MCGUIRE NUCLEAR STATION

Report No: SD-369/370-80-1

Report Date: February 29, 1980

Facility: McGuire Nuclear Station - Units 1 & 2

Identification of Deficiency: Solid State Protective Relays and Trip Devices--Deficient SCR's

Description of Deficiency:

During relay and trip device acceptance and system startup testing, it was determined that fourteen (14) relays and trip devices did not meet the time-current characteristic specifications of the relay for its application (i.e. the relay or device would trip at a lower level of current or time than its setting). The items found to contain the deficiency were solid state relays manufactured by Gould-Brown Boveri, Horsham, PA and consists of Types 1TE-51L and 1TE-51Y overcurrent relays and Type SS4G (Power Shield) solid state trip device. The component that has been identified as causing the deficiency was Motorola, Inc. SCR's types 1379 and 1235. Additional Gould-Brown Boveri relay types GR-5, ground fault relay, and Type 1TE-50, overcurrent relay also contain similar type SCR's.

Preliminary investigations indicated that the output SCR in the relays was deficient. One relay was returned to the manufacturer for investigation. The relay manufacturer and SCR manufacturer have evaluated and analyzed the deficiency and have indicated that the deficiency was caused by copper migration within the SCR. The copper migration was from the top metal system into the bulk silicon material which would result in its failure. The migration is a direct function of temperature and time. The deficiency is further described in a letter dated February 11, 1980 to Mr. Victor Stello, Office of Inspection Enforcement, U.S. Nuclear Regulatory Commission, Washington, D. C. 20555, from Mr. D. D. Duval of Gould-Brown Boveri. However, the letter incorrectly identifies how and where the deficiencies were initially detected. The deficiencies were initially identified during testing at McGuire Nuclear Station rather than at Catawba Nuclear Station. The manufacturer is conducting further evaluations to determine if the SCR deficiency is lot or batch related or purely random.

Analysis of Safety Implication:

There are 633 relays and trip devices within the station with 180 of these in safety circuits. Of the 633 relays only fourteen or approximately 2% have been found to have the deficiency. The deficiency appears to be random in nature.

Of the fourteen only five were in safety system circuits. Of these five, only two affected redundant circuits. The relays and trip devices are utilized for overcurrent protection for various motors and load centers and upon failure of the SCR would cause the associated load to be tripped.

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Corrective Action:

All relays and trip devices containing the specific type of SCR's that are within safety circuits have been identified. The SCR's in the identified relays in Unit No. 1 will be replaced with SCR's that have gone through a special screening. The trip devices that do not have stud type SCR's will be replaced rather than replacement of the SCR's. The SCR's that are removed will be returned to the manufacturer for further analysis and evaluation to determine if the deficiency is random or confined to a batch or lot. Upon completion of this evaluation, action will be undertaken to changeout those SCR's and trip devices in Unit No. 2 as required to correct the deficiency. The change out of those items for Unit No. 1 is anticipated to be completed by June 1, 1980. The changeout of any SCR's and trip devices identified by the evaluation in Unit No. 2 is anticipated to be completed by January 1, 1981.