

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

DOCKET/REPORT NOS. 50-219/94-01

LICENSE NO. DPR-16

LICENSEE: GPU Nuclear Corporation
1 Upper Pond Road
Parsippany, New Jersey 07054

FACILITY NAME: Oyster Creek Nuclear Generating Station

INSPECTION AT: Forked River, New Jersey

INSPECTION DATES: January 3-7, 1994 and January 18, 1994

INSPECTORS: Aniello L. Della Greca 2/10/94
Aniello Della Greca, Sr. Reactor Engineer
Electrical Section, EB, DRS Date

Leanne Kay 10 Feb 94
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APPROVED BY: William H. Ruland 2/9/94
William H. Ruland, Chief
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Areas Inspected: Routine announced inspection by regional personnel to review the status of previously identified open items and to determine the adequacy of the licensee's actions to resolve these issues.

Results: The corrective actions taken by the licensee to address three issues were found to be generally acceptable and the items are closed. A fourth issue was reviewed, but left open because the corrective actions were still incomplete. The inspectors also found the timeliness of GPUN's actions to address two areas of concern to be less than adequate. In the case of the ADS system, a concern regarding breaker-fuse coordination and the system capability to meet the single failure criterion was not totally resolved until the current inspection. Similarly, a concern raised by a GPUN calculation regarding the adequacy of the voltage at certain motor control centers, under degraded grid voltage conditions, did not receive the required attention for more than a year. The inspectors' review of the latter issue resulted in an unresolved item.

The inspectors found GPUN's programs to evaluate and close internal audit findings and review of Information Notices for applicability to be generally good.

DETAILS

1.0 PURPOSE OF INSPECTION

The purpose of the inspection was to review the status of several issues identified previously and to determine the adequacy of the licensee's corrective actions in resolving each issue. The items reviewed were identified in June 1992, during the NRC functional inspection of the Oyster Creek electrical distribution system.

2.0 STATUS OF PREVIOUSLY IDENTIFIED ITEMS

2.1 (Open) Violation No. 50-219/92-80-01 pertaining to the lack of functional testing of safety-related components

The NRC found that no program had been established to ensure that the battery main breakers, the static battery chargers, the rotary battery chargers, and the inverters would perform satisfactorily in service. The inspection team also found that no written test procedures had been prepared to test these components.

In their letter of August 13, 1992, General Public Utilities Nuclear Corporation (GPUN) concurred with the violation and stated that: (1) they had issued preventive maintenance requests to implement vendor and engineering recommendations to test the battery main breakers; (2) they had revised the preventive maintenance for the rotary inverter; and (3) engineering tasks had been assigned to develop detailed test procedures for the inverters, static battery chargers, and rotary battery chargers.

During the subject inspections, the NRC reviewed the status of the corrective actions identified by GPUN and determined that the battery main breakers had been functionally tested and that the preventive maintenance revisions for the rotary inverters had been performed during the last refueling outage. The review of the breaker test results, of the inverter maintenance program revisions, and of the maintenance results identified no items of concern. The inspectors also found that, to establish trip setting for the battery main breakers, GPUN had developed Calculation No. C-1302-735-5350-008. This calculation proposed a revision of the main breaker trip settings, on a short term basis, and the replacement of the tripping elements, on the long term basis. The trip settings had been revised.

Regarding the test procedures for the inverters, static battery chargers, and rotary battery chargers, GPUN indicated that they were under development and that they would be completed in time for implementation during the next refueling outage, as per schedule. This item remains open pending completion and implementation of these procedures.

2.2 (Closed) Unresolved Item No. 50-219/92-80-08 regarding allowable diesel generator battery hydrogen concentration levels during normal operation

The electrical distribution system functional inspection (EDSFI) team raised a concern regarding the potential for hydrogen concentration build up in the battery compartments of the emergency diesel generators (EDGs), during normal operation. The team had found that each EDG was equipped with eight battery cells enclosed in two boxed compartment. Although 1.5 in. x 2.0 in. openings were provided on the side of the battery compartments, no top vents or forced ventilation had been included. In addition, no devices were installed to measure or monitor hydrogen generation.

To address the inspectors' concerns and determine the volume of hydrogen gas generated by the battery during normal operations, a hydrogen detector was placed inside each battery box through each side opening and the hydrogen measured while the battery was operating at 127 V float voltage. No hydrogen was detected. The results of GPUN's review and testing were included in Engineering Evaluation No. 228-92.

