



Turkey Point Plant  
December 11, 1973

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



TURKEY POINT UNITS NO. 3 AND 4  
DOCKET NUMBERS 50-250 AND 50-251  
SPECIAL MAINTENANCE REPORT NO. 73-1  
TORQUE CHECK OF FISCHER AND PORTER COMPANY  
ELECTRONIC DIFFERENTIAL PRESSURE TRANSMITTERS

Dear Mr. O'Leary:

This report is submitted in accordance with Technical Specification 6.6.3.d, Operating License Numbers DPR-31 and DPR-41. The special maintenance was performed on October 23-25, 1973, for Unit No. 3, and on November 3-5, 1973, for Unit No. 4.

I. BACKGROUND

During the startup and initial operation of Turkey Point Units 3 and 4, a significant number of Fischer and Porter Company Electronic Differential Pressure Transmitters, Model 2495 and Model 2496, were found to have failed internally. After the startup of Turkey Point Unit No. 4 in June, 1973, the high level of maintenance required to keep these transmitters operational became of concern to staff and plant personnel of Florida Power and Light Company. A meeting was held on August 1, 1973 with Fischer and Porter Company personnel to discuss the cause of the high failure rate and corrective action. At this meeting it was agreed that Florida Power and Light Company would provide Fischer and Porter Company with five failed units which would be disassembled completely at the factory and evaluated to determine what had caused the failure.

In a letter dated October 1, 1973, Florida Power and Light Company was advised by Fischer and Porter Company that all five of the failed transmitters had lost their fill fluid and failed. The through-bolts on the process flanges for these five transmitters were not torqued to the manufacturer's recommended torque value. The postulated failure mechanism is an elongation of the through-bolts due to inadequate bolt torque, with a subsequent loss of fill fluid under process pressures.

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## II. CORRECTIVE MAINTENANCE ACTION TAKEN

The initial corrective action taken was to measure the torque on the through-bolts of all Fischer and Porter Company electronic differential pressure transmitters. Maintenance Procedure 0707.3 was written and approved to conduct the torque check. The Unit No. 3 transmitters were checked during a maintenance shutdown on October 23-25, 1973, and the Unit No. 4 transmitters were checked during a maintenance shutdown on November 3-5, 1973. The arithmetic average torque for the four through-bolts on each transmitter was calculated and the following information obtained:

1. Three of ninety-four 3000 psig working pressure transmitters were found properly torqued to the manufacturer's recommended torque of eighty foot-pounds. Approximately seventy per cent (70%) of the transmitters had torque values less than one half (1/2) of the recommended torque. The lowest average torque measured was 19.2 foot-pounds.
2. Three of ten 1500 psig working pressure transmitters were found properly torqued to the manufacturer's recommended torque of forty foot-pounds. The average torque values were greater than one-half of the recommended torque on all transmitters.
3. On November 7, 1973, the five transmitters that were evaluated by Fischer and Porter Company personnel were returned to the Turkey Point Plant after repair. The as-received torque was measured by plant personnel. All four of the 3000 psig working pressure transmitters were found below the required torque of eighty foot-pounds; the one 1500 psig working pressure transmitter was found torqued satisfactorily.

All transmitters were retorqued to the correct value in accordance with Maintenance Procedure 0707.3. The Fischer and Porter Company was notified of the results of the torque check in a letter dated November 9, 1973.

Followup investigation and testing was performed as follows:

1. On November 10, 1973, a Fischer and Porter Company Model 10B2496PB electronic differential pressure transmitter (3000 psig working pressure) was tested at Turkey Point Plant as follows:
  - (a) The four through-bolts on the process flanges were loosened and then carefully torqued to eighty foot-pounds.
  - (b) The transmitter was pressurized to the hydrostatic test pressure recommended by the manufacturer, 4100 psig, for a period of ten minutes.
  - (c) The hydrostatic test pressure was released and the torque was measured. The torque had reduced to seventy foot-pounds on all four bolts.

2. On November 11, 1973, the stainless steel through-bolts on the same transmitter were replaced with high tensile strength bolts fabricated from A.I.S.I. Type 4130 low alloy carbon steel. The test performed on November 10, 1973, was repeated; the through-bolt torque remained eighty foot-pounds.
3. A review of the instrument records was performed to determine the failure rate of the differential pressure transmitters in various pressure environments. The following results were obtained for operations subsequent to August, 1971:

<u>Pressure Environment</u>	<u>Design Pressure</u>	<u>Number of Units Installed</u>	<u>Number of Units Failed</u>
Reactor Coolant System	2485 psig	22	11
Charging System	2735 psig	8	3
Safety Injection System	1750 psig	8	0
Feedwater System	1525 psig	12	6
Steam Generator System	1200 psig	36	15
Residual Heat Removal System	600 psig	2	0
Low Pressure Letdown System	500 psig	2	1
Component Cooling System	150 psig	4	1
Boric Acid Tank Level	atmospheric	3	0

There were five transmitters that failed during prestartup checks (prior to September, 1971)

The postulated failure mechanism of elongating the through-bolts under pressure appears to be credible in view of the results of the testing to date. The decision on final corrective action will be determined after the Fischer and Porter Company has completed testing and has recommended corrective action.

### III. EVALUATION OF SAFETY IMPLICATIONS

All transmitters affected had failed in the safe (tripped) condition upon loss of fill fluid. The steam generator level transmitters failed to maximum output and caused a single channel Hi-Hi Steam Generator Level Turbine Trip signal, which would trip the turbine and reactor if the second trip signal occurred and tripped the 2/3 logic matrix. All other transmitters failed to zero output and caused a single channel trip signal for either Low Reactor Coolant Flow, Low Steam Generator Feedwater Flow, or Low Steam Generator Steam Flow. There are no trip signals associated with the remaining transmitters.

### V. SUMMARY OF THE SPECIAL MAINTENANCE

1. High maintenance was experienced on Fischer and Porter Company Electronic Differential Pressure Transmitters due to internal failures.
2. An evaluation by Fischer and Porter Company factory personnel revealed that the failures are due to inadequate torque on the through-bolts for the process flanges of the transmitter. The postulated cause is an elongation of the through-bolts under pressure.

3. The torque on the through-bolts of all Fischer and Porter Company Electronic Differential Pressure Transmitters at the Turkey Point Plant was checked and found to be below the required torque value for nearly all transmitters, including those transmitters recently received from the factory. All through-bolts were torqued to the manufacturer's recommended torque value. Fischer and Porter Company representatives have been notified of the results of the torque check.
4. Testing at Turkey Point Plant subsequent to the torque check confirmed that the through-bolts are elongating.
5. The final corrective maintenance will be determined after the manufacturer's recommendations have been received.
6. This special maintenance has not resulted in any danger to the public health and safety, nor has safe operation of the reactor been jeopardized.

We will keep you advised of progress on this problem and of final corrective action.

  
A. D. Schmidt

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cc: Mr. Norman C. Moseley