Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

May 22, 2003

L-2003-136
10 CFR 50.90

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

RE: St. Lucie Unit 2
Docket No. 50-389
Proposed License Amendment
ECCS Subsystem Flow Balance Technical
Specification Surveillance Requirement

Pursuant to 10 CFR 50.90, Florida Power and Light Company (FPL) requests to amend Facility Operating License NPF-16 for St. Lucie Unit 2 by incorporating the attached Technical Specification (TS) revision. While performing high pressure safety injection (HPSI) subsystem flow surveillances during the Spring 2003 Cycle 14 refueling outage, HPSI pump 2A did not meet the flow balance requirements specified in TS 4.5.2.i.3. Based on the review of test data and the sensitivity of test data to small system changes, the flow balance TS validation criteria is set at the bounds of the system capability. The test failure troubleshooting team systematically ruled out system or component degradation as the cause of the test failure. The unsuccessful test was caused by the extremely restrictive TS requirements that were developed from pre-operational test data. However, the measured developed head and flow rates are more than adequate to meet all applicable safety analysis requirements.

Therefore, FPL proposes to modify St. Lucie Unit 2 TS 4.5.2.i.3 to change the HPSI simultaneous hot and cold leg injection mode flow and head surveillance requirements. The proposed change will relax the subject surveillance requirements while maintaining adequate margin to the safety analysis.

FPL requests that this change be processed as an exigent local TS pursuant to 10 CFR 50.91(a)(6) because failure to act in a timely way would prevent resumption in operation. The HPSI system is required to be operable to enter Mode 3 with pressurizer pressure greater than or equal to 1750 psia. FPL requests that this amendment be approved by May 30, 2003, the date when pressurizer pressure is scheduled to be greater than 1750 psia with St. Lucie Unit 2 in Mode 3.

Attachment 1 is an evaluation of the proposed changes. Attachment 2 is the "Determination of No Significant Hazards Consideration." Attachment 3 contains the affected Technical Specification page marked-up to show the proposed changes. Attachment 4 contains the word-processed TS change.

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The St. Lucie Facility Review Group and the FPL Company Nuclear Review Board have reviewed the proposed amendment. In accordance with 10 CFR 50.91(b)(1), copies of the proposed amendment are being forwarded to the State Designee for the State of Florida.

Please contact us if there are any questions about this submittal.

Very truly yours,

William Jefferson, Jr.
Vice President
St. Lucie Plant

WJ/KWF

Attachments

cc: Mr. W. A. Passetti, Florida Department of Health

STATE OF FLORIDA)
) ss.
COUNTY OF ST. LUCIE)

William Jefferson, Jr., being first duly sworn, deposes and says:

That he is Vice President, St. Lucie Plant, for the Nuclear Division of Florida Power and Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information and belief, and that he is authorized to execute the document on behalf of said Licensee.

William Jefferson, Jr.

STATE OF FLORIDA

COUNTY OF ____St. Lucie_____

Sworn to and subscribed before me

this 22 day of May, 2003

by William Jefferson, Jr., who is personally known to me.

Leslie J. Whitwell

Signature of Notary Public-State of Florida

Name of Notary Public (Print, Type, or Stamp)

Leslie J. Whitwell
MY COMMISSION # DD020212 EXPIRES
May 12, 2005
BONDED THRU TROY FAIN INSURANCE, INC.

EVALUATION OF PROPOSED TS CHANGES

EVALUATION OF PROPOSED TS CHANGES

INTRODUCTION

While performing high pressure safety injection (HPSI) subsystem flow surveillances during the Spring 2003 Cycle 14 refueling outage, HPSI pump 2A did not meet the flow balance requirements specified in Technical Specification (TS) 4.5.2.i.3. As discussed below, system or component degradation did not contribute to the unsuccessful surveillance. Additionally, as discussed later, Florida Power and Light Company (FPL) determined that the measured developed head and flow rates were adequate to meet all applicable safety analysis requirements. Therefore, FPL proposes to modify St. Lucie Unit 2 TS 4.5.2.i.3 to change the HPSI simultaneous hot and cold leg injection mode flow and head surveillance requirements. The proposed change will relax the subject surveillance requirements while maintaining adequate margin to the safety analysis.

