



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20565-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 197

TO FACILITY OPERATING LICENSE NO. DPR-16

GPU NUCLEAR, INC. AND

JERSEY CENTRAL POWER & LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

I.0 INTRODUCTION

In its letter of June 29, 1998, as supplemented July 27, 1998, GPU Nuclear, Inc. (the licensee) proposed that the technical specifications (TS) and the associated TS Basis for the emergency diesel generators (EDGs) at Oyster Creek Nuclear Generating Station (Oyster Creek) be revised. The proposed TS amendment requests that the biennial inspection for the EDG be performed on-line while the unit is at power, instead of during shutdown, and that the capacity test for the EDG start batteries, which were replaced during the previous biennial inspection, not be performed this upcoming refueling outage. The licensee contends that completion of the EDG maintenance before the outages would increase the reliability of the onsite ac power system during shutdown. In addition, the proposed TS would increase the EDG load level from 20% to 80% during its bi-weekly surveillance. Finally, all of the above TS changes and corrections of typographical errors would be incorporated in the TS and its Basis section. The July 27, 1998, submittal provided clarifying information and was within the scope of the original application.

Oyster Creek will commence its refueling outage (17R) on September 26, 1998. The licensee requests that the proposed amendment be issued by early September 1998 so that the on-line inspection of one of the EDGs and other tests of the EDG start batteries be completed before commencing the refueling outage.

EDGs provide the onsite ac standby power source to shut down and maintain the reactor in a safe condition under a design-basis accident, that is, a loss-of-coolant accident (LOCA) coincident with a loss-of-offsite-power (LOOP) event. EDGs are one of the most risk-significant components in a nuclear power plant that affect the core damage frequency (CDF). The staff believes that the requirement that the EDG be given a thorough inspection at least once every 24 months during shutdown would reduce that risk by ensuring the ability of the EDGs to meet their loading and timing requirements, as well as their ability to maintain adequate reliability and availability levels.

The staff has reviewed the proposed TS modifications and changes to the appropriate Basis sections for Oyster Creek, and its evaluation follows.

2.0 EVALUATION

2.1 EDG Load Testing - Modification of TS 3.7.C.2, TS 4.7.A.1, and the Basis Section

To prevent the formation of soot in the cylinders and the injection nozzles, current TS 4.7.A.1 requires that the EDGs be started and loaded to not less than 20% power during their regular bi-weekly tests. On the basis of experience with many of its engines, the EDG manufacturer recommended the 20% loading of the EDGs and found it adequate for stabilizing the engine and generator temperatures within the prescribed 1-hour testing time. Since the TS was written, the EDGs have been upgraded. The licensee now states that the EDG manufacturer determines that 20% loading is no longer adequate and the proposed 80% is more appropriate for the upgraded EDG. Thus, the licensee proposed that the current 20% be changed to 80% for its bi-weekly surveillance. This change requires replacement of all the 20% with 80% figures in TSs 3.7.C.2 and 4.7.A.1 and the supporting justification provided in the TS Basis on pages 3.7-2, 4.7-1, and 4.7-3.

The staff has reviewed the proposed changes to TS 3.7.C.2 and 4.7.A.1 and the Basis sections. According to Surveillance Requirement 3.8.1.3 in NUREG-1433, "Standard Technical Specification-General Electric Plants," this particular EDG test is performed to verify that the EDGs are capable of synchronizing with the offsite electrical system and accept loads greater than or equal to the equivalent of the maximum expected accident loads. A minimum time of 60 minutes is required to stabilize engine temperatures, while the load band is often provided to avoid routine overloading of the EDG. Because testing the EDGs at 80% load level more closely represents accident loads than testing them at the 20% load level, and because the EDGs would not be overloaded, the staff finds that the proposed 80% loading is the more stringent requirement and is consistent with the above mentioned standard TS. Therefore, the staff concludes the proposed changes to 80% of the rated load in TS 3.7.C.2 and 4.7.A.1 and the Basis section are acceptable.

2.2 EDG On-line Inspection - Modification of TS 4.7.A.3 and TS 3.7.C.2

Currently, TS 4.7.A.3 states that "each diesel generator shall be given a thorough inspection at least once per 24 months during shutdown," while TS 3.7.C.2 states, in part, as follows: "If one diesel generator becomes inoperable during power operation...[t]he reactor may remain in operation for a period not to exceed 7 days in any 30-day period if a diesel generator is out of service. During the repair period none of the engineered safety features normally fed by the operational diesel generator may be out of service or the reactor shall be placed in the cold shutdown condition."

To permit the biennial inspection of an EDG at power, the licensee proposed to delete the words "during shutdown" from TS 4.7.A.3 and to revise TS 3.7.C.2 by adding the following sentence: "If a diesel is made inoperable for biennial inspection, the testing and engineered safety feature requirements described above must be met." The proposed TS 3.7.C.2 would read as follows:

If one diesel generator becomes inoperable during power operation, repairs shall be initiated immediately and the other diesel shall be operated at least one hour every 24 hours at greater than 80% rated load until repairs are completed. The reactor may remain in operation for a period not to exceed 7 days in any 30-day period if a diesel generator is out of service. During the repair period none of the engineered safety features normally fed by the operational diesel generator may be out of service or the reactor shall be placed in the cold shutdown condition. If a diesel is made inoperable for biennial inspection, the testing and engineering safety feature requirements described above must be met.

