U. S. NUCLEAR REGULATORY COMMISSION
REGION I

OYSTER CREEK NUCLEAR GENERATING STATION

REPORT NO. 92-18

FACILITY DOCKET NO. 50-219

FACILITY LICENSE NO. DPR-16

LICENSEE: GPU Nuclear Corporation
P. O. Box 388
Forked River, New Jersey 08731

FACILITY: Oyster Creek Nuclear Generating Station

INSPECTION AT: Forked River, New Jersey

INSPECTION DATES: August 25 - 27, 1992

INSPECTORS: Samuel L. Hansell, Operations Engineer

Inspector: _____ 9/18/92
S. L. Hansell, Operations Engineer Date

Approved By: _____ 9/18/92
Richard J. Conte, Chief, BWR Section Date
Operations Branch,
Division of Reactor Safety

Inspection Summary: Inspection on August 25 to 27, 1992 (Report No. 50-219/92-18)

Areas Inspected: An announced safety inspection was conducted to review the facility's ability to respond to the recent reactor water level instrument safety concern. The scope of the inspection was two-fold. The first objective was to verify that the plant operators were aware of the potential water level indication errors caused by noncondensible gases. The second was to ensure that the Oyster Creek procedures, operator training, operator knowledge, and industry responses adequately addressed the NRC's concerns with reactor water level instrument problems.

Results: The inspector concluded overall that the operator training, operators' knowledge level, and the guidance in existing plant procedures were adequate to ensure the continued safe operation of the plant, in light of the most recent reactor water level instrument concerns. The Operation Manager's brief covered the important details of the reactor water level response to a plant depressurization.

The operators received a limited amount of dynamic simulator training because the facility does not currently have a site specific simulator. The limited amount of dynamic simulator training has had little affect on their overall preparedness to respond to reactor water level malfunctions/failures.

The facility's reactor water level instrumentation training lesson plan and reactor water level diagnostic operating procedure contained comprehensive detailed information.

There was one unresolved item pertaining to the plant response to GE SIL-470 (paragraph 6.2, No. 219/92-18-01). The plant did not address all of the applicable concerns related to reactor water level mismatches for cold reference leg instrumentation.

DETAILS

1.0 BACKGROUND

There are two types of reactor vessel water level indicators at Oyster Creek, Yarway (heated reference leg), and GEMAC (cold reference leg). The recent industry safety concern applies to the cold reference leg reactor water level instruments. The Yarway level indicators provide most safety system inputs, including Emergency Core Cooling System (ECCS) actuations. However, the GEMAC's are used for functions important to plant safety, including operator decision inputs for the Emergency Operating Procedures (EOPs).

The NRC has issued a Generic Letter, No. 92-04, and an Information Notice, No. 92-54, to address the noncondensible gas effect on cold reference leg reactor water level instruments. A postulated rapid plant depressurization could result in noncondensible gases coming out of solution in the reference leg. This could result in indicated reactor water level reading higher than actual vessel reactor water level. The NRC has determined that, in general, existing plant procedures, plant design and adequately trained operators can successfully address the reactor water level safety issue.

2.0 PERSONS CONTACTED

GPU Nuclear Corporation

* S. Levin, Director, Operations and Maintenance
* R. Brown, Manager Plant Operations
* P. Czaya, Licensing Manager
* B. Behrle, Technical Functions Site Director
* B. DeMerchant, Licensing Engineer
* M. Godnecht, Plant Engineer
* G. Cropper, Operations Training Manager
  A. Agarwal, Technical Functions/Controls Manager

The inspector also held discussions with several licensed operators during the inspection.

Nuclear Regulatory Commission

* S. Hansell, Operations Engineer
  D. Vito, Senior Resident Inspector
* J. Nakoski, Resident Inspector

* Denotes those present at exit meeting on August 27, 1992.

3.0 OPERATOR KNOWLEDGE

3.1 Scope of Inspection

The inspector interviewed a crew of licensed operators to determine their knowledge of reactor water level instrumentation operation, indication/symptoms of failures, applicable plant procedures, and adequacy of continuous training.

3.2 Findings

The operators were knowledgeable of the cold and hot reference leg reactor water level instrument operation specific to Oyster Creek. They knew which instruments provided inputs to automatic safety functions and the limitations of both instrument types. The operators understood how a rapid plant depressurization could affect the response and accuracy of the reactor water level instrumentation. The operators provided the correct response to questions about postulated instrument malfunctions, including a reference line flashing to steam.

The operators had a detailed knowledge of the Emergency Operating Procedures (EOPs) that applied to reactor water level instrument failures. Their definition of the EOP term, "If RPV water level CANNOT be determined," was consistent with the Boiling Water Reactor Owners Group (BWROG) definition. All operators knew how to ascertain if RPV water level could NOT be determined and how to flood the reactor vessel to maintain adequate core cooling. They were also familiar with the Yarway water level response to a plant depressurization. All personnel knew which level instruments were available for use if the Yarway level indicators failed.

