and measurement techniques for residual stresses. Continuing work in round robin testing and measurements of welds with known weld fabrication parameters in Phase 2 of the Joint EPRI/NRC Weld Residual Stress Validation program has shown a plus or minus 20 ksi (140 MPa) range of stresses. A recent paper, PVP2015-45950, provided during the ASME 2015 Pressure Vessels & Piping Conference, showed a range of 100 MPa to 250 MPa in a comparison of several types of residual stress measurements. It also found the average calculated residual stresses using the xLPR Version 2.0 Code.	The discussion of the uncertainty in residual stress measurements is misleading in that there is not a one-to-one correspondence between the uncertainty in the stress level before shakedown and thermal stress relaxation effects and the stress level after these effects. The driving force for stress relaxation due to shakedown and creep is reduced as the magnitude of the compressive stress is reduced. Thus, the uncertainty in the initial stress cannot be applied directly to the final stress state at the end of the plant operating life. In addition, NRC will have the opportunity to review individual relief requests that discuss how residual stress measurement uncertainties were treated in the work showing that the performance criteria are met.	MRP-267 Revision 1, Sections 4.3 and 4.4	In the subject paragraph, the NRC staff did not consider the impact of the shakedown and thermal stress relaxation effects on the residual stresses throughout the remaining life of the plant. The NRC staff's main concern is the uncertainties associated with the calculation and measurement techniques for residual stresses as shown in the reference paper, PVP2015-45950. The NRC staff finds that regardless whether it is the initial residual stress or final residual stress, the uncertainties exist and need to be resolved.
35	Section 4.3.1 Page 21	A recent paper, PVP2015-45950, provided during the ASME 2015 Pressure Vessels & Piping Conference, showed a range of 100 MPa to 250 MPa in a comparison of several types of residual stress measurements. It also found the average calculated residual stresses using the xLPR Version 2.0 Code.	This does not make sense as written. It appears that this should be corrected to the following: "A recent paper, PVP2015-45950, provided during the ASME 2015 Pressure Vessels & Piping Conference, showed a range of 100 MPa to 250 MPa in a comparison of several types of residual stress measurements~~. It also found~~ ***and*** the average calculated residual stresses ~~using~~ ***used in*** the xLPR Version 2.0 Code."	Editorial	The NRC staff has deleted the last sentence in the subject paragraph.
36	Section 4.3.1 Page 21	Section A.4 of MRP-287, "Primary Water Stress Corrosion Cracking (PWSCC) Flaw Evaluation Guidance," suggests the possible use of 10 ksi (70 MPa) as an error band. These examples of uncertainty in residual stress measurement and calculation are recent findings of current state-of-the-art methods for performing these analyses.	Section A.4 of MRP-287 suggests possible use of an error band of ±10 ksi√in (±11 MPa√m) in terms of the stress intensity factor calculated based on stress analyses versus that based on stress measurements. The draft SE text is incorrect that Section A.4 of MRP-287 discusses an error band in terms of stress. MRP-287: *Materials Reliability Program: Primary Water Stress Corrosion Cracking (PWSCC) Flaw Evaluation Guidance (MRP-287)*, EPRI, Palo Alto, CA: 2010. 1021023. [freely available for download at www.epri.com]	MRP-287, Section A.4	The NRC staff has deleted the following sentence: Section A.4 of MRP-287, "Primary Water Stress Corrosion Cracking (PWSCC) Flaw Evaluation Guidance," suggests the possible use of 10 ksi (70 MPa) as an error band…"

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
37	Section 4.3.1 Page 21	Therefore, to ensure that the post peening stresses are sufficient to prevent crack growth to the prescribed peening depth for the life of the plant, given the uncertainties associated with residual stress measurement, the NRC staff has established Condition 5.3.1 to ensure that the proposed performance criteria for peening will provide reasonable assurance of structural and leak tight integrity of the subject components.	Condition 5.3.1 is not necessary because peening meeting the performance criteria of the topical report will prevent new PWSCC initiations and because the combination of pre-peening and follow-up examinations addresses the concern for pre-existing PWSCC flaws. This draft SE discussion refers to preventing crack growth and not preventing crack initiation. The uncertainty in residual stress measurements cannot be applied directly to the final stress state (after shakedown and thermal stress relaxation) that is required to meet the performance criteria. The driving forces for stress shakedown and thermal relaxation decrease as the magnitude of the compressive stress at the surface is reduced. With regard to the residual stress profile present beyond the surface region of compressive stresses due to peening, probabilistic distributions are applied in MRP-335, Revision 2 to model variation and uncertainty in the stress profile. Finally, in addition to being unnecessary, the approach of Condition 5.3.1 is impractical and would not be met by the peening approaches now being planned for application to U.S. PWRs.	MRP-335 Revision 2, Sections 1.3, 2.3, and 6 MRP-335 Revision 2, Table A-3, Table B-4	Condition 5.3.1 states that **"...**For the remaining life of a plant, from 0.002 in. (0.051 mm) below the peened surface to the depth prescribed in MRP-335R2 for that component, the maximum stress at operating conditions shall not be greater than 0 ksi..." The NRC finds that Condition 5.3.1 is necessary for three reasons: First, 0 ksi at the surface is necessary to address uncertainties in the measurement and calculation of residual stresses. Second, some sections of MRP-335R2 indicate that there will be a compressive region in which cracks will not grow. The NRC cannot make a finding, i.e., that no compressive stresses are required below the surface of the component when that finding is contradicted by the topical report. Third, the NRC conducted independent crack growth calculations and found that, if the industry proposed peening stress and depth were used, the industry proposed inspection plan would not find all the necessary preexisting postulated cracks prior to leakage. Condition 5.3.1 resolves the inconsistency in the wording of MRP-335R2 and, based on NRC deterministic calculations provides reasonable assurance that cracks will be found. Therefore, the NRC finds that the topical report does not support the proposed inspection intervals and requires conditioning. The NRC staff does not plan to revise the subject paragraph in the draft SE.

