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AUTH.NAME AUTHOR AFFILIATION
UHRIG,R.E. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
CLARK,R.A. Operating Reactors Branch 3

SUBJECT: Forwards "Analysis of Natural Circulation Cooldown W/o Upper Head Voiding for St Lucie Unit 1," in response to NRC 801017 request for info re 800611 natural circulation cooldown event.

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FLORIDA POWER & LIGHT COMPANY

December 30, 1980
L-80-431

Office of Nuclear Reactor Regulation
Attention: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Clark:

Re: St. Lucie Unit #1
Docket No. 50-335
Natural Circulation Cooldown

The NRC letter dated October 17, 1980 requests additional information concerning our response to your question regarding the June 11, 1980 St. Lucie Natural Circulation Cooldown Event. Your basic concern appears to be that we have not presented an analytically justified procedure which would result in a natural circulation cooldown without voiding in the reactor vessel head, and which would at the same time stay within our technical specification limit for condensate storage.

In previous correspondence, we have shown that the drain and fill method utilized during the June 11, 1980 event is a method which we can safely use to cool down the reactor on natural circulation while remaining well within the cooldown limits as specified in the technical specifications.

However, in an attempt to minimize the need for drain and fill cycles during the operational life of St. Lucie Unit 1, we will make certain alterations to the procedure governing natural circulation cooldown. The purpose of the changes will be to extend the time the reactor remains at 325° before dropping pressure to shutdown cooling conditions. This will allow the temperature of the water in the upper head to approach that of the hot leg, thereby allowing depressurization without void formation.

As stated in our September 16, 1980 letter, we revised our emergency operating procedure to require a cooldown rate of 25-30°F/hour, with the cooldown to be stopped at approximately 325°F RCS temperature for 4 hours. This revision was based on the best information available at the time and was felt to include adequate conservatisms.

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We have now performed more detailed analyses of natural circulation cooldown events to determine the time it would take for the upper head to cool to a temperature that will prevent voids upon depressurization and how much condensate is required to achieve that condition. A description of the analysis is contained in Attachment 1. Our results indicate that cooling down at a 50°/hr rate to 325° and then maintaining the hot leg temperature at 325° for 20.4 hours would allow shutdown cooling pressure to be reached without flashing of the upper head fluid in a total cooldown time of 25.7 hours. The condensate requirement for this cooldown is 270,500 gallons. Our procedures will be revised to require the operator to follow this cooldown procedure, to establish makeup to the condensate storage tank, and to maintain the volume of the tank continuously above the technical specification limit. Should the makeup supply be inadequte, the operator will be instructed to commence the drain and fill method, which then can be accomplished utilizing the technical specification condensate water volume. Makeup water can be supplied from the water treatment plant and the two 500,000 gallon city water storage tanks. Pumping capability from both sources can be supplied from the diesel generators.

In this way, we can accommodate the events which have the highest probabilities of leading to a natural circulation cooldown, i.e. loss of offsite power or loss of component cooling water to the RCP seals. Should an extremely low probability event occur which could cause a loss of condensate makeup capacity, i.e. SSE, we would then follow the drain and fill shutdown procedure. This procedure has been analyzed and performed successfully twice previously at St. Lucie and is considered to be a safe method of cooldown.

We have concluded that this approach adequately accomplishes the goal of bringing the plant to shutdown conditions in a safe manner.

Very truly yours,

Robert E. Uhrig

Robert E. Uhrig
Vice President
Advanced Systems & Technology

REU/JEM/md

cc: J.P. O'Reilly, Region II
Harold F. Reis, Esquire