Florida Power
CORPORATION

May 4, 1982
#3F-0582-04
File: 3-0-1-a

Mr. John F. Stolz, Chief
Operating Reactor Branch #4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Rupture Matrix Signals

Dear Mr. Stolz:

Florida Power Corporation submitted forty copies of the report "Evaluation of Reactivity Response for a Steam Line Break Event with Unterminated Emergency Feedwater Flow" on September 3, 1981, to be used in the safety review on the removal of rupture matrix signals to Emergency Feedwater Valves EFV-161 and 162. On April 20, 1982, Syd Miner and Sammy Diab (in a telephone conversation) requested additional information on the effect of 40 or 50°F emergency feedwater being added to a steam generator after it boiled dry and requested documentation on the reported steam generator inventory (fouled) being 46,200 pounds mass. The following information was requested by Mr. Sammy Diab to complete his review on removing the rupture matrix signals from EFV-161 and 162.

The attached information from the Babcock & Wilcox Technical Document 18-1005812-00 "Functional Contract Specification for Reactor Coolant System," provides graphs of the calculated responses of pressure and temperature of the reactor vessel and steam generators and the feedwater flow rate and temperature caused by emergency feedwater injected to a dry steam generator.

Transient 17A is a transient in which feedwater flow is lost to a steam generator, which causes reactor trip, and the steam generator is evaporated to a dry, pressurized condition. The plant is designed for twenty (20) of these events. Transient 17B is an emergency transient in which a turbine bypass valve is assumed to stick open. The affected steam generator blows down to a dry, depressurized condition, and a reactor trip occurs. The faulted bypass valve is isolated and feedwater is slowly introduced through the emergency feed nozzles on the dry steam generator until minimum water level and pressure are restored. The plant is designed for ten (10) of these events.

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Transient 2A (0% to 15% Power) and transient 3 (8% to 100% Power) data are included in this submittal since they are referred to in the dry steam generator transients.

The steam generator inventory assumed as an initial condition for a secondary system upset exerts a large influence on the consequence of the transient. Early steam generator inventory predictions for 177 operating plants of 55,000 and 62,500 pounds mass were used for double-ended Steam Line Break analyses. These inventory predictions were a conservatively large estimation of the maximum amount of mass that could be present in the steam generator tube and primarily downcomer region that would still result in a guaranteed minimum superheat production of 35°F during rated power operation with fouled conditions. These predictions were based on consideration of actual steam generator geometry and the matching of tube region temperature distributions with an Alliance Research Center test steam generator model in order to obtain a profile of fluid density along the steam generator tube region.

These inventory predictions have, over the past several years, been refined to more accurately reflect true generator inventory. Operating experience at Arkansas Nuclear One has indicated a very slight degradation in steam generator exit steam temperature as a function of fouling. Steam generator performance has indicated less degradation on heat transfer as a result of fouling than originally predicted. This results in lower inventory calculated for fouled conditions than was previously considered. The steam generator inventory for Crystal River Unit 3 for the analysis of reactivity response to a Steam Line Break Event with unterminated emergency feedwater flow is 46,200 pounds mass.

A conservative approach to steam generator inventory as an initial condition for transient analyses is still insured by using a nominal valve $\pm$ 10% in the direction of known conservatism.

Should you have any questions, please contact this office.

Very truly yours,

David G. Mardis

David G. Mardis
Acting Manager
Nuclear Licensing

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