

September 6, 2002

Dr. Kenneth D. Bergeron
17 Tierra Monte NE
Albuquerque, NM 87122

SUBJECT: NRC STAFF RESPONSE TO YOUR SUGGESTIONS TO RISK-INFORM THE
REVIEW OF THE SEQUOYAH AND WATTS BAR TRITIUM PRODUCTION
LICENSE AMENDMENT REQUESTS

Dear Dr. Bergeron:

I am responding to your letters of September 13, 2001, and January 16, 2002, requesting that we risk-inform our process for reviewing Tennessee Valley Authority's (TVA's) license amendment requests to produce tritium at Sequoyah and Watts Bar, and expressing other safety concerns. We reviewed your written requests and evaluated your concerns expressed during the November 7, 2001, meeting held at One White Flint North.

As you are aware, RIS-2001-002 "Guidance on Risk-Informed Decision Making in License Amendment Reviews," addresses our process for determining when requests for risk information are justified as part of our review of a license amendment request. We conducted a technical assessment of the issues you identified following the guidance in RIS-2001-002. We were not able to substantiate that there would be a significant increase in risk if the U.S. Nuclear Regulatory Commission (NRC) approved TVA's amendment requests. However, we elevated your concerns to the risk informed licensing panel (RILP) even though our staff's assessment did not identify any issues that would raise questions about TVA's ability to maintain adequate protection of public health and safety. The RILP convened on July 11, 2002, and unanimously agreed that gathering additional risk information to evaluate TVA's amendment requests was not necessary. However, in our July 29, 2002, letter to TVA, we did ask TVA to send us some risk-informed background information to confirm our decision. In your email of August 10, 2002, to Mark Padovan of the NRC, you asked for a copy of TVA's response to the staff's request for information. TVA's August 9, 2002, response is enclosed.

Your letters noted numerous safety concerns. NRC staff considered each of your concerns against the guidance of RIS-2001-002, but grouped the concerns into the following broad categories:

- historical safety performance of Sequoyah and Watts Bar
- postulated increased risk from internal events, external events, and security concerns stemming from the dual-purpose civilian and military-related uses of the TVA reactors
- potential ice condenser plant design vulnerabilities to severe accident conditions, in particular, under station blackout (SBO) scenarios
- other issues, such as NRC's legal authority to issue the amendments, Advisory Committee on Reactor Safeguards (ACRS) participation in the amendment reviews, and more time for public comments

The staff's assessment of your concerns is provided below.

Regarding your concerns about TVA's performance, the staff does not use overall plant performance as a criterion for approving amendment requests. The NRC's reactor oversight process (ROP) continuously monitors licensee performance to provide assurance that licensees are operating plants safely and in accordance with the regulations and licensing bases. The ROP allows for a graded, predictable agency response commensurate with licensee performance. This can result in agency actions up to and including ordering the plant to shut down should NRC determine performance to be unacceptable.

The ROP relies on objective performance indicators (PIs) along with risk-informed inspections using 39 inspection procedures to monitor and evaluate plant performance. As discussed in the most recent Annual Assessment Letters for Watts Bar and Sequoyah, the results of the PIs and inspections are in the "licensee response band" of the ROP Action Matrix. This means that both plants have acceptable performance that does not require additional oversight beyond the baseline level of inspection. Plant performance results are available for public view on the NRC's external website at <http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/index.html>.

You also expressed concern that Watts Bar may not be capable of operating with a tritium production core. The staff notes that TVA has successfully demonstrated its ability to irradiate and handle tritium producing burnable absorber rods (TPBARs). TVA successfully irradiated 32 lead test assemblies for one cycle as part of TPBAR efficacy testing at Watts Bar. Therefore, the staff does not have any basis to question TVA's capability to manage such a change.

You postulated several new accident scenarios in your letter of January 16, 2002. In particular, you were concerned that a TPBAR ejection was not evaluated. Each TPBAR has a threaded end plug that is connected to a hold-down plate. The TPBAR is also secured in place via a crimping device as described in TVA's submittal of August 20, 2001. The TPBARs are inserted into fuel assemblies, similar to traditional burnable poison rod assemblies, and do not contain fissile material. Immediately above the fuel assemblies containing TPBARs is the upper core plate and reactor vessel upper internals package. Therefore, the staff does not agree that a realistic scenario exists for TPBARs to be ejected, or that there is a significant increase in initiating event transients.

