Vogtle PEmails

From: Hoellman, Jordan
Sent: Tuesday, September 11, 2018 10:58 AM
To: Vogtle PEmails
Subject: Draft Proposed Alternative Section for ALT-06
Attachments: Alt-06 Proposed Alternative Section - Draft.pdf

Please see the attached draft Proposed Alternative Section of Alt-06 for discussion at a future public meeting. Note that this section of Alt-06 only focuses on the proposed examination and does not include the technical basis for the code alternative (that will be in another section of the alternative).

The attachment does not contain SUNSI.

Hearing Identifier: Vogtle_COL_Docs_Public
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Subject: Draft Proposed Alternative Section for ALT-06
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From: Hoellman, Jordan

Created By: Jordan.Hoellman2@nrc.gov

Recipients:
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Alt-06 Proposed Alternative Section - Draft.pdf	685343	

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The proposed alternative is to eliminate the volumetric examination requirement for the austenitic stainless steel valve material. The proposed valve-to-pipe examination volume is shown in Figure 2 for Category 1 and Category 2 welds, including Class 3 LBB valve to piping welds.

Figure 2 also illustrates the AP1000 design features implemented on the Vogtle Units 3 and 4 valve-to-pipe welds intended to improve inspectability and provide better access to the valve side examination volume. These design features include a flush weld on the outer surface with a 1/32-inch per inch flatness with a smooth transition from the weld to pipe. Additionally, Figure 2 shows a reduced maximum OD taper of 18° on the valve for a distance of 1.5 times the minimum pipe wall thickness from the valve-to-pipe weld in comparison to the 30° maximum OD taper as specified in ASME Section III, Subsection NB, Figure NB-4250-1 and Subsection NC, Figure NC-4250-1.

These AP1000 design features have made it possible to qualify a new ultrasonic examination procedure, specifically for Vogtle Units 3 and 4. This new ultrasonic exam procedure is being developed based on the requirements of latest revision of PDI-UT-2. In accordance with Appendix VIII-3130(a), any two procedures with the same essential variables are considered equivalent. This new procedure has been demonstrated to extend the qualified ultrasonic examination coverage beyond the current 50% to include the far side of the weld material, up to the fusion line, resulting in a larger qualified valve-to-pipe examination volume, illustrated in Figure 2.

To support development of the new ultrasonic examination procedure, 25 mock-ups were developed using the valve to pipe configurations at Vogtle Units 3 and 4. These mockups range from 3” nominal outside diameter (OD) to 14” OD with nominal wall thicknesses ranging from 0.322” to 1.406”. These dimensions are currently within the qualified range of PDI-UT-2. The sizes utilized in the mockups bound the Vogtle 3 and 4 configurations. In addition, these mockups will be used in conjunction with existing to develop the Vogtle Units 3 and 4 specific procedure.

The proposed alternative implements a similar approach for the examination volume on the valve side of the weld that has been adopted in the ASME Code Section XI for Examination Category B-M-2: Valve Bodies. In Section XI editions prior to the 2008 Addenda, welds in valve bodies were required to undergo volumetric examinations. However in the 2008 Addenda of Section XI, the volumetric examination requirement was removed and substituted with a VT-3 visual examination of the internal surfaces when a valve is disassembled for maintenance or repair. This change was justified based on the high flaw tolerance of cast and wrought austenitic materials.

While the proposed alternative is to eliminate the requirement for a volumetric examination of the austenitic valve material in the valve-to-pipe welds, site specific qualified outer diameter (OD) surface ultrasonic examinations of the valve side weld and fusion line examination volume using ultrasonic test techniques from the pipe side of the weld, on the conditioned weld surface and where practical from the valve side of the weld will be performed. These site specific qualified OD surface applied ultrasonic examinations will include:

- Longitudinal wave ultrasonic techniques are currently defined in PDI-UT-2 for the detection of circumferentially oriented flaws from the pipe side of the weld; these techniques are not qualified in accordance with the requirements in 10CFR50.55a(b)(2)(xvi)(B) for austenitic material single side coverage.

Longitudinal wave probes will be utilized for the detection of circumferential flaws utilizing the Vogtle 3 and 4 specific procedure. These longitudinal wave probes will be contoured to the outer diameter surface in accordance with the procedure requirements and will be used for axial beam scanning from the pipe side of the weld toward the valve for the detection and length sizing of circumferential flaws. Shear wave probes are not practical in this application due to attenuation within the weld material.

