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GILBERT ASSOCIATES, INC., DESIGN OF CONTAINMENT VESSELS FOR THE THREE  
MILE ISLAND AND CRYSTAL RIVER UNITS USING GROUTED PRESTRESSED TENDONS

C&CTB:DRL:RCDeY RT-189

# POOR ORIGINAL

The Crystal River Unit is included in this memo because this applicant (Florida Power Corporation) expressed a desire to pattern their application on the review of Metropolitan Edison's Three Mile Island Unit. However, this may not be possible when considering the containment vessel because ground water at the Crystal River site is saline as compared to fresh water at the Three Mile Island site.

Based on an initial review of the information provided by the applicant, Mr. N. Davison does not believe sufficient evidence has been presented to justify the use of concrete grouting to provide corrosion protection for their prestressing tendons. The ability of the grout to prevent corrosion is completely dependent on the quality of the installed grouting, which is very difficult to accomplish in curved tendon prestressing systems. He knows of no nondestructive test to verify the quality of installed grout. At present, there is no vessel of this size and duty cycle which has installed grouted tendons using 1/4 inch diameter wire in a curved conduit. He feels the use of grouted tendons is premature in that the corrosion protection provided by grouting must be balanced against the loss of in-service inspection and the ability to verify the proper individual tensioning and allow retensioning of the tendons during the lifetime of the structure.

As the understanding of these vessels matures a possible acceptable program to monitor the effectiveness of the prestressing tendons during the entire lifetime of the vessel would involve the following two requirements, (1) leaving a representative portion of the installed tendons ungrouted in order to monitor for loss of tensioning and (2) instrumenting the vessel for critical stress levels and for dimensional stability combined with relatively frequent design pressure tests. The established lifetime of instrument sensors to monitor stresses within concrete is less than the expected lifetime of a containment vessel. Until the long term reliability of stress-strain sensors is established and there is better understanding of detailed stress levels within the vessel, he would not recommend approval of such a program.

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Currently, the principle proponents of grouted tendons are the French, and they are not grouting some 50 of the installed tendons in their recent PCRV in order that they can monitor the possible loss of pre-stressing. In some ways, the duty cycle of a PCRV is less severe and more predictable than that of a containment vessel.

This problem must be resolved before the granting of a construction permit as little or nothing can be done to influence the design and use of the vessel during the operating permit stage.

cc: C. G. Long, DRL  
N. H. Davison

bcc: R. C. DeYoung  
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POOR ORIGINAL

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