

January 12, 2005

10 CFR 54

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Washington, D.C. 20555-0001

Gentlemen:

In the Matter of)	Docket Nos.	50-259
Tennessee Valley Authority)		50-260
			50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 1, 2, AND 3 LICENSE RENEWAL APPLICATION - TIME LIMITED AGING ANALYSIS (TLAA) FOR REACTOR BUILDING CRANE LOAD CYCLE SECTION 4.7.1 - RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) (TAC NOS. MC1704, MC1705, AND MC1706)

By letter dated December 31, 2003, TVA submitted, for NRC review, an application pursuant to 10 CFR 54, to renew the operating licenses for the Browns Ferry Nuclear Plant, Units 1, 2, and 3. As part of its review of TVA's license renewal application, the NRC staff, by letter dated December 14, 2004, identified an area where additional information is needed to complete its review.

The specific area requiring a request for additional information (RAI) is related to the TLAA for the Reactor Building Crane Load Cycles, Section 4.7.1.

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The enclosure to this letter contains the specific NRC requests for additional information and the corresponding TVA response.

If you have any questions regarding this information, please contact Ken Brune, Browns Ferry License Renewal Project Manager, at (423) 751-8421.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 12th day of January, 2005.

Sincerely,

Original signed by:

T. E. Abney
Manager of Licensing
and Industry Affairs

Enclosure:
cc: See page 3

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Enclosure

cc (Enclosure):

State Health Officer
Alabama Department of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, Alabama 36130-3017

Chairman
Limestone County Commission
310 West Washington Street
Athens, Alabama 35611

(Via NRC Electronic Distribution)

Enclosure

cc (Enclosure):

U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303-8931

Mr. Stephen J. Cahill, Branch Chief
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303-8931

NRC Senior Resident Inspector
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, Alabama 35611-6970

NRC Unit 1 Restart Senior Resident Inspector
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, Alabama 35611-6970

cc: continued page 4

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cc (Enclosure) :

Margaret Chernoff, Project Manager
U.S. Nuclear Regulatory Commission
(MS 08G9)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

Eva A. Brown, Project Manager
U.S. Nuclear Regulatory Commission
(MS 08G9)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

Yaira K. Diaz-Sanabria, Project Manager
U.S. Nuclear Regulatory Commission
(MS 011F1)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

Ramachandran Subbaratnam, Project Manager
U.S. Nuclear Regulatory Commission
(MS 011F1)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

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GLS:BAB

Enclosure

cc(Enclosure):

A. S. Bhatnagar, LP 6-C
K. A. Brune, LP 4F-C
J. C. Fornicola, LP 6A-C
F. C. Mashburn, BR 4X-C
R. G. Jones, NAB 1A-BFN
K. L. Krueger, POB 2C-BFN
R. F. Marks, Jr., PAB 1A-BFN
N. M. Moon, LP 6A-C
J. R. Rupert, NAB 1F-BFN
K. W. Singer, LP 6A-C
M. D. Skaggs, PAB 1E-BFN
E. J. Vigluicci, ET 11A-K
NSRB Support, LP 5M-C
EDMS, WT CA-K

s://Licensing/Lic/BFN LR TLAA Reactor Building Crane Load Cycle Section 4.7.1 RAI TVA
Response Letter1.doc

ENCLOSURE

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA),

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI),
RELATED TO THE TIME LIMITED AGING ANALYSIS FOR REACTOR BUILDING
CRANE LOAD CYCLE, SECTION 4.7.1

(SEE ATTACHED)

**TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA),**

**RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI),
RELATED TO THE TIME LIMITED AGING ANALYSIS FOR REACTOR BUILDING
CRANE LOAD CYCLES, SECTION 4.7.1**

By letter dated December 31, 2003, the Tennessee Valley Authority (TVA) submitted, for NRC review, an application pursuant to 10 CFR 54, to renew the operating licenses for the Browns Ferry Nuclear Plant, Units 1, 2, and 3. As part of its review of TVA's license renewal application, the NRC staff, by letter dated December 14, 2004, identified an area where additional information is needed to complete its review.

The specific area requiring a request for additional information (RAI) is related to the TLAA for the Reactor Building Crane Load Cycles, Section 4.7.1.

