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bcc: J. R. Buchanan, NSIC
T. B. Abernathy, TIC

OCT 1 1976

Docket No. 50-302

Mr. J. T. Rodgers
Assistant Vice President and
Nuclear Project Manager
Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Dear Mr. Rodgers:

REQUEST FOR ADDITIONAL INFORMATION REGARDING REACTOR BUILDING DOME DELAMINATION REPORT FOR CRYSTAL RIVER, UNIT 3

This letter is a follow-up to a telephone conversation between you and the Licensing Project Manager, Mr. Leon Engle on October 1, 1976. Per this same date you were telecopied requests for additional information regarding our review and evaluation of your Reactor Building Dome Delamination Report for Crystal River, Unit 3 and Supplement No. 1 to this report. The additional information is required before we can complete our evaluation of your dome repairs. The requests for additional information are provided in the Enclosure to this letter.

Mr. Engle, per the above telephone call requested your response to the requests for additional information be completed by October 15, 1976 or sooner if possible. You indicated that you would contact Mr. Engle by phone as soon as you were able to assess the requests for information and the requested submittal date of October 15, 1976.

Until such time as you inform us differently, we have scheduled your submittal date for October 15, 1976.

Please contact us if you have any questions regarding these matters.

Sincerely,

Original Signed by
John F. Stolz

John F. Stolz, Chief
Light Water Reactors Branch No. 1
Division of Project Management

Enclosure:
Request for Additional
Information

OFFICE ➤	LWR 1	LWR 1				
cc:	See page 2					
SURNAME ➤	LEngle:rcd	JStolz				
DATE ➤	10/1/76	10/1/76				

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Form AEC-318 (Rev. 9-53) AECM 0240 ☆ U. S. GOVERNMENT PRINTING OFFICE: 1974-526-166

OCT 1 1976

cc: Mr. S. A. Brandimore
Vice President and General Counsel
P. O. Box 14042
St. Petersburg, Florida 33733

OFFICE ➔						
SURNAME ➔						
DATE ➔						

ENCLOSURE

REQUEST FOR ADDITIONAL INFORMATION
FLORIDA POWER CORPORATION
CRYSTAL RIVER, UNIT NO. 3
DOCKET NO. 50-302

I. DOME REPAIR

1. An analysis of the repaired dome should be made for the following conditions:

   (a) Before the hardening of the cap concrete,

   (b) After the hardening of the cap concrete, including all the loading conditions as described in the FSAR.

   Indicate the stresses and strains in the mainly-reinforced concrete cap portion and in the prestressed concrete lower portion.

2. Provide a description of the final design of the radial anchors and indicate how the combined action of the cap concrete and the lower dome concrete is ensured.

3. It was indicated that two layers of reinforcing steel will be provided in the cap. For the meridional reinforcing steel, if only one layer can be spliced to the existing meridional steel near the ring girder, indicate how the other layer can effectively carry the load if it is not spliced to the existing steel, noting that under internal pressure, dome concrete may crack in tension.

4. Since the repaired dome becomes a unique structural element of the containment structure, indicate any special considerations to meet the requirements of Regulatory Guide 1.18 in executing the structural integrity test of the containment.

5. The original dome design concrete strength, f'_c, is based on 5000 psi; now a concrete strength of 6000 psi is used for evaluating the repaired dome. The basis for using 6000 psi is that the actual strength of the existing structure possesses that strength. It is a well-known fact that concrete strength increases with age beyond 28 days and stabilizes after a certain time. Generally, designers of concrete structures do not take such increases into consideration mainly to offset "ignorance factors"in areas of design and construction. Provide a justification that such additional margins of safety are not required in the case of a concrete containment, noting that there is a reduction in dome concrete area due to the presence of cracks, sheathing ducts and other possible voids, and if such reduction of concrete area is disregarded in the stress computation, the computed membrane compressive stress may be less than the actual.

6. The cracks in the dome concrete as discussed in the general comments, have reached stability. The structural integrity test (SIT) will affect such stability. Provide an evaluation of SIT on the lower level cracks of concrete which may not be grouted with epoxy. Provide the data on the effectiveness of epoxy grout in controlling concrete cracks.

III. CAUSES OF DELAMINATION

1. On Page C-3 in Appendix C under the subsection on "Direct Tensile Test Results" the applicant indicates that the range of direct tensile tests on 6 core sampler was 230 psi to 505 psi with an average value of 420 psi. In view of these low results, the allowable membrane tensile stresses indicated in table 2-2 appear high. Discuss the cause of these low tensile ultimate stresses, the reason for the wide scattering of the test results and the possibility that the delamination phenomen was caused by the poor quality of the aggregate, and the propagation of local cracks along the whole surface of the dome as surmised in the general comments above.

2. The applicant presented in Fig. 3-22 the plane strain finite element model used to evaluate some stress concentrations at the tendon ducts.

   a. Present a detailed description of boundary conditions (especially at the duct) and initial conditions introduced in the computer analysis for all cases of stress concentration.

   b. Justify the use of plane strain to analyze what is essentially a three-dimensional problem.