Florida Power
A Progress Energy Company

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref.: 10 CFR 50.73

November 19, 2001
3F1101-02

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: LICENSEE EVENT REPORT 50-302/01-002-00

Dear Sir:

Please find enclosed Licensee Event Report (LER) 50-302/01-002-00. The LER discusses two Main Steam Safety Valve (MSSV) setpoints found to be outside their required tolerance for a period longer than allowed by the Improved Technical Specifications (ITS) in 2001. The LER also discusses two MSSV setpoints found to be outside their required tolerance for a period longer than allowed by ITS in 1999 that were not reported to the NRC. This report is being submitted pursuant to 10CFR50.73(a)(2)(i)(B) as a condition prohibited by the ITS.

If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing & Regulatory Programs at (352) 563-4883.

Sincerely,

Daniel L. Roderick
Plant General Manager

DLR/dwh

Enclosure

xc: NRR Project Manager
Regional Administrator, Region II
Senior Resident Inspector

IE22

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
CRYSTAL RIVER UNIT 3	05000 302	1 OF 8

4. TITLE
Main Steam Safety Valve Setpoints Outside Required Tolerance Longer Than Allowed By Technical Specifications

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
09	26	2001	01	- 002	- 00	11	19	2001	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	1
10. POWER LEVEL	100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)	
20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)	
20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)	
20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)	
20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A	
20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)		
20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)		
20.2203(a)(2)(v) X	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)		
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)		
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Dennis W. Herrin, Project Licensing Engineer	(352) 795-6486, Extension 3299

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FA CTURER	REPORTABLE TO EPIX
X	SB	RV	D243	Y					

14. SUPPLEMENTAL REPORT EXPECTED			15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On September 26, 2001, Florida Power Corporation's (FPC's) Crystal River Unit 3 (CR-3) was in MODE 1 (POWER OPERATION) at 100 percent RATED THERMAL POWER. While performing surveillance procedure SP-650, "ASME Code Safety Valve Test," on the 'A' Once Through Steam Generator (OTSG) main steam safety valves (MSSVs) MSV-33 and MSV-42 setpoints were found outside their required tolerance. Improved Technical Specification (ITS) 3.7.1 states that the MSSVs shall be operable as specified in Table 3.7.1-1 in MODES 1, 2 and 3. With one or more required MSSVs inoperable, THERMAL POWER shall be reduced to less than the reduced power limit of Table 3.7.1-1 within 4 hours and the nuclear overpower trip setpoint shall be reduced in accordance with Table 3.7.1-1 within 12 hours. The existence of similar discrepancies in multiple relief valves is an indication that the discrepancies may have developed over a period of time. Therefore, FPC concludes that the condition existed during plant operation and the event is reportable under 10CFR50.73(a)(2)(i)(B) as a condition prohibited by ITS. This condition does not represent a reduction in the public health and safety. The most probable causes for this condition were disc/seat bonding and/or aging. MSV-33 and MSV-42 were adjusted and/or retested satisfactorily. Previous similar occurrences within the last three years have been identified that were not reported to the NRC.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
CRYSTAL RIVER UNIT 3	05000302	01	-- 002 --	00	2 OF 8

17. TEXT *(If more space is required, use additional copies of NRC Form 366A)*

EVENT DESCRIPTION

On September 26, 2001, Florida Power Corporation's (FPC's) Crystal River Unit 3 (CR-3) was in MODE 1 (POWER OPERATION) at 100 percent RATED THERMAL POWER. While performing surveillance procedure SP-650, "ASME Code Safety Valve Test," on the 'A' Once Through Steam Generator (OTSG) [SB, SG], main steam safety valves (MSSVs) MSV-33 and MSV-42 [SB, RV] setpoints were found outside their required tolerance. The acceptance criteria specified in Improved Technical Specification (ITS) Table 3.7.1-1 is +/- 3 percent of the nominal setpoint. At 1549 on September 26, 2001, MSV-42 lifted at 5.1 percent above the nominal setpoint. At 2005 on September 26, 2001, MSV-33 lifted at 3.7 percent above the nominal setpoint. The MSSVs were declared inoperable and actions associated with Improved Technical Specification (ITS) 3.7.1, Condition A, became applicable. The remaining six tested 'A' OTSG MSSVs were within their required setpoint tolerance.

