FPL

July 24, 2017

L-2017-121
10 CFR 50.55a

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Re: Florida Power & Light Company
St. Lucie Units 1 and 2, Docket Nos. 50-335, 50-389
Turkey Point Units 3 and 4, Docket Nos. 50-250, 50-251

NextEra Energy Seabrook, LLC
Seabrook Station, Docket No. 50-443

NextEra Energy Duane Arnold, LLC
Duane Arnold Energy Center, Docket No. 50-331

NextEra Energy Point Beach, LLC
Point Beach Units 1 and 2, Docket Nos. 50-266, 50-301

Subject: Proposed Alternative for the Use of Encoded Phased Array Ultrasonic Examination Techniques In Lieu of Radiography

Pursuant to 10 CFR 50.55a(z)(1), Florida Power & Light Company (FPL), acting on behalf of itself and as agent for NextEra Energy Seabrook, LLC; NextEra Energy Duane Arnold, LLC; and NextEra Energy Point Beach, LLC, requests Nuclear Regulatory Commission (NRC) approval of a proposed alternative to radiography performed on construction welds in ferritic piping. American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel (B&PV) Section III requires that certain ferritic circumferential pipe weld joints be examined using radiographic examination techniques to satisfy nondestructive examination requirements. FPL requests approval to use encoded Phased Array Ultrasonic Examination Techniques (PAUT) as an alternative to radiographic examination. FPL considers the proposed alternative would provide an acceptable level of quality and safety.

FPL requests approval of the proposed alternative by August 1, 2018 to support the refueling outages in the fall of 2018.

The basis for this request is provided in the enclosure to this letter. There are no commitments contained in this submittal.

If you have any questions regarding this submittal, please contact Glenn Alexander, Engineering Supervisor, at 561-904-5159.

A047
NRR

Sincerely,

Larry Nicholson
Director, Nuclear Licensing and Regulatory Compliance
Florida Power & Light Company

Enclosure: Proposed Alternative for the Use of Encoded Phased Array Ultrasonic Examination Techniques In Lieu of Radiography

cc: NRC Project Manager - St. Lucie
NRC Project Manager - Turkey Point
NRC Project Manager - Seabrook
NRC Project Manager - Duane Arnold
NRC Project Manager - Point Beach
Regional Administrator - NRC Region 1
Regional Administrator - NRC Region 2
Regional Administrator - NRC Region 3
NRC Resident Inspector - St. Lucie
NRC Resident Inspector - Turkey Point
NRC Resident Inspector - Seabrook
NRC Resident Inspector - Duane Arnold
NRC Resident Inspector - Point Beach

Enclosure to Letter No. L-2017-121

Proposed Alternative for the Use of Encoded Phased Array Ultrasonic Examination Techniques In Lieu of Radiography

RELIEF REQUEST NUMBER FRR-01, REVISION 0

ALTERNATIVE REQUIREMENTS FOR THE USE OF ENCODED PHASED ARRAY ULTRASONIC EXAMINATION TECHNIQUES IN LIEU OF RADIOGRAPHY

Proposed Alternative
In Accordance with 10CFR50.55a(z)(1)

--Alternative Provides Acceptable Level of Quality and Safety--

1. ASME Code Component(s) Affected

All American Society of Mechanical Engineers (ASME), Boiler & Pressure Vessel (B&PV) Code, Section XI, ISI ferritic piping butt welds requiring radiography during repair/replacement activities.

2. Applicable Code Edition and Addenda

PLANT	INTERVAL	EDITION	START	END
Duane Arnold Energy Center	Fifth	2007 Edition through 2008 Addenda	November 1, 2016	October 31, 2026
Point Beach Nuclear Plant Units 1 and 2	Fifth	2007 Edition through 2008 Addenda	August 1, 2012	July 31, 2022
St. Lucie Nuclear Plant Unit 1	Fifth	2007 Edition through 2008 Addenda	February 11, 2018	February 10, 2028
St. Lucie Nuclear Plant Unit 2	Fourth	2007 Edition through 2008 Addenda	January 20, 2013	January 19, 2023
Seabrook Station	Third	2004 Edition No Addenda	August 19, 2010	August 18, 2020
Turkey Point Nuclear Plant Unit 3	Fifth	2007 Edition through 2008 Addenda	February 22, 2014	February 21, 2024
Turkey Point Nuclear Plant Unit 4	Fifth	2007 Edition through 2008 Addenda	April 15, 2014	April 14, 2024

3. Applicable Code Requirement

The 2004 Edition with No Addenda and the 2007 Edition through the 2008 Edition of Section XI, IWA-4221 (Construction Code and Owner's Requirements) requires the owner to use the requirements of the construction code for repair and replacement activities. IWA-4520 requires that welded joints made for installation of items be examined in accordance with the Construction Code identified in the Repair/Replacement Plan.

