

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

October 29, 1985

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WBRD-50-391/82-04

U.S. Nuclear Regulatory Commission
Region II
Attention: Dr. J. Nelson Grace, Regional Administrator
201 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Dear Dr. Grace:

WATTS BAR NUCLEAR PLANT UNIT 2 - FOAM SEALS IN MECHANICAL PIPE SLEEVES -
WBRD-50-391/82-04 - FINAL REPORT FOR UNIT 2

The subject deficiency was initially reported to NRC-OIE Inspector R. V. Crlenjak on December 4, 1981 in accordance with 10 CFR 50.55(e) as NCR WDN CEB 8118. A number of interim reports have been submitted and enclosed is our final report for unit 2.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. A. Damer
J. W. Hufham, Manager
Licensing and Risk Protection

Enclosure

cc: Mr. James Taylor, Director (Enclosure)
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Washington, D.C. 20555

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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNIT 2
FOAM SEALS IN MECHANICAL PIPE SLEEVES
WBRD-50-391/82-04
NCR WBN CEB 8118 R3
10 CFR 50.55(e)
FINAL REPORT FOR UNIT 2

Description of Deficiency

Some wall penetration piping sleeves shown on TVA drawing series 47W470 and 47W471 have rigorously analyzed safety-related piping routed through them. Silicone sealants are provided between the pipe and sleeve at certain locations as shown on TVA series 47W472. These seals had not been considered by the piping analyst for most cases and thereby could result in increases in pipe stresses and support loads for some situations. The maximum pipe movements at the sleeves could cause failures of the sealant to perform its intended design function as a pressure, water, and/or fire protection seal.

TVA has determined that the cause of this deficiency involves two areas:

1. The drawings indicating the sleeve arrangement were not squadchecked to the piping analysts--a lack of identification control of interfaces.
2. There was no design criteria or other documentation to address the consideration of the foam sleeve seals--inadequate procedures to control the analysts' activities.

Safety Implications

TVA has analyzed this deficiency and determined that for pipe movement greater than 1 inch, the foam may exert forces on the piping system. If this condition were to have remained uncorrected it could have resulted in excessive stresses on the affected piping under design basis accident conditions, which could have adversely affected the safe operation of the plant.

Corrective Action

In order to determine the resistance of the foam-to-pipe movement and thus its ability to exert adverse forces on the piping system for large movements, a series of tests were conducted for various pipe/sleeve configurations. The measured spring constants of the foam were found to be very small compared to the stiffness of a rigid support. CEB Report 82-9 compares the spring constants of the foam to the spring constants of the other phenomena which are considered insignificant.

The foam seal stiffness was found to be insignificant except for pipe movements exceeding 1 inch. The measurements of pipe movements have been completed and two seals have been identified with movements greater than 1 inch. Boot seals will be required to replace the foam sealant at sleeves mark Nos. 444B in the auxiliary building and 603 in the reactor building. This work will be performed in accordance with engineering change notice (ECN) 4858 and field change requests (FCRs) M11086 and M30328. TVA anticipates to have this work complete by January 15, 1986, contingent upon a material delivery date of December 1, 1985.

NCR SQN CEB 8108 documented a concern for separation of silicone foam penetration seals at SQN. The final report on that NCR stated that a field survey of approximately 50 of the SQN penetrations, where large pipe movements have been experienced, revealed no loss of seal integrity. Between February 15 and May 2, 1983, an inspection of all fire-rated silicone foam penetration seals in the safety-related areas of SQN were inspected per surveillance instruction 233. This inspection did not identify any problems with foam separation. The foam seals were again inspected and documented on November 9, 1983, at SQN during operation, and no degradation of the seals was observed. Operating experience at SQN has shown that the foam seals are not jeopardized by pipe movements. As such, it is concluded that sealant integrity at WBN will not be jeopardized by pipe movement.

To prevent recurrence of this problem, two procedural documents have been developed to guide the sleeve designer and piping analysts. Rigorous Analysis Handbook instructions have been provided to the piping analyst. Also, Mechanical Design Standard DS-M5.2.6 has been developed to aid the sleeve designer in determining proper seals in the future. In addition, the integrity of the fire and pressure seals will be inspected and maintained per surveillance instruction 4.7.12.1.