UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 7, 2012

Mr. George H. Gellrich, Vice President
Calvert Cliffs Nuclear Power Plant, LLC
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 2 - REQUEST FOR ADDITIONAL INFORMATION REGARDING RELIEF REQUEST RR-ISI-04-07A, "DISSIMILAR METAL BUTT WELDS BASELINE EXAMINATIONS" (TAC NO. ME8871)

Dear Mr. Gellrich:

By letter dated June 7, 2012, Calvert Cliffs Nuclear Power Plant, LLC, the licensee, submitted relief request RR-ISI-04-07A for authorization of proposed alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (Code) Case N-770-1 for Calvert Cliffs Nuclear Power Plant, Unit No. 2.

The Nuclear Regulatory Commission staff is reviewing the submittal and has determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). The NRC staff is requesting a response to the RAI within 60 days of receipt.

If you have any questions regarding this issue, please contact me at (301) 415-1016.

Sincerely,

Nadiyah S. Morgan, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-318

Enclosure:
RAI

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

REGARDING RELIEF REQUEST RR-ISI-04-07A

CALVERT CLIFFS NUCLEAR POWER PLANT, LLC.

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 2

DOCKET NO. 50-318

By letter dated June 7, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12164A372), Calvert Cliffs Nuclear Power Plant, LLC, the licensee, submitted relief request RR-ISI-04-07A for authorization of proposed alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Case N-770-1 for Calvert Cliffs Nuclear Power Plant, Unit No. 2. The Nuclear Regulatory Commission (NRC) staff is reviewing the submittal and requests the following additional information:

1. Describe the hardship associated with obtaining 100 percent axial scan coverage of the susceptible material for welds 30-RC-21A-10 and 30-RC-21B-10.

2. State whether any indications were found in the five subject welds of this proposed alternative during the 2011 refueling outage examinations, and how these indications have been dispositioned.

    a. If reportable indications were found that were identified as embedded flaws due to lack of apparent connection to the weld root, provide information on the depth of the indications.

3. Provide a copy of the performance demonstration qualification summary and identify any specific limitations associated with the scope of the SI-UT-130 R3 ultrasonic examination (UT) procedure.

    a. Did the UT procedure pass the ASME Code, Section XI, Appendix VIII requirements with the 10 degree maximum skew angle?

4. For welds 30-RC-21B-10 and 30-RC-22A-10, provide an estimate of the time required for the largest potential undetected root-connected flaw in the susceptible material to grow by primary water stress corrosion cracking (PWSCC) in response to operational and weld residual stresses to exceed ASME Code, Section XI, IWB-3600 allowable size.

5. In order to permit the NRC staff to verify the flaw analyses:

   a. Provide data for:

      i. Pipe diameter.

      ii. Wall thickness.

      iii. Safe end length.

      iv. Weld operating temperature.

      v. Internal pressure.

      vi. Axial stress due to internal pressure.

      vii. Global bending stress.

   b. Provide drawings of the circumferential cross sectional arc of weld 30-RC-21B-10 and axial cross section of weld 30-RC-22A-10 showing the scale of the drawing and:

      i. Coverage maps showing the uninspected region of the susceptible material.

      ii. Dimensions of the largest potential undetected PWSCC flaw.

      iii. Position of the flaw when it can first be detected using the UT procedure employed.

         1. What criterion is used for determining how far the hypothetical flaw must extend into the inspected region before it is detected?

   c. Provide a description of the weld process, including any post-weld machining (including back chipping and rewelding on the inside diameter).

   d. Provide the axial weld residual stress (WRS) profile used for weld 30-RC-21B-10 and hoop WRS profile for weld 30-RC-22A-10.

      i. Guidelines found in Electric Power Research Institute MRP-287, Section 3.6, suggest using a weld repair depth of 50 percent for calculation of the WRS profile. If a weld repair depth of less than 50 percent is used for the present WRS determination, provide justification for the weld repair depth assumed. This justification could include documentation of the number and depth of weld repairs for the subject welds.

      ii. If post-repair heat treatment is used in the WRS calculation, provide documentation that the heat treatment was performed.

      iii. Is the effect of the safe end stainless steel weld used in determining the stress profiles?

6. As a defense in depth measure for indications which may exist in the areas that cannot be examined and may grow through-wall, leakage monitoring is useful in the early detection of through wall cracks. Describe the leakage monitoring used for the reactor coolant pressure boundary, including leak rates or trends that would cause actions to be taken to determine the location of leaks.

7. In order to assess when the UT examinations would be expected to detect PWSCC flaws, examinations of welds 30-RC-21B-10 and 30-RC-22A-10 need to be modeled. In order to make these models accurate, information is needed concerning the as-built geometries of the subject welds and variables associated with the phased array method. Provide the following information:

   a. As-built weld geometry:

      i. Scaled drawings are needed to create accurate CAD models of the weld and surrounding geometry. Provide dimensioned drawings of the subject welds including the immediate region around the weld location.

      ii. Estimate and provide depth of geometrical anomalies (e.g., concavity or waviness) on the outside diameter surface of the welds that impact volumetric inspection. Also, provide distances from weld to any obstructions that limit the inspection of the weld region.

   b. Phased array probe:

      i. Center frequency, bandwidth, pulse excitation type and duration.

      ii. Operating mode.

