Progress Energy

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United States Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, Maryland 20852

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

REQUEST FOR RELIEF FROM ASME BOILER AND PRESSURE VESSEL CODE, SECTION XI, FOR THE FOURTH TEN-YEAR INSERVICE INSPECTION PROGRAM INTERVAL (RELIEF REQUEST NO. RR-22)

Ladies and Gentlemen:

The purpose of this letter is for Carolina Power and Light Company, also known as Progress Energy Carolinas, Inc. (PEC), to request relief, in accordance with 10 CFR 50.55a(a)(3)(i), from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, 1995 Edition, 1996 Addenda, for reactor pressure vessel examinations at the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2. Relief is requested on the basis that alternative methods provide an acceptable level of quality and safety.

Specifically, relief is requested on the basis that ASME, Section XI, Appendix VIII, contains no supplement for demonstrating Bottom-Mounted Instrument (BMI) penetrations Ultrasonic Testing (UT) procedures. The proposed alternative of performing automated UT of the BMIs from the inside surface using procedures and equipment that have been demonstrated as described in MRP-166, "Materials Reliability Program: Demonstration of Equipment and Procedures for the Inspection of Alloy 600 Bottom Mounted Instrumentation (BMI) Head Penetrations," supplemented by an equivalency demonstration described in AREVA document 51-9137268-000, would provide an acceptable level of quality and safety.

Attachment I provides the relief request. Attachment II provides proprietary AREVA document 51-9137268-000. Attachment III provides the AREVA Affidavit regarding the proprietary nature of Document 51-9137268-000. Due to the extent of proprietary information in the document, a non-proprietary version is judged to be of no value and is not provided. MRP-166 was previously submitted to the NRC by EPRI in a letter dated February 17, 2009.

PEC requests approval of this request by June 18, 2010, in order to support the Fourth Ten-Year Inservice Inspection for HBRSEP, Unit No. 2, being performed during Refueling Outage No. 26.

Progress Energy Carolinas, Inc.
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville, SC 29550

A047
NRR

If you have any questions concerning this matter, please contact me at (843) 857-1626.

Sincerely,

Curt Castell

Curt Castell
Supervisor – Licensing/Regulatory Programs

RAC/rac

Attachments

I. Request for Relief from ASME Boiler and Pressure Vessel Code, Section XI
II. Proprietary AREVA NP Document 51-9137268-000, Equivalency Demonstration for BMN Ultrasonic Examination Procedure 54-ISI-167-03
III. AREVA Affidavit Regarding Proprietary Document 51-9137268-000

c: L. A. Reyes, NRC, Region II
T. J. Orf, NRC, NRR
NRC Resident Inspector

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

REQUEST FOR RELIEF FROM ASME BOILER AND PRESSURE VESSEL CODE, SECTION XI (RELIEF REQUEST NO. RR-22)

1. ASME Code Components Affected

Code Class: 1
Reference: ASME Code Case N-722 and 10 CFR 50.55a(g)(6)(ii)(E)
Examination Category: Class 1 PWR Components Containing Alloy 600/82/182
Item Number: B15.80
Description: RPV Bottom-Mounted Instrument Penetrations (BMIs)
Component Number: 101/PEN 01 through 101/PEN 50. There are 50 Alloy 600 Bottom-Mounted Instrument (BMI) penetrations.

2. Applicable Code Edition and Addenda

The Fourth Ten-Year Interval Inservice Inspection (ISI) Program Plan is prepared to American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, 1995 Edition through the 1996 Addenda.

3. Applicable Code Requirement

10CFR50.55a(g)(6)(ii)(E)(1) states, "All licensees of pressurized water reactors shall augment their inservice inspection program by implementing ASME Code Case N–722..."

Code Case N-722; Table 1, Examination Categories, Item No. B15.80, RPV Bottom-Mounted Instrument Penetrations.

10CFR50.55a, Footnote 1: For inspections to be conducted every refueling outage and inspections conducted every other refueling outage, the initial inspection shall be performed at the next refueling outage after January 1, 2009. For inspections to be conducted once per interval, the inspections shall begin in the interval in effect on January 1, 2009, and shall be prorated over the remaining periods and refueling outages in this interval.