The inspector observed the Operation Manager's shift brief for one operating crew about the phenomena of noncondensible gases coming out of solution and its effect on indicated reactor water level. The brief covered the recent industry safety concern and increased the operators' awareness if the postulated failure were to occur at Oyster Creek. The operators who did not attend the Operation Managers brief were provided the same information in writing.

3.3 Conclusions

The licensed operators demonstrated an adequate knowledge of the reactor water level instrument operation and related failures. The Operation Manager's brief covered the important details of the reactor water level response to a plant depressurization.

4.0 LICENSED OPERATOR TRAINING PROGRAM

4.1 Scope of Inspection

The inspector reviewed the licensed operator requalification (LOR) training material related to the reactor water level instrumentation operation and component failures. The review included the following areas: LOR lesson plans, simulator training and EOP training.

4.2 Findings

The inspector reviewed the reactor water level instrumentation training administered during the current LOR training program. The LOR continuing training program has provided reactor water level instrumentation classroom and simulator training this year. The training instructor's reactor water level instrument lesson plans were comprehensive and included detailed descriptions of normal instrument operation and associated failures. The existing lesson plan discussed the impact of a plant depressurization on the Yarway level indicators. The operators provided positive comments about the content and quality of the reactor water level instrument training.

The EOP training included simulator scenarios related to the loss/malfunction of reactor water level instrumentation at the Nine Mile Point 1 simulator. In addition, the operators receive EOP classroom training during each two year training period.

4.3 Conclusions

The information provided in the reactor water level instrument lesson plan was noteworthy. The operators received a limited amount of dynamic simulator training because the facility does not currently have a site specific simulator. The limited amount of dynamic simulator training has had little affect on their overall preparedness to respond to reactor water level malfunctions/failures.

5.0 PLANT PROCEDURES

5.1 Scope of Inspection

The inspector reviewed the facility normal operating and emergency operating procedures relative to the reactor water level concerns. The procedures were reviewed to determine if they provided sufficient guidance to the plant operators for the postulated reactor water level instrument malfunction. The inspector reviewed all or parts of the procedures listed in Attachment 1.

5.2 Findings

The inspector reviewed station procedure, 2000-OPS-3024.24, "Reactor Pressure Vessel Level Instruments Diagnostic and Restoration Actions." The procedure provides detailed guidance to address reactor water level instrument malfunctions prior to entering the EOPs. The procedure coverage was comprehensive for specific water level instrument failures. For example, the procedure described the effect and action for: one or more level indication is erratic or inconsistent with other indicators, elevated drywell temperature, reference leg flashing (rapid depressurization below 500 psig), loss of power, and instrument line break.

The inspector reviewed the plant EOPs related to the noncondensible gas effect on reactor water level indication. The facility's RPV Flooding and RPV Emergency Depressurization EOPs do not deviate from the BWROG's written guidance. The EOPs provide adequate direction for the operators to maintain adequate core cooling if reactor water level is undetermined. The procedures caution the operators of the possible loss of the Yarway level indicators on a plant depressurization less than 500 psig.

5.3 Conclusions

The reactor vessel level diagnostic procedure was detailed and comprehensive for reactor water level instrument failures. The plant EOPs provide adequate guidance to mitigate the postulated reactor water level instrument failure.

6.0 PLANT RESPONSE TO INDUSTRY INFORMATION

6.1 Scope

The inspector reviewed the facility's response to the past and present reactor water level information from the BWROG/General Electric. The review also focused on a site specific problem: the reason for the "B" GEMAC reactor water level indicator reading 5 to 10 inches higher than the "A" GEMAC and Yarway indicators.

6.2 Findings

General Electric (GE) issued an Information Letter, SIL No. 470, on September 16, 1988. The SIL identified recommendations to correct "Reactor Water Level Mismatches." The recommendations from GE included the following items: (1) confirm that instrument lines have a downward slope (from the reference leg condensing chamber back to the reactor vessel tap) of at least 1/2-inch per foot; (2) confirm that structural supports do not interfere with condensing chamber movement, of up to three inches, as the RPV expands during heatup; (3) confirm that there are no points in the steam leg to the condensing chamber that are lower than the leg's RPV nozzle under both hot and cold conditions; a low point can block return flow of water from the chamber to the RPV and cause a false (nonconservative) high water level indication.

