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CALVERT CLIFFS  
NUCLEAR POWER PLANT

November 1, 2010

U. S. Nuclear Regulatory Commission  
Washington, DC 20555

**ATTENTION:** Document Control Desk

**SUBJECT:** Calvert Cliffs Nuclear Power Plant  
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318  
Response to Request for Additional Information – Request for Approval of  
Alternative (Relief Request) for Dissimilar Metal Weld Repairs (ISI-04-05)

**REFERENCES:**

- (a) Letter from Mr. J. J. Stanley (CCNPP) to Document Control Desk (NRC) dated May 18, 2010, Request for Approval of Alternative (Relief Request) for Dissimilar Metal Weld Repairs (ISI-04-05)
- (b) Letter from Mr. D. V. Pickett (NRC) to Mr. G. H. Gellrich (CCNPP), dated September 9, 2010, Request for Additional Information Re: Request for Approval of Alternative (Relief Request) for Dissimilar Metal Weld Repairs (ISI-04-05)- Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. ME3963 and ME3964)

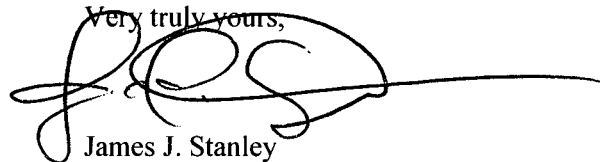
In Reference (a), Calvert Cliffs Nuclear Power Plant, LLC (Calvert Cliffs) submitted a contingency relief request, for Calvert Cliffs Units 1 and 2, allowing for the use of full structural weld overlay over dissimilar metal welds should the need arise. In Reference (b), the Nuclear Regulatory Commission requested additional information be submitted to support their review of Reference (a). Attachment (1) provides the responses to the Nuclear Regulatory Commission's request for additional information contained in Reference (b).

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Should you have questions regarding this matter, please contact Mr. Douglas E. Lauver at (410) 495-5219.

Very truly yours,

A handwritten signature in black ink, appearing to read 'JJS', with a long horizontal line extending to the right.

James J. Stanley  
Manager-Engineering Services

JJS/KLG/bjd

Attachment: (1) Response to Request for Additional Information – Relief Request for Dissimilar Metal Weld Repairs (ISI-04-05)  
Enclosure 1: List of Unit 1 & 2 Dissimilar Metal Weld Population

cc: D. V. Pickett, NRC  
W. M. Dean, NRC

Resident Inspector, NRC  
S. Gray, DNR

**ATTACHMENT (1)**

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION –  
RELIEF REQUEST FOR DISSIMILAR METAL WELD REPAIRS**

**(ISI-04-05)**

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**ATTACHMENT (1)**

**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION – RELIEF REQUEST FOR  
DISSIMILAR METAL WELD REPAIRS (ISI-04-05)**

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**NRC RAI 1:**

*RR ISI-04-05 specifically stated that the relief is requested for the spring 2011 refueling outage at Calvert Cliffs, Unit No. 2, but did not identify the refueling outage at Calvert Cliffs, Unit No. 1, for which the relief is requested. Please clarify and/or include the refueling outage of Calvert Cliffs, Unit No. 1 for which the relief is requested.*

**Calvert Cliffs Response RAI 1:**

As indicated, Relief Request ISI-04-05 (Reference 1) is applicable to Calvert Cliffs Unit 1 and Unit 2. The relief request was submitted to be applicable for the remaining duration of Calvert Cliffs Fourth Ten Year Inservice Inspection Program Interval. Calvert Cliffs Fourth Ten Year Inservice Inspection Program Interval started for each unit on October 10, 2009 and will end on June 30, 2019. As such the relief request, if approved, would be applicable during all refueling outages for both units during the Fourth Ten Year Inservice Inspection Program Interval. Approval was requested in a time frame which would support the Unit 2 2011 refueling outage as it will be the next refueling outage in which there might arise a need to install a full structural weld overlay on one of the applicable welds identified in the relief request.

