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Vice President
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U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Document Control Desk

Gentlemen:

SUBJECT: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Special Report 88-001/1
Diesel Generator Number 12
Trip During Surveillance
AECM-88/0072

Reference: AECM-88/0066, dated March 29, 1988

On March 29, 1988, System Energy Resources, Inc. (SERI) submitted a Special Report concerning a trip of Diesel Generator 12 that occurred on March 2, 1988. On March 30 a similar trip of the same diesel generator occurred which required additional troubleshooting and evaluation.

As a result of these investigative efforts on March 30, SERI staff recognized that certain information provided in its March 29 submittal was not correct. The information concerns the auxiliary lube oil pump start permissive associated with diesel speed and the relationship between the Load Shedding and Sequencing system and the auxiliary lube oil pump power supply. The March 29 submittal stated that the auxiliary lube oil pump functions as a backup to the engine driven lube oil pump and automatically starts on low lube oil pressure if diesel speed is greater than 200 rpm. The correct diesel speed for an automatic start of the auxiliary lube oil pump, if required, is 425 rpm. In addition, this submittal stated that the auxiliary lube oil pump power supply is shed by the Load Shedding and Sequencing system in the emergency operating mode and requires operator action to reestablish power to the pump. The power supply to the auxiliary lube oil pump is automatically reestablished in the emergency operating mode without operator action being required.

On March 31, a teleconference was held with the NRC Region II Staff to discuss the SERI March 29 Special Report. In that call SERI advised NRC Staff of the most recent diesel generator trip and associated findings and the need for corrections to the March 29 Special Report. This submittal makes these corrections as described above and provides key aspects of SERI's findings resulting from the latest diesel generator trip.

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In the March 29 report SERI stated that the diesel generator tripped on low lube oil pressure. SERI has refined its conclusions regarding the cause of the trip. Based on the latest troubleshooting and testing accomplished, the cause of the trip is attributed to low turbocharger oil pressure. The low turbocharger oil pressure trip is bypassed in the emergency operating mode. Therefore, SERI's overall conclusions remain unchanged, namely that these are not valid failures as defined by Regulatory Guide 1.108 position C.2.e(2). This conclusion is based on troubleshooting and testing accomplished and is discussed in the attached report.

This submittal supercedes the March 29 report and addresses the March 30 engine trip as well as the associated investigation and corrective actions taken. Please advise if additional information on this subject is required.

Yours truly,



ODK:lm
Attachment

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Special Report 88-001/1
Diesel Generator 12 Trip

On March 2, 1988 at 1030, Diesel Generator 12 automatically tripped during the performance of the monthly functional surveillance. The diesel generator had been manually started at 0924 and synchronized and fully loaded onto bus 16AB. Approximately 30 minutes after achieving full load, an operator noticed that the auxiliary lube oil pump was operating. Because this pump is normally in a standby mode, the operator reported the condition to the Control Room and then checked lube oil pressure indications. Lube oil pressure was above normal indicating that both the auxiliary lube oil pump and the engine driven lube oil pump were operating. After consultation with the Shift Superintendent, it was decided to shutdown the auxiliary lube oil pump. When the auxiliary lube oil pump switch was placed in "TRIP", the diesel generator also tripped. The diesel generator was declared inoperable and the associated Limiting Condition for Operation (LCO) actions were performed.

The investigation immediately following the March 2 trip was inconclusive regarding why the auxiliary lube oil pump was operating and exactly what signal tripped the diesel generator. The diesel generator tripped with several alarms indicating both a low turbocharger oil pressure trip and a low engine lube oil pressure trip. While pertinent annunciators that alarmed were noted, the alarm sequence was not noted; therefore, it could not be confirmed which signal actually tripped the diesel generator.

The auxiliary lube oil pump functions as a backup to the engine driven lube oil pump and starts on low lube oil pressure if diesel speed is greater than 425 RPM. The auxiliary lube oil pump does not normally start during a diesel startup.