Code Case N-722; Table 1, Footnote 5: An ultrasonic examination (UT), performed from the component inside or outside surface in accordance with the requirements of Table IWB-2500-1 and Appendix VIII (1995 Edition with the 1996 Addenda or later) shall be acceptable in lieu of the visual, VE requirement of this table.

4. Reason for Request

Relief is requested on the basis that ASME, Section XI, Appendix VIII contains no supplement for demonstrating BMI UT procedures. The proposed alternative of performing automated UT of the BMIs from the inside surface using procedures and equipment that have been demonstrated as described in MRP-166, "Materials Reliability Program: Demonstration of Equipment and Procedures for the Inspection of Alloy 600 Bottom Mounted Instrumentation (BMI) Head Penetrations," supplemented by an equivalency demonstration described in AREVA document 51-9137268-000, would provide an acceptable level of quality and safety.

5. Proposed Alternative and Basis for Use

Instead of qualifying an ultrasonic examination technique in accordance with the requirements of ASME Section XI, Appendix VIII (1995 Edition with the 1996 Addenda or later), Progress Energy Carolinas, Inc. (PEC) proposes to use ultrasonic (volumetric) techniques demonstrated by the examination vendor (AREVA). These techniques have been demonstrated as described in MRP-166, "Materials Reliability Program: Demonstration of Equipment and Procedures for the Inspection of Alloy 600 Bottom Mounted Instrumentation (BMI) Head Penetrations," supplemented by an equivalency demonstration described in AREVA document 51-9137268-000 provided with this relief request. The demonstration described in MRP-166 was administered by EPRI personnel on behalf of the Material Reliability Program (MRP) in 2004. The ultrasonic techniques were demonstrated to effectively detect and size BMI tube ID and OD initiated flaws as well as locating the flaws with respect to the weld profile for Westinghouse 3/4 loop designs with 0.600 inch bores. AREVA document 51-9137268-000 concludes that the equipment, techniques, and procedure to be used on the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, BMI tubes with 0.460 inch bores will result in examinations that are equivalent to the demonstrated procedure described in MRP-166.

The UT examination from the BMI ID is capable of detecting axial cracking in the nozzle material that could be a precursor to OD cracking below the weld. Additionally, UT examination is capable of detecting any OD-initiated cracking that was caused by reactor coolant that leaked through the J-groove weld.

This relief is applicable to one or more of the 50 HBRSEP, Unit No. 2, BMIs.

Demonstration Process

The demonstration process consisted of two parts: an open results phase and a blind phase. The open results phase allowed collection of data that was reviewed without security restrictions.

The mockups used in the open results phase contain manufactured flaws. These manufactured flaws are constructed using a variety of methods as appropriate for the particular inspection geometry and inspection method. Flaw manufacturing processes may include cold isostatic processing (CIP), hot isostatic processing (HIP), laboratory-grown stress corrosion cracks (SCC), weld contamination flaws, and/or a combination of these processes. These manufactured flaw processes have been shown to produce NDE responses representative of primary water stress corrosion cracks (PWSCC) when paired with their appropriate NDE inspection method(s).

The blind demonstration uses a group of full-scale mockups consisting of a penetration welded into a simulated section of reactor pressure vessel (RPV) head.

The mockups used in the blind phase of the demonstration represent the Westinghouse designs in the field with 0.600 inch bores. The mockups contain manufactured flaws constructed using methods appropriate for the particular inspection geometry and inspection method. The mockups were built in accordance with the manufacturers' drawings and requirements.

The mockups contain the following flaw types:

- Axial/radial and circumferential/radial flaws in the tube located above, below, and/or over the attachment weld area (a circumferential flaw is defined as following the weld-to-vessel intersection line).
- Flaws are aligned in both the axial and circumferential directions on both the ID and OD surfaces.
- Individually isolated and branched flaw configurations are included.

An additional demonstration was performed in May 2010 prior to the HBRSEP, Unit No. 2, BMI examinations and was structured to use only a blind mockup representing the 0.460 inch bore penetrations. The results of this demonstration are discussed in AREVA document 51-9137268-000 and are planned to be incorporated in the next revision of MRP-166. This demonstration shows that similar flaw detection capability exists as previously documented in MRP -166 for the 0.600 inch bore penetrations.