**NRC RAI 2:**

*Section I of RR ISI-04-05 does not contain the applicable ASME Code, Section XI, Examination Category and Item Number, for each component for which the relief is requested. Please specify the Examination Category and Item Number from the applicable ASME Code, Section XI, for each component for which the relief is requested.*

**Calvert Cliffs Response RAI 2:**

The table listed in our original submittal [Reference 1, Attachment (1), Section I] has been modified to include the Code Category and Item Number for each item. This revised table is contained in Enclosure 1 of this response to the Request for Additional Information.

**NRC RAI 3:**

*Section III of RR ISI-04-05 does not contain the ASME Code, Section XI, Appendix VIII, Supplement 11, as the applicable Code requirement. Clarify and/or include the ASME Code, Section XI, Appendix VIII, Supplement 11, as the applicable Code requirement. Specify the edition and addenda of the ASME Code, Section XI, that will be used for Appendix VIII, Supplement 11.*

**Calvert Cliffs Response RAI 3:**

American Society of Mechanical Engineers (ASME) Code, Section XI, 2001 Edition, Appendix VIII, Supplement 11, "Qualification Requirements for Full Structural Overlaid Wrought Austenitic Piping Welds" is an applicable code requirement for this relief request and should have been included in Reference 1, Attachment (1), Section III. While Supplement 11 is currently not applicable, as no full structural weld overlays have been installed on the subject welds listed in our relief request, it will become applicable should a need to apply a full structural weld overlay arise. Reference 1, Attachment (1), Sections V.B and VI.B and Reference 1, Enclosure (5) discuss the proposed alternative to Appendix VIII, Supplement 11 requirements to be taken should a need to apply a full structural weld overlay arise.

**ATTACHMENT (1)**

**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION – RELIEF REQUEST FOR  
DISSIMILAR METAL WELD REPAIRS (ISI-04-05)**

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Calvert Cliffs Code of Record for the Fourth Ten Year Inservice Inspection Interval is ASME Code Section XI, 2004 Edition with no Addenda. However, as stated in 10 CFR 50.55a(b)(xv), the 2001 Edition of ASME Code Appendix VIII should be used when a later edition and addenda than the 2001 Edition of the ASME Code is used.

**NRC RAI 4:**

*RR ISI-04-05 did not commit to submit to the NRC the following documents or reports.*

- a. Within 14 calendar days of completion of the ultrasonic testing (UT) examinations of the subject welds, the final nondestructive examination (NDE) report that includes the following:*
  - i. Listing of any indications detected and the type and nature of the indications,*
  - ii. Disposition of all indications using the acceptance standards of the ASME Code, Section XI, IWB-3514-2 and/or IWB-3514-3 criteria,*
  - iii. Discussion of any repairs to the weld metal, the overlay material, and/or the base metal,*
  - iv. Reason for the needed repairs.*
- b. Before Mode 4:*
  - i. The design analysis of FSWOL demonstrating that the application of the FSWOL satisfies the ASME Code, Section III, NB-3000, requirements,*
  - ii. The crack growth evaluation of flaws demonstrating the life of the overlay,*

*Commit to provide the above reports or justify why they are not needed to be submitted*

**Calvert Cliffs Response RAI 4:**

Calvert Cliffs recognizes the Nuclear Regulatory Commission's (NRCs) interest in information associated with the dissimilar metal weld and the full structural weld overlay should the need for installing a full structural weld overlay occur. In such a case, Calvert Cliffs will have available, before the unit returns to Mode 4, information identifying the affected dissimilar metal weld, flaw characteristics detected during the weld examination, weld overlay material and size dimension information, and the weld overlay sizing analysis that justifies installation of the full structural weld overlay. Additional analyses including a nozzle specific residual stress analysis, fracture mechanics analyses, an ASME Section III analysis, a weld overlay shrinkage analysis, and a weld overlay weight analysis will be completed within a reasonable time period following the unit's return to power. Additional information on these analyses is contained in Reference 1, Attachment (1), Section VI.A.1.

