

SUBMERGED COMPONENT CIRCUIT PROTECTION

LIMITING CONDITION FOR OPERATION

3.8.4.3 The submerged circuits protection for the components listed in Table 3.8-3 shall be OPERABLE

APPLICABILITY: Modes 1, 2, 3, and 4

ACTION: With one or more submerged component circuit protection inoperable, restore the inoperable circuit to OPERABLE status within 7 days or be in HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.8.4.3 The above required submerged component circuit protection shall be demonstrated OPERABLE at least once per 18 months by verifying that the circuits automatically deenergize on a simulated accident signal.

8504230501 850417  
PDR ADDCK 05000390  
A PDR

BASES

B 3/4.8.4.3 SUBMERGED COMPONENT CIRCUIT PROTECTION

Circuits that are not designed to protect the 1E buses when the components are submerged during an accident are automatically deenergized directly or indirectly by ESFAS signals generated during an accident.

## APPENDIX 8A

### Analysis of Submerged Electrical Equipment (During Post LOCA) Powered from Auxiliary Power System

#### Purpose

The purpose of this analysis was to evaluate the response of the Class IE Auxiliary Power System (APS) to the submergence and subsequent fault of electrical equipment inside the containment vessel during post-LOCA flooding. The effect of flooding on the non-Class IE power system was not analyzed since its failure would not affect the Class IE power system or any electric equipment required to mitigate the accident.

#### Assumptions

- ~~1. Conductivity of the water used in flooding the containment vessel is high enough to cause the equivalent of bolted 3-phase faults on submerged circuits.~~
- ~~2. Power outlets and receptacle boxes are deenergized.~~

#### Reference

Letter from L. M. Mills (TVA) to Ms. E. Adensam (NRC), dated March 3, 1982, which included additional information concerning power systems at Watts Bar Nuclear Plant.

#### Procedure

The Class IE devices of the APS located below the anticipated maximum flood level were identified. These devices were examined to determine if they would be tripped (deenergized) due to the plant's operating mode. The remaining devices will be energized and faulted due to flooding. The effect to submersion on the energized devices was studied as follows:

1. The relationship of the faulted Class IE equipment to the APS was typically sketched.
2. The 480V system fault currents were calculated or taken from the issued Containment Penetration Protection Study. The 120V system fault currents were calculated.
3. These currents were plotted along with the protective devices response curves to show proper coordination.

APPENDIX 8A (Con't)

Analysis

Where there was only one submerged component connected to the power system below the 6900-480-volt transformer, the protective relaying adequately isolates the faulted device from the remainder of the system without loss of the upstream board. This is the design basis for the protective system. The ability of each circuit's redundant protective devices to clear faults inside containment was verified in the issued containment penetration protection study.

In ~~no cases~~ <sup>the</sup> ~~were~~ <sup>where</sup> there ~~were~~ <sup>were</sup> more than two submerged components connected to a common bus below the 6900-480 volt transformer. ~~In that instance~~ the described procedure was followed to verify that the protective relaying for each device adequately isolates the faulted devices from the remainder of the system without loss of the upstream board.

48

The effect of submerging hand switches, level switches, and annunciation contacts fed from single phase control transformers is not considered significant. These transformers have fuse protection in their secondary circuits. A short or ground fault of the circuit element fed by these transformers has no adverse effect on the Auxiliary Power System.

Conclusions

The post-LOCA flood will not cause breakers to trip out of sequence or degrade the 6900V or 480V voltage levels of the Class IE Auxiliary Power System.