April 3, 2003

Mr. John L. Skolds,
Chairman and CEO
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: OYSTER CREEK NUCLEAR GENERATING STATION - ALTERNATIVE FOR REACTOR VESSEL 4-HOUR PRESSURE TEST (TAC MB6573)

Dear Mr. Skolds:

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g), requires that nuclear power facility components must meet the requirements contained in specific editions of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for Inservice Inspection and Repair and Replacement Programs. Specifically, Table IWB-2500-1 of the ASME Code, Section XI, specifies that a system hydrostatic test is required to include all Class 1 components within the system and a visual inspection, VT-2 performed. ASME Code, Section XI, Paragraph IWA-5213(d) requires a 4-hour hold time after attaining the test pressure and temperature conditions for insulated systems when conducting a hydrostatic test. Per ASME Code Section XI, Paragraph IWA-5212(c), the system test conditions shall be maintained essentially constant during the course of the visual examination.

By letter dated November 8, 2002, AmerGen proposed an alternative such that a “cumulative” 4-hour hold time be used for the pressure test. The NRC staff reviewed the submittal and concludes that the alternative provides reasonable assurance of leak-tightness, and that imposition of Code requirements would result in a hardship on AmerGen without a compensating increase in the level of quality and safety. Details of the review are delineated in the enclosed safety evaluation. Therefore, the proposed alternative is authorized on a one-time basis for the third 10-year interval, pursuant to 10 CFR 50.55a(a)(3)(ii).

Sincerely,

/RA/

Richard J. Laufer, Chief, Section 1
Project Directorate 1
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-219

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF RR-33, ALTERNATIVE REACTOR VESSEL

4-HOUR PRESSURE TEST

AMERGEN ENERGY COMPANY, LLC

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

1.0 INTRODUCTION

By letter dated November 8, 2002, AmerGen Energy Company, LLC (AmerGen, the licensee) applied for a relief (Request for Relief RR-33) concerning the 4-hour pressure test of the Oyster Creek Nuclear Generating Station (OCNGS) reactor vessel. The Nuclear Regulatory Commission (NRC) staff reviewed that application as follows.

2.0 REGULATORY REQUIREMENTS

Inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code (Code) and applicable addenda as required by 10 CFR 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(6)(g)(i). 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the applicant demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, “Rules for Inservice Inspection of Nuclear Power Plant Components,” to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first ten-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The code of record for the Oyster Creek Generating Station, third 10-year ISI interval, is the 1986 Edition of the ASME Boiler and Pressure Vessel Code.

3.0 TECHNICAL EVALUATION

The OCNGS third 10-year interval ISI Program Plan is prepared to the 1986 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI. Table IWB-2500-1 of the ASME Code, Section XI, specifies that a system hydrostatic test is required to include all Class 1 components within the system and a visual inspection, VT-2 performed. ASME Code, Section XI, Paragraph IWA-5213(d) requires a 4-hour hold time after attaining the test pressure and temperature conditions for insulated systems when conducting a hydrostatic test. Per ASME Code Section XI, Paragraph IWA-5212(c), the system test conditions shall be maintained essentially constant during the course of the visual examination.

3.1 Licensee's Code Relief Request

The licensee requested a relief on the basis that the proposed alternative satisfactorily meets the intent of the Code requirements and complying with the Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. In order to achieve the Code-required 4-hour hold time, it would be necessary to extend the outage an additional ten days to dissipate decay heat or modify hardware for additional decay heat removal. OCNGS was not designed with a high pressure decay heat removal system, and therefore temperature limits could not be maintained for 4 hours. Addition of new nuclear systems to cool down primary containment water for the purpose of removing decay heat is a hardship, considering the cost of the additional nuclear safety systems with no increase in safety gained.

3.2 Licensee's Proposed Alternative and Basis

The components affected by this relief request have been identified by the licensee as the Class 1 Reactor Coolant Pressure Boundary, and include insulated portions of the Feedwater, Main Steam, Isolation Condenser, Reactor Water Cleanup, Shutdown Cooling, and Reactor Recirculation. The licensee requested the relief, pursuant to 10 CFR 50.55a(g)(5)(iii), on the basis that extending the outage in order for decay heat to be at a level which would not result in exceeding the procedurally established 240^{o}F limit results in a hardship with no increase in safety gained.

The licensee stated that OCNGS was not designed with a high pressure decay heat removal system, and the test procedure requires that the test pressure be in the range of 1020 to 1065 psig, and the temperature in the range of 220^{o} F and 240^{o} F. Given this narrow temperature range for this test and the relatively short shutdown time (approximately 19 days), the reactor decay heat load made it difficult to conduct the test sequence (4-hour hold time and an approximate 1 hour inspection time) in a continuous fashion without exceeding the procedurally established maximum temperature of 240^{o} F. The procedurally established maximum temperature of 240^{o} F ensures that the Technical Specification limit of 250^{o} F is not exceeded, and ensures adequate time to depressurize and place shutdown cooling into service. The procedurally established minimum temperature is based on OCNGS's current Technical Specifications limit associated with reactor pressure vessel nil-ductility transition temperature of 218^{o} F.

