

INDIANA & MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT

Operating License DPR-58
Docket No. 50-315
Special Report: SI-12

SAFETY INJECTION ACTUATION -- MARCH 23, 1979

CONDITIONS PRIOR TO OCCURRENCE

The Reactor was operating in Mode 1 at 100% power with all parameters at normal values.

DESCRIPTION OF OCCURRENCE

Power supplies to vital instrument Buses I and II failed, nearly simultaneously. The first failure initiated Reactor and Unit trip. The second failure initiated Safety Injection and Safeguard Train "B" actuation. Steam Line isolation was also automatically initiated and all four Reactor Coolant Pumps tripped.

DESIGNATION OF CAUSE OF OCCURRENCE

With the twin vital instrument bus failure, Safety Injection signals were initiated from false indication of "Steam Line Differential Pressure" and "Low Pressurizer Pressure" coincident with Low Pressurizer Level. Steam Line isolation was initiated by false indication of "High Steam Flow" coincident with false indication Lo-Lo Tavg. Reactor Coolant Pumps tripped because of false indication of "Underfrequency" on two of the four power busses of these pumps. The two vital instrument buses were manually energized from the backup source. After verification that all systems functioned properly and all operating parameters were within their normal ranges, the Unit was returned to Normal Hot Standby conditions in accordance with OHP 4022.008.003 -- "Termination of Safety Injection."

The failure of the two vital instrument power supplies was found to be the failure of a capacitor in each power supply. The 250 volt D.C. battery that supplies the D.C. portion of Vital Instrument Buses I and II power supplies was under equalizing charge at the time.

The 250 volt station batteries are normally operated at 260 volts and equalized at 280 volts. The capacitor failures have been attributed to overvoltage. The near simultaneous failure is attributed to the first failure causing a surge that resulted in the second failure.

ANALYSIS OF OCCURRENCE

The following is a list of major items that were reviewed for their Safety implications.

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ANALYSIS OF OCCURRENCE (Continued)

a) Reactor Coolant System Cooldown Rate:

With the closure of the Steam Generator Stop Valves and the stopping of the Reactor Coolant Pump, this system was on natural circulation. On the wide range loop temperature indicators T-hot reduced from 600°F to 580°F and T-cold increased from 540°F to 550°F, for a net Tavg reduction of 5°F. The temperatures stabilized in this area until a Reactor Coolant Pump was restarted, nearly 2 hours later, when all temperatures equalized at their normal hot standby value of 547°F.

b) Thermal Effects of Safety Injection:

Safety Injection was terminated after 9 minutes of operation. During this time the Centrifugal Charging Pump injected 1,350 gallons of boric water with an initial temperature of 165°F into the Reactor Coolant System. This is the twelfth (12th) inadvertent actuation of Safety Injection in which water was injected into the Reactor Coolant System and conservatively would constitute .00030 of allowable thermal cycles. Total accumulated, amounts to .00245 of allowable thermal cycles.

c) Effects on the Emergency Core Cooling System Piping (ECCS)

The piping and supports in the ECCS were given a thorough visual inspection to determine if any mechanical damage was experienced during the Safety Injection. There was no evidence of any mechanical damage or abnormal movements of the piping.

CORRECTIVE ACTIONS

The voltage level for equalize charging of station batteries has been reduced to 275 volts.