Comments on Code Case N-740-2 Version 11-15-2007

Introduction

1. In the REPLY paragraph, it is stated that all section XI references are to the 2007 edition of the ASME Code, Section XI. The NRC has not endorsed the 2007 edition in Title 10, Code of Federal Regulations, Part 50.55a. The NRC cannot approve a code case that uses an edition of the Code that the NRC has not endorsed in the regulation. The NRC suggests that the reference to the 2007 edition be removed. JT

2. Mitigation is not defined or addressed in the ASME Code. While an attempt is made in the General Requirements Section, mitigations should be defined when it is first used (in the reply). Ideally, however, this definition should be in the Code. O-24

3. In order to perform the evaluation in IWB-3640, the stress terms Pb, Pm, and Pe must be known. What value of "D" or "t" is used in these evaluations (e.g., $t = t_{wall}$, $t = t_{wall} + t_{overlay}$). O-49

Section 1

1. Under Section 1, General Requirements, the Definition for the Mitigative Weld Overlay should be changed to "…Weld overlay that is applied over material with no inside surface connected flaws or subsurface defects found during an examination performed in accordance with 2(a)(3) prior to the weld overlay being applied…" The "subsurface defects" is added to emphasize that the original weld must contain neither subsurface defects nor inside-surface connected flaws in order to be qualified for being a "Mitigative Weld Overlay". JT

2. The terminology for these overlays differs from that in NUREG-0313, Revision 2 (Standard, Designed, or Limited Service). How do these new terms compare to the terms in NUREG-0313? Should we be using similar terminology? O-52

3. In Section 1, for mitigative weld overlay change "preformed" to "performed".

4. Paragraph 1(a) states that "…This Case applies to austenitic nickel alloy and austenitic stainless steel welds between P-No. 8 or P-No. 43 and P-Nos. 1, 3, 12A, 12B, or 12C materials; between P-Nos 1, 3, 12A, 12B, and 12C materials, or between P-No. 8 and P-No. 43 materials…" This sentence is confusing. For clarification, the NRC staff suggests the following format:

> This Case applies to austenitic nickel alloy and austenitic stainless steel welds between the following items:
>
> P-No. 8 and P-Nos, 1, 3, 12A, 12B, and 12C.
> P-No. 43 and P-Nos, 1, 3, 12A, 12B, and 12C.
> P-No. 8 and P-No. 43
> Between P-Nos 1, 3, 12A, 12B, and 12C materials. JT, O-27

5. Paragraph 1(b) permits the overlay to extend to adjacent welds joining P-No 8 materials. It does not require it to extend to these welds. If the overlay does not cover the adjacent P-8 weld it may increase the ID tensile stresses of the SS to SS weld. Although there has not been any significant cracking of these welds in PWRs, the Code Case should indicate that in the event the overlay does not cover the SS-to-SS weld, the effects of the overlay on the residual stresses on the ID surface of the SS-to-SS weld should be minimal. O-33

6. Paragraph 1(b) permits the overlay to extend to adjacent welds joining P-No 8 materials; however, it is not clear whether the beneficial effects of the overlay apply to this weld also (i.e., it is not clear that the design must assess this condition or whether the overlay can simply be extended). O-50

7. Given that the definitions are not numbered, it is no longer clear whether 1(a) only applies to repair weld overlays or both repair and mitigative weld overlays. O-61

8. The NRC finds paragraphs 1(c), 1(c)(1), 1(c)(1)(a), 1(c)(1)(b), and 1(c)(2) regarding PWHT exemption unacceptable because the staff does not agree with paragraph 1(c)(1)(a) which defines the nominal weld thickness as the maximum overlay thickness. The NRC staff thinks that the nominal weld thickness should be defined as the maximum base metal (component) thickness. The staff needs to review the white paper. JT, TL

In the event that paragraph 1(c)(1) is retained, a figure that depicts the various definitions/terms would be useful. O-53

The term “nominal weld thickness” is confusing. O-62

9. 1(c)(2) states that Appendix I may be used for temperbead welding. Since this is a mandatory appendix that must be used when temperbead welding is performed to alleviate the need for PWHT, 1(c)(2) should be reworded to indicate "If ambient-temperature temper bead welding is used, Appendix I shall be used."

