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W3F192-0396
A4.05
QA

December 31, 1992

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Boraflex Surveillance Program

Gentlemen:

Waterford 3 committed in December 1987 to propose to the NRC by January 1, 1993 an appropriate surveillance program for surveillance of Boraflex in the spent fuel storage racks. The purpose of this letter is to provide to the NRC the information which satisfies this commitment including a discussion of the detailed commitments and the description of the proposed surveillance program. This information is provided in the attachment to this letter.

Please contact me or Robert J. Murillo should there be any questions regarding this letter.

Very truly yours,

R.F. Burski
Director, Nuclear Safety

RFB/RJM/dc
Attachment
cc: J.L. Milhoan, NRC Region IV
D.L. Wigginton, NRC-NRR
R.B. McGehee
N.S. Reynolds
NRC Resident Inspectors Office

A001

Attachment to Letter W3F192-0396

A. Background

The pertinent information regarding the Boraflex surveillance program was documented in the following documents: Louisiana Power and Light (LP&L) letter W3P87-2055 dated 9/16/87, LP&L Letter W3P87-2527 dated 12/15/87, and NRC Safety Evaluation Report (SER) dated 12/21/87. These documents established NRC and Waterford 3 agreement for the following commitments:

1. The current Boraflex coupon surveillance commitment will not be performed.

2. Waterford 3 will develop a log to track the gamma dose buildup in the spent fuel storage racks (SFSR).

3. Waterford 3 will provide the NRC by January 1, 1993 with actual data, from nondestructive techniques, on several Boraflex panels to verify that the poison material has not been unacceptably degraded by the formation of gaps.

4. Waterford 3 will provide the NRC by January 1, 1993 with a surveillance program to verify the effectiveness of the Boraflex poison material in the Waterford 3 spent fuel storage racks. This surveillance program will be based on the latest industry developments on Boraflex surveillance methods and techniques as well as studies on Boraflex degradation mechanisms from radiation exposure.

B. Commitment Resolution

The resolution for each of the foregoing commitments is the following:

1. The Boraflex coupon surveillance program was terminated and is not active.

2. Waterford 3 maintains a database of the calculated Boraflex panel gamma exposures in the Waterford 3 SFSR.

3. Testing of Boraflex panels was performed in November, 1992. A review of the test results indicates that the Boraflex continues to perform its intended neutron attenuation function. Additional information is provided in section C of this attachment.

4. The proposed surveillance program has been developed, and it is described in section D of this attachment.

C. Testing of Boraflex Panels

Testing of a representative sample of Boraflex panels was performed in November, 1992. A review of the test results indicates that the Boraflex continues to perform its intended neutron attenuation function.

Testing was conducted to test the highest exposed panels for gaps. The test results are therefore bounding on expected gap formation in the Boraflex.

The following is a summary of the test results:

Number of Panels Tested	=	697
Total Number Of Gaps	=	185
Number of Panels With No Gap	=	538
Average Exposure	=	8.03E+09 rads
Maximum Exposure	=	1.66E+10 rads
Number of Panels With 1 Gap	=	136
Average Exposure	=	8.93E+09 rads
Maximum Exposure	=	1.66E+10 rads
Average Gap Size (A&B)	=	2.17 inches
Maximum Gap Size (A&B)	=	3.57 inches
Number of Panels With 2 Gaps		20
Average Exposure	=	9.00E+09 rads
Maximum Exposure	=	1.62E+10 rads
Average Gap Size (A&B)	=	2.04 inches
Maximum Gap Size (A&B)	=	2.74 inches
Number of Panels With 3 Gaps	=	3
Average Exposure	=	1.01E+10 rads
Maximum Exposure	=	1.31E+10 rads
Average Gap Size (A&B)	=	1.05 inches
Maximum Gap Size (A&B)	=	1.24 inches

The distribution of gaps size indicates that the Boraflex is performing as expected based on EPRI/industry data. EPRI data indicates that after approximately 7x10E+09 rads, shrinkage, and gap formation, of the panels reaches a maximum value.

