U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-219/86-25

Docket No. 50-219

License No. DPR-16

Licensee: GPU Nuclear Corporation

Oyster Creek Nuclear Generating Station

P. O. Box 388

Forked River, NJ 08731

Facility Name: Oyster Creek

Inspection At: Forked River, New Jersey

Inspection Conducted: August 25-29, 1986

Inspector: C Petrone 9/11/86
C. Petrone, Lead Reactor Engineer — date

Approved by: Jon R. Johnson 9/12/86
J. Johnson, Chief — date
Operational Programs Section

Inspection Summary: Routine unannounced inspection by a region based inspector of refueling activities and a review of fuel cladding failures.

Results: No violations were identified.

DETAILS

1.0 Persons Contacted

Licensee

* P. B. Fiedler	Vice President and Director
W. Stewart	Manager Plant Operations
* S. Fuller	Operations QA Manager
R. Brown	Operations Control Manager
B. Pittman	Licensing Engineer
* M. Heller	Licensing Engineer
* G. Busch	Licensing Engineer
* J. R. Molnar	Core Manager
* D. Pietruski	GSS Operations

U.S. Nuclear Regulatory Commission

* W. Bateman	Senior Resident Inspector
J. Wechselberger	Resident Inspector

* Denotes those present at the exit meeting on August 29, 1986.

2.0 Refueling Activities

2.1 Areas Reviewed and Observations

The inspector reviewed the licensee's refueling activities to determine if they meet the requirements contained in Technical Specifications and approved implementing procedures. The inspector reviewed the documents listed in attachment 1; interviewed operations, training, quality assurance, and management personnel; and observed refueling activities in the control room and on the refueling floor. The inspector verified the following requirements were met.

- Continuous communication was being maintained between the control room and the refueling bridge during refueling operations;
- All assigned personnel were qualified;
- Hourly Source Range Monitor (SRM) readings were recorded in the shutdown log;
- Continuous monitoring of the SRMs was being accomplished during core alterations;
- Fuel status tag boards were updated following each fuel move;
- SRMs were verified operational prior to fuel movement;

- The refueling floor radiation monitors were operable;
- The weekly refueling interlock checks had been completed;
- The refueling bridge check off had been performed each shift;
- The refueling cavity seal was being monitored for leakage;
- The control rod valve lineup had been completed as required;
- All four SRMs were operable;
- Standby Liquid Control System (SBLC) was operable;
- Refueling Cavity water clarity was checked daily and logged;
- The reactor mode switch was locked in the refueling position;
- A licensed reactor operator was on duty in the control room;
- All control rods were inserted where required;
- Core Engineering personnel visually verified that refueling interlock jumpers had been correctly installed in the cable spreading room;
- The necessary prerequisites had been signed off in procedures 207.1.1 and 205.5;
- No more than two diagonally adjacent fuel assemblies were loaded in one cell (during loading to Black and White configuration);
- Quality Assurance periodically verified the status of the fuel status tag boards;
- Activities on the refueling bridge were directed by a licensed SRO and verified by a designated fuel move checker;
- The refueling cavity water was maintained at the proper level;
- Health Physics personnel continuously monitored refueling activities on the refueling floor; and,
- Plant conditions were being maintained as required by Technical Specifications.

The inspector witnessed control rod replacement and fuel movement activities on the refueling floor and in the control room during the day and evening shifts. All activities were performed in accordance with the approved procedures. Discussions with operations, core

engineering, quality assurance, and health physics (Radcon) personnel indicated they were knowledgeable of their responsibilities.

During observation of activities on of the refueling floor, the inspector noted that housekeeping was generally adequate. However, the inspector questioned the licensee's extensive use of clear plastic sheeting surrounding the refueling cavity. Clear plastic (or Plexiglas) sheets approximately 3' by 5' had been attached to the hand rails which surround the refueling cavity. Two strips of "RADCON" tape had been placed diagonally on the plexiglas sheets to form an "X" across each sheet. There was no other means to prevent pieces from entering the reactor cavity, if the clear plastic breaks. The inspector discussed these concerns with plant management who stated that the plastic had been installed to help control the spread of contamination from the refueling cavity to the surrounding refueling floor. They did, however, admit that there was a potential problem and agreed to add additional tape to the clear plastic to capture any broken or loose plastic pieces. The licensee began the application of additional tape prior to the exit meeting. This satisfied the inspector's concern.