10. In paragraph 1(d), the surface where the overlay is to be applied must be inspected with PT. Given standard industry practice to inspect at least ½-inch beyond the area of interest and the requirements of 3(a)(2), the inspection extent in 1(d) should be ½-inch beyond the area where the overlay is to be deposited.

11. In 1(d)(2), the term “initial weld overlay layer” is used. This is confusing since this layer is applied per 1(d)(1) and this layer is not credited in meeting weld reinforcement design thickness requirements. Alternate terminology should be used to avoid confusion since this “layer” is not part of the overlay. TL

12. 1(d)(3) permits the application of an austenitic stainless steel filler material “layer” over stainless steel base metal to reduce the potential for hot cracking. Is there any specific type of austenitic stainless steel filler material that should or should not be used in this application? If so, this should be specified. TL

13. 1(d)(3) discusses that an austenitic stainless steel filler material may be used to reduce the potential for hot cracking. The paragraph does not state whether this is a single layer or layers. In one sentence, it implies it is a single layer and the next sentence implies it could be layers. If a single layer, the inconsistency between the two

sentences should be corrected. How is the amount of SS filler material that is needed to reduce the potential for hot cracking determined? O-5

14. The justification for the chromium values in 1(e)(2) should be provided. O-54

15. 1(f) discusses the weldability of irradiated materials. Although thermal fluence may be of concern, it is not clear that the fluence levels reported are those associated with fast or thermal neutrons. In fact, some references use the energy levels associated with fast neutrons when discussing the limits on fluence (from a weldability perspective). Please clarify. O-29

Section 2a

1. 2(a)(2), 2(a)(3) and possibly other paragraphs do not appear to address the situation when the safe end is a PWSCC susceptible material. In these cases, the flaw may grow into the material (or there could be pre-existing flaws in the material). As a result, it is not clear that postulating an axial flaw length of 1.5-inches (or the combined width of the weld plus buttering) is conservative for cases when the safe end is a PWSCC material. In addition, qualified examinations of the safe end material should be performed. This is not addressed in 2(a)(3). TL

2. Paragraph 2(a)(3) states that "…If an Appendix VIII, Supplement 10, or Supplement 2, as applicable, ultrasonic examination is performed prior to application of the overlay, and no inside-surface connected planar flaws are discovered, initial flaws originated from the inside surface of the weldment equal to 10% of the original wall thickness shall be assumed…". There are four possible outcomes of inspection results from the pre-installation UT of the original weld: (1) a subsurface flaw is detected, but no inner surface-connected flaw is detected, (2) a subsurface flaw is not detected, but an inner surface-connected flaw is detected, (3) both a subsurface flaw and an inner surface-connected flaw are detected, and (4) no flaws are detected. Paragraph 2(a)(3) is only applicable to Case (4) above. Crack growth calculations for Cases (1), (2), and (3) above can be handled by paragraph 2(a) which requires that crack growth be evaluated based on the examination results. Therefore, for clarification, paragraph 2(a)(3) should be revised to read "…If an Appendix VIII, Supplement 10, or Supplement 2, as applicable, ultrasonic examination is performed prior to application of the overlay, and no ~~inside-surface connected~~ planar flaws are discovered, initial flaws originated from the inside surface of the weldment equal to 10% of the original wall thickness shall be assumed…" JT

The basis for the 10% depth assumption in 2(a)(3) should be provided. Include in this information, the probability of detecting flaws between 10% and 75% through-wall, and the potential for flaws to grow (both in depth and length) during application of the weld overlay. TL, O-55