FPL is requesting that this amendment be processed as an exigent TS change. Although pre-outage planning identified the small margin associated with the flow balance, a subsequent change was made to the test methodology that was expected to regain margin. This exigent TS change was unavoidable because unsuccessful test results were not foreseen. This proposed TS change meets the requirement for an exigent situation because failure to act in a timely way would prevent resumption in operation.

BACKGROUND

When the 2A HPSI pump flow balance test did not satisfy the acceptance criteria for the simultaneous hot and cold leg injection mode, FPL developed a detailed troubleshooting plan to determine the cause. TS 4.5.2.i flow balance testing was required because the ECCS subsystem flow characteristics could have been changed when selected safety injection throttle and check valves were replaced during the refueling outage. Flow instrument changes were not made. FPL does not consider that the system work scope was an issue because minor changes in component pressure drop and flow parameters would be compensated by the repositioning of the discharge throttle valves. No changes were introduced into the system that would account for the failure to meet the surveillance total developed head (TDH) requirements in the simultaneous hot and cold leg injection mode. Other potential causes for the unsuccessful flow balance test results included component degradation, foreign material exclusion (FME) issues, and instrumentation issues.

With respect to component degradation, FPL assessed the health of the 2A HPSI pump and HPSI flowpaths. FPL reviewed the 2A HPSI pump data and determined that the pump was performing on its pump curve consistent with its pre-operational test data. The quarterly recirculation and 18-month full flow inservice test (IST) data also support the conclusion that the 2A HPSI pump had not degraded. The quarterly recirculation testing performed at near

dead-head conditions shows no degradation over the last 10 years. The full flow testing data shows some scatter in the data within 2% (attributed to test flow set-up repeatability due to noisy flow indication) but no adverse trend. Furthermore, in the region of the pump curve where the flow balance testing is performed, the data is in tight agreement with the nominal pump curve. FPL's 2A HPSI pump health assessment was backed up by an independent industry pump expert's review of pump performance that also concluded that the 2A HPSI pump was not degraded. Therefore, FPL concluded that pump degradation had no role in the inability to pass the TS surveillance.

The HPSI system utilizes flow orifices to develop the accident flow distribution between HPSI hot and cold leg injection flow paths. Research into past HPSI flow balancing issues revealed that problems were encountered with the original pre-operational orifice design and sizing criteria. Degradation of the hot and cold leg orifices could have contributed to the test failure by allowing higher flow through the cold leg leading to greater pump flow at reduced developed head. The orifice plates were removed from the system and inspected. The inspection results showed that the orifice plates were not worn and their bore dimensions were consistent with design dimensions.

FPL also considered valve degradation as a means to affect the flow balance. During simultaneous hot and cold leg injection, the hot leg injection throttling valve is open, the HPSI pump discharge valve is closed, and cold leg flow is limited by the flow orifices. Leakage through the HPSI pump discharge valve would be a potential cause of excess cold leg flow. The HPSI pump discharge valve is a 6-inch gate valve that is monitored within the site Generic Letter (GL) 89-10 and 96-05 motor operated valve programs. A review of the valve parameters and performance concluded that the HPSI pump discharge valve is capable of achieving full closure under design conditions. Additionally, boroscopic inspection of the valve did not identify any damage indicative of seat leakage.

FPL also investigated seat leakage of other boundary valves (e.g., recirculation, inter-system cross connect, and relief valves) as a potential cause for flow diversion. A review of work histories did not reveal any problems with these components. In some cases double valve isolation was implemented during subsequent testing as available with no effect on the test results. Additionally, system leakage would not be a contributing factor as the pump is operating on its pump curve and as such any leakage would be identifiable. Therefore, FPL ruled out boundary valve leakage as a contributing factor in the test failure.

Another item considered and ruled out pertained to the different system boundary conditions (e.g., refueling cavity and refueling water tank level differences) that may have existed during tests. However, the head differences would not have been enough to significantly influence test results.

FPL considered foreign material within the system. Foreign material is an unlikely cause due to the cleanliness level maintained within the non-corrosive stainless steel system. The bore

sizes of the flow element orifice plates do not readily lend themselves to plugging or obstruction. Throttle valve positions could potentially accommodate partial blockage. However, no flow anomalies were identified during the test that would be indicative of an improper flow-to-valve position relationship.

