NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
CRYSTAL RIVER UNIT 3	0 5 0 0 0 3 0 2	1 OF 0 4

TITLE (4) Improper Positioning of Turbine Bypass Valves and Sluggish Response of a Startup Feedwater Control Valve Results in a Low Level in "B" Steam Generator and Subsequent EF Actuation

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 1	0 7	8 8	8 8	— 0 0 1	— 0 0	0 2	0 8	8 8	N/A	0 5 0 0 0
									N/A	0 5 0 0 0

OPERATING MODE (9)	3	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)		
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)
				73.71(b)
				73.71(c)
				OTHER (Specify in Abstract below and in Text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
L. W. MOFFATT, NUCLEAR SAFETY SUPERVISOR	AREA CODE 9 0 4 — 7 9 5 — 6 4 8 6

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)

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

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

On January 7, 1988, Crystal River Unit 3 was in the Hot Standby condition (Mode 3). An automatic actuation of Emergency Feedwater occurred due to 2 out of 4 EFIC channels detecting a low level in the "B" steam generator. A similar actuation also occurred on January 9, 1988. In both cases the Emergency Feedwater System responded as designed to the conditions in the "B" steam generator.

There were several factors contributing to the event of January 7, including a slight steam generator pressure increase and sluggish control response of the "B" startup feedwater control valve. The January 9 event was due to an improper integral setting in a module in the "B" startup control valve control circuit.

In both cases the EF actuations were reset once normal level control was established with a main feedwater pump. As a result of both actuations, work has been performed on the "B" startup feedwater control valve and its control circuit. In addition, new procedures are being written for preventive maintenance of the Integrated Control System, and Operators will be reminded of the increased monitoring required as a result of having multiple control stations in manual.

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EVENT DESCRIPTION:

On January 7, 1988, Crystal River Unit 3 (CR-3) was in the Hot Standby condition (Mode 3). The operating main feedwater (FW) pump [SJ,P] was being controlled in manual with a fixed discharge pressure of approximately 1100 PSIG. The turbine bypass valves (TBV's) [JI,V] were also in manual, due to the performance of a rod drop timing surveillance. The steam generators (SG's) [AB,SG] were being controlled at the low level limit by using the startup (S/U) feedwater control valve [JB,FCV] in automatic. In addition, a surveillance procedure for checking the main steam safety valve (MSSV) [SB,RV] relief setpoints was in progress, which required the operators to maintain steam header pressure at a constant value.

At approximately 0400, an automatic actuation of the Emergency Feedwater System (EF) [BA] occurred when 2 out of the 4 Emergency Feedwater Initiation and Control (EFIC) [BA,CHA] channels detected a low level condition in the "B" steam generator. Due to the logic configuration of the EFIC system, only the steam-driven EF pump [BA,P] started and delivered flow to both steam generators. Only 2 of 4 EFIC channels detected a low level due to slight calibration differences in the level transmitters [LT]. Also, with an EF pump and a FW pump both delivering flow to the steam generators, the level was very rapidly restored to the normal level for the required conditions. Once the main Feedwater System was verified to be controlling level, the EF pump was secured.

On January 9, 1988, CR-3 was in the Startup Mode (Mode 2). Moderator temperature coefficient testing had been completed at approximately 1000 as part of zero power physics testing. Both the primary and secondary systems had been stabilized following the test. The operating main FW pump was being controlled in manual, and the TBV's were being controlled in automatic. At approximately 1110, an EFIC actuation occurred due to a low level condition in the "B" steam generator. Once again only 2 of 4 EFIC channels detected the low level and the steam-driven EF pump started as designed. The "B" S/U feedwater control valve did not respond to its demanded control signal. A control room operator was in the process of opening the low load feedwater control valve to try to regain level when the EFIC actuation occurred.

CAUSE:

There were several factors which contributed to the January 7 event. The "B" SG level was oscillating nearly 15 inches prior to and following the EF actuation. This was apparently a result of sluggish operation of the "B" S/U feedwater control valve, which was thought at the time to be due to sticking of the valve stem. The downward level oscillations were only approximately 4 inches above the level for EF actuation. This margin is extremely small, which increased the chance of actuating Emergency Feedwater due to a slight SG level transient.

