GPU NUCLEAR

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December 17, 1997
6730-97-2282

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington DC 20555

Dear Sir:

Subject: Oyster Creek Nuclear Generating Station
Docket No. 50-219
Inspection Report 50-219/97-06
Reply to Notices of Violation

By letter dated November 17, 1997, the NRC docketed the results of a Pre-Decisional Enforcement Conference held with GPU Nuclear, Inc. on September 30, 1997. That letter contained six notices of violation. The attachment to this letter provides the requisite reply.

If any additional information or assistance is required, please contact Mr. John Rogers of my staff at 609.971.4893.

Very truly yours,

for Michael B. Roche
Vice President and Director
Oyster Creek

MBR/JJR
cc: Administrator, Region I
NRC Project Manager
Senior Resident Inspector

IE01

Attachment I

Area 1, Violations Related to Design Control:

"The Code of Federal Regulations, 10 CFR 50, Appendix B, Criterion III, requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies, are correctly translated into specifications, drawings, procedures, and instructions. Design control measures shall be applied to compatibility of materials."

Notice of Violation 1A:

"Contrary to the above, in October 1993, the vendor specification for the emergency service water (ESW) pump bowl assemblies was changed from cast iron to stainless steel without adequately applying design control measures for use in considering the compatibility of materials specified for other ESW pump components. As a result, in November 1993, the "C" and "D" ESW pumps were installed with cast iron top case flanges and stainless steel bowl assemblies, and the materials in these components were incompatible in that they created the opportunity for accelerated galvanic corrosion. Subsequently, the "C" ESW pump was found to be inoperable on July 31, 1997, because of a broken coupling (top case flange) between the pump bowl and the discharge head."

GPUN Reply to Violation 1A:

GPUN acknowledges that a violation occurred and offers the following additional information:

Cast iron was used in the original design of the Emergency Service Water Pumps. In 1985, the vendor started to recommend material changes to the design of the pump which replaced the cast iron column pipe with stainless steel. GPUN approved the recommendations. This created an opportunity for accelerated galvanic corrosion. In 1992, the vendor rebuilt the pump which was eventually installed in the 'C' location to the vendor's approved Bill of Materials which had cast iron top case and head flanges.

In 1993, the vendor rebuilt three pumps under 10 CFR 50 and 10 CFR 21 programs. These pumps were to be upgraded to all stainless steel. Due to a request for expediting, the vendor supplied one of the three pumps with a cast iron head flange (supplied in error by GPUN) and reused the existing top case flange (without advising GPUN). This pump was eventually placed into the 'D' location. During this time period, a GPUN Engineering Evaluation was performed for the stainless steel bowl assemblies, but did not evaluate the head flange or top case assemblies. Stainless steel parts were delivered to the warehouse as spares. Existing cast iron parts were scheduled to be scrapped as the stainless steel parts arrived.

The "C" and "D" pumps were replaced with the rebuilt stainless steel pumps with cast iron flanges. In 1995 GPUN verified that no inappropriate cast iron ESW pump spare parts were in the warehouse.

On July 31, 1997, the "C" ESW pump failed during a routine surveillance test.

Root Cause:

The immediate cause of the failure was inadequate design and configuration control by both the vendor and GPUN. This allowed a material incompatibility to occur with the resultant galvanic corrosion accelerated by the galvanic cell.

The root cause of this event was a lack of knowledge and understanding on the part of the GPUN reviewer on the impact of material compatibility. A contributory cause was the lack of procedural guidance regarding material compatibility.

Corrective Actions:

Short Term
The three remaining pumps were inspected for a common mode problem. The 'D' ESW pump was found to have a cast iron top case flange. Both the 'C' and 'D' pumps were declared inoperable. They were replaced with pumps containing stainless steel parts. The 'A' and 'B' pumps were verified to contain only stainless steel parts. The warehouse was searched and no unacceptable ESW parts were found.

Long Term
The vendor was informed of the compatibility concern and was requested to expedite his investigation and corrective action processes. The vendor issued a 10 CFR 21 report. The Oyster Creek modification and alternative replacement procedures were upgraded to include material compatibility considerations. A new engineering design change evaluation for the stainless steel ESW pumps was issued.

Engineering memorandums which had directed the warehouse to dispose of material since 1985 will be identified and reviewed. Action will be taken to ensure proper implementation. Training will be provided to appropriate engineering personnel. These actions are presently projected for completion by the end of December 1997.

Date When Full Compliance was Achieved:

Full compliance was achieved in August 1997 when the two ESW pumps were replaced with pumps containing compatible parts.