Figure 3 and Figure 4 show the expected examination coverage for circumferentially oriented flaws (for both Tapered and Flat welds, respectively) utilizing the qualified examination techniques described above for both Category 1 and Category 2 welds.

- Longitudinal wave ultrasonic techniques are not currently defined in PDI-UT-2 for the detection of axially oriented flaws from the conditioned weld surface and where practical from the valve surface; these techniques are not qualified in accordance with ASME Section XI Appendix VIII.

  Longitudinal wave probes will be utilized for the detection of axial flaws utilizing the Vogtle 3 and 4 specific procedure. These longitudinal wave probes will also include a skew or beam correction angle to compensate for the valve taper angle and provide for more direct impingement on axial planar flaws. The probes will be contoured to the outer diameter surface in accordance with the site specific procedure requirements and will be used for circumferential beam scanning from the conditioned weld surface and where practical from the valve surface for the detection and length sizing of axial flaws. Circumferential scans of the weld will be performed primarily from the top of the weld. Some minor loss of coverage is expected at the transition of the base metal to weld toe, due to the taper transitions. Shear wave probes are not practical in this application due to attenuation within the weld material.

  Figure 5 and Figure 6 show the expected examination coverage for axial oriented flaws (for both Tapered and Flat welds, respectively) utilizing the qualified examination techniques described above for both Category 1 and Category 2 welds.

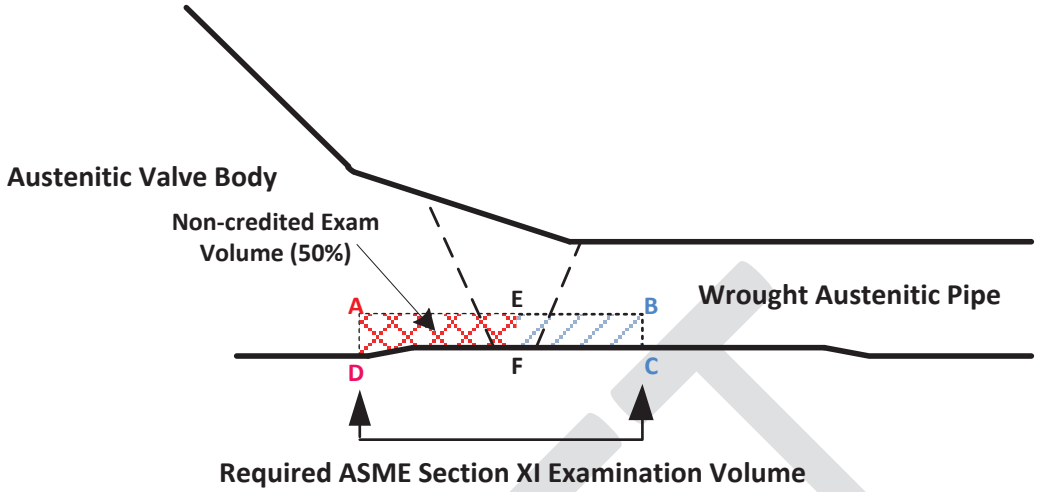
Individuals qualified to the Vogtle 3 and 4 specific procedure shall be qualified to PDI-UT-2. These examination techniques will result in essentially 100% ASME Section XI coverage for axial and circumferential flaws included in the piping base metal and the weld.

These outer diameter surface applied ultrasonic test techniques will be applied for the preservice examination in order to obtain a baseline volumetric examination of the ASME Code Section XI defined examination volume. It is noted that volumetric examination of the weld using the radiographic examination method will have already been performed in accordance with ASME Code Section III.

Additionally, per the examination requirements of ASME Section III NB-2541 and NB- 2571, a liquid penetrant examination of all external and accessible interior portions of the valve bodies and machined surfaces (including the weld prep) has been completed prior to N-stamping the valves. For cast austenitic valves, visual examinations will be performed in accordance with design specifications.