The examination requirements for ASME Section III, Class 1, 2 and 3 circumferential butt welds are contained in the ASME Section III, subarticle NB-5200, NC-5200 and ND-5200 and the acceptance standards for radiographic examination are specified in subarticle NB-5300, NC-5300 and ND-5300.

10 CFR 50.55a(b)(2)(xx)(B) requires that "The NDE provision in IWA-4540(a)(2) of the 2002 Addenda of Section XI must be applied when performing system leakage tests after repair and replacement activities performed by welding or brazing on a pressure retaining boundary using the 2003 Addenda through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of this section." IWA-4540(a)(2) requires that the nondestructive examination method and acceptance criteria of the ASME Section III, 1992 Edition or later be met prior to return to service in order to perform a system leakage test in lieu of a system hydrostatic test.

4. Reason for Request

Replacement of piping is periodically performed in support of the Flow Accelerated Corrosion (FAC) program as well as other repair and replacement activities. The use of encoded Phased Array Ultrasonic Examination Techniques (PAUT) in lieu of radiography (RT) to perform the required examinations of the replaced welds would eliminate the safety risk associated with performing RT, which includes the planned exposure and the potential for accidental personnel exposure. PAUT minimizes the impact on other outage activities normally involved with performing RT such as limited access to work locations and the need to control system fill status because RT would require a line to remain fluid empty in order to obtain adequate examination sensitivity and resolution. In addition, encoded PAUT has been demonstrated to be adequate for detecting and sizing critical flaws.

NextEra Energy (NextEra) requests approval of this proposed alternative to support anticipated piping repair and replacement activities starting in the fall 2018 outage season. The duration of the proposed alternative request is for the remainder of the ISI Interval for the plants defined in Section 2 of this relief request.

5. Proposed Alternative and Basis for Use

Proposed Alternative

NextEra is proposing the use of encoded PAUT in lieu of the code-required RT examinations for ASME ferritic piping repair/replacement welds. Similar techniques are being used throughout the nuclear industry for examination of dissimilar metal welds and overlaid welds, as well as other applications including ASME B31.1 piping replacements. This proposed alternative request includes requirements that provide an acceptable level of quality and safety that satisfy the requirements of

10 CFR 50.55a(z)(1). The capability of the alternative technique is comparable to the examination methods documented in the ASME Code Sections III, VIII, and IX, and associated code cases (References 1, 3, 5, 6, 8, 9, 10, 11, 12 and 13) related to using ultrasonic examination techniques for weld acceptance. The examinations will be performed using personnel and procedures qualified with the requirements below.

The electronic data files for the PAUT examinations will be stored as part of the archival quality records. In addition, hard copy prints of the data will also be included as part of the PAUT examination records to allow viewing without the use of hardware or software.

NextEra is proposing to perform encoded PAUT examination techniques using demonstrated procedures, equipment, and personnel in accordance with the process documented below:

(1) The welds to be examined shall meet the surface conditioning requirements of the demonstrated ultrasonic procedure.

(2) The welds to be examined shall be conditioned such that transducers properly couple with the scanning surface with no more than a 1/32 in. (0.8 mm) gap between the search unit and the scanning surface.

(3) The ultrasonic examination shall be performed with equipment, procedures, and personnel qualified by performance demonstration.

(4) The examination volume shall include 100% of the weld volume and the weld to base metal interface.

   (a) Angle beam examination of the complete examination volume for fabrication flaws oriented parallel to the weld joint shall be performed.

   (b) Angle beam examination for fabrication flaws oriented transverse to the weld joint shall be performed to the extent practical. Scan restrictions that limit complete coverage shall be documented.

   (c) A supplemental straight beam examination shall be performed on the volume of base metal through which the angle beams will travel to locate any reflectors that can limit the ability of the angle beam to examine the weld. Detected reflectors that may limit the angle beam examination shall be recorded and evaluated for impact on examination coverage. The straight beam examination procedure, or portion of the procedure, is required to be qualified in accordance with ASME Section V, Article 4 and may be performed using non-encoded techniques.

