GPU Nuclear

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November 3, 1994
C321-94-2186
5000-94-0048

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Dear Sir:

Subject: Oyster Creek Nuclear Generating Station (OCNGS)
Operating License No. DPR-16
Docket No. 50-219

Technical Specification Change Request (TSCR) No. 216
Re: Limiting Safety System Settings - Technical Specification 2.3.D, "Reactor High Pressure, Relief Valve Initiation"
REQUEST FOR ADDITIONAL INFORMATION (RAI) - TAC No. M89684

Pursuant to our telephone conference call of October 11, 1994 enclosed please find our revised responses to Questions No. 3 and 4 of your letter dated August 22, 1994 on the subject TSCR No. 216, which GPU Nuclear (GPUN) Corporation responded to on September 23, 1994. Also enclosed are copies of replacement pages for Section 11 of our referenced topical report TR-101, which serves to address concerns of the Staff with regard to criteria used in the GPUN evaluations.

Pursuant to 10 CFR 50.91 (b) (1), a copy of our response to your RAI has been sent to the State of New Jersey, Department of Environmental Protection.

Sincerely,

R. W. Keaten
Vice President and Director
Technical Functions Division

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Enclosures: 1. GPUN Revised Response to RAI on TSCR No. 216
2. Replacement pages for revised Section 11, of GPUN Topical Report, TR-101.

cc: OCNGS NRC Project Manager
Administrator, Region I
OCNGS NRC Sr. Resident Inspector

ENCLOSURE 1

Technical Specification Change Request (TSCR) No. 216
Request for Additional Information, TAC No. M89684

ENCLOSURE TO NRC'S LETTER TO GPUN DATED AUGUST 22, 1994

QUESTION 3.

Section 11.0 of Enclosure 3 discusses the effects of torus corrosion and EMRV setpoint increases on the code allowable. The staff has not accepted the use of the actual material properties (compared to the minimum properties established by the ASME code) for design basis loadings. It should be recognized that the code permitted under tolerance is for accepting the plate material for use in the fabrication of vessels. Therefore, it should not be used to allow for additional corrosion depth. Provide a summary of the torus stresses considering the reduced thickness due to corrosion. Also, provide a copy of MPR Report 953 which formed the basis for your safety assessment of the torus.

QUESTION 4

MPR-953 is based on 1983 torus inspections. Provide a summary of the subsequent updated torus corrosion inspection data that would form the basis for safety assessment of the torus.

REVISED RESPONSE TO QUESTIONS 3 AND 4:

During the 10R refueling outage, (1983-84), Mark I Containment modifications were made to the Oyster Creek torus. Corrosion found in the torus shell was repaired by weld overlay, or shell stresses with a reduced shell wall thickness were shown to comply with the Mark I stress criteria.

The interior of the Oyster Creek torus was also coated during this outage with an epoxy coating to protect the shell and internal pipe from additional corrosion. The coating replaced the chromates, which had served as the primary corrosion inhibitor for the torus until removal in 1983. The coating to date, is intact and continues to function as the primary barrier against corrosion.

The exterior of the shell was coated in 1987 after shell rusting was observed during a routine inspection in 1986. The rusting was categorized as uniform and superficial with no evidence of rust scale. No appreciable metal loss, was associated with this condition, i.e., the loss was estimated to be no more than 2 mils.

To assure coating integrity, periodic inspections of the torus interior have been performed since the coating application in 1983. The inspections focused on the coating's ability to properly adhere to the torus shell and provide corrosion protection.

The first inspection, which took place during the 11R refueling outage (1986), consisted of a visual examination of the vapor region and shell surface at the water line. No coating damage or evidence of corrosion was observed.

The second inspection, which was performed during refueling outage 12R (1988-1989), focused on the immersion region utilizing divers qualified to perform detailed coating and corrosion assessment. This inspection revealed a blistered condition in the coating at the torus invert where a pre-coating filler primer was applied. The three most severely blistered bays, 15% of the total, were identified for future inspections. Also, three one foot square test patches were established; and, the size and degree of frequency of the blisters within each test patch was recorded as a baseline for future observations. Further, adhesion tests using a vacuum box were conducted on the blisters, and elcometer (an instrument used to measure coating adhesion in psi) and putty knife adhesion tests were conducted on the unblemished coating. Although the blistered condition was unexpected, no evidence of corrosion associated with this condition was observed nor was there any evidence of coating delamination. Minor mechanical damage such as scratches and abrasions to the coating, and fractured blisters exposing substrate were repaired.

