



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

May 26, 2011

Mr. M. J. Ajluni  
Nuclear Licensing Director  
Southern Nuclear Operating Company, Inc.  
40 Inverness Center Parkway  
P. O. Box 1295, Bin - 038  
Birmingham, AL 35201-1295

SUBJECT: EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2, CORRECTION TO  
SAFETY EVALUATION INSERVICE INSPECTION PROGRAM ALTERNATIVE  
ISSUED DATE JUNE 24, 2009

Dear Mr. Ajluni:

On June 24, 2009, the Nuclear Regulatory Commission (NRC) issued a Safety Evaluation (SE) (Agencywide Documents Access and Management System (ADAMS), Accession No. ML090340017) in support of the granting of reliefs requested on June 11, 2008, and October 8, 2008, by Southern Nuclear Company Inc. (the licensee). Specifically, the authorization to use weld overlay repairs as alternative to American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code*, Section XI, for nozzle-to-safe-end dissimilar metal welds.

In a letter dated April 27, 2011 (ADAMS Accession No. ML111250064), the licensee notified the NRC staff of two errors in the SE that were inconsistent with the request and contradicted the supporting documentation. Review of the SE revealed that an error had been introduced and the revised pages are enclosed as an attachment. The revised SE pages supersede the ones issued on June 24, 2009. The revision to the SE does not change the conclusion or the intent.

Sincerely,

A handwritten signature in black ink, appearing to read "G. Kulesa".

Gloria Kulesa, Branch Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-321 and 50-366

Enclosure:  
Revised Safety Evaluation pages

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would use the provisions that are specified in paragraph NB-4335.3 of the ASME Code, Section III, 2001 Edition with 2002 Addenda which would allow adjustment to Charpy V notch test temperature at which the aforementioned criterion is met. The licensee proposed to use the provisions that were approved by the ASME Code Committee and were subsequently incorporated in the ASME Code Case N-638-2. These provisions include an adjustment temperature for the procedure qualification which shall be determined in accordance with NB-4335.3 of ASME Code, Section III, 2001 Edition with 2002 Addenda. Reference nil ductility temperature or lowest service temperature of the materials for which the welding procedure will be used will be increased by a temperature equivalent to that of the adjustment temperature.

- 3.6.3 Section 4.0, "Examination" of CC 638-1, specifies the requirements for examination of welds. Section 4.0 of Appendix 5 to the licensee's June 11, 2008, submittal indicates that SNC's alternative to Section 4.0 of CC 638-1 is provided in Section 3 of the enclosure to its June 11, 2008 submittal.

ASME CC N-638-1, Paragraph 4.0 (b) specifies that the final weld surface shall be examined using surface and UT testing examinations no sooner than 48 hours after the weld reaches ambient temperature. As an alternative, the licensee would perform surface and volumetric examinations 48 hours after the third layer is installed. Based on research and industry experience, Electric Power Research Institute (EPRI) has provided a technical basis for starting the 48-hour hold after completion of the third temper bead weld layer rather than waiting for the weld overlay to cool to ambient temperature. Weld layers beyond the third layer are not designed to provide tempering to the ferritic HAZ during ambient temperature temper bead welding. EPRI has documented their technical basis in Technical Update report 1013558, "Repair and Replacement Applications Center: Temper bead Welding Applications 48-Hour Hold Requirements for Ambient Temperature Temper bead Welding" (ADAMS Accession No. ML070670060). The technical data provided by EPRI in their report is based on testing performed on SA-508, Class 2 low-alloy steels, which is the nozzle material. After evaluating all of the issues relevant to hydrogen cracking such as microstructure of susceptible materials, availability of hydrogen, applied stresses, temperature, and diffusivity and solubility of hydrogen in steels, EPRI concluded that: "...[t]here appears to be no technical basis for waiting the 48 hours after cooling to ambient temperature before beginning the NDE of the completed weld. There should be no hydrogen present, and even if it were present, the temper bead welded component should be very tolerant of the moisture..."