With respect to instrument issues, flow testing used both installed and test instrumentation. Pump suction and discharge pressures were obtained by highly accurate temporary test gauges. Cold leg and hot leg injection flows were obtained with the normal control room instruments. All instrumentation had recent calibrations, and the as-found data supports the contention that instrument drift was not an issue. A review of the overall uncertainty of the flow and pressure instruments in the simultaneous hot and cold leg injection mode concluded that the variance in indicated flow alone could cause a test failure or conversely cause a test passing with a marginal system set-up. A review of the 2003 test results indicates the recorded pressures and flows were consistent with expected values based on the vendor pump curve. Instrument uncertainty may be a contributing cause, and may account for the inability to reliably produce acceptable test results.

The current TS surveillance requirement was developed based on pre-operational test data. The pre-operational test was designed to set up the system to provide sufficient flow to meet the safety analysis for all accident scenarios and also avoid pump damage by preventing excessive flow conditions. A review of 1982 and 1983 pre-operational test data demonstrated difficulty in meeting earlier, preliminary TS criteria. Even though acceptable system and pump performance were eventually achieved in 1983, there was a relatively large variance in test data. While testing was successfully repeated in 1990 following system modifications, the testing was difficult to perform, required many repeat runs, and eventually passed with little to no margin. Based on review of test data and the sensitivity of test data to small system changes, the flow balance TS validation criteria is set at the bounds of the system capability.

Based on the above, the unsatisfactory test results were not due to system or component degradation, but were caused by the extremely restrictive TS requirements that were developed from pre-operational test data in conjunction with the associated instrument inaccuracies.

DESCRIPTION OF PROPOSED CHANGE

The marked-up page of the proposed changes to St. Lucie Unit 2 Technical Specification Surveillance Requirement 4.5.2.i.3 is shown in Attachment 3. The proposed changes are presented in strikethrough (deleted text) and underline (added text) below:

Technical Specification 4.5.2.i.3

> With the system operating in hot/cold leg injection mode, the hot leg flow ~~shall be greater than or equal to 317 gpm and within 10% of the cold leg header flow~~, and the sum of the four cold leg flows, shall each be greater than or equal to 290 gpm and:
>
> HPSI Pump 2A:
>
> The pump shall be producing total developed head greater than or equal to ~~1297~~ 1260 ft but less than or equal to 1500 ft.
>
> HPSI Pump 2B:
>
> The pump shall be producing total developed head greater than or equal to 1042 ft but less than or equal to 1250 ft.

The developed head requirements for the 2B HPSI pump remain unchanged.

BASIS/JUSTIFICATION FOR PROPOSED CHANGE

The basis for HPSI pump simultaneous hot and cold leg injection flow requirements is the post-LOCA long term cooling (LTC) analysis. The flow requirements are specifically based on the boric acid precipitation portion of the post-LOCA LTC analysis, which is performed as part of the emergency core cooling system (ECCS) performance analysis. The current St. Lucie Unit 2 post-LOCA LTC analysis is described in the Updated Final Safety Analysis Report (UFSAR) Section 15.6.6.3 (Reference 2). There is no other UFSAR described accident analysis which relies on the HPSI system operating in simultaneous hot and cold leg injection mode. The current UFSAR safety analysis assumes a total flow of 552 gpm (276 gpm through the hot leg injection line and 276 gpm through the four cold leg injection lines combined). With consideration of measurement uncertainties, the 2A HPSI pump will provide the required flow at a pump developed head of less than 1200 ft.

UFSAR post-LOCA LTC analysis, included in the safety analysis report approved in Reference 4, requires initiation of simultaneous hot and cold leg injection between 2 and 6 hours post-LOCA. The early time requirement is based on adequate core cooling and preventing hot leg steam entrainment of injected water. The later time requirement is based on preventing boric acid precipitation in the core.

The boric acid precipitation analysis for the limiting large break LOCA used the Westinghouse NRC approved post-LOCA LTC evaluation model described in Reference 3, and showed that initiating a minimum flow of 220 gpm through the hot leg injection line, and 220 gpm through

the four cold leg injection lines combined at 6 hours would prevent boric acid precipitation in the core. This minimum flow requirement is bounded by the analysis requirement of 276 gpm on each side (hot leg and cold leg).

