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 FACIL: 50-331 Duane Arnold Energy Center, Iowa Electric Light & Pow      05000331  
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 MINECK, D.L.      Iowa Electric Light & Power Co.  
 RECIP. NAME      RECIPIENT AFFILIATION  
 DAVIS, A.B.      Region 3, Ofc of the Director

SUBJECT: Responds to NRC concerns re susceptibility of LPCI swing bus design to single failure mode.

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Iowa Electric Light and Power Company  
October 19, 1989  
NG-89-3120

Mr. A. Bert Davis  
Regional Administrator  
Region III  
U. S. Nuclear Regulatory Commission  
799 Roosevelt Road  
Glen Ellyn, IL 60137

Subject: Duane Arnold Energy Center  
Docket No: 50-331  
Op. License No: DPR-49  
Potential LPCI Swing Bus Design Deficiency  
Reference: Thomas M. Parker to Director of NRR, "Low  
Pressure Coolant Injection System Swing  
Bus Single Failure," Oct. 6, 1989.  
File: A-103, E-11, R-10

Dear Mr. Davis:

This letter provides our response to your staff's concern regarding the susceptibility of the DAEC Low Pressure Coolant Injection (LPCI) swing bus design to the single failure mode recently identified at the Monticello plant, (Reference). This failure in the Emergency Diesel Generator (EDG) output voltage regulator could cause the swing bus to fail to automatically transfer under degraded voltage conditions as intended. After reviewing our design we have concluded that, although this single failure could occur at the DAEC, the consequences would not be as severe as at Monticello and do not invalidate the current Loss-of-Coolant Accident (LOCA) analysis for the DAEC.

The Monticello plant utilizes conventional control relays to monitor swing bus voltage. These relays are suitable for monitoring swing bus voltage only if necessary to detect a total loss of power. They will not initiate a swing bus transfer under certain degraded voltage conditions. This is because the drop out voltage of a conventional relay of this type is too low, i.e., approximately 40 - 50% of its rated coil voltage. In addition, the trip setting for this type of relay is not adjustable.

The DAEC utilizes a General Electric (GE) NGV Series undervoltage relay to monitor the swing bus voltage. This relay is a high-speed relay specifically designed for undervoltage protection of equipment. The NGV series relay has an adjustable setpoint. The undervoltage relays used at the DAEC can be set to initiate their protective function between 70% and 100% of rated bus voltage. The design change package which installed the undervoltage relay specified a setpoint of 80% and the most-recent calibration records confirm the 80% setting. This 80% value corresponds to the value of degraded voltage analyzed in the DAEC FSAR for safety-related equipment, i.e., safety-related equipment is designed to perform its intended safety functions at degraded voltage conditions of 80% of rated bus voltage. Thus, the DAEC swing bus would automatically transfer to the other division of AC power if the bus voltage degraded to a value below that at which the equipment was designed to operate.

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Even in the case where the undervoltage relay setpoint may have drifted to the 70% value, the swing bus would still work as designed. After the EDG starts and loads onto its distribution bus, the essential pumps and valves are load-sequenced onto the bus at approximately 5 second intervals. This is done to allow the EDG to recover from the load peaks associated with one set of loads before the next set of loads is added. Therefore, even in the worst case scenario where the EDG malfunctions and supplies an output voltage between 70% and 80% of rated, (i.e., below the supplied equipment's designed low voltage rating (80%) yet higher than the undervoltage relay setpoint (70%)), the voltage dips associated with each load peak are of sufficient magnitude and duration that the undervoltage relay would transfer the swing bus to the electrical division being supplied by the properly-operating EDG.

Based upon the above information we have concluded that, the design of the DAEC swing bus is not subject to the recently-identified failure mode, and no corrective actions are required prior to start-up.

Very truly yours,



Daniel L. Mineck  
Manager, Nuclear Division

DLM/RAB/gt

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