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October 22, 2002

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
ASME Section XI Relief Request to Use an Alternative to the Inservice Inspection Requirement for Replacement Steam Generator Girth Welds

REFERENCE: (a) Letter from Ms. M. Gamberoni (NRC) to Mr. C. H. Cruse (BGE), dated April 5, 2000, Safety Evaluation of Proposed Alternate American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI, 1998 Edition for the Third 10-Year Inspection Interval – Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. MA4647 and MA4648

Pursuant to 10 CFR 50.55a(a)(3)(i), Calvert Cliffs Nuclear Power Plant (CCNPP) hereby proposes an alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) requirement concerning the CCNPP Steam Generator Replacement Project and associated Inservice Inspection (ISI) Program for the third ten year interval. Calvert Cliffs Technical Specification 4.0.5 states in part, "Inservice inspection of ASME Code Class 1, 2, and 3 components . . . shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50, Section 50.55a(g) . . . ." Paragraph 50.55a(a)(3)(i) allows the use of alternatives to the requirements of Paragraph 50.55a(g), that provide an acceptable level of quality and safety, when authorized by the Director of the Office of Nuclear Reactor Regulation.

The CCNPP Steam Generator Replacement Project and the Third Ten-Year ISI Program Plan for Calvert Cliffs Units 1 and 2 meets the requirements of the 1998 Edition, no Addenda of Section XI of the ASME Code (except for Subsections IWE and IWL), as approved by Nuclear Regulatory Commission letter dated April 5, 2000 (Reference a). Table IWC-2500-1, Examination Category C-A in Section XI describes the general requirements for categorizing pressure retaining welds in pressure vessels as ISI welds where the welds are located at a gross structural discontinuity as defined by ASME Section III, NB-3213.2. Examples are junctions between shells of different thicknesses, cylindrical shell-to-conical shell junctions, shell (or head)-to-flange welds, and head-to-shell welds. As an alternative to the generic

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criteria of gross structural discontinuity for categorizing ISI welds, CCNPP proposes to utilize the associated stress and fatigue analysis for the entire replacement steam generator to show that susceptibility of the closure girth weld to fatigue cracking is significantly less than the steam generator welds currently in the ISI program. Therefore adding the closure girth weld to the ISI program for the steam generators provides no added value in monitoring and maintaining the structural integrity of the vessel.

COMPONENT FOR WHICH RELIEF IS REQUESTED

Replacement Steam Generator Closure Girth Weld, ASME Class 2.

CODE REQUIREMENTS FOR WHICH RELIEF IS REQUESTED

The 1998 Edition no Addenda of ASME Section XI Table IWC-2500-1, Examination Category C-A, requires in part that shell circumferential welds in pressure vessels be categorized as ISI welds when the welds are located at a gross structural discontinuity as defined by ASME Section III, NB-3213.2. Examples are junctions between shells of different thicknesses, cylindrical shell-to-conical shell junctions, shell (or head)-to-flange welds, and head-to-shell welds.

PROPOSED ALTERNATIVE

The CCNPP Steam Generator Replacement Project involves replacing the steam generator lower assembly section containing the steam generator tubes and completely refurbishing the original steam drum in accordance with ASME Section III, 1989 Edition no Addenda and ASME Section XI, 1998 Edition no Addenda. Both sections will then be joined by the closure girth weld. The secondary side of the steam generator (both the original Combustion Engineering and replacement Babcock & Wilcox Canada) is classified as ASME Class 2 for the purposes of ISI but was constructed in accordance with ASME Class 1 requirements. As such, a stress and fatigue analysis of the secondary side has been performed which determined the predicted maximum stress intensity ranges and cumulative usage factors at specific junctions throughout the vessel shell. The junctions evaluated included the closure girth weld and other shell circumferential welds currently categorized as ISI welds. In lieu of categorizing the closure girth weld as an ISI weld solely due to the weld being classified by definition as a gross structural discontinuity since the weld will become a junction between shells of different thicknesses, CCNPP proposes to utilize the stress analysis to show that susceptibility of this weld to fatigue cracking is significantly less than the steam generator welds currently in the ISI program. Therefore adding the closure girth weld to the ISI program for the replacement steam generators provides no added value in monitoring and maintaining the structural integrity of the vessel.