A slight level transient did occur as the result of an increase in SG pressure, possibly due to the TBV being positioned too far closed. This SG pressure increase would not normally have resulted in a transient, because the FW pump would have increased its speed to maintain a constant differential pressure across the S/U feedwater control valve. However, the FW pump was in manual, therefore the pump speed remained constant. A slight underfeed occurred, and the level oscillation was low enough for 2 of the 4 EFIC channels to detect a low SG level in "B" steam generator.

The event of January 9 was similar in nature. The "B" SG level was fluctuating as much as 20 inches prior to and following the EF actuation. One of the level oscillations downward was low enough for 2 of the 4 EFIC channels to detect a low SG level condition and initiate emergency feedwater. The cause of the SG level oscillations were determined to be due to an improper integral setting in an Integrated Control System (ICS) module in the "B" S/U FW control valve circuit.

EVENT ANALYSIS:

In both cases, the Emergency Feedwater System responded as designed to the conditions in the steam generators. In both cases, only "C" and "D" EFIC channels detected the low level condition for longer than the required 2 second time delay. The reason that channels "A" and "B" of EFIC did not detect the low level condition is most likely due to slight calibration differences in the level transmitters for these channels. Once an emergency feedwater pump was started, the SG level was rapidly increased, thus precluding the "A" and "B" channels from detecting a low SG level.

The effect of the Emergency Feedwater actuations on primary system parameters was minimal. A decrease in Reactor Coolant System (RCS) [AB] pressure, cold leg temperature (Tc) and pressurizer [PZR] level was noted, yet no parameter decreased below any applicable limits for the plant conditions. These decreases are expected with an emergency feedwater actuation, due to injection of colder water at higher flow rates into the steam generators. Based on the above, the Safety significance of these events is minimal.

CORRECTIVE ACTION:

Following the EF actuation of January 7, the EF system was reset once main feedwater was verified to be operating and properly controlling. Operators halted the testing of the MSSV's so that there would be less interference in completing the rod drop timing test. Once the rod drop test was satisfactorily completed, testing of the MSSV's was then resumed, and subsequently completed.

Even though the operators on duty at the time of this event knew enough to place the turbine bypass valves in manual for the rod drop test, the procedure did not mention this. The surveillance procedure will be revised to add this requirement. In addition, this change will also add a caution to closely monitor steam header pressure with these valves in manual, to prevent an

inadvertent SG pressure increase and subsequent underfeed of the steam generator. In addition, an Operations Study Book entry will be made which will remind Operators of the increased monitoring required as a result of having multiple control stations in manual.

Also following the January 7 event, the valve stem of the "B" startup control valve was lubricated to prevent sticking. Even though the SG level oscillations still existed, no further troubleshooting was performed because the S/U control valve itself was satisfactorily stroked. In retrospect, further evaluation of this problem should have been required, since the work performed did not correct the problem with SG level oscillations.

Following the January 9 event, the pilot valve for the "B" startup control valve was cleaned and adjusted. However, this did not change the actual valve position versus the demanded input. The valve was controlling properly, as it had before, but level oscillations were still as much as 20 inches. The integral rate for a module in the valve control circuit was then adjusted from 5 repeats per minute (RPM) to a value of 1 RPM. This integral rate change dampened the level oscillation to approximately 4 inches, which prevented the SG level from oscillating close to or below the level for Emergency Feedwater initiation.

As a result of these events, it is clear that additional actions are necessary. Problems encountered with the ICS are often difficult to work on because it usually requires tuning of the system while it is controlling the plant. There have been several new procedures generated, however, which would identify and correct many ICS problems prior to their discovery during normal system operations. These procedures are under the category of Preventive Maintenance Procedures, and are currently in the review process.

PREVIOUS SIMILAR EVENTS:

The initiation of emergency feedwater on low SG level has occurred many times, most notably during startup from the Refuel V outage, which was the first one with the newly installed EFIC system. These events were reported in LER 85-12.

Florida Power
CORPORATION

February 8, 1988
3F0288-07

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

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Licensee Event Report No. 88-01-00

Dear Sir:

Enclosed is Licensee Event Report (LER) 88-01-00 which is submitted in accordance with 10 CFR 50.73.

Should there be any questions, please contact this office.

Sincerely,

Ken Wilson for

E. C. Simpson, Director
Nuclear Operations Site Support

WLR:mag

Enclosure

xc: Dr. J. Nelson Grace
Regional Administrator, Region II

Mr. T. F. Stetka
Senior Resident Inspector

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