Notice of Violation 1B:

"Contrary to the above, in April 1989, the licensee failed to establish adequate measures to assure that the design basis for reactor water cleanup (RWCU) system inlet isolation valve V-16-2 was correctly translated into specifications, drawings, procedures, and instructions. Specifically, in April 1989, the licensee modified the RWCU system procedures such that operators periodically opened V-16-2 at full reactor pressure (1020 psig) in order to fill and pressurize the RWCU system. However, the design input of 125 psid differential pressure used in the design basis calculations that determined the capabilities of V-16-2 failed to consider that V-16-2 might be required to close against full reactor pressure. Therefore, there was no assurance that V-16-2 would be able to close to perform its required isolation function against full reactor pressure."

GPUN Reply to Violation 1B:

GPUN acknowledges that a violation occurred and offers the following additional information:

In 1984, V-16-2 was replaced with a valve designed for 1125 psid. In November 1988, the system was modified to place a one inch line downstream of V-16-2 (a six inch valve). The operating procedure was then revised to allow for filling and pressurizing at power through V-16-2. Valve thrust requirements at this time were based on Torrey Pines calculations which used the design pressure of the valve as the differential pressure. In February 1992, the valve differential pressure calculation was incorrectly changed based on the assumption that the valve was not opened at elevated reactor pressures. In March 1997, the design input omission was self identified during expert panel review while establishing relative risk ranking for the interim Periodic Verification Valve Test Program.

Root Cause:

The immediate cause of the violation was that an incorrect design input was used in the design basis calculation and an inadequate design verification was performed. The root cause of the occurrence was that there was a lack of thoroughness on the part of the preparers and reviewers. Additionally, no formal training was given to emphasize the need of the preparer and design verifier to assure calculation inputs were correct.

Corrective Action:

<u>Immediate</u>
Administrative controls were put in place to prevent the opening of V-16-2. The operating procedure for the RWCU system was revised to allow for filling and pressurizing with a parallel valve (V-16-14).

Short Term
In March 1997, the existing design Δp calculations for GL 89-10 were reviewed for any similar occurrences. Two drywell spray and two torus cooling valves were identified which could have been operated differently than the GL 89-10 assumptions. The EOPs did not preclude the operators from cycling the valves with the Containment Spray pumps running. It was subsequently concluded that the valves were operable.

Training emphasizing the need for the preparer and the design verifier to assure that calculation inputs are correct was given to the appropriate personnel.

Long Term
A GL 89-10 thrust calculation for V-16-2 was completed to account for a high energy line break. In September 1997, the valve electrical circuitry was modified and procedures revised to allow operation at power. The differential pressure calculation for all GL 89-10 valves is being revised to enhance our ability to use the performance prediction model. Design inputs were subject to multidiscipline review. An update to the GL 89-10 Supplement 3 response was submitted to the NRC on November 5, 1997.

Date When Full Compliance was Achieved:

Full compliance was achieved March 12,1997 when the administrative controls were put in place to prevent the opening of V-16-2.

Notice of Violation 1C:

"Contrary to the above, in 1994, the licensee failed to take adequate corrective measures to assure that specifications for the 4160 volt vital bus degraded voltage relay (DVR) setpoints were adequate to ensure that the onsite distribution system, was capable of providing acceptable voltage under worst case station electric load and grid voltages as specified in the Final Safety Analysis Report (FSAR), Sections 8.3.1.2.a and 8.2.2.g. Specifically, the degraded grid analysis, performed in 1994, failed to consider that the startup transformer voltage regulators could lower bus voltage. The analysis did not consider the design of the voltage regulators, specifically the regulator response time and setpoints, in selection of the DVR setpoints. As a result, on August 1, 1997, when the output of the Oyster Creek unit was lost due to a manual reactor scram, the startup transformer voltage regulators failed to supply sufficient voltage to the vital busses to preclude an undervoltage (UV) condition. This UV condition lasted for greater than 10 seconds which caused the DVRs to trip (and not reset) which de-energized the vital buses and started the emergency diesel generators contrary to the design bases."

GPUN Reply to Violation 1C:

GPUN acknowledges that a violation occurred and offers the following additional information.

The separation of the 4160v vital buses from the preferred offsite power source occurred due to the actuation of the DVR sensors and sustained undervoltage condition for 10 ± 1 seconds. The relays operated as designed to protect the plant's electrical distribution system, however, the separation occurred above the lower analyzed voltage limits for the off site power source.

Root Causes:

The 1994 degraded grid analysis utilized incorrect design input assumptions regarding the control and operation of the Induction Regulators. The fact that the Induction Regulators could lower bus voltage was not considered. The Design Verification did not identify this oversight.

Additionally, there was a lack of thoroughness on the part of the preparers and reviewers. No formal training was given to emphasize the need of the preparer and design verifier to assure calculation inputs were correct. Finally, management expectations were not fully communicated.