Based on review of the above engineering evaluation and associated test results, the inspectors concluded that the existing battery configuration was acceptable. This item is closed.

2.3 (Closed) Unresolved Item No. 50-219/92-80-10 pertaining to the adequacy of the minimum specified EDG battery voltage

Licensee Event Report (LER) No. 89-019 addressed a failure of a diesel generator to start during a surveillance test in the reduced voltage slow roll mode. The failure was attributed to latent heat expansion of the engine from a previous start resulting in increased friction. The resistors used to reduce voltage to the starters to slow roll the engine, during surveillance, are bypassed during an emergency fast start. However, reduced voltage to the starters could also result from battery degradation. Therefore, the team asked GPUN whether an analysis was available addressing the capability of the engine to fast start at the minimum battery voltage allowed by the Technical Specifications, particularly if the engine was hot from a previous start.

In response to the NRC concern, GPUN prepared an analysis, dated March 25, 1993, which evaluated starter voltage requirements and battery bank capabilities. The NRC reviewed this analysis and determined that GPUN used vendor-supplied performance curves and test data obtained during engine and battery surveillance tests to conclude that adequate voltage would be available to the starters at the minimum allowable battery voltage. In particular, the analysis calculated that, with a minimum no-load battery voltage of 106 V, the voltage at the starters would not drop below 65 V with maximum engine starting inrush current. The starter voltage was considered to be more than sufficient to roll and start the engine, based on test data indicating the minimum required starting voltage to be approximately 35 V. The minimum terminal voltage (106 V) was based on a battery operating voltage at the alarm setpoint decreased by the concurrent loss of the associated battery charger. Based on the above review, this item is closed.

2.4 (Closed) Unresolved Item No. 50-219/92-80-11 regarding adequacy of coordination between breakers and fuses used in the automatic depressurization system

The Oyster Creek automatic depressurization system (ADS) consists of five valves, each actuated by a single solenoid valve. Power to the solenoids is supplied by two sets of two 20 A molded-case circuit breakers, one each at dc power panels D and F. Three solenoids are powered by one set and two from the other. To address single failure, the solenoids are individually protected by a set of two 10 A fuses, one from each source. A throw-over scheme between the redundant sources ensures that voltage is available to each solenoid.

The EDSFI team's review of the solenoid protection scheme found that coordination between fuses and breakers had not been directly addressed by GPUN. However, preliminary calculations performed during the inspection indicated a small area of potential overlap in the instantaneous trip region. The team did not view the potential overlap to be an immediate safety concern due, in part, to conservative assumptions used in the calculation, i.e., fault type and cable length. However, given the importance of the system, they also concluded that adequate coordination needed to be fully demonstrated.

While evaluating the issue, GPUN found two additional concerns with the existing fuses: (1) their voltage rating (125 Vdc) was less than the normal operating and battery equalizing voltages (132 V and 137.5 Vdc, respectively); and (2) their short circuit rating (200A) was less than the calculated short circuit current at the fuse terminals (615 A). GPUN issued a deviation report, No. 93-635, which outlined the concerns and evaluated the consequences. The evaluation concluded that there was no operability concern, but recommended the replacement of the fuses at the earliest opportunity.

In the supporting document, Calculation No. C-1302-735-5350-C13, GPUN evaluated possible replacements and concluded that the existing Bussman type BAF fuses should be replaced with 10 A Bussman type KTK, KLM, or FNQ fuses. KLM type fuses had been ordered for replacement of the existing fuses during the 1994 refueling outage. In addition, GPUN's review of the cable routing performed during the current inspection revealed that the cable length between panel D and panels ER18A and B was approximately 200 feet. The calculation had incorrectly established it to be 77 feet. This change minimized the inspectors' concern regarding the breaker fuse coordination and the capability of the ADS system to perform its safety function. Based upon the inspectors' review of the above documents and further discussions with the licensee, this item is closed.

In conjunction with this review, the inspectors also concluded that the resolution of the NRC and GPUN findings regarding the ADS fuses was less than timely. The conclusion was based on the following observations:

1. The calculation addressing the EDSFI team concerns was not issued until August 27, 1993, more than fourteen months after the issue was originally identified as a concern by the NRC.

