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Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 1217
230 Peachtree Street, NW.
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - EXCESSIVE ERCW SYSTEM HEAD
LOSS - NCR 1003 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Region II,
Inspector J. K. Rausch, on February 28, 1978. Enclosed is our
final report on this deficiency.

Very truly yours,

J. E. Gilleland
Assistant Manager of Power

Enclosure

cc: Dr. Ernst Volgenau, Director (Enclosure) ✓
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 EXCESSIVE ERCW SYSTEM HEAD LOSS - NCR 1003

FINAL REPORT

Description of Deficiency

Following problems at operating TVA power plants which were traced to insufficient cooling water flow, a detailed investigation was made of the Sequoyah Nuclear Plant's essential raw cooling water (ERCW) system. As a result of the Sequoyah investigation, the ERCW system at Watts Bar Nuclear Plant was investigated (see Sequoyah NCR 71D). The head requirements for various subloops of the Watts Bar ERCW system were evaluated by comparison with the corresponding subloops in the Sequoyah ERCW system. (This comparison is possible because the ERCW piping in the two plants is similar.) The comparison revealed that five ERCW subloops at Watts Bar Nuclear Plant have friction head losses in excess of the available head for the case of loss of downstream dam. These loops are:

- a. Station Air Compressor Intercooler
- b. Safety Injection Pump Room and Oil Cooler
- c. Containment Spray Pump Room Cooler
- d. EL. 713 Penetration Room Cooler
- e. Pipe Chase Cooler 2-A

All of the subloops named above are essential loads on the ERCW system except the station air compressor intercooler. The station air compressor intercooler is a highly desirable system but not considered essential to ensure that a safe shutdown condition can be reached and maintained.

This deficiency was caused by a failure to perform detailed design calculations on some of the small subloops of the ERCW system. Estimates of the flow losses in these small subloops were made and incorporated into the design which have since proved to be inadequate. Since the initial design of the ERCW system at Sequoyah and Watts Bar Nuclear Plants, engineering procedures and quality assurance programs have been implemented to ensure adequate design and review.

Safety Implications

If this deficiency had remained uncorrected and the downstream dam had failed, the plant could have been maintained in a safe condition without the function of the equipment on the deficient loops. If an accident had occurred in the plant coincident with the loss of downstream dam, overheating of some of the safety-related equipment used to mitigate the accident may have occurred. Overheating and possible resulting malfunction of this equipment may have jeopardized the safe shutdown of the plant.

Corrective Actions

Detailed head loss calculations were performed for the complete ERCW system at Sequoyah Nuclear Plant. Because of the similarity between the ERCW systems for Sequoyah Nuclear Plant and Watts Bar Nuclear Plant, the head loss calculations made for Sequoyah were applicable to corresponding subloops of the Watts Bar ERCW system. Based on the Sequoyah detailed calculations and a conservative fouling factor, new piping specifications (both in materials and piping diameter) have been formulated for the Watts Bar ERCW system.

Procurement of replacement piping to the revised specifications has begun. All design changes required to ensure the ERCW system can meet the preoperational test requirements are expected to be completed by June 1, 1978.