For adequate core cooling at 2 hours post-LOCA, the injected flow must meet the boil-off due to decay heat. Based on the decay heat boil-off curve presented in the UFSAR Figure 15.6.6-16, the injection flow requirement at 2 hours is 276 gpm, after accounting for the spillage.

The proposed TS amendment, to modify the HPSI pump 2A flow requirement to ≥ 290 gpm through the hot leg line, and ≥ 290 gpm through the four cold leg injection lines combined at a pump developed head of 1260 ft, meets the above specified analysis requirements with margin for future pump flow degradation.

There is no change to the developed head requirement for the 2B HPSI pump and the reduction in flow requirement to ≥ 290 gpm for the 2B HPSI pump continues to meet the safety analysis requirements as stated above.

With the proposed changes, the safety analyses of all design basis accidents would thus continue to meet the applicable acceptance criteria.

SUMMARY CONCLUSION

The results of this evaluation demonstrate that the proposed amendment does not result in violation of any safety limit or acceptance criterion. Therefore, there is no safety concern associated with the proposed change.

REFERENCES

1. St. Lucie Unit 2 Technical Specifications, Amendment 131

2. St. Lucie Unit 2 Updated Final Safety Analysis Report, Amendment 14

3. CENPD-254-P-A, "Post-LOCA Long Term Cooling Evaluation Model," June 1980

4. Letter K. N. Jabbour (USNRC) to T. F. Plunkett (FPL), "St. Lucie Unit 2 – Issuance of Amendment Regarding the Cycle 12 Reload Process Improvement (TAC No. MA4523)," December 21, 1999 (Amended in letter dated March 1, 2000).

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

Description of amendment request: Pursuant to 10 CFR 50.90, Florida Power and Light Company (FPL) requests to amend Facility Operating License NPF-16 for St. Lucie Unit 2 by incorporating the attached Technical Specification (TS) revision. During the St. Lucie Unit 2 Spring 2003 refueling outage, FPL performed maintenance on emergency core cooling valves that affected the safety injection system performance. Although the TS flow and head verification requirements of TS Surveillance Requirement 4.5.2.i.3 were not met during post modification testing, FPL determined that the flow rates were adequate to meet all applicable safety analysis requirements. Therefore, FPL proposes to modify St. Lucie Unit 2 TS 4.5.2.i.3 to change the HPSI flow and head requirements with the system operating in the simultaneous hot and cold leg injection mode. The proposed change will relax the surveillance requirements with the HPSI system operating in the simultaneous hot and cold leg injection configuration, while maintaining adequate margin to the safety analysis.

Pursuant to 10 CFR 50.92, a determination may be made that a proposed license amendment involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. Each standard is discussed as follows.

1) Would operation of the facility in accordance with the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   The proposed amendment would change the HPSI flow and head surveillance requirements while maintaining compliance with the safety analysis requirements. There are no system alterations due to this change. The surveillance requirements are not accident initiators and do not affect the frequency of occurrence of previously analyzed transients.

   This evaluation has demonstrated acceptable results for all the affected accidents previously analyzed. The changes proposed do not alter or prevent the ability of structures, systems or components to perform their intended function to mitigate the consequences of accidents previously evaluated in the Updated Final Safety Analysis Report. There is no impact on the radiological consequences of accidents previously analyzed.

Therefore, operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.

2) Would operation of the facility in accordance with the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

This proposed amendment revises the HPSI flow and head surveillance requirements. There are no physical changes to the plant systems and there is no adverse impact on component or system interactions due to the proposed changes. The modes of operation of the plant remain unchanged and the design functions of all the safety systems remain in compliance with the safety analysis.

Therefore, operation of the facility in accordance with the proposed amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated.

3) Would operation of the facility in accordance with the proposed amendment involve a significant reduction in a margin of safety?

The impact of the proposed changes to the HPSI flow and head surveillance requirements on the design basis accident analysis was evaluated and it is concluded that the safety analyses of all design basis accidents meet the applicable acceptance criteria with respect to the radiological consequences, specified acceptable fuel design limits (SAFDLs), primary and secondary overpressurization, peak containment pressure and temperature and 10 CFR 50.46 requirements. There is no adverse effect on plant safety due to the proposed HPSI flow and head surveillance requirements.