38	Section 4.3.1 Page 22	The extent of peening coverage for DMWs is provided by Section 4.2.1 of MRP-335R2. The NRC staff notes that the extent of coverage does not have a minimum distance beyond the susceptible material on the wetted surface. Because of uncertainties in measurement of residual stresses, and slight variability which can be expected from location to location in performing the peening process, the NRC finds that some overlap of peening coverage onto non-susceptible material is appropriate.	In fact, the performance criteria of the topical report do require that such an overlap distance beyond the susceptible material be defined and applied. The performance criteria state that the appropriate minimum overlap shall be determined for the particular peening process to provide high assurance that the areas susceptible to PWSCC receive the required peening effect. So, it is inaccurate to state that no overlap beyond the susceptible material is required. Also, the uncertainty in measurement of residual stress is irrelevant to the discussion as the entire area of Alloy 82/182 material is included in the peening coverage.	MRP-335 Revision 2, Section 4.2.8.1	MRP-335R2, Section 4.2.8.1, page 4-8, states that "... The boundaries of the area required to be effectively peened shall be extended beyond the PWSCC susceptible area a suitable distance to provide high assurance that the areas susceptible to PWSCC receive the required peening effect..." However, MRP-335R2 does not provide specific overlap area. Condition 5.1.3 provides the specific areas that peening coverage must be achieved. Condition 5.1.3 requires that the peening coverage for DMWs, as provided by Section 4.2.1 of MRP-335R2, shall be extended at least 0.25 in. (0.64 cm) beyond the susceptible material. The NRC acknowledges that some degree of overlap is, in fact required by the topical report but that the NRC finds that a minimum specific overlap is required, i.e., not less than 0.25 inches. In addition, the NRC required overlap is consistent with the required overlap for inspection purposes. The NRC does not plan to revise the subject statement in the draft SE.
39	Section 4.3.1 Page 22	To determine the appropriate delay for the post-peening follow-up inspection and final inspection frequency, a range of crack growth rates should be considered.	This is precisely the reason for the probabilistic calculations. The probabilistic approach considers the full range of crack growth rate behavior applicable to the PWSCC-susceptible materials. The draft SE is misleading in implying that the topical report does not consider an appropriate range of crack growth rates. Furthermore, it is trivial to adjust deterministic crack growth time results presented in the topical report for a different crack growth rate material factor. The time versus crack size is simply scaled by the material factor. In addition, it is noted that the ASME Section XI approach to deterministic PWSCC crack growth calculations is to use a conservative mean for the crack growth rate (75^{th} percentile).	MRP-335 Revision 2, Figures A-12, A-13, B-23, and B-24 ASME Section XI	The subject statement summarized how MRP performed the deterministic analysis and the subject statement is located under the heading of the deterministic analysis in the draft SE. The NRC staff recognizes that in the probabilistic calculations, MRP did use various crack growth rates. However, the probabilistic calculations are summarized in a separate section of the draft SE. The NRC staff finds that a range of crack growth rates should be considered in the deterministic analysis. The NRC staff does not plan to revise the subject statement in the draft SE.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
40	Section 4.3.2 Page 23	However, MRP-335R2 provides no information concerning the post peening stresses that will exist following peening at the peened surface other than to indicate that these stresses will be compressive and that compression will exist down to either 0.25 mm or 1.0 mm depending on the location within thickness of the RPVHPN wall.	This statement is misleading as it implies that MRP-335R2 has a shortcoming because it does not provide this information. On the contrary, the performance criteria are intended to define bounding stress conditions following peening. NRC has stated that the analysis in the topical report should assume the bounding effect of peening meeting the performance criteria such that it generically covers peening processes for which inspection relief will be sought. MRP-335R2 takes this approach. Also, the topical report is clear that the depth of compression reflects the residual stress state following peening and that this is sufficient to support the specified inspection relief. The draft SE misstates the purpose of the peening depth. The depths specified for the compressive residual stress ensure that the peening effect has significant penetration into the treated material. However, it is not necessary for the compressive depth with consideration of operating stresses to be precisely quantified because peening mitigation is effective because it prevents new PWSCC initiations.	NRC 2nd RAI on Topical Report (ML15057A028) MRP-335 Revision 2, Sections 2.3, 5.1, 4.2.8.1, and 4.3.8.1	The subject statement is part of summary of the stress profile of the RPVHPN under the deterministic analysis heading in the draft SE. The NRC staff understands the performance criteria in terms of bounding stress conditions following peening in MRP-335R2. However, the subject statement reflects the information that the NRC staff was looking for but which was not in MRP-335R2, i.e., what are the post-peening stresses at the peened surface immediately after peening. As discussed in above, the NRC staff disagrees with MRP regarding the purpose of the peening depth.

