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SUBJECT: Forwards addl justification to support util deviation from Reg Guide 1.97 re steam generator wide range level instrumentation. Instrumentation beyond that already provided not considered necessary for safe plant operation.

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FLORIDA POWER & LIGHT COMPANY

JUNE 17 1987

L-87-242

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

Gentlemen:

Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Conformance to Regulatory Guide 1.97

By letter L-86-461, dated December 30, 1986, Florida Power & Light Company (FPL) submitted a response to the NRC's Safety Evaluation Report (SER) which assessed St. Lucie Plant's conformance to Regulatory Guide 1.97, Revision 3 (Reg. Guide 1.97). In that submittal, FPL proposed a deviation from Reg. Guide 1.97 for St. Lucie related to steam generator wide range level instrumentation. On April 3, 1987, FPL discussed this proposed deviation with the NRC. The staff stated that its technical concern related to the scenario in which one steam generator is no longer available as a heat sink (as a result of any failure) and a single active failure occurs, resulting in the loss of the single wide range level instrument on the operable steam generator. The staff then questioned the method by which FPL would verify the operability of the unaffected steam generator as a heat sink.

The purpose of this letter is to submit the enclosed additional justification to support FPL's deviation from Reg. Guide 1.97 for this variable.

If you have any questions concerning this submittal, please contact us.

Very truly yours,

C. O. Woody
Group Vice President
Nuclear Energy

COW/EJW/gp
Enclosure

cc: Dr. J. Nelson Grace, Regional Administration, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant

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REGULATORY GUIDE 1.97 PROPOSED DEVIATION

INTRODUCTION

In order to ensure the availability of steam generator (SG) level information in a post-accident situation, FPL proposed to upgrade the environmental qualification of the existing single wide range level instrument for each SG to meet the Regulatory Guide (Reg. Guide 1.97) criteria for environmental qualification and power supplies. In addition to the single wide range channel, there are four narrow range level instruments per SG which meet the qualification standards set forth in Reg. Guide 1.97. Other diverse means of nuclear safety-related instrumentation are also available to the operator to verify secondary heat sink operability (see Attachment 1). These instruments include: primary loop temperature and pressure, Reactor Coolant System (RCS) subcooling margin monitor, SG pressure as well as indication of main and auxiliary feedwater flow to each SG. FPL believes that, for SG level, existing instrumentation provides redundant monitoring capability during all postulated plant operating modes and accident situations to verify the operability of SGs as heat sinks.

ANALYSIS

The Feedwater Regulating System of each unit maintains SG water level in the downcomer of each SG at approximately 65% of the narrow range indication. This is done by positioning the main feedwater regulating valves which control the feedwater flow to each SG. Each system uses a three-element control system with inputs of feedwater flow, steam flow, and SG water level for automatic water level control above 15 % power. In the event of a reactor or turbine trip, the feedwater regulating valves are closed and feedwater control is transferred to the single element control system of the feedwater bypass valves. In the event of a low SG level transient, a Reactor Protection System (RPS) actuation occurs if level falls below a preset narrow range level setpoint.

If the feedwater system fails to maintain SG level, initiation of the Auxiliary Feedwater Actuation System (AFAS) occurs automatically when the level in either of the two SGs falls below a preset narrow range level. The auxiliary feedwater pumps are started and the auxiliary feedwater discharge valves are automatically fully opened. Two motor-driven AFW pumps, each with a capacity of 320 gpm, are lined up to independently feed the SGs on demand. Additionally, a steam driven pump with a capacity of 570 gpm is automatically aligned to feed both SGs if both initiate an AFAS signal on low level or is aligned to a single SG if an AFAS signal is initiated by only one SG on low water level. A maximum water flow is initially established to bring the level in the SGs back to normal range. In the event of an unisolable fault in a SG, feedwater flow to that SG will automatically be secured and the turbine driven pump will be automatically lined up to supply feedwater to the unaffected SG.The AFAS will maintain SG inventory in the unaffected SG until the operator takes manual control of feedwater addition. Subsequent manual operator action maintains the SG level by throttling the auxiliary feedwater flow. The four redundant narrow range SG level instruments per SG are used for primary indication of SG level.