2. The correct cable length value that ultimately resolved the issue was verified only after the inspectors disagreed that the calculation had adequately addressed the EDSFI team concern regarding the overlap area in the breaker-fuse coordination.
3. The deviation report, No. 93-635, addressing the additional GPUN findings pertaining to the fuses, was not issued until November 12, 1993.

3.0 DEGRADED GRID VOLTAGE RELAY SETTING

During the May and June 1992 EDSFI, the inspection team evaluated the quality of voltage available at various safety-related buses. This review resulted in three unresolved items, Nos. 92-80-02, -03 and -05. Although GPUN had scheduled resolution of these issues between February and August 1994, the NRC inspectors inquired about the status of these items. GPUN informed the NRC that the work was still ongoing and that GPUN's review had resulted in the issuance of material Nonconformance Report (MNCR) No. 930115 on August 18, 1993, and LER No. 93-005 on October 8, 1993. Copies of these documents were made available for the inspectors' review.

The MNCR stated that:

"Calculation C1302-700-5350-011 identified that, under worst case LOCA loading, the voltage at various safety-related equipment, could be below the manufacturer's design limit and below the minimum starter pickup voltage. Therefore, the undervoltage relays do not adequately protect safety-related equipment from operation at low voltage, a single failure mechanism (low grid voltage) exists that could affect both safety related trains of power, and degraded grid commitments with the NRC are not being met."

The MNCR justified acceptability of the condition until additional analysis could be performed, based on GPUN considering unlikely that the grid voltage would degrade to 212 kV (nominal grid voltage was 230 kV) and the voltage regulators fail at the same time. The LER scenario also included the failure of one of the startup transformers.

The inspectors' review of the bases determined that:

1. The calculation assumed the voltage at the 34.5 kV grid to be 31,154 V. The minimum voltage recorded at this grid between April 1992 and September 1993 was 32.9 kV. The mean grid voltage was calculated to be 35.6 kV with more than 99% of the recordings falling above 34.5 kV.
2. The NRC, in their letter and safety evaluation report, dated October 16, 1981, considered the addition of voltage regulators an acceptable solution to minimize the possibility of degraded voltages occurring on the Class 1E buses. However, they requested that limiting conditions for operation be included in the technical specification to cover the situation when the regulators were out of service. In a

letter, dated February 11, 1985, based on additional data provided by the licensee, the NRC agreed that the probability of exposure of Class 1E components to a voltage below their minimum rating was minimal. Currently, adequate surveillance and monitoring of the voltage regulators is provided to assure their operational status.

3. The calculation did not appear to assume the loss of one startup transformer.

Discussions with GPUN engineering regarding their evaluation and use of the calculation results revealed that the calculation had been prepared to address Generic Letter 89-10 and the results used in another calculation. After the inspection, on January 18, 1994, the licensee submitted Calculation No. C1302-730-5350-004. A complete review of this analysis could not be performed since the referenced documents and additional calculations were not provided. However, the NRC evaluation of the calculation results found that, under the stated assumptions, the voltage at the terminals of certain valves could drop to as low as 66% of the motor voltage rating. In Section 2, based on additional calculations, GPUN also concluded that the calculated voltage was adequate for proper valve actuation.

Considering that: (1) the grid voltage was typically above its nominal value; (2) the minimum grid voltage during the recording period was well above the level assumed in the calculation; (3) controls existed to increase the grid voltage, if necessary; and (4) adequate surveillance and monitoring of the voltage regulators was provided to assure their operational status; inspectors did not consider the adequacy of the supply voltage for the motors as well as motor starters and control relays to be an immediate safety concern. However, this item is unresolved pending NRC review of appropriate documents and confirmation of its acceptability (50-219/94-01-01).

The review of this issue also revealed that Calculation No. C1302-700-5350-011 had originally identified a concern regarding the adequacy of the voltage at two motor control centers before June 2, 1992, its date of issuance. Discussions with the GPUN engineering personnel regarding the delay in bringing the issue to the attention of the proper level of management indicated that the calculation had been prepared for the sole purpose of addressing available voltage at motor-operated valves, in response to Generic Letter 89-10. Therefore, the results were not provided for general distribution. The inspectors were not able to ascertain when or why management was informed of the finding more than fourteen months later.