3. Paragraph 2(a)(4) requires that for cast austenitic stainless steel items, a 100% through wall flaw be assumed. Although the 100% through wall flaw assumption is acceptable, it may be impractical or create a hardship in the overlay design or installation. In these cases, an initial flaw with 75% through wall depth may be assumed in the crack growth calculation provided the required inspection volume is examined at a higher frequency than the requirements in paragraph 3(c). The subject weld shall be ultrasonically inspected during the first or second refueling outage following the weld

overlay installation. If UT is performed prior to weld overlay installation and after installation without detecting any planar flaws in the original weld and the weld overlay, the first or second refueling outage UT may be eliminated. After the first ISI examination, the required inspection volume shall be ultrasonically inspected every 10 years from the date of the installation until such time when UT is qualified to examine the CASS portion of the required inspection volume in accordance with the performance demonstration requirements of ASME Code, Section XI, Appendix VIII. After the subject weld is examined by qualified UT for the CASS material and no planar flaws are detected, the weld may be placed in the 25 percent sample inspection population per paragraph 3(c)(5). The inspection of the overlaid weld shall not be credited to satisfy the requirement of the twenty-five percent sample inspection every ten years of overlaid welds with non-CASS materials. JT

4. In 2(a)(4), the meaning of the phrase "consistent with the overlay examination volume in Figure 2" should be clarified. TL

5. In 2(a)(5), the second sentence is awkward. Suggest rewording. TL, O-15, O-64

6. 2(a)(6) Suggest rewording the 2nd sentence as follows: "…region of the pipe wall thickness which was not examined using an ultrasonic examination procedure meeting Appendix VIII for that region." In general, this sentence is awkward since it could be read that a 100% through-wall flaw (i.e., the "postulated worst-case flaw depth") must be added to the detected depth. Suggest rewording. TL, O-45

7. In 2(a)(6), for clarity instead of just referencing "(3), (4), or (5) above", the paragraph should indicate " 2(a)(3), 2(a)(4), or 2(a)(5) above." In addition, the paragraph numbers in this paragraph (and possibly others) should be in italics (since the Code Case numbering is in italics).

8. Figure 2 is referred to before Figure 1. O-63

Section 2(b)

1. 2(b)(1) does not appear to address the case when there is a PWSCC susceptible safe end. When wouldn't the requirements be satisfied by extending the overlay full thickness length beyond the projected flaw by $0.75\sqrt{Rt}$? Is "t" the overlay wall thickness, the combined thickness of the overlay and the original wall thickness of the pipe or nozzle, or just the nominal wall thickness of the pipe or nozzle?

Define R and t for the case where you have an overlay on a nozzle-to-pipe weld where $R_{noz} > R_{pipe}$ and $t_{nozzle} > t_{pipe}$. O-65

2. In 2(b)(1), there should be some stipulation on the proximity of the overlay to the safe end weld since the weld residual stress may be affected at the ID. O-16

3. In 2(b)(2), a figure would help clarify the slope. O-57

4. It is not clear why both 2(b)(3) and 2(b)(4) are needed. If 2(b)(3) is for a repair overlay and 2(b)(4) is for a mitigative overlay, it is not clear why 2(b)(6) is needed. If paragraph 2(b)(3) was intended to address the length of a repair overlay and 2(b)(4), the depth, 2(b)(4) has a length dimension in it. If not, the flaw of 2(b)(4) will always be larger

than the flaw of 2(b)(3). Paragraphs 2(b)(3), 2(b)(4), and 2(b)(6) should be clarified. TL, O-12, O-8, O-35

5. The phrase “for the entire circumference” in 2(b)(5) and 2(b)(6) should be clarified. Does this mean that the axial flaw can be anywhere around the circumference and it should be assumed to be at the worst possible location, or is it trying to express the view that the flaw affects the entire welded area and the overlay can credit none of the original material? TL, O-11, O-9, O-36

