

Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

Richard T. Purcell
Site Vice President, Watts Bar Nuclear Plant

May 6, 1998

TVA-WBN-TS-98-002

10 CFR 50.90

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

Gentlemen:

In the Matter of) Docket No(s).. 50-390
Tennessee Valley Authority)

**WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 - TECHNICAL
SPECIFICATION (TS) CHANGE NO. 98-002 - CHANGES TO NEW FUEL
VAULT STORAGE REQUIREMENTS FOR INCREASED FUEL ENRICHMENT**

In accordance with the provisions of 10 CFR 50.4 and 50.90, TVA is submitting a request for an amendment to WBN's license NPF-90 to change the TSs for Unit 1. The amendment addresses changes to the new fuel vault storage requirements to allow fuel enrichments up to 5.0 weight percent U-235.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the change is exempt from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). The WBN Plant Operations Review Committee and the WBN Nuclear Safety Review Board have reviewed this proposed change and determined that operation of WBN Unit 1 in accordance with the proposed change will not endanger the health and safety of the public. Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosures to the Tennessee State Department of Public Health.

9805180419 980506
PDR ADDCK 05000390
P PDR

11
D030

U.S. Nuclear Regulatory Commission

Page 2

MAY 06 1998

Enclosure 1 to this letter provides the description and evaluation of the proposed change. This includes TVA's determination that the proposed change does not involve a significant hazards consideration and is exempt from environmental review. Enclosure 2 contains copies of the appropriate TS pages from Unit 1 marked-up to show the proposed change. Enclosure 3 forwards the revised TS pages for Unit 1 which incorporate the proposed change. Enclosure 4 provides the Westinghouse analysis dated June 1990. Enclosure 5 provides the list of commitments for this submittal.

NRC has previously approved an amendment similar to this one for TVA's Sequoyah Nuclear Plant. TVA requests that NRC's approval be prior to receipt of new fuel currently scheduled for early 1999. TVA also requests that the revised TS be made effective within 30 days of NRC's approval. If you have any questions about this change, please contact P. L. Pace at (423) 365-1824.

Sincerely,



R. T. Purcell

Enclosures

cc: See page 3

Subscribed and sworn to before me
on this 6th day of May 1998.

E. Jeannette Long
Notary Public

My Commission Expires

June 27, 2001

U.S. Nuclear Regulatory Commission

Page 3

MAY 06 1998

cc (Enclosures):

NRC Resident Inspector
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

Mr. Robert E. Martin, Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852

U.S. Nuclear Regulatory Commission
Region II
Atlanta Federal Center
61 Forsyth St., SW,
Suite 23T85
Atlanta, Georgia 30303

Mr. Michael H. Mobley, Director
Div. of Radiological Health
3rd Floor
L & C Annex
Nashville, Tennessee 37243

ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1
DOCKET NO. 50-390

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-98-002
DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGE

I. DESCRIPTION OF THE PROPOSED CHANGE

TVA proposes to modify the Watts Bar Nuclear Plant (WBN) Unit 1 Technical Specifications (TSs) by revising the allowed enrichment of fuel stored in the new fuel storage racks from 4.3 to 5.0 weight percent U-235. This revision also places limitations on fuel storage locations that may be utilized in these racks. These limitations are depicted in a new Figure 4.3-2 which is added to TS Section 4.3 for fuel storage requirements. The revised TS Section 4.3.1.2 does not change the requirements for k_{eff} under optimum moderation conditions but does provide additional limits on k_{eff} when flooded with unborated water.

Due to the simplicity of the unused cell pattern, no physical modification to the unused cells is planned. Plant procedures will be changed to prevent the use of these cell locations.

II. REASON FOR THE PROPOSED CHANGE

TVA requested Westinghouse Electric Corporation to perform an analysis to support the storage of new fuel in the new fuel vault storage racks that exceeded a 4.3 weight percent U-235 but would be bounded to no more than 5.0 weight percent U-235. Enclosure 4 provides a copy of a Westinghouse analysis which imposed limitations on the fuel storage locations that could be utilized and still maintain the required k_{eff} limits.

TVA has not used this analysis because there has not been a need to use fuel with enrichments of greater than 4.3 weight percent U-235. For WBN cycle three operation, the required fuel enrichment will exceed the current limit with some new fuel that is enriched to 4.4 weight percent U-235. For this reason, TVA is pursuing a TS change to support the cycle three operation of WBN and is implementing the more restrictive limitations on acceptable fuel storage locations as evaluated by Westinghouse.

III. SAFETY ANALYSIS

TS Section 4.3.1.2 provides k_{eff} limits for new fuel such that the storage of this fuel in dry or flooded racks will

remain below acceptable levels and prevent the fuel from becoming critical. Westinghouse Electric Corporation has performed an analysis to support the proposed revision of the acceptable fuel enrichment and the storage location limitations required to support this analysis. Since the development of this analysis by Westinghouse, two changes have occurred that require evaluation to ensure the validity and acceptability of this analysis at WBN. The first change involves the upgrade to Westinghouse fuel with Performance Plus features. The fuel assembly modeled by Westinghouse in this analysis is the 17x17 STANDARD design. The Vantage 5H (V5H) design was also evaluated and deemed equivalent. Since this analysis was performed, WBN upgraded from the STANDARD design to the Vantage 5H design for cycle 1 and then to the Westinghouse fuel product with enhanced features (Performance Plus) for subsequent reload cycles. A comparison of the fuel design parameters relevant to the criticality analysis was performed as follows:

Parameter	W V5H	W Performance Plus	Change	Effect on Reactivity
UO2 pellet:				
• density (%)	96	96	None	None
• diameter (in)	0.3225	0.3225	None	None
Rod:				
• pellet/clad gap (in)	0.00325	0.00325	None	None
• clad material	zirc-4	ZIRLO	Slight	Decrease - More neutron absorption
• clad thickness (in)	0.0225	0.0225	None	None
• outer diameter (in)	0.374	0.374	None	None
• inner diameter(in)	0.329	0.329	None	None
• pitch (in)	0.496	0.496	None	None
Guide Tube:				
• outer diameter (in)	0.474	0.474	None	None
• inner diameter (in)	0.442	0.442	None	None
• material	zirc-4	ZIRLO	Slight	Decrease - more neutron absorption

The comparison showed that all but the clad and tube material parameters were unchanged between the two designs. This material change to ZIRLO results in a less reactive Westinghouse Performance Plus design. Therefore, the analysis using the Westinghouse STANDARD design which is considered equivalent for the Vantage 5H fuel design is also acceptable for the Performance Plus fuel design.

The second change involved an industry change in the temperature assumed for analysis purposes. At the time this analysis was purchased, industry practice was to perform criticality analyses at 68 degrees F. However, current analyses are performed at 4 degrees C, since this has been proven to be an achievable temperature in storage areas. Although the lower temperature results in a more reactive configuration for poisoned spent fuel storage configurations, this change is not significant for new fuel arrays and does not impact the validity of the Westinghouse analysis.

Temperature affects a fuel storage array by increasing or decreasing the density of the water in the array and thus changing the hydrogen/uranium (H/U) ratio of the system (moderation). For spent fuel storage systems which are flooded and poisoned, decreasing temperature increases the density of the water, thus increasing the moderation of the system (H/U ratio) and making it more reactive. Safety analysis practice dictates that dry, non-poisoned systems also be analyzed wet for conservatism. For these systems, such as the new fuel storage racks being analyzed, the optimum moderation recommended by NUREG-0800 occurs at water densities less than 1.0 gm/cc and thus would occur at higher temperatures. The Westinghouse analysis has already addressed the most reactive temperature by addressing the low density optimum moderation condition.

Based on the evaluation discussed above, the Westinghouse analysis is applicable to the current WBN conditions and fuel design. The Westinghouse evaluation provides the appropriate analysis to support the increase fuel enrichment and storage in the new fuel pit storage racks. The storage rack loading limitations imposed by this TS change request and required to support the analysis ensures the criticality requirements are not increased from the current TS requirements. Therefore, the proposed TS change does not increase the potential for criticality events as a result of storing new fuel that is enriched up to 5.0 weight percent U-235.

IV. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

TVA has concluded that operation of Watts Bar Nuclear Plant (WBN) Unit 1 in accordance with the proposed change to the technical specifications does not involve a significant hazards consideration. TVA's conclusion is based on its evaluation, in accordance with 10 CFR 50.91(a)(1), of the three standards set forth in 10 CFR 50.92(c).

- A. The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed change to the allowed enrichment of new fuel stored in the new fuel storage racks does not change the criticality potential with the proposed fuel arrangement requirements for the storage racks. The potential k_{eff} values are maintained the same as the current TS requirements. In addition, the storage racks are not modified and the processes for loading and unloading fuel in these racks and the controls for these racks remain the same except for the storage limitations dictated by the criticality analysis. Additional controls are required with appropriate verification to assure the fuel is stored within the analysis assumptions. Handling procedures contain additional steps to specifically verify prohibited cells remain empty after fuel movement. This verification assures that the probability of a criticality event is not increased by the enrichment change. Since the k_{eff} limits and operating processes are unchanged by the proposed revision, there is no increase in the probability of an accident previously evaluated. Likewise, there is no impact to the consequences of an accident or increase in offsite dose limits as a result of the proposed TS change because the criticality requirements are unchanged and plant equipment will be utilized and operated without change considering the fuel storage location limits imposed by this request.

- B. The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

As stated above, the plant equipment and operating processes will not be altered by the proposed TS change with the exception of allowed fuel storage locations in the new fuel storage racks. The limitations on acceptable fuel storage locations in the racks ensure that the k_{eff} limits are maintained at the same limits as currently required. TVA has not postulated a criticality event at WBN for the spent or new fuel storage locations because the design of the associated storage racks, potential moderation, and TS allowable fuel enrichments do not support the potential for this condition. Therefore, this change does not create the potential for a new accident from any previously analyzed.

C. The proposed amendment does not involve a significant reduction in a margin of safety.

The proposed TS change maintains the existing requirements for criticality by utilizing limited storage locations in the new fuel pit storage racks. There is no change to operating practices associated with the use and control of these racks except for the storage limitations. For these reasons, there will be no reduction in the margin the safety as a result of implementing the proposed TS change.

V. ENVIRONMENTAL IMPACT CONSIDERATION

The proposed change does not involve a significant hazards consideration, a significant change in the types of or significant increase in the amounts of any effluents that may be released offsite, or a significant increase in individual or cumulative occupational radiation exposure.

Therefore, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-
MARKED PAGES

I. AFFECTED PAGE LIST

TS page 4.0-4

TS page 4.0-8

II. MARKED PAGES

See attached.