February 28, 2003

Mr. John L. Skolds, President
Exelon Nuclear
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: RELIEF REQUEST RV-5 FOR BRAIDWOOD STATION, UNITS 1 AND 2, AND RELIEF REQUEST RV-9 FOR BYRON STATION, UNITS 1 AND 2 - ALTERNATIVE TESTING OF CONTAINMENT SUMP SUCTION VALVES FOR THE SECOND 10-YEAR INSERVICE TESTING (IST) INTERVAL (TAC NOS. MB6636, MB6637, MB6638, AND MB6639)

Dear Mr. Skolds:

By letter dated October 18, 2002, Exelon Generation Company, LLC (Exelon) requested Nuclear Regulatory Commission (NRC) approval of a proposed alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," ASME/American National Standards Institute OMa-1988, "Operations and Maintenance of Nuclear Power Plants," 1987 Edition through the 1988 Addenda, Part 10, Section 4.2.1.1 for the Braidwood and Byron Stations. The licensee proposed to test its containment sump recirculation suction valves without restriction on the plant operating mode while maintaining an 18-month testing frequency. By letter dated January 23, 2003, the licensee supplemented its request in a response to the staff's request for additional information to support justification of the proposed alternate valve testing frequency.

The staff concludes that the licensee's proposed alternative to exercise and stroke time test the containment sump outlet isolation motor-operated valves (1SI8811A, 1SI8811B, 2SI8811A, and 2SI8811B) once per fuel cycle regardless of plant mode (as opposed to testing them during refueling outages as required by the ASME Code) with a 25 percent allowance for flexibility in scheduling is partly authorized. Performing the exercise stroke time test of these valves on-line at an 18-month frequency (with a 25 percent allowance for flexibility in scheduling) during residual heat removal (RH) system maintenance work windows when the RH pump suction piping is drained will reduce overall system/train out of service time and thus will provide an acceptable level of quality and safety.

If there is not an on-line RH system maintenance work window that requires the RH pump suction piping to be drained, the exercise and stroke-time testing must continue to be tested

during refueling outages (preferably when RH requirements are minimal). This limited approval of the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for each plant's second 10-year inservice testing interval on the basis that it provides an acceptable level of quality and safety. The inservice testing interval will end on July 28, 2008, for Braidwood Station, and on June 30, 2006, for Byron Station.

Sincerely,

***/RA by L. Raghavan for/***

Anthony J. Mendiola, Chief, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-454, STN 50-455,
STN 50-456 and STN 50-457

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO BRAIDWOOD STATION, UNITS 1 AND 2, RELIEF REQUEST RV-5

AND

BYRON STATION, UNITS 1 AND 2, RELIEF REQUEST RV-9

FOR THE SECOND 10-YEAR INSERVICE TEST INTERVAL

EXELON GENERATION COMPANY, LLC (EXELON)

DOCKET NOS. 50-456, 50-457, 50-454, AND 50-455

## 1.0 INTRODUCTION

By letter dated October 18, 2002, Exelon Generation Company, LLC (Exelon) requested Nuclear Regulatory Commisson (NRC) approval of a proposed alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," ASME/American National Standards Institute (ANSI) OMa-1988, "Operations and Maintenance of Nuclear Power Plants," 1987 Edition through the 1988 Addenda, Part 10, Section 4.2.1.1 for the Braidwood and Byron Stations. The licensee proposed to test its containment sump recirculation suction valves without restriction on the plant operating mode while maintaining an 18-month testing frequency. By letter dated January 23, 2003, the licensee supplemented its request in response to the staff's request for additional information to support justification of the proposed alternate valve testing frequency.

## 2.0 REGULATORY EVALUATION

The *Code of Federal Regulations* in 10 CFR 50.55a requires that inservice testing (IST) of certain ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with the ASME *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code requirements which are acceptable to the staff. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

The Code of record for Braidwood Station, Units 1 and 2, and Byron Stations, Units 1 and 2, is the 1987 Edition through the 1988 Addenda to the ASME OM Code. The licensee's proposed alternative is for the second 10-year IST intervals for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2. For Braidwood Station, the second 10-year interval began on July 29, 1998, and will end on July 28, 2008. For Byron Station, the second 10-year interval began on July 1, 1996, and will end on Jun 30, 2006.

The containment sump recirculation suction valves at Braidwood and Byron Stations (1SI8811A, 1SI8811B, 2SI8811A, and 2SI8811B) are Class 2, Category B, 24-inch motor-operated gate valves. These valves are located outside containment and are opened or closed to control the flowpath from the containment recirculation sump to the residual heat removal (RH) and containment spray (CS) pump.

