



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 5, 2012

Mr. Michael J. Pacilio
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: OYSTER CREEK NUCLEAR GENERATING STATION REVIEW OF
COMMITMENT SUBMITTAL FOR LICENSE RENEWAL REGARDING
THERMAL AGING IRRADIATION EMBRITTLEMENT OF CAST AUSTENITIC
STAINLESS STEEL (TAC NO. ME7123)

Dear Mr. Pacilio:

By letter dated April 9, 2008, AmerGen Energy Company LLC, the licensee for the Oyster Creek Nuclear Generating Station (OCNGS), submitted information to document and inform the NRC of a proposed change to the licensee's commitment for license renewal regarding thermal aging and neutron irradiation embrittlement of cast austenitic stainless steel (CASS) reactor vessel (RV) internals at the nuclear plant. The licensee's original commitment is specified in Commitment no. 10 in Appendix A of NUREG-1875, Volume 2, "Safety Evaluation Related to the License Renewal of Oyster Creek Generating Station," dated March 2007. Commitment no. 10 states that the licensee will submit to the NRC "... 1) the type and composition of CASS reactor internal components within the scope of license renewal; and 2) the results of evaluations performed to determine susceptibility to thermal aging and neutron irradiation embrittlement."

The NRC staff reviewed the information in the licensee's letter and in the response dated April 6, 2012, to the staff's request for additional information, and determined that the licensee's change to license renewal application Commitment no. 10 does not change the staff's previous conclusion regarding OCNGS's managing CASS RV internals degradation, as documented in NUREG-1875 and the subsequent supplement.

Sincerely,

A handwritten signature in black ink, appearing to read "Heather Jones".

Heather M. Jones, Project Manager
Subsequent Renewal, Guidance,
and Operations Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-219

Enclosure: Review of Commitment

cc w/encl: Listserv

OFFICE OF NUCLEAR REACTOR REGULATION
REVIEW OF COMMITMENT FOR LICENSE RENEWAL
EVALUATION OF CASS REACTOR VESSEL INTERNALS DEGRADATION
OYSTER CREEK NUCLEAR GENERATING STATION
DOCKET NO. 50-219

By letter dated April 9, 2008 (ADAMS Accession No. ML081070060), AmerGen Energy Company, LLC, the licensee for the Oyster Creek Nuclear Generating Station (OCNGS), submitted information to document and inform the Nuclear Regulatory Commission (NRC) of a proposed change to the licensee renewal application (LRA) commitment concerning thermal aging and neutron irradiation embrittlement of cast austenitic stainless steel (CASS) reactor vessel (RV) internals at the nuclear plant. The licensee's original commitment for CASS RV internals degradation is given in Commitment No. 10 in Appendix A of NUREG-1875, Volume 2, "Safety Evaluation Related to the License Renewal of Oyster Creek Generating Station," which identifies that the licensee will submit "1) the type and composition of CASS reactor internal components within the scope of license renewal; and 2) the results of evaluations performed to determine susceptibility to thermal aging and neutron irradiation embrittlement." In addition to the submittal, the staff's review also includes the licensee's response dated April 6, 2012, to the staff's request for additional information (RAI).

Background

In accordance with Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," of Title 10 of the *Code of Federal Regulations* (10 CFR Part 54), the NRC issued Renewed Operating License DPR-16 for OCNGS on April 8, 2009. NUREG-1875, dated March 2007, as supplemented in Supplement 1 of the report (Sept. 2008), documents the NRC staff's technical review of the LRA for OCNGS. Appendix A, "Commitments for License Renewal of OC[N]GS," of NUREG-1875 and NUREG-1875, Supplement 1 lists the commitments that were made in relation to the licensee's aging management programs (AMPs) for managing the aging effects for the OCNGS structures, systems, and components during the period of extended operation.

The subject commitment is item number 10 in this list. It states:

Program is new. The program will include a component specific evaluation of the loss of fracture toughness in accordance with the criteria specified in NUREG-1801, XI.M13. At least one year prior to the period of extended operation, the following information will be submitted to the NRC: 1) the type and composition of CASS reactor internal components within the scope of license renewal; and 2) the results of evaluations performed to determine susceptibility to thermal aging and neutron irradiation embrittlement. For those components where loss of fracture toughness may affect the intended function of the component, a supplemental inspection will be performed.

ENCLOSURE

This inspection will ensure the integrity of the CASS components exposed to the high temperature and neutron fluence present in the reactor environment.

The licensee provided this commitment by letter dated July 7, 2006, which is available under ADAMS Accession No. ML061940020.

Summary of Information in the Licensee's Submittals

In its letter of April 9, 2008, the licensee indicated that its attempt to meet Part 1 of the commitment by locating material details of the CASS components to determine the type and composition of CASS RV internals was not completely successful. As such, it concluded, "Because the material details for the OCNGS CASS components have not yet been identified, OCNGS is unable to differentiate between those components that may be susceptible to loss of fracture toughness and those that would not be susceptible. Therefore, OCNGS plans to conservatively implement supplemental inspections...."