You also noted that you believed it was not an appropriate neutronic practice to offset, by soluble boron poisoning, additional reactivity from higher fuel enrichment. Changes to the core design and core reactivity issues will be fully addressed in the staff's safety evaluation. However, the staff did not identify in its deterministic design basis review any reactivity issues that would warrant probabilistic treatment of TVA's amendment requests.

You suggested that a potential TPBAR drop accident "during the TPBAR consolidation process" was not adequately addressed. You note that the TPBAR drop accident could occur with the plant at full power. The rod consolidation process is performed in the spent fuel pool and, as such, does not increase the likelihood of a reactor trip. From a dose perspective, TVA addressed dropping a TPBAR and NRC staff evaluated it for (1) fuel movement in the reactor cavity and (2) spent fuel pool operations. All of the fuel rods in an irradiated fuel assembly, and

24 TPBARs, are assumed to rupture, releasing the radionuclides within the fuel-clad gap to the fuel pool or reactor cavity water. TVA's analyses show the offsite consequences of this event are well within Title 10, *Code of Federal Regulations* (10 CFR), Part 100, dose guidelines. A complete radiological assessment of potentially dropped TPBARs will be addressed in the staff's safety evaluations.

Previous performance issues with the ice condenser system were also noted in your January 16, 2002, letter. For example, you noted problems with lower inlet door binding for both plants. These issues have been corrected, and the staff is not aware of any recent door failures due to floor upheaval/door binding within the past few years. The lower inlet doors continue to be tested in accordance with each plant's Technical Specifications and are monitored under several licensee programs, including the regulatory-required 10 CFR 50.65 maintenance rule program. More important, there is no direct nexus between a change in the core design and any effect on the reliability or availability of the ice condenser system. Therefore, overall, given no demonstrated significant increase from the baseline core damage frequency, and no demonstrated significant change in containment systems performance, the staff could not substantiate that there would be a significant increase in the baseline severe accident large early release frequency because of tritium production.

In your letters, and during the November 7, 2001, meeting, you noted concerns that safeguards measures at Sequoyah and Watts Bar may be inadequate once tritium production begins at these stations, especially in view of the events of September 11, 2001. The NRC and its licensees have taken a number of actions following the terrorist attack of September 11, 2001, to increase security at NRC-licensed facilities, including a heightened security stance pursuant to safeguards advisories. On February 25, 2002, the NRC issued Orders to all commercial nuclear power plants to implement interim compensatory measures for the current threat environment. Some of the requirements made mandatory by the Orders formalize the security measures that NRC licensees had taken in response to NRC's advisory letters. The specific actions are sensitive, but generally include requirements as follows:

- increased patrols
- augmented security forces and capabilities
- additional security posts
- installation of additional physical barriers
- checks at greater stand-off distances
- enhanced coordination with law enforcement and military authorities
- restrictive site access for all personnel
- additional security measures pertaining to waterways and the owner-controlled land outside the plants' protected areas

During our meeting of November 7, 2001, you raised a specific terrorist scenario against Watts Bar. Further, you alluded to this postulated vulnerability in your letter of January 16, 2002. Although the exact scenario you described is not evaluated in the plant's Updated Final Safety Analysis Report (UFSAR), the effects of the scenario had been analyzed for design basis considerations and are documented in the UFSAR. Under such a scenario, the specific plant structures and systems of interest to your concern are protected from such a phenomenon. The analysis used bounding design-basis assumptions and conditions beyond the nominal conditions that would be present from the scenario that you postulated. This phenomenon was also evaluated in the licensee's individual plant examination (IPE) of external events submittal. The staff concludes that the outcome of the scenario you postulated during our meeting and in your letter is not credible.

