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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

MAR 25 1987

Docket No. 50-219
License No. DPR-16

GPU Nuclear Corporation
ATTN: Mr. P. B. Fiedler
Vice President and Director
Oyster Creek Nuclear Generating Station
P. O. Box 388
Forked River, New Jersey 08731

Gentlemen:

Subject: Inspection Report No. 50-219/86-38

This refers to the routine safety inspection by Messrs. W. Bateman, J. Wechselberger, W. Baunack, R. Borchardt, L. Doerflein, R. Fuhrmeister, R. Freudenberger and D. Florek from November 17, 1986 - January 16, 1987 at the Oyster Creek Nuclear Generating Station. The inspections were augmented to provide 16 hour a day coverage during plant startup activities and consisted of document reviews, interviews, and observations of activities as documented in the enclosed inspection report. The findings were discussed with you and other members of your staff at the conclusion of the inspection.

We acknowledge receipt of your November 7, 1986 response to the Violation cited in Inspection Report 86-21. The corrective action in your response did not specify commitments made by the Radiological Controls Director to the resident inspector. The commitments concerned revisions to the ALARA review procedure to ensure the radiological engineer and the assigned job supervisor thoroughly understand the radiological job aspects just prior to commencement of work activities, and to the radiological control survey procedure to ensure radiological control technicians properly evaluate radiological survey data in addition to performing the survey to obtain the radiological information for a work area. In addition, the direction you provided to the Group Radiological Control Shift Supervisor on proper supervisory inspection of the radiological and safety conditions in the drywell was to be delineated in a memorandum and later proceduralized. If your understanding of these additional commitments differs from the above description, please notify this office promptly. In addition, we acknowledge receipt of your December 3, 1986 response to the violation cited in Inspection Report 86-24 and your comments in addressing the improvements in timeliness of processing Preliminary Safety Concerns. Your corrective actions will be verified in a future NRC inspection.

The NRC inspection results indicated EQ splice problems existed but were corrected by replacing the potentially deficient splices. QC inspections were found to be inadequate but additional emphasis and training since identification of the problems appears to have addressed this problem. Other than the Unresolved Item stated above, the inspectors had no further questions.

15. Review of Periodic and Special Reports

Upon receipt, periodic and special reports submitted by the licensee pursuant to Technical Specification requirements were examined by the inspectors. This review included the following considerations: the report includes the information required to be reported to the NRC; planned corrective actions are adequate for resolution of identified problems; and the reported information is valid.

The following report was reviewed:

- Special Report 86-14 dated 10/9/86 involving non-functional fire barrier penetration seals not restored to functional status within 7 days from the time of discovery as required by Tech Spec paragraph 3.12.E.3. An hourly fire watch was established.

No concerns were identified.

16. Summary of Drywell Shell Thinning Problem

During this report period, the licensee reported to the NRC a problem involving thinning of an area of the drywell shell due to corrosion. The problem was identified during ultrasonic (UT) thickness measurements of the shell that were taken because of licensee suspicions that water leakage into the sand cushion located toward the bottom of the drywell and between the drywell and the surrounding concrete in the circumferential vessel segment from approximately the invert of the drywell vent line penetration down just over 3' could cause corrosion. The resolution of the technical significance of the problem involved the licensee and NRC licensing (NRR) with Regional and resident inspector support. The NRR staff was assigned the lead responsibility for evaluation of the licensee's submittal and the technical resolution of the identified drywell corrosion. It was concluded that the original code stress allowables would be met with the drywell plates locally reduced in the sand cushion area to 0.700". Based on UT examination (NRC Report No. 219/86-40) it is concluded that the drywell shell has been reduced by corrosion from its original thickness of 1.154" to an average thickness of about 0.850" with some local areas thinned to about 0.75". The best estimate corrosion rate, based on evaluation of samples of the drywell shell and adjacent sand, is about 0.020" per year. The most conservative estimate for the corrosion rate is approximately 0.050" per year. Thus, even assuming the most conservative rate of corrosion, there is sufficient margin between the current thickness of the drywell and the 0.70" acceptable minimum thickness to justify the next cycle of operation.

The key events by date are listed below:

- 11/20/86 GPUN notified the resident inspectors of a problem with thinning of the drywell shell. Only a small number of areas measured by UT. Thinnest reading reported as .832". Original plate thickness stated to be 1.154".
- 11/24/86 A telephone conference call involving the licensee, Region I, and NRR personnel was held to discuss the known particulars of the problem. GPUN stated it appeared that if drywell shell was greater than .8" thick, that it would be acceptable to operate at least one more operating cycle. They stated, however, further investigations were in progress. NRC stated they felt additional UT thickness measurements should be taken to better determine the extent of the problem. The licensee agreed.
- 11/28/86 Results of additional UT thickness readings indicated there were localized thin spots of approximately .4". Other areas were found with less thinning but more extensive in nature.
- 12/1/86 The licensee met with NRC licensing to discuss the status of the investigation. The licensee and NRC agreed additional information was required prior to plant restart.
- 12/6-7/86 Core samples removed from drywell shell. Sand samples taken. Inspection of the core samples verified the localized thin spots were not real but were the results of UT thickness measurement inaccuracies caused by imperfections in the steel plate used to fabricate the drywell shell. Other samples indicated the UT thickness measurements were accurate when an imperfection did not cause a premature reversal of the sound wave.
- 12/9/86 Excavations in the drywell concrete floor to permit additional thickness measurements of the shell were completed. However, one of the two excavations partially filled with water. This indicated the drywell concrete floor contained water. The water was analyzed and found to be reactor coolant quality. Because concrete is porous and the drywell floor is not sealed, it was suspected that the volume of concrete forming the floor had become somewhat of a concrete sponge. The source of the water was suspected to have been leakage onto the floor during both operating and outage cycles throughout the history of the plant. Concerns as to its deleterious affects on the drywell shell were allayed when UT thickness measurements of the drywell shell in the excavation below the water line indicated full plate thickness.

