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

John A. Scalice
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JAN 31 1997

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

Gentlemen:

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

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - REQUEST FOR ADDITIONAL INFORMATION REGARDING REQUEST FOR LICENSE AMENDMENT TO TECHNICAL SPECIFICATIONS - SPENT FUEL POOL STORAGE CAPACITY INCREASE (TAC NO. M96930)

The purpose of this letter is to provide the response to NRC's request for additional information dated January 2, 1997, concerning the license amendment request to increase the spent fuel pool storage capacity. The enclosure provides the response to each of NRC's questions.

No commitments are identified in this letter. If you should have any questions, please contact P. L. Pace at (423) 365-1824.

Sincerely,

J. A. Scalice

Enclosure
cc: See page 2

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cc (Enclosure):

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ENCLOSURE

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
REQUEST FOR ADDITIONAL INFORMATION
SPENT FUEL POOL STORAGE CAPACITY

The following provides the response to the NRC's request for additional information dated January 2, 1997.

MATERIALS REVIEW

Question

Although Boral neutron absorbing material exhibits high degree of stability, it is still prone to some corrosion in certain chemical environments. The study performed by the Brookhaven National Laboratory has indicated that Aluminum 1100, used for cladding of Boral panels, will exhibit some degree of corrosion in a low pH spent fuel pool water. This corrosion is especially significant in new racks where aluminum cladding may corrode before protective oxide film is formed. There could be two potential consequences of this corrosion: generation of hydrogen and loss of boron carbide.

When a Boral panel is enclosed in a wrapper and not enough venting is provided, hydrogen generated by the corrosion induced by inleaking water could produce swelling. Apparently, this phenomenon was observed in a few cases.

Loss of boron carbide will occur when Boral panels become significantly damaged by corrosion. It is a very remote possibility, but it still should be taken into consideration.

In view of these potential mechanisms for Boral degradation, does Tennessee Valley Authority plan to establish a Boral surveillance program?

RESPONSE

TVA carefully considered the potential mechanisms and potential consequences for Boral degradation. A Boral surveillance program is not planned at WBN for the following reasons.

1. The Programmed and Remote System Corporation (PaR) racks from Sequoyah Nuclear Plant (SQN) are not vented. A proven design is utilized wherein the Boral panels are sandwiched between two stainless steel cans which are seal welded at the ends.

2. The PaR racks performed successfully at SQN for 13 years, and 901 fuel assemblies were stored in the racks at the time the racks were replaced with higher density racks in 1995.

3. After installation at WBN, the racks will be subjected to a 100 percent drag test which checks for storage cell distortion caused by hydrogen-induced swelling.

4. Also, at each refueling outage, drag is monitored during insertion and withdrawal of approximately 275 fuel assemblies. Although this is a part of routine fuel handling operations and not a formal test, hydrogen-induced swelling into the storage cell envelope would be detected.

5. No vintage coupon material is available for transfer to WBN with the SQN PaR racks. Since the PaR racks are not vented, the Boral is not exposed to pool water. Therefore, a Boral surveillance program is not considered necessary at WBN.

6. The Holtec racks planned for future installation will be vented. The cell design is identical to that in the high density racks now in use at SQN. Those racks are over half full and have been used for two refueling outages. The racks have been subjected to the 100 percent drag test mentioned previously as well as the more routine operational monitoring. Hydrogen induced swelling has not been detected. Potential problems would reasonably be expected to become evident very shortly after the Boral comes into contact with water. This performance is consistent with the fact that very few, if any, problems concerning domestic applications of Boral have been identified in the last ten years. Pre-characterized Boral material coupons have however, been installed in the SQN spent fuel pool and are available for examination if problems occur with the Boral at either WBN or SQN.

7. TVA has Boral surveillance coupons at the Browns Ferry Nuclear Plant (BFN) in a vented design. These samples have been examined, and there has been no evidence of any corrosion damage causing loss of boron carbide or loss of neutron attenuation capabilities. This is consistent with industry Boral experience. Although some swelling and blistering has been detected, TVA is unaware of any instances involving adverse effects on Boral's neutron absorbing properties.

ENVIRONMENTAL REVIEW

Question 1

Are any changes to the National Pollutant Discharge Elimination System permit required?

Response 1

During the study phase of the spent fuel storage capacity expansion project for WBN, it was determined that no effects were anticipated relative to non-radiological waste stream generation or alteration, specifically for air, wastewater, solid waste or hazardous waste.

ENCLOSURE

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
REQUEST FOR ADDITIONAL INFORMATION
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This subject has been recently reviewed, and the conclusion remains that no changes to the NPDES permit are required.

Question 2

Are there required changes to the waste treatment systems or flowrates?

Response 2

There are no required changes to the radiological waste treatment system or flowrates. The spent fuel polisher resin replacement is determined primarily by the requirement for water clarity, and the resin is normally changed once per refueling cycle. During rerack operations, a small amount of additional resins may be generated by the pool cleaning system on a one time basis. The same conclusion can be made for the spent fuel pool skimmer filters as well as the spent fuel pool filter.

The waste treatment system processing flowrates are not affected unless there is an abnormal imbalance in the water clarity or purity in the spent fuel pool which would require change out of some portion of the pool water. In this event, sufficient excess processing capability and holding capacity presently exist.

