

LER 311/83-041

Event Description: Trip with Number 2A Vital Bus De-energized

Date of Event: August 1, 1983

Plant: Salem 2

Summary

On August 1, 1983 during routine power operation, a low-component cooling flow alarm was received in the control room. Upon entering the control room, the shift supervisor observed 2A vital bus infeed breaker 22ASD trip without an automatic transfer, thus de-energizing the bus. Shortly after the bus de-energized, the reactor tripped on a power range neutron flux high negative rate signal. The bus was declared inoperable, Technical Specification Action Statement 3.8.2.1 was entered, and the plant was placed in a stable shutdown condition. The bus was re-energized within the time allowed in the Technical Specification action statement. Investigation revealed that the alternative 24-Vde power supply for rod control cabinet 2SCD had failed prior to the occurrence, and a spurious channel A actuation of the safeguards equipment control (SEC) system caused the loss of the 2A bus, which resulted in an attempt of the rod control cabinet to transfer to the failed alternative power supply. The rod control cabinet power supply failure led to the dropping of rod banks C and D, which resulted in the negative flux rate and thus the reactor trip. The failed alternative power supply was replaced and the unit was returned to power operation on August 2. On August 9, another spurious SEC channel A actuation occurred and the 2A vital bus was de-energized once again. The reactor apparently did not trip following vital bus de-energization. The bus was again declared inoperable, and was again re-energized within the time specified in the Technical Specification action statement. Further investigation revealed that monitoring equipment connected to the SEC channel 2A circuit at several locations led to near-short conditions on the terminals of the output test panel and was possibly the cause of the spurious SEC signals.

The August 1, 1983 trip was modeled as a transient with the 2A vital bus failed. The licensee event report (LER) states that when the 2A vital bus was de-energized, the 21 boric acid transfer pump, the No.21 component cooling water pump, the 21 containment fan coil unit, the 21 fuel handling exhaust fan, the 22 service water pump, and the 21 shield ventilation fan were also de-energized. The service water pump is one of six and any two pumps can fully supply all service water needs. The component cooling water pump provides seal cooling to SI pump 11, charging pump 12, and residual heat removal (RHR) pump 11. Since pump cooling is not needed for injection but is most likely needed in the recirculation modes, this event was modeled as a transient with one train of RHR, high-pressure recirculation (HPR) and RHR.AND.HPR failed. The estimated conditional core damage probability for this event is 1.2×10^{-6} . The dominant sequence involved a successful reactor trip, failure of auxiliary feedwater (AFW), failure of main feedwater (MFW), and failure of feed and bleed. The dominant sequence did not include any modified events.