



## 2A D/G FAILURE REPORT

On August 3, 1988 at 0937, the 2A Diesel Generator was started, using an emergency start signal, in performance of the monthly operability surveillance. Following a successful start, the Operator transferred the Diesel/Generator from the emergency mode to the test mode to begin synchronizing to the grid. Immediately upon entering the test mode, the Diesel Generator began losing speed. At 280 rpm the 2A Diesel Generator tripped on "Incomplete Sequence".

Three troubleshooting/maintenance runs were attempted during the subsequent troubleshooting. In each attempt the Diesel Generator speed began to decrease after accelerating to 350-400 rpm. At 280 rpm the Diesel Generator tripped on Incomplete Sequence. All three attempts were performed in the test mode.

Troubleshooting identified the cause of the speed loss, and subsequent Incomplete Sequence trips, to be the result of an abnormally high resistance in the normally closed test mode contacts of the 4EX3 relay. These contacts are in series with the Motor Operated Potentiometer (MOP) which provides the electronic governor's speed reference signal in the test mode. The MOP is used to change the Diesel Generator's frequency when synchronizing to the grid or to change the Diesel Generator's load when synchronized. The increased resistance in this circuit caused the Diesel Generator to reduce speed. When the Diesel Generator is in the emergency mode, the MOP circuit is open and the speed reference signal is provided by a separate resistor bank preset to 60 Hertz. The Emergency Automatic circuit was functional as evidenced by the successful Emergency Mode start.

The 4EX3 relay was removed by Electrical Maintenance personnel, the contacts were cleaned and the relay was reinstalled. Two additional troubleshooting runs were performed during which the Diesel Generator functioned properly. At 0225 on 8-5-88 the Diesel Generator was started to demonstrate Operability, using the same surveillance previously used during the August 3, 1988 failure. At 0352 the diesel Generator was shutdown after successfully completing the operability surveillance. At 0451 on 8-5-88, the 2A Diesel Generator LCOAR was exited. The 2A Diesel Generator was inoperable for 43 hours and 14 minutes.

The August 3, 1988 failure is conservatively classified as a valid failure. Regulatory Guide 1.108 position C.2.e.2 provides for classifying failures as invalid for unsuccessful start and load attempts that can definitely be attributed to the malfunction of equipment that is not operative in the emergency operating mode. The dirty contacts which resulted in this failure are not operative in the emergency operating mode. The 2A Diesel Generator did start upon receipt of the emergency start signal and would have loaded successfully had an accident situation occurred. Considering the worst case accident, if an operator attempted to transfer load from the 2A diesel to an offsite power source, the 2A diesel would have tripped and the remaining redundant train would mitigate the

accident consequences. Diesel Generator failures shall continue to be evaluated on a case by case basis per the guidance provided in Regulatory Guide 1.108.

The 2A Diesel Generator has had 2 valid failures in the 19 valid tests since the completion of pre-operational testing. The 2A Diesel Generator is currently being tested weekly in accordance with Technical Specification 4.8.1.1.2.

Similar 4EX3 related failures were previously identified in the letters to the U.S. NRC dated April 6, 1988, Subject - Braidwood Station Unit 1 Diesel Generator 1DG01KB Failure, NRC Docket No. 50-456, and October 5, 1987, Subject - Braidwood Station Unit 1 Diesel Generator 1DG01KA Failure, NRC Docket No. 50-456. The modification request to replace the 4EX3 relays with relays having less contact resistance and more stable characteristics is being tracked by AIR No. 4356-200-97-28401. The designs for the installation of the new relays are complete and the procurement of the necessary materials is in progress. Upon receipt of the materials, each Diesel Generator's 4EX3 relay will be replaced at the first outage of sufficient duration.