Listed below are the specific NRC requests for additional information and the corresponding TVA responses.

NRC RAI 4.7.1-1

Reactor Building Crane Load Cycles

Section 4.7.1 of the LRA, describes the analysis of the reactor building crane. This section states that the total number of expected cycles for this crane over the entire life including construction is 60 years of operation for all three units. This includes decommissioning which is conservatively estimated at less than 21,000 loading cycles. LRA aging management program (AMP), B.2.1.20, includes an evaluation of the reactor building crane fatigue. It states that the disposition of the time-limited aging analysis (TLAA) is that the analyses are valid through the period of extended operation because the 60 year, 7,500 cycle estimate remains a small fraction of the 100,000 cycle design. TVA letter to the NRC dated September 28, 1982, in response to NUREG-0612, states that the structural and rotating parts of the crane were designed for infinite life. Clarify if infinite life is still valid or explain the derivation for the total number of loading cycles estimated for the reactor building crane. Also, explain the difference between the 21,000 cycles estimated in LRA Section 4.7.1 and the

7,500 cycles estimated in LRA Section B.2.1.20. If the crane design does not provide for infinite life, clarify if additional loading cycles caused by vibration during crane operation are considered in the analysis or the basis for not including loading cycles induced by vibration.

TVA Response to NRC RAI 4.7.1-1

7,500 vs. 21,000 CYCLES

A conservative estimate of Reactor Building Crane usage resulted in less than 21,000 total lifts of 0.5 to 122.5 tons, over 60 years of operation for all three units, plus construction and decommissioning. The estimated loads for these lifts are:

Near Rated Load Lifts (122.5 ton) - < 1,000 Lifts

Moderate Load Lifts (30 to 100 ton) - < 10,000 Lifts

Light Load Lifts (0.5 - 30 ton) - < 10,000 Lifts

This results in approximately 7,500 full load equivalent cycles. (See Attachment 1 for Calculation)

This also results in less than 21,000 total lifts, of which less than 1,000 lifts are near 90% of the rated capacity.

LRA AMP B.2.1.20 discusses the cycle count as it applies to fatigue evaluation of the crane. Fatigue evaluations typically compare full load equivalent cycle counts to the allowable cycle count. While this discussion states "7500 cycles", it was implied that these are full load equivalent cycles, as it is included in a fatigue evaluation discussion.

LRA 4.7.1 & B.2.1.20 vs. TVA letter of September 28, 1982:

For license renewal the reactor building crane was evaluated for fatigue in accordance with the applicable portions of Crane Manufacturers Association of America, Inc. (CMAA) 70. The TVA letter of September 28, 1982 does not evaluate fatigue in accordance with CMAA 70. This letter defined 40% of the tensile strength as the endurance limit and compared the maximum stress to this limit. As this limit was met with significant margin, it concluded the structural components were designed for infinite life. While this analysis is reasonable, it is not in accordance with CMAA 70. Therefore, the results of the

evaluation for license renewal supercede the September 28, 1982 results provided to NRC.

Vibration due to Crane Operation:

A review of the operating experience indicates that vibration in the structural components has not been noticed or reported for the BFN Reactor Building Crane. Therefore, a need to consider vibration in the structural components is not apparent at this time.

This review did reveal that non-structural vibration, such as motor or motor generator set vibration has been reported, measured, and promptly corrected. Additionally, normal wear issues concerning the crane have been identified and corrected promptly. The motor and motor generator set vibration observations and wear issues with their subsequent correction provide assurance that crane related problems are being reported and addressed when present.

Attachment 1

Calculation of Full Load Equivalent Cycles

Rated Capacity = 125 ton

Near Rated Load Lifts (122.5 ton) – < 1,000 Lifts

$$\text{Full Load Equivalent Cycles} = (122.5/125) \times 1,000 = 980$$

Moderate Load Lifts (30 to 100 ton) – < 10,000 Lifts

$$\text{Full Load Equivalent Cycles} = \{[(30+100)/2]/125\} \times 10,000 = 5,200$$

Light Load Lifts (0.5 – 30 ton) – < 10,000 Lifts

$$\text{Full Load Equivalent Cycles} = \{[(0.5+30)/2]/125\} \times 10,000 = 1,220$$

Total Full Load Equivalent Cycles = 7,400