Alabama Power Company
600 North 18th Street
Post Office Box 2641
Birmingham, Alabama 35291
Telephone 205 323-5341

F. L. CLAYTON, JR.
Senior Vice President

Alabama Power
the southern electric system

July 16, 1980

Docket No. 50-364

Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. A. Schwencer

Gentlemen:

JOSPEH M. FARLEY NUCLEAR PLANT - UNIT NO. 2
CONTAINMENT SUMP PERFORMANCE

Per NRC request, attached is additional information on the performance of the containment sump.

Yours very truly,

F. L. Clayton, Jr.

F. L. Clayton, Jr.

CLB:rt

Attachment

cc: Mr. R. A. Thomas
Mr. G. F. Trowbridge
Mr. W. H. Bradford
Mr. L. L. Kintner

B001
s
1
1/1

8007220486 A

ATTACHMENT

NRC Requirement: Establish a housekeeping program to assure that the plant is always restored to "as-licensed" cleanliness prior to power operations.

Response: Alabama Power Company's (APCO) Technical Specification 4.5.2(c) and (d) requires an inspection of containment to verify cleanliness of (1) all accessible areas prior to establishing containment integrity, and (2) the areas affected within containment at the completion of each containment entry when containment integrity is established. APCO has developed and implemented a surveillance test procedure number STP43.0 which ensures that the containment is kept free of debris which could possibly restrict flow to the containment sump prior to initial fueling and each occasion when containment is accessed.

NRC Requirement: Reevaluate the insulation used inside containment to assure that insulation debris would not be expected to block approach paths, trash racks, or screens in such a manner as to jeopardize intake performance and that debris penetrating the intake screens would not be expected to compromise safety system life or performance or degrade core cooling.

Response: The metal reflective and anti-sweat are the only types of insulation used inside the containment of Farley Nuclear Plant. The anti-sweat insulation is a foamed, close cell plastic which is much lighter than water. Metal reflective insulation which could come off the piping systems by the postulated primary system pipe breaks will consist of large pieces. This insulation material is much heavier than water.

Farley Nuclear Plant Unit 2 recirculation intakes from the containment floor are comprised of two vertical 14-inch RHR and two vertical 10-inch containment spray intakes located in separate intake areas all outside of the primary shield wall. The location details of intakes are shown in Figures 6C-19 and 20, Appendix 6C of the FSAR. These vertical intakes extend one foot above the containment floor as shown in Figure 6C-5, Appendix 6C of the FSAR. Each intake is surrounded by a protective screen-grating and grating cage structure as shown in Figures 6C-17 and 18, Appendix 6C of the FSAR.

The calculated maximum and minimum water levels in the containment following a LOCA are 58.3 and 77.1 inches above the containment floor. The top of the grating cage structure is 29 and 48 inches below these water levels, respectively.

Extensive 1:1 scale model testing of containment sump recirculation intakes was performed to evaluate the hydraulic performance of these intakes during the recirculation phase of ECCS and containment spray operation. The results of this test have been documented in Appendix 6C of the FSAR and the final test report has been provided to the Staff.

One of the parameters which was investigated during these tests was the approach velocities in the bulk fluid since this is the important determining factor in formation of vortices. Further, the flow rates approaching the intakes was increased above the nominal flow condition by 40% (augmented flow) to achieve Reynolds Numbers equal to or greater than prototype values which could occur at a calculated post-LOCA pod temperature of 212°F (tests were performed with water temperatures of up to 180°F). The results of these tests conclusively showed that with all pumps operating and under the augmented flow conditions, the approach velocities in bulk fluid was low (maximum calculated velocity 0.49 fps) and there was no organized circulation or tendency for vortex formation anywhere outside the screen-grating structure. Therefore, there is no reason to expect other than the anti-sweat insulation to float on the surface of the water at least 29 inches above the grating cage structure and the metal reflective insulation to sink to the containment floor. Based on these test results, none of these materials or any others are expected to be carried along with the flow to the screen-grating cage structure surrounding the intakes.

In spite of the above test results, prudence was used and range of screen-grating cage blockage cases were also tested. The blockages were selected to represent the following conditions:

Blockage	Condition
1	Blockage material uniformly distributed over the vertical screen area around periphery. Top screen totally blocked.
2	Blockage materials are not buoyant and thus block the lower portion of the vertical screen. Top screen totally blocked.
3	Blockage materials are buoyant and thus block the upper part of the vertical screen. Top screen totally blocked.
4	Blockage materials are not bouyant and thus block the lower portion of the vertical screen. Top screen unblocked.
5	Blockage is postulated as occurring over screen area most exposed to approach flows.

The results of these blockage tests are presented in Appendix 6C of the FSAR. Blockages of up to 71% of the screen-grating surface area were performed. Even under these conservative test conditions, neither an appreciable difference in approach velocities to screen nor any organized circulation or tendency for vortex formation was observed outside the screen-grating case structure. Head losses due to this extreme condition were also acceptable and is was shown that no degradation in pump performance will result.

Based on these test results and the significant points presented above, it is concluded that the accident conditions inside the containment will not adversely affect the recirculation intake performance.

The concern of debris penetrating the screens was addressed during the FSAR review, in response to NRC Question CSB-22. As discussed in this response, the maximum particle size that could pass through the wire screens in 0.120 inches. This size particle will have no affect on pump operation or will not clog the containment spray nozzle orifices. Therefore, the debris, even though not considered credible based on the above discussions, passing through the wire screens is not expected to compromise safety systems life or performance or degrade core cooling.

It should be noted that the design of FNP does not include sand plugs or sand shields.

NRC Requirement: Describe the available instruments and controls, and provide procedures permitting the operator to detect conditions of low ECCS flow and to take corrective actions.

Response: Based on the discussion presented in the above response, it is Alabama Power Company's position that the performance of recirculation sump intake performance under accident conditions has been investigated in sufficient and adequate detail and concluded that they will perform their intended function under these adverse conditions. Therefore, we do not expect air entrainment, cavitation, debris blockage or entrainment to occur to a degree which could result in inadequate core cooling situation.

However, if needed, existing control grade instrumentation (monitoring RHR pump motor amperage, flow and pressure) would detect and annunciate inadequate ECCS flow. Existing plant Annunciation Response Procedures and Emergency Operation Procedures require response to these alarm signals. A procedure will be developed prior to fuel load to allow backflushing of the containment sump utilizing water from the RWST in the event of low ECCS flow due to blockage of the containment sump.