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June 18, 1982

Mr. R. C. Haynes
Regional Administrator, Region I
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

SUSQUEHANNA STEAM ELECTRIC STATION
FINAL REPORT OF A DEFICIENCY INVOLVING
CUTLER-HAMMER SIZE 2 MOTOR STARTERS
ERs 100450/100508 FILE 821-10
PLA-1099

Reference: PLA-943 dated October 12, 1981

Dear Mr. Haynes:

This letter serves to provide the Commission with a final report on a deficiency involving Cutler-Hammer Size 2 Motor Starters.

This deficiency was originally reported by telephone to Mr. E. Brunner of NRC Region I on August 19, 1981 by Mr. A. Sabol of PP&L. At that time the condition was identified as "Potentially Reportable". The referenced PLA-943 provided the Commission with an interim report on the subject deficiency.

The attachment to this letter contains a description of the deficiency, its cause, an analysis of safety implications and the corrective action taken and planned. This information is furnished pursuant to the provisions of 10 CFR 50.55(e).

Since the details of this report provide information relevant to the reporting requirements of 10 CFR 21, this correspondence is considered to also discharge any formal responsibility PP&L may have in compliance thereto.

We trust the Commission will find this report to be satisfactory.

Very truly yours,

N. W. Curtis

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

JS:sab

Attachment

IE27

cc: Mr. Richard C. DeYoung (15 copies)
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
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U. S. Nuclear Regulatory Commission
P.O. Box 52
Shickshinny, PA 18655

FINAL REPORT

SUBJECT

Cutler-Hammer Size 2 AC Motor Starters

DESCRIPTION AND EXTENT OF DEFICIENCY

During the test program for combined load qualification for seismic and hydrodynamic loads, one Cutler-Hammer Size 2 AC Motor Starter failed pre-seismic and one failed post-seismic functional tests. Upon investigation, the following anomalies were discovered:

- Pre-Seismic Anomaly

  In the pre-seismic functional test on the size 2 starters in Unit 051 of Specimen 2, the contactor would not seal properly at any voltage. Also, a loud noise was associated with this contactor due to improper sealing.

  At the direction of the Cutler-Hammer representative, the contactor was disassembled and inspected. The inspection revealed that, (1) the magnet frame retention plates had been installed upside-down and (2) the magnet frame assembly contained a lump of epoxy. These discrepancies were corrected and the contactor was reassembled. A functional retest was then conducted and the contactor performed satisfactorily.

- Post-Seismic Anomaly

  In the post-seismic functional test on the Size 2 starter in the Unit 031 of Specimen 1, the reversing contactor failed to pick-up and seal properly within minimum voltage criteria. The voltage was increased until the contactor picked-up. Minimum pick-up voltages were measured in three successive tests. These voltages were much higher than the minimum pick-up voltage which was established for the same contactor in its pre-seismic functional test. Also, this contactor would not seal properly at any voltage and a loud noise was emitted from the contactor due to improper sealing.

  The contactor was then disassembled and inspected at the direction of Cutler-Hammer/Eaton technical representative. Several plastic moulding chips were found, which were removed. The contactor was reassembled and it performed satisfactorily on functional retest.

In order to ascertain that the above anomalies had not resulted from the disturbances of seismic tests, a complete seismic retest was conducted. No anomalies were observed in the pre-seismic or post-seismic functional tests. Those successful retests lead to the conclusion that the above anomalies were not a result of seismic testing.

Cutler-Hammer recommended that all safety related size 2 AC motor starters be checked to verify that they do not exhibit a high noise condition at both normal and reduced (85% or normal) voltage. The test required each motor starter to be operated 5 times at 102V A.C. (85% nominal) and then 5 times at 120V A.C. For the motor starters to pass the test at the 102V A.C. level, the starter must seal within 3 seconds with no contact chatter and 4 of the 5 operations must not exhibit a high noise condition. To be considered acceptable at the 120V A.C. level, the motor starters must remain quiet (at a distance of 3 feet) during continued operation for all 5 operations.

Subsequently, PP&L tested all safety-related size 2 AC motor starters in the manner directed by Cutler-Hammer. Test results showed that ten size 2 starters installed in Unit I and Common 480V Motor Control Centers and four size 2 starters installed in Unit II 480V Motor Control Centers failed the test criteria.

CAUSE OF DEFICIENCY

Based upon the inspections performed at Wyle Labs and upon performance of seismic tests using another Cutler-Hammer NEMA size 2 contactor, it has been concluded that the deficiencies were not the result of seismic testing; rather, the cause appeared to be related to the suppliers design, manufacturing, and inspection process.

ANALYSIS OF SAFETY IMPLICATIONS

Since size 2 AC motor starters are used as components of various safety-related systems, an analysis of the system safety function was completed for the Unit I & Common starters that failed the test criteria. This anlaysis revealed the following:

(1) Four starters failed due to excessive noise; these would have completed their safety function because the contacts sealed in and the motors started.

(2) Six starters failed electrically (contact chatter, failure to seal in); three of these are utilized as in-plant spares, therefore, they presently have no safety function. The remaining three are used to power motor operated valves in an application that is much less severe than the tested conditions, therefore they would have properly performed their safety function.

The conclusion is that the aforementioned Unit I and Common starters in their present application, would not impair plant safety. However, if the condition had gone undetected, the three in-plant spares could have been utilized in a future safety-related application. This deficiency is therefore considered to be reportable under the provisions of 10 CFR 50.55(e).

The four Unit II starters that failed the test criteria were returned to Cutler-Hammer for disassembly and inspection. Cutler-Hammer concluded that the Unit II starters, although noisy, would have performed their intended function.

CORRECTIVE ACTION

All size 2 AC motor starters were checked to verify that they do not exhibit an undesirable high noise condition. The replacement of the four Unit II safety-related size 2 AC motor starters that had exhibited high noise has been documented on NCR 7893. The ten defective Unit I safety-related size 2 AC motor starters will be replaced before initial criticality. The Unit I replacements will be documented on Work Authorizations WA-U-21945(2), WA-U-21928, WA-U-21978, WA-U-21942, WA-U-21927, WA-S-21702, WA-S-21703(2), and WA-S-21647.

To prevent the possibility of additional defective starters being obtained as spare or replacement parts in the future, Bechtel Construction has been instructed to stipulate in their purchase documents that each Cutler-Hammer size 2 motor starter shall be tested for minimum pickup voltage at Cutler-Hammer's facilities in accordance with established inspection procedure (Bechtel Vendor print 8856-E118-173-2); and only those which pass this test, in addition to the standard production tests, will be accepted by the jobsite. To assure that the above requirements are met for PP&L procurements, Cutler-Hammer NEMA size 2 contactors have been included on the Defective Device List (DDL).