HARTSVILLE NUCLEAR PLANT UNITS A1, A2, B1, and B2

HIGH PRESSURE CORE SPRAY MOTOR CONTROL CENTER

WIRING DISCREPANCIES

REPORT NO. 3 (FINAL)

NCR HNP-A-013

On May 23, 1978, TVA notified NRC-OIE, Region II, Inspector John Rausch, of a potentially reportable condition regarding wiring deficiencies discovered in the unit A1 high pressure core spray system (HPCS) motor control center (MCC). On June 23, 1978, TVA notified Mr. Rausch that similar wiring discrepancies had been found in HPCS MCC's for the other units and requested that the reportability of the deficiency be expanded to include all units. (However, subsequent investigation showed the MCC for unit A2 to have only nonsignificant discrepancies.)

TVA submitted a first interim report to NRC on June 22, 1978, and a second interim report on July 14, 1978. This is the final report on the subject NCR.

Description of Deficiency

During the course of conducting a general class for new employees in nondestructive wiring testing, the unit A1 HPCS motor control center wiring terminations were checked for continuity against the as-built wiring diagram. A number of wiring discrepancies were noted as listed below (those termed significant are preceeded by a "*"):

Unit A1

1. Metering Relay Unit 1A: FU-7 has wire labeled X-11. Should be labeled X-1.

*2. HPCS DG Immersion Heater Unit 2A: Terminal board terminals 5 and 6 have wires switched.

3. Condensate Storage Tank Bypass Valve E22-F010 Unit 3D: Wire No. 6 to 42-C coil is number No. 3 at 42-C coil.

*4. HPCS DG Air Compressor Unit 3C: Wire No. 1 on relay 74 coil makes a loop on itself. It goes nowhere--does not tie coil to control transformer.

*5. HPCS Area 120-V Distribution Panel Unit 4A: The feeder service cable is loosely connected.

*6. Vertical Section No. 1: Strip heater screw is loose on terminal N.

*7. Vertical Section No. 2: Both strip heater screws are loose (terminals H and N).

*8. Ground Bus (top horizontal wireway): Ground connection to control power transformer for metering compartment is loose.

*9. Metering Relay Unit 1A: Various loose terminal connections on terminal board.

Subsequently, the motor control centers for units A2, B1, and B2 were checked. The MCC for unit A2 were found to have a few discrepancies of a nonsignificant nature (mislabeled wires, etc.). Units B1 and B2 were found, however, to have the following significant discrepancies:

Unit B1

1. Metering Relay Panel: The wire from TB-21 to M3 on the 95Z Agastat relay and the wire from TB-1 to M1 on the 95X Agastat relay are switched.

Unit B2

1. HPCS DG Circ. Oil Pump Compartment: The pump breaker reset button is incorrectly labeled as a start button.

2. Suppression Pool MOV (MPL#E22-F012) Compartment: The feeder wires into the circuit breaker are switched such that the phasing sequence is Ø3, Ø1, Ø2, instead of Ø1, Ø2, Ø3, in accordance with vendor's drawings.

The motor control centers were procured by TVA as a part of the General Electric NSSS package and were fabricated by Powell Electric Manufacturing Company (hereinafter referred to as Powell) under subcontract with GE.

Cause of Deficiency

The investigations by GE and TVA uncovered a number of individual causes for the listed discrepancies as follows (numbering corresponds to listings above by unit):

Unit A1

1. TVA interpreted the wiring labeling incorrectly (i.e., no discrepancy exists).

2. Powell has a mistake on the as-built drawing. The MCC is wired correctly.

3. Same as 2 above.

4. GE said this wiring was correct when the unit was functionally tested. However, the configuration

of the wire in the cabinet with this wire tied in a bundle of other wires by a wire wrap indicates that the discrepancy probably occurred at Powell after the test was performed.

5. through 9. Loose connections occurred during shipment.

Unit B1

1. These wires were wired incorrectly at Powell and were not found during functional testing because all relays are not checked.

Unit B2

1. Vendor error which the inspector missed.

2. Vendor error which the inspector missed. Phasing of each piece of equipment is not checked.

The overall cause for the deficiency is a combination of miswiring not caught during unit testing, one wire change evidently made after performance testing (but an isolated incident not found on other MCC's), and, in some case failure of Powell to wire units strictly according to the approved wiring diagrams.

Safety-Implications

TVA determined that this deficiency was reportable because of the evidence of poor workmanship and the possibility that one or more of the wiring discrepancies might lead to the impairment of the ability of an MCC and ultimately the HPCS system to perform its safety function. Subsequently, GE has analyzed each discrepancy independently and concluded that none of the listed discrepancies could prevent either MCC from performing its intended safety function. TVA agrees with the GE assessment on each individual discrepancy but maintains that quality workmanship is essential on production of items of this type.

Corrective Actions

Corrective actions to clear up the various discrepancies will be undertaken as follows:

Unit A1

1. No corrective action necessary.

2. Drawing will be revised by Powell to match the as-built configuration.

3. Same as 2 above.

4. TVA will be authorized by GE to wire this to the correct configuration.

5. through 9. TVA will tighten these connections.

Unit B1

1. TVA will be authorized by GE to rewire the unit to the correct configuration.

Unit B2

1. Vendor will provide the correct label for TVA installation.

2. TVA will be authorized by GE to change the feeder wires to correspond to the drawing.

TVA will take corrective actions as described above by March 1, 1979, considerably before installation of the MCC's.

Means Taken to Prevent a Recurrence

GE informed Powell in detail of this deficiency and they performed a QA audit of Powell (on Nov. 7 and 8, 1978) and will continue to audit Powell on a periodic basis. The Phipps Bend Nuclear Plant unit 2 MCC was at Powell during the time of the audit and was wire checked by the GE QC inspector, and only a couple of nonsignificant discrepancies were found. Furthermore, GE is now requiring Powell to do a complete wire check before performance testing to ensure that the wiring configuration matches the as-built wiring diagram.