**NRC RAI 5:**

*Confirm that the duration of the proposed RR ISI-04-05 is for the fourth 10-year inservice inspection (ISI) interval at Calvert Cliffs, Unit Nos. 1 and 2. The NRC staff may approve the FSWOL design for the life of the repair. However, the staff will not approve the ISI requirements of RR ISI-04-05 for the life of the repair because the ISI requirements may change based on future NRC regulatory requirements or improved examination techniques. The staff suggests that a section titled "Duration of Proposed Alternative" be added to RR ISI-04-05.*

**Calvert Cliffs Response RAI 5:**

Proposed Relief Request ISI-04-05 was submitted to be applicable for Calvert Cliffs Fourth Ten Year Inservice Inspection Interval. As with all other relief requests approved for the Fourth Ten Year Inservice

## ATTACHMENT (1)

### RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION – RELIEF REQUEST FOR DISSIMILAR METAL WELD REPAIRS (ISI-04-05)

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Inspection Interval, this proposed relief request would have to be re-submitted in order to be used during future inservice inspection intervals. Future submittal of any relief request would be based on examination techniques being used and NRC regulatory requirements in place at the time of the submittal.

#### **NRC RAI 6:**

*For those safe ends or pump casings that are made of cast austenitic stainless steel (CASS) material and are joining the DM weld, the UT examinations of the DM weld will not achieve 100% coverage because the current UT technology is not qualified in accordance with the ASME Code, Section XI, Appendix VIII, to examine the CASS material. Therefore, the structural integrity of Alloy 82/182 weld will not be fully understood. Discuss whether the CASS pipe prevents 100% examination coverage of the DM weld.*

#### **Calvert Cliffs Response RAI 6:**

Relief Request ISI-04-05 proposes to allow the alternative of installing a full structural weld overlay in case unacceptable flaw indications are found during examinations of the listed components. As defined in Reference 1, Attachment (1), Section VI, the assumed design basis flaw for the purpose of structural sizing the weld overlays is a 360° circumferential flaw that is 100% through the original wall thickness of the 82/182 dissimilar metal weld. Therefore no credit for the structural integrity of the underlying 82/182 weld is taken.

As stated, there are currently no Appendix VIII qualified techniques to examine CASS material or through CASS material. However, the examination techniques utilized for examining the weld overlay and the underlying Alloy 82/182 dissimilar metal weld are fully qualified.

#### **NRC RAI 7:**

*On page 2 of Enclosure 1, Item 1.2(d)(3) specifies that the filler material used shall meet the minimum requirement for delta ferrite. Specify the minimum requirement for delta ferrite content.*

#### **Calvert Cliffs Response RAI 7:**

Weld filler material to be used as a buffer layer must meet ASME Code Section III, NB2400 requirements. As specified in NB2433.2, "The minimum acceptable delta ferrite shall be 5FN." Please note that a stainless steel barrier layer will only be applied if adverse chemistry conditions exist in the underlying stainless steel, however we do not intend to credit this barrier layer towards the required overlay design thickness.

#### **NRC RAI 8:**

*On page 3 of Enclosure 1, Item 2.2(a) specifies that the axial length of the weld overlay is  $0.75\sqrt{Rt}$ . Clarify if this distance is required to be applied to both sides of the weld overlay (i.e. the nozzle side and the safe end side).*

#### **Calvert Cliffs Response RAI 8:**

As required by Reference 1, Enclosure (1), Item 2.2(a), "The axial length and end slope of the weld overlay shall cover the weld and heat affected zones on each side of the weld, as well as any SCC-susceptible base material adjacent to the weld, and provide for load redistribution from the item into the weld overlay and back into the item without violating applicable stress limits of NB-3200." This sentence requires that the weld length in question applies to both sides of the susceptible weld.