6. In 2(b)(6), the assumption of 1.5-inch or the combined width of the weld plus buttering does not account for configurations involving a safe end made of PWSCC susceptible material such as Alloy 600. See comment 1 in Section 2a. TL

7. 2(b)(6) should specify what is considered limiting. Is it the thickest overlay? O-10

8. 2(b)(8) discusses the effects that weld shrinkage could have on the piping system and that it should be assessed. However, the code case does not discuss whether these stresses should be considered in the design of the overlay (i.e., axial tension will also be a loading on the overlay and should be considered as an increase in the axial membrane tensile stresses. This stress should be classified as a secondary stress). In addition, guidance should be provided on how to determine these stresses since a simple mockup would not necessarily match all of the restraint that may be provided by the connected piping systems. O-38

9. 2(b) references IWA-4311 and IWB-3640, IWC-3640, and IWD-3640; however, none of these sections really describes how to design a weld overlay. For example, what material properties are used (i.e., the base material properties for the weld material – Alloy 690 for Alloy 52/152 weld metal). This should be clarified. O-6, O-32, O-39, O-44

More generally, guidance should be added on how to perform analyses in support of overlays. For example, what material properties are used, what crack growth rates are used for the overlay material, what are the important parameters in determining the weld residual stresses (e.g., weld sequencing, with or without water in the pipe, effects on adjacent pipes, etc).

Section 3

1. The NRC does not accept achieving less than 100% coverage for a preservice examination. Conversely, if 100% coverage can be obtained on a preservice examination, then 100% coverage should be able to be achieved during an inservice inspection examination. When the weld involves cast austenitic stainless steel, less than 100% coverage can be accepted provided the crack growth analysis is based on an assumption of a 100% through wall flaw as outlined in 2(a)(4). Alternatively, another option may be to assume a 75% through wall flaw if the overlay is inspected at a frequency of once per interval (i.e. the welds cannot be placed into a 25% sample). See comment above. TL

2. In paragraphs 3(a)(2) and 3(a)(3) it is not clear whether “at least 48 hrs following completion” is a minimum or maximum time value. O-67

3. Paragraph 3(a)(3) introduces a dimension of "t_3". The NRC staff has the following concerns with application of "t_3" when applying the acceptance standards of IWB-3514-2: (a) The"t_3"dimension is difficult to measure accurately because it is based on the locations of the flaw in the base metal and in the weld overlay. There could be substantial errors in this measurement. (b) The "t_3" dimension is calculated based, in part, on the location of the inner surface connected flaw; however, the current UT method is not qualified to examine the inner 75% of the base metal. Therefore, it is not clear that "t_3" can be implemented. The NRC staff suggests this dimension be eliminated. JT

The application of t_1, t_2, and t_3 is complicated. It should be simplified. The weld overlay transmits loads to and from the nozzle and pipe system (generally if the overlay extends beyond any flaw (postulated or actual) by $0.75\sqrt{Rt}$). As a result, the t1 thickness should be used for flaw evaluations within this region, and outside this region, the t2 thickness may be used. It is not clear if the area E-F-G-H includes the $0.75\sqrt{Rt}$ additional length for the overlay. It should. Lastly, it is not clear that the examination volume would cover and PWSCC susceptible material beyond the weld (e.g., an Alloy 600 safe end) and that it is appropriate to use thicknesses other than t1 for such materials. TL

Figure 1 does not address the case where the flaw crosses two boundaries (e.g., flaw resides in JEHI and EFGH). In these cases, the code case should specify that the smaller thickness should be used. O-17

4. The examination volume A-B-C-D in Fig 1(a) (referenced in 3(a)(3)) depicts a portion of the overlay that is not examined due to encroachment on a curved surface that limits the ultrasonic transducer positioning in this area. How is it ensured that this area is not required to transmit loads back to the original piping system and nozzle ($0.75\sqrt{Rt}$)? A similar comment applies to area E-F-G-H defined in Fig 1(b). Does E-F-G-H include all portions of the structural weld overlay necessary to transmit loads from the piping system to the nozzle and vice versa ($0.75\sqrt{Rt}$)? If not, this area should be expanded to include this transition zone. TL