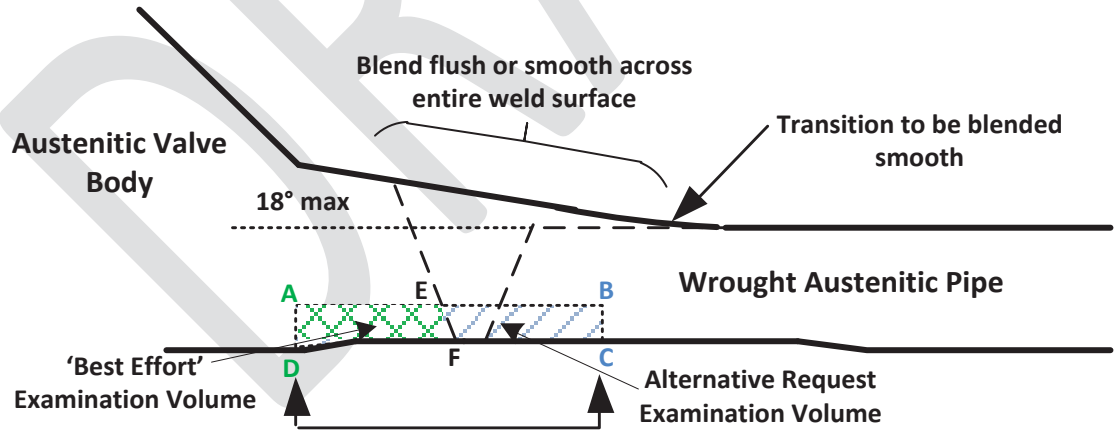
Application of other volumetric methods such as ID applied ultrasonic techniques is not practical due to access and the as-welded surface conditions of the weld.

Figure 1: Valve to Pipe Welds – Current Qualified PDI-UT-2 Examination Volume



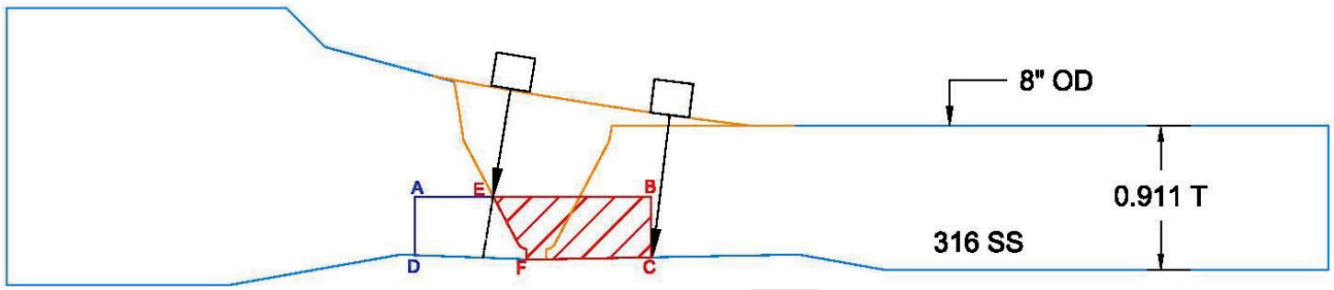
(a) ASME Code Examination Volume, A-B-C-D.
(b) Valve-to-pipe weld with current qualified PDI-UT-2 examination volume shown as blue parallel lined area, E-B-C-F.
(c) Representation of coverage limitations; the non-credited ASME Section XI examination volume is shown as red cross-hatched area, A-E-F-D (50% of examination volume cross-section).

Figure 2: Category 1 and 2 Alternative Request Examination Volume and AP1000 Inspectability Design Features Based on New Qualified UT Exam Procedure for Vogtle 3 & 4



(a) Valve-to-pipe weld with Alternative Request examination volume based on new site specified qualified UT procedure, shown as blue parallel lined area, E-B-C-F.
(b) Inspectability features include flush weld surface, smooth transition, and a reduced maximum outer surface taper of 18°.