The third inspection was conducted during the 13R refueling outage (1991). Divers revisited the three bays, identified in the 12R outage, and the three one foot square test patches. In addition, all the adhesion tests conducted in 12R were repeated. No additional coating degradation was observed, i.e., the blistered condition found in the 12R refueling outage was stable and the adhesion qualities measured in the 12R outage did not change.

A fourth inspection was performed during the 14R refueling outage (1992-93). This inspection replicated the inspection performed in the 13R refueling outage and a visual inspection was conducted for seven additional bays. The results of this inspection confirmed the conclusion of the 13R inspection, namely that the coating is stable.

Based on these inspections, we have concluded that the torus shell thickness is virtually unchanged since the repair and coating effort performed in 1983. And, no new pitting or general corrosion was found during the subsequent inspections performed since 1983. Data collected to date provide a high confidence level that the coating material is adequately adhering to the shell and providing corrosion protection.

MPR documented Mark I Program stresses on the torus shell in MPR Report No. 733. Brookhaven National Laboratory reviewed that report for the Staff in Technical Evaluation Report No. BNL 04243, which BNL issued in 1983. The shell stresses documented in the report are based on the nominal torus shell thicknesses. MPR's report served in part as the basis for the Mark I Program modifications performed on the torus shell during the 10R refueling outage.

MPR documented the as-left torus shell thicknesses, in MPR Report No. 953, after the completion of repairs in 1983. MPR also computed the minimum shell thicknesses required to satisfy Mark I stress requirements and tabulated thickness margins (nominal less minimum required thicknesses) at various locations on the torus shell in the same report. Calculated thickness margins exceeded as-left corrosion depths at all locations on the shell. These thickness margins and corrosion depths are tabulated in Columns: (2) and (4) of Table 1.

GPUN's submittal of Technical Specification Change Request (TSCR) No. 216 to increase the setpoint values of the Electromatic Relief Valves (EMRVs) required an evaluation of the torus shell for the consequent increase in the EMRV loads. MPR Report No. 1434 evaluated the shell stresses documented in MPR Report No. 733 for a four percent increase in the EMRV loads based on the following two-step screening process:

1. Total stresses were increased by four percent regardless of the specific EMRV contribution to the load and compared with allowable stresses.

2. Only the EMRV contribution to the total stress was increased by four percent at shell locations with stresses that exceeded allowable stresses after application of screening Step No. 1.

MPR concluded that all locations on the torus shell met Mark I Program stress requirements. However, as noted in the report, MPR's evaluation of the torus shell for the increased EMRV loads was based on nominal shell thicknesses and did not consider the effects of corrosion. To consider the effects of corrosion, GPUN calculated revised thickness margins based on MPR's screening criteria and the data presented in MPR Report No. 953.

As documented in the calculation, revised shell thickness margins remain greater than corrosion depths at all locations on the torus shell. These revised thickness margins are tabulated in Column: (3) of Table 1.

TABLE 1

SUMMARY OF TORUS SHELL THICKNESS MARGINS AND MAXIMUM CORROSION INSIDE SURFACE OF TORUS SHELL

(1) LOCATION	(2) THICKNESS MARGIN BASED ON MARK I PROGRAM STRESS REQUIREMENTS (MILS)	(3) REVISED MARK I THICKNESS MARGIN DUE TO PROPOSED INCREASE IN SRV LOADS (MILS)	(4) MAXIMUM DEPTH OF CORROSION IN THE AS-LEFT CONDITION(A) (MILS)
1. Clean shell above top of straps	100	89	40
2. Clean shell below top of straps	60	47	40
3. Shell at edge of straps within 1 inch	57	44	40
4. Same as (3) except remaining portion between straps	60	47	40
5. Shell at tip of straps	90	78	40
6. Shell at saddle flange within 1 inch	60	47	35
7. Same as (6) except greater than 1 inch	151	142	40
8. Shell at saddle flange tips	158	149	35
9. Shell at ring girder within 1 inch of EMRV supporting RG	61	61	50
10. Same as (9) except within 1 inch of non-EMRV supporting RG	79	67	50
11. Same as (9) except between 1 to 8 inches away from all RG	103	92	40

NOTE: (A) This corrosion (which was identified during the 10R refueling outage in 1983) did not warrant repair, occured over small areas, and was dispersed over the immersion region of the torus shell.