According to the licensee's estimate, in order to achieve a continuous hold time of 4 hours, and the additional 1 hour for inspection, it would be necessary to extend the outage an additional 10 days. In order to avoid the additional days necessary for decay heat to dissipate, major hardware modifications in the form of additional decay heat removal systems would be necessary. These modifications would lead to a significant financial burden. Addition of new nuclear systems to cool down primary containment water for the purpose of removing decay heat is burdensome considering the cost of the additional nuclear safety systems. Furthermore, the time required to reduce the decay heat load would significantly extend the refueling outage, with no increase in safety.

The licensee proposed that the pressure be held for a "cumulative" time of greater than 4 hours, while the test temperature be maintained continually for a minimum of 4 hours. The minimum pressure reached during the test was approximately 45 psig.

The pressure test was performed as follows. The reactor recirculation pumps were used to increase temperature during the initial test pressurization. Once the test pressure was reached, the temperature continued to increase up to the limit set in the test procedure. Since OCNGS was not designed with a high pressure decay heat removal system, the temperature would increase such that the temperature limit could not be maintained. The test procedure requires depressurization to less than 100 psig prior to exceeding 250^{o} F so that the shutdown cooling system can be placed into service to reduce the temperature. The cumulative time at test pressure for this portion of the test was 118 minutes (approximately two hours).

Afterwards, reactor coolant temperature was reduced to the low end of the test band, the shutdown cooling system was secured, and the pressure was again raised to the test pressure. Based on the heatup rate during this second pressurization (approximately 5.76 degrees per hour), it was determined that the 250^{o} F limit would be exceeded, and the continuous four hour time and pressurization inspection could not be achieved without exceeding the maximum temperature. The VT-2 inspections commenced after this second hold time of approximately 139 minutes (two hours and 19 minutes).

The licensee stated that the basis for the hold time for insulated systems is to allow any leakage to travel through the insulation and thus become visible. At OCNGS, the reactor pressure was decreased to allow the temperature to be lowered. Since the time at the lower pressure was minimized, any insulation that became wet from leakage should remain wet until the inspection. There was no time during the total test sequence during which the primary system pressure was reduced to atmospheric, nor was the test temperature allowed to go below 220^{o} F. The minimum pressure reached during the test was approximately 45 psig, and therefore, any leakage would always be in the outward direction during the test.

3.3 NRC Staff Evaluation

The ASME Code requires a 4-hour hold time after attaining the test pressure and temperature conditions for insulated systems during a hydrostatic test. Per the ASME Code, the system test conditions shall be maintained essentially constant during the course of the visual examination. However, due to decay heat, the continuous 4-hour hold time after attaining test pressure could not be achieved without exceeding the maximum procedurally established 240^{o} F limit. Instead, the licensee proposed that the test pressure and temperature be held for a "cumulative" time of greater than 4 hours, and considered the intent of the Code requirements were met.

Based on the an NRC publication (67 *FR* 60520, September 26, 2002), hold times are not necessary for leakage tests of Class 1 components because these leakage tests are normally performed following each refueling outage as the reactor is heating up. The heat up process of the reactor is performed within the pressure-temperature constraints of the heatup curve in the plant Technical Specifications. These constraints limit the rate of temperature and pressure increase resulting in a heatup period of several hours. In light of the substantial length of time required for the reactor heatup process, sufficient time is available for leakage from the Class 1 system to collect in sufficient quantity to be detectable by visual examination. Holding the Class 1 components for additional time at this temperature and pressure is unnecessary to accomplish the purpose of the pressure test.

Therefore, since OCNGS completed a refueling outage requiring a heat up process of several hours as described above, in addition to the 4 hours "cumulative" hold time after attaining test conditions, sufficient time was available for leakage in sufficient quantity to be detectable by visual examination. Additional continuous hold time would require additional stress on systems and components and exceeding the temperature limits of the Technical Specification. This would result in a significant burden and hardship on the licensee without a compensating increase in the level of quality and safety.

The NRC staff determined that the proposed alternative examination using a 4-hour "cumulative" hold time after the heat up process for the system leakage test provides reasonable assurance of leak-tightness of the subject systems. Imposing the Code-required hold time would result in a significant burden on the licensee. The licensee completed the Code-required VT-2 visual examinations for evidence of leakage during the system leakage test after the refueling outage. Therefore, the licensee's best-effort hold times and VT-2 visual examinations performed during the system leakage tests provide reasonable assurance of leak-tightness of the subject components.

4.0 CONCLUSION

The NRC staff concludes that the licensee's proposed alternative of a 4-hour "cumulative" hold time after attaining the required test conditions provides reasonable assurance of leak-tightness, and that imposition of Code requirements would result in a hardship on the licensee without a compensating increase in the level of quality and safety. Therefore, the licensee's proposed alternative is authorized on a one-time basis for the third 10-year interval, pursuant to 10 CFR 50.55a(a)(3)(ii).

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Date: April 3, 2003

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