In support of this effort, we have reviewed the applicable sections of various editions of ASME Section III, Section VIII, and Section XI Codes to determine the basis for the current definition of a gross structural discontinuity. In addition, we sought and received a Code Interpretation from the ASME Section III Committee clarifying the definition of a gross structural discontinuity (Attachments 2 and 3). As documented in the following section, based on this Code Interpretation, the low stress intensity and usage factor values determined by the stress and fatigue analysis do not support classifying the closure girth weld as a gross structural discontinuity.

SUPPORTING INFORMATION

Calvert Cliffs Nuclear Power Plant's ISI program for the secondary side of the steam generators currently includes the following circumferential welds (Attachment 1):

- Head Circumferential Weld
- Upper Steam Drum Shell-To-Transition Cone Weld
- Tubesheet-to-Shell Weld

The head circumferential weld and the upper steam drum shell-to-transition cone weld are welds on the original steam drum section, which will be re-installed. These two circumferential welds have been subjected to two ten-year ISI inspection intervals. The tubesheet-to-shell weld is part of the replacement lower assembly and therefore a new weld in the ISI program.

The stress and fatigue analysis performed for the replacement steam generators evaluated the entire vessel for a design life of 40 years taking into account the operating history of the steam drum section prior to replacement. A summary of the stress analysis is tabulated below:

Junction	**Range of Stress Intensity (ksi) ($P_L + P_b + Q$)**	**Allowable Stress Intensity (ksi)**		**Fatigue Usage Factor**	**Fatigue Usage Factor Limit**
		$3S_m$	**$1.5S_m$**		
Head Circumferential Weld	20.3	80.1	40.1	0.04	1.0
Tubesheet-to-Shell Weld	71.6	90.0	45.0	0.03	1.0
Upper Steam Drum-to-Transition Cone Weld	36.0	80.1	40.1	0.02	1.0
Replacement Steam Generator Closure Girth Weld	26.0	80.1	40.1	0.002	1.0

The data tabulated above shows that the susceptibility of the closure girth weld to fatigue cracking is very low in comparison to the other three circumferential welds listed that are currently in the ISI program. Of particular note is the comparison between the upper steam drum shell-to-transition cone weld and the closure girth weld. Per ASME Section XI, Table IWC-2500-1, the upper steam drum shell-to-transition cone weld is also an ISI weld solely due to the weld being classified as a gross structural discontinuity since this weld is a cylindrical shell-to-conical shell junction. The upper steam drum shell-to-transition cone weld has both a higher stress intensity range and fatigue usage factor than the closure girth weld. The upper steam drum shell-to-transition cone weld is part of the original steam drum and has undergone two ten-year ISI inspections with no flaws detected. This weld will remain an ISI weld. Based on the stress analysis performed for the replacement steam generator, the probability of the upper steam drum shell-to-transition cone weld developing a fatigue crack is significantly higher than the closure girth weld. Therefore, subjecting the closure girth to future volumetric inspections will not provide any added value in monitoring the structural integrity of the steam generators.

SAFETY COMMITTEE REVIEW

The proposed relief request has been reviewed by our Plant Operations and Safety Review Committee, and they have concluded that the proposed alternative provides an acceptable level of quality and safety.

SCHEDULE

Not adding the closure girth weld to the ISI program directly impacts planning for the upcoming Calvert Cliffs Unit 2 Spring 2003 Steam Generator Replacement Outage (scheduled to begin on February 14, 2003). We request that the Nuclear Regulatory Commission review and approve our proposed alternative prior to this outage.

Should you have questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

PEK/GT/bjd

Attachments:
(1) Figure 1, Replacement Steam Generator Weld Locations
(2) CCNPP Code Interpretation Request Letter
(3) ASME Code Interpretation Letter

cc:
J. Petro, Esquire
J. E. Silberg, Esquire
Director, Project Directorate I-1, NRC
D. M. Skay, NRC
H. J. Miller, NRC
Resident Inspector, NRC
R. I. McLean, DNR

ATTACHMENT (1)

