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October 5, 2012

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTENTION: Document Control Desk

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

Response to Request for Additional Information Regarding Relief Request ISI-08 Examination of Reactor Pressure Vessel Upper Head Penetration Nozzles

REFERENCES:

(a) Letter from Mohan Thadani (NRC) to Thomas Harding (Ginna LLC), Ginna: RAI for the CRDM Nozzle Examination Relief Request (ML12264A619)

(b) Letter from Thomas Mogren (Ginna LLC) to Document Control Desk (NRC), Proposed Alternative Reactor Vessel Closure Head Penetration Nozzle Examinations for the Fifth Interval Inservice Inspection (ISI) Program (ML12151A405)

By letter dated September 20, 2012 (Reference a), the NRC requested additional information regarding R.E. Ginna Nuclear Power Plant, LLC's Proposed Alternative Reactor Vessel Closure Head Penetration Nozzle Examinations for the Fifth Interval Inservice Inspection (ISI) Program, which was submitted to the NRC on May 24, 2012 (Reference b). The requested information is contained in the Enclosure.

There are no new regulatory commitments identified in this correspondence. If you have any questions or need any other clarifying information, please contact Thomas L. Harding, at (585) 771-5219.

Sincerely,

Thomas Mogren

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NRR

Enclosure: Response to Request for Additional Information

cc: M.C. Thadani, NRC
Ginna Resident Inspector, NRC
W.M. Dean, NRC

ENCLOSURE

Response to Request for Additional Information

The NRC staff has reviewed and evaluated Relief Request ISI-08 Request for Relief from 10 CFR 50.55a(g)(6)(ii)(D) Requirements for Examination of Reactor Pressure Vessel Upper Head Penetration Nozzles and has determined that the following information is needed in order to complete its review of the relief request.

1. In Section 5 of the submittal, the licensee "proposes to perform the bare metal visual examination of the CRDM nozzle to reactor vessel head bore annulus area in lieu of a demonstrated volumetric or surface leak path by virtue of the weep channel designed into the Ginna replacement Reactor Vessel Head." During the September 6, 2012 teleconference between the licensee and NRC, the licensee clarified that the intent of the upcoming inspection is to perform a best effort volumetric leak path assessment in lieu of a demonstrated volumetric leak path assessment in accordance with 10 CFR 50.55a(g)(6)(ii)(D)(*3*). The NRC requests that the licensee revise Section 5 to document the new proposed alternative.

   Response

   The section 5 alternative examination is replaced as follows:

   R. E. Ginna Nuclear Power Plant proposes to perform a volumetric examination for leak path assessment augmented by a bare metal visual examination in accordance with ASME code case N-729-1 (reference 2) of the CRDM nozzle to reactor vessel head bore annulus area. The proposal is in lieu of a demonstrated volumetric or surface leak path examination. The ultrasonic examination for leak path (reference 4) is the same technique that has been demonstrated on other industry reactor head designs with the exception that it has not been demonstrated on the R.E. Ginna reactor head design which includes an axial weep channel. The weep channel that is machined axially through the region of interference fit connects the larger tolerance (non interference fit) low alloy steel nozzle bore above and below the interference fit region. Any CRDM J weld pressure boundary leakage would be free to flow and promote detection. This alternative examination approach provides an improved probability of detection as compared to a leak path assessment only examination approach in accordance with 10 CFR 50.55a (g)(6)(ii)(D)(3) (reference 1).

   R.E. Ginna has an improved reactor pressure vessel head design which makes the N-729-1 Table 1, Item B4.30 visual examination for leak path more effective than the conventional reactor vessel head designs using ultrasonic leak path detection.

   Industry experience has shown that visual examination in conjunction with ultrasonic leak path examination is optimum for detecting reactor coolant leakage. These examinations are further improved upon with a visual examination of the R.E. Ginna Reactor head with the weep channel design.

2. Given the change in the licensee's proposed alternative, the NRC requests additional information be included through-out the submittal to adjust to the change and provide the basis for not being able to perform a demonstrated volumetric leak path assessment or a surface leak path assessment in accordance with 10 CFR 50.55a(g)(6)(ii)(D)(*3*). The NRC notes that the basis should be sufficient to support the method of requesting authorization of the proposed alternative under 10 CFR 50.55a(a)(3)(i) or (a)(3)(ii). As discussed during the September 6, 2012 teleconference, the NRC recognizes the potential hardships of developing a mockup for demonstration purposes in this limited timeframe, and the potential radiological dose concerns of a surface leak path assessment in general. Additionally, recent reports from Task 4 of the EPRI Boric Acid

Corrosion program and NRC NUREG/CR-7142, "Ultrasonic Phased Array Assessment of the Interference Fit and Leak Path of the North Anna Unit 2 Control Rod Drive Mechanism Nozzle 63 with Destructive Validation," could provide a basis for an effective volumetric leak path examination at Ginna, given consideration for the size of the weep channel. However, these bases need to be correlated to the Ginna case and documented for review.

