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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 2055-0001

R.E. Ginna Nuclear Power Plant
Renewed Facility Operating License No. DPR-18
NRC Docket No. 50-244

Subject: R.E. Ginna Nuclear Power Plant, Final Response and Close-out to Generic Letter 2004-02

References:

1. NRC Generic Letter 2004-02: Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors, September 13, 2004. (ML042360586)

2. Letter from Ginna to NRC, “Resolution Path and Schedule for Generic Safety Issue (GSI)-191 Closure”, May 15, 2013. (ML13141A272)

3. SECY-12-0093 – Closure Options for Generic Safety Issue – 191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance, July 24, 2012. (ML121320270)

The. U.S. Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2004-02, "Potential Impact of Debris on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors" (Agency wide Documents Access and Management System (ADAMS) Accession No. ML042360586) dated September 13, 2004, requesting that licensees address the issues raised by Generic Safety Issue (GSI) – 191, "Assessment of Debris Accumulation on Pressurized Water Reactor (PWR) Sump Performance."

By letter dated May 15, 2013 (ML13141A272), R.E. Ginna indicated that the approach to resolving GSI-191 was to use Option 2 (Mitigative Measures and Alternative Methods Approach) with the deterministic approach described in SECY-12-0093, "Closure Options For Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance" (ML121320270).

This submittal provides the R.E. Ginna Final Response and Close-out to Generic Letter 2004-02.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Jessie Hodge at (610) 765-5532.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of April 2021.

Respectfully,

David T. Gudger

David T. Gudger
Senior Manager - Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachment 1: Supplemental Response to Generic Letter 2004-02

cc: NRC Regional Administrator, Region 1
NRC Project Manager, Ginna
NRC Resident Inspector, Ginna
A. L. Peterson, NYSERDA

Commitments History and Status Summary

There are no outstanding commitments relative to GL-2004-02 given the discussion below. The following commitments were made by Ginna for closure of GSI-191 and GL-2004-02 under Reference 1 and the status of each commitment is provided below.

1. Reduce the overall impact on strainer head loss and in-vessel effects:

    a. Identify insulation and aluminum that can be removed from containment.
    STATUS: Ginna will NOT perform this action since it is unnecessary given successful in-vessel debris effects analysis without reducing the debris loading as discussed below. Also, there is adequate strainer head loss margin without this effort as previously shown in Reference 2.
    b. Revise 3-D CAD model, debris generation, transport, and chemical effects analyses, for revised insulation and aluminum loading.
    STATUS: Ginna will NOT perform this action since is unnecessary given successful in-vessel debris effects analysis without reducing the debris loading as discussed below.
    c. Perform Strainer Bypass Testing.
    STATUS: The intent of this action was to perform additional bypass testing following revised debris loading determined under 1.b. Ginna will NOT perform this action since it is unnecessary given that Ginna did NOT perform 1.b.

2. Ginna will follow a resolution strategy and methodology for completion of the in-vessel downstream effects aspect of this approach. This resolution strategy and methodology will be aligned with the effort being taken by the PWROG for resolving this issue. Ginna will submit a schedule for closure within 60 days following the date that the results of the PWROG testing efforts are available.
    STATUS: Ginna documented acceptable in-vessel debris loading consistent with the owner's group effort (Reference 3) under a document only design change package (Reference 4) which is discussed below.

3. Ginna will perform a thermal hydraulic analysis of vessel internals with the intension of showing the use of upper plenum injection (UPI) to disrupt debris bed formation on the bottom nozzles, and the use of safety injection (SI) and two phase flow to disrupt debris bed formation on the top support grid.
    STATUS: Ginna issued design analysis DA-ME-14-019 for interim justification until the in-vessel debris effects analysis discussed below was completed. This analysis modeled a large cold leg break considering in vessel debris using Relap5 and bounded a hot leg break. The analysis showed adequate core heat removal for the debris loading considered at the time. The analysis was NOT revised for the updated in vessel debris loading discussed below due to the demonstration of adequate core heat removal using the method discussed below. This analysis is a historical record and not a design basis document.

4. If Ginna determines that the proposed testing and analysis resolution path alone will not lead to acceptable results, then an alternate resolution path will be discussed with the NRC to gain acceptance of the proposed path and to establish an acceptable completion schedule. This resolution path may be consistent with risk-informed methods developed for Option 3.

   STATUS: Ginna will NOT perform this action since it is unnecessary given successful in-vessel debris effects analysis as discussed below.

