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50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251

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RECIP.NAME RECIPIENT AFFILIATION
EISENHUT,D.G. Division of Licensing

SUBJECT: Proposes mod to turbine runback sys,deleting flux rat input. Sys prone to spurious runbacks due to single failure of single electrical component.Encl safety evaluation discusses consequences of single dropped rod control cluster assembly.

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FLORIDA POWER & LIGHT COMPANY

August 10, 1982
L-82-343

Office of Nuclear Reactor Regulation
Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Eisenhut:

Re: Turkey Point Units 3 & 4
Docket No. 50-250 and 50-251
Turbine Runback System

The Turbine Runback System (TRS) at Turkey Point Units 3 & 4 receives inputs from either the ex-core neutron flux detectors or a rod-on-bottom indication signal. It has been our experience that the TRS is prone to spurious runbacks due to single failure of single electrical components. These spurious runbacks have subjected the plant to unnecessary transients and reduced availability.

Therefore, we are proposing for your review and approval under the guidance of 10 CFR 50.59 a modification to the TRS which deletes the flux rate input. This modification will significantly reduce the probability of spurious runbacks without compromising plant safety.

The attached safety evaluation demonstrates that the consequences of a single dropped Rod Cluster Control Assembly (RCCA) assuming manual rod control and no turbine runback is bounded by the previously analyzed static RCCA misalignment. The static RCCA misalignment has been analyzed in WCAP-9272, "Reload Safety Evaluation Methodology" which is the proprietary topical report submitted to you from Westinghouse on April 15, 1978. The automatic rod control system has been disconnected at Turkey Point Units 3 & 4, thereby assuring operation in the manual mode.

Very truly yours,

A001

Robert E. Uhrig
Vice President
Advanced Systems and Technology

REU/JEM/mbd

Attachments

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

MODIFICATION OF THE TURBINE RUNBACK SYSTEM

The automatic turbine runback feature of Turkey Point Units 3 and 4 is designed to provide protective action in the event of a dropped RCCA or dropped bank. Detection of a dropped RCCA or bank occurs by either a rod-on-bottom signal device or by a change in neutron flux as seen by the excore detectors. The rod-on-bottom signal provides separate indication for each RCCA in the core and one signal is sufficient to initiate the turbine runback. Also, a change in flux as seen by one of the four excore detectors will cause the turbine load to be reduced. The turbine load is reduced to a pre-set value of 70%. At the same time, automatic withdrawal of the control rods is prevented by a rod withdrawal block. This scenario is discussed and analyzed in Section 14.1.4 of the Turkey Point FSAR.

The design of the automatic turbine runback is prone to spurious runbacks (i.e., runbacks not caused by a RCCA drop) because there is no coincidence logic used in the initiation of the runback. Thus, a single failure of an electrical component (burnout of a rod position indicator signal, failure of one excore detector, etc.) instead of acting to prevent protective action will, in fact, cause a turbine runback when it is not needed. This causes unnecessary plant transients and results in a significant loss in operability and availability. Operating history at the Turkey Point units shows that seven spurious runbacks have occurred in the last two years. No runbacks occurred due to a dropped RCCA or bank.

The majority of the spurious runbacks have resulted from failures in the flux rate input to the runback logic. If this input could be deleted, operability would be greatly improved. Since the turbine runback system is designed to provide protection for a dropped RCCA/bank, this accident must be re-evaluated in light of any changes to the system.

In any accident analysis, a limiting single failure for that transient is assumed. In the event of a dropped bank (assuming the flux rate input has been deleted), between four and eight rod-on-bottom signals will be generated, one for each rod in the bank. A failure of any one signal has no impact, since there are still several other signals available, and only one is needed to initiate the turbine runback. Therefore, the dropped bank analysis is not affected by this change

to the turbine runback logic, and the FSAR analysis presented in Section 14.1.4 remains applicable.

However, for a single dropped RCCA, the failure of one rod-on-bottom signal means that no runback will occur, since the only signal generated, failed. (If the flux rate input is used, this will initiate runback if a rod-on-bottom signal fails for a dropped RCCA.) Therefore, this accident must be reanalyzed assuming no turbine runback occurs.

The transient for a dropped RCCA is calculated using the same methods as described in Section 15.1.4. The LOFTRAN code is used to model the plant response. The LOFTRAN code is a detailed digital computer program which simulates neutron kinetics, the pressurizer and its relief and safety valves, pressurizer spray and heaters, rod control system, and steam generators and their relief and safety valves. Pertinent plant variables, including temperature, pressure, and power level, are computed. Most negative moderator and doppler temperature coefficients are used to maximize the core heat flux.