41	Section 4.3.2 Page 23	MRP-335R2 noted that compressive stresses induced by peening would be reduced over time because of thermal cycling of the plant. The NRC interprets that information to indicate that the tensile stress fields MRP-335R2 proposes to exist under operating conditions will increase with time.	This statement is incorrect. The performance criteria for the bounding stress effect apply for at least the remaining service life of the peened component. The effect of thermal cycling must be considered when meeting the performance criteria. The correct interpretation is that the initial stress field must be more compressive than the bounding condition conservatively assumed in the analyses of the topical report.	MRP-335 Revision 2, Sections 2.4, 4.3.1, and 4.3.8.2	The NRC has revised the subject paragraph to read: "...MRP-335R2 noted that compressive stresses induced by peening would be reduced over time because of thermal cycling of the plant. However, MRP-335R2 does not provide a concise method to calculate this decay. Additionally MRP-335R2 establishes acceptance criteria at end of plant life. Therefore, the NRC finds that the required surface stress at time of peening will be an undefined value which is more compressive that the acceptance criteria specified in the document..."
42	Section 4.3.2 Pages 23-24	MRP-335R2 proposes that these cracks will all be identified through inspections or, if not identified, will fail to grow 100 percent through wall in the normal life of the plant (40 years). The NRC staff notes that the plant life under license renewal and, potentially, subsequent license renewal, are not addressed in MRP-335R2.	This is a misinterpretation of the operational service periods covered by the calculations. For DMWs, the probabilistic analyses presented in MRP-335R2 assume an operational service period of 80 years, with peening after 25.5 or 28.5 years of operation. For RPVHPNs, the probabilistic analyses presented in MRP-335R2 assume an operational service period of 60 years, with peening after 24 or 34 years of operation. The probabilistic risk results do not show an increasing risk with time after peening such that the probabilistic results are considered applicable for license renewal and subsequent license renewal periods.	MRP-335 Revision 2, Table A-2, Table A-10, Section A.8.1.2, Table B-2, Table B-10, Section B.8.1.2	The NRC staff recognizes that the probabilistic analyses presented in MRP-335R2 do include the license renewal period (60 years) and subsequent license renewal period (80 years). However, the NRC staff could not find the information in the deterministic analyses presented in MRP-335R2 regarding license renewal period (60 years) and subsequent license renewal period (80 years). Nevertheless, the NRC staff has revised the draft SE to read: "...The NRC staff notes that the plant life under license renewal and, potentially, subsequent license renewal, are not addressed in the deterministic analyses presented in MRP-335R2. However, the probabilistic analyses presented in MRP-335R2 include the license renewal period (60 years) and subsequent license renewal period (80 years)..."

43	Section 4.3.2 Page 24	The NRC staff also notes that MRP-335R2, Table 5-2, states that median values were generally used in analyses as opposed to statistical distributions.	Table 5-2 lists inputs for deterministic analyses. Distributed inputs are meant to be applied in probabilistic analyses. These input parameters are distributed in the probabilistic analyses presented in Appendices A and B of MRP-335R2. Section 5.2.2 of MRP-335R2 states: "*In general, the inputs used for the deterministic calculations in this section are taken to be the median of the respective distributed inputs for the analogous, hot component, probabilistic analyses in the following section.*"	MRP-335 Revision 2, Section 5.2.2	The NRC staff has revised the draft SE to read: "...The NRC staff also notes that MRP-335R2, Table 5-2, states that median values were generally used in deterministic analyses as opposed to statistical distributions. In the present case, in which minimum and maximum times to inspections are of interest, the NRC finds it appropriate to use both low and high input variables, e.g., crack growth rates and residual stress measurements to bound the time required for crack growth in the deterministic analysis…"

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44	Section 4.3.2 Page 24	The NRC staff notes that research concerning weld residual stress profiles indicates that they are variable and should be represented by statistical distributions.	In fact, the probabilistic analyses, not deterministic analyses, are the appropriate approach to treatment of the welding residual stress using statistical distributions. The probabilistic calculations do include weld residual stress profiles represented by statistical distributions. The draft SE is misleading in that it implies that this is a shortcoming of the topical report.	MRP-335 Revision 2, Table A-3, Table B-4	The NRC staff has revised the subject sentence in the draft SE to read: "...The NRC staff notes that research concerning weld residual stress profiles indicates that they are variable. The NRC staff finds that deterministic evaluation should consider reasonably diverse cases of crack growth, initial crack depth, and residual stress distribution to demonstrate whether minimum and maximum inspection intervals will identify all preexisting cracks. The NRC staff notes that this effort is independent of any probabilistic evaluation…"
45	Section 4.3.2 Page 24	…the NRC staff concludes that the proposed inspections will not be able to identify all cracks that were not identified at the time of peening before the cracks growing through wall…	This statement is misleading in that it implies that identifying all cracks prior to the cracks growing through wall is necessary for appropriate inspection relief. This is not a requirement for unmitigated Alloy 600/82/182 components. Inspections are performed to maintain an acceptably low probability of through-wall penetration and leakage and an extremely low probability of pressure boundary rupture. Because probability of detection is always less than 100%, no inspection program can ensure 100% confidence that through-wall penetration will not occur. The key relevant point is that because peening prevents new initiations, the probability of leakage is reduced even considering relaxation in ISI intervals. With regard to any cracking initiating on the wetted surface of the J-groove weld, the required examinations for unmitigated heads would not prevent leakage regardless of the ISI interval in the case that the cracking remains in the weld. Peening has the benefit of reducing the probability of leakage due to weld cracking because future initiations on the weld wetted surface are prevented. MRP-117: *Materials Reliability Program Inspection Plan for Reactor Vessel Closure Head Penetrations in U.S. PWR Plants (MRP-117)*, EPRI, Palo Alto, CA: 2004. 1007830. [freely available for download at www.epri.com]	MRP-117	The NRC staff evaluated this request in a manner similar to all other requests for relief for nickel alloy material, i.e., will the proposed inspections detect cracks which will not be detected by the inspection method used (0.1x wall thickness for UT) for the range of crack growth and residual stresses that may be present. In the present case, given the inspection intervals proposed and a reasonable set of crack growth rates and residual stresses, some postulated cracks may grow through wall prior to detection by proposed inspection. The NRC staff considers this to be unacceptable. The original text is not changed.

