May 8, 2007

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: R.E. GINNA NUCLEAR POWER PLANT - CORRECTION LETTER TO AMENDMENT NO. 101 RE: TECHNICAL SPECIFICATION 3.5.1 EMERGENCY CORE COOLING SYSTEM ACCUMULATORS (TAC NO. MD0686)

Dear Mrs. Korsnick:

By letter dated March 28, 2007, the Commission issued Amendment No. 101 to Renewed Facility Operating License No. DPR-18 for the R.E. Ginna Nuclear Power Plant. This amendment revised Technical Specification Surveillance Requirement 3.5.1.4 to change the method and frequency for verifying emergency core cooling system accumulator boric acid concentration for the R.E. Ginna Nuclear Power Plant.

Your staff subsequently identified discrepancies within the Nuclear Regulatory Commission (NRC) staff's safety evaluation (SE). While the discrepancies do not change the NRC staff's prior conclusions that the proposed changes are acceptable, we are reissuing the SE that accompanied Amendment No. 101 to Renewed Facility Operating License No. DPR-18. A copy of the revised SE is enclosed.

We apologize for any inconvenience this may have caused. Please contact me at 301-415-1364 if you have any questions.

Sincerely,

/RA/

Douglas V. Pickett, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-244

Enclosure:
As stated

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 101 TO RENEWED FACILITY

OPERATING LICENSE NO. DPR-18

R.E. GINNA NUCLEAR POWER PLANT, INC.

R.E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

1.0 INTRODUCTION

By letter dated March 28, 2006 [1] (Agencywide Documents Access and Management System (ADAMS) Accession No. ML060940329), as supplemented by letter dated October 24, 2006 (ADAMS Accession No. ML063030027), R.E. Ginna Nuclear Power Plant, LLC (the licensee) submitted a request to change Technical Specification (TS) Surveillance Requirement (SR) 3.5.1.4, related to verifying emergency core cooling system (ECCS) accumulator boric acid concentration for the R.E. Ginna Nuclear Power Plant (Ginna). In order to meet the current SR, samples from one of the two ECCS accumulators must be taken every 31 days on a staggered test basis, resulting in sampling frequency of once every 2 months for each individual accumulator. In the proposed SR, each ECCS accumulator will be sampled every 6 months, and water leakage into the accumulators will be monitored every 12 hours. The licensee provided engineering analyses and risk insights in support of the requested change. In addition, the licensee stated that the revised SR will result in reduction of approximately 0.2 REM per year in exposure to the operators taking accumulator fluid samples.

The supplemental letter dated October 24, 2006, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on April 25, 2006 (71 FR 23960).

2.0 REGULATORY EVALUATION

The NRC staff evaluated the licensee's request utilizing Standard Review Plan (SRP) Section 6.3, "Emergency Core Cooling System." The acceptance criteria in SRP 6.3 that pertain to boron concentration in the ECCS accumulators comprise the following General Design Criteria (GDC):

- GDC 27, "Combined reactivity control systems capability," the reactivity control systems shall be designed to have a combined capability, in conjunction with poison addition by the ECCS, to maintain the capability to cool the core with appropriate margin for stuck rods.

- GDC 35, "Emergency core cooling," requires that a system to provide abundant emergency core cooling shall be provided.

- GDC 36, “Inspection of emergency core cooling system,” requires that the ECCS shall be designed to permit appropriate periodic inspection of important components.

- GDC 37, “Testing of emergency core cooling system,” requires that the ECCS shall be designed to permit appropriate periodic pressure and functional testing.

The licensee provided risk insights but did not submit a risk-informed license amendment request. Therefore, the NRC staff reviewed the licensee’s request using guidance contained in SRP Chapter 19, Appendix D, “Use of Risk Information in Review of Non-Risk-Informed License Amendment Requests.”

3.0 TECHNICAL EVALUATION

The Ginna plant is equipped with two ECCS accumulators, each of which is connected to the cold leg of one of Ginna’s two reactor coolant system (RCS) loops. Each accumulator has a capacity of 1750 ft^3, which contains nitrogen gas, and between 1111 ft^3 and 1139 ft^3 of water [2]. The accumulators are maintained at containment ambient temperature with a pressure of about 745 psig. Each accumulator connection to the RCS contains a motor-operated isolation valve and two check valves in series. The motor-operated valve is normally open, with power removed from the valve motor to prevent inadvertent closure prior to or during an accident.