Figure 1 illustrates the transient for a typical dropped rod worth of 150 pcm in manual rod control. The core heat flux initially drops and then returns to the initial power level due to reactivity feedback. Temperature and pressure drop to a lower value. New equilibrium conditions are reached with the core at full power and reduced temperature and pressure. These conditions are less limiting than those for which the static full length misalignment of an RCCA is analyzed in the Reload Safety Evaluation for each cycle. In this analysis, the reactor is at full power with nominal temperature and pressure (including uncertainties). At the same power level, the DNBR benefit due to the reduction in temperature which occurs in the transient case more than compensates for the DNBR penalty caused by the transient drop in pressure. Thus, the single dropped RCCA analysis assuming manual rod control and no turbine runback is bounded by static RCCA misalignment. A dropped RCCA in automatic rod control is not bounded by this analysis since a power overshoot above 102% could occur.

In summary, Westinghouse finds that it is acceptable to delete the flux rate portion of the turbine runback system provided the plants remain in manual rod control. The detection and analysis of dropped banks are not affected by this change. A dropped RCCA which does not result in a runback is bounded by static RCCA misalignment.

DROPPED ROD MANUAL CONTROL

TURBINE RUNBACK

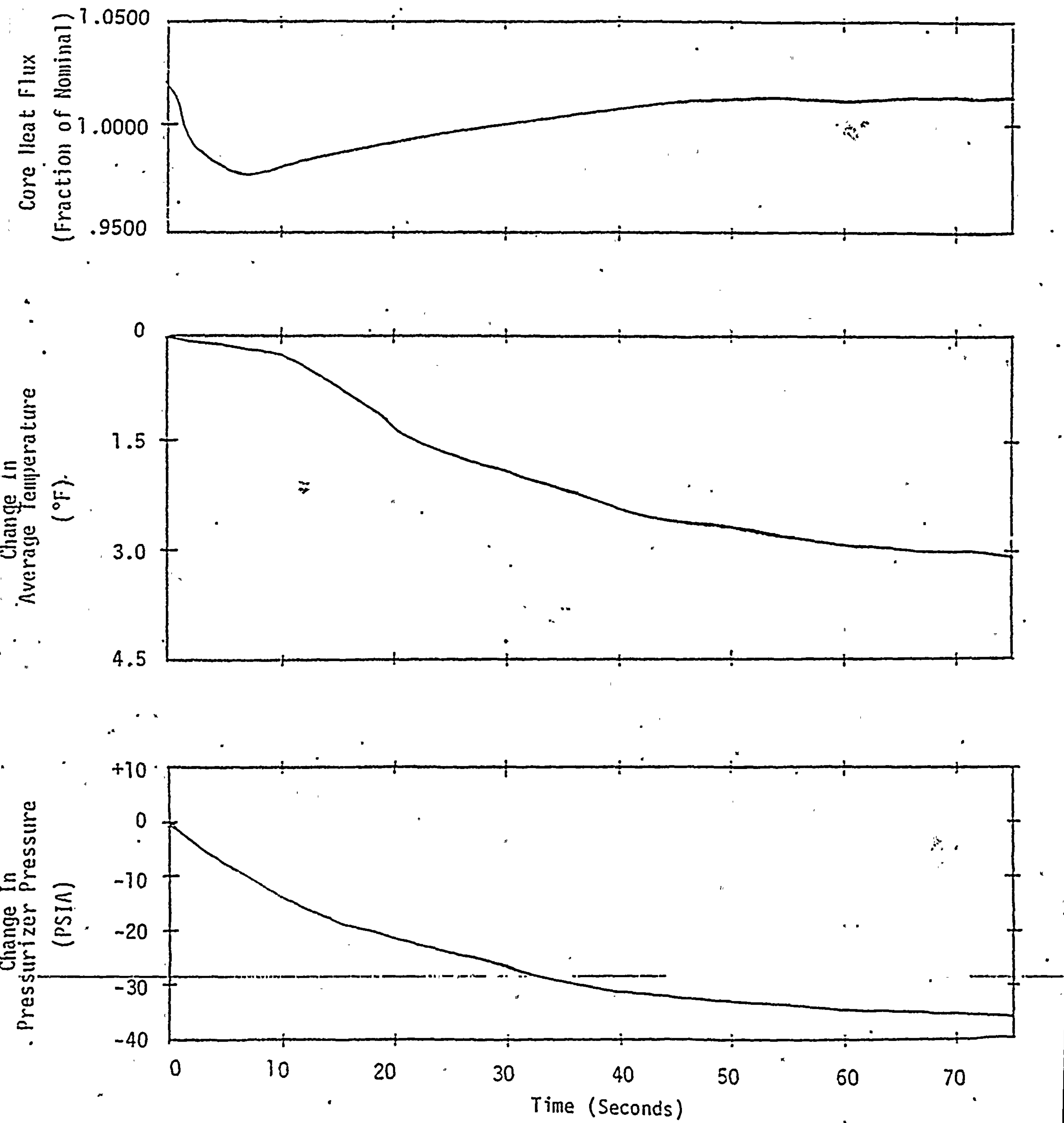

FIGURE 1