Associated instruments and switches were checked by maintenance personnel and found to operate properly. These checks included observation of engine speed, lube oil pressure, and component responses during engine startup. Maintenance personnel checked the calibration of the engine low lube oil pressure switch which starts the auxiliary lube oil pump. In addition, the lube oil pressure sensing line for annunciation, pressure indication and low lube oil pressure trip was vented. A diesel engine test start following these activities demonstrated that the auxiliary lube oil pump did not start during engine startup. The diesel generator was successfully tested and returned to service at 2250 on March 2, 1988.

The monthly functional surveillance for Diesel Generator 12 was changed to require operators to check that the auxiliary lube oil pump is not operating prior to synchronizing the generator. The change also included guidance concerning under what conditions the auxiliary pump is allowed to be shutdown. All of the following conditions must now be met prior to a shutdown of the auxiliary lube oil pump:

- 1) the diesel generator is not synchronized to grid;
- 2) the diesel generator has operated for less than 5 minutes;
- 3) sufficient lube oil pressure is provided by the engine driven oil pump independent of the auxiliary lube oil pump;

- 4) permission of the Shift Supervisor or Shift Superintendent is obtained.

System Operating Instructions, the monthly functional surveillances, and the 18 month surveillance procedures for both Diesel Generator 11 and 12 were later changed to include similar guidance. In addition, the System Operating Instructions were changed to prohibit shutdown of the auxiliary lube oil pump if emergency conditions exists. The start of the auxiliary lube oil pump has not been experienced following a Diesel Generator 11 start.

On March 30, 1988 at 1246 the diesel generator tripped again when the auxiliary lube oil pump started and was secured by the non-licensed operator in accordance with the new procedural guidance. Further investigation was begun to determine the cause and additional corrective actions needed. Particular attention was given to the first-in annunciator during the subsequent operation for troubleshooting.

During the diesel generator operation for troubleshooting, the trip conditions were repeated and it was verified that the low turbocharger oil pressure trip occurred first. From the troubleshooting operation it has been concluded that the diesel generator trips on March 2 and again on March 30 were caused by low turbocharger oil pressure. This trip is bypassed in the emergency operating mode. Therefore, the diesel generator trips are not considered valid failures and the test frequency remains at once per 31 days in accordance with the test schedule of Technical Specification Table 4.8.1.1.2-1.

As a result of the investigation for the trip on March 30, it was concluded that the response time of the lube oil pressure regulators was not adequate to always prevent an auxiliary lube oil pump start during a main engine start nor to prevent a low turbocharger oil pressure engine trip if the auxiliary lube oil pump was tripped with the engine running. Needle valves on the lube oil pressure regulators were adjusted to improve this response time. The testing performed after these adjustments demonstrated that a trip of the auxiliary lube oil pump would not trip the diesel engine from a condition with both lube oil pumps running. Testing was also conducted to verify that the auxiliary lube oil pump did not start during engine start-up. The diesel generator was returned to service on March 31, 1988 at 1216.

Both Diesel Generators 11 and 12 were started on April 1 without experiencing a start of their respective auxiliary lube oil pumps thereby providing further assurance that the auxiliary lube oil pumps do not routinely start when the engine starts.

Division I Diesel Generator was also tested on April 5, 1988 by verifying the auxiliary lube oil pump did not start on the diesel engine start and verifying that an auxiliary lube oil pump trip did not cause an engine trip.

Subsequent corrective actions to be taken as a result of the investigation are:

- 1) By May 31, 1988 or prior to any work on the lube oil pressure regulators additional controls will be implemented to ensure that the needle valves on the lube oil pressure regulators are set to handle the off-normal conditions of a trip of the auxiliary lube oil pump with the diesel generator in operation.
- 2) Non-licensed operators will be trained on the "first-in" response to diesel generator panel annunciators. The Diesel Generator failure checklist procedure was changed to require the Shift Superintendent or Shift Supervisor's permission to reset any annunciator or flag following a diesel trip.
- 3) Operators were notified through night orders of the new changes to these procedures; however, they will also receive more detailed training on the procedure changes concerning operation and shutdown of the auxiliary lube oil pump.
- 4) The next cycle of requalification training will include the more detailed training on items 2 and 3 above.