A review of the accident scenarios identified in Chapters 15 and 10 of the St. Lucie Unit Nos. 1 and 2 FSARs was conducted in order to identify the possible accident conditions under which SG level will undergo the most severe transients. FPL has identified two possible events, Main Steam Line Break (MSLB) and Main Feed Line Break (MFLB), meeting the Staff's postulated scenario in which a SG is no longer available as a heat sink and an active failure disables the wide range SG level indication on the other SG. It should be noted that the transients discussed below are more limiting and conservative than those discussed in the FSAR or postulated by the Staff since the discussions include additional active failures beyond the NRC's postulated loss of the SG wide range level indication.

MAIN STEAM LINE BREAK (MSLB)

Section 15.1.4 of the Unit 2 FSAR and Section 15.4.6 of the Unit 1 FSAR address the MSLB event. Review of the SG water level in the unaffected SG has shown that the MSLB as modeled in the St. Lucie Unit 1 FSAR produces the limiting level transient. The MSLB event results in little change in the unaffected SG level during the transient. The small change in level is due primarily to the quick Main Steam Isolation Signal that will occur and the fact that the affected SG is assumed to provide all of the primary cooling. In the most limiting MSLB relative to unaffected SG level, the SG water level drops below the narrow range instrumentation band for less than 20 seconds. After that time, narrow range level indication is regained.

Based on the above, wide range SG level instrumentation beyond existing instrumentation is not considered to be necessary for safe plant operation, accident mitigation or post-accident recovery following a MSLB.

Main Feedwater Line Break (MFLB)

Section 15.2 of the Unit 2 FSAR addresses the MFLB and provides an analysis which bounds the scenario identified by the Staff. The event described in the FSAR is a Feedwater Line Break with a loss of AC power. A review of this analysis indicates that the water level may decrease past the lower limits of the narrow range level indication in the unaffected SG. It should be noted that the transient modeled in the Safety Analysis section of the FSAR is performed in a very conservative manner relative to the SG level indication since 1) an instantaneous loss of feedwater flow to both SGs is assumed at the time of the break, and 2) the transient is forced to be a heatup event by modeling the main feed line at the bottom elevation of the SG allowing the affected SG to drain out the break. Even with these very conservative assumptions, the results of the MFLB analysis shows that an adequate heat sink is provided by the operation of the AFAS and that primary pressure and temperature are stabilized after approximately 500 seconds. If the wide range level instrumentation is not available, a determination of heat sink operability can be made by the primary system response through observation of other nuclear safety-related instrumentation (detailed below) until SG level returns to the narrow range level band.

St. Lucie Plant has been evaluated for a worst-case MFLB with the results showing that the unaffected SG will provide an adequate heat sink for the reactor core. Based on the above, additional redundant wide range SG level instrumentation is not necessary for safe plant operation, accident mitigation, or post-accident recovery.

INSTRUMENTATION

FPL believes that existing instrumentation provides the necessary indication to operators in the event of a Design Basis Accident (DBA) to aid them in mitigating the accident. However, FPL proposes to upgrade for each unit the environmental qualification of the single channel wide range SG water level instrument that is located in a potentially harsh environment.

Loss of the wide range SG level instrumentation is not limiting to the safe operation of the St. Lucie Plant. Other diverse means of nuclear safety-related instrumentation are available for operators to verify secondary heat sink operability. The indications and alarms in the control room related to determination of SG operability are: narrow range SG level, SG pressure, SG steam flow, SG feedwater flow, SG level alarms, auxiliary feedwater flow and pressure, Primary Coolant temperatures (both hot and cold legs), core exit thermocouples, and Qualified Safety Parameter Display System (QSPDS) provisions. Attachment 1 is a partial list of these instruments.

It should be noted that instrumentation such as the Qualified Safety Parameter Display System, which is a Nuclear Safety Related Class 1E system, and the Safety Assessment System (SAS) are signal processing display systems which provide integrated information of the primary and secondary system.

The QSPDS is a microprocessor based signal processing system with a Reactor Turbine Generator Board (RTGB) mounted plasma display unit and associated keyboard for each of the two channels. Each channel receives and processes signals and transmits the output to the plasma display unit. The three main functions of the QSPDS are to process input signals, display the information to the control room operator, and transmit data to the SAS.