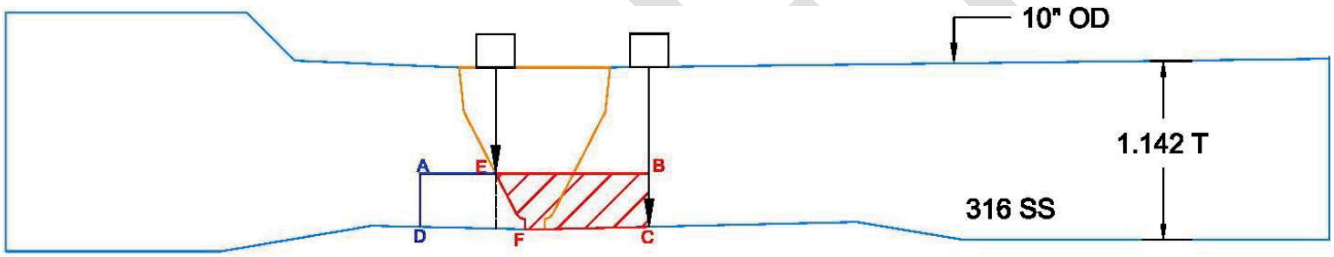
Figure 3: Valve to Pipe Weld Representing Austenitic Valve to Pipe Welds (Tapered) - Alternative Request Qualified Examination Volume for Circumferentially Oriented Flaws



ASME Code Examination Volume A-B-C-D

Qualified Examination Volume E-B-C-F

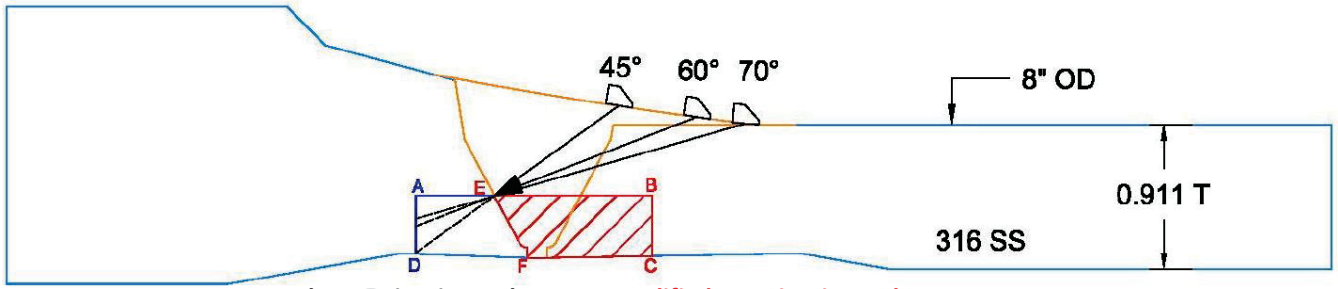
Figure 4: Weld Representing Austenitic Valve to Pipe Welds (Flat) - Alternative Request Qualified Examination Volume for Circumferentially Oriented Flaws



ASME Code Examination Volume A-B-C-D

Qualified Examination Volume E-B-C-F

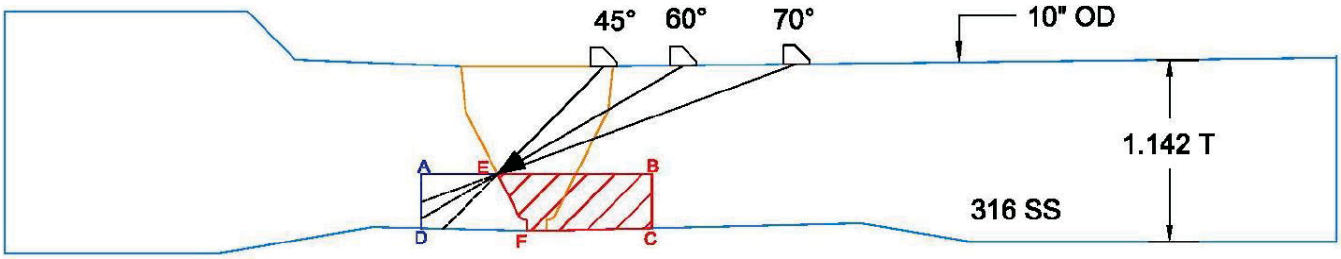
Figure 5: Weld Representing Austenitic Valve to Pipe Welds (Tapered) - Alternative Request Qualified Examination Volume for Axially Oriented Flaws



ASME Code Examination Volume A-B-C-D

Qualified Examination Volume E-B-C-F

Figure 6: Weld Representing Austenitic Valve to Pipe Welds (Flat) - Alternative Request Qualified Examination Volume for Axially Oriented Flaws



ASME Code Examination Volume A-B-C-D

Qualified Examination Volume E-B-C-F