UT Techniques

The UT techniques used for examination are the same techniques qualified for Control Rod Drive Mechanism (CRDM) nozzle examination. These techniques have been successfully used for many years to examine CRDM nozzle penetrations and have recently been qualified in accordance with ASME Code Case N-729-1 and 10 CFR 50.55a for examination of CRDM nozzles. Although the wall thickness of CRDM nozzles and BMI nozzles are similar, the diameter of the BMI nozzle is significantly smaller. This requires adaptation of the probe for the smaller bore.

The UT technique is Time of Flight Diffraction (TOFD) and employs a probe with both axial and circumferential looking beams. This probe arrangement is capable of detecting axial, circumferential, and off-axis flaws in the penetration tube wall. This probe configuration was successful in detecting and characterizing flaws in the BMI nozzles at South Texas Project, Unit 1, in 2004.

The TOFD technique uses separate angled transmitter and receiver elements that are directed toward each other. The goal of the transmitter is to insonify the entire tube wall. When flaw indications are present, the energy diffracted or reflected from the flaw tip travels to the receiver and is detected. The "time of flight" to the receiver provides through wall sizing capability.

The data is collected using an automated UT system and scanner that encodes the probe position and integrates this information with the time of flight information. The data is used to develop a B-scan display in a gray scale format that includes phase information of the A-scan signal and probe position. Additional displays include color scaled B, C, and D-scans. These displays are used to identify and characterize detected flaw signals in accordance with written instructions described in the UT procedure. The data analysis process is essentially the same as described in the examination procedure demonstrated for CRDM nozzle penetrations.

This technique is sensitive to both ID and OD initiated flaws and, unlike conventional UT techniques, is not amplitude dependent. A lateral wave is produced traveling near the ID surface. When an ID flaw or a very deep OD flaw exists, the effect is to disrupt the lateral wave and this disruption is evident in the data display. The technique also produces a strong back wall reflection that is monitored for evidence of disruption caused by OD initiating

flaws. This disruption is also evident in the data display unless the probe is positioned over the J-groove weld. In this case the display is reviewed for evidence of diffracted signals from flaws in this region.

Personnel Certification

Data acquisition personnel receive a minimum of 16 hours of documented training covering the setup and operation of the acquisition system in accordance with the examination procedure and applicable tooling operating instructions. Data acquisition personnel do not require UT certification because essential parameters involved in collection of the data, as specified by the examination procedure, are verified by Level II or Level III certified personnel prior to scanning and are automatically embedded in the data file where they can be verified during data analysis off line.

Data analysis personnel are qualified to a minimum of Level II in ultrasonic examination in accordance with the AREVA Written Practice and have documented training in the ACCUSONEX™ analysis system or have a valid Performance Demonstration Qualification Summary (PDQS) for an automated UT procedure using ACCUSONEX™. Data analysis personnel also receive a minimum of 16 hours of documented training on reactor head penetration (RHP) examination techniques or have a minimum of 200 hours of documented RHP analysis experience. Data analysis personnel are required to demonstrate an understanding of the techniques described within the procedure and the ability to perform data analysis to the satisfaction of a Level III experienced in RHP analysis.

Recording Criteria

The recording criteria are defined in detail in the examination procedure. Indications detected within the tube wall are considered recordable indications. Guidance is provided for discrimination between PWSCC type flaw responses and responses from welding fabrication flaws. Flaw response characteristics, flaw orientation, and flaw location relative to the J-groove weld fusion line are used to discriminate between fabrication flaws and service induced flaws. Flaws that disrupt the lateral wave or backwall responses are reported. Flaws in the tube wall adjacent to the J-groove weld are also recorded and dispositioned as either welding fabrication flaws or service related flaws. The MRP mockups used for the demonstration contain some welding fabrication flaws, and the opportunity existed at the time of the demonstration to make the distinction between fabrication flaws and simulated PWSCC. Those results are documented in MRP-166.

Furthermore, since the TOFD techniques are the same as used for CRDM nozzle examinations and AREVA has significant experience with CRDM nozzle examinations involving service related flaws at other nuclear sites and numerous baseline examinations containing welding fabrication flaws, the flaw response characteristics of welding fabrication flaws and PWSCC flaws are well understood.

Acceptance Criteria

Acceptance criteria will be in accordance with ASME Section XI, IWB-3000.