The Core Exit Thermocouples, RCS leg temperatures, and pressurizer pressure are used as inputs in calculating subcooled or superheat margins while the Heated Junction Thermocouples detect RCS inventory loss.

The SAS continuously receives data relative to plant operating conditions and safety status from remote processors which interface directly with the instrumentation systems.

The functional design of the system is centered around the following operating features:

1) Qualified Safety Parameter Display System
2) Reg. Guide 1.97 Data Set Monitoring
3) Plant System Mimic Displays
4) Plant System Trend Group Displays
5) Plant System logs and reports generation (automatic and on-demand)

The major portion of input signals accessed by the SAS represents the Reg. Guide 1.97 data set for each plant.

CONCLUSION

The NRC has requested additional justification for FPL's proposed deviation from Reg. Guide 1.97's guidance regarding wide range SG water level indication. The Staff requested that FPL justify having one wide range SG level instrument versus Reg. Guide 1.97's listing of redundant instrumentation for this variable. There are two possible events which meet the criteria of the staff's concerns regarding the ability of operators to verify the integrity of the steam generators as heat sinks: MSLB and MFLB. Other diverse means of instrumentation exist to verify the operability of steam generators as heat sinks during these conservatively modeled transients. FPL believes that a determination of heat sink operability can be made by monitoring primary plant instrumentation which provides verification of heat sink operability as a function of the response of the RCS.

Based on the above, wide range SG level instrumentation beyond that already provided at St. Lucie is not considered to be necessary for safe plant operation, accident mitigation, or post-accident recovery since sufficient information is available to the operator. The installation of an additional redundant wide range SG level channel does not afford a substantial increase in the overall protection of the public health and safety, and the costs of additional SG wide range level indication are not justified.

ATTACHMENT I

INDICATIONS IN THE CONTROL ROOM
RELATED TO STEAM GENERATORS

~~For Each Unit~~

INDICATIONS

INDICATION	INSTRUMENT	RANGE	LOCATION
S/G Level A	LIC-9005	0-100% Narrow	RTGB 102 [202]
B	LIC-9006	0-100% Narrow	RTGB 102 [202]
S/G Level A	LIC-9011	0-100% Narrow	RTGB 102 [202]
B	LIC-9021	0-100% Narrow	RTGB 102 [202]
S/G Level A	LIC-9013A	0-100% Narrow	RTGB 102 [202]
A	LIC-9013B	0-100% Narrow	
A	LIC-9013C	0-100% Narrow	
A	LIC-9013D	0-100% Narrow (183" span)	
S/G Level B	LIC-9023A	0-100% Narrow	RTGB 102 [202]
B	LIC-9023B	0-100% Narrow	
B	LIC-9023C	0-100% Narrow	
B	LIC-9023D	0-100% Narrow (183" span)	
S/G Level Recorder	LR-9011/9021	0-100% Narrow	RTGB 102 [202]
S/G Level A	LI-9012	0-100% Wide	RTGB 103 [203]
B	LI-9022	0-100% Wide (465" span)	
S/G Level Recorder	LR-9012/9022	0-100% Wide	PAP
S/G Pressure A	PI-8013A	0-1200 psia	RTGB 103 [203]
A	PI-8013B	0-1200 psia	
A	PI-8013C	0-1200 psia	
A	PI-8013D	0-1200 psia	
S/G Pressure B	PI-8023A	0-1200 psia	RTGB 106 [206]
B	PI-8023B	0-1200 psia	
B	PI-8023C	0-1200 psia	
B	PI-8023D	0-1200 psia	
S/G Hdr Pressure A	PI-08/1A	0-1200 psia	RTGB 102 [202]
B	PI-08/1B	0-1200 psia	RTGB 102 [202]
S/G Pressure Recorder	PR-8013A/8023A	0-1200 psia	PAP
S/G 1A Steam/Feed Flow Recorder	FR-8011/9011	Both 6.00×10^6 lbm/hr	RTGB 102[202]

S/G 1B Steam/Feed [202] Flow Recorder	FR-8021/9021	Both 6.00×10^6 lbm/hr	RTGB 102
Valve Position	ZI-9005/9006 ZI-9011/9021	Lights 0-100%	RTGB 102[202]