FIGURE 1,

REPLACEMENT STEAM GENERATOR WELD LOCATIONS

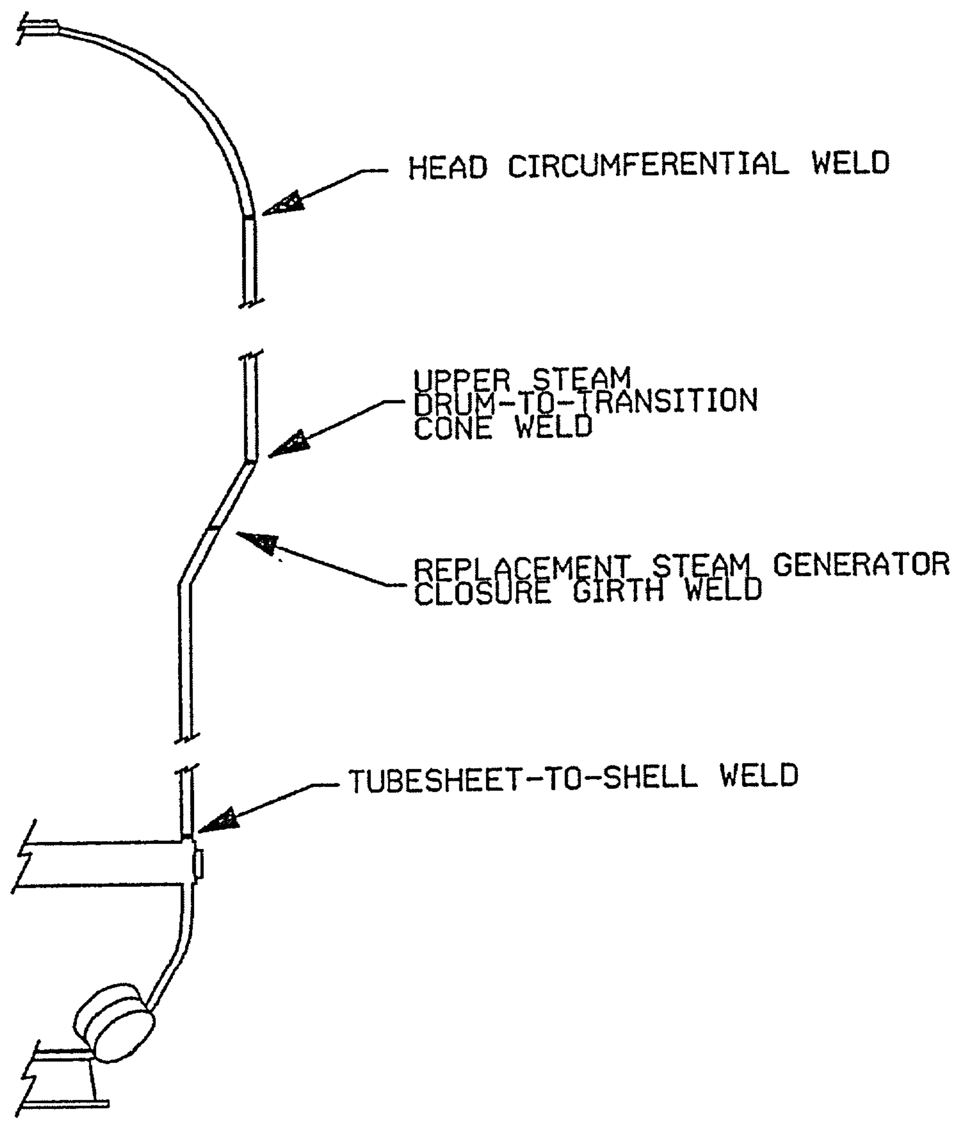

FIGURE 1
REPLACEMENT STEAM GENERATOR WELD LOCATIONS

ATTACHMENT (2)

CCNPP CODE INTERPRETATION REQUEST LETTER

Calvert Cliffs Nuclear Power Plant, Inc.
October 22, 2002

Calvert Cliffs Nuclear Power Plant
Constellation Generation Group, LLC

1650 Calvert Cliffs Parkway
Lusby, Maryland 20657

Constellation Energy Group

Steam Generator Project

October 8, 2002
SGP-PM-02-186

Secretary
ASME Boiler and Pressure Vessel Committee
ASME International
Three Park Ave.
New York, NY 10016-5990

Subject: Section III. Interpretation of NB-3213.2

Dear Sir:

We are in the final stages of preparing for our upcoming steam generator replacement project and need to finalize the closure girth weld joint configuration for the two-piece vessel assembly in the field. Section XI requires some welds to be ultrasonically examined. If it is required that a circumferential weld at a tapered transition be ultrasonically examined, a different weld joint configuration will be used than if ultrasonic examination is not required. To determine where examinations are to be performed, Section XI refers to Section III for the definition of gross structural discontinuity.