5. Paragraph 3(c)(2) should be revised to read: "Alternatively, for mitigative weld overlay, in which pre-overlay examination are performed in accordance with 2(a)(3), post-overlay examinations are performed in accordance with 3(a) and 3(b), and no ~~inside surface connected~~ planar flaws are discovered, the overlay may be placed immediately into the population to be examined in accordance with 3(c)(5)…" This is to emphasize that if the weld overlay and base metal/original weld has no planar flaws (either subsurface or inside surface connected) then it is allowed to be placed in the sample inspection population. If a subsurface flaw exists in the base metal/original weld (even if no inside surface connected flaws are detected), the weld needs to be examined during the first or second refueling outage to confirm that that the subsurface flaw has not grown due to the weld overlay installation or some other mechanism. JT

6. Paragraph 3(c)(4) states that "…Any indication characterized as stress corrosion cracking in the weld overlay material is unacceptable…". In the context of the rest of Paragraph 3(c)(4), the above requirement could be interpreted to be that stress corrosion cracking is unacceptable to IWB-3514-2 or unacceptable to IWB-3600. For clarity, the NRC staff suggests the above requirement be revised to read "…Any indication characterized as stress corrosion cracking in the weld overlay material is unacceptable <u>and shall be removed</u>…" JT

7. The requirements for additional examinations in 3(d) are inconsistent with IWB-2430 and with the Code Case drafted by the Task Group on Alloy 600. The requirements should be consistent with the Alloy 600 task group's recommendations. O-31

Appendix

1. Paragraph I-1(c) is confusing. O-68

2. Paragraph 1-1(d). Is the 3/8-inch criterion independent of the wall thickness. O-69

3. Appendix I, paragraph I-3(e) states that "…Temperature measurement (e.g. pyrometers, temperature indicating crayons, thermocouples) during welding…". As currently written, the code case would require the use of all 3 methods listed in this section. This is acceptable. If this was not the intent, the code case should be clarified to indicate that 1-3(e)(1) should be used except when it is impractical due to situations where the weldment area is not accessible, such as internal bore welding or when there are extenuating radiological concerns. In which case, the interpass temperature shall be determined by performing paragraphs I-3(e)(2) and 1-3(e)(3). JT

Comments on Case N-XXX (07-1682) *Nickel Alloy Reactor Coolant Barrier Weld for Mitigation of PWR Full Penetration Circumferential Nickel Alloy Welds in Class 1 Items, Section XI, Division 1 Draft Rev B*

1. In the Reply (or in the Code itself), mitigation should be defined (see related comment on N-740-2). IM-10

2. Paragraphs 1.0(a)(2)(i) and (ii) define the inlay barrier weld and onlay barrier weld, respectively. It seems that paragraphs 1.0(g) and 1.0(h), which provides thickness requirement, are only applicable to the weld inlay (i.e., there are no requirements for the weld onlay thickness). As a result, paragraphs 1.0(g) and 1.0(h) should be revised to clearly specify the barrier layer thickness for the weld inlay and onlay design. In addition, it is not clear whether the onlay thickness will affect the fluid flow inside small bore piping (e.g., potential for turbulence and vortex generation, flow restriction). As a result, it is not clear whether the code case should be applicable to small bore piping. Lastly, it is not clear whether the weld onlay will be affected by the higher fluid flow (and whether there should be requirements to address this). T

3. Paragraph 1.0(a)(3) requires that the sulfur mitigation layer be considered pressure boundary. This requirement has significant implications. According to General Design Criteria 14 of 10 CFR 50, Appendix A, the reactor coolant pressure boundary needs to be designed, fabricated, erected and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture. This means that the sulfur mitigation layer shall be maintained to provide structural integrity to the component. However, the design and examination requirements for the sulfur mitigation layer are not provided in the code case except paragraph 2.0(c), which is related to welding. Every requirement that is imposed on the barrier layer needs to be imposed on the sulfur mitigation layer in this code case. T