The primary safety function of the accumulators is to inject large quantities of borated water into the reactor vessel during the blowdown phase of a large loss-of-coolant accident (LOCA) and to provide inventory to help accomplish the refill phase that follows the blowdown phase. Boron concentration is controlled in the accumulators to prevent either excessive or insufficient boron concentrations. Post-LOCA emergency procedures are based on the worst case minimum boron precipitation time. Maintaining the accumulator boron concentration within the upper limit ensures that the borated water sources used for injection during a LOCA would not result in boron precipitation earlier than predicted by the design-basis calculation. The minimum boron concentration requirement is based on beginning-of-life reactivity values selected to ensure that the reactor will remain subcritical during the reflood stage of a large-break LOCA. During a large-break LOCA, control rods are not assumed to insert into the core. Instead, the reactor is shutdown by void formation during blowdown. The concentration of boron in the accumulators must be high enough to prevent a return to criticality during the reflood stage of the large-break LOCA.

The licensee proposes to change the method for complying with the surveillance required by TS SR 3.5.1.4. SR 3.5.1.4 requires that the boron concentration in the accumulators be verified every 31 days on a staggered test basis (i.e., by sampling one of the two accumulators every 31 days). The proposed change would require that leakage into the accumulators be monitored every 12 hours, and that a sample be taken from each accumulator every 6 months. The samples would be used to verify that the boron concentration, inferred from inleakage observation, remains within the TS limit. Water level in the accumulators would continue to be measured every 12 hours. The proposed change would reduce radiation exposure by reducing the number of required containment entries during power operation for sampling. In addition to the proposed changes to the surveillance requirement, the licensee has also proposed changes to the TS Bases that would include additional sampling and verification of boron concentration if inleakage monitoring indicates that the ECCS accumulator boron concentration falls to within 100 ppm of the TS limit.

Deterministic Evaluation

To justify the proposed change, the licensee evaluated the measured inleakage actually occurring in both ECCS accumulators during an 8-month period between April 2005 and December 2005. During this period, the inleakage to the accumulators was very steady and there was no significant change in boric acid concentration due to feed and bleed or any other procedurally initiated operations. Also, no trends were evident that would suggest significant inleakage causing boron depletion. The licensee's study indicated that the largest change in accumulator boron concentration was approximately 2 ppm over the period, which is less than 0.1 percent of the total boron concentration in an accumulator.

Inleakage past two check valves is a very slow process, and is the only means by which boron dilution could occur in the accumulators. The licensee noted that the water volume between the low accumulator level alarm setpoint (60% of span) and the high level alarm setpoint (75% of span) is 94 gallons. Therefore, if an inleakage flow is assumed to begin when the water level is just above the low level alarm setpoint, and continues, unnoticed, until the high level alarm setpoint is reached, then the accumulator water inventory will have increased by a maximum of 94 gallons. Since water level and inleakage is monitored at 12-hour intervals, the 94 gallons can enter the accumulator during a period of no more than 12 hours, or at a rate of no more than 7.83 gallons per hour (gph). To attain a net flow rate of 7.83 gph, the leakage past either of the two serial check valves cannot be less than 7.83 gph. Higher inleakage flow rates could not add more than 94 gallons since the operator would be expected to correct the problem after the high level alarm is sounded. Lower inleakage flow rates will be detected at the next regular surveillance, per SR 3.5.1.2, before 94 gallons could be added.

The licensee included a simple calculation to show that the addition of 94 gallons of clean (i.e., boron-free) water to the accumulator would not result in unacceptable boron dilution. Assuming clean water enters the accumulator is a conservative assumption since some amount of boron would be expected in the reactor coolant system. Starting from the median TS boron concentration of 2800 ppm in the ECCS accumulator (i.e., TS SR 3.5.1.4 requires that the boron concentration in each accumulator is $\geq$ 2550 ppm and $\leq$ 3050 ppm), the licensee's calculation demonstrated that the maximum boron dilution would be approximately 31 ppm. Thus, a maximum dilution of approximately 1 percent is predicted. The NRC staff agrees with this calculation and its underlying assumptions.

