September 15, 1986

Docket Nos. 50-250
and 50-251

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Mr. C. O. Woody, Group Vice
President
Nuclear Energy Department
Florida Power and Light Company
Post Office Box 14000
Juno Beach, Florida 33408

Dear Mr. Woody:

Subject: Request for Additional Information, Topical Report NTH-G-6 "RETRAN Code: Transient Analysis Model Qualification"

Reference: TAC Numbers 60549 and 60550

By letter dated January 7, 1986, you submitted Florida Power and Light Company Topical Report NTH-G-6 "RETRAN Code: Transient Analysis Model Qualification" for NRC review and approval.

We have completed our preliminary review of the Topical Report with the assistance of our contractor, International Technical Service, Inc. In order to complete our review, we require the additional information requested in the enclosure. We and our consultants will meet with your staff to discuss the information request if necessary.

The reporting and/or recordkeeping requirements of this letter affect fewer than 10 respondents; therefore OMB clearance is not required under P.L. 96-511.

Sincerely,

Daniel G. McDonald, Project Manager
PWR Project Directorate #2
Division of PWR Licensing-A
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
See next page

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Mr. C. O. Woody
Florida Power and Light Company

Turkey Point Plant

cc:
Harold F. Reis, Esquire
Newman and Holtzinger, P.C.
1615 L Street, N.W.
Washington, DC 20036

Mr. Jack Shreve
Office of the Public Counsel
Room 4, Holland Building
Tallahassee, Florida 32304

Norman A. Coll, Esquire
Steel, Hector and Davis
4000 Southeast Financial Center
Miami, Florida 33131-2398

Mr. C. M. Wethy, Vice President
Turkey Point Nuclear Plant
Florida Power and Light Company
P.O. Box 029100
Miami, Florida 33102

Mr. M. R. Stierheim
County Manager of Metropolitan Dade County
Miami, Florida 33130

Resident Inspector
U.S. Nuclear Regulatory Commission
Turkey Point Nuclear Generating Station
Post Office Box 57-1185
Miami, Florida 33257-1185

Mr. Allan Schubert, Manager
Office of Radiation Control
Department of Health and Rehabilitative Services
1317 Winewood Blvd.
Tallahassee, Florida 32301

Intergovernmental Coordination and Review
Office of Planning & Budget
Executive Office of the Governor
The Capitol Building
Tallahassee, Florida 32301

Administrator
Department of Environmental Regulation
Power Plant Siting Section
State of Florida
2600 Blair Stone Road
Tallahassee, Florida 32301

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
Suite 2900
101 Marietta Street
Atlanta, Georgia 30323

Martin H. Hodder, Esquire
1131 NE, 86th Street
Miami, Florida 33138

Joette Lorion
7269 SW, 54 Avenue
Miami, Florida 33143

Mr. Chris J. Baker, Plant Manager
Turkey Point Nuclear Plant
Florida Power and Light Company
P.O. Box 029100
Miami, Florida 33102

Attorney General
Department of Legal Affairs
The Capitol
Tallahassee, Florida 32304

Enclosure

1. In all transients where the "actual" data are used in the calculations, discuss degrees of uncertainties associated with data used in computations and later compared. Explain each substantial change in slope of all plant parameters in the plots presented for each transient.

2. (Loss of 1 MFW Pump event) (i) Why do the results not agree well for 40-50 seconds after the reactor trip? (ii) What caused the steep change in slope in all the plant data at approximately 50 seconds and in the pressurizer at 50 & 55 seconds, in the steam generator pressure at 120 seconds, and at approx. 50, 75 and 80 seconds in the RETRAN analysis? (iii) The data indicate cycling in the pressurizer pressure from 20 to 50 seconds into the event yet this was not predicted by RETRAN. Please comment. (iv) In addition, demonstrate the adequacy of modeling the reactivity due to manual insertion of control rods by an input table. (v) Provide plots of core power, feedwater flowrate, auxiliary feedwater flowrate, and steam generator mixture level for both steam generators together with hot and cold leg pressure and temperature for both loops and the pressurizer pressure and level. (vi) In discussing the results, cross reference these plots. (vii) Finally, was the pressurizer on the affected loop?

3. (RCP Coastdown Test) The RETRAN simulation of this transient was performed for the first 20 seconds only. The flows for the case of one pump coastdown appear to begin diverging when the calculations were terminated. Provide further evidence that this is not the case, and if they are in fact diverging, explain and justify the divergence. If RETRAN auto initializer was used, what parameters were permitted to be adjusted by the code? If not, what adjustments to loss coefficients were made to obtain initial pressure profile and flowrate? Compare those coefficients to known friction losses. Were reverse flow loss coefficients through the pumps different than forward flow? Give numerical values and justify by comparison to plant or pump data.

   If these analyses were used to establish loss coefficients used in other transients for which the flow went down to natural circulation flowrates (such as Stuck Open Steam Generator relief valve and SBLOCA), carry the transient out to natural circulation flow and justify the end result. Plot and compare temperature as well as flowrate for each loop against data for the full length of the transient for which data are available.

