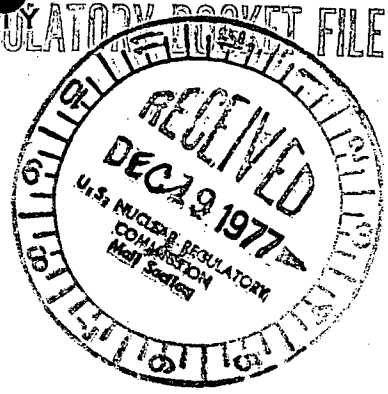
TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401



DEC 14 1977

Director of Nuclear Reactor Regulation
Attention: Mr. S. A. Varga, Chief
Light Water Reactors Branch No. 4
Division of Project Management
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Varga:

In the Matter of the Application of	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328
		50-390
		50-391

We have reviewed your letter dated October 3, 1977, transmitting your concerns regarding our planned Containment Sump Model Test. Enclosed are responses to each of your concerns.

You are invited to visit Norris Engineering Laboratories and observe the Containment Sump Model Test on December 16, 1977.

Very truly yours,

for H. H. Harris

J. E. Gilleland
Assistant Manager of Power

Enclosure

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ENCLOSURE

1. We will measure sump performance while drastically altering the distribution of flow into the model at the model extremities. If there is no change in sump performance, this shows that the extent of the model is sufficient. If there is a change in sump performance, we have several possible alternatives:

   a. determine a worst possible flow distribution and make the sump work acceptably for this case.

   b. extend the model limits and repeat the test above until the flow distribution at the model extremity no longer affects sump performance.

   These tests are part of the sensitivity tests in the test procedure on page 6 of report No. 72-27.

2. To operate the model with either velocities or Reynolds numbers equal to those in the prototype is not a common or wise "scaling practice" for this type of model and would be irrelevant or even incorrect. We would be happy to discuss the scaling criteria in person.

   The model will have pumping capacity to reach a maximum flow of about twice the Froude scaling flow. The corresponding velocities will have a magnitude near those in the prototype. Reynolds numbers equality between model and prototype will be physically impossible to attain. We intend to operate the model throughout its flow rate range as part of the sensitivity tests mentioned on page 6 of report 72-27.

3. We agree that proper scaling of the screens is an important consideration. The model screens were chosen with approximately the same geometric proportions as those in the prototype and with energy loss coefficients equal to those of the prototype. In addition, we intend to make sensitivity tests on the effect of the screens on the sump performance by:

   a. testing without screens (the worst case regarding vortex formation),

   b. testing with the "scaled" screens as defined above, and

   c. testing with screens that are more closed (relatively) than those in the prototype.

4. We have made provisions for jetting water into the model from above or below the water surface at any location in the model.

5. We do not refer to creating turbulence on page 4 of report 72-27. We do intend to measure pressure fluctuations on the wall inside the sump directly opposite the discharge pipe entrances. This measurement is an indication of the severity of large-scale turbulence in the sump and is considered one of the sump performance indicators.

6. We do not intend to install the air trap to measure entrained air unless air drawing vortices are formed at the sump. In this case, the air flow measurements are interesting, but only of academic value, because the sump will be remodeled until acceptable performance has been attained according to the acceptance criteria on page 7 of report 72-27. In any case, we intend to analyze and attempt to interpret any largely periodic component of the measured pressure fluctuations.

7. Transient circulations, vortices, pressure fluctuations, etc., of small magnitudes must be acceptable because neither the prototype nor the model nor any other sump of similar size and flow has ever been made that did not have these as a result of turbulent flow between abruptly changing short-coupled, nonstreamlined, geometric boundaries. No discrete vortices will be allowed of such magnitudes that the sump performance is measurably affected. We would be happy to discuss the acceptance criteria to clarify the meaning of the words used.

8. We are planning to perform screen blockage tests. However, it should be kept in mind that any sump inlet can probably be altered with "simulated blockage" to create tangential approach flow, strong circulation, and possibly discrete vortices. We will test reasonable blockage geometries and apply the acceptance criteria given on page 7 of report No. 72-27.

9. The operation of the model at temperatures equal to those in the prototype is not a relevant procedure to obtain similarity. Operation over a range of Reynolds numbers provides the required information to evaluate the effects of temperature. Estimated prototype temperature is 180°F. We cannot get the water this hot in the model, and the plexiglas model parts would have questionable structural integrity at this temperature. We estimate that we can reach 100-150°F in the model with the present steam injection system.