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46	Section 4.3.2 Page 24	In addition to the above analysis, the NRC staff notes that one of the conclusions which is contained in MRP-335R2 section 5.4 (which provides conclusions for both DMWs and RPVHNs and J-Groove welds) states: Cracks present at the time of peening and located within a surface compressive stress layer resulting from peening are assumed to be arrested as they are not acted on by tensile stresses under normal operating conditions. The above conclusion contradicts statements in MRP-335R2 that permit tensile stress to exist in the peened depth. Given that this statement is not specifically limited to one type of component and that the section applies to DMWs, RPVHNs, and J-Groove welds, the NRC interprets this statement as applying to all the subject components. While the relationship between this conclusion and the analyses discussed above is not completely clear to the NRC staff, the NRC staff believes that a fundamental principle of the peening analyses presented in MRP-335R2 is that cracks within the peened depth (either 0.25 mm or 1.0 mm depending on location) should not grow because they will not be subjected to tensile stresses (i.e. the stress field under operating conditions must be compressive at the surface and remain compressive down to the specified depth of peening). This requirement cannot be met with the operating stress field proposed by MRP-335R2, as discussed above. To meet the requirement of the MRP-335R2 conclusion, it is necessary for the stress field under operating conditions to be compressive at the surface and remain compressive at a value of not less than 0 ksi at the prescribed peening depth to ensure no crack growth.	This paragraph in the draft SE represents a key misinterpretation of the topical report. The conclusion in Section 5.4 that is cited is just making the point that cracks contained in locations where the residual plus normal operating stress is compressive are arrested. The draft SE implies that the definition of the required peening depth based on the residual stress was a very significant oversight. That is not at all the case. The benefit of peening due to prevention of future PWSCC initiations is sufficient. The probabilistic analysis documented in MRP-335, Revision 2 conservatively assumes the bounding stress effect permitted by the performance criteria such that at certain locations on the component surface the post-peening stresses do not arrest flaws regardless of how shallow they are modeled to be. The topical report applies the same type of depth requirement that has been adopted by the ASME Code after a consensus process. That requirement is the appropriate depth requirement as residual stress measurements are used to demonstrate penetration of the peening stress effect into the treated component.	MRP-335 Revision 2, Sections 1.3, 2.3, and 6	The MRP commented that "... The benefit of peening due to prevention of future PWSCC initiations is sufficient..." The NRC staff does not agree with above MRP's comment if a licensee requests relief from current inspection requirement. MRP's argument is that any cracks exist in the peened component would be identified during the pre-peening inspection and follow-up inspection. The NRC staff believes that for those small cracks that are located within the depth of the effective peened volume and are missed by the pre-peening inspection and follow-up inspection, the compressive stresses caused by peening will prevent these cracks from growing. It is the effect of the compressive stresses and the prevention of crack initiation as a result of peening that give the NRC staff confidence to approve the inspection relief.

47	Section 4.3.2 Pages 24-25	Therefore, because the analyses in MRP-335R2 did not consider an appropriate range of residual stress profiles in analyzing time to leakage of postulated cracks, and the conclusion drawn in section 5.4 of the report requiring compressive stresses down to the prescribed peening depth is in conflict with the proposed operating stresses, the NRC staff has established Condition 5.3.1 to provide reasonable assurance that the proposed inspection intervals will provide reasonable assurance of structural and leak-tight integrity of the subject components.	Given the technical accuracy and misinterpretation issues cited, Condition 5.3.1 is unnecessary. The probabilistic analysis appropriately considers the variability and uncertainty in the crack growth rate time, and the conclusion cited in Section 5.4 does not represent a condition that is credited in the probabilistic analysis (it merely states that cracks contained in compression are arrested). Peening is effective by preventing new PWSCC initiations. Pre-existing flaws are addressed by pre-peening and follow-up inspections. The uncertainty in residual stress measurements cannot be applied directly to the final stress state (after shakedown and thermal stress relaxation) that is required to meet the performance criteria. Finally, in addition to being unnecessary, the approach of the NRC condition is impractical and would not be met by the peening approaches now being planned for application to U.S. PWRs.	MRP-335 Revision 2, Sections 1.3, 2.3, and 6	Condition 5.3.1 states that **"...**For the remaining life of a plant, from 0.002 in. (0.051 mm) below the peened surface to the depth prescribed in MRP-335R2 for that component, the maximum stress at operating conditions shall not be greater than 0 ksi..." The NRC staff notes that 0 ksi at the surface is to address measurement and modeling uncertainty. Compressive stress at depth is required because under the MRP proposed inspection intervals cracks will grow through wall undetected if nominally 0 stresses are present only at the surface.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