   Explain what is meant by the "best estimate parameters taken from test data (p. 5-2)."

4. (Uncontrolled RCCA Withdrawal). Describe how the rod insertion was modeled and justify the rod insertion rate (i.e., reactivity insertion rate); the rate appears to be slower with RETRAN than that used in the FSAR.

   Explain the changes in slope in RETRAN results at approximately 20, 25, 52, 55 seconds. Explain why the slope of the temperature vs time is different in the RETRAN results from those of the FSAR. Explain why the two computations predict different trip times. Explain and justify why RETRAN seems to have a different total scram reactivity insertion than the FSAR computation. Plot reactivity, power, hot leg temperature, core inlet and outlet temperature, core flow and pressure vs. time.

5. More complicated transients, such as SBLOCA, Stuck-open steam generator relief valve (SGRV) and steam generator tube rupture require detailed and thorough discussions and analyses of results supported by plots and tables. Since only a handful of plots and limited thermal-hydraulic analyses were presented in the Westinghouse generic analysis, the liensee cannot demonstrate its analytical skills by comprison of his results to the generic study.

   For their SBLOCA analysis, the licensee presented plots of downcomer P and T, break flow and injection flow, accompanied by brief analysis. Here, the licensee has the opportunity to analyze a challenging transient. To do so, the licensee should plot and inter-compare hot and cold leg flows for both loops, pressurizer pressure and level, upper head void fraction and flows, core mixture level, (if the primary voids enough) void fractions in the hot legs and (if there was enough void) discuss countercurrent flows and recirculating natural circulation flow. In addition, from the plots that were presented, the licensee should discuss and explain the changes in slopes at roughly 2000, 2300, 3000 and 3700 seconds.

   In addition if the licensee intends that this analysis be used to meet PTS criteria, justify that a two inch break on the hot leg side will result in the worst case SBLOCA with respect to PTS. Compare the sequence of events between the Westinghouse generic analysis and the FPL analysis and explain differences, if any. Finally, compare the break flow (the crucial parameter) to the Westinghouse break flow and discuss how and why they are different.

6. (Stuck Open SGRV) The results presented for this analysis appear to be significantly different, with the RETRAN analysis under-predicting the overcooling in the early part of the transient (compared to Westinghouse's analysis) and in the long run over-predicting the overcooling by nearly 30 degrees. Explain the cause of this difference and, in addition, discuss why the initial conditions for the core inlet coolant temperature were not matched. Compare and discuss the differences in the SGRV flowrates computed by these codes, and compare and discuss the heat transfer coefficients used in these codes which may also contribute to the difference. In discussing these differences, refer to the following plots: steam generator pressure, mixture level, steam flowrate through the SGRV, heat transfer rate across the steam generator tubes, feedwater flow, hot and cold leg temperatures, flow rates and void fractions, upper head void fraction for the first 2000 seconds and, for the period from 2000 to 4000 seconds, plot and inter-compare affected loop hot and cold leg pressure, temperature and flow, PORV and charging flow and affected steam generator AFW and steam flowrate.

7. (SGTR) Provide, at a minimum, the following: break flow, steam generator pressure and temperature, affected steam generator mixture level, steam generator relief valve flow, AFW and MFW flows, SI flow, upper head void fraction together with details of the operator actions modeled. All of these should be accompanied by a thorough and specific discussion of each curve, cross referencing both phenomena and other plant parameters. In addition, justify the statement that the cold side break is the worst case.

8. We have insufficient data to assess the ability of FPL to perform licensing-type analysis, since FPL presented only one such transient analysis (Uncontrolled RCCA Withdrawal) in which they did not discuss the specific assumptions which they have made which are required for licensing purposes and which are different from best estimate analysis. Provide and justify all initial conditions and modeling assumptions as compared with nominal plant operating conditions to demonstrate that such choices will provide a conservative analysis.

Generically, for each transient:

i(a) describe the nodalization and justify its adequacy for the phenomena peculiar to that particular transient.

In addition, the submittal states that "reasonable" noding and parameter values were utilized. Justify the nodalization for each transient on the basis of the phenomena characteristic of that transient; specifically, address the following items:

i(b) Where there is an asymmetric loop condition which can impact the analysis of the transient, justify not using a split-core nodalization.

i(c) SLOBCA transient behavior is known to be very sensitive to the secondary nodalization (see ANL/LWR/NRC 83-12); therefore justify the nodalization used by providing results of sensitivity analyses to demonstrate the solution is converged.

i(d) Where steam generator flows govern the transient, justify using a non-recirculating, single volume boiling region nodalization.

i(e) Where primary flows become two phase (i.e., the pressurizer empties), justify the upper head nodalization and nodalization of the loop seals in the cold leg region.

(ii) describe in detial the plant control systems which were modeled for that transient and explain how their modeling conforms to the actual plant controls;

(iii) present enough plots of physical parameters throughout the plant and discuss the major changes of slope in each by reference to physical phenomena and justify such explanations by use of the plots of other variables.