(5) All detected flaw indications from (4)(a) and (4)(b) above shall be considered planar flaws and compared to the preservice acceptance standards for volumetric examination in accordance with IWB-3000, IWC-3000 or IWD-3000. Preservice acceptance standards shall be applied. Analytical evaluation for acceptance of flaws in accordance with IWB-3600, IWC-3600 or IWD-3600 is permitted for flaws that exceed the applicable acceptance standards and are confirmed by surface or volumetric examination to be non-surface connected.

(6) Flaws exceeding the applicable acceptance standards and when analytical evaluation has not been performed for acceptance, shall be reduced to an acceptable size or removed and repaired, and the location of the repair shall be re-examined using the same ultrasonic examination procedure that detected the flaw.

(7) The ultrasonic examination shall be performed using encoded UT technology that produces an electronic record of the ultrasonic responses indexed to the probe position, permitting off-line analysis of images built from the combined data.

(a) Where component configuration does not allow for effective examination for transverse flaws (e.g., pipe-to-valve, tapered weld transition, weld shrinkage, etc.), non-encoded UT technology may be used. The basis for the non-encoded examination shall be documented.

(8) A written ultrasonic examination procedure qualified by performance demonstration shall be used. The qualification shall be applicable to the scope of the procedure {e.g., flaw detection and/or sizing (length or through-wall height)}, encoded or non-encoded, single and/or dual side access, etc. The procedure shall:

(a) Contain a statement of scope that specifically defines the limits of procedure applicability (e.g., minimum and maximum thickness, minimum and maximum diameter, scanning access);

(b) Specify which parameters are considered essential variables, and a single value, a range of values, or criteria for selecting each of the essential variables;

(c) List the examination equipment, including manufacturer and model or series;

(d) Define the scanning requirements, such as beam angles, scan patterns, beam direction, maximum scan speed, extent of scanning, and access;

(e) Contain a description of the calibration method (i.e., actions required to ensure that the sensitivity and accuracy of the signal amplitude and time outputs of the examination system, whether displayed, recorded, or automatically processed, are repeated from examination to examination);

(f) Describe the method and criteria for discrimination of indications (e.g., geometric indications versus indications of flaws and surface versus subsurface indications); and

(g) Describe the surface preparation requirements.

(9) Performance demonstration specimens shall conform to the following requirements:

(a) The specimens shall be fabricated from ferritic material with the same inside surface cladding process, if applicable, with the following exceptions:

(i) Demonstration with shielded metal arc weld (SMAW) single-wire cladding is transferable to multiple-wire or strip-clad processes;

(ii) Demonstration with multiple-wire or strip-clad process is considered equivalent but is not transferable to SMAW-type cladding processes.

(b) The demonstration specimens shall contain a weld representative of the joint to be ultrasonically examined, including the same welding processes.

(c) The demonstration set shall include specimens not thicker than 0.1 in. (2.5 mm) more than the minimum thickness, nor thinner than 0.5 in. (13 mm) less than the maximum thickness for which the examination procedure is applicable. The demonstration set shall include the minimum, within 1/2 inch of the nominal pipe size (NPS), and maximum pipe diameters for which the examination procedure is applicable. If the procedure is applicable to outside diameter (OD) piping of 24 in. (600 mm) or larger, the specimen set must include at least one specimen 24 in. OD (600 mm) or larger but need not include the maximum diameter.

(d) The demonstration specimen scanning and weld surfaces shall be representative of the surfaces to be examined.

(e) The demonstration specimen set shall include geometric conditions that require discrimination from flaws (e.g., counterbore, weld root conditions, or weld crowns) and limited scanning surface conditions for single-side access, when applicable.

(f) The demonstration specimens shall include both planar and volumetric fabrication flaws (e.g., lack of fusion, crack, incomplete penetration, slag inclusions) representative of the welding process or processes of the welds to be examined. The flaws shall be distributed throughout the examination volume.

(g) Specimens shall be divided into flawed and unflawed grading units.

(i) Flawed grading units shall be the actual flaw length, plus a minimum of 0.25 in. (6 mm) on each end of the flaw. Unflawed grading units shall be at least 1 in. (25 mm).

(ii) The number of unflawed grading units shall be at least 1-1/2 times the number of flawed grading units.

