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U.S. Nuclear Regulatory Commission
Document Control Room
Washington, D.C. 20555

Ladies and Gentlemen:

Subject: Oyster Creek Nuclear Generating Station (OCNGS)
Docket No. 50-219
Revision to NUREG-0619 Routine Inspection Criteria for Feedwater (FW) and Control Rod Drive Return Line (CRDRL) Nozzles

By letters dated July 12, 1990 and July 8, 1992, GPU Nuclear Corporation (GPU) submitted to the U.S. Nuclear Regulatory Commission (NRC) a proposal requesting an exemption from some inspection requirements for the aforementioned components.

Specifically, GPU requested:

(1) to eliminate routine internal liquid Dye Penetrant (PT) examinations (except if flaws which would compromise nozzle integrity are known to be pre-existing or have been detected first via the proposed Phased-Array Ultrasonic test (UT) technique), and utilize instead UTs as the primary method to detect, characterize, and monitor flaws on these components; the UTs to be performed per ASME Boiler and Pressure Code, Section XI;

(2) to only perform UT inspections on those components once each Inservice Inspection (ISI) interval (every 10 years) and not longer than ten years between inspections, in conformance with the current requirements of the ASME Code; and

(3) to defer certain routine PT inspections required to be performed during (past) oncoming outages.

The staff of the New Jersey Department of Environmental Protection & Energy's (NJ DEPE) Bureau of Nuclear Engineering (BNE) reviewed twelve pieces of communication that were exchanged between

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the NRC and licensee (GPU) from January 1990 to June 1993, as well as several pertinent regulatory documents. This subject is being studied by the licensee and being evaluated by the NRC for over a decade now. The BNE review identified the following broad areas of concern:

(A) Whether the Automated Phased-Array UT technique has the capability to reliably detect and characterize thermal fatigue cracks per NUREG-0619 criteria, for the complex configurations of said systems.

(B) Whether the Automated Phased-Array UT examinations are capable of detecting defects that can grow to an unacceptable, per ASME Code, size prior to the next routine inspection.

(C) Whether it is justifiable to reduce the frequency of even UT surface examinations (conducted from the exterior) to once every ten years, even though the overall conditions that caused the thermal fatigue cracking in the first place (before the repairs and modifications since 7R) potentially still exist; essentially setting aside some of the recommendations of NUREG-0619, such as using the number of startup/shutdown cycles as an indicator to determine the inspection frequencies.

Based on the information contained in these communications, and subsequent clarifications provided by the licensee, the BNE staff has evaluated these issues and has the following comments:

Item (A): The BNE has no concerns with the conclusion that the Automated Phased-Array UT technique (after incorporating the 1992 refinements) has the capability of detecting thermal fatigue cracks of 1 inch in depth. For the FW nozzle, the NRC intended to limit crack growth to less than 1 inch during 40 years of operation (the licensed life of the plant).

Item (B): GPU stated that "reportable" indications (attributed to thermal fatigue) were not detected in any of the 5 nozzles examined via the Automated Phased-Array UTs during the 14R outage. However, the possible existence of any other non-thermal fatigue-induced indications (via UT inspection during 14R) was not discussed.

The BNE reviewed GPU's conceptual methodology for sizing crack depth propagation and finds it acceptable. Briefly, their approach assumes initial fatigue crack depths (0.172 inch for the FW nozzles and 0.132 inch for the CRDRL nozzle), with these values representing the minimum detectable notch depth in the respective mockup systems. Then, GPU stated that they have applied linear elastic fracture mechanics methods, per ASME Code, to assess crack

growth, and concluded that the cracks of those assumed depths will not grow to a depth greater than those acceptable per ASME Code over a 10-year interval; any cracks of smaller depth than those are inherently represented by the assumed crack sizes. In addition, the thermal fatigue cracks implanted and detected via UT in the GPU mockup were reported to be hairline cracks, compared to the larger actual thermal fatigue cracks originally detected in the FW before the 7R modifications. Although the BNE has no concerns with the conceptual methodology, our staff has not reviewed all the details of the calculations and assumptions used by GPU in implementing this methodology, and is not in a position to provide meaningful comments on the final crack propagation depths over a 10-year interval, as calculated by GPU.

However, BNE discussed with GPU and clarified the following:

(a) The UT data allows the analysts to distinguish between thermal fatigue cracks vs "all other indications".

(b) GPU surface flaws data do not suggest that thermal fatigue cracks are more likely to be initiated at locations where these "other indications" are present.

(c) If any of these "other indications" has any "depth", initially or developed subsequently, such surface flaws are monitored as cracks.

Item (C): Accepting that the crack depth propagations predicted by GPU's fracture mechanics analysis, based on ASME Code, Appendix XI, are representative of potential actual cracks,

(a) The BNE suggests that there should be a well-defined monitoring and maintenance program to ensure that the auxiliary components (which helped mitigate the earlier thermal cycling conditions in the FW nozzles) will maintain their effectiveness over a 10-year interval.

(b) The BNE raised the question relating to the presence and frequency of occurrences of "challenges" (not necessarily associated with startup/shutdown cycles) potentially contributing to crack initiation/propagation, and on how will these "challenges" impact on the need for more frequent UTs or other associated inspections. Such "challenges" may include, but not limited to, vibrations from various sources, or water hammers. GPU's response was that conditions to induce water hammers are not likely, and any vibrations are expected to be very minor contributors to the propagation of any potential cracks.

(c) Also, the BNE raised the question of whether the "once in 10 years" inspection schedule will remain fixed or will the frequency of the proposed UT inspections still be dictated by a predetermined number of future transients events (per NUREG-0619 or other inspection requirements), and in this latter case what will be this target number.

GPU's response expressed confidence that the operation of the plant is not expected to result in the number of startup/shutdown cycles (90 such cycles within a 10-year period or even during the remaining life of the plant) to necessitate PT inspections according to the NUREG-0619 schedule. GPU re-iterated that the FW nozzle thermal cracking issue has been resolved.

The BNE staff is available to participate and wishes to be included in discussions relating to this issue.

If you have any questions, please contact Suren Singh at (609) 987-2039, or Ariadni Kapsalopoulou at (609) 987-2052.

Sincerely,

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