         1. Transmit-receive (TR), pulse / echo, etc.
         2. Longitudinal (L) and/or shear (S) wave.

      iii. Array configuration (matrix):

         1. Whether identical or different transmit-receive arrays were used (if applicable).
         2. Physical separation between arrays (if TRL/TRS configuration). Identify distance between first element of one array and first element of second array (array separation–see Figure 1).
         3. If TRL or TRS mode is used, identify transmit and receive arrays (relative to weld geometry).

      iv. Total number of elements per array:

         1. Number of elements along the primary axis.
         2. Number of elements along the secondary axis.

      v. Element dimensions along primary and secondary axes, spacing between elements, and center-to-center distance (pitch–see Figure 2):

1. Element shape if not rectangular.

vi. Element wiring configuration and element firing/receiving ordering sequence for each array.

vii. Probe manufacturer and/or part number.

c. Wedge (see Figure 3):

i. Material type–Rexolite, other, etc.

1. Longitudinal and shear wave velocity.
2. Attenuation.
3. Density.

ii. Geometry:

1. Wedge angle.
2. Roof angle (if used).
3. All physical dimensions necessary to create 3-D solid model, such as height at front of wedge, height at back of wedge, width of wedge, and length of wedge
4. Placement of each probe on each wedge, i.e., what is the height of the middle of the first element?
5. Is wedge contact geometry contoured to the specimen? If not, what contour does it have, if any?

d. Beam focusing:

i. The type of focusing technique is needed as well as the specific parameters associated with each type. The four types of focusing techniques are listed below and shown graphically in Figure 4. State the type of focusing used and include associated details, as listed below:

1. Projection–focusing in a specific vertical plane.

   a. Parameters: distance from probe reference point, sweep angles (start, stop, interval), skew angle(s).

2. True depth–focusing at specific constant depth with all angles focused at this depth.

   a. Parameters: focusing depth, sweep angles (start, stop, interval), skew angle(s).

3. Half-path–sound path held constant as beam is swept.

   a. Parameters: sound path length, sweep angles (start, stop, interval), skew angle(s).

4. Focal plane – arbitrary user-defined plane of focus.

   a. Low angle path length, high angle path length, sweep angles (start, stop, interval), skew angle(s).

ii. Number and configuration of elements used in data acquisition (active aperture), if different than total number of elements within each probe (e.g., if a linear array probe physically contains 64 elements but only the first 32 were active – this needs to be defined).

iii. If possible, please provide a set of transmit and receive delay law values for each element at a particular angle and focus to validate model.