Question 3

Will there be any temperature changes to effluents as a result of increases in pool temperature or evaporation?

Response 3

No temperature changes to effluents are expected. Spent fuel pool (SFP) water is cooled by the spent fuel pool cooling and cleaning system (SFPCCS) which rejects heat to the component cooling system (CCS). Essential Raw Cooling Water (ERCW) is supplied to the shell side of each CCS heat exchanger and provides the ultimate heat sink. ERCW also provides cooling for the essential safety feature (ESF) room coolers, electrical board room and main control room chiller packages, emergency diesel generator heat exchangers, upper and lower compartment coolers, auxiliary control air compressors, control rod drive mechanism coolers, etc. Therefore, the temperature of the ERCW discharge, which is normally routed to the cooling tower basin, is a mixture of many individual return line temperatures. Although the SFP heat load has increased (during the various refueling mode scenarios) the existing worst case ERCW return line temperature for any CCS heat exchanger aligned to a SFPCCS heat exchanger results from refueling prior to discharging fuel to the pool. The original temperature of

115.8°F is still bounding since it reflected a two unit plant with the residual heat removal (RHR) heat load at 20 hours after shutdown concurrent with the maximum current design heat load in the pool (24.22 E+06 BTU/hr). The new SFP total heat load for this case is less since it consists of spent nuclear fuel from only one unit operation over many years and an 80 assembly discharge recently off-loaded, approximately/equal to 16.2 E+06 BTU/hr, concurrent with the RHR heat load. The RHR heat load in each case is considered the same. Therefore, no increase in the ERCW system effluent stream temperature is expected due to higher SFP heat loads.

The fuel handling area (FHA) is supplied with outdoor air from the Auxiliary Building general ventilation system. Air from the FHA, waste packaging and cask handling area is exhausted by the FHA exhaust fans to the Auxiliary Building exhaust stack where it is monitored for radioactivity prior to release to the environment. The normal maximum and abnormal maximum temperatures for this area as defined on the environmental data drawings are 104°F and 115°F, respectively. In the event that both trains of SFP cooling were lost for a extended period of time, the pool water temperature would approach boiling. The new maximum boil-off rate as specified in Table 5.5.2 of the modification report attached to the October 23, 1996, License Amendment Request is 68.59 gpm with no make-up water added and is based on an ambient room air temperature of 104°F. The new boil-off rate is approximately 14 gpm greater than the original value of 55 gpm. Although fire hoses located near the SFP are capable of supplying much more than 55 gpm, only 55 gpm of make-up water was credited in the analysis. Therefore, the temperature change in the heating, ventilation and air conditioning (HVAC) exhaust from the FHA due to a greater theoretical boil-off rate is considered minimal. Furthermore, no limits currently exist on the exhaust temperatures from any HVAC systems at WBN either through the NPDES or state permits.

Question 4

Please provide amplification of the subsequent actions for increasing spent fuel storage capacity discussed on page 10-2 of the application.

Response 4

Reracking the WBN spent fuel pool with the racks formerly used at SQN offered an opportunity to further increase storage capacity. The subsequent actions which would be available were:

1. Concentrate the installation of the replacement racks toward a corner of the pool instead of in the middle of the pool. This would provide space along two walls for additional racks to be installed in the future. The use of these racks is requested as part of the October 23, 1996, license amendment request for spent fuel storage.

ENCLOSURE

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2. Since an evaluation of the racks for acceptability for use at WBN would be required, the evaluation could also consider the use of consolidated fuel storage. Evaluations showed consolidated fuel to structurally be an acceptable alternative. However, the use of consolidated fuel is not part of the October 23, 1996, license amendment request.

3. The use of a storage rack in the cask pit area was considered as an acceptable method to provide increased storage. The use of this rack is requested as part of the October 23, 1996, license amendment request.

4. Implement onsite dry storage in multi-purpose canisters with overpacks, metal dual purpose casks or concrete casks/vaults. The use of onsite dry storage is not part of the October 23, 1996, license amendment request.

Question 5

Discuss the planned length of current and future fuel cycles, i.e., 18 month or other.

Response 5

WBN Cycle 1 is currently scheduled to end September 1997. Cycle 2 begins the transition to 18 month fuel cycles. The attached table shows the fuel cycle discharge schedule in effective full power days of operation. Additionally, the need for flexibility to load new fuel into the pool for component shuffling during a refueling outage advance the date for increased spent fuel pool storage capacity to one cycle (18 months) earlier.

Question 6

An apparent misspelling of the work "reasons" appears on page 9-4 of the application.

Response 6

The word "reasons" is misspelled. The correct word is "resins."

TABLE

FUEL DISCHARGE SCHEDULE

CYCLE NO.	SHUTDOWN DATE	EFFECTIVE FULL POWER DAYS (EFPDS)	NUMBER OF DISCHARGE ASSEMBLIES	ASSEMBLIES IN POOL
1	9/97	450	84	84
2	2/99	479	88	172
3	9/00	499	80	252
4	3/02	485	80	332
5	9/03	487	80	412
6	3/05	487	80	492

CYCLE 2 IS PLANNED AS A TRANSITION TO 18-MONTH CYCLES.

CYCLE 5 AND SUBSEQUENT FUEL CYCLES ARE PROJECTED TO BE 18-MONTH CYCLES WITH APPROXIMATELY 487 EFPDS