Section XI, Table IWC-2500-1, Category C-A requires examination of circumferential shell welds at gross structural discontinuities, as defined in Section III, NB-3213.2. Unfortunately, the definition for gross structural discontinuity in NB-3213.2 is unclear and is inconsistent with the definition for gross structural discontinuity in B31.7, Section VIII, Division 2, 4–112(b.) and Section VIII, Division 3, KD-210(b). The original definition of gross structural discontinuity in the 1968 Edition of Section III is consistent with the current definitions in Section VIII, Divisions 2 and 3. We feel the definitions in all three books should be essentially the same because the stress analysis methodologies in the three books are identical.

When the original Section III definition (or the Section VIII, Division 2 and 3 definition) for gross structural discontinuity is used, it seems obvious that a structural discontinuity is considered "gross" only when associated with stresses higher than the basic allowable primary stresses (primary membrane plus primary bending). Table NB-3217-1, and Fig. NB-3222-1 seem to support this conclusion. Further confirmation of this conclusion is the fact that F-102.2 in the B31.7 Code states that, "The C factors in Equations (10), (11), and (12) are gross structural discontinuities." In B31.7 and Section III, Equation (10) addresses primary plus secondary stress intensity range; Equation (11) addresses peak stress intensity range; and Equation (12) addresses simplified elastic-plastic discontinuity analysis. These three equations all deal with stresses that are much higher than the allowable stress values for primary stress. From this fact, it seems apparent that structural discontinuities are considered "gross" only when associated with stresses higher than the primary stress allowable values.

NB-3361 is also related to the issue of the Code definition of gross structural discontinuity. The first sentence states, "In general, a tapered transition section as shown in Fig. NB-3361-1 which is a type of gross structural discontinuity (NB-3213.2) shall be provided at joints of Categories A and B between sections that differ in thickness by more than one-fourth the thickness of the thinner section." We have calculated the stresses at the transition joint of our vessel and the sum of primary plus secondary plus peak is less than 1.5S.

Based on the above, our questions are as follows:

Question (1): Is a structural discontinuity considered to be a "gross structural discontinuity" when the membrane stress intensity does not exceed 1.1 Sm and the membrane plus bending stress intensity does not exceed 1.5 Sm?

Reply (1): No.

Question (2): Does the first sentence of NB-3361 classify a tapered transition in thickness as a "gross structural discontinuity"?

Reply (2): No. The definition used for classifying whether a discontinuity is a "gross structural discontinuity" is given in NB-3213.2. The tapered transition referenced in NB-3361 is a type of structural discontinuity, but whether or not it is a "gross structural discontinuity" depends on the level of stress calculated at the joint.

We would appreciate an answer as soon as possible as we are now preparing our mock-up and welding processes. There is an urgent need for a quick response if at all possible.

Sincerely,

J. R. Dalrymple
Project Manager
Steam Generator Project

JRD/smp

cc: T. L. Konerth
J. O. Calle
File 9.1

g:SGPM02-186.doc

ATTACHMENT (3)

ASME CODE INTERPRETATION LETTER

Calvert Cliffs Nuclear Power Plant, Inc.
October 22, 2002

ATTACHMENT (3)

Codes and Standards

ASME International

Three Park Avenue
New York, NY 10016-5990
U.S.A.

October 18, 2002

J. R. Dalrymple
Project Manager
Calvert Cliffs Nuclear Power Plant
Constellation Generation Group, LLC
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657

Subject:	ASME Section III, NB-3213.2
Reference:	Your letter dated October 8, 2002
ASME File #:	NI02-018

Dear J. R. Dalrymple:

Our understanding of the questions in your inquiry, and our replies are as follows:

Question (1): Is a structural discontinuity considered to be a "gross structural discontinuity" (Table NB-3217-1 and Fig. NB-3222-1) when the membrane stress intensity does not exceed 1.1 S_m (NB-3213.10) and the membrane plus bending stress intensity does not exceed 1.5 S_m (Fig. NB-3221-1)?

Reply (1): No.

Question (2): Does the first sentence of NB-3361 classify a tapered transition in thickness as a "gross structural discontinuity"?

Reply (2): No. The definition used for classifying whether a discontinuity is a "gross structural discontinuity" is given in NB-3213.2. The tapered transition referenced in NB-3361 is a type of structural discontinuity, but whether or not it is a gross structural discontinuity depends on the level of stress calculated at the joint.

Very truly yours,

Christian Sanna
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ASME Project Engineer Admin.
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1-212-591-8513