October 28, 2005

Mrs. Mary G. Korsnick
Vice President R.E. Ginna Nuclear Power Plant
R.E. Ginna Nuclear Power Plant, LLC
1503 Lake Road
Ontario, NY 14519

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING REVISED LOSS-OF-COOLANT ACCIDENT ANALYSES, R.E. GINNA NUCLEAR POWER PLANT (TAC NO. MC6860)

Dear Mrs. Korsnick:

By letter dated April 29, 2005, R.E. Ginna Nuclear Power Plant, LCC (Ginna LLC) submitted an application requesting changes to the Technical Specifications for the Ginna Nuclear Power Plant to reflect the results of revised analyses performed to accommodate expected changes in the nuclear fuel associated with a planned power uprate and to permit the use of Nuclear Regulatory Commission (NRC)-approved methodology for large-break and small-break loss-of-coolant accidents.

The NRC staff has reviewed the information supporting the proposed amendment and has determined that additional information is required in order for the staff to complete its review. Enclosed is the NRC staff's request for additional information (RAI). This RAI was discussed with the Ginna LLC staff on October 24, 2005, and it was agreed that a response would be provided with 45 days of the date of this letter.

Sincerely,

/RA/

Patrick D. Milano, Sr. Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-244

Enclosure: RAI

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

REGARDING REVISED LOSS-OF-COOLANT ACCIDENT ANALYSES

R.E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

By letter dated April 29, 2005 (Agencywide Documents Access and Management System Accession No. ML051260239), R.E. Ginna Nuclear Power Plant, LLC (the licensee) submitted an application to amend the technical specifications (TSs) for the R.E. Ginna Nuclear Power Plant. Specifically, the licensee proposed changes that would reflect the revised analyses performed in support of the planned extended power uprate.

Effects of Post-Loss-of-Coolant Accident (LOCA) Analysis on Containment Sump pH

1. In order to complete its evaluation, the Nuclear Regulatory Commission (NRC) staff needs to review the general assumptions and calculations used by the licensee to prove that the containment sump pH will be maintained above seven throughout the duration of the accident.

   Describe the procedure utilized for calculating pH of the containment sump water during the 30-day period after a LOCA. If the calculations were performed manually, describe the methodology and provide sample calculations. If a computer code was used, provide the input to the code and the results calculated by it.

Best-Estimate Large-Break LOCA (LBLOCA) Analysis

1. In order to show that the referenced, generically approved LOCA analysis methodologies apply specifically to Ginna, provide a statement that confirms that Ginna LLC and its vendor have ongoing processes to assure that the ranges and values of the input parameters for the Ginna LOCA analysis conservatively bound the ranges and values of the as-operated plant parameters.

2. If the plant-specific analyses are based on the model and/or analyses of any other plant, provide the justification showing that the model or analyses applies to Ginna.

Over-Pressure Protection - Safety Valve Capacity

1. In its July 7 application with supporting documentation, descriptions of the provisions to address over-pressure protection were included for Ginna when operating at the uprated power. The NRC staff is reviewing continued sufficiency of the design margin of the safety valve capacity at the uprated power. The information provided in the application only addresses the change to the pressurizer safety valve lift setting and does not address the adequacy of the safety valve capacity. Although Table 5.2-1 in the Ginna Updated Safety Analysis Report does refer to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section III, “Nuclear Vessels,” 1965, the application does not provide details about analyses that were done

at the uprated power to demonstrate the adequate relief capacity and to show that sufficient design quantify margin remains.

Westinghouse Report WCAP-7769, Revision 1, "Topical Report Overpressure Protection for Westinghouse Pressurized Water Reactors," dated June 1972, does provide demonstration of compliance for Ginna with Article NM-7000, “Protection Against Overpressure,” in Section III of the ASME Code. However, WCAP-7769 assumed that Ginna operating at 1518.5 megawatts thermal (MWt).

Provide the analysis results, determined using methods consistent with those in WCAP-7769 (including credit for the second (or later) safety grade trip from the reactor protection system), to show sufficiency margin in the design capacity for the Ginna pressurizer and steam line safety valves, with Ginna operating at the uprated power of 1775 MWt.

Small-Break LOCA (SBLOCA) Analysis

1. Provide the full set of transient parameters for the 1.5, 2, and 3-inch break sizes that includes the following:

   - core power
   - core inlet mass flowrate
   - break mass flow rate
   - break quality
   - pressurizer pressure
   - inner vessel or core two-phase level
   - clad temperature at peak clad temperature (PCT) location
   - steam temperature at hot spot
   - heat transfer coefficient at hot spot
   - injection mass flow rate vs time (pumped should be separate from accumulator injection)
   - condensation rate in cold legs
   - void fraction in each core node versus time

2. What is the bottom elevation of the suction leg piping and the top elevation of the core? Also, provide the top elevation of the cold-leg discharge pipe.

3. Provide the limiting top peaked axial power shape used in the analysis.

4. Provide the head flow curve for the pumped safety injection (SI) system for the severed emergency core cooling injection line. Provide a set of plots for this break (see item 1).

5. Breaks larger than 3 inches were not provided. Provide information to demonstrate that breaks as large as 0.5 ft^2 are not limiting and, as such, the worst-case break has been identified.