Corrective Actions:

Prior to Restart
A voltage band was established to ensure that the existing degraded grid design bases were satisfied, accounting for the Induction Regulators. The switchyard tour frequency was increased from weekly to daily. The operator logs were revised to identify the acceptable voltage regulator bands. Future operability determinations for the Startup Transformers will include the Induction Regulators. The event was reviewed with the licensed operators.

Ongoing Corrective Actions
The degraded grid analysis for Oyster Creek is being reviewed by an independent industry expert to ensure that the methods of the analysis are consistent with the regulations and industry standards, and that the analytical assumptions are valid. This review is presently projected to complete by the end of December 1997.

The degraded grid analysis for Oyster Creek will be updated to include the Induction Regulators, any issues identified by the independent consultant, and further benchmarking against the actual plant response. The design inputs will be reviewed by a multidisciplinary panel. New degraded grid voltage sensing relays which are not susceptible to harmonics are being evaluated.

These actions are presently scheduled for completion prior to restart from the 17R refueling outage.

In recognition that the root cause of incorrect design input assumptions could be widespread and affect other calculations performed by GPUN, a one time review of calculations on key parameters performed by GPUN will be conducted. The review project commenced in November 1997 with the distribution of the identified calculations to the responsible engineering sections. Phase I will complete in June 1998 with a multidiscipline verification panel review of the design input adequacy/thoroughness of these calculations. At that time, a decision will be made concerning which (if any) calculations will receive a more in-depth review by verification teams. Finally, training was completed on the calculation process/procedure to ensure the ongoing accuracy of calculation inputs.

Date When Full Compliance Was Achieved:

Full compliance was achieved prior to restart when the voltage band for the Induction Regulators was established and the operator logs revised to identify acceptable readings.

Area 2, Violation Related to Inoperable CRD Pumps:

Notice of Violation 2

"Oyster Creek Technical Specifications 3.4.D.1, requires that the control rod drive (CRD) hydraulic system shall be operable when the reactor water temperature is above 212 degrees F.

"Contrary to the above, for a substantial period of time prior to August 1, 1997, with reactor water temperature above 212 degrees F, both CRD pumps were inoperable in that both CRD pumps tripped and could not be restarted remotely when they attempted to load onto the vital buses. The anti-pumping feature of the CRD pump breakers prevented the breakers from closing after a trip signal with a start signal continuously supplied. The CRD pumps are designed to automatically load onto the vital busses following a loss of offsite power."

GPUN Reply To Violation 2

GPUN acknowledges that a violation occurred and offers the following additional information:

During the August 1, 1997 event, both CRD pumps failed to load onto the vital buses. Both the CRD pump start and undervoltage trip signals were concurrently present. This caused the breaker to trip and lockout due to the anti-pumping feature in the breaker logic.

The last ten years of operating history were reviewed. No similar occurrence when both CRD pumps failed to start was identified. Prior to this event, a vital bus was lost and re-energized by a diesel with the CRD pump receiving an autostart signal a total of five times. In four out of the five cases, the CRD pump started.

Root Cause

The root cause of this event was a lack of understanding of the original plant design for the CRD breaker logic. This lack of understanding led to an inadequate testing of the breaker and its control logic.

Corrective Actions:

Short Term
Site personnel started a pump locally at the breaker.

Prior to Restart
The CRD pump breakers and UV devices were successfully tested. The pump start logic was modified to require a 60 second delay for all diesel loading sequences. The timer modification was successfully tested. The remaining DG loading circuits were reviewed. No additional automatic starting problems existed.

Long Term
The CRD circuitry was evaluated under the methodologies of GL 96-01. The evaluation correctly identified that the immediate start circuit had not been tested. No other problems were identified. The remainder of the GL 96-01 circuit reviews are presently projected for completion by the end of December 1997.

Date When Full Compliance Was Achieved:

Full compliance was achieved on August 3, 1997 when the CRD pump was manually started.

Area 3, Violations Related to Inadequate Corrective Actions:

"The Code of Federal Regulations, 10 CFR 50, Appendix B, Criterion XVI (Corrective Action), requires that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition.

Notice of Violation 3A:

"Contrary to the above, between January 22, 1997, and July 9, 1997, the licensee failed to take timely and effective corrective action to preclude repetition of a significant condition adverse to quality that resulted in both trains of the Standby Gas Treatment (SBGT) System being inoperable.

"Specifically, the licensee failed to ensure that technicians assigned to calibrate the reactor building (RB) ventilation exhaust radiation monitors on July 9, 1997, had received remedial logarithmic scale training. Training should have been provided as corrective action for a previous event on January 22, 1997, which resulted in miscalibration of the RB ventilation exhaust radiation monitors. However, all of the technicians that calibrated the radiation monitors on July 9, 1997, had not received the training and the technicians' supervisor failed to ensure that the technicians were properly trained. As a result, the RB ventilation exhaust radiation monitor setpoints were set non-conservatively high which would have delayed initiation of the SBGT System."