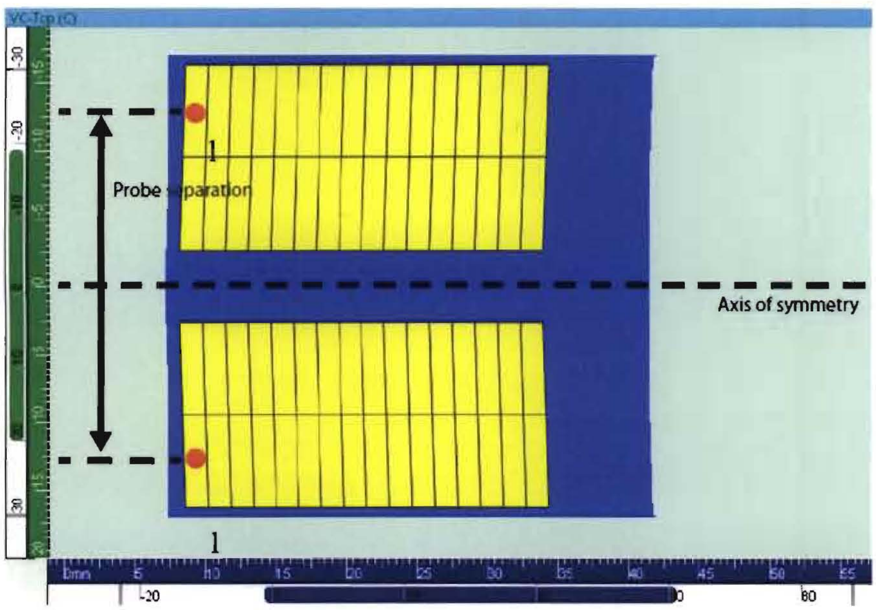

Figure 1 Top View of 2D Matrix Array Depicting Separation Dimension

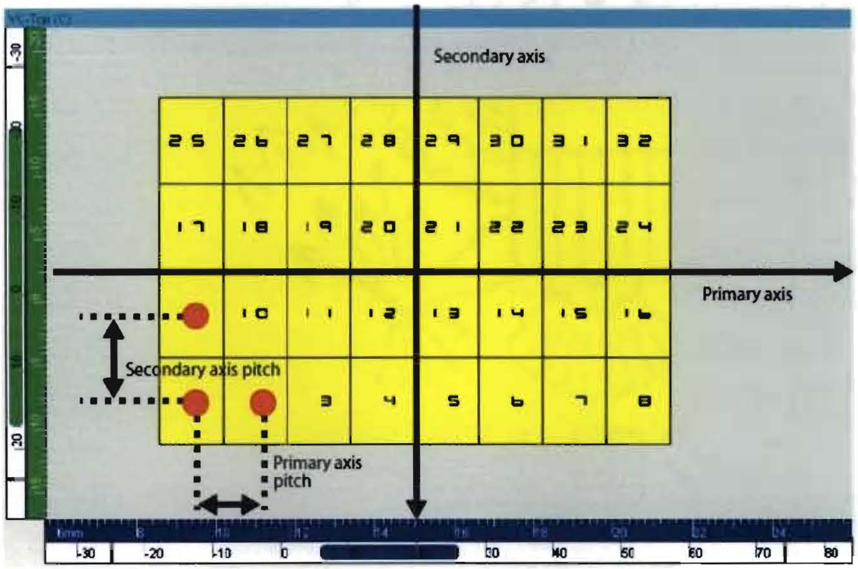

Figure 2 Top View of 2D Matrix Array Depicting Primary and Secondary Axis Pitch Dimensions

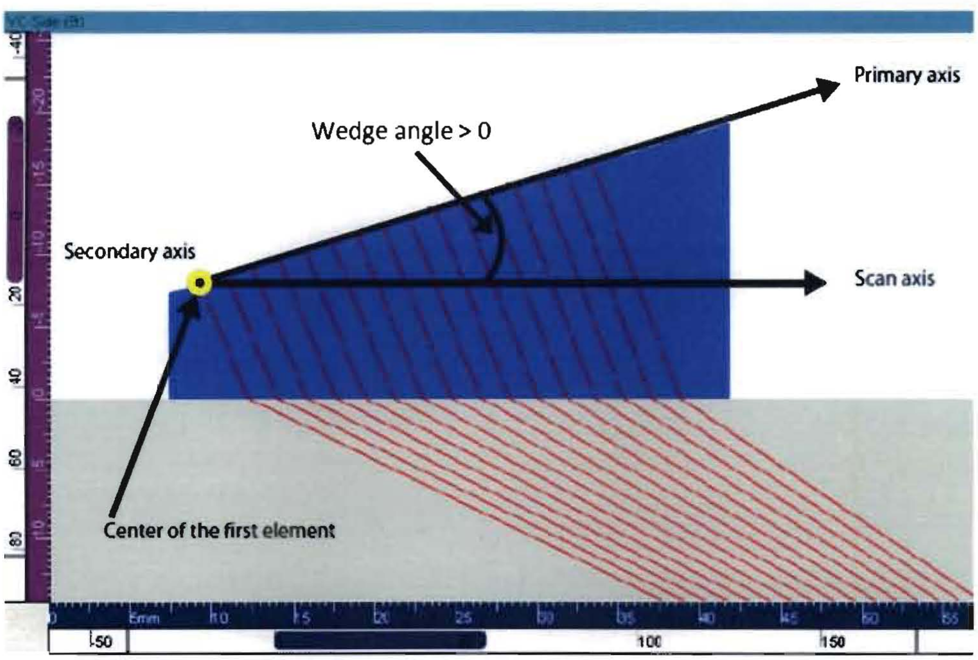

Figure 3 Definition of Wedge Angle

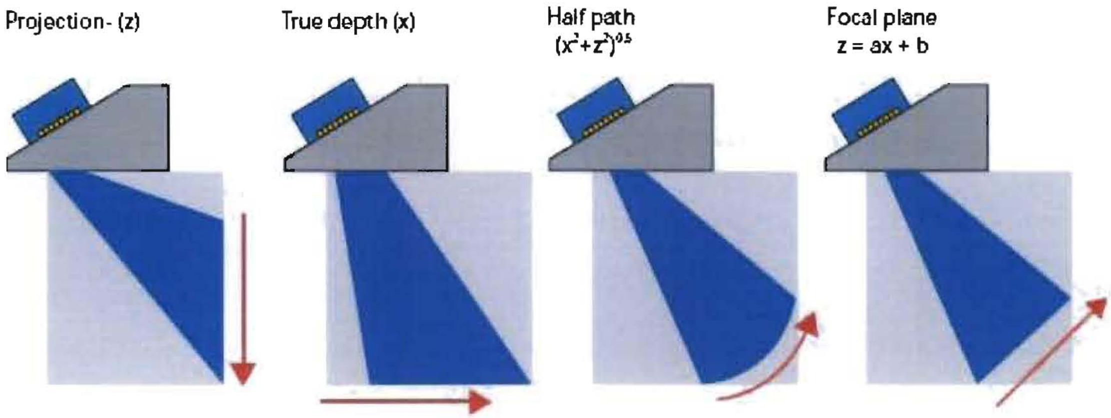

Figure 4 Beam Focusing Options for Phased Array Probes

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