(h) Demonstration specimen set flaw distribution shall be as follows:

(i) For thickness greater than 0.50 in. (13 mm), at least 20% of the flaws shall be distributed in the outer third of the specimen wall thickness, at least 20% of the flaws shall be distributed in the middle third of the specimen wall thickness, and at least 40% of the flaws shall be distributed in the inner third of the specimen wall thickness. For thickness 0.50 in. (13mm) and less, at least 20% of the flaws shall be distributed in the outer half of the specimen wall thickness and at least 40% of the flaws shall be distributed in the inner half of the specimen wall thickness.

(ii) At least 30% of the flaws shall be classified as surface planar flaws in accordance with IWA-3310. At least 40% of the flaws shall be classified as subsurface planar flaws in accordance with IWA-3320.

(iii) At least 50% of the flaws shall be planar flaws, such as lack of fusion, incomplete penetration, or cracks. At least 20% of the flaws shall be volumetric flaws, such as slag inclusions.

(iv) The flaw through-wall heights shall be based on the applicable acceptance standards for volumetric examination in accordance with IWB-3400, IWC-3400 or IWD-3400. At least 30% of the flaws shall be classified as acceptable planar flaws, with the smallest flaws being at least 50% of the maximum allowable size based on the applicable a/l aspect ratio for the flaw. Additional smaller flaws may be included in the specimens to assist in establishing a detection threshold, but shall not be counted as a missed detection if not detected. At least 30% of the flaws shall be classified as unacceptable in accordance with the applicable acceptance standards. Welding fabrication flaws are typically confined to a height of a single weld pass. Flaw through-wall height distribution shall range from approximately one to four weld pass thicknesses, based on the welding process used.

(v) If applicable, at least two flaws, but no more than 30% of the flaws, shall be oriented perpendicular to the weld fusion line and the remaining flaws shall be circumferentially oriented.

(vi) For demonstration of single-side-access capabilities, at least 30% of the flaws shall be located on the far side of the weld centerline and at least 30% of the planar flaws shall be located on the near side of the weld centerline. The remaining flaws shall be distributed on either side of the weld.

(10) Ultrasonic examination procedures shall be qualified by performance demonstration in accordance with the following requirements.

(a) The procedure shall be demonstrated using either a blind or a non-blind demonstration.

(b) The non-blind performance demonstration is used to assist in optimizing the examination procedure. When applying the non-blind performance demonstration process, personnel have access to limited knowledge of specimen flaw information during the demonstration process. The non-blind performance demonstration process consists of an initial demonstration without any flaw information, an assessment of the results and feedback on the performance provided to the qualifying candidate. After an assessment of the initial demonstration results, limited flaw information may be shared with the candidate as part of the feedback process to assist in enhancing the examination procedure to improve the procedure performance. In order to maintain the integrity of the specimens for blind personnel demonstrations, only generalities of the flaw information may be provided to the candidate. Procedure modifications or enhancements, based on the feedback process, shall be applied to all applicable specimens based on the scope of the changes.

(c) Objective evidence of a flaw's detection, length and through-wall height sizing, in accordance with the procedure requirements, shall be provided to the organization administering the performance demonstration.

(d) The procedure demonstration specimen set shall be representative of the procedure scope and limitations (e.g., thickness range, diameter range, material, access, surface condition).

(e) The demonstration set shall include specimens to represent the minimum and maximum diameter and thickness covered by the procedure. If the procedure spans a range of diameters and thicknesses, additional specimens shall be included in the set to demonstrate the effectiveness of the procedure throughout the entire range.

(f) The procedure demonstration specimen set shall include at least 30 flaws and shall meet the requirements of (9) above.

(g) Procedure performance demonstration acceptance criteria

(i) To be qualified for flaw detection, all flaws in the demonstration set that are not less than 50% of the maximum allowable size, based on the applicable a/l aspect ratio for the flaw, shall be detected. In addition, when performing blind procedure demonstrations, no more than 20% of the non-flawed grading units may contain a false call. Any non-flaw condition (e.g., geometry) reported as a flaw shall be considered a false call.

(ii) To be qualified for flaw length sizing, the root mean square (RMS) error of the flaw lengths estimated by ultrasonics, as compared with the true lengths, shall not exceed 0.25 in. (6 mm) for diameters of NPS 6.0 in. (DN150) and smaller, and 0.75 in. (18 mm) for diameters greater than NPS 6.0 in. (DN150).