48	Section 4.3.2 Page 25	The NRC staff notes that there are uncertainties associated with the calculation of residual stresses, as stated in the Stress Profile section for DMW above. Additionally, the NRC staff notes that it has rejected the previous industry proposal of limiting the area of interest on the nozzle surfaces that make up the reactor coolant pressure boundary to the surfaces with greater than 20 ksi when the NRC issued its first revision of Order EA-03-009, "First Revised Order Modifying Licenses," in February 2004.	This discussion creates a significant misimpression by ignoring the fact that the NDE coverage area in Figure 2 of ASME Code Case N-729-1 was based on representative finite-element analysis calculations to determine a region encompassing all areas where the stress exceeds +20 ksi tensile. Furthermore, the current inspection requirements of ASME Code Case N-729-1 as subject to NRC conditions include the 20 ksi criterion as part of the analysis (subject to prior NRC approval) specified in its Appendix I to develop an alternative examination zone. So, the current requirements for unmitigated heads as mandated by NRC make substantial use of the 20 ksi criterion. (The First Revised Order, which has been superseded by N-729-1, does in fact include the 20 ksi stress level in its coverage definition.) In summary, the NRC discussion does not support its conclusion that Condition 5.2.2 is necessary. MRP-95R1: *Materials Reliability Program: Generic Evaluation of Examination Coverage Requirements for Reactor Pressure Vessel Head Penetration Nozzles, Revision 1 (MRP-95R1)*, EPRI, Palo Alto, CA: 2004. 1011225. [NRC ADAMS Accession No.: ML043200602]	MRP-95R1 ASME Code Case N-729-1	Condition 5.2.2 states that "...The extent of peening coverage for RPVHPNs and associated J-groove welds shall extend to cover the areas defined by the surface examination requirements of Figure 2 of ASME Code Case N-729-1..." Appendix I to ASME Code Case N-729-1 provides an analysis procedure to define an alternative examination area or volume (zone) to that defined in Fig. 2 of N-729-1 if impediments prevent examination of the complete zone. Appendix I-2000 to N-729-1 requires plant-specific analysis to demonstrate that the stresses on the nozzle inside and outside surfaces remain below 20 ksi (tensile) over the entire region outside the alternative examination zone but within the examination zone defined in Fig. 2. In order to obtain the inspection relief as a result of peening, the NRC staff finds that the concept of an alternative area for peening coverage is not acceptable. The NRC staff permits licensees' to use alternative examination zone for the unmitigated RPVHPNs because they are examined per the code case, without inspection relief.
49	Section 4.3.2 Page 25	The NRC staff finds that the MRP calculations' use of a single crack growth rate based on the 75 percentile of the crack growth rate data in MRP-55 limits the effectiveness of the deterministic calculations.	This discussion makes a significant misimpression that the variability in the crack growth rate material factor was not considered in the MRP analyses. On the contrary, the full range of crack growth rate material variability was in fact considered in the probabilistic analyses. Furthermore, it is trivial to adjust the deterministic results presented in the topical report for other material factors by simply scaling the crack growth times with the material factor from the published MRP-55 or MRP-115 statistical distributions. In addition, it is noted that the ASME Section XI approach to deterministic PWSCC crack growth calculations is to use a conservative mean for the crack growth rate (75^{th} percentile).	MRP-335 Revision 2, Table A-8, Table B-8 ASME Section XI	The NRC staff notes that the subject sentence is a part of discussion of crack growth calculation in the deterministic analysis of the RPVHPN. Therefore, the subject sentence did not mention the crack growth rate variability in the probabilistic analyses. The NRC staff does not plan to revise the subject sentence in the draft SE.

50	Section 4.3.3 Page 26	The NRC staff identified inputs to MRP's probabilistic fracture mechanics analyses that contain significant uncertainties that can affect the final outcome of the analysis. The NRC staff has raised questions on some of these inputs, such as on the flaw initiation model and the weld residual stress profiles in the NRC's request for additional information. The NRC staff determined that MRP did not address the NRC staff's questions sufficiently. NRC evaluations of MRP's probabilistic fracture mechanics analyses have shown that several variables, such as α in the crack growth equation, with very large uncertainties, can significantly alter the conclusions if the data used are nearer to one end of the distribution rather than another. The NRC staff determined that further uncertainty analyses would need to be conducted to identify models and input distributions that would most benefit from additional data collection or testing.	It is unclear what specifically is needed to address the NRC staff's questions sufficiently. Previously accepted approaches were used to model residual stress profiles, and the uncertainty in the profiles was addressed through statistical distributions similar to the approach now being applied in the xLPR Project. The approach taken for the flaw initiation models is also similar to that being taken in the xLPR Project, the initiation models are fit to actual plant experience, and aggressive sensitivity cases are applied for the flaw initiation models.	MRP-335 Revision 2, Section 5.3, App. A, and App. B	The NRC staff is reviewing the validity of the xLPR program through verification and validation. The NRC staff will await the results of this effort before giving full consideration to xLPR methodologies. Any extensions of the xLPR approach will also need to undergo verification and validation of equal rigor. Due, at least in part, to the requested schedule for this safety evaluation, the NRC staff has neither fully reviewed nor written a safety evaluation on the probabilistic methods used in MRP-335R2. Until such time as such a review is requested by the MRP and completed by the NRC staff, the probabilistic analyses provided will be used to augment the deterministic analyses.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
51	Section 4.4.1 Page 27	However, the NRC staff questioned the acceptance criteria and disposition of flaws that are detected during the pre-peening examination.	The discussion that follows does not discuss or explain the NRC question of the acceptance criteria and disposition of flaws that are detected during the pre-peening examinations. Therefore, it is not clear why this this sentence is included in the draft SE.	Needed Clarification	The NRC staff has deleted the subject sentence from the draft SE.