The MSSVs are required to be tested for relief setpoint accuracy in accordance with the Crystal River Unit 3 Inservice Testing Pump and Valve Program. This program requires that each MSSV be tested once every five years. Typically, 50 percent of the MSSVs are tested during each refueling outage. The 'A' OTSG MSSVs are normally tested during even numbered outages (e.g., R12) and the 'B' OTSG MSSVs are normally tested during the odd numbered outages (e.g., R13). MSV-33 and MSV-42 were scheduled to be tested during R12, scheduled to begin on September 29, 2001.

ITS 3.7.1 states that the MSSVs shall be operable as specified in Table 3.7.1 -1 in MODES 1, 2 and 3. With one or more required MSSVs inoperable, THERMAL POWER shall be reduced to less than the reduced power limit of Table 3.7.1-1 within 4 hours (Action A.1) and the nuclear overpower trip setpoint shall be reduced in accordance with Table 3.7.1-1 within 12 hours (Action A.2). Once declared inoperable, MSV-33 and MSV-42 were restored to an operable status within 4 hours.

The existence of similar discrepancies in multiple relief valves is an indication that the discrepancies may well have developed over a period of time. Therefore, FPC concludes that the condition existed during plant operation and the event is reportable under 10CFR50.73(a)(2)(i)(B) as a condition prohibited by ITS.

While reviewing SP-650 test results over the last three years for evidence of similar occurrences, FPC identified two 'B' OTSG MSSV setpoints that were found outside their required tolerance in 1999. On September 28 and 29, 2001, FPC's CR-3 was in MODE 1 (POWER OPERATION) at 97.6 percent RATED THERMAL POWER. While performing SP-650 on the 'B' OTSG MSSVs, MSV-45 and MSV-48 setpoints were found outside their required tolerance. At 1500 on September 28, 1999, MSV-45 lifted at 3.3 percent below the nominal setpoint. At 0030 on September 29, 1999, MSV-48 lifted at 11.1 percent above the nominal setpoint. MSV-45 and MSV-48 were declared inoperable and actions associated with ITS 3.7.1, Condition A, became applicable. Once declared inoperable, MSV-45 and MSV-48 were restored to an operable status within 4 hours. The remaining six tested 'B' OTSG MSSVs were within their required setpoint tolerance.

The existence of similar discrepancies in multiple relief valves is an indication that the discrepancies may well have developed over a period of time. Therefore, FPC concludes that the condition existed during plant operation and the event should have been reported under 10CFR50.73(a)(2)(i)(B) as a condition prohibited by ITS.

SAFETY CONSEQUENCES

The MSSVs provide overpressure protection for the main steam piping and the OTSGs. The technical evaluation below concludes that, even with the out-of-tolerance setpoints of either MSV-33 and MSV-42 or MSV-45 and MSV-48, the safety relief valves (as a group) were capable of protecting the Main Steam System [SB] and the OTSGs from overpressurization.

The design pressure for the Main Steam System is 1050 psig. Enhanced Design Basis Document Tab 6/10, "Main Steam System," states the total MSSV capacity to be such that steam pressure will not exceed 110 percent of system design pressure (1155 psig) for the limiting overpressurization event. The limiting event that challenges the MSSV capacity is the Turbine Generator trip that occurs at 112 percent rated thermal power. The total required relieving capacity for this event is 11,103,336 lbm/hr or 5,551,668 lbm/hr per steam generator. The full open relieving capacity for each of the safety valves is as follows:

A OTSG	Capacity (lbm/hr)	Set Pressure (psig)	B OTSG	Capacity (lbm/hr)	Set Pressure (psig)
MSV-33	845,759	1050	MSV-35	845,759	1050
MSV-34	845,759	1050	MSV-36	845,759	1050
MSV-37	845,759	1070	MSV-39	845,759	1070
MSV-38	845,759	1070	MSV-41	845,759	1070
MSV-42	845,759	1090	MSV-44	845,759	1090
MSV-43	845,759	1090	MSV-45	845,759	1090
MSV-40	583,574	1100	MSV-47	845,759	1100
MSV-46	845,759	1100	MSV-48	583,574	1100
Total A =	6,503,887		Total B =	6,503,887	

