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Docket Nos.: 50-327/328

MEMORANDUM FOR: R. L. Tedesco, Assistant Director for Licensing, DL

FROM: L. Rubenstein, Assistant Director for Reactor Systems, DSI

SUBJECT: ECCS SUMPS

Plant Name:	Sequoyah, Units 1 and 2
Docket Nos.:	50-327 and 50-328
Licensing Stage:	OL
Responsible DL Branch:	LB-1
Responsible Project Manager:	C. Stahle
DSI Branches Involved:	Reactor Systems Branch
Description of Review:	Study of Debris Issue
Review Status:	Continuing

A previous memo to DPM dated March 21, 1980 on this subject identified areas in which we needed additional information in order to continue our review. The purpose of that memo was also to enable TVA to prepare for the staff's site visit concerning this matter. The site visit was held on April 8 and 9, 1980.

As a result of our site visit and discussions with TVA, we have developed the attached set of questions which replace in their entirety the previous six questions. This new set of questions contained in the attachment should be transmitted to TVA to enable their submission of docketed responses.

Original signed by
L. S. Rubenstein

L. S. Rubenstein, Assistant Director
for Reactor Systems
Division of Systems Integration

Enclosure:
Request for Additional
Information - Containment Sump

cc: R. Martin
J. Watt
J. Mazetis
~~T. Speis~~
L. Rubenstein

OFFICE ▶	DSS:RSB	DSS:RSB	DSS:RSD	DSS:RS
SURNAME ▶	RMartin:mf	GMazetis	TSpeis	LRubenstein
DATE ▶	4/30/80	5/2/80	5/6/80	5/6/80

Enclosure

Request for Additional Information - Containment Sump

Background

The safety issue of containment emergency sump performance under post-LOCA conditions can be viewed as two parts: (1) containment sump hydraulic performance (i.e., providing adequate NPSH to the recirculation pumps with up to 50 percent of the sump screen area blocked) and (2) the effects of debris. The first part, sump hydraulic performance, has previously been addressed in the Sequoyah Nuclear Plant, and has been acceptably resolved as is stated in Section 6.3.4 of the SER. The problem addressed herein is the potential for debris from insulation and other sources within containment to collect and compromise the ability of the ECCS to recirculate coolant from the containment sump through the RHR heat exchangers to the vessel. Please respond to the following items with the desired information.

1. As stated in Section 6.3.4 of Supplement No. 1 to the SER, a scale model test of the SNP sump design has been successfully conducted to show that adverse hydraulic phenomena which could impede long-term cooling of the core following a LOCA will not occur. This testing was performed with up to fifty percent of the sump screens blocked. The responses to the following concerns are required to support this assumption.
   a) For each type of thermal insulation used in the containment, provide the following information:
      (1) The manufacture, brand name, volume and area covered.
      (2) A brief description of the material and an estimate of the tendency of this material either to form particles small enough to pass through the fine screen in the sump or to block the sump trash racks or sump screens.

(3) Location of the material (metal mirrored, foam glass, foam rubber, fiberglass, etc.) with respect to whether a mechanism exists for the material to be transported to the sump.

b) Part four of the response to question 6.28 does not provide an estimate of the amount of debris that the sump inlet screens may be subjected to during a loss-of-coolant accident. Provide this information including the results of an analysis of the worst break in terms of the amount of insulation blown off by pipe whip and hydraulic jet forces, indicating where the insulation would come to rest. If a blockage problem is identified, propose corrective actions.

c) Discuss the basis for the conclusion that debris with a specific gravity greater than unity will settle before reaching the sump cover. Consider the potential for flow paths which may direct significant quantities of debris laden coolant into the lower containment in the vicinity of the sump and the availability or lack of sufficient horizontal surface areas or obstructions to promote settling or holdup of debris prior to reaching the sump .

d) Discuss the significance of containment coating, e.g., paint, as a source of debris over the long term post-LOCA recirculation phase. Have the coatings been environmentally qualified for the long term post-LOCA environmental conditions?

e) Does metal mirror insulation house other materials, fibrous or otherwise, which could become debris if the insulation were blown off as a result of a LOCA?

f) Expand the discussion in response to question 6.28 on loose insulation to include examples of how the insulation will be precluded from reaching the sump.

g) Expand the discussion on containment and ice condenser insulation to include details on the reaction of various insulation types to the post-LOCA environment and to include examples of the use of foam concrete. What is the density of foam concrete and what tendency does it have to be broken up into small sized particles? Discuss the bases, including any analyses performed, for the protection of insulation from the effect of a LOCA.

2. The resolution of the concerns noted above plus the provision of adequate NPSH under non-debris conditions, and adequate housekeeping practices are expected to reduce the likelihood of problems during recirculation. However in the event that RHR recirculation system problems such as pump cavitation or air entrainment do occur, the operator should have the capability to recognize and contend with the problems.

   Both cavitation and air entrainment could be expected to cause pump vibration and oscillations in system flow rate and pressure. Show that the operator will be provided with sufficient instrumentation and appropriate indications to allow and enable detection of these problems. List the instrumentation available giving both the location of the sensor and the readout.

   The incidence of cavitation, air entrainment or vortex formation could be reduced by reducing the system flow rate. The operator should have the capability of throttling or terminating flow as required. Show that the emergency operating instructions and the operator training consider the need to monitor the long-term performance of the recirculation system and consider the need for corrective actions to alleviate problems.

3. Discuss the effect of debris entrained in the recirculating coolant on the long term operability of the RHR, safety injection and charging pumps and motors.

   For each pump/motor type discuss the applicable operating experience and the design aspects of the seals, bearings and other components with respect to whether the design is susceptible to failure resulting from interaction of the components with debris entrained in the recirculating coolant. Include in the response information on the means of lubricating and cooling the pump and motor bearings and on the means of cooling the pump seals, e.g., is seal cooling water at a higher pressure than the pumped fluid during the recirculation mode?

4. Provide a schematic drawing of the post-LOCA water level in the containment during the recirculation mode relative to the elevation of the ECCS sump floor (elevation 667.0 ft) as shown on FSAR Figure 1.2-13. Include on this drawing the location of the containment water level sensor and the elevations which correspondsto readings of zero and 100 percent of range on the control room indicator.

5. Provide several large scale drawings of the containment structures, systems and components at elevations ranging from 679 to 732 feet.

6. Does the SNP utilize sand or similar materials in the containment during power operation for purposes such as reactor cavity annulus biological shielding (e.g., sand tanks or sand bags) or reactor cavity blow out sand plugs?