52	Section 4.4.1 Page 27	MRP-335R2, Table 4-1, footnote 19(c)(2), states that “...if a surface-connected flaw is not removed, the weld may be peened while acceptability for continued service in accordance with -3132.3(a) is determined. If the weld is acceptable for continued service in accordance with -3132.3(a), the weld shall be placed into Inspection Items A-1, A-2, or B, and shall be re-examined in accordance with Note 5 of Table 1 of N-770-1. The flaw may subsequently be made acceptable for continued service in a subsequent outage in accordance with (3).”	MRP-335R2, Table 4-1, footnote 19(c)(2) is incorrectly quoted. This footnote states: “***If the*** ~~*if a surface-connected*~~ *flaw is not removed, the weld may be peened while acceptability for continued service in accordance with -3132.3(a) is determined. If the weld is acceptable for continued service in accordance with -3132.3(a), the weld shall be placed into Inspection Items A-1, A-2, or B, and shall be re-examined in accordance with Note (5) of Table 1 of N-770-1. The flaw may subsequently be made acceptable for continued service in a subsequent outage in accordance with (3).*”	MRP-335 Revision 2, Table 4-1	The NRC staff has revised the draft SE accordingly.
53	Section 4.4.1 Page 27	The NRC staff notes that this footnote makes no distinction between flaws identified during the period of follow-up inspections and flaws that may be detected following that period. The NRC finds that some distinction is required in the manner in which identified flaws are treated in these two periods. During the follow-up examination period, MRP-335R2 analyses demonstrate that flaws may be detected because of preexisting flaws and that the detection of a flaw in a follow-up examination period need not indicate a problem with the peening process. Alternatively, MRP- 335R2 indicates that preexisting flaws should not be identified following the follow-up examinations. As such, if a flaw is detected after the follow-up examination period , it is necessary to consider the potential that the peening process was ineffective in preventing crack initiati on or the growth of cracks that were wholly within the depth of peening at the time of peening. Therefore, the NRC staff finds that the proposed actions in regard to finding new cracks or crack growth after the follow-up examinations are not adequately supported by the analysis presented in MRP-335R2. To address this issue, the NRC staff has created condition 5.3.3 to ensure that the proposed inspection requirements in combination of this condition will provide reasonable assurance of structural and leak-tight integrity of the subject components	Section 4.4.1 is on Pre-Peening Examinations. This draft SE discussion is in regard to post follow-up examinations, not pre-peening examinations. This discussion should be re-located to Section 4.4.3, page 29, where the similar discussion related to RPVHPNs is located.	Editorial	The NRC staff has relocated the subject paragraph accordingly.
54	Section 4.4.1 Page 27	Alternatively, MRP-335R2 indicates that preexisting flaws should not be identified following the follow-up examinations.	This statement is incorrect. As made clear in Section 2.5.3 of MRP-335R2, the in-service inspections are part of the overall inspection regime to ensure an acceptably low nuclear safety risk and an acceptably low probability of through-wall cracking and leakage.	MRP-335 Revision 2, Section 2.5.3	The NRC staff has deleted the subject sentence from the draft SE.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
55	Section 4.4.1 Page 27 and similar wording in Section 4.4.3 Page 30	To address this issue, the NRC staff has created condition 5.3.3 to ensure that the proposed inspection requirements in combination of this condition will provide reasonable assurance of structural and leak-tight integrity of the subject components	The condition is unnecessary and inspection credit should not be automatically withdrawn as it does not credit the plant corrective action program, which would be triggered to review the implications of the crack detection for the effectiveness of the peening mitigation. Detection of a PWSCC flaw in the ISI examinations subsequent to the follow-up examination(s) does not necessarily indicate that the peening mitigation is not being effective. Instead, such a flaw detection may merely reflect the fact that the probability of flaw detection is always less than 100%. Condition 5.3.3 will substantially decrease the likelihood for plants to proactively mitigate by peening.	Plant Corrective Action Programs	Condition 5.3.3 states that "...The use of inspection schedules proposed in MRP-335R2 is prohibited for peened components in which surface-connected flaws or unexpected flaw growth is observed after completion of follow-up examinations, irrespective of whether a component is re-peened..." While the MRP comments on this issue regarding plant corrective action and less than certainty in identifying existing cracks are valid, the basis for the topical report is that new cracks will not initiate and that the initial and follow on inspections will identify existing flaws. If flaws are identified after follow on inspections are complete, evidence exists of a deviation from the expectations of the topical report. Due to the fact that peening is a new mitigation method and that the protected volume in the peened component is a very thin layer, the NRC finds that any deviation from the proposed peening alternative is sufficient to render the alternative unacceptable. The NRC staff does not plan to revise the subject statement in draft SE.
56	Section 4.4.2 Page 28	Follow-Up Examination	This subsection heading is extraneous, and should be removed.	Editorial	The NRC staff has revised the draft SE accordingly.