(iii) To be qualified for flaw through-wall height sizing, the RMS error of the flaw through-wall heights estimated by ultrasonics, as compared with the true through-wall heights, shall not exceed 0.125 in. (3 mm).

(iv) RMS error shall be calculated as follows:

$$\text{RMS} = \left[\frac{\sum_{i=1}^{n}(m_i - t_i)^2}{n}\right]^{1/2}$$

where

m_i = measured flaw size

t_i = true flaw size

n = number of flaws measured

(h) Essential variables may be changed during successive personnel performance demonstrations. Each examiner need not demonstrate qualification over the entire range of every essential variable.

(11) Ultrasonic examination personnel shall be qualified in accordance with IWA- 2300. In addition, examination personnel shall demonstrate their capability to detect and size flaws by performance demonstration using the qualified procedure in accordance with the following requirements:

(a) The personnel performance demonstration shall be conducted in a blind fashion (flaw information is not provided).

(i) The demonstration specimen set shall contain at least 10 flaws and shall meet the flaw distribution requirements of (9)(h) above, with the exception of (9)(h)(v). When applicable, at least one flaw, but no more than 20% of the flaws, shall be oriented perpendicular to the weld fusion line and the remaining flaws shall be circumferentially oriented.

(b) Personnel performance demonstration acceptance criteria:

(i) To be qualified for flaw detection, personnel performance demonstration shall meet the requirements of the following table for both detection and false calls. Any non-flaw condition (e.g., geometry) reported as a flaw shall be considered a false call.

Performance Demonstration Detection Test Acceptance Criteria			
Detection Test Acceptance Criteria		**False Call Test Acceptance Criteria**	
No. of Flawed Grading Units	**Minimum Detection Criteria**	**No. of Unflawed Grading Units**	**Maximum Number of False Calls**
10	8	15	2
11	9	17	3
12	9	18	3
13	10	20	3
14	10	21	3
15	11	23	3
16	12	24	4
17	12	26	4
18	13	27	4
19	13	29	4
20	14	30	5
Note 1: Flaws ≥ 50% of the maximum allowable size, based on the applicable *a/l* aspect ratio for the flaw.			

(ii) To be qualified for flaw length sizing, the RMS error of the flaw lengths estimated by ultrasonics, as compared with the true lengths, shall not exceed 0.25 in. (6 mm) for NPS 6.0 in. (DN150) and smaller, and 0.75 in. (18 mm) for diameters larger than NPS 6.0 in. (DN150).

(iii) To be qualified for flaw through-wall height sizing, the RMS error of the flaw through-wall heights estimated by ultrasonics, as compared with the true through-wall heights, shall not exceed 0.125 in. (3 mm).

(12) Documentation of the qualifications of procedures and personnel shall be maintained. Documentation shall include identification of personnel, NDE procedures, equipment and specimens used during qualification, and results of the performance demonstration.

(13) The pre-service examinations will be performed per ASME Section XI (Reference 4).

Basis for Use

The overall basis for this proposed alternative is that encoded PAUT is adequate compared to RT for detecting and sizing critical (planar) flaws. In this regard, the basis for the proposed alternative was developed from numerous codes, code cases, associated industry experience, articles, and the results of RT and encoded PAUT examinations. The examination procedure and personnel performing examinations are qualified using representative piping conditions and flaws that demonstrate the ability to detect and size flaws that are both acceptable and unacceptable to the defined acceptance standards. The demonstrated ability of the examination procedure and personnel to appropriately detect and size flaws provides an acceptable level of quality and safety alternative as allowed by 10CFR50.55a(z)(1).

All remaining Repair/Replacement activities will satisfy the applicable Owner's and Construction Code requirements including the System Leakage Test requirements as modified by 10CFR50.55a(b)(2)(xx)(B).

6. Duration of Proposed Alternative

This relief request will be applied for the duration of the inservice inspection intervals defined in Section 2 of this relief request.