Therefore, operation of the facility in accordance with the proposed amendment would not involve a significant reduction in a margin of safety.

Based on the determination made above and the supporting documentation, it is concluded that the proposed amendment does not involve a significant hazards consideration.

Environmental Consideration

The proposed license amendment does not change requirements with respect to the use of a facility component located within the restricted area as defined in 10 CFR Part 20. The proposed amendment involves no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite, and no

significant increase in individual or cumulative occupational radiation exposure. FPL concluded that the proposed amendment involves no significant hazards consideration and meets the criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and that, pursuant to 10 CFR 51.22(b), an environmental impact statement or environmental assessment need not be prepared in connection with issuance of the amendment.

Conclusion

FPL concludes, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (2) such activities will be conducted in compliance with the Commission's regulations; and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

ST. LUCIE UNIT 2 MARKED-UP TECHNICAL SPECIFICATION PAGES

TS Page 3/4 5-6

EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

2. At least once per 18 months:

	HPSI System Valve Number	LPSI System Valve Number
a.	HCV 3616/3617	a. HCV 3615
b.	HCV 3626/3627	b. HCV 3625
c.	HCV 3636/3637	c. HCV 3635
d.	HCV 3646/3647	d. HCV 3645
e.	V3523/V3540	

By performing a flow balance test, during shutdown, following completion of modifications to the ECCS subsystems that alter the subsystem flow characteristics. The test shall measure the individual leg flow rates and pump total developed head to verify the following conditions:

1. HPSI Pump 2A:
The sum of the three lowest cold leg flow rates shall be greater than or equal to 476 gpm with total developed head greater than or equal to 1150 ft but less than equal to 1290 ft.

2. HPSI Pump 2B:
The sum of the three lowest cold leg flow rates shall be greater than or equal to 484 gpm with total developed head greater than or equal to 910 ft but less than or equal to 1040 ft.

3. With the system operating in hot/cold leg injection mode, the hot leg flow shall be greater than or equal to 317 gpm and within 10% of the cold leg header flow and:

HPSI Pump 2A:
The pump shall be producing total developed head greater than or equal to 1297 ft but less than or equal to 1500 ft.

1260

HPSI Pump 2B:
The pump shall be producing total developed head greater than or equal to 1042 ft but less than 1250 ft.

the hot leg flow, and the sum of the four cold leg flows, shall each be greater than or equal to 290 gpm.

4. LPSI System – Each Pump:
The flow through each injection leg shall be greater than or equal to 1763 gpm at a total developed head greater than or equal to 298 ft but less than or equal to 337 ft.

ST. LUCIE UNIT 2 WORD PROCESSED TECHNICAL SPECIFICATION PAGES

TS Page 3/4 5-6

EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

2. At least once per 18 months.

HPSI System Valve Number	LPSI System Valve Number
a. HCV 3616/3617	a. HCV 3615
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c. HCV 3636/3637	c. HCV 3635
d. HCV 3646/3647	d. HCV 3645
e. V3523/V3540	

i. By performing a flow balance test, during shutdown, following completion of modifications to the ECCS subsystems that alter the subsystem flow characteristics. The test shall measure the individual leg flow rates and pump total developed head to verify the following conditions:

1. HPSI Pump 2A:
The sum of the three lowest cold leg flow rates shall be greater than or equal to 476 gpm with total developed head greater than or equal to 1150 ft but less than equal to 1290 ft.

2. HPSI Pump 2B:
The sum of the three lowest cold leg flow rates shall be greater than or equal to 484 gpm with total developed head greater than or equal to 910 ft but less than or equal to 1040 ft.

3. With the system operating in hot/cold leg injection mode, the hot leg flow, and the sum of the four cold leg flows, shall each be greater than or equal to 290 gpm and:

HPSI Pump 2A:
The pump shall be producing total developed head greater than or equal to 1260 ft but less than or equal to 1500 ft.

HPSI Pump 2B:
The pump shall be producing total developed head greater than or equal to 1042 ft but less than 1250 ft.

4. LPSI System – Each Pump:
The flow through each injection leg shall be greater than or equal to 1763 gpm at a total developed head greater than or equal to 298 ft but less than or equal to 337 ft.