We expect that the locations with fuel currently stored will have a much lower number of gaps, due to being in lower exposed areas.

Attachment To Letter W3F192-0396

D. Description of Boraflex Surveillance Program

Objective

The objectives of the Boraflex surveillance program are:

1. To verify the effectiveness of the Boraflex poison material in the SFSR.

2. To ensure the requirements of Technical Specification 5.6.1 are met. These requirements are:

   The spent fuel storage racks are designed and shall be maintained with:

   a. A k_{∞} equivalent to less than or equal to 0.95 when flooded with unborated water, which includes a conservative allowance for uncertainties.

   b. A nominal 10.38 center-to-center distance between fuel assemblies placed in the spent fuel storage racks.

3. To ascertain the rate of change (gap formation) in the Boraflex and determine the interval between surveillances.

Methodology

The Boraflex surveillance program at Waterford 3 will consist of the following:

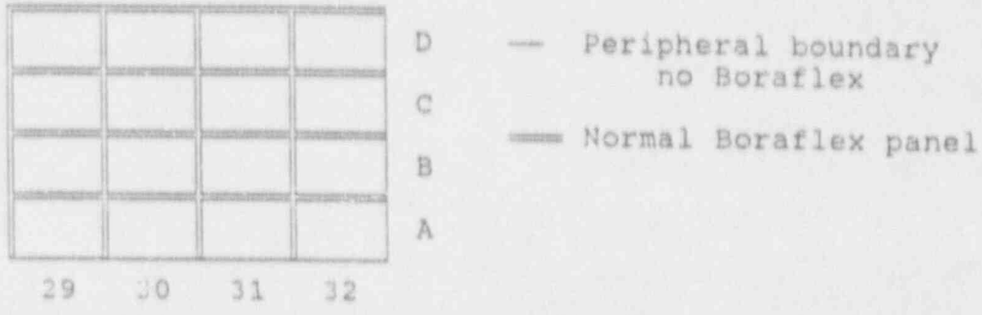
1. Tracking of the gamma exposure of the Boraflex panels.

2. Periodic nondestructive testing ("blackness" testing) of selected Boraflex panels to determine the extent of gap formation. The proposed schedule for the blackness testing is four (4) year intervals but no later than 12/31/94 for the next testing with the exact schedule being determined by the rate of gap formation.

   The results of the nondestructive testing will be compared to industry data and EPRI sponsored research. The Waterford 3 SFSR criticality analysis will be reviewed by April 15, 1993 based on EPRI data for maximum expected gap formation. The review will be performed by modeling the current status of the Boraflex panels and projecting the expected gap formation due to calculated exposure through 12/31/94. Data collected in November, 1992 will provide a baseline for the trending of gap formation.

Waterford 3 will have lead exposure cells in the SFSR to ensure that degradation due to gamma exposure will be identified early. These 16 cells will have freshly discharged fuel loaded into them following refueling outages, and these cells will be tested during each nondestructive test. The configuration of these cells in the SFSR is shown in Figure One (1).

FIGURE ONE



Since these locations contain some of the leading exposure panels, fuel will not be placed into these cells until the review of the criticality analysis is complete. These lead exposure cells will provide data for the performance of Boraflex under gamma exposure and early indication of unacceptable trends. These cells are expected to lead the SFSR in gap formation.

3. Periodic destructive testing of selected panels if engineering assessment determines a need for destructive testing. The need for destructive testing will be determined by a review of nondestructive test results, trend data, and industry experience.

4. Monitoring of industry developments to determine the latest methods for testing Boraflex and to determine Boraflex performance at other sites.

Summary

The Boraflex surveillance program will provide sufficient data to verify the effectiveness of the Boraflex poison material and to review the SFSR criticality analysis. Additionally, it will provide trending data for changes in the Boraflex with gamma exposure and thus provide a technical basis for taking early corrective action if problems arise. The surveillance program satisfies the program objectives and provides assurance that the margin of safety in the SFSR will be maintained.