ASME CC N-638-1, Paragraph 4.0(c), specifies that the area from which weld-attached thermocouples have been removed shall be ground and examined using a surface examination method. Thermocouples will not be used. Instead, preheat and interpass temperatures will be monitored by calibrated pyrometers or temperature indicating crayons. As an alternative, if it is not possible to measure temperature by the aforementioned tools, heat flow calculations in conjunction with a measurement of maximum interpass temperature on a test coupon will be used to determine the interpass temperature. The test coupon will be made using maximum heat input of the welding procedure to be used in production and the thickness of the test coupon will be equal to or less than the thickness of the item to be welded.

- 3.7.3 Section 4.0, "Examination" of CC 638-1, specifies the requirements for examination of welds. Section 4.0 of Appendix 5, to the licensee's June 11, 2008, submittal indicates that SNC's alternative to Section 4.0 of CC 638-1 is provided in Section 3 of the enclosure to its June 11, 2008 submittal.

As discussed in Section 3(a), "Acceptance Examination of the Overlay," of the June 11, 2008, submittal, the licensee will perform a surface examination of an installed weld overlay and use the acceptance criteria of NB-5300 of ASME Code, Section III. The UT examinations of the installed weld overlay will be performed to assure adequate fusion and to detect fabrication defects. The required examination volume is defined in Appendix 2, Figure 1, of the RR. The acceptance criteria for the UT examination will be based on IWB-3514-2 of ASME Code, Section XI. Any unacceptable planar indication found in the FSWOL that does not meet IWB-3514-2 will be removed. The staff finds that the licensee's alternative is acceptable because removal of an unacceptable indication as determined by IWB-3514-2 is consistent with the staff's position.

ASME CC N-638-1, Paragraph 4.0(b), specifies that the final weld surface shall be examined using surface and UT methods no sooner than 48 hours after the weld reaches ambient temperature. EPRI Technical Report 1013558, *Temper bead Welding Applications - 48 Hour Hold Requirement for Ambient Temperature Temper bead Welding*, has shown that it is not necessary to wait until ambient temperature is reached before initiating the 48-hour hold in order to assure adequate hydrogen removal. No further tempering or potential hydrogen absorption effects will occur after deposition of the third overlay layer. The described approach has previously been reviewed and approved by the staff (*Safety Evaluation By the Office of Nuclear Reactor Regulation Related To ASME Code, Section XI, Alternatives for Union Electric Company Callaway Plant, Unit 1, Docket No. 50-483, July 10, 2007*), (ADAMS Accession No. ML071520329). Therefore, the licensee's proposed alternative to perform the surface and UT examinations no sooner than 48 hours after the third layer of the weld overlay is installed provides an acceptable level of quality and safety.

ASME CC N-638-1, Paragraph 4.0(c) of CC N-638-1 specifies that the area from which weld-attached thermocouples have been removed shall be ground and examined using a surface examination method. Thermocouples will not be used. Instead, preheat and interpass temperatures will be monitored by calibrated pyrometers or temperature indicating crayons. These temperature sensing devices will be used to verify preheat temperature and interpass temperature of every weld pass of the first three layers. If it is not possible to measure temperature by the aforementioned tools, heat flow calculations in conjunction with a measurement of maximum interpass temperature on a test coupon will be used to determine the interpass temperature. The test coupon will be made using maximum heat input of the welding procedure to be used in production and the thickness of the test coupon shall be equal to or less than the thickness of the item to be welded. The staff determined that the large mass of the weldment relative to the weld bead size, coupled with the low heat input GTAW process helps to ensure that the maximum interpass temperature will not be exceeded. Additionally, the alternate heat flow calculations which take into account weld heat input, thickness of the weld joint, and thermal conductivity of the materials will provide a good estimation of the interpass

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SUBJECT: EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2, CORRECTION TO SAFETY EVALUATION INSERVICE INSPECTION PROGRAM ALTERNATIVE ISSUED DATE JUNE 24, 2009

Dear Mr. Ajluni:

On June 24, 2009, the Nuclear Regulatory Commission (NRC) issued a Safety Evaluation (SE) (Agencywide Documents Access and Management System (ADAMS), Accession No. ML090340017) in support of the granting of reliefs requested on June 11, 2008, and October 8, 2008, by Southern Nuclear Company Inc. (the licensee). Specifically, the authorization to use weld overlay repairs as alternative to American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code*, Section XI, for nozzle-to-safe-end dissimilar metal welds.

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Sincerely,

/RA/

Gloria Kulesa, Branch Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

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