ENCLOSURE 2

Technical Specification Change Request (TSCR) No. 216
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Revised pages for TR-101: la, 43, and 44 which follow this page.

GPU Nuclear		DOCUMENT NO. TR 101	
TITLE	CONSIDERATIONS ASSOCIATED WITH CHANGING ELECTROMATIC RELIEF VALVE (EMRV) SETPOINTS		
REV	SUMMARY OF CHANGE	APPROVAL	DATE
1	Editorial changes made to Section 11.0 to provide the clarification necessary to resolve NRC Technical Reviewer comments.	[signature] G. L. Bond	10/29/94 10-31-94

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demonstrates that the peak torus temperature expected is dependent almost exclusively on the success/effectiveness of operator action.

From an overpressure protection perspective, the analysis that supported License Amendment No. 150 demonstrated that an MSIV closure ATWS (8 safety valves) with recirculation pump trip (RPT) and EMRV actuation was bounded by the MSIV closure with High Flux Scram (9 safety valves) and no RPT or EMRV actuation. That analysis addressed the overpressurization limits associated with an ATWS event, and demonstrated that the ATWS transients do not have to be reanalyzed for each reload. Since the Cycle 14 reload transients were reanalyzed at the proposed TSCR 2.3.D high pressure EMRV actuation setpoints, using the GPUN reload methodology, the ATWS transients were not reanalyzed for high pressure protection evaluation.

10.0 EMERGENCY OPERATING PROCEDURE (EOP) CONSIDERATIONS

Appendix C of revision 4 of the BWR Owner's Group Emergency Procedure Guidelines identifies Plant Specific Data needed and calculational procedures for developing various limits and limit curves for the Emergency Operating Procedures. A change in the minimum pressure in the reactor vessel at which the EMRV is set to lift, as specified by Standing Order No. 1, would require the recalculation or revision of several of these limits/limit curves. Refer to Attachment 1 of this Topical Report for a list and description EMRV dependent EOP limits and limit curves.

11.0 TORUS SHELL THICKNESS/CORROSION ALLOWANCES

MPR Report, MPR-953, presents the results of analyses performed to determine the margin in the thickness of the Oyster Creek torus shell. The torus shell thickness margin is determined in order to determine the corrosion allowance for the inside and outside surfaces of the torus shell.

As part of the modifications that resulted from the OCPUA, the original coatings on the inside and outside surfaces of the torus shell were removed. Inspections of the torus shell in 1983 revealed pitting corrosion on the inside surface of the shell below the water line. Repair criteria were established which defined an acceptable effective metal loss due to corrosion based on OCPUA stress analysis results.

Corroded areas not meeting the criteria were repaired by weld overlay. After installation of the torus structural modifications and weld repair, the inside surface of the torus shell was recoated with a protective coating.

In 1986, general corrosion on the outside surface of the torus shell was identified. The corrosion was categorized as a superficial uniform rusting with no evidence of rust scale. Metal loss was assessed as minimal. Subsequently, in 1987, the exterior surface of the torus was coated to abate any additional corrosion.

The scope of MPR-953, dated October, 1986, was to document the basis for margin in the torus shell thickness which may be considered as a corrosion allowance. This scope included:

1. Review of OCPUA torus stress analysis results to determine the minimum thickness for which the torus shell would meet ASME Code allowable stress values. This included formally documenting the analyses and corrosion allowance criteria used.

2. Review of the manufacturers' material certificates to determine actual plate thickness and strength.

3. Determination of underthickness tolerance permitted by the ASME Code.

4. Review of the 1983 GPUN torus inspection reports to determine the maximum depths of pitting corrosion which were not weld repaired.

Torus shell thickness margins were determined based on calculated stresses. Stress margins were determined for the general shell and for the shell near discontinuities such as the ring girder, saddle flange and hoop straps. Stress margin is defined as the difference between nominal shell thickness and the minimum required thickness. No credit was taken for actual material properties, actual plate thicknesses, and ASME Code permitted undertolerance. The maximum corrosion depths left in the torus shell following the 1983 inspections and repairs were determined.

As demonstrated by MPR-953, the calculated stress margin exceeds the maximum corrosion depth left in the torus shell for all regions of the torus. The difference between the stress margin and maximum corrosion depth can be considered as a corrosion allowance.