Response

The section 5 basis for use is amended as follows:

The R.E. Ginna reactor vessel head axial weep channel design is proprietary (references 5 and 6) and has been described to NRC staff. When compared to findings described in NUREG/CR-7142 (reference 3) scenarios 1, 2, and 3 below are possible. The R.E. Ginna reactor head design is consistent with other reactor head designs with the exception of an axial weep channel. The axial weep channel is a small portion of the CRDM interference fit, the shrink fit area comprises 99.6% of the total area. The R.E. Ginna reactor head can be inspected with a demonstrated volumetric leak path assessment examination consistent with other industry reactor head designs aside from the weep channel area.

R.E. Ginna has performed a baseline examination of the interference fit region using an ultrasonic leak path assessment technique. Since this data is available for comparison to inservice inspections for leak path assessment, this data provides an excellent ultrasonic response knowledge base for 100% of the CRDM nozzle interference fit regions of the R.E. Ginna reactor vessel head.

Scenario 1
A leak path is created via PWSCC (primary water stress corrosion cracking) through the J weld / CRDM pressure boundary. The leakage flows through the lower counterbore annulus region (non interference fit) just above the J weld. The leakage then finds its way to the weep channel which connects through the interference fit region to the upper counterbore region. This leakage is detected on the external reactor head surface by visual inspection. The detectability is improved by the R.E. Ginna design and is an improvement over conventional reactor vessel head designs. The efficiency of detection is based upon the improved weep channel design which effectively bypasses the interference fit region in favor of the lower resistance flow path through the weep channel.

Scenario 2
A leak path is created through the J weld / CRDM pressure boundary. The leakage flows through the lower counterbore region (non interference fit) just above the J weld. The leakage does not flow to the weep channel and accumulates in the interference fit region and is allowed to accumulate. The interference fit region with accumulated boric acid deposits (wetted region) is detected by the ultrasonic leak path detection technique which would be indicated by a lower ultrasonic amplitude response as compared to the mid range amplitude ultrasonic response from the nominal interference fit region. The detectability is consistent with other industry reactor head designs and the efficiency of detection is documented in reference 4.

Scenario 3
A leak path is created through the J weld / CRDM pressure boundary. The leakage flows through the lower counterbore region (non interference fit) just above the J weld. The leakage does not flow to the weep channel and accumulates in the interference fit region and is allowed to accumulate. The interference fit region with accumulated boric acid deposits initiates boric acid

corrosion (leak path) of the low alloy steel reactor vessel head base material and is detected by the ultrasonic leak path detection technique which would be indicated by a higher ultrasonic amplitude response as compared to the mid range amplitude ultrasonic response from the nominal interference fit region. The detectability is consistent with other industry reactor head designs and the efficiency of detection is documented in reference 4.

The demonstrated volumetric leak path assessment in accordance with 10 CFR 50.55a(g)(6)(ii)(D)(*3*) is performed on the interference fit region in conjunction with the visual examination for boric acid leakage in accordance with ASME code case N-729-1 Item B4.30. The addition of the visual examination which will be performed on a 3rd refueling cycle or 5 calendar year whichever is less frequency will be performed so it will coincide with the volumetric leak path assessment. Together the visual and volumetric examinations will provide additional assurance that any potential CRDM pressure boundary leak path would be detected.

R.E. Ginna believes that scenario 1 would more rapidly and reliably detect a CRDM / J weld leak than scenario 2 or 3 due to the improved axial weep channel design and the more frequent visual examination versus the volumetric leak path examination which will be performed every 10 years.

1. References

1. 10 CFR 50.55a, Industry Codes and Standards; Amended Requirements; Final Rule

2. ASME Code Case N-729-1, Alternative Examination Requirements for PWR Reactor Vessel Upper Heads with Nozzles Having Pressure - Retaining Partial - Penetration Welds Section XI, Division I

3. NUREG/CR-7142 Ultrasonic Phase Array Assessment of the Leak Path of the North Anna Unit 2 Control Rod Drive Mechanism Nozzle 63 with Destructive Validation

4. WDI-TJ-006-03-P, Revision 4 Ultrasonic Testing of Interference Fit Samples for Leak Path Detection (Westinghouse proprietary)

5. 083ND112, Revision 2 Closure Head Initial Machining (Babcock & Wilcox Canada proprietary)

6. 083NE001, Revision 2 General Arrangement (Babcock & Wilcox Canada proprietary)