7. Precedent

1. Exelon Generation Company, LLC which includes Braidwood Station, Units 1 and 2; Byron Station, Unit Nos. 1 and 2; Calvert Cliffs Nuclear Power Plant, Units 1 and 2; Clinton Power Station, Unit 1; Dresden Nuclear Power Station, Units 2 and 3; Lasalle County Station, Units 1 and 2; Limerick Generating Station, Units 1 and 2; Nine Mile Point Nuclear Station, Units 1 and 2; Peach Bottom Atomic Power Station, Units 2 and 3; Quad Cities Nuclear Power Station, Units 1 and 2; R. E. Ginna Nuclear Power Plant; and Three Mile Island Nuclear Station, Unit 1, submitted "Proposed Alternative To Use Encoded Phased Array Ultrasonic Examination Techniques," (CAC Nos. MF8763-MF8782 and MF9395) dated November 22, 2016 (ADAMS Accession No. 16307A253), Request for Additional Information dated February 21, 2017 (ADAMS Accession No. ML17052A574) and revised letter dated March 13, 2017 (ADAMS Accession No. ML17072A385). NRC approval dated June 5, 2017 (ADAMS Accession No. ML17150A091).

2. Millstone Power Station Units 2 and 3 Alternative Requests RR-04-21 and IR-3-25, dated October 6, 2014 (ADAMS Accession No. ML14283A128). NRC approval dated September 21, 2015 (ADAMS Accession No. ML15257A005).

3. Millstone Power Station Unit 2 Alternative Request RR-04-16, dated August 1, 2013 (ADAMS Accession No. ML13220A019). NRC approval dated April 4, 2014 (ADAMS Accession No. ML14091A973).

4. Palo Verde Nuclear Generating Station Relief Request 48, dated August 1, 2012 (ADAMS Accession No. ML12229A046). NRC approval dated April 12, 2013 (ADAMS Accession No. ML13091A177).

5. Wolf Creek 10 CFR 50.55a Request ET 06-0029, dated September 1, 2006, requested an alternative for examination of main steam and feedwater piping welds being replaced due to flow assisted corrosion. The reason for the request was based on the acceptability of the proposed ultrasonic examination alternative process, radiation exposure reduction, outage costs and duration, and radiography exposure risk (ADAMS Accession No. ML062500093).

6. Oconee Request for Relief No. 2006-0N-01, dated February 2, 2006, requested an alternative for examination of butt welds between the Pressurizer Level and Sample Tap nozzles and their respective Safe Ends. The reason for the request was based on the difficulty to perform the code required radiography. The alternative was to perform ultrasonic examination per similar requirements to Code Case N- 659-1 (ADAMS Accession No. ML060450464).

8. References

1. ASME Section III Code Case N-659-2, "Use of Ultrasonic Examination in Lieu of Radiography for Weld Examination Section III, Divisions 1 and 3," dated June 9, 2008.

2. Pacific Northwest National Laboratory Report PNNL-19086, "Replacement of Radiography with Ultrasonics for the Nondestructive Inspection of Welds- Evaluation of Technical Gaps - An Interim Report," dated April 2010.

3. ASME B31.1, Case 168, "Use of Ultrasonic Examination in Lieu of Radiography for B31. 1Application," dated June 1997.

4. ASME Section XI Code Editions and Addenda applicable to each site.

5. ASME Section III, Code Case N-818, "Use of Analytical Evaluation approach for Acceptance of Full Penetration Butt Welds in Lieu of Weld Repair," dated December 6, 2011.

6. ASME Code Case 2235-9, "Use of Ultrasonic Examination in Lieu of Radiography Section I, Section VIII, Divisions 1 and 2, and Section XII," dated October 11, 2005.

7. Journal of Pressure Vessel Technology, "Technical Basis for ASME Section VIII Code Case 2235 on Ultrasonic Examination of Welds in Lieu of Radiography;" Rana, Hedden, Cowfer and Boyce, Volume 123, dated August 2001.

8. ASME Code Case 2326, "Ultrasonic Examination in Lieu of Radiographic Examination for Welder Qualification Test Coupons Section IX," dated January 20, 2000.

9. ASME Code Case 2541, "Use of Manual Phased Array Ultrasonic Examination Section V," dated January 19, 2006.

10. ASME Code Case 2558, "Use of Manual Phased Array E-Scan Ultrasonic Examination per Article 4 Section V," dated December 30, 2006.

11. ASME Code Case 2599, "Use of Linear Phased Array E-Scan Ultrasonic Examination per Article 4 Section V," dated January 29, 2008.

12. ASME Code Case 2600, "Use of Linear Phased Array S-Scan Ultrasonic Examination per Article 4 Section V," dated January 29, 2008.

13. ASME Code Case N-713, "Ultrasonic Examination in Lieu of Radiography Section XI, Division 1," dated November 10, 2008.