AUXILIARY FEEDWATER INDICATIONS IN THE CONTROL ROOM

INDICIATIONS FOR UNIT 1

AUXILIARY FEEDWATER PUMP - 1A

Flow	FI-09-2A	0-400 gpm	RTGB 102
Pump Discharge Pressure	PI-09-8A	0-1500 psig	RTGB 102

AUXILIARY FEEDWATER PUMP - 1B

Flow	FI-09-2B	0-400 gpm	RTGB 102
Pump Discharge	PI-09-8B	0-1500 psig	RTGB 102

AUXILIARY FEEDWATER PUMP - 1C

Flow	FI-09-2C	0-600 gpm	RTGB 102
Steam Pressure at Turbine Inlet	PI-08-5	0-1200 psig	RTGB 102
Pump Discharge Pressure	PI-09-8C	0-1500 psig	RTGB 102
Pump Speed	VI-09-1	0-5000 rpm	RTGB 102

INDICATION FOR UNIT 2

AUXILIARY FEEDWATER PUMP - 2A

Aux Feedwater Hdr A Flow/Pressure	FI-09-2A/ PI-09-8A	0-400/1500 gpm/psig	RTGB 202
Aux Feedwater Hdr A Flow	FR-09-2A	0-400 gpm	RTGB 202

AUXILIARY FEEDWATER PUMP - 2B

Aux Feedwater Hdr B Flow/Pressure	FI-09-2B/ PI-09-8b	0-400/1500 gpm/psig	RTGB 202
Aux Feedwater	FR-09-2B/2C	0-400/600 gpm	RTGB 202

AUXILIARY FEEDWATER PUMP - 2C

Aux Feedwater Hdr C Flow/Pressure	FI-09-2C/ PI-09-8C	0-600/1500 gpm/psig	RTGB 202
Steam Pressure to Pump 2C	PI-08-5	0-1200 psig	RTGB 202

INDICATIONS IN
THE CONTROL ROOM RELATED TO
REACTOR COOLANT SYSTEM

For Each Unit

TEMPERATURE

INDICATIONS	INSTRUMENT	RANGE	LOCATION
T_H/T_C			
Safety Channel			
A	TI-1102 A	T_H:515 - 665°F T_C:465 - 605°F	RTGB 103 [203]
B	TI-1102B		
C	TI-1102C		
D	TI-1102D		
Control Channel T_H			
Loop A	TIA-1111X	515 - 615°F	RTGB 103 [203]
Loop B	TIA-1121X		
Recorder	TR-1111X/1121X		
Control Channel T_C			
Loop A to RRS	TIC-111Y	515 - 615°F	RTGB 103[203]
Loop B to RRS	TIC-1121Y		
Recorder	TR-1115/1125	0 - 600°F	
Loop A to OMS [LTOP]	TI-1115	0 - 600°F	RTGB 103[203]
Loop B to OMS [LTOP]	TI-1125	0 - 600°F	RTGB 103 [203]
Loop A to T_C	TI (EP) 1115 [TI-1115-1]	0 - 600°F	HSD Panel
[Loop B to T_C]	[TI-1125-1]	[0 - 600°F]	[HSD Panel]

INDICATIONS	INSTRUMENT	RANGE	LOCATION
RCP A1/A2 P			
Indicator [204]	PDI-1110/1112	0-100 psid	RTGB 104
Recorder [204]	PDR-1110/1112	0 - 100 psid	RTGB 104
RCP B1/B2 P			
Indiciator [204]	PDI-1120/1122	0 - 100 psid	RTGB 104
Recorder [204]	PDR-1120/1122	0 - 100 psid	RTGB 104

Core P Loop A			
. Indicator [204]	PDI-1124 X/W	0 - 60 psid	RTGB 104
Recorder [204]	PDR-1124 X/W	0 - 60 psid	RTGB 104
Core P Loop B			
Indicator [204]	PDI-1124 Y/Z	0 - 60 psid	RTGB 104
Recorder [204]	PDR-1124 Y/Z	0 - 60 psid	RTGB 104