The plant contractor reviewed SIL-470 and provided their response in GPU Nuclear Memorandum No 5350-89-418, dated September 1, 1989. The contractor response stated that the water level mismatch items "apply to the feedwater control instrument lines only. Since the feedwater control system has been functioning well and protection systems have not been jeopardized, we cannot justify inspection on these items, based on the fact that this would require significant ManRem exposure and expenditures."

Operations management reviewed the engineering response to SIL-470 and took exception to the importance placed on the cold reference leg level instruments. After additional engineering review of the "B" GEMAC level disparity the operations personnel concurred with the final closure of SIL-470 on December 7, 1990.

The additional engineering evaluation for the cold reference leg level concerns was noted in GPU Nuclear Memorandum No. 5350-90-433, dated November 28, 1990. The plant engineering group reviewed system drawings and documents and conducted a field walkdown to address the operations management concerns. The conclusions from the evaluations were: (1) the slope of the instrument lines could not be verified due to accessibility problems; however no gross errors were evident; (2) the insulation was replaced on the "A" and "B" GEMAC connecting line from the RPV to the constant level chambers; the level discrepancy still persisted so insulation was excluded as a probable cause; (3) thermal expansion effects could not be verified due to inaccessibility of the drywell during plant operation; however, based on engineering judgement this was not considered to be the cause for the disparity. The memorandum concluded that the GEMAC level indicator disparity was due to the relative difference in the location of the reference leg nozzles to the corresponding main steam nozzles. The "B" GEMAC reference leg is located approximately 11 inches from the center of its associated main steam nozzle compared to the "A" GEMAC reference leg distance of 63 inches from the center of its associated main steam nozzle.

The inspector reviewed the engineering observations from the drywell walkdown of the GEMAC reference legs and condensing chambers conducted on June 25, 1989. The personnel made the following significant observations: (1) the slopes of the RPV connecting line and horizontal part of the reference leg were not apparent; (2) it appeared, that considering the 1.5 inches of RPV thermal expansion, that the connecting line would slope away from the RPV when the vessel is fully heated.

The inspector noted that the facility response to GE SIL-470, and Supplement 1, did not address all of the possible concerns related to reactor water level cold reference leg instrumentation. Specifically, the facility did not measure the exact slope from the reference leg steam condensing chamber to the reactor vessel penetration or take into account the effect of RPV expansion on the reference leg slope during plant heatup. The questionable reference leg slope and RPV heatup concerns were noted in a system engineer walkdown. Even though plant personnel continued to question the "B" GEMAC high water level indication, the plant Vendor Document Control Group closed SIL-470 on December 7, 1990.

The facility plans to measure the cold reference leg slope during the next refueling outage. This item is unresolved pending completion of licensee action and review by NRC staff on a future inspection (219/92-18-01).

The facility's BWROG contact for the reference leg safety issue was very knowledgeable about the subject and has remained directly involved in its solution. The facility has analyzed the BWROG information to determine the plant specific short term and long term corrective actions. Both the site and corporate engineering groups are working together to resolve the safety issue.

6.3 Conclusions

The facility's response to reactor water level concerns contained in the General Electric Information Letter, SIL No. 470, dated September 16, 1988, was not thorough. Specifically, the facility did not document the exact slope of the cold reference leg reactor water level instrumentation or account for the effect of RPV heatup on the "B" GEMAC level indication, even though plant personnel questioned the water level instrument accuracy. The facility's contact is very knowledgeable and in close constant communication with the owners group on the reference leg safety issue.

7.0 UNRESOLVED ITEMS

Unresolved items are matters about which more information is required in order to determine whether they are acceptable, an item of noncompliance or a deviation. Unresolved items disclosed during the inspection are discussed in Section 6.2.

8.0 EXIT MEETING

The inspector met with licensee representatives (denoted in section 2.0) at the conclusion of the inspection on August 27, 1992. The inspector summarized the scope and findings of the inspection.

Attachment: Documents Reviewed

ATTACHMENT 1

DOCUMENTS REVIEWED

Procedure Number	Title	Revision
EMG-3200.08	"RPV Flooding"	rev. 2
EMG-3200.04	"RPV Emergency Depressurization"	rev. 3
EMG-3200.01	"RPV Control"	rev. 3
OC PSTG	"PSTG for the Symptom Based EOPs"	rev. 0
2000-OPS-3024.24	"Rx Water Vessel Level Diagnostic"	rev. 10
LOR-828.55	"Training Lesson Plan for Reactor Water Level Instrumentation"	rev. 1
LOR-845.03	"Training Lesson Plan for RPV Control"	rev. 2
LOR-845.13	"Training Lesson Plan for Reactor Water Level Restoration"	rev. 2
LOR-845.18	"Training Lesson Plan for RPV Flooding"	rev. 1
LOR-845.18	"Training Lesson Plan for RPV Emergency Depressurization"	rev. 2

Oyster Creek Technical Specifications