4. Paragraph 1.0(b) indicates that this Case is applicable to austenitic stainless steel welds. It is not clear why it is applicable to such welds given that the inlay/onlay only extends ¼-inch beyond the DMW. IM5

5. Paragraph 1.0(c) states that DMW shall not contain pre-existing flaws exceeding the inservice examination acceptance standards of Table IWB-3514-2 and IWB-3514-3. This requirement implies that this code case is applicable to DMW that contains flaws accepted by IWB-3514. This paragraph should be revised to clarify the following issues. T

   (a) The code case should be clear that an inlay/onlay can not be installed over an inside-surface connected flaw. Any inside-surface connected flaw would require repair.

   (b) The code case indicates that it does not apply if there are “volumetric pre-existing flaws” that exceed IWB-3514 values. Given that the Code Case specifies “volumetric” flaws, it is not clear whether this code case applies to circumferential and/or axial flaws.

6. How is the measurement method for determining the distance between the surface to be welded and the ferritic steel based material demonstrated (as discussed in paragraph 1.0(d)). IM-23

7. It is not clear that the fluence in 1.0(e) is correct. Please verify (see related comment on N-740-2). IM-11

8. This code case allows excavation of the DMW, which may affect the structural integrity of thin wall piping. There should be a limitation imposed on the thickness of the pipe that can be repaired using this code case. For example, excavating a thin pipe that has a thickness of say 0.375 inches may cause unintended consequences (e.g., if excavation is more than 50% of pipe). T

What are the guidelines for determining the excavation depth? Is the thickness of the inlay/onlay the only guideline? IM-6

9. Paragraph 1.0(g) specifies the minimum thickness and paragraph 1.0(h) specifies the maximum thickness of the barrier layer. It seems that the maximum and minimum thickness do not consider the thickness of the sulfur mitigation layer. The exact thickness of the inlay is important because if the thickness exceeds the maximum allowable, the thermal and residual stresses may cause unintended consequences. Revise Paragraphs 1.0(g) and 1.0(h) to clarify the issue. T

Paragraph 1.0(g) is difficult to read. Suggest "The excavation depth shall be greater than 1/8-inch (3 mm)." IM-21

10. The following new paragraph shall be added to prevent repeat use of the inlay and onlay repair. T

> Paragraph 1.0(j) *A new onlay or inlay shall not be installed over the existing weld inlay or onlay that has been in service.*

11. "Design and Stress Analysis" and "Flaw Growth Evaluation" should be addressed in the Code Case. It is not clear whether the "basis document" will be readily available and whether this will contain requirements. IM-15

The type of stresses (compressive, tensile) that will be present at the interface between the edge of the barrier weld and the base metal should be provided. C

12. Paragraph 2.0(c) is confusing. Can A82 be deposited before the E309L? IM-7

13. Paragraph 2.0(d) should be revised to read, "The barrier weld shall consist of at least two (2) <u>barrier</u> layers after final surface preparation. The machine gas tungsten arc welding (GTAW) process shall be used." The word, "barrier" is added to distinguish the difference between the barrier layer and sulfur mitigation layer, if there is a difference. If there is no difference in terms of protecting the structural integrity of the component, the requirement still needs to be revised to clarify whether the sulfur mitigation layer is considered as part of the 2 layers. T

Paragraph 2.0(d) suggests that the inlay/onlay will be at least 6 mm (assuming 3 mm per weld layer). Paragraph 1.0(g), however, suggests that 3 mm is the minimum. IM-8

14. Because sulfur mitigation layer uses austenitic stainless steel filler metal, the following requirement must be added to Section 2.0 to be consistent with ASME Code Case N-504-2, paragraph (e):