6. The 2-inch break shows an interruption in SI flow for about 500 seconds while the 3-inch break shows an interruption of about 600 seconds. For the 3-inch break, the two-phase level in the upper plenum shows very little recession when the SI flow has been

terminated from 2700 to 3300 seconds. Explain and verify the insensitivity of the two-phase level due to the termination of SI flow. Provide an alternate means to verify core uncovery does not occur for all small breaks.

7. For larger breaks, the termination of SI flow is expected to have a more significant impact. Identify the impact of SI flow termination on the largest SBLOCA and the limiting LBLOCA.

Post-LOCA Long-Term Cooling

1. The long-term cooling analysis and boric acid precipitation analysis are based on a 1975 Westinghouse letter that the NRC staff does not consider acceptable. Submit a new analysis that contains the following considerations for performing the long-term cooling analyses:

    a. The mixing volume must be justified and the void fraction must be taken into account when computing the boric acid concentration.

    b. Since the mixing volume is a variable quantity that increases with time, the boric acid concentration just prior to the switch to simultaneous injection should reflect the variable size of the mixing region set by the pressure drop in the loop. The fluid static balance between the downcomer and inner vessel region (i.e. lower plenum, core, and upper plenum regions of the vessel) can then be performed taking into account the loop pressure drop at a given steaming rate to compute the mixture volume in the core and eventually the upper plenum regions. The concentration in the resulting mixing volume just prior to expansion into the upper plenum (which will cause a sudden decrease in concentration due to the large area change in the upper plenum) must be shown to remain below the precipitation limit.

    c. The precipitation limit must be justified, especially if containment pressures greater than 14.7 psia are assumed or additives are contained in the sump water.

    d. The decay heat multiplier, as required by Appendix K to 10 CFR 50.46, must employ a multiplier of 1.2 for all times. 10 CFR 50.46(b)(5) states that "decay heat shall be removed for an extended period of time required by the long lived radioactivity remaining in the core." Subsection (I)(A)(4), "Fission Product Decay," of Appendix K states that "The heat generation from radioactive decay of fission products shall be assumed to be equal to 1.2 times the values for infinite operating time ..."

2. Small breaks were not addressed. The boric acid concentration for the limiting SBLOCA needs to be evaluated. Provide a summary of the results to show that the boric acid concentration is not sufficient to cause precipitation should the operators inadvertently depressurize the reactor coolant system (RCS) in a rapid manner.

3. Provide information to show that for the largest break that does not actuate upper plenum injection (UPI) (where a cooldown is required) that there is sufficient time to

perform this function given an appropriate precipitation time based on consideration of the four items in item 1 above.

4. What is the temperature of the SI water entering the core at the time of SI re-initiation at 6 hours?

5. Once UPI initiates, at what time following an LBLOCA would the core steaming rate be insufficient to entrain the hot-side injection?

6. What are the guidelines for depressurizing the RCS below 140 psia? Describe the emergency operating procedure (EOP) requirements to accomplish this? Is there a time constraint for initiating a cooldown? Does the cooldown consider a failure of the steam generator atmospheric dump valves (ADVs)?

7. If the RCS refills early during the cooldown for very small breaks and hot water is trapped in the pressurizer with a saturation temperature above the entry temperature to start residual heat removal (RHR), how is the pressurizer eventually cooled to initiate RHR? Explain the method to reduce RCS pressure under these conditions. Can cooldown be accomplished before the condensate storage tank supply is exhausted?

8. What precipitation limit is used for LBLOCAs and intermediate-break LOCAs? Explain whether debris in the sump water affects this limit and the time variation in boric acid concentration.

9. For intermediate breaks that produce RCS pressures above the UPI shut-off head, the SI pumps are secured if the need to switch to recirculation should occur. Explain the procedure for assuring RHR can be actuated if the steam generators (SGs) have to be cooled down, especially with the loss of offsite power and failure of one of the ADVs. What is the timing for cooldown of the SGs to assure RHR will be operating when the switch to recirculation is made?

10. Following LBLOCAs, borated water is entrained in the steam exiting the core, which can enter the SG tubes. Since the secondary side is at high temperatures, the borated water can be boiled-off leaving behind the boric acid. What happens to the boric acid in the SGs? Can boric acid build-up sufficiently to increase the loop resistance and depress the two-phase level in the core?

11. Following a SBLOCA, the RCS can boil for an extended period of time. While the boric acid will remain in solution at the high temperatures, the sudden need to depressurize the RCS rapidly could cause an inadvertent precipitation. Explain what guidelines or EOP directives are available to the operators to assure this does not happen.

12. Explain how the EOPs guide the operators to assure them that they can refill the RCS for all small breaks and re-establish natural circulation to flush the boric acid from the vessel.

13. What is the size of the bottom mounted instrument tubes? Are failed instrument tubes in the bottom of the head part of the design basis? If so, was a failed tube analyzed at

extended power uprate conditions? Also, is operator action required to assure the core remains below 2200 EF with one tube assumed failed?

14. Explain the impact of the refilling of the loop seals (for breaks on the side of the cold leg) on the mixing volume and boric acid concentration.