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March 18, 1986
ST-HL-AE-1624
File No.: G12.315

Mr. Robert D. Martin
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U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
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South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
Interim Report Concerning
Multi-pin Plug Type Connectors

Dear Mr. Martin:

On March 10, 1986 Houston Lighting & Power Company notified your office, pursuant to 10CFR50.55(e), of an item concerning multi-pin plug type electrical connectors at the South Texas Project. Enclosed is an interim report on this item. Our next report will be submitted by April 30, 1986.

If you should have any questions on this matter, please contact Mr. C. A. Ayala at (512)972-8628.

Very truly yours,

J. H. Goldberg

J. H. Goldberg
Group Vice President, Nuclear

CAA/mg

Attachment: Interim Report Concerning
Multi-pin Plug Type Connectors

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South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
Interim Report Concerning
Multi-pin Plug Type Connectors

I. Summary

On March 10, 1986, Houston Lighting and Power (HL&P) notified the NRC Region IV of a potentially reportable item concerning physical damage to multi-pin plug type electrical connectors to Class 1E cabinets. Immediate corrective actions (rework of terminations) and recurrence controls (improved practices and inspections) have been implemented while long range, permanent measures are being developed.

II. Description of Deficiency

A recent sampling of completed terminations of multi-pin plug type connectors to the Class 1E Westinghouse Solid State Protection System (SSPS) cabinets revealed discrepancies on some of the terminations. The type of discrepancies include pins or sockets pushed out of inserts, bent or broken pins, and mis-keyed connections (i.e. mismatched plug and socket). The sampling was initiated after a number of individual multi-pin connector discrepancies were noted in various nonconformance reports. Although the original findings were limited to Burndy and Amphenol brand connectors in the SSPS cabinets, Project investigations include evaluation of other brand multi-pin connectors.

III. Corrective Action

Preliminary evaluations show that the root cause of these discrepancies is in one or more of the following areas:

- Construction errors resulting in damage during field installation,

- Improper assembly by the supplier resulting in discrepancies found in the field, and

- Design errors resulting in mis-keyed connectors.

Immediate corrective actions and recurrence controls have been established based upon the investigations completed to date.

The following actions are being taken at this time:

1. A 100% inspection of Amphenol and Burndy multi-pin connectors will be performed. This will include all such connectors regardless of installation status.

2. An inspection program will be undertaken to determine, by a sampling inspection process, if discrepancies exist in other multi-pin connector assemblies. Based on this inspection we will establish if there are any systemic problems with other types of connectors. Installed connectors, both mated and unmated, will be reviewed to determine whether identified discrepancies occurred in supplier fabrication or in field installation.

   As the inspection progresses, inspection results will be evaluated to determine the need for replacement, rework, or any other appropriate action.

3. A review of drawings related to prefabricated cables with connectors installed by a vendor other than the equipment supplier was completed. This review showed that of the 969 Unit 1 cable assemblies purchased separately from the equipment, a total of 15 connectors were mis-keyed. These were the result of errors on the part of either the designer or the cable fabricator.

4. The site procedure dealing with cable termination has been revised to include detailed procedures governing the assembly of multi-pin connectors. Construction and quality control inspection personnel have received appropriate training regarding these new procedural requirements.

Any additional corrective actions indicated by Project inspection and evaluation will be addressed in the Final Report.

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IV. Recurrence Control

The following actions have been initiated to preclude the recurrence of this type of problem:

1. The site procedure on termination of electrical cable has been revised to provide specific direction for the installation of multi-pin connectors, including training and inspection requirements.

2. Training on installation of multi-pin connectors has been conducted for craft, quality control, and engineering personnel. Any further installation of these connectors will be done only by these specially trained crews.

3. Design drawings for multi-pin connector cables are being reviewed against the equipment manufacturer's drawings for inconsistencies.

Any additional recurrence control measures will be identified in the Final Report.

V. Safety Analysis

Damaged connectors on cables entering Class 1E cabinets could compromise circuit integrity, resulting in improper operation and subsequent failure of the logic, actuation or protection circuitry. The majority of the discrepancies would have been identified during functional testing. However, vibration during plant lifetime, including seismic-induced motion, could cause disengagement of recessed pins creating intermittent or open circuits. Therefore, this issue is considered to be potentially reportable pending further investigation and evaluation.

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