

CATAWBA NUCLEAR STATION

Report No.: SD 413-414/80-02

Report Date: February 29, 1980

Facility: Catawba Nuclear Station - Units 1&2

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

Initial Report:

On January 31, 1980, Mr. Milt Hunt of NRC Region II, Atlanta, Georgia, was notified of this deficiency by Mr. J. R. Wells, B. M. Rice, W. J. Foley and D. M. Clark of Duke Power Company.

Supplier and/or Component:

The items found to contain the deficiency were solid state relays manufactured by Gould-Brown Boveri, Horsham, Pennsylvania and consist of Types 1TE-51L and 1TE-51Y overcurrent relays and Type SS46 (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 1TB-50, overcurrent relay also contain similar type SCR's.

Description of Deficiency:

During relay and trip device acceptance and system startup testing, it was determined that three 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). 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 advise that the deficiency has been 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, NRC/OIE, from Mr. D. D. Duvall of Gould-Brown Boveri. However, that report incorrectly identifies how or where the deficiencies were detected. The deficiencies were identified initially 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.

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Analysis of Safety Implication:

Only three relays out of 829 relays have been found deficient and none of these were in safety circuits. The investigation is continuing by Duke and the manufacturer to determine if those in safety-related circuits could be affected by the same problem.

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 that were removed from McGuire Nuclear Station are being returned to the manufacturer for further analysis and evaluation to determine if the deficiency is confined to a batch, a lot or are random. Upon completion of this evaluation or any identification of deficiencies in the subject relays or trip devices in safety-related circuits, action will be undertaken to change out those SCR's and trip devices as required to correct any deficiency. The change out of any SCR's and trip devices identified by the evaluation is anticipated to be completed by January 1, 1981. A final report will be provided at that time.