> 2.0(i) The austenitic stainless steel weld overlay shall consist of at least two weld layers having as-deposited delta ferrite content of at least 7.5 FN. The first layer of weld metal with delta ferrite content of at least 7.5 FN shall constitute the first layer of the weld reinforcement that may be credited toward the required thickness. Alternatively, first layers of at least 5 FN are acceptable, provided the carbon content of the deposited weld metal is determined by chemical analysis to be less than 0.02%. [Taken from Code Case N-740-2 verbatim]

15. The basis for the 24% chromium requirement in 2.0(g) is weak. The inlay process will create large tensile ID stresses which will promote SCC. If 24% chrome is only borderline in terms of SCC resistance, it is possible that SCC will occur. If it does occur, it only has to grow through 6 mm of material (or possibly only 3 mm if 1.0(g) is correct) to expose the more susceptible material. It would seem that a higher chromium requirement is needed for an inlay. IM-9

There should be a minimum inlay/onlay thickness requirement with no dilution of the chromium content. It does not appear that just having 24% chromium in just the final surface is sufficient to resist SCC given that surface grinding may be performed. IM-19

16. It seems that the examination requirements of Section 3.0 apply to the barrier layer only and not to the sulfur mitigation layer. As defined in paragraph 1.0(a)(3), the sulfur mitigation layer is considered as part of the pressure boundary. As a result, the examination requirements imposed on the barrier layer need to be applied to the sulfur mitigation layer. Therefore, the phrase “sulfur mitigation layer” needs to be included in all the paragraphs and subparagraphs in Section 3.0. T

17. Paragraph 1.0(g) (and 3.0(d)(1)?) require that the barrier layer extend a minimum of ¼-inch (1/2-inch?) beyond the DWM edge. This might not be enough given the experience at North Anna. IM-22

18. Paragraphs 3.0(e) and 3.0 (f) specify requirements for preservice examination and inservice examination, respectively. However, the contents of these two paragraphs were removed and replaced with a reference to Case N-XXX. Referencing a Code Case that has not been endorsed by the Committees in this draft code case which has not been endorsed does not make sense and does not serve the intended purpose. The NRC staff suggests that specific preservice and inservice examination requirements be included in paragraphs 3.0(e) and 3.0 (f). T

19. The examination diagrams of the weld in Section 3.0 have been removed. The NRC staff suggests that the diagrams be included in the code case. T

20. Appendix I, Paragraph 1.0(a) allows the maximum area of an individual barrier weld based on the finished surface over the ferritic base material be 500 square inches. It seems that the industry’s technical basis for the 500 square inch weld area is based on the analysis of the weld covering outside surface of the pipe (i.e., weld overlay). (Reference, EPRI report 1014351, “ Topical Report Supporting an Expedited NRC review of the Content of the Code Case Needed for Dissimilar Metal Weld Overlay

Repairs." The industry needs to confirm that an analysis is performed to support the acceptability of the inlay or onlay of 500-square-inch weld area. T

21. Nothing is ever said about how surface grinding will be done in order to obtain a smooth surface for volumetric and PT inspections. Heavy grinding that increases the temperature to melting results in surface biaxial stresses. Grinding at a lower temperature (slower) will cause cold working and will result in compressive ID surface stresses. This is more important when there is only part of one weld bead that has 24% chromium as per 2.0(g). IM-18

22. Will the stress limits in Section 3 still be satisfied after excavation? There should be requirements to verify this. IM-x

23. A reference to Section IX qualifications should be included in the Code Case for cases when temperbead welding is not used (e.g., possibly when welding between stainless steel and Alloy 600 with Alloy 52 weld wire). C

24. What is the thickness used in determining the acceptability of the flaws in the inlay/onlay? Will it be the inlay/onlay thickness or the full weld thickness? L

25. The user should be allowed to determine the interpass temperature with thermocouples or contact pyrometers. The methods in the code case should only be used as an exception. A