The staff has reviewed the proposed on-line surveillance requirement of TS 4.7.A.3 and its added action statement in TS 3.7.C.2 for the EDGs at Oyster Creek. The staff has made the following deterministic and risk evaluations.

2.3 Deterministic Evaluation

Current TS 4.7.A.3 requires that the EDG be given a thorough inspection at least once every 24 months during shutdown. The removal of the phrase "during shutdown" from TS 4.7.A.3 would, in turn, permit scheduling the EDG biennial inspection on-line during normal plant operation. To support the on-line EDG inspection activities, the licensee finds it necessary that TS 3.7.C.2 be modified by adding that "if a diesel is made inoperable for biennial inspection," which essentially allows making an operable EDG inoperable in order to perform the EDG inspection every 24 months.

The EDG inspection and maintenance (preventive) at regular intervals are prudent and recommended by the vendor, but those activities are normally reserved for plant shutdown. However, the licensee cites that the performance of the biennial EDG inspection at power would enhance focusing of the EDG inspection activity and would increase configuration control as compared to performing the inspection while the plant is shut down. The licensee also cites that performance of the EDG inspection while the plant is on-line may result in a net safety benefit because it ensures greater flexibility in planning and scheduling. Once the on-line inspection of the EDG is completed, the reliability of the EDGs would be enhanced for the remainder of the cycle and the availability of both EDGs during plant shutdown would be increased as well. This measure reduces the shutdown risk. Since this inspection is a preventive maintenance that is intended to enhance EDG reliability, the licensee has made this inspection part of the Oyster Creek maintenance rule (i.e., 10 CFR 50.65).

The staff has reviewed the applicable TS action statement, the EDG design features, and the administrative controls that are currently available to assess the risk associated with performing the EDG biennial inspection on-line under TS 4.7.A.3. The staff finds that:

- 1) The action statement of TS 3.7.C.2 requires that the operable EDG be tested at least one hour out of every 24 hours until the inspection is completed (i.e., tested 7 times). During the inspection, two of the four offsite power sources would be available and none of the engineered safety features (ESF) normally fed by the operable EDG can be out of service or the reactor would be placed in the cold shutdown condition.
- 2) EDGs are declared operable during the regular surveillance test, and if a LOCA or a LOOP occurred while an EDG was being tested, the EDG breaker would trip and the EDG would return to a standby mode. This EDG test override feature allows the EDG being tested to remain fully capable of performing its intended safety function.
- 3) The Oyster Creek On-Line Maintenance (OLM) Procedure provides a methodology for determining that component testing or maintenance is acceptable, given a system outage. This process ensures that there would be no conflicting work and that all components required to be operational would be in service. The methodology considers many factors such as reactivity management, probabilistic risk assessment (PRA) considerations, and maintenance rule performance criteria.
- 4) According to the last 100 EDG demand starts, there have been a total of two failures, one for each diesel, while the unavailability of EDG 1 and 2 has been 1.26% and 0.55% for the 2-year period. EDG unavailability is forecasted, and the EDG is tested, and maintained in accordance with 10 CFR 50.65 (i.e., maintenance rule) performance criteria. EDGs at Oyster Creek have been highly reliable and available.
- 5) Oyster Creek has a station blackout (SBO) alternate ac source, that is, either of the two combustion gas turbines, which would be available within 1 hour of an SBO event to supply electric power to the plant.

Based on the above findings and no change in the EDG inspection frequency (i.e., biennial), the staff concludes that the appropriate level of safety can be maintained when performing the EDG inspection on-line.

It should be noted that testing the operable EDG every day for the duration of the EDG inspection (i.e., 7 days) may be too excessive and it may lead to degradation of the EDG and possibly result in potential for unnecessary shutdowns. The staff encourages the licensee to submit changes to the EDG TS to reduce the EDG testing requirements.

2.4 Risk Evaluation

The staff's risk evaluation associated with the proposed biennial inspection of EDGs at power is based mostly on the information provided by the licensee for its previous EDG TS amendment

in which the licensee requested the NRC to extend the EDG allowed outage time (AOT) from 7 to 14 days.

The licensee used both the original Individual Plant Examination (IPE) developed in 1991 and the modified version of the IPE, the Oyster Creek Probabilistic Risk Analysis (OCPRA), to justify the proposed change for on-line EDG inspection. The Office of Nuclear Regulatory Research completed its review of the IPE submittal and issued a staff safety evaluation report dated August 2, 1994, which concluded that Oyster Creek met the intent of Generic Letter 88-20. Independent reviews of the IPE also include both internal and external contractor reviews. In response to the staff's request, the licensee provided substantial additional information to ensure that its PRA is a reasonably valid tool for the proposed change. For example, the licensee's internal review indicated that the IPE and the OCPRA reasonably represent the as-built, as-operated condition of the plant. The licensee also indicated that internal risk analysis personnel performed additional reviews of the OCPRA LOOP recovery model. Results of all risk model calculations were reviewed by various internal groups, which included Engineering, Operations, and Maintenance Departments. In addition, the Boiling Water Reactor Owners Group Peer Certification Committee performed a detailed review of the OCPRA in August 1996, and the review team consisted of both utility and non-utility PRA experts. The staff also examined the IPE and reviewed the licensee's response to the staff's request for additional information and found no significant shortcomings that could have an impact on the results of the PRA performed for the requested change.