## ATTACHMENT (1)

### RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION – RELIEF REQUEST FOR DISSIMILAR METAL WELD REPAIRS (ISI-04-05)

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#### **NRC RAI 9:**

*On page 8 of Enclosure 1, Footnote (a) of Figure 1 states that "Dimension b is equivalent to the nominal thickness of the nozzle or pipe being overlaid, as appropriate." Dimension b is the UT distance away from the toe of the original weld. The above requirement is inconsistent with Footnote (1) of Figure 2 which requires that the examination extent shall be at least ½ inch beyond the as-found flaw. The NRC staff suggests the following wording:*

*"... Dimension b is equivalent to the nominal thickness of the nozzle or pipe being overlaid, as appropriate; however it shall not be less than ½ inch from the toe of the original weld..."*

*Revise Footnote (a) of Figure 1 or justify why the proposed footnote (a) of Figure 1 is adequate.*

#### **Calvert Cliffs Response RAI 9:**

Figure 1 of Reference 1, Enclosure (1) provides definitions of the Acceptance Examination Volume and Thickness for the weld overlay itself. Figure 2 of Reference 1, Enclosure (1) defines the Preservice and Inservice Examination Volume. As such the figures are not related. In addition, dimension b of Figure 1 does not define the examination extent. Dimension b is equivalent to the nominal thickness of the nozzle or pipe being overlaid which varies accordingly with the component and defines whether  $t_1$  or  $t_2$  is utilized when applying the acceptance standards. As stated in Reference 1, Enclosure (1), Section 3.0(a)(3), the entire volume A-B-C-D is to be UT examined. Dimension b is used to divide region A-B-C-D into three regions (A-E-H-D, E-F-G-H, and F-B-C-G) for the purpose of defining  $t_1$  and  $t_2$  for application of the acceptance standards of ASME Code IWB-3514 as described in Reference 1, Enclosure (1), Section 3.0(a)(3).

#### **NRC RAI 10:**

*On page 3 of Enclosure 2, Section 3.0(e)(1) states that "Direct temperature measurement (e.g., pyrometers, temperature-indicating crayons, and thermocouples) during welding or if direct measurement is impractical, one of the following methods shall be used to determine the interpass temperature." The NRC staff considers temperature measurements to be impractical if excessive radioactive dose or inaccessibility prevents the direct temperature measurements. Identify the impracticality in taking direct measurements for the proposed weld overlays.*

#### **Calvert Cliffs Response RAI 10:**

It is anticipated there will be few, if any situations, where direct temperature measurement cannot reasonably be performed. Since Relief Request ISI-04-05 involves a large number of welds that will be inspected for flaws during the Fourth Ten Year Inservice Inspection period, it is impractical to predict where inaccessibility or inadequate ALARA conditions might exist. As a result, if Calvert Cliffs encounters a situation where direct measurement is impractical due to either inaccessibility or will result in excessive radioactive dose, specific relief will be requested, on a case by case basis, to use one of the alternatives listed in Code Case 740-2.

#### **REFERENCE:**

1. Letter from Mr. J. J. Stanley (CCNPP) to Document Control Desk (NRC) dated May 18, 2010, Request for Approval of Alternative (Relief Request) for Dissimilar Metal Weld Repairs (ISI-04-05)

**ENCLOSURE 1**

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**List of Unit 1 & 2 Dissimilar Metal Weld Population**

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**Enclosure 1**

**List of Unit 1 & 2 Dissimilar Metal Weld Population**

**I. COMPONENTS FOR WHICH RELIEF IS REQUESTED**

Class 1 dissimilar metal welds (DMWs) with unacceptable indications attributed to primary water stress corrosion cracking (PWSCC) in existing Alloy 82/182 welds. These welds may include:

<b>UNIT 1 DM WELD POPULATION</b>							
<b>DM Weld Designator/ID</b>	<b>Code Category</b>	<b>Item Number</b>	<b>DM Weld Material</b>	<b>Base Material</b>	<b>Location</b>	<b>Stainless Steel Weld ID</b>	<b>Nozzle Size</b>
102300/30-RC-11A-W7	R-A	R1.20	82/182	A516-70/A351-CF8M Elbow to Safe End	11A RCP Inlet	30-RC-11A-W8	30"
102450/30-RC-11A-W10	R-A	R1.20	82/182	A516-70/A351-CF8M Pipe to Safe End	11A RCP Outlet	30-RC-11A-W9	30"
104550/30-RC-11B-W7	R-A	R1.20	82/182	A516-70/A351-CF8M Elbow to Safe End	11B RCP Inlet	30-RC-11B-W8	30"
104700/30-RC-11B-W10	R-A	R1.20	82/182	A516-70/A351-CF8M Pipe to Safe End	11B RCP Outlet	30-RC-11B-W9	30"
107450/30-RC-12A-W7	R-A	R1.20	82/182	A516-70/A351-CF8M Elbow to Safe End	12A RCP Inlet	30-RC-12A-W8	30"
107600/30-RC-12A-W10	R-A	R1.20	82/182	A516-70/A351-CF8M Pipe to Safe End	12A RCP Outlet	30-RC-12A-W9	30"
109600/30-RC-12B-W7	R-A	R1.20	82/182	A516-70/A351-CF8M Elbow to Safe End	12B RCP Inlet	30-RC-12B-W8	30"
109750/30-RC-12B-W10	R-A	R1.20	82/182	A516-70/A351-CF8M Pipe to Safe End	12B RCP Outlet	30-RC-12B-W9	30"
111100/12-PSL-W-13	R-A	R1.11	82/182	A105-Gr II/A351-CF8M Nozzle to Safe End	PZR Surge @ RCS Hot Leg		12"
114350/12-SI-10009-W16	R-A	R1.20	82/182	A182-F-1/A351-CF8M Nozzle to Safe End	Safety Injection to 11A Cold Leg		12"
115200/12-SI-1010-W14	R-A	R1.20	82/182	A182-F-1/A351-CF8M Nozzle to Safe End	Safety Injection to 11B Cold Leg		12"
116000/12-SI-1011-W13	R-A	R1.20	82/182	A182-F-1/A351-CF8M Nozzle to Safe End	Safety Injection to 12A Cold Leg		12"
116750/12-SI-1012-W13	R-A	R1.20	82/182	A182-F-1/A351-CF8M Nozzle to Safe End	Safety Injection to 12B Cold Leg		12"

**Enclosure 1**

**List of Unit 1 & 2 Dissimilar Metal Weld Population**

<b>UNIT 1 DM WELD POPULATION</b>							
<b>DM Weld Designator/ID</b>	<b>Code Category</b>	<b>Item Number</b>	<b>DM Weld Material</b>	<b>Base Material</b>	<b>Location</b>	<b>Stainless Steel Weld ID</b>	<b>Nozzle Size</b>
118550/3-PS-1001-W1	R-A	R1.20	82/182	A105-Gr II/A-182 TP 316 Nozzle to Safe End	PZR Spray from 11A Cold Leg		3"
120350/3-PS-1002-W1	R-A	R1.20	82/182	A105-Gr II/A-182 TP 316 Nozzle to Safe End	PZR Spray from 11B Cold Leg		3"
123100/4-SR-1005-W1	R-A	R1.20	82/182	SA508-C12/SA-182-F316 Nozzle to Safe End	PZR Relief		4"
123450/4-SR-1006-W1	R-A	R1.20	82/182	SA508-C12/SA-182-F316 Nozzle to Safe End	PZR Relief		4"
125050/2-LD-1004-W1	R-A	R1.20	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	12A Cold Leg Letdown/Drain		2"
128900/2-CV-1004-W19	R-A	R1.11	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	12B Cold Leg Charging Inlet		2"
130450/2-CV-1005-W29	R-A	R1.11	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	11A Cold Leg Charging Inlet		2"
131200/2-DR-1003-W1	R-A	R1.20	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	11A Cold Leg Loop Drain		2"
131500/2-DR-1004-W1	R-A	R1.20	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	11B Cold Leg Loop Drain		2"
132150/2-DR-1006-W1	R-A	R1.20	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	12B Cold Leg Loop Drain		2"