2.2 Dropped Control Rod

Prior to this inspection, the licensee had inadvertently dropped a control rod from a position about ten feet above the reactor core top guide. The control rod blade became detached from the unlatching/grappling tool while the blade was being moved into a position over the core in preparation for installation of this new (replacement) control blade. Previously, all fuel had been removed from the reactor core to facilitate control rod blade replacement. The licensee subsequently removed the dropped rod from the core. The licensee's QC (ISI) inspectors verified that no damage had been done to the core. The control blade was, however, damaged. A new control blade was inserted in its place in the core.

When the (NRC) inspector arrived onsite for this inspection, he reviewed this problem with plant management and observed a portion of the post incident critique held by the licensee. The inspector noted that the cause of the dropped rod was not determined at that time; however, the licensee's management did decide not to use the unlatching/grappling tool for further rod movement until the cause of the malfunction was determined. This tool is normally used to unlatch the control rod blade from the control rod drive mechanism, as well as for lifting and moving the control rod blade. Alternate tools can be used for lifting and moving the control rod.

The inspector examined the damaged control rod blade and noted that the bottom ring of the velocity limiter had been bent up approximately ½ inch where it had struck the top grid of the core.

The inspector also reviewed the procedure 205.25, Uncoupling Control Rod Drives From Above the Reactor Core, the tool vendors technical manual, and the tool drawings. Based on this review, and discussions with the tool vendor's representative, the inspector noted that the procedure (205.25) did not contain the following:

- A caution to remind the operator that if the tool is not properly seated on the control rod, the grappling portion of the tool may not fully engage the lifting bail on the control rod. The blade can be inadvertently lifted by the unlatching actuator rather than the lifting grapple.

- The procedure prerequisites to check the tool for proper operation prior to use, including verification that the unlatching actuator closes prior to the lifting grapple actuator as described in the note on GE drawing 718E835 and that no water has accumulated in the air operated pistons to cause sluggish operation.

- A caution in step 5.4 to remind the operator that he should allow sufficient time for the lifting of grapple to fully close prior to lifting.

At the exit meeting the inspector discussed these clarification with the licensee management, who indicated that they would review these comments and incorporate them in their procedures if warranted. The completion of the licensee's review of the dropped control rod blade incident, and any corrective actions, is considered an open item (86-25-01) and will be reviewed during future inspections. The inspector notes that the licensee has committed not to use the unlatching/grappling tool for movement of control rod blades until the cause of the malfunction is identified and corrected.

2.3 Training

The inspector reviewed the training provided by the licensee to their staff prior to refueling. This included a four-hour course provided by the licensees training department. The inspector reviewed the Instructors Guide for the fuel handling and core parameters course and noted it appeared to cover appropriate material. The inspector also reviewed the qualification cards maintained for each operator by the operations department and verified that appropriate training had been signed off for each of the operators involved in the fuel handling. The inspector also questioned control room operations personnel, and reactor engineering personnel. They were knowledgeable of their responsibilities and refueling activities.

No discrepancies were identified.

3.0 Quality Assurance

The inspector reviewed the extent of the licensee's quality assurance and quality control involvement in refueling activities. The licensee's procedures require that QA periodically verify the status of fuel status tag boards, Kardex file, and refueling interlock jumpers. They are also required to independently perform a core load verification. QC receipt inspection is required to verify, prior to core reloading, that all new fuel had completed receipt inspection satisfactorily.

The (NRC) inspector reviewed the fuel status tag boards in the control room and the refueling floor, and noted that a QA inspector had reviewed and verified the information on the fuel status tag boards. The (NRC) inspector reviewed QA Monitoring Reports 8610903, 4, 5, and 6 and noted the activities monitored included fuel movement, CRD scram discharge volume surveillance, installation of jumpers, completion of prerequisites and precautions, and other refueling related activities.

Review of the licensee's schedule for QA coverage of refueling activities indicated that planned QA coverage of refueling activities included some night and weekend coverage.

