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RECIP.NAME RECIPIENT AFFILIATION
GRIER,B.H. Region 1, Philadelphia, Office of the Director

SUBJECT: Status update of deficiency re excessive voltage drops in power & control circuits initially reported 801020,Partial stop work on Unit 2 cable installation for affected circuits implemented,Final rept will be submitted in May 1981.

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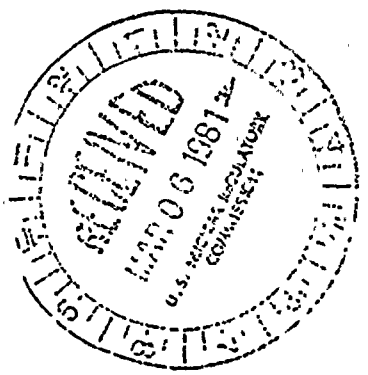
NORMAN W. CURTIS
Vice President-Engineering & Construction-Nuclear
770-5381

March 2, 1981

Mr. Boyce H. Grier
Director, Region I
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406



SUSQUEHANNA STEAM ELECTRIC STATION
STATUS UPDATE OF A DEFICIENCY RELATING TO EXCESSIVE VOLTAGE DROPS IN POWER AND CONTROL CIRCUITS
ERs 100450/100508 FILE 840-4
PLA-638

References: PLA-560 (10/20/80)
PLA-570 (11/17/80)

Dear Mr. Grier:

This letter serves to supplement the above referenced correspondence which advised the Commission of deficiencies relating to AC motor operated valve control circuits (PLA-560) and DC power supply cables (PLA-570). Due to similarities in the causes and the corrective actions required to resolve these conditions, PP&L has chosen to address both problems in this combined response.

PP&L initiated Deficiency Report (DR) # 0138 on November 26, 1980 which described the deficiencies detected in the AC and DC circuit designs. In addition to resolving these design deficiencies, Bechtel has also been directed to identify and correct the cause of the design problems in order to preclude recurrence. PP&L has also invoked a partial stop work on Unit 2 cable installation for all circuits which may be affected.

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Pursuant to the provisions of 10 CFR 50.55(e), the attachment to this letter provides: a description of the problem; the probable causes; an analysis of safety implications; and the corrective action planned.

We anticipate that a final report on these deficiencies will be submitted in May, 1981.

Very truly yours,

N. W. Curtis
Vice President-Engineering & Construction-Nuclear

FLW:sab

Attachment

cc: Mr. Victor Stello (15)
Director-Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. G. McDonald, Director (1)
Office of Management Information & Program Control
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. Robert M. Gallo
U. S. Nuclear Regulatory Commission
P. O. Box 52
Shickshinny, PA 18655

Status Report

Subject

Excessive voltage drop in power and control circuits.

Description of Problem

Excessive voltage drop occurs in various power and control circuits when motors are started or coils are energized. The specific problem areas at Susquehanna SES are:

1. AC motor starters (motor starters are devices which provide the control of power to motors.) - Excessive control cable resistance caused excessive voltage drop in control cables. This resulted in inadequate voltage across the terminals (less than 85% of rated voltage) of the motor starter. The motor starter could not operate at this reduced voltage, and therefore, the motor would fail to operate.

   A review of all safety related AC motor starter control circuits has shown that excessive control cable resistance existed for fifty nine (59) safety-related motor starters. These starters control the power to motors for valves, pumps, and fans.

2. 250V DC power cables - Excessive power cable resistance caused excessive voltage drop in power cables. This resulted in inadequate voltage (less than 80% of rated voltage) across the terminals of 250V DC motors used to operate valves. The motors would not start at this reduced voltage.

   Analysis of all safety related DC motor circuits has shown that excessive power cable resistance existed for fourteen (14) safety-related 250V DC motor operated valves.

3. 4.16Kv Circuit Breaker Controls - Excessive control cable resistance caused excessive voltage drop in 125V DC control cables. This resulted in inadequate voltage across the close (less than 90 volts DC) coils of 4.16Kv circuit breakers. The subject circuit breakers would fail to operate when required.

   Analysis of all 4.16Kv circuit breaker control circuits has shown that excessive control cable resistance existed for four (4) safety-related 4.16Kv circuit breakers.

Cause

The most probable causes of the low voltage problem are 1) a lack of attention to detail in the area of permissible voltage drops in power and control cables by the circuit design engineer, 2) a lack of control on final cable lengths by the engineer(s) at Bechtel who designed the subject schemes, and 3) a lack of design criteria and design documentation by Bechtel that provided control of cable size and length by the design engineer.

Analysis of Safety Implications

These design deficiencies affect multiple components of various safety related systems. The systems include Residual Heat Removal, Reactor Core Isolation Cooling, and High Pressure Coolant Injection. The nature of the design deficiency is such that critical equipment will not be controllable to perform design safety functions. Engineering considers this deficiency to be reportable under 10CFR 50.55(e).

Corrective Action

1. AC motor starters - Interposing relays or larger control transformers (whichever is appropriate) will be installed in the deficient motor starter control circuits. Interposing relays require less power than motor starters and can operate satisfactorily with existing control cables. The interposing relay contacts will control the motor starters through rewired low impedance circuits.

   In some cases, larger control transformers could be used because the voltage drop across these transformers is less since the load remains the same. This allows a larger voltage drop in the control cable. In using this fix, the total drop in the larger control transformer and the existing control cable must not be so great as to allow the starter voltage to drop below 85% of rated.

2. 250V DC power cables - existing power cables will be replaced with larger power cables for the subject devices.

3. 4.16Kv circuit breaker controls - interposing relays, applied similarly to the description in item 1 above, will be installed.

Schedule for Completion

These changes will be accomplished on Unit 1 prior to May 1, 1981. Corrective action for Unit 2 will be addressed in our final report.