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CT-R17

To: Dr. R. Savio

From: Ivan Catton

Subject: Zimmer Subcommittee Meeting, 16-17 November 1978

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I would like to add a few comments to several of the topics discussed at the Zimmer Subcommittee Meeting. They are more generic than specific in nature.

Reactor Vessel Supports. One of the contributors to reactor vessel support loading is non-uniform pressure in the annulus around the vessel. The annulus pressures are calculated using a one-dimensional code when the phenomena is clearly two-dimensional. Large pressure variations exist and the flow being two-phase results in sonic conditions being predicted to exist between volumes specified for analysis. This is accomodated by the analyst using a Moody coefficient approach. It is not clear to me that the predicted pressures are realistic or conservative.

Fuel Bundle Lift. Fuel bundle lift potential during the blowdown phase of a LOCA, a concern of Mr. Ebersole, is not fully addressed in any document I have access to. As far as I can tell, the upward force on the fuel bundle is based on end of channel life friction with end of life being defined as the time at which the friction between the control rod and the assembly wall is high enough to impede withdrawal of the control rod. With this definition the upward force amounts to 107 lb_f. The downward force, corrected for water buoyancy, is 300 lb_f. The net is then about 200 lb_f in the downward

A direction. During blowdown, the pressure in the bypass region falls faster than in the fuel bundle causing a decrease in the bundle to bundle gap. It is not inconceivable that a several fold increase in [illegible]ion factor might result and the 200 lb_f margin might disappear. It is possible that I have missed an important aspect of the problem. If so, I would like to review the documents clarifying how the fuel bundle lift question is put to rest.

Suppression Pool Downcomers and Lateral Loads. The downcomers are over thirty feet long and have no lateral restraints. The magnitude of the lateral loads depends strongly on the suppression pool temperature and downcomer mass flux. As a result the loads vary with time. If the pool temperature remains low enough, large lateral loads do not occur and my concerns are not well founded. To assess the potential for large lateral loads, the pool temperature and downcomer mass flux time histories are needed. The pool temperature must properly account for stratification. Some consideration should also be given to the geometric arrangement of the eighty or so downcomers and possible interactions as the data base is primarily the 4T tests. The submergence is ten feet and restraints, if needed, could be submerged eliminating concern about pool swell impact loads.

Control Drive Tube Location. The control rod drive tubes are located very close to the recirculation line with half of the tubes being on each side of the vessel. The tubes are routed so that if half are lost, due to a pipe break, the remaining can still scram the reactor. It seems to me that the possible loss of half your control drive tubes is an important consideration and maybe they ought to be less exposed.