At the exit meeting, on January 7, 1994, the inspectors identified to GPUN attendees the observed apparent lack of timeliness by engineering in addressing and informing management of this issue. In response to GPUN's question regarding the definition of timeliness, the inspectors stated that this was a licensee management function that should be addressed in terms of the safety significance of the finding. The inspectors had found no evidence that GPUN management had been informed at the time of the finding, nor that the issue had been evaluated prior to the issuance of the MNCR.

4.0 REVIEW OF INFORMATION NOTICES

The inspectors performed a review of the licensee's process for addressing Information Notices related to electrical issues. This review was made to assess licensee review of information for applicability to Oyster Creek and consideration of actions, as appropriate, to avoid similar problems presented in NRC generic communications.

Oyster Creek Licensing Instruction No. 003-LIC-1, dated December 1, 1993, "Incoming Correspondence Instruction," was reviewed. This procedure sets forth requirements for the management of regulatory correspondence and the assignment of tasks associated with that correspondence. Tasks are assigned through the "Action Item Tracking System" per Oyster Creek Licensing Instruction 005-LIC-2.

Based on review of these procedures, the inspectors determined that adequate controls had been established for the tracking of items/issues and that individual responsibilities related to the process were appropriately defined. The dispositioning of a selected sample of Information Notices issued within the last three years (IN 90-51, 90-57, 91-13, 91-15, 92-09, 92-40, 93-25, and 93-33) were reviewed for Oyster Creek applicability and consideration of necessary actions. The inspectors concluded the licensee had adequately addressed the regulatory information for the sample reviewed and established controls for managing the information provided.

5.0 OPERATIONS QUALITY ASSURANCE REPORT

The inspectors reviewed quality assurance (QA) Monitoring Report No. 9328002 pertaining to system design basis document (SDBD) reviews. The monitoring report was used by GPUN to document performance-based QA assessments of activities being conducted at Oyster Creek. The review addressed identification of deficiencies, escalation of findings to higher management levels, and responses to audit findings.

Monitoring Report 9328002 presented good observations and included both positive and negative findings of SDBD reviews. Observations made within the report noted the actions taken since the previous audit and assessed the quality of current procedures in light of these actions. The inspectors found the report to be well organized and to present an appropriate safety focus and clear findings. Furthermore, the results of the SDBD reviews addressed actions to be taken to correct the deficiencies identified. The inspectors noted that management attention and evaluation of the open items was evident from the meetings held and the correspondence between departments specific to these findings.

Based upon the above review, the inspectors concluded that GPUN's responses to the audit findings were appropriate and that the performance-based approach used in conducting self assessments was effective. The inspectors also noted adequate initiative for resolving technical concerns and reemphasis of the importance in using established systems for analysis and prioritization of work.

6.0 UNRESOLVED ITEMS

Unresolved items are matters that require more information to determine whether an item is acceptable or a violation. An unresolved item is discussed in Section 3.0.

7.0 EXIT INTERVIEW

At the conclusion of the inspection on January 7, 1994, the inspectors met with GPUN's personnel denoted in Attachment 1. At that time the NRC summarized the purpose and scope of the inspection and identified the observations discussed within the body of this report. In particular, the inspectors emphasized the need for a timely evaluation of findings whether equipment or design related. The licensee acknowledged the closure of unresolved issues and the observations by the inspectors, but questioned the meaning of timeliness. The inspectors' response is described in section 3.0 of this report. Following the review of the data provided after the inspection, the NRC contacted the licensee and informed them of the results.

ATTACHMENT 1

Persons Contacted

General Public Utilities Nuclear Corporation

* W. Behrle	Director Plant Engineering
* T. Blount	NSCC Staff
B. De Merchant	Licensing Engineer
* J. K. Gulati	Manager Electrical Power
* D. G. Jerko	Licensing Engineer
* M. G. Kapil	Plant Engineer
* S. Levin	Director Operations and Maintenance
* R. Milos	Safety Engineer
H. A. Robinson	Engineer Electrical Power & Instrumentation
* A. Rone	Director Technical Functions - Site

Nuclear Regulatory Commission

L. E. Briggs	Sr. Resident Inspector
* S. M. Pindale	Resident Inspector

* Indicates personnel attending the exit meeting on January 7, 1994.