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10 CFR 50
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10 CFR 54

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U. S. Nuclear Regulatory Commission
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Washington, DC 20555

Oyster Creek Generating Station
Facility Operating License No. DPR-16
NRC Docket No. 50-219

Subject: Supplement to AmerGen Response to NRC Request for Additional Information RAI 4.3-4, Related to Oyster Creek Generating Station License Renewal Application (TAC No. MC7624)

Reference: May 1, 2006 AmerGen Response to NRC Request for Additional Information, dated March 30, 2006, Related to Oyster Creek Generating Station License Renewal Application (TAC No. MC7624)

In the referenced letter, AmerGen responded to NRC Request for Additional Information (RAI) 4.3-4. During the NRC Staff review of this response, it was determined that a clarification to the response was needed. The Enclosure to this letter provides that clarification. Question RAI 4.3-4 along with the original response is repeated. New information included in the response is displayed in bold font for ease of identification. An exception to this convention is that information bolded in Table 4.3.4-1 of the original response remains bolded. No new information has been introduced into that Table.

If you have any questions, please contact Fred Polaski, Manager License Renewal, at 610-765-5935.

I declare under penalty of perjury that the foregoing is true and correct.

Respectfully,

Executed on 06-12-2006

Michael P. Gallagher
Vice President, License Renewal
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Enclosure: Clarification to RAI 4.3-4 Response

A114

cc: Regional Administrator, USNRC Region I, w/o Enclosure
USNRC Project Manager, NRR - License Renewal, Safety, w/Enclosure
USNRC Project Manager, NRR - License Renewal, Environmental, w/o Enclosure
USNRC Project Manager, NRR - OCGS, w/o Enclosure
USNRC Senior Resident Inspector, OCGS, w/o Enclosure
Bureau of Nuclear Engineering, NJDEP, w/Enclosure
File No. 05040

ENCLOSURE

CLARIFICATION TO RAI 4.3-4 RESPONSE
RELATED TO OYSTER CREEK GENERATING STATION
LICENSE RENEWAL APPLICATION

RAI 4.3-4

Section 4.3.4 of the license renewal application discusses the evaluation of the effects of the reactor coolant environment on the fatigue life of components and piping. Table 4.3.4-1 provides the overall environmental fatigue multipliers for the components analyzed. Provide the calculation of the environmental factors for the RPV inlet and outlet nozzles and the feedwater nozzle. Explain how each parameter used in the calculation was determined.

Response:

The environmental fatigue calculations for the recirculation inlet and outlet nozzles and the feedwater nozzle are contained in Structural Integrity Associates Calculation No. OC-05Q-314, Revision 0, "Environmental Fatigue Calculations for RPV Locations" (proprietary). The calculations for all three of these locations are performed in accordance with NUREG/CR-6583 (ANL-97/18), "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels," March 1998, as the limiting locations for all three components are low alloy steel material. All three locations were evaluated in a similar fashion, based on the governing fatigue calculation for each component, with the following specifics:

Recirculation Inlet Nozzle: Bounding F_{en} multipliers for hydrogen water chemistry (HWC) and normal water chemistry (NWC) were determined based on maximum transient temperature, minimum (saturated) assumed strain rate, and oxygen values estimated for the recirculation system. An overall usage factor was computed considering the NWC F_{en} value for the time period prior to HWC implementation (41%) and the HWC F_{en} value for the time period after HWC implementation until the end of the 60-year operating period (59%).

Recirculation Outlet Nozzle: The fatigue usage at the outlet nozzle is greater than at the inlet nozzle, primarily because the outlet nozzle experiences the added thermal transients associated with operation of the Isolation Condenser. As a result, the fatigue usage for the outlet nozzle was calculated using a more detailed approach. Load pair specific F_{en} multipliers for hydrogen water chemistry (HWC) and normal water chemistry (NWC) were determined based on the maximum load pair temperature, average computed (tensile) strain rate, and oxygen values estimated for the recirculation system. Because load-pair specific F_{en} multipliers were determined based on load-pair specific strain rates and temperatures, the overall F_{en} multiplier for the recirculation outlet nozzle was determined to be significantly lower than the bounding value described above for the recirculation inlet nozzle. An overall usage factor was computed considering the NWC F_{en} value for the time period prior to HWC implementation (41%) and the HWC F_{en} value for the time period after HWC implementation until the end of the 60-year operating period (59%).