57	Section 4.4.3 Page 28	The NRC staff notes, through its flaw analyses, that fabrication defects allowed to remain in service or shallow subsurface flaws that may later be exposed to primary coolant after cycles of operation could cause a future initiation site for PWSCC.	The discussion in para. 4.4.3 in the first paragraph at the top of page 29 of the draft SE is not credible. Fabrication flaws remaining in service have shown no history of sudden failure, as is suggested by the writeup. As such, this statement is misleading, and should be removed. A more robust basis is needed to make such a statement. Also, it is recommended that the word “defect” be replaced with “flaw,” as it is more consistent with ASME code and other standard terminology. Section A.7.2 of MRP-115 reviews laboratory and plant investigations on the potential influence of fabrication flaws on PWSCC initiation. It concluded that “recent investigations appear to provide convincing evidence that hot and ductility-dip weld defects do not play a significant role in PWSCC initiation and propagation.” Furthermore, plant experience does not show evidence that weld fabrication flaws have played a significant role in PWSCC initiation for Alloy 82/182 dissimilar metal butt welds in PWR primary system piping. Peening reduces the risk of PWSCC, whether or not fabrication flaws are present, through its improvement of the stress condition at the wetted surface. MRP-115: *Materials Reliability Program Crack Growth Rates for Evaluating Primary Water Stress Corrosion Cracking (PWSCC) of Alloy 82, 182, and 132 Welds (MRP-115)*, EPRI, Palo Alto, CA: 2004. 1006696.	MRP-115	The NRC staff notes that since the publication of MRP-115 in 2004, large through wall flaws have occurred in the Alloy 82/182 dissimilar metal butt welds of the primary loop piping at North Anna in 2012. North Anna did not take a boat sample of the flaws; therefore, it is not clear whether the flaws at North Anna was caused by fabrication defects. However, the dissimilar weld was repaired during construction. The NRC is conducting research on the topic of weld flaws as initiators of PWSCC and interactions between the fabrication defect and PWSCC. The NRC does not plan to revise the subject sentence in the draft SE.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
58	Section 4.4.3 Page 29	The NRC staff has a reservation regarding the extension of the bare metal visual examinations.	It appears that NRC staff has misinterpreted how the bare metal visual examination (VE) intervals are set in MRP-335, Revision 2 for peened heads. As emphasized in MRP-335, Revision 2, the same basic VE intervals are already maintained for peened heads. For example, a cold head (EDY < 8) without previously detected PWSCC would require a VE every third refueling outage, or 5 calendar years, whichever is sooner. This is tightened to every other cycle upon peening to ensure that there is a VE either in the first or second refueling outage after peening. This can be extended back to the three cycle interval (or 5 calendar years, if sooner) only if there are no flaws unacceptable for continued service under -3130 or -3140 of N-729-1 detected in the first or second refueling outage following peening. For a non-cold head (EDY ≥ 8), the VE interval is each refueling outage before and after peening. So, the word "extended" in Note (10) of Table 4-3 of MRP-335, Revision 2 is being misinterpreted as an extension beyond that which is permitted for unmitigated heads. As mentioned, the cold head VE interval is more restrictive in the MRP-335, Revision 2 requirements than that for unmitigated heads when PWSCC has not been previously detected. MRP-335, Revision 2 provides a modest level of extension in the VE interval versus that for unmitigated heads only in the following circumstances: • Once a cold head reaches EDY ≥ 8, an unmitigated head would need to have the VE performed each refueling outage. The MRP-335, Revision 2 requirement is based on the EDY at the time of peening such that the switch to a VE every refueling outage would not be required as long as the peening was performed with EDY < 8. • An unmitigated cold head with previously detected PWSCC is required to perform the VE each refueling outage. MRP-335, Revision 2 allows this to be extended if peening is performed and no PWSCC is detected in the first or second refueling outage following peening. This modest credit is warranted if the follow-up examinations do not detect PWSCC. Moreover, it appears that the draft SE is not giving consideration to the benefit of the IWA-2212 VT-2 visual examinations of the head performed under the insulation through multiple access points that are required by MRP-335, Revision 2 for all refueling outages in which a VE is not required. Plant experience shows that periodic visual examinations performed under the insulation have been highly effective in detecting pressure boundary leakage prior to any discernible boric acid corrosion of carbon or low-alloy steel material. Large amounts of boric acid deposits are necessarily produced by leaks of sufficient magnitude to cool the pressure boundary metal to the point that a corrosive liquid environment can be sustained over a significant area. MRP-308: *Materials Reliability Program: Boric Acid Corrosion Testing: Implications and Assessment of Test Results (MRP-308)*, EPRI, Palo Alto, CA: 2011. 1022853. [freely available for download at www.epri.com]	MRP-335 Revision 2, Table 4-3 MRP-308	Condition 5.2.1 on page 30 of the draft SE requires that the bare metal visual examination (VE) of the peened RPVHPN be performed per 10 CFR 5055a(g)(6)(ii)(D) which requires: Hot head (EDY > 8): VE is performed on all reactor vessel head penetration nozzle (RPVHPN) every refueling outage (RFO). Cold head (EDY < 8): VE is performed every 3 RFO or 5 years, whichever is less. If PWSCC is found in a RPVHPN, VE is performed on all nozzles every RFO. MRP-335R2 proposes for peened RPVHPN: Hot Head: VE is performed every 2 RFO. During the RFO when VE is not performed, VT-2 is performed. Cold Head: VE is performed every 2 RFO. Every 3 RFO or 5 years whichever is less if no flaw is detected. VT-2 is performed whenever VE is not performed. The NRC staff's concern is that the recent operating experience in PWRs has shown that PWSCC has occurred on the cold head RPVHPNs. The NRC staff finds that VT-2 is not adequate as compared to the VE. Current inspection requirements have been effective in identifying degradation. It is not clear to the NRC staff that the proposed VT-2 would be sufficiently effective. The NRC staff notes that the bare metal visual examination is defense in depth. The NRC staff does not find that the proposed alternative has negated the need for defense in depth bare metal visual examination in accordance with current regulatory requirements. The NRC staff finds that it is necessary to retain the current regulatory requirements for the bare metal visual examination. The NRC staff has revised the draft SE to read: "The NRC staff views bare metal visual examinations as a defense-in-depth measure to address failures of mitigation actions, inspections or for locations in which inspections are not possible…" Also, the NRC staff has deleted the word "extension" that is associated with the bare metal visual examination on page 29 of the draft SE.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
59	Section 4.4.3 Page 29	For the cold head, the bare metal visual examination interval may be extended to every third refueling outage or 5 calendar years	MRP-335, Revision 2, Table 4-3, footnote 10(b) indicates that "*the interval for performance of a VE may be extended to every third refueling outage or 5 calendar years, whichever is less*." As the SE is referencing this footnote, the text should be revised to state: "*For the cold head, the bare metal visual examination interval may be extended to every third refueling outage or 5 calendar years****, whichever is sooner.***"	MRP-335 Revision 2, Table 4-3	The NRC staff has revised the draft SE accordingly.