SUBCOOLED MARGIN MONITOR

INDICATIONS	INSTRUMENT	RANGE	LOCATION
Temperature Margin	Calculator	999.9°F	RTGB 103 [203]
Pressure Margin	Calculator	3200 psia	RTGB 103 [203]

INADEQUATE CORE COOLING SYSTEM

INDICATIONS	INSTRUMENT	RANGE	LOCATION
QSPDS	Display	See Note 1	RTGB 103 [203]
QSPDS	Display	See Note 1	RGGB 103 [204]

Note 1: The Qualified Safety Parameter Display System (QSPDS) installed at St. Lucie Unit 1 satisfies the NUREG 0737 requirement for a redundant Class IE inadequate Core Cooling (ICC) instrumentation processing and display system. The QSPDS CONSISTS OF A Subcooled Margin Monitor System, Heated Junction Thermocouple System and a Core Exit Thermocouple System.

The QSPDS is a microprocessor based signal processing system with an RTGB mounted plasma display unit and associated keyboard for each of the two channels. Each channel receives and processes signals and transmits the output to the plasma display unit. The three main functions of the QSPDS are to process input signals, display the information to the control room operator and transmit date to the Safety Assessment System. Inputs into each channel of the system consists of 22 Core Exit Thermocouple signals (23 for channel B), 8 Heated Junctions Thermocouples, 4 RCS leg temperatures and 1 pressurizer pressure input.

The Core Exit Thermocouples, RCS leg temperatures and pressurizer pressure are used as inputs in calculating subcooled or superheat margins while the Heated Junction Thermocouples detect RCS inventory loss.

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D. Miller w/encl.

June 10, 1987

DOCKET NO(S). 50-335 and 50-389
Mr. C. O. Woody
Group Vice President
Nuclear Energy
Florida Power and Light Company
Post Office Box 14000
Juno Beach, Florida 33408

SUBJECT:
ST. LUCIE, UNITS 1 AND 2

The following documents concerning our review of the subject facility are transmitted for your information.

- ☐ Notice of Receipt of Application, dated _____.
- ☐ Draft/Final Environmental Statement, dated _____.
- ☐ Notice of Availability of Draft/Final Environmental Statement, dated _____.
- ☐ Safety Evaluation Report, or Supplement No._____ dated _____.
- ☐ Environmental Assessment and Finding of No Significant Impact, dated _____.
- ☐ Notice of Consideration of Issuance of Facility Operating License or Amendment to Facility Operating License, dated _____.
- ☒ Bi-Weekly Notice; Applications and Amendments to Operating Licenses Involving No Significant Hazards Considerations, dated 6/3/87 [*see page(s)*] _____.
- ☐ Exemption, dated _____.
- ☐ Construction Permit No. CPPR-_____, Amendment No. _____ dated _____.
- ☐ Facility Operating License No. _____, Amendment No. _____ dated _____.
- ☐ Order Extending Construction Completion Date, dated _____.
- ☐ Monthly Operating Report for _____ transmitted by letter dated _____.
- ☐ Annual/Semi-Annual Report- _____ _____ transmitted by letter dated _____.

Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

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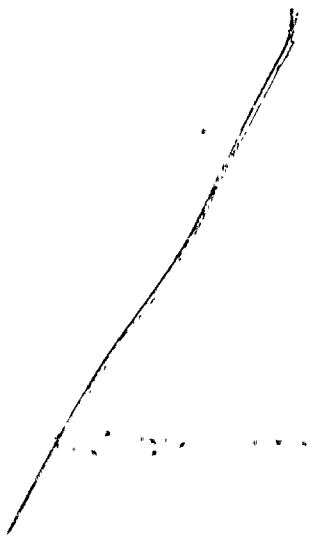

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E. Tourigny w/encl.

June 1, 1987

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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

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- ☐ Notice of Consideration of Issuance of Facility Operating License or Amendment to Facility Operating License, dated _____.
- ☒ Bi-Weekly Notice; Applications and Amendments to Operating Licenses Involving No Significant Hazards Considerations, dated 5/20/87 [*see page(s)*] _____.
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- ☐ Construction Permit No. CPPR-_____, Amendment No. _____ dated _____.
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