Feedwater Nozzle: **A revised CUF of 0.389 was computed for the feedwater nozzle for 60 years of projected cycles.** Similar to the recirculation outlet nozzle, load-pair-specific F_{en} multipliers for hydrogen water chemistry (HWC) and normal water chemistry (NWC) were determined based on the maximum load pair temperature, average computed (tensile) strain rate, and oxygen values estimated for the feedwater system. **These F_{en} multipliers were determined to be 2.45 for each condition in accordance with NUREG/CR-6583 requirements.** An overall usage factor **of 0.955** was computed **for 60 years of projected cycles (= 2.45 x 0.389). This considered** the NWC F_{en} value for the time period prior to HWC implementation (41%) and the HWC F_{en} value for the time period after HWC implementation until the end of the 60-year operating period (59%).

The feedwater nozzle was repaired 7 years after plant startup, when the cladding inside the nozzle was removed and replacement thermal sleeves and spargers were installed. Therefore, the evaluation period for the environmental fatigue analysis was adjusted to 53 years. Based on this, the 53-year usage factor, including environmental effects, was calculated as (53/60) x 0.955 = 0.843. The overall F_{en} multiplier for the feedwater nozzle is therefore shown in the LRA as 0.843 / 0.389 = 2.17.

As a result of a recent review of our documents, it was noticed that some of the fatigue usage factors cited in Section 4.3 of the OC LRA do not correspond to the values in our latest fatigue calculations. Some fatigue values changed slightly as a result of incorporation of comments during the finalization of these calculations. As part of the corrective actions for this finding a complete review of all of the values cited in LRA Section 4 was performed to ensure the fidelity of the information provided. The changes are shown in bold face on the new Table 4.3.4-1 (below). The changes are relatively small and do not impact the conclusions discussed in the application.

Table 4.3.4-1
Environmental Fatigue Results for Oyster Creek for NUREG/CR-6260 Components

NUREG/CR-6260 Location	Equivalent OCGS Location	Material	60-Year Fatigue Usage Factor (1)	60-Year Fatigue Usage Factor with Environmental Effects (2)	Overall Environmental Fatigue Multiplier
Reactor Vessel (Lower Head to Shell Transition)	Reactor Vessel (Vessel-Head Junction)	Low Alloy Steel	0.0004	0.0042	10.28
Feedwater Nozzle	Feedwater Nozzle	Low Alloy Steel	0.3889	0.8433	2.17
Recirculation System (RHR Return Line Tee and the RPV inlet and outlet nozzles)	Isolation Condenser Return Line Tee into SDC Line	Stainless Steel	~~0.851~~ **0.1205**	~~0.493~~ **0.43**	~~5.79~~ **3.57**
	RPV inlet nozzle	Low Alloy Steel	0.0151	0.1554	10.28
	RPV outlet nozzle	Low Alloy Steel	~~0.131~~ **.1832**	0.978	5.34
Core Spray System (Nozzle and Safe End)	Core Spray Nozzle Core Spray Nozzle Safe End	Low Alloy Steel Stainless Steel	0.0013 0.0006	0.0129 0.0072	10.28 12.48
Residual Heat Removal Line (Tapered Transition)	Bounded by Isolation Condenser Return Line Tee Location Above	Stainless Steel	N/A	N/A	N/A
Feedwater Line (Feedwater/RCIC Tee Connection)	Limiting Class 1 Location in the Feedwater Line	Carbon Steel	~~0.0789~~ **0.0245**	~~0.178~~ **0.0767**	~~2.26~~ **3.13**

Notes:

1. Revised fatigue usage factors were computed for all of the NUREG/CR-6260 components based on projected cycles for 60 years of plant operation and updated ASME Code fatigue methodology.
2. Environmental fatigue usage was computed using the methodology of NUREG/CR-6583 (for carbon/low alloy steels) and NUREG/CR-5704 (for stainless steels), as appropriate for the material for each location.