In 2001, the as-found setpoints for MSV-33 and MSV-42 were 1089.72 and 1145.88 psig, respectively. Both valves would have lifted before reaching the 1155 psig limit. Per vendor documentation, the minimum capacity of these valves when lifted at their as-found setpoints (high) is assumed to be 70 percent of full rated flow. The remaining six 'A' OTSG MSSVs passed the as-found setpoint test. Reproducing the above table for the 'A' OTSG, with 70 percent flow for both MSV-33 and MSV-42:

MSV-33	592,031
MSV-34	845,759
MSV-37	845,759
MSV-38	845,759
MSV-42	592,031
MSV-43	845,759
MSV-40	583,574
MSV-46	845,759
Total A =	5,996,432

The total required capacity is 5,551,668 lbm/hr. The total available capacity is 5,996,432 lbm/hr. The available relieving capacity exceeds the required relieving capacity. Therefore, the 'A' OTSG MSSV's, were collectively capable of providing overpressure protection with the as-found setpoints.

In 1999, the as-found setpoints for MSV-45 and MSV-48 were 1053.88, and 1222.5, respectively. MSV-45 would have lifted before reaching 1155 psig limit. MSV-48 would not have lifted before reaching the 1155 psig limit. The minimum capacity of MSV-45 when lifted at its as-found setpoint (low) is assumed to be 100 percent of full rated flow. The remaining six "B" OTSG MSSVs passed the as-found setpoint test. Reproducing the above table for the 'B' OTSG, with 0 percent flow for MSV-48:

MSV-35	845,759
MSV-36	845,759
MSV-39	845,759
MSV-41	845,759
MSV-44	845,759
MSV-45	845,759
MSV-47	845,759
MSV-48	0
Total A =	5,920,313

The total required capacity is 5,551,668 lbm/hr. The total available capacity is 5,920,313 lbm/hr. The available relieving capacity exceeds the required relieving capacity. Therefore, the 'B' OTSG MSSV's, were collectively capable of providing overpressure protection with the as-found setpoints.

Based on the above discussion, FPC concludes that the inoperability of either MSV-33 and MSV-42 or MSV-45 and MSV-48 did not represent a reduction in the public health and safety. This event does not meet the definition of a Safety System Functional Failure.

CAUSE

MSSV Setpoints Out Of Tolerance

The cause for the tested MSSV as-found setpoints being out of tolerance is indeterminate. The most probable cause is disc/seat bonding. Disc/seat bonding is defined as the physical surface bonding of the disc and seating surfaces. The fusion of the martensitic stainless steel A422 disc to the austenitic stainless steel A316 seat occurs by an oxide film that forms and results in a bonding mechanism. Research has shown that the disc material has essentially transferred to the seat on a microscopic level. The disc/seat bonding will frequently lead to a high initial first lift as the bond is broken.

A suggested industry fix for disc/seat bonding is to install Inconel X-750 discs (among others). This material is harder than the A422 disc and is less likely to transfer material to the seat. Another suggested fix is a pre-oxidation treatment of the disc/seat prior to re-assembly. The industry has no definite conclusion at this time that these recommendations will resolve the setpoint issue. Owners groups and vendors are still conducting studies.

A contributing factor for the tested MSSV as-found setpoints being out of tolerance may be aging. Aging is defined as valves that remain in service for extended periods of time with little or no preventive maintenance. The aging process is not just time dependent, but also the result of the sum of the total events the valve has experienced between maintenance activities. Aging is general wear of the components that make up the valve. There is no one component that causes setpoint drift more than another. It is the summation of slightly worn components throughout the valve. The industry identifies aging as a leading cause of setpoint drift. Industry experts conclude the best way to prevent aging is through a preventive maintenance program (valve rebuild). A contradiction to this recommendation is that disc/seat bonding is highly dependent upon maintenance practices that suggests valves should only be worked as necessary. Currently, MSSV's are only rebuilt at CR-3 if seat leakage is evident prior to a refueling outage.