ASME/ANSI OMa-1988, Part 10, Section 4.2.1.1, requires Category A and B valves to be full-stroke exercise tested nominally every 3 months (i.e., quarterly), unless the conditions provided by Section 4.2.1.2 are used to justify an alternate test frequency. Section 4.2.1.2 (e) states that, if exercising is not practical during plant operation or cold shutdowns, it may be limited to full-stroke during refueling outages. Refueling Outage Justification (ROJ-4) in the Braidwood and Byron 2nd Interval IST Plans state, in part, "The stroke time testing of these valves during unit operation would be clearly impractical due to the extensive activities required to perform this testing, along with rendering a subsystem of emergency core cooling system (ECCS) (RH) inoperable for an extended period of time (placing the plant in an undesirable condition)." Relief Requests RV-5 for Braidwood Station and RV-9 for Byron Station propose to allow testing of the containment sump recirculation suction valves without restriction on plant operating mode, while maintaining an 18-month testing frequency. The license stated that the availability and maintenance of the RH and CS systems can be optimized by performing the full-stroke tests of these valves during scheduled work windows for these systems.

The NRC's findings with respect to authorizing alternatives and granting or denying the IST program relief requests are given below.

## 3.0 TECHNICAL EVALUATION

The containment sump recirculation suction valves (1SI8811A, 1SI8811B, 2SI8811A, and 2SI8811B) provide an isolation boundary between the suctions of the RH and CS pumps, and containment recirculation sumps. Under normal plant operating conditions, the RH and CS systems are filled with borated water and the containment recirculation sumps are maintained in a dry state.

A stroke test of these valves requires the RH and CS pumps for a given train to be removed from service and the suction lines drained to prevent water flow from the refueling water storage tank and associated system piping into the normally empty containment recirculation sump. An estimated 600 gallons of radioactive, borated water are drained and must be processed by the radioactive waste systems. This same amount of borated water must be used to refill the system. This sequence of events is required whether the testing is performed on-line or during a refueling outage. The staff finds that it is impractical to perform these required drain/refill and associated activities on a quarterly frequency because of the extensive testing activities involved and the need to render the RH system inoperable for an extended period of time.

According to Exelon's relief request, it takes approximately 24 hours to drain the suction side of the RH and CS systems (approximately 600 gallons), perform the required valve tests, and refill and restore the systems to their normal configuration. However, ROJ-4 in the Braidwood and Byron 2nd Interval IST Plans states that "[t]he full stroke testing of 1/2SI8811A/B valves; in conjunction with system draining, filling and venting of each train, accounts for an additional 6 days (3 days per train) of scheduling requirements" and the processing of "thousands of gallons of contaminated water." In its response to the staff's request for additional information, the licensee clarified that the original refueling outage test frequency justification for this valve presented in ROJ-4, was based upon the fact that major work on the RH pumps was also only performed during refueling outages. The licensee stated that since that time, most scheduled RH pump work has been moved from refueling outages to on-line work windows. In ROJ-4, the reference to "thousands of gallons of contaminated water" to be drained, included the volume of water required to be drained in order to perform major work on the RH pump. The difference in time estimate for draining the system (i.e., 24 hours versus 3 days per train) was primarily due to the difference in the amount of water that must be drained for valve stroke time testing only as compared to stroke time testing in conjunction with RH pump maintenance.

In its relief request, Exelon stated that "Due to improvements in the logistics of planning and executing work, some maintenance of the RH system is performed on line (i.e., Mode 1). At other times, the nature of the maintenance to be performed requires that the maintenance be performed during a refueling outage. ... In order to minimize the number of drain/refill evolutions and the processing of radioactive, borated water described previously, it is advantageous to perform the containment recirculation sump valve exercise and stroke time tests during the same drain and refill evolution used to perform system maintenance." These periodic system maintenance activities include:

| Activity | Frequency |
|---|---|
| SI8811 motor-operated valve diagnostic test | 54 months |
| Suction relief valve (RH 8708A/B) set point verification | 72 months |
| RH pump discharge check valve (RH 8730) disassembly and inspection | 12 years |

Other typical maintenance work that requires draining of the suction piping during scheduled on-line work windows may include routine preventive maintenance activities (e.g., pump seal or bearing replacements, pump internal inspections, and major motor inspections/preventive maintenance that requires disconnecting the motor from the pump).

Based on this information, it appears that less than half of the time, the exercise testing of these valves would (or could) be performed in conjunction with on-line RH system work windows that require the RH pump suction piping to be drained. Most of the time, the RH pump suction piping and recirculation portion of the CS train piping would have to be drained solely for performing the valve exercise test.

