

"Updated Report - Previous Report Date 07-15-81"

Virginia Electric and Power Company
North Anna Power Station, Unit 2
Docket No. 50-339
Report No. LER 81-055/01X-1

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Description of Event

On July 3, 1981 at 0723, while in mode 1 at about 17.9% reactor power and 76.7 Mwe, a fire occurred in B phase main transformer. Since reactor power was above the P-7 setpoint (10%), the main transformer 'B' differential trip caused a generator turbine trip and a reactor trip. The unit had just been returned to power following the replacement and testing of 'C' phase main transformer.

The Fire Brigade was activated and the actions of the emergency procedure (2-EP-1) were completed. The reactor was in Mode 3 at this time.

The transformer fire spread beyond the capability of the installed deluge systems which had activated on A and B phase main transformers automatically. The ceramic insulator on the phase lead had shifted and the side of the transformer ruptured spraying oil over the transformer and the side of the turbine building. At 0725, assistance from local fire departments was summoned. At 0729, the Emergency Director declared an Unusual Event and the notification of the counties, state and NRC made in accordance with EPIP-1.

Since the fire threatened the 1C Reserve Station Service Transformer (RSST) above ground feeder cables to 1C and 2C station service busses, reactor coolant pumps B and C and Condensate Pump A were secured to reduce station load. The main steam line isolation valves were closed to inhibit further cooldown of the reactor coolant system.

At 0746, the 1C RSST feeder breakers to 1C and 2C station service busses tripped on overcurrent. An Emergency Core Cooling System actuation (S.I.) signal was received.

The automatic isolation of 1C RSST resulted in an undervoltage condition on "1H" and "2J" emergency busses. The "1H" Emergency bus was re-energized immediately by the alternate off-site source from "1B" station service bus. Therefore, "1H" EDG output breaker did not close. "2H" EDG also started on the S.I. signal but remained unloaded.

At 0748 the S.I. signal was reset after it was determined that it was a spurious actuation. At the time of the actuation, the reactor was in Mode 3 with an average coolant temperature of 538°F. This completed one logic train for the SI actuation. It appears that the loss of 1C RSST, created a voltage transient of significant magnitude and duration to cause several bistables in the Solid State Protection System to drop out resulting in an erroneous high steam line flow signal. This completed the logic necessary for the S.I. actuation.

At 0750, the Emergency Director declared an "Alert Condition" and the Technical Support Center was subsequently manned. Notification of this upgrading of the site emergency was made in accordance with EPIP-1.

The unit was stabilized and a controlled cool-down was commenced through the Decay Heat Release Valve. Unit 1 ramp-down to 30% power was initiated.

At approximately 0830 the fire was brought under control. The Emergency Director declared the "Alert Condition" secured at 0900.

As a result of the safety injection, the contents of the Boron Injection Tank (BIT) were flushed to the Reactor Coolant System which caused the BIT boron concentration to fall below the T.S. 3.5.4.1 limit.

As a result of the safety injection, the control room bottled air system activated causing air pressure to drop below the T.S. 3.7.7.1 limit of 2300 psig.

As a result of the transformer fire, the actions of 2-PT-80 were not completed as required by T.S. 3.8.1.1. The breaker alignment and starting requirements of T.S. 4.8.1.1.a and 4.8.1.1.2.a.4 could not be completed since the "2J" emergency diesel generator was supplying power to the "2J" emergency bus.

The ECCS actuation is reportable per T.S. 3.5.2 and 6.9.1.9.b. This report is also intended to meet the additional requirements of the 90 day report for T.S. 6.9.2.

The other events included in this report are reportable as 30 day items per T.S. 6.9.1.9.b.

This is the first ECCS actuation reportable pursuant to T.S. 6.9.2.

Probable Consequences of Event

The on-site power supply system, as analyzed in section 8.3 of the North Anna Units 1 and 2 FSAR, is redundant with the individual systems separated and independent of each other so that a coincidental loss of power generation (normal source) and off-site power (preferred source) will not reduce overall system integrity. In addition, the emergency power system is also redundant and independent to provide dependable power to safety related equipment with the loss of one system. Therefore, since the emergency power to 2J bus was restored after the failure of the normal and preferred sources by the emergency diesel generator and the redundant emergency bus 2H remained operable, the health and safety of the public were not affected.

The purpose of the ECCS is to ensure adequate shutdown margin and core cooling in the event of a loss of coolant accident. Although the S.I. system performed its intended function to inject borated water into the RCS, an actual accident condition did not exist and therefore the S.I. system actuation was not required. As a result, the health and safety of the public were not affected.

Cause of Event

The cause of the transformer failure appears to be an internal fault condition. Further investigation of the failure is continuing.

The ECCS actuation was caused by a low reactor coolant temperature coincident with a spurious high steam line flow signal. The cause of the spurious bistable trips is under investigation.

Immediate Corrective Actions

The on-site fire brigade, with the assistance from off-site fire-fighting teams, promptly responded to combat the fire and thereby minimized fire damage.

The safety injection signal was reset at 0748 and the equipment restored to normal conditions in accordance with the applicable emergency procedures. The unit was cooled down to Mode 5.

The boron injection tank boron concentration was restored as required by T.S. 3.5.4.1.

The control room bottled air system was reset and repressurized as required by T.S. 3.7.7.1.

The surveillance requirements of T.S. 3.8.1.1 were accomplished when the independent off-site power source was re-established through the underground feeder cables from 1C RSST to the 1C and 2C station service busses.

Subsequent Corrective Actions

During 2H and 2J bus blackout testing vital bus voltages were monitored. Voltage transients on the vital busses did not occur during the blackout testing.

Scheduled Corrective Action --

Further corrective actions will be taken as required by the results of the investigation of the bistable trips. The main transformer is being replaced and the fire damage repaired.

Actions Taken to Prevent Recurrence

No further actions will be taken at this time except as mentioned previously.

Generic Implications

The generic implications of this event are being investigated by the equipment supplier.