In-Vessel Debris Evaluation Summary

Ginna has followed the PWROG effort documented in WCAP-17788-P and has verified that the amount of debris that could be delivered to the reactor vessel during a design basis event does not compromise long term core cooling (LTCC). Ginna is a two loop upper plenum injection plant. Ginna verified that the amount of debris introduced to the core is less than 100 grams per fuel assembly (g/FA) AND Ginna verified that the boric acid precipitation mitigation measures are taken prior to 24 hours to prevent debris concentration in the core. Ginna's in-vessel debris loading prediction, debris load acceptance criteria, and boric acid precipitation measures are discussed in the following paragraphs.

1. In-Vessel Debris Load

   The currently predicted fiber debris that could bypasses the sump strainer was updated to 71 g/FA from the 62 g/FA communicated under Reference 1. The increased debris load was the net effect of two updates since Reference 1 as described here and documented in Reference 4.

   a. The sump strainer efficiency was reduced to account for the possibility that small fibers may have penetrated the fine mesh bypass strainer during testing. This was an issue addressed at Salem and other sites with the method shown in Reference 5. Ginna's bypass testing strainer fiber debris distribution was applied with the Reference 5 method and the strainer efficiency was reduced to 98.4%.
   b. The fiber debris load of 62 g/FA communicated in Reference 1 used an overly conservative approach that summed the largest amount of each debris type from either of the three break location compartments (A S/G, B S/G, or Pressurizer) as discussed in Reference 2. The revised methodology uses the Westinghouse analytical method for predicting strainer fiber penetration for downstream effects consistent with Reference 7. The debris load from the B S/G compartment was applied since it contains the most conservative debris load.

   Reference 3 established that an in-vessel debris load of 100 g/FA would not challenge LTCC for both cold leg and hot leg breaks in two loop upper plenum injection plants. Acceptable applicability of Reference 3 was confirmed for Ginna under Reference 4. Ginna's current 71 g/FA debris load is less than the 100 g/FA limit. Ginna also documented that up to 100 g/FA is acceptable to accommodate future discovery that may increase the current 71 g/FA debris load.

2. Boric Acid Precipitation Mitigation

   Timely re-establishment of cold leg injection mitigates postulated blockage from boric acid precipitation per Reference 3. Ginna confirmed that cold leg injection was re-established consistent with Reference 3 criteria under Reference 4. Reference 6 has a note prior to stopping pumps supplied from the RWST that states, “Cold leg injection should be reinitiated within 4 hours – 5.5 hours after stopping SI pumps”. This note is repeated in Reference 6 prior to step 26. Step 26 action is to, “Check Event Duration – GREATER THAN 4 HOURS AFTER ALIGNMENT FOR SUMP RECIRCULATION”. The next step aligns SI to re-establish cold leg injection. Cold leg injection would therefore be re-aligned after 4 hours from start of sump recirculation AND well less than 24 hours. Establishing cold leg recirculation between 4 and 24 hours ensures that debris does not concentrate in the core as a result of boric acid precipitation.

As described above, Ginna has satisfied commitments necessary for GL-2004-02. Apart from the information provided above, Reference 1 provided a summary of how Ginna addressed GL-2004-02. Although the title of Reference 1 refers to GSI-191, the content specifically addressed GL-2004-02 as well with sections that summarized actions completed, margins, conservatisms, and defense-in-depth measures.

References:

1. ML13141A272, Letter from Ginna to NRC, “Resolution Path and Schedule for Generic Safety Issue (GSI)-191 Closure”, May 15, 2013.

2. Letter from Ginna to NRC, “Response to Commitments Regarding Generic Letter 2004-02 Specific To Debris Transport Analysis and Strainer Head-loss Testing”, October 26, 2010.

3. WCAP-17788-P, “Comprehensive Analysis and Test Program for GSI-191 Closure (PA-SEE-1090), Rev 0, July 2015.

4. ECP-20-000592, “GSI 191 Document Updates”, Rev 0.

5. ML13114A048, Letter from Salem to NRC, “Final Responses to NRC Questions Regarding Salem Bypass Testing”, dated 4/22/13.

6. ES-1.3, “Transfer to Cold Leg Recirculation”, Rev 047.
   Design Basis Accidents at Pressurized-Water Reactors”, July 25, 2008.

7. CN-SEE-I-07-13, “GSI 191 Down Stream Effects For R.E. Ginna Nuclear Generating Plant Unit 1 Debris Ingestion Evaluation”, Rev 001.