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FLORIDA POWER & LIGHT COMPANY

November 26, 1973

Mr. John F. O'Leary, Director
Direcorate of Licensing
Office of Regulation
U. S. Atomic Energy Commission
Washington, D. C. 20545

TURKEY POINT UNIT NO. 3
DOCKET NUMBER 50-250
SUPPLEMENT TO ABNORMAL OCCURRENCE NO. 3-72-8
NO. 3 BATTERY CHARGER FIRE

Dear Mr. O'Leary:

I. INTRODUCTION

On December 22, 1972, Abnormal Occurence Report No. 3-72-8, which concerned No. 3 Battery Charger Fire, was submitted in accordance with Technical Specification No. 6.6.2.a for Turkey Point Unit No. 3, Operating License No. DPR-31.

This supplemental report presents the results and evaluation of tests and inspections performed to provide assurance that the cause of No. 3 Battery Charger fire was determined and corrected.

II. PROBLEM AND INVESTIGATIVE ACTION

BACKGROUND

On December 16, 1972 at 7:57 a.m. a small fire was discovered in No. 3 Battery Charger cubicle. Immediate actions were directed toward electrically isolating the No. 3 Battery Charger and extinguishing the fire. After No. 3 Battery Charger was isolated, No. 3S Battery Charger was placed in service.

At the time No. 3 Battery Charger fire was discovered, Unit No. 3 was in cold shutdown condition and Unit No. 4 was under construction. No. 3 Battery Charger was supplying both units because of construction activities involving No. 4 Battery Room. The total electrical load was about 200 amps. This electrical load represents approximately 50% rated capacity of No. 3 Battery Charger.

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INVESTIGATION AND RESULTS

An immediate investigation by plant personnel revealed that the fire involved one of two parallel input transformers in No. 3 Battery Charger. The insulation of this input transformer was charred and burned which indicated that localized overheating of the insulation had occurred. The second input transformer which is located in the same cubicle and immediately to the left of the burned transformer did not appear to be damaged by the fire, however dark rings were noted on the insulation of the second transformer coils. No. 3 Battery Charger control wiring, located immediately above the two parallel input transformers, showed no evidence of excessive temperature. An intense fire in No. 3 Battery Charger would have damaged the insulation of the left transformer and the insulation of the control wiring.

It was concluded that No. 3 Battery Charger fire was highly localized and involved the right transformer. No. 3 Battery Charger was placed in service using the left input transformer to supply an electrical load of about 110 amps and performance was satisfactory. This test verified that the left transformer was not affected by the fire.

Visual inspection of No. 3S Battery Charger revealed that the left transformer had moderately dark rings on the coil insulation. Visual inspection of the right input transformer coil insulation revealed a normal appearance with no evidence of the dark rings. Visual inspection of No. 4 Battery Charger revealed dark rings present on the coils of the left input transformer and dark rings with evidence of peeling on phase B coil of the right transformer.

The right input transformer from No. 3 Battery Charger which failed was returned to the manufacturer for further examination and tests.

When the failed transformer was disassembled, a winding short was revealed. The winding short extended from layer to layer in the center leg secondary coil, directly below the only turn in the top layer. This winding short caused several turns in B phase of the secondary side of the transformer to be shorted across.

Analysis and evaluation of the consequences of a winding short involving several turns in the secondary side of the input transformer shows that the current flow in the secondary side will greatly increase as the result of a smaller number of effective turns in the secondary side of the transformer. An increase in current flow in the secondary windings will result in higher temperatures in the conductors and in the conductor insulation. Excessive temperature in the insulation could result in insulation failure. If the temperature reached the combustion temperature of the insulating material, the insulation will burn.

It was concluded that the fire in No. 3 Battery Charger right input transformer was caused by a winding short involving several turns in the center leg (B phase) secondary coil. The short caused a greatly increased current flow in the secondary coil which resulted in excessive temperature. When the insulation temperature reached the combustion temperature of the insulation, the material burned.

Tests were performed by the battery charger manufacturer which compared a transformer similiar to the failed transformer with a new type transformer of an improved design. This improved design provides for cooling air ducts between transformer coil layers and the use of larger size conductors in the transformer coil windings.

Review and analysis of the test results indicate that the transformer with the cooling air ducts had a maximum core temperature 6C lower than the maximum core temperature of the transformer similiar to the failed transformer. Comparison of other winding temperatures revealed that temperatures were 21 to 27C lower in the improved design transformer compared to the transformer similiar to the failed transformer.

III CORRECTIVE ACTION TO PREVENT RECURRENCE

Six new input transformers with cooling air ducts between transformer coil layers, larger size conductors in the transformer coil winding, and Class F insulation for the transformer coils were installed in Battery Charger Nos. 3, 3S, and 4.

IV CONCLUSION

Inspection and tests indicated that the design of the input transformers was marginal resulting in operating temperatures high enough to degrade the insulation which resulted in failure of one transformer.

Corrective action consisted of replacing all input transformers with tranformers of an improved design.

Very truly yours,

A. D. Schmidt
Director of Power Resources

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