- 12/10/86 The licensee met with NRC licensing for a second time to discuss the status of the investigation.
- 12/11/86 Region based NRC inspector exited after reviewing UT measurement activities. (See NRC Inspection Report 86-40.)
- GPUN held briefing onsite to update key personnel as to status of thinning problem.
- Welding plugs into the holes in the drywell commenced.
- 12/19/86 The licensee met with NRC licensing for a third time. At this meeting the licensee presented conclusions from their investigations and a Safety Evaluation Report in accordance with the requirements of 10 CFR 50.59. Based on the information presented in this meeting, NRC licensing agreed the plant was safe to restart but requested the licensee not exceed 15% power until their review of the SER was complete.
- 12/22/86 Onsite inspectors reviewed completed drywell work packages. Several concerns were identified including inadequate traceability for the material used for the replacement plugs. Additionally, Region based and resident personnel reviewed SER and ASME Code requirements.
- 12/23/86 Drywell work package concerns resolved satisfactorily. A modified CMTR was received from the supplier of the plug material that corrected the material traceability problem.
- 12/24/86 All NRC reviews completed. NRC licensing notified GPUN by telephone call that it was acceptable to operate Oyster Creek for at least one more operating cycle. This was contingent, however, on (1) a mid-cycle shutdown and drywell entry to take UT thickness measurements of the drywell shell to determine if the rate of corrosion is consistent with the predicted, and (2) the submission by 6/30/87 of a corrective action plan to stop the corrosion.
- 12/29/86 NRC licensing issued a letter stating in writing what had been discussed verbally in the 12/24/86 telephone call with GPUN.

The particular details of the problem were discussed at length in various pieces of correspondence between GPUN and NRR. This report will defer to these documents for a detailed description of the problem. These documents and others listed below were reviewed by the NRC inspectors as part of the overall inspection effort to ensure this problem was properly resolved:

- NRR letter dated 12/12/86 documenting the 12/1/86 meeting with GPUN.
- NRR letter dated 1/5/87 documenting the 12/10/86 meeting with GPUN.
- NRR letter dated 1/14/87 documenting the 12/19/86 meeting with GPUN.
- GPUN letter dated 12/18/86 presenting the Safety Evaluation Review to NRR.
- NRR letter dated 12/29/86 documenting NRC's approval to operate through the end of Cycle 11.
- Interpretations of ASME Boiler Code, Cases 1272 N and 1272 N-S.
- NRC IE Information Notice No. 86-99, Degradation of Steel Containments
- GPUN Work Order No. A15A-51992, Drywell Steel Wall Evaluation
- GPUN BA328227, Drywell Steel Wall Evaluation
- CMTR for plug material: CMTR dated 12/8/86 from Spectrum Laboratories, Inc. to Meredith Corporation documenting chemical and physical properties on steel manufactured by Johnson Forge.
- QC Inspection Reports for UT thickness measurements, visual welding inspections, liquid penetrant testing of plugs, vacuum box leak testing of completed plug welds, and magnetic particle testing of plug welds.
- Original General Electric/Burns and Roe Specification S-2299-4, Design, Furnishing, Erection, and Testing of the Reactor Drywell and Suppression Chamber Containment Vessels
- GPUN MNCR No. 86-966
- ASME Section VIII 1962 Edition and 1983 Edition

In addition to reviewing the above documents, the inspectors toured the drywell and observed in process work activities. Welding records were reviewed including the Weld Procedure Specification, Filler Metal Withdrawal Authorizations, and welder qualification records. No discrepancies were identified.

In the licensee's letter dated 12/18/86 that submitted the SER to the NRC, it was stated their understanding of the corrosion mechanism was not complete. Based on calculations, however, it was determined sufficient structural strength exists to permit continued operation for at least Cycle 11. The licensee concluded this letter by stating,

"... we intend to maintain an intensive effort to:

- A. Eliminate the source of any future water incursions into the sand bed.
- B. Dry the moisture from the sand cushion and/or otherwise render corrosive attack minimal.
- C. Continue the metallurgical and chemical investigations to determine, if possible, the exact cause of the attack.
- D. Further assess longer term corrective actions that may be appropriate.
- E. Continue the UT shell thickness test program at future outages of opportunity including forced outages otherwise requiring entry during the next cycle."

The NRC response letter dated 12/29/86 required a mid-cycle shutdown by no later than 9/30/87 to ultrasonically inspect affected areas in the drywell shell to ensure corrosion rate assumptions are conservative and the submission of a corrective action plan by no later than 6/30/87. These licensee commitments and NRC requirements constitute an unresolved item pending their completion. (219/86-38-02)

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17. Lack of Rod Block Clamping Circuitry

The licensee made a 10 CFR 50.72 report concerning the lack of a clamping circuit in the average power range monitor (APRM) rod block system. The licensee determined this during the process of changing the rod block line slope as a result of a change to the Technical Specifications. The change allowed the clamp to increase from 106% to 108% power.

The significance of this determination is that the surveillance on the rod block circuitry did not ascertain the lack of the rod block circuitry. The licensee is reviewing other Technical Specification surveillances to determine the adequacy of each surveillance procedure. This review will be discussed in the licensee's LER on this problem. The inspector will review the licensee's LER.

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