Conclusion

Based upon the results of the blind capability study of the ultrasonic process performed on a mockup representative of the HBRSEP, Unit No. 2, BMIs, procedures, and personnel certification and training, it is concluded that use of the alternative ultrasonic inspection of the

BMIs will provide an equivalent level of quality and safety as the visual examination performed on the OD of the reactor vessel bottom head at the intersection with the BMIs.

6. Duration of Proposed Alternative

The duration of the proposed alternative is until the end of the HBRSEP, Unit No. 2, fourth interval, scheduled to end on February 18, 2012.

7. Precedents

NRC Letter dated July 30, 2009, Indian Point Nuclear Generating Unit No.3 - Relief Request RR-3-48 for Reactor Vessel Bottom Penetrations Examination (TAC No. ME0414)

NRC Letter dated August 27, 2009, Braidwood Station, Units 1 and 2 - Relief Request I3R-04 for Reactor Vessel Bottom Penetrations Examination (TAC Nos. ME0598 and ME0599)

NRC Letter dated March 8, 2010, Relief Request Number 24 – Fourth Interval Inservice Inspection Program Proposed Alternative for Bottom Mounted Instrumentation Examinations -R.E. Ginna Nuclear Power Plant (TAC No. ME1364)

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

REQUEST FOR RELIEF FROM ASME
BOILER AND PRESSURE VESSEL CODE, SECTION XI)

AREVA Affidavit Regarding Proprietary Document 51-9137268-000

AFFIDAVIT

COMMONWEALTH OF VIRGINIA)
) ss.
CITY OF LYNCHBURG)

1. My name is Mark J. Burzynski. I am Manager, Product Licensing, for AREVA NP Inc. and as such I am authorized to execute this Affidavit.

2. I am familiar with the criteria applied by AREVA NP to determine whether certain AREVA NP information is proprietary. I am familiar with the policies established by AREVA NP to ensure the proper application of these criteria.

3. I am familiar with the AREVA NP information provided to the NRC in support of a Progress Energy project at the Robinson Nuclear Plant (Docket Number 50-261) in AREVA NP document 51-9137268-000, *Equivalency Demonstration for BMN Ultrasonic Examination Procedure 54-ISI-167-03.* AREVA NP document 51-9137268-000 is provided and referred to herein as the "Document." Information contained in this Document has been classified by AREVA NP as proprietary in accordance with the policies established by AREVA NP for the control and protection of proprietary and confidential information.

4. This Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by AREVA NP and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in this Document as proprietary and confidential.

5. This Document has been made available to the U S. Nuclear Regulatory Commission in confidence with the request that the information contained in this Document be withheld from public disclosure. The request for withholding of proprietary information is made in accordance with 10 CFR 2.390. The information for which withholding from disclosure is requested qualifies under 10 CFR 2.390(a)(4) "Trade secrets and commercial or financial information".

6. The following criteria are customarily applied by AREVA NP to determine whether information should be classified as proprietary:

(a) The information reveals details of AREVA NP's research and development plans and programs or their results.

(b) Use of the information by a competitor would permit the competitor to significantly reduce its expenditures, in time or resources, to design, produce, or market a similar product or service.

(c) The information includes test data or analytical techniques concerning a process, methodology, or component, the application of which results in a competitive advantage for AREVA NP.

(d) The information reveals certain distinguishing aspects of a process, methodology, or component, the exclusive use of which provides a competitive advantage for AREVA NP in product optimization or marketability.

(e) The information is vital to a competitive advantage held by AREVA NP, would be helpful to competitors to AREVA NP, and would likely cause substantial harm to the competitive position of AREVA NP.

The information in this Document is considered proprietary for the reasons set forth in paragraphs 6(a), 6(b), 6(c) and 6(d) above.

7. In accordance with AREVA NP's policies governing the protection and control of information, proprietary information contained in this Document has been made available, on a limited basis, to others outside AREVA NP only as required and under suitable agreement providing for nondisclosure and limited use of the information.

8. AREVA NP policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

9. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

Mark J. Burzynski

SUBSCRIBED before me on this 19th day of May, 2010.

Sherry L. McFaden
NOTARY PUBLIC, COMMONWEALTH OF VIRGINIA
MY COMMISSION EXPIRES: 10/31/2010
Registration # 7079129

SHERRY L. MCFADEN
Notary Public
Commonwealth of Virginia
7079129
My Commission Expires Oct 31, 2010