September 20, 1994

Mr. Oliver D. Kingsley, Jr.
President TVA Nuclear and
Chief Nuclear Officer
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Dear Mr. Kingsley:

SUBJECT: WATTS BAR NUCLEAR PLANT - SEVERE ACCIDENT MITIGATION DESIGN ALTERNATIVES (TAC NOs. M77222 AND M77223)

By letter dated September 2, 1994, the NRC staff requested Tennessee Valley Authority (TVA) to provide additional information on the Watts Bar Severe Accident Mitigation Design Alternatives (SAMDA) analysis.

On September 12, 1994, the staff and TVA held a telephone call to clarify the questions in the staff's September 2, 1994, letter. As a result of the telephone call, the staff revised its questions and added two additional questions.

Enclosed is a revised list of information requested. This request for additional information supersedes the staff's request by letter dated September 2, 1994. A prompt response is necessary to minimize any possible delay in the completion of this review.

This requirement affects less than ten (10) respondents, and therefore, is not subject to Office of Management and Budget review under Public Law 96-511.

Sincerely,
Original signed by:
Scott F. Newberry, Director
License Renewal and Environmental Review
Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-390
and 50-391

Enclosure: Watts Bar
Revised SAMDA RAI

cc w/enclosures:
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ENCLOSURE

## Watts Bar Revised SAMDA RAI

1. The decision regarding which alternatives will be implemented at Watts Bar appears to have been based on a strict interpretation of the $1000/person-rem criterion, without explicit consideration of uncertainties in core damage frequency estimates, containment performance, and offsite consequence modelling. Since several of the design alternatives were ruled out on this basis, even though they are close to being cost effective, a more detailed assessment of uncertainties in the risk reduction estimates is needed in order to justify not implementing additional design alternatives, particularly those that are within a factor of 10 of being cost beneficial. In this regard, provide an assessment of the maximum possible risk reduction for each candidate design improvement (Table 5, page ES-21), considering the following:

   a. the increase in risk if the upper bound (e.g., 95th percentile) value for the Watts Bar core damage frequency is used,

   b. the increase in the containment failure probability and risk associated with the most limiting MAAP sensitivity calculations recommended by EPRI, and

   c. the impact of uncertainties in consequence assessment on the risk reduction estimates for the candidate SAMDAs. Consider both the uncertainties and sensitivities assessed in NUREG-1150 Sequoyah evaluation and those inherent in the Level 3 scaling described in Appendix C to the Value Impact Analysis.

2. For each design alternative, provide a breakdown of the risk reduction (person-rem) in terms of the contribution from: early containment failure, containment bypass failure, late containment failure, and any other key release modes.

3. Discuss whether a purely procedural option would be viable in place of the "Install Reactor Depressurization System" option, and if not, why not.

4. None of the Category 5 enhancements are procedural in nature. Please justify that there are no procedural enhancements (e.g., accident management strategies) that can improve containment performance.

5. Please explain why the options identified as V-2 and V-3 yield identical risk reductions.

6. TVA considered two options to enhance the containment spray system -- installation of an independent train of containment spray with injection capacity only, and addition of an independent train of containment spray with recirculation and heat removal. Another option suggested in NUREG/CR-5589 (page 29) is to use the fire water spray pump as a backup means for spray injection into the containment. Please explain why this option was not considered as a design alternative.

7. Combining two or more design alternatives can potentially offer a lower greater cost benefit ratio (CBR) than the CBR for the individual design alternatives. In this regard, please evaluate and identify combinations of design alternatives that could provide increased risk reduction potential, and provide a value impact assessment for the more promising combinations.

8. The Westinghouse Owners Group has recently completed its development of Severe Accident Management Guidelines (SAMG). These guidelines identify a set of accident management strategies that can be implemented by utility staff during an accident to either prevent or mitigate the consequences of severe accidents. Since the focus of the SAMG is on the use of existing plant equipment, and the risk reduction typically ascribed to accident management is on the order of a factor of 10, the cost benefit ratio for implementing the SAMG would appear favorable. In this regard, please provide a value impact assessment for implementing the SAMG at Watts Bar. This assessment should consider both:

   a. implementation of the entire guideline document, and

   b. implementation of individual strategies in the document that have not already been assessed in the TVA value impact study.

9. Enhancement V.2 Reactor Cavity Flooding. Flooding the cavity before the corium is on the floor could create the possibility of severe explosions by the interaction of the hot molten mass falling into the pool of water. Introduction of a measured amount of water after the corium is on the floor would provide the same benefits and avoid the possibility of an explosion. Should, an enhancement be considered to suggest severe accident management practices which would avoid water-corium interactions?

10. Please explain the apparent inconsistency in the Value Impact Analysis between the CDF value for Sequoyah used in Table 1, page ES-4, of 1.7E-4 (mean value) and the value used in Table C-4, page C-7 of 5.58E-5 (mean value). This difference can have implications for the consequence scaling assessment.

11. Enhancement V.1 considered improving hydrogen control capabilities by providing additional hydrogen igniters throughout containment and an additional power source independent of existing AC and DC power systems. It would appear that similar benefits could be derived from a more modest design improvement that would utilize existing hardware. In this regard, provide an assessment of the costs associated with the following variations on this design enhancement (along with the risk reduction associated with each variation, if significantly different than that provided in the Value Impact Analyses for this design change).

   a. use a subset of the existing igniters in conjunction with the new power source (e.g., connect one train of the existing igniters to the independent power system). As part of this assessment, include consideration of a new, non-safety grade portable generator dedicated for this purpose and pre-staged to facilitate connection during a station blackout.

b. use a subset of the existing igniters in conjunction with existing station batteries,

c. use a subset of the existing igniters in conjunction with existing AC- and DC-independent onsite power sources such as the security system diesel, small portable generators that may exist on site for maintenance purposes, or safe shutdown facility diesels.

12. Some recurring costs appear not to have been discounted. What would costs be if recurring costs were discounted at 7 percent to the present?

13. In Enhancement II.2, cost data need to be recalculated to show true costs. For II.2, the true cost should be the <u>added</u> cost of having 5th diesel generator available at the earlier date vs. the later date. Other enhancements should be checked for similar problem.

14. If other values (reflecting uncertainty) than mean point estimate for person rem yr. are used (say 90th percentile value), are cost benefit ratios significantly different?

Mr. Oliver D. Kingsley, Jr.
Tennessee Valley Authority

WATTS BAR NUCLEAR PLANT

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