As shown in the table below, the proposed TS SR is comparable to the Standard TS (STS) for Westinghouse plants [7]. The Ginna sampling interval is six times longer (1 month vs. 6 months) than the STS, but includes inleakage observations at 12-hour intervals. Other plants require boron concentration measurements after a specified change in accumulator volume, typically 1% (or about 130 gallons). For Ginna, it is apparent that boron concentration would not be diluted by more than 31 ppm in any 12-hour period. Therefore, it would take more than three 12-hour surveillance intervals to dilute by more than 100 ppm.

Plant	Surveillance of Boron Concentration in Accumulators
Ginna (present)	2 mos (each accumulator)
Ginna (proposed) [1]	6 mos and monitoring inleakage every 12 hrs
Catawba [3]	1 mo and ≤ 6 hrs after volume increases by 75 gal
Cook [4]	1 mo and ≤ 6 hrs after volume increases by 1%
Millstone Unit 2 [5]	6 mos and ≤ 6 hrs after volume increases by 1%
Calvert Cliffs [6]	12 hrs by inleakage monitoring and 6 mos and within 1 hr after volume increases by 1%
Westinghouse STS [7]	1 mo and ≤ 6 hrs after volume increases by { } gal or { }%

The results of the licensee's analysis indicate that the normal change of boric acid concentration due to inleakage is very low, but even with a high inleakage due to operational error causing fluid level in the accumulator to raise from low to high alarm levels, the change of measured boric acid dilution remains within the acceptable limit.

The NRC staff finds Ginna's proposed SR acceptable, because no more than 94 gallons can enter an accumulator before either an inleakage surveillance is required, or a high level alarm is actuated. In comparable plants, boron concentration surveillance is required when the accumulator volume changes by 1% (typically about 130 gallons).

Based upon the review of the licensee's proposed change to the Ginna TS SR and supporting justification, the NRC staff concludes the proposal will provide protection against boron dilution in the accumulators that is equal to or better than the current SR.

Evaluation Based on Risk Insights

The proposed license amendment was not risk-informed, but did provide risk insights from the Ginna plant-specific probabilistic risk assessment (PRA). The NRC staff review of the licensee's risk insights was performed in accordance with the guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Chapter 19, "Use of Probabilistic Risk Assessment in Plant-Specific, Risk-Informed Decisionmaking," Appendix D, "Use of Risk Information in Review of Non-Risk-Informed License Amendment Requests." Appendix D provides guidance to the staff in determining if "special circumstances" exist for license amendment requests that are not risk-informed. Special circumstances would exist if, even though the application is in compliance with existing regulatory requirements, concerns associated with the application are identified regarding adequate protection. Per the guidance of Appendix D, the staff used elements of the risk-informed decisionmaking process described in Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," to focus the review. The staff did not perform an in-depth review of the licensee's PRA. Although the guidance presented in RG 1.174 does not constitute a definition of adequate protection, it does provide an appropriate set of guidelines that can be used in the initial process in determining the potential for "special circumstances" and in providing a basis for finding that there is reasonable assurance of adequate protection by compliance with the

existing regulatory requirements.

As described in Section 4 of the licensee's original submittal, the licensee evaluated extending the surveillance test sampling interval for the ECCS accumulator boron concentration by considering two factors:

1. The likelihood of boron concentration in an ECCS accumulator being less than 2100 ppm, given the increase in sampling interval to once per 6 months.

2. The increase in core damage frequency (CDF), given an inadequate ECCS accumulator boron concentration.

The licensee estimated the likelihood of boron concentration being less than 2100 ppm based on plant-specific sample data and extrapolating the data to address the extension in sampling from 2 months to 6 months. During the 5-year period evaluated, the boron concentration never fell below 2100 ppm. With the extension in the sample interval and the facility operating at the extended power uprate (EPU) power level, the licensee estimated that there is approximately a 3% chance that a single ECCS accumulator will have a boron concentration less than 2100 ppm. This estimate does not take into account the fact that there is Control Room indication for ECCS accumulator level, which will likely be related to major changes in ECCS accumulator boron concentration. Level monitoring is expected to reduce the likelihood that an ECCS boron concentration will be below 2100 ppm.