**Enclosure 1**

**List of Unit 1 & 2 Dissimilar Metal Weld Population**

<b>UNIT 2 DM WELD POPULATION</b>							
<b>DM Weld Designator/ID</b>	<b>Code Category</b>	<b>Item Number</b>	<b>DM Weld Material</b>	<b>Base Material</b>	<b>Location</b>	<b>Stainless Steel Weld ID</b>	<b>Nozzle Size</b>
109280/30-RC-21A-W7	R-A	R1.20	82/182	A516-70/A351-CF8M Elbow to Safe End	21A RCP Inlet	30-RC-21A-W8	30"
109310/30-RC-21A-W10	R-A	R1.20	82/182	A516-70/A351-CF8M Pipe to Safe End	21A RCP Outlet	30-RC-21A-W9	30"
110280/30-RC-21B-W7	R-A	R1.20	82/182	A516-70/A351-CF8M Elbow to Safe End	21B RCP Inlet	30-RC-21B-W8	30"
110310/30-RC-21B-W10	R-A	R1.20	82/182	A516-70/A351-CF8M Pipe to Safe End	21B RCP Outlet	30-RC-21B-W9	30"
111280/30-RC-22A-W7	R-A	R1.20	82/182	A516-70/A351-CF8M Elbow to Safe End	22A RCP Inlet	30-RC-22A-W8	30"
111310/30-RC-22A-W10	R-A	R1.20	82/182	A516-70/A351-CF8M Pipe to Safe End	22A RCP Outlet	30-RC-22A-W9	30"
112280/30-RC-22B-W7	R-A	R1.20	82/182	A516-70/A351-CF8M Elbow to Safe End	22B RCP Inlet	30-RC-22B-W8	30"
112310/30-RC-22B-W-10	R-A	R1.20	82/182	A516-70/A351-CF8M Pipe to Safe End	22B RCP Outlet	30-RC-22B-W9	30"
113130/12-PSL-W-13	R-A	R1.11	82/182	A105-Gr II/A351-CF8M Nozzle to Safe End	PZR Surge @ RCS Hot Leg		12"
115140/12-SI-2009-W15	R-A	R1.20	82/182	A182-F-1/A351-CF8M Nozzle to Safe End	Safety Injection to 21A Cold Leg		12"
116190/12-SI-2010-W13	R-A	R1.20	82/182	A182-F-1/A351-CF8M Nozzle to Safe End	Safety Injection to 21B Cold Leg		12"
117120/12-SI-2011-W13	R-A	R1.20	82/182	A182-F-1/A351-CF8M Nozzle to Safe End	Safety Injection to 22A Cold Leg		12"
118120/12-SI-2012-W13	R-A	R1.20	82/182	A182-F-1/A351-CF8M Nozzle to Safe End	Safety Injection to 22B Cold Leg		12"

**Enclosure 1**

**List of Unit 1 & 2 Dissimilar Metal Weld Population**

<b>UNIT 2 DM WELD POPULATION</b>							
<b>DM Weld Designator/ID</b>	<b>Code Category</b>	<b>Item Number</b>	<b>DM Weld Material</b>	<b>Base Material</b>	<b>Location</b>	<b>Stainless Steel Weld ID</b>	<b>Nozzle Size</b>
137010/3-PS-2001-W1	R-A	R1.20	82/182	A105-Gr II/A-182 TP 316 Nozzle to Safe End	PZR Spray from 21A Cold Leg		3"
138010/3-PS-2002-W1	R-A	R1.20	82/182	A105-Gr II/A-182 TP 316 Nozzle to Safe End	PZR Spray from 21B Cold Leg		3"
141000/4-SR-2005-W1	R-A	R1.20	82/182	SA508-C12/SA-182-F316 Nozzle to Safe End	PZR Relief		4"
142000/4-SR-2006-W1	R-A	R1.20	82/182	SA508-C12/SA-182-F316 Nozzle to Safe End	PZR Relief		4"
156530/2-CV-2021-W34	R-A	R1.11	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	22B Cold Leg Charging Inlet		2"
152440/2-CV-2005-W30	R-A	R1.11	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	21A Cold Leg Charging Inlet		2"
157010/2-DR-2003-W1	R-A	R1.20	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	21A Cold Leg Loop Drain		2"
158010/2-DR-2004-W1	R-A	R1.20	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	21B Cold Leg Loop Drain		2"
160010/2-DR-2006-W1	R-A	R1.20	82/182	A105-Gr II/A-182-TP 316 Nozzle to Safe End	22B Cold Leg Loop Drain		2"