60	Section 4.4.3 Pages 29-30	Furthermore, operating experience indicates that flaws that are repaired using the embedded flaw technique are subject to the identification of indications in follow-up inspections. These indications appear to be caused by weldability issues with the allow Alloy 52/152 weld material used in this repair technique. MRP-335R2 contains no analyses related to the effects of peening on ductility dip cracks, solidification cracks, or other fabrication defects associated with the repairs using embedded flaw technique on the RPVHPN.	This discussion is misleading as it does not discuss the much greater resistance to PWSCC of Alloy 52/152 weld materials compared to the original materials. The replacement Alloy 52/152 materials are much more resistant to PWSCC, such that the modest extension in inspection intervals (no greater than factor of 5) credited by the topical report would be supported by the Alloy 52/152 weld metal even if peening was not applied to those materials. Also the requirements for previously repaired head nozzles are covered by relief requests and SEs specific to the repaired locations. Thus, Condition 5.3.3 is not needed to address any potential concerns with RPVHPNs that were previously weld repaired. MRP-375: *Materials Reliability Program: Technical Basis for Reexamination Interval Extension for Alloy 690 PWR Reactor Vessel Top Head Penetration Nozzles (MRP-375).* EPRI, Palo Alto, CA: 2014. 3002002441. [freely available for download at www.epri.com]	MRP-335 Revision 2, Section 4.3.7 MRP-375	The NRC staff recognizes that Alloy 52/152 weld material has better resistance to PWSCC than Alloy 82/182 weld material. However, the operating experience has shown that repairing of RPVHPNs using embedded flaw technique (seal welds) that uses Alloy 52/152 weld filler metal has resulted in fabrication defects. Until such time as it is conclusively demonstrated that these fabrication defects do not serve as crack initiators or until it is demonstrated that the cracks do not pass all the way through the overlay material, the NRC staff does not find alteration of current inspection requirements acceptable. The NRC staff does not plan to revise the subject paragraph in the draft SE.
61	Section 4.4.3 Page 29	Alternatively, based on MRP-335R2 analyses, flaws identified after the period in which follow-up examinations are being conducted should not be preexisting flaws.	This statement is incorrect. As made clear in Section 2.5.3 of MRP-335R2, the in-service inspections are part of the overall inspection regime to ensure an acceptably low nuclear safety risk and an acceptably low probability of through-wall cracking and leakage. As the NDE probability of detection is always less than 100% for all inspection including for the pre-peening and following examinations, the ongoing ISI examinations are included in the inspection regime to address the residual possibility of pre-existing flaws not being detected in the pre-peening and follow-up examinations. Thus, MRP-335R2 does not presume that any PWSCC detected after the follow-up examination(s) necessarily is an indication that the peening is not being effective.	MRP-335 Revision 2, Sections 2.5.3 and 5.3, App. B	Identification of cracking after follow-up inspections is either due to failure of an inspection to detect a crack that it was expected to find (low probability event) or to an unanticipated event such as a new crack initiation (unknown probability event). Until reasonable assurance otherwise is established, the NRC staff must assume that newly identified cracking is due to an unanticipated event. The NRC staff does not plan to revise the subject paragraph in the draft SE.

#	Location in Draft SE	Draft SE Text in Question	MRP Comments on Factual Errors, Technical Accuracy Issues, Misinterpretations of Topical Report, or Clarity Concerns	Basis	NRC Staff Response
62	Section 4.4.3 Pages 29-30	Detection of flaws following the period in which follow-up examinations are being conducted must be considered to be a deficiency in the peening process. As such, remedial activities must address all nozzles in the reactor vessel head. … Therefore, the NRC staff finds that the proposed actions in regard to finding new cracks or crack growth after the follow-up examinations are not adequately supported by the analysis presented in MRP-335R2 unless the above issues are addressed. To address these issues, the NRC staff has created condition 5.3.3, as discussed above, to ensure that the proposed inspection requirements, in combination with this condition, will provide reasonable assurance of structural and leak-tight integrity of the subject components.	This is applying an overly conservative assumption, which essentially disregards the benefit of peening to the entire head if an indication is found in one penetration. The condition is unnecessary and inspection credit should not be automatically withdrawn as it does not credit the plant corrective action program, which would be triggered to review the implications of the crack detection for the effectiveness of the peening mitigation. This condition will substantially decrease the likelihood for plants to proactively mitigate by peening.	Plant Corrective Action Programs	MRP-335R2 has not provided the details of the plant corrective action program and factual basis to support its opinion. The NRC staff does not intend to revise the subject statement in the draft SE.