The licensee estimated the increase in CDF, given an inadequate ECCS accumulator boron concentration, by evaluating those accident sequences that involve ECCS accumulator injection, which are limited to large-break loss-of-coolant accidents (LBLOCAs) (i.e., breaks greater than 0.1 ft^2). The frequency of LBLOCAs is estimated by the licensee to be on the order of 2E-5/year. The frequency of a LBLOCA also involving a failure of the control rods to insert to control reactivity is estimated by the licensee to be less than 1E-7/year. The licensee's estimate does not consider the fact that a LBLOCA occurring with one ECCS accumulator injecting less than 2100 ppm may not cause core damage. If the other ECCS accumulator is above 2100 ppm and injects, the extra capacity of the other ECCS accumulator may be sufficient to shut down the reactor.

Combining the above factors together, the frequency of a LBLOCA that involves a failure of the control rods to insert to control reactivity when the boron concentration in an ECCS accumulator is less than 2100 ppm would be less than 3E-9/year (1E-7/year * 0.03) considering plant operation at EPU conditions. Even if it is assumed that all LBLOCAs induce the failure of the control rods and including EPU conditions, the frequency of this scenario would be on the order of 6E-7/year (2E-5/year * 0.03).

Based on the NRC staff's approval of the licensee's EPU on dated July 11, 2006 (ADAMS Accession Number ML061380249), and subsequent implementation, the internal events CDF is less than 2E-5/year (total CDF of about 7E-5/year) and the internal events large early release frequency (LERF) is less than 2E-6/year (total LERF of about 5E-6/year). Based on the licensee's calculations described above, the change in CDF is in the range considered to be a very small increase (even for the worst case sensitivity calculation) and is acceptable per the guidelines of RG 1.174. The licensee did not perform any LERF calculations, but comparing the change in CDF estimate to the LERF guidelines and recognizing that these scenarios would not impact the most significant contributors to LERF (i.e., interfacing system LOCAs and steam generator tube ruptures), the change in LERF would also be expected to be in the range

considered to be a very small increase (and a small increase for the worst case sensitivity calculation) and would be acceptable per the guidelines of RG 1.174.

The NRC staff finds that the licensee's approach and analyses to address the risks associated with the proposed license amendment are conservative and demonstrate that the risk increases due to implementation of the proposed license amendment are expected to be very small and within the acceptance guidelines of RG 1.174. Therefore, the staff concludes that the proposed license amendment does not introduce a level of risk that would rebut the presumption of adequate protection provided by the licensee meeting the deterministic requirements and regulations.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New York State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (71 FR 23960). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The NRC staff has concluded, based on the considerations discussed above that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. Letter from M. G. Korsnick, Site Vice President, R.E. Ginna Nuclear Power Plant, LLC, to USNRC, "R.E. Ginna Nuclear Power Plant, Docket No. 50-244, License Amendment Request: Emergency Core Cooling System (ECCS) Accumulator Boron Concentration Verification Frequency," March 28, 2006 (ADAMS Accession No. ML0609403292)

2. Docket No. 50-244, Updated Final Safety Analysis Report, R.E. Ginna Nuclear Power Plant, Rev. 18, April 2004

3. Letter from Kahtan Jabbour, USNRC, to H. B. Tucker, Vice President, Nuclear Production Department, Duke Power Company, "Issuance of Amendment No. 31 to Facility Operating License NPF-35 and Amendment No. 22 to Facility Operating License NPF-52-Catawba Nuclear Station, Units 1 and 2, November 10, 1987 (ADAMS Accession No. ML0130402530)

4. Letter from J. B. Hickman, USNRC, to E. E. Fitzpatrick, Vice President, Indiana Michigan Power Company, "Donald C. Cook Nuclear Plant, Unit Nos. 1 and 2 - Issuance of Amendment re: Accumulators," November 8, 1994 (ADAMS Accession No. ML0210505580)

5. Letter from S. Dembek, USNRC, to M. L. Bowling, Jr., Recovery Officer - Technical Services, Northeast Nuclear Energy Company, Issuance of Amendment - Millstone Nuclear Power Station, Unit No. 2, December 17, 1998 (ADAMS Accession No. ML0129105220)

6. Letter from D. Skay, USNRC, to P. E. Katz, Vice President, Calvert Cliffs Nuclear Power Plant, Inc., "Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 - Amendment re: Safety Injection Tank Surveillance Frequency," December 19, 2002 (ADAMS Accession No. ML0235306420)

7. NUREG-1431, Vol. 1, Rev. 3.0, "Standard Technical Specifications, Westinghouse Plants," June, 2004

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