Based on this review it appears that the licensee has established adequate ongoing QA/QC coverage of refueling activities.

4.0 Fuel Clad Failures

In Licensee Event Report (LER) No. 86-016, dated July 30, 1986, the licensee reported fuel clad failures. During fuel sipping operations while the reactor was in cold shutdown, the licensee identified forty seven fuel bundles with cladding failures. This type of fuel clad failure is normally in the form of small cracks or pinholes in the cladding which allow some leakage of fission products into the reactor coolant. This type of failure is not unusual and would not normally require that the reactor be shut down unless the offgas radiation levels exceeded Technical Specification limits. The plant operated with this condition for at least part of Cycle 10. The plant was in operation from November 1984 through April 12, 1986 when the plant was brought to a cold shutdown for a refueling outage. During Cycle 10 operation it was noted that the offgas radiation level continually increased throughout the cycle (from 50,100 uCi/sec to 224,000 uCi/sec) and the I-131/I-133 fission product ratio also increased (from .069 to .144). The Cycle 10 core load included GE and EXXON fuel. Fuel sipping operations identified that the fuel cladding failures occurred in the Exxon fuel.

The inspector discussed the progress of the licensee's investigation into the cause of the fuel cladding failures with core engineering personnel. At this time, they believe that the failures are due to some deficiency in the fuel since nearly all (45 out of 47) of the failures occurred in the same Exxon fuel batch. They believe the failure mechanism may be pellet/

clad interaction or defective cladding. Failure to follow the preconditioning recommendations may have also contributed to the fuel failures. However, the licensee has not completed their evaluation of the cause. Because this evaluation will take some time to complete, the licensee plans to reload and resume operation with the following changes:

1. All leaking fuel bundles have been removed, as well as any fuel bundle in the same control cell. Therefore, all fuel bundles subjected to the same control rod maneuvering would be removed and replaced. (Excessive control rod maneuvering can increase the probability of clad failures due to pellet/clad interaction). A total of eighty fuel bundles were removed and replaced with a combination of new and old fuel bundles. A new core reload analysis was performed by the fuel vendor (GE).

2. The licensee has purchased a new load line limit computer analysis from GE which will allow them to maneuver at high power by adjusting recirculation pump speed rather than by changing rod position. This will help reduce rod maneuvering and minimize pellet/clad interaction failures.

3. The licensee's core monitoring code, the Power Shape Monitoring System (PSMS) was used during Cycle 10 to monitor core performance, including the preconditioning envelope recommendations which are designed to prevent pellet/clad interaction failures. The licensee identified errors in the PSMS program which made it impossible to follow the preconditioning recommendations. The licensee reports these errors have been corrected.

4. The core engineering personnel have written a computer program to track and trend the weekly offgas reactivity levels and the reactor coolant fission product ratios. During Cycle 10 this information was recorded by the chemistry department but the possibility of fuel failures was not realized due to a lack of trending and evaluation. During Cycle 11 this new program will be used to aid in early identification of fuel failures.

No additional concerns were identified during this review, however the inspectors will continue to follow the licensee's investigation into the fuel failures. At the exit meeting the licensee's management committed to keep the NRC resident inspectors informed of the investigation results and to provide a copy of an initial evaluation report when it is completed sometime in September 1986.

5.0 Management Meetings

The inspector met with the licensee's management personnel at various times during the inspection and presented his findings at an exit meeting on August 29, 1986.

At no time during the inspection did the inspector provide written material to the licensee.

Attachment 1

Procedures Reviewed

- 205.7.1, Control Cell Reloading: To Black and White, Revision 9, 8.23/86.

- 205.5, Core Reloading (Refueling), Rev 14, 8/23/86.

- 205.25, Uncoupling Control Rod Drives From Above the Reactor Core, Rev 2, 6/17/84

- 205.0, Reactor Refueling, Rev 23, 8/1/86.

- 205.6, Fuel Shuffle (Refueling) Rev 8, 4/10/86.

- 119, Housekeeping, Rev 6, 6/25/82

- 119.3 Tool, Equipment and Material Accountability, Rev 4, 6/15/86