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ATTENTION: Document Control Desk

SUBJECT: **R.E. Ginna Nuclear Power Plant**
Docket No. 50-244

ASME Code Section XI Evaluation of the Bottom Mounted Instrumentation (BMI) Penetration Nozzle A86 at the R.E. Ginna Nuclear Power Plant

REFERENCES: (1) Transmittal of 2011 Owner's Activity Report for the R.E. Ginna Nuclear Power Plant, dated August 30, 2011 (ML11255A127)

In accordance with ASME Code Section XI, 2004 Edition with No Addenda, Subparagraph IWB-3144(b), the R.E. Ginna Nuclear Power Plant, LLC (Ginna), is submitting the attached Analytical Evaluation for the Ginna Reactor Vessel Bottom Mounted Instrumentation (BMI) Penetration Nozzle A86. An outside circumferential indication was identified in BMI Penetration Nozzle A86 by the first time ultrasonic testing (UT) of the BMI nozzles at Ginna during the Spring 2011 outage. A small, lack of fusion indication, resulting from the fabrication process, was also detected at this nozzle near the circumferential indication. The circumferential indication of interest has been determined to be a fabrication related reflector and is most likely the result of grinding into the BMI nozzle outside surface during the original weld fabrication process with weld material being subsequently deposited into the ground-out area. This circumferential indication is embedded and not exposed to the primary water environment, and therefore it is not subject to Primary Water Stress Corrosion Cracking (PWSCC). Fatigue would be the only credible crack growth mechanism at this location. There is reasonable assurance that the circumferential flaw of interest is not a crack, but is evaluated as such for conservatism. The circumferential indication is addressed in the Owner's Activity Report submittal, Reference (1), and in the evaluation, Attachment 1, that is submitted herewith as required by ASME Code Section XI requirements.

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During the 2011 refueling outage, the BMI penetration nozzles were first time volumetrically inspected in accordance with Ginna's Fifth 10-Year, Inservice Inspection (ISI) Plan and 4th Interval ISI Relief Request Number 24. All 36 BMI penetration nozzles were examined by time-of-flight diffraction ultrasonic, 0 degree ultrasonic, 45 degree shear wave ultrasonic, and eddy current non-destructive examination methods. Except for BMI Penetration Nozzle A86, no indications were noted. Penetration Nozzle A86 had two (2) indications. Indication number 1 was seen with the time-of-flight-diffraction ultrasonic examination and classified as a circumferentially oriented planar flaw, which extends into the nozzle wall from the weld-to-nozzle interface. The dimensions of this indication are 1.35 inch circumferentially by 0.161 inch in through-wall depth. The nozzle wall thickness is approximately 0.59 inches, making the indication approximately 27 percent of the nozzle wall in depth. The indication was not seen with either the 0 degree or 45 degree ultrasonic or the eddy current examinations.

With the assistance of the Electric Power Research Institute (EPRI) NDE Center, the time-of-flight ultrasonic data was compared to similar data from J-groove welds at other plants. Ginna's circumferential indication number 1 has many signal characteristics similar to indications found in retired Reactor Vessel Head Control Rod Drive penetrations at the nozzle-to-weld interface. Those indications were destructively verified as being created by fabrication, most likely as a result of an in-process grind and repair evolution. Ginna's circumferential indication number 1 also lacked many of the characteristics of actual PWSCC indications as outlined in EPRI Report IR-2011-476. This independent review of the data concluded the characteristics of indication number 1 were consistent with the response from a metallurgical interface associated with a grind and weld evolution during original fabrication. (See figure, Attachment 2.)

Indication number 2 was classified as a laminar flaw, most likely resulting from lack of fusion at the nozzle-to-weld interface. The report dimensions are 0.16 inch axial by 0.25 inch circumferential by 0.0 inch through-wall depth. This indication was seen in the 0 degree and 45 degree UT examinations. This indication is acceptable[1] in accordance with the criteria.

Neither of the Ginna BMI Penetration Nozzle A86 flaws indicated are open to a wetted surface. Enhanced Visual Examination (EVT-1) using a 0.044 inch character card was performed on the vessel interior wetted surface and eddy current was performed on the nozzle inside surface of BMI Penetration Nozzle A86. No indication of cracking, pores, or inclusions that could be associated with a wetting path was observed at the weld, nozzle, and adjacent vessel surfaces. The EVT-1 evaluation method is capable of detecting Stress Corrosion Cracking flaws, as detailed within Pacific Northwest National Laboratory, NUREG/CR-6943, PNNL-16472, "A Study of Remote Visual Methods to Detect Cracking in Reactor Components," October 2007, Prepared for the Division of Fuel, Engineering, and Radiological Research Office of Nuclear Regulatory Research.

A finite element residual stress analysis shows that the residual axial stresses are low or compressive in the region of the Penetration Nozzle A86 indications. The propensity for circumferential cracking is less likely than axial cracking because hoop stress in this region exceeds the axial stress. Therefore, circumferential PWSCC initiation is unlikely, even without considering the additional beneficial effect of post-weld heat treatment. The operating temperature of the lower vessel head region is approximately 528 degrees F[2], which translates to a lower probability of initiating PWSCC cracking.

It is concluded that indications number 1 and 2 are not the result of PWSCC. The indications are embedded and significantly away from the wetted surface. The attached Westinghouse Analytical Evaluation was performed for indication number 1 and is the basis for acceptability per ASME Code Section XI analytical evaluation rules. Indication number 2 is acceptable without an analytical evaluation. It is concluded that both indications were introduced during the original fabrication of the vessel.

Should you have any questions regarding this matter, please contact Mr. Thomas Harding at (585) 771-5219 or Thomas.HardingJr@cengllc.com.

Very truly yours,

Thomas Mogren

Attachment 1: Structural Integrity Evaluation of Circumferential Indication in Ginna BMI Nozzle No. A86, Westinghouse Report LTR-PAFM-11-69, Revision 0, dated July 2011

Attachment 2: Location of Indications in A86 BMI Penetration – R.E. Ginna Nuclear Power Plant

cc: W. M. Dean, NRC
D. V. Pickett, NRC
Resident Inspector, NRC

[1] Westinghouse WCAP-17410-P, Revision 0, dated April 2011, "Structural Integrity Evaluation of Reactor Vessel BMI Penetrations to Support Continued Operation: Ginna," Westinghouse Proprietary Class 2

[2] Ginna Station UFSAR Revision 23, Table 15.0-1, Nuclear Steam Supply System (NSSS) Power Capability Working Group (PCWG) Parameters for Ginna Station Uprate Program, Reactor Coolant Temperature