

LER 295/82-025

Event Description: Postulated Grid/Weather-Related LOOP with Two EDGs Inoperable

Date of Event: August 11, 1982

Plant: Zion 1

Summary

During normal operation on August 11, 1982, while the 0 emergency diesel generator (EDG) was being tested as a daily requirement for EDG 1A being out of service, a small fire was observed near the turbocharger on the 0 EDG. The diesel was shut down and declared inoperable. A unit shutdown commenced due to the two out of three EDGs being inoperable. The 1A EDG was made operable prior to reaching hot shutdown and the load decrease was terminated. Investigation revealed that the mounting screw for the turbocharger lubrication oil filter canister vibrated loose, allowing oil to spray onto the hot exhaust manifold through an o-ring seal, which caused the lubrication oil to flash. The o-ring was replaced and the canister was retightened. Zion 1 has three emergency diesel generators, two of which are specifically dedicated to Zion 1. Diesel generator 1A feeds 4-kV bus 148, and diesel generator 2B feeds 4-kV bus 149. One diesel generator (diesel generator 0) is connected to both Zion 1 bus 147 and Zion 2 bus 247. The buses are electrically interlocked to prevent the operation of both buses at the same time. Diesel generator 1A bus 148 supplies auxiliary power to auxiliary feedwater pump 1B, residual heat removal (RHR) pump B, and safety injection pump B. Diesel generator 0 bus 147 supplies auxiliary power to safety injection pump A and charging pump B. In addition to the diesel generators, power from the Unit 2 station auxiliary transformer (SAT) can be manually aligned to supply power to Unit 1. Since auxiliary power can be supplied from Unit 2, plant-centered loss of offsite power (LOOPs) would not be of particular importance in this event. LOOPs that affected both units (i.e., Unit 2 could not provide auxiliary power to Unit 1 given both EDGs were inoperable), such as grid-related and weather-related LOOPs, would be of importance given both dedicated EDGs were inoperable.

This event was modeled as a postulated grid-related/weather-related LOOP with two EDGs inoperable. The LOOP frequency, the offsite power recovery probabilities, and the probability of seal loss-of-coolant-accident (LOCA) were modified as shown in following table to reflect those values associated with grid-related and weather-related LOOPs (see ORNL/NRCILTR 89/11, *Revised LOOP Recovery and PWR Seal LOCA Models*, August 1989). The first train of emergency power was set to failed to reflect the failed EDG since it was assumed that the fault discovered in EDG 0 could also have occurred in the other EDGs. The second train of emergency power was set to failed to reflect the fact that EDG 1A was out of service for repairs. The corresponding system trains that rely on these diesels for power given the loss of offsite power were also modified to reflect their unavailability. Since the test done on EDG 0 that resulted in the fire was performed on a daily basis while EDG 1A was out for service, the length of time in which both faults were present was assumed to be 24 hours. The increase in core damage probability (CDP), or importance, over the duration of the event is 3.8×10^{-6} . The base-case CDP over the duration of the event is 1.2×10^{-7} resulting in an estimated conditional core damage probability of 3.9×10^{-6} . The dominant sequence involved a postulated LOOP with emergency power failure (station blackout), a reactor coolant pump (RCP) seal LOCA, and failure to recover offsite power before core uncover.

Revised LOOP Probabilities

Event	Default Probability	Revised Probability
LOOP frequency	1.6×10^{-5}	2.8×10^{-6}
LOOP short-term non-recovery	0.53	0.66
Seal LOCA probability	0.27	0.42
Offsite power recovery prior to battery depletion given no seal LOCA	0.031	0.14
Offsite power recovery prior to battery depletion given seal LOCA	0.57	0.77
Offsite power recovery within two hours (OFFSITE.PWR.REC/- EP.AND.-AFW)	0.22	0.52
Offsite power recovery within six hours (OFFSITE.PWR.REC/- EP.AND.AFW)	0.067	0.32