GPUN Reply to Violation 3A:

GPUN acknowledges that a violation occurred and offers the following additional information:

Following the January 22, 1997, occurrence, the corrective actions focused on Human Performance (the meter was misread). It was determined at that time that administrative controls or engineering changes were not necessary.

Following the July 9, 1997, occurrence, the corrective actions focused on administrative controls and engineering changes. The corrective actions were also expanded to other instrumentation involving logarithmic scales.

Root Cause:

The immediate cause of both occurrences was initially determined to be lack of both proper self checking and proper peer checking. It was subsequently determined that Instrument & Control Technicians experienced difficulty reading logarithmic scale instruments as evidenced by initial training sessions, and the instrument set point was not at a discrete marking on meter face resulting in a human factors issue. Also, the technicians were not trained on the new surveillance procedure prior to its implementation. Additionally, the technicians assigned to the task had not all received the logarithmic scale training. Finally, management failed to implement corrective actions in a timely fashion.

Corrective Actions:

Refresher training was provided to all Instrument and Control personnel on reading logarithmic scales, self-checking and peer checking practices. The setpoints were changed to a discrete marking on the meter face. The setpoints on all logarithmic scale instruments were reviewed for similar conditions. Surveillance procedures were revised to address human factor concerns as appropriate. Instrument & Control technicians and supervisors were given additional training on conducting pre-job briefings. Finally, the monitoring of corrective action tracking has been enhanced.

Date When Full Compliance Was Achieved:

Full compliance was achieved on September 23, 1997, when the refresher training for the Instrument and Control Technicians was completed.

Notice of Violation 3B:

"Contrary to the above, between September 13, 1996, and August 3, 1997, the licensee failed to take effective corrective action to preclude repetition of a significant condition adverse to quality that removed the low suction pressure protection feature from the Shutdown Cooling (SDC) pumps, and resulted in inadvertent SDC pump trips. The SDC pump trips could have resulted in a loss of SDC. Specifically, the licensee failed to assure that corrective actions to revise procedures and provide training were adequate to ensure that the suction pressure switches were not isolated during SDC pump operation following similar events on September 13, 1996, and April 24, 1997. On April 24, 1997, and August 3, 1997, a shutdown cooling pump inadvertently tripped because the suction pressure switches were isolated."

GPUN Reply to Violation 3B:

GPUN acknowledges that a violation occurred, and offers the following additional information:

For the September 13, 1996, discovery (no pump trip involved), all of the instrument root isolation valves were found closed while lining up system in preparation for startup. Several additional inconsistencies were identified with the System Operating Procedure. A revision to the System Operating Procedure was initiated.

For the April 24, 1997, occurrence (pump trip involved), the operators intentionally left all the instrument root isolation valves closed waiting for system flow to stabilize. Additionally, the operators failed to communicate this decision (valve position) to the oncoming shift. The word selection in this revision led to procedural misinterpretation. A second revision to the System Operating Procedure was initiated.

For the August 3, 1997, occurrence (pump trip involved), all of the instrument root isolation valves were found closed. It was identified that the valves were left closed following shutdown of the system using the revision of the System Operating Procedure that had been identified as deficient following the September 1996 discovery. Upon discovering these valves closed, the inconsistency between the procedure revisions was identified and the valves were appropriately positioned (opened) in accordance with the current revision (initiated after the September 1996 discovery) of the System Operating Procedure.

Root Cause:

The immediate cause of the pump trips was that the actual valve lineup was consistent with that required by the old procedure revision, but it was different from that required in the new procedure revision.

It was further determined that the procedural revisions were examples of Operator Work Arounds. Reliance on operators to properly manipulate valves was inappropriate to compensate for system design deficiencies. Additionally, the change management process was found to be weak. The new procedure revision did not cause the valves to be repositioned to reflect the new requirements.

Corrective Actions:

Interim Corrective Actions
The System Operating Procedure was revised to include specific valve lineups when starting up or securing the SDC System. This event was reviewed with all Operations Department personnel. Existing Operator Work Arounds were evaluated for similar situations and engineering solutions are being pursued, as appropriate. The monitoring of corrective action tracking has been enhanced.

Long Term Actions
Appropriate personnel are evaluating potential engineering alternates to eliminate the necessity for valve manipulations. The Procedure Control Process is being revised to include a "flag" for identifying any procedure changes that require valve lineups.

Date When Full Compliance Was Achieved:

Full compliance was achieved on May 25, 1997, when the operating procedure was appropriately revised.