The scopes and frequencies of the proposed supplemental inspections for the items identified in the April 9, 2008, letter are as follows:

- Fuel Support Piece In addition to the approved alternative inspection based on BWRVIP-47-A, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," OCNGS will add a VT-1 inspection of accessible surfaces of one fuel support piece each refueling outage when control rod blade (CRB) exchange is performed; or every other outage if CRB exchange is not performed.
- Core Spray Line Spray Nozzle Elbows In addition to the required visual (VT-1) inspection of a rotating sample of 50 percent of all sparger to nozzle lock weld every other outage based on BWRVIP-18-A, "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines," OCNGS will increase the sample to 100 percent every other outage.
- Control Rod Guide Tube (CRGT) Base In addition to the required enhanced visual (EVT-1) inspection of 10 percent of the guide tubes within a 12-year period (a minimum of 5 percent of the guide tubes inspected within the first 6 years) based on BWRVIP-47-A, OCNGS will inspect one CRGT base each refueling outage when CRB exchange is performed; or every other outage if CRB exchange is not performed.

In summary, the licensee's April 9, 2008, letter provides changes to the prior commitment in LRA Commitment no. 10 and provides new regulatory commitments as a result of using the alternatives to meet LRA Commitment no. 10.

NRC Staff Review

Part 1 of LRA Commitment No. 10 requires the licensee to submit the type and composition of CASS RV internals. Part 2 of LRA Commitment No. 10 requires the licensee submit results of its evaluations regarding susceptibility determination of these internals to thermal aging and neutron irradiation embrittlement based on the material information obtained in Part 1. Since the licensee's effort in locating material details of the CASS RV internals was not completely successful, the licensee assumed that the relevant CASS RV internals are susceptible to thermal aging and neutron irradiation embrittlement. This would necessitate adoption of the corrective measure specified in LRA Commitment No. 10, which states, "For those components where loss of fracture toughness may affect the intended function of the component, a supplemental inspection will be performed."

For the fuel support piece, in addition to a BWRVIP-47-A approved alternative inspection using an underwater camera, the proposed OCNGS supplemental inspection will add a VT-1 inspection of accessible surfaces of one fuel support piece each refueling outage when control rod blade (CRB) exchange is performed; or every other outage if CRB exchange is not performed. The licensee states that the loading on the fuel support piece is mostly in compression and loss of fracture toughness is not expected to affect the component's structural integrity. The licensee clarified in the April 6, 2012, response to the staff's RAI that coverage was achieved on both the inside diameter and outside diameter surfaces of the component when it is removed from the RV and with the compressive loads removed. The response in the letter dated April 6, 2012, further states that a prior plant-specific inspection in 2010 showed 70 percent coverage with no recordable indications. Based on the information provided, the staff concludes: (1) cracking is unlikely to occur when the fuel support piece is mostly in compression during operation, (2) compression will not cause big tensile stress variation among fuel support pieces, therefore, results from supplemental VT-1 inspection of accessible surfaces of one fuel support piece each refueling outage will be representative for other fuel support pieces, and (3) plant-specific inspections indicated that 70 percent coverage is achievable and this coverage should provide meaningful cracking or degradation information in the component. Hence, the staff determined that the supplemental VT-1 inspection is acceptable.

For core spray line spray nozzle elbows, the proposed supplemental inspection increases the inspection scope of the BWRVIP-18-A VT-1 inspection from a rotating sample of 50 percent of all sparger to nozzle lock welds to 100 percent every other outage. Since the licensee has expanded the inspection scope to the maximum of 100 percent through the supplemental inspection, it is acceptable to the staff.

For CRGTs, in addition to a BWRVIP-47-A required EVT-1 inspection of weld CRGT-3 10 percent of the guide tubes within a 12-year period, OCNGS will inspect one CRGT base each refueling outage when CRB exchange is performed; or every other outage if CRB exchange is not performed. Weld CRGT-3 connects the CRGT bottom end to the CRGT CASS base. Since the CRGTs are designed to experience only minimum stresses and fluences, the inspection information from one CRGT base, each refueling outage, should be representative of the rest. Further, combined with the weld CRGT-3 inspection, the proposed supplemental inspection for the CRGT base will provide the maximum possible area to detect indication of degradation in the CASS material of a CRGT and is, therefore, acceptable to the staff.

Conclusion

The staff reviewed the information in the licensee's submittal and in the response dated April 6, 2012, to the staff's RAI. Based on this review, the staff determined that the licensee's change to LRA Commitment No. 10 does not change the staff's previous conclusion regarding OCNGS's managing CASS RV internals degradation, and, hence, does not change the staff's previous conclusion regarding OCNGS's Thermal Aging and Neutron Embrittlement of CASS Program, as documented in Section 3.1.2.1.4 of NUREG-1875, Vol. 2 and the subsequent supplement.

Primary Contributor: Simon Sheng, NRR/DE

Date: February 21, 2012

July 5, 2012

Mr. Michael J. Pacilio
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

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Sincerely,

/RA/

Heather M. Jones, Project Manager
Subsequent Renewal, Guidance,
and Operations Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

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Letter to M. Pacilio from H. Jones dated July 5, 2012

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