On the matter of the NUREG/CR-6427, "Assessment of the DCH [Direct Containment Heating] Issue for Plants with Ice Condenser Containments," the staff is in the process of resolving Generic Safety Issue (GSI)-189, "Susceptibility of Ice Condenser Plants and Mark III Containments to Early Failure from Hydrogen Combustion During a Severe Accident." Although NUREG/CR-6427 notes a 0.97 conditional containment failure probability (CCFP) for Sequoyah under SBO conditions, this CCFP value results from assumptions that were appropriate for resolving the Direct Containment Heating issue and must be used in the correct context. The NUREG gives no credit for offsite power recovery, and provides no evaluation of recovery of one of several simultaneously failed emergency diesel generators. The NUREG also does not reflect plant improvements since the licensee's original IPE submittal that reduces the frequency of SBO and reduces the likelihood of core damage during SBO conditions such as the following:

- maintaining high emergency diesel generator reliability
- a maintenance rule program
- high-temperature reactor coolant pump seals
- modifications to the turbine driven auxiliary feedwater operation procedures
- improved emergency operating procedures

More realistic treatment of SBO scenarios would probably reduce the core damage frequency, containment failure frequency, and CCFP. Also, the tritium amendment requests would not result in an increase in core damage frequency or large early release frequency above the current values. The CCFP value, as it stands today, is appropriate for its intended purpose of resolving the direct containment heating issue and use as a screening value for GSI-189 regulatory backfit analysis.

In summary, the staff evaluated your suggestions and concerns against the special circumstances criteria noted in RIS-2001-002 and against standards defined in NRC Regulatory Guide 1.174. The staff was not able to substantiate that there would be a significant increase in risk of internal or external events because of tritium production. The staff concluded this primarily because a tritium production core in itself does not:

- increase the likelihood of an initiating event

- affect the probabilistic risk assessment (PRA) success criteria
- affect the functionality, availability, or reliability of equipment and structures necessary to prevent core damage (Level I PRA) or mitigate core damage effects (Level II PRA)

The staff determined that the only salient issue relevant to Sequoyah and Watts Bar is GSI-189, which is unaffected by TVA's amendment requests. The Office of Nuclear Regulatory Research is completing GSI-189 regulatory analysis, and will forward it to Office of Nuclear Reactor Regulation for final resolution. However, the staff does not believe that approving the amendment requests depends on resolving GSI-189 for reasons previously noted.

You commented on the NRC's legal authority to issue the amendments in light of 42 USC 7272. This very issue was analyzed by the Atomic Safety and Licensing Board in the recent consolidated tritium license amendment proceedings. In a decision issued on July 2, 2002 (LBP-02-14), the Board concluded that Public Law 106-65, section 3134(a), which provides that the Secretary of Energy shall produce tritium at Watts Bar or Sequoyah, and its legislative history "clearly show that Congress intended for the NRC to entertain" TVA's tritium license amendment applications, notwithstanding 42 USC 7272. Thus, there should be no doubt that the NRC has the legal authority to issue the amendments.

The ACRS determines what involvement it will have reviewing licensing actions. It received your letter of October 18, 2001, on the subject of allowing tritium production at Watts Bar. The ACRS has not asked to participate in the review of TVA's amendment requests, but wanted to be informed of our response to you. Accordingly, we are forwarding a copy of this letter to the ACRS.

You also suggested that the NRC should allow more than 30 days for public comment on the staff's proposed no significant hazards consideration determinations. On January 15, 2002, Mr. David Lochbaum of the Union of Concerned Scientists sent us a letter requesting a 60-day extension of the public comment period. The letter of January 17, 2002, from the Secretary of the Commission, denied that request. However, the Secretary's letter said that the NRC staff would consider additional comments as it received them while reviewing other comments. Likewise, we continued to assess the information in your letters of September 13, 2001, and January 16, 2002, and are now responding to your concerns.

K. Bergeron

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We appreciate your comments and suggestions regarding the amendment requests for tritium production and we hope that our response addresses your concerns. Please feel free to contact L. Mark Padovan at (301) 415-1423 or me should you have any questions.

Sincerely,

/RA/

Brian W. Sheron, Associate Director
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Office of Nuclear Reactor Regulation

Enclosure: TVA letter to NRC dated 8/9/02

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