The technical specification allowed outage time for having one train of ECCS out of service in Modes 1 through 3 is 7 days. The total time necessary to complete the on-line RH system work window should be significantly less than this allowed outage time. This is to preclude technical specification violations or the need to issue exigent technical specification amendments or notices of enforcement discretion. Addition of SI8811A/B valve work to the on-line work

windows could require a work window of longer duration (than the existing on-line RH system work window) depending on the amount of work scheduled in the work window and the type of critical path activities.

The staff recognizes that there is a trade-off, from a risk perspective, between testing these valves at power (when they could be needed to mitigate the consequences of a loss-of-coolant accident) and testing them during outages (when there may be a greater reliance on RH). The NRC staff also understands that considerations, which impact when this work is performed, include the scope of the work on the system, the scheduling of work windows in the planning process, system availability requirements, personnel resources, and maintenance of an acceptable risk profile.

Prior to performing either on-line or shutdown testing, its effect on risk must be evaluated in accordance with the requirements of 10 CFR 50.65(a)(4). "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." Section 50.65(a)(4) states, in part, "Before performing maintenance activities (including but not limited to surveillance, post-maintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities."

Exelon stated that the history of both the maintenance and IST for all eight valves at Braidwood and Byron show good material condition and that testing is consistent with applicable stroke times, demonstrating that an acceptable level of quality and safety is maintained with an 18-month test frequency.

Performing the exercise stroke time test of these valves on-line at an 18-month frequency (with a 25 percent allowance for flexibility in scheduling) during RH system maintenance work windows when the RH pump suction piping is drained, will reduce overall system/train out of service time and thus will provide an acceptable level of quality and safety. However, if there is not an on-line RH system maintenance work window that requires the RH pump suction piping to be drained, the exercise testing must continue to be tested during a refueling outage (preferably when RH requirements are minimal).

## 4.0 CONCLUSION

On the basis of the above discussion, the staff concludes that the licensee's proposed alternative to exercise and stroke time test the containment sump outlet isolation motor-operated valves (1SI8811A, 1SI8811B, 2SI8811A, and 2SI8811B) once per fuel cycle regardless of plant mode (as opposed to testing them during refueling outages as required by the ASME Code) with a 25 percent allowance for flexibility in scheduling is partly authorized. Performing the exercise stroke time test of these valves on-line at an 18-month frequency (with a 25 percent allowance for flexibility in scheduling) during RH system maintenance work windows when the RH pump suction piping is drained will reduce overall system/train out of service time and, thus, will provide an acceptable level of quality and safety. If there is not an on-line RH system maintenance work window that requires the RH pump suction piping to be drained, the exercise and stroke-time testing must continue to be tested during refueling outages (preferably when RH requirements are minimal). This limited approval of the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for each plant's second 10-year IST interval on the basis that it provides an acceptable level of quality and safety.

## 5.0 REFERENCES


5.1 *U.S. Code of Federal Regulations*, "Domestic Licensing of Production and Utilization Facilities," Part 50, Chapter I, Title 10, "Energy," paragraph 50.55a(a)(3)(i).

5.2 American Society of Mechanical Engineers, *ASME Code for Operation and Maintenance of Nuclear Power Plants*, 1987 Edition with 1988 Addenda, New York, NY.

5.3 U.S. Nuclear Regulatory Commission, "Guidance on Developing Acceptable Inservice Testing Programs," Generic Letter 89-04, through Supplement 1, April 4, 1995.

5.4 U.S. Nuclear Regulatory Commission, "Guidelines for Inservice Testing at Nuclear Power Plants," NUREG-1482, April 1995.

5.5 U.S. Nuclear Regulatory Commission, "Relief Request Reviews," NRR Office Instruction LIC-102, July 18, 2002.

5.6 Exelon Generation Company, LLC letter to the Nuclear Regulatory Commission, RS-02-156, dated October 31, 2002, Subject: "Relief Request for Alternative Testing of Containment Sump Suction Valves 1/2SI8811A/B."

5.7 Exelon Generation Company, LLC letter to the Nuclear Regulatory Commission, RS-03-004, dated January 23, 2003, Subject: "Response to Request for Additional Information Supporting a Relief Request for Alternative Testing of Containment Sump Suction Valves 1/2SI8811A/B."

5.8 Commonwealth Edison Company letter to the Nuclear Regulatory Commission, BYRON 98-5022, dated January 29, 1998, Subject: "Revision 1 of the Byron 2nd Interval Inservice Testing Program for Pumps and Valves."

5.9 Commonwealth Edison Company letter to the Nuclear Regulatory Commission, dated April 16, 1998, Subject: "Braidwood Station Units 1 and 2 Inservice Testing Program Plan for Pumps and Valves."


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Date: February 28, 2003