Missed Reporting Opportunity In 1999

The cause for not reporting the 1999 MSSV setpoints found to be outside their required tolerance is attributed to the lack of familiarity with the examples of reportability provided in NUREG-1022, "Event Reporting Guidelines – 10CFR50.72 and 10CFR50.73." Operations and Licensing personnel reviewed occurrences of MSSV setpoints being found outside their required tolerance as individual deficiencies. Reviewing personnel did not recognize that similar discrepancies in multiple valves is an indication that the discrepancies may well have arisen over a period of time. As such, the condition existed during plant operation and the event is reportable under 10CFR50.73(a)(2)(i)(B) as a condition prohibited by ITS.

CORRECTIVE ACTIONS

MSV-33 (Dresser, Model 3707 RA) and MSV-42 (Dresser, Model 3707 RA) were restored to an operable status within 4 hours of identifying the associated setpoints to be outside their required tolerance.

FPC decided not to remove MSV-33 or MSV-42 for inspection, based on the following:

> MSSV setpoint failures are a generic industry problem. Aging, disc/seat bonding, and temperature variations contribute to the difficulties of identifying a root cause for setpoint failures.
>
> No apparent external mechanical or structural deficiencies were noted.
>
> An open and inspect would likely not reveal a root cause. Both valves were subsequently retested within tolerance to meet the as-left requirements. No seat leakage was evident before or after the testing.

MSV-45 (Dresser, Model 3707 RA) and MSV-48 (Dresser, Model 3777 QA) were restored to an operable status within 4 hours of identifying the associated setpoints to be outside their required tolerance in 1999.

A copy of this LER will be provided to appropriate Operations and Licensing personnel as a means of demonstrating applicability of the NUREG-1022 example concerning multiple relief valve failures to MSSV setpoints being found not to meet required tolerance.

FPC engineering personnel will continue to monitor industry progress associated with the disc/seat bonding issues/solutions and the benefit of increased preventive maintenance of the MSSVs.

PREVIOUS SIMILAR EVENTS

While reviewing SP-650 test results over the last three years for evidence of similar occurrences, FPC identified two 'B' OTSG MSSV setpoints that were outside their required tolerance in 1999. That event was not reported to the NRC. Therefore, FPC has augmented this LER to contain information necessary to satisfy the missed reporting opportunity.

ATTACHMENTS

Attachment 1 - Abbreviations, Definitions, and Acronyms

Attachment 2 - List of Commitments

ATTACHMENT 1

ABBREVIATIONS, DEFINITIONS AND ACRONYMS

ASME	American Society of Mechanical Engineers
ANSI	American National Standards Institute
CFR	Code of Federal Regulations
CR-3	Crystal River Unit 3
FPC	Florida Power Corporation
ITS	Improved Technical Specifications
lbm/hr	pounds mass per hour
MSV	Main Steam Valve
MSSV	Main Steam Safety Valve
OTSG	Once Through Steam Generator
psig	pounds per square inch gauge
R12	Refueling Outage 12
SP	Surveillance Procedure

NOTES: Improved Technical Specifications defined terms appear capitalized in LER text {e.g., MODE 1}

Defined terms/acronyms/abbreviations appear in parenthesis when first used {e.g., Reactor Building (RB)}.

EIIS codes appear in square brackets {e.g., reactor building penetration [NH, PEN]}.

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17. TEXT *(If more space is required, use additional copies of NRC Form 366A)*

ATTACHMENT 2

LIST OF COMMITMENTS

The following table identifies those actions committed to by Florida Power Corporation in this document. Any other actions discussed in the submittal represent intended or planned actions by Florida Power Corporation. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Supervisor, Licensing & Regulatory Programs of any questions regarding this document or any associated regulatory commitments.

RESPONSE SECTION	COMMITMENT	DUE DATE
	No regulatory commitments are being made in this submittal.	