A number of sensitivity studies were performed and provided to the staff to ensure reasonable robustness in the PRA modeling of the LOOP/SBO events. The staff finds that the licensee's sensitivity studies were thorough and comprehensive. Although performing on-line inspection would result in an increase in the unavailability of EDGs and a subsequent increase in the SBO contribution to CDF, the staff finds the proposed change, which allows on-line biennial inspection with the current 7-day allowed outage time, would result in a small risk increase. This small risk increase meets all staff numerical guidelines and criteria used in the risk-informed licensing applications, and contained in the approved Regulatory Guide (RG) 1.177, "An Approach for Plant-Specific, Risk-Informed Decision Making: Technical Specifications," and RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis." The change in CDF as result of the proposed change would be less than $3.2 \times 10^{-7}/\text{yr}$ ($4.74 \times 10^{-6}/\text{yr} - 4.42 \times 10^{-6}/\text{yr}$). This value is based on the licensee's analysis for the original request for a 14-day AOT for EDGs (using a modified model that includes the recirculation pump seal LOCA model); therefore, the value is conservative. The change in large early release frequency would be less than $1.7 \times 10^{-8}/\text{yr}$ ($8.69 \times 10^{-7}/\text{yr} - 8.52 \times 10^{-7}/\text{yr}$) and is also conservative since the value is based on the 14-day AOT assumption.

The licensee has the OLM Program in place, which uses risk achievement worth to determine which systems are more important when performing maintenance at power. The licensee's administrative procedure is used to manage on-line maintenance activities. Combinations of system windows are analyzed using the plant-specific PRA to determine the overall risk, including the effect of environmental conditions as well as any potential for risk reduction.

Configurations that result in a risk achievement worth of greater than 10 necessitate compensatory actions to reduce the risk of the planned maintenance. Changes to the OLM schedule require evaluation through PRA or, if impossible, a deterministic engineering judgment to ensure that no undue risk is incurred. In the case of the EDGs, outage periods have been moved from the summer and winter to the spring and fall when the grid voltages are more stable. In addition, outages associated with the combustion gas turbines have been scheduled such that they do not coincide with EDG outages. Other risk-significant systems, such as the core spray system and the isolation condenser system, have been moved out of the EDG work window.

Therefore, the staff finds that: (1) the risk impact of the proposed change is small; (2) the PRA used to calculate the risk impact is reasonable for the proposed application; and (3) the licensee has a reasonable proceduralized process for controlling risk when scheduling maintenance activities at power for EDGs. The staff concludes that PRA supports the proposed change that allows biennial EDG inspection at power.

On the basis of deterministic and risk evaluations, the staff finds that on-line inspection of TS 4.7.A.3 represents low risk and that the performance of TS 4.7.A.3 during power operation would not adversely affect overall EDG availability or the EDG's ability to perform its design function.

2.5 Deletion of Battery Capacity Test - Modification of TS 4.7.A.5 and its Basis

Current TS 4.7.A.5 states the following: "The diesel generators' starting batteries shall be tested and monitored the same as the station batteries, Specification 4.7.B." The licensee proposed to add a sentence so that the proposed TS 4.7.A.5 would read as follows: "The diesel generators' starting batteries shall be tested and monitored the same as the station batteries, Specification 4.7.B. The battery capacity test need not be performed if the installed batteries were replaced during the previous biennial inspection."

The reason for not performing the initial EDG battery capacity test is based on the batteries having been replaced in the previous biennial inspection of the EDGs in which the new batteries were tested and qualified before installation. A battery performance test is intended to determine overall battery degradation as a result of age and usage. According to IEEE Standard 450-1975, the frequency for this test is 60 months, or every 12 months if the battery shows degradation. The battery capacity would not have degraded because new batteries were installed less than 2 years previously, and a new battery would have been tested and qualified before installation. The staff concurs with the licensee that the battery capacity would not have degraded significantly in less than 2 years of service and adding a sentence that eliminates the battery capacity discharge test for the batteries replaced during the previous biennial inspection is acceptable.

2.6 Typographical Errors

The licensee proposed to make the following typographical corrections:

- 1) Correction of Specification 4.7.b to Specification 4.7.B in TS 4.7.A.5 on page 4.7.1.
- 2) Removal of the word "volts" from TS 4.7.B.3.C because it refers to the specific gravity of each cell, not to voltages.

Since the above corrections are administrative in nature and involve no technical evaluation, the staff finds the proposed changes acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Jersey State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (63 FR 40556). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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