TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

December 22, 1983

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WBRD-50-390/83-24
WBRD-50-391/83-23

U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - SPACING AND CLEARANCE OF SPRINKLER HEADS IN THE HPFP SYSTEM - WBRD-50-390/83-24, WBRD-50-391/83-23- FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector L. Watson on March 31, 1983 in accordance with 10 CFR 50.55(e) as NCR W-110-P. Interim reports were submitted on April 28, June 24, and October 17, 1983. Enclosed is our final report.

If you have any questions, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing

Enclosure
cc: Mr. Richard C. DeYoung, Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Records Center (Enclosure)
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
Atlanta, Georgia 30339

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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
SPACING AND CLEARANCE OF SPRINKLER HEADS IN THE HPFP SYSTEM
NCR W-110-P
WBRD-50-390/83-24, WBRD-391/83-23
10 CFR 50.55(e)
FINAL REPORT

Description of Deficiency

Sprinkler system heads in the various plant areas have not been installed in strict compliance with National Fire Protection Association (NFPA) Standard 13. TVA committed to compliance with this standard in a letter from J. E. Gilleland (TVA) to R. S. Boyd (NRC) dated April 18, 1977.

The deviations from NFPA 13 are of the following types:

1. Sprinkler head located less than six feet apart with no intervening structure or baffle to prevent cold soldering.

2. Sprinkler head spray patterns significantly reduced by proximity of seismically qualified pipe hangers, HVAC duct, conduit, cable trays, and pipe.

3. Incomplete spray coverage due to item number 2.

4. Sprinkler heads located beyond maximum allowable distance below ceiling with no heat collectors.

5. Sprinkler heads damaged by construction activities.

The root cause of this deficiency was a lack of understanding by design and construction personnel for the necessity of maintaining adequate spray patterns and sprinkler head placement. If the personnel involved had an adequate understanding of these requirements, the deficiency would never have occurred.

Sprinkler system deficiencies have been a generic problem at all nuclear power plants within the TVA system. This issue was addressed by TVA and the NRC at Browns Ferry and Sequoyah Nuclear Plants during the plant licensing process. A program has been implemented for Bellefonte Nuclear Plant to address sprinkler deficiencies during the construction process. This program involves the training of design personnel and inclusion of specific guidance on sprinkler head placement in drawings issued to construction personnel.

Safety Implications

If the deficiencies were not corrected, the effectiveness of the involved suppression system could be impaired during a fire. Fire damage to safe shutdown equipment could exceed the limits established in 10 CFR 50 Appendix R.

Corrective Action

During the months of April and May of 1983, an inspection team consisting of personnel from TVA's Divisions of Engineering Design (EN DES), Construction (CONST), and Nuclear Power (NUC PR) conducted a walk-down of the sprinkler systems within the reactor building, control building, auxiliary building, intake pumping station, diesel generator building, security power and backup-building, transformer yard, and unit 1 annulus. Existing discrepancies, as discussed above in the "Description of Deficiency," were identified and corrective actions were determined. These corrective actions include the relocation of sprinkler heads and piping, the addition of heat collectors and baffles, and replacing of damaged sprinkler heads. These actions are being implemented under engineering change notice (ECN) 3867.

Subsequent to the system walk-down, additional sprinkler obstructions have been created by the installation of pipe and duct insulation, hangers, and missile barriers. To address these obstructions and any new obstructions resulting from the continuing construction process, the following actions are being taken:

1. A second walk-down of the sprinkler system was conducted in October and November of 1983, by the same organizations involved in the first walk-down. All new deficiencies identified during the second walk-down are being corrected by Field Change Requests (FCRs).

2. A drawing (47A491-1B) defining the acceptance criteria for sprinkler obstructions has been issued. This drawing will be used for field evaluation of potential obstructions. These evaluations will cover construction activities after the start of the second walk-down and will be made on a continuing basis as the construction process continues. Any deficiencies identified during the evaluations will be corrected immediately by FCRs.

3. Notes defining the criteria for installing heat collectors and baffles have been added to the fire protection mechanical piping drawings (47W490-series, 47W491-series, 47W492-series). These criteria will be followed when relocating sprinkler heads under ECN 3867 and the FCRs for items 1 and 2.