



**Florida  
Power**  
CORPORATION

Crystal River Unit 3  
Docket No. 50-302

April 5, 1993

3F0493-05

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

Subject: Licensee Event Report (LER) 93-01

Dear Sir:

Enclosed is Licensee Event Report (LER) 93-01 which is submitted in accordance with 10 CFR 50.73.

Sincerely,

G. L. Boldt  
Vice President  
Nuclear Production

EEF:mag

Enclosure

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

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A Florida Progress Company

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EXPIRES 4/30/92

## LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.0 HOURS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON DC 20503.

FACILITY NAME (1)

CRYSTAL RIVER UNIT 3 (CR-3)

DOCKET NUMBER (2)

0 5 0 0 0 3 0 2 1 OF 0 4

PAGE (3)

TITLE (4)

Failure of Decay Heat System Cooling Control Valve Causes Cooldown Exceeding Technical Specification Limits

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	3	0	5	9	3	9	3	0	0	1	0	5	0	0	0						
N/A										0	5	0	0	0							

OPERATING MODE (9)

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (CHECK ONE OR MORE OF THE FOLLOWING) (11)

POWER LEVEL (10)

20.402(b)

20.405(c)

50.73(a)(2)(iv)

75.71(b)

20.405(a)(1)(i)

50.36(c)(1)

50.73(a)(2)(v)

75.71(c)

20.405(a)(1)(ii)

50.36(c)(2)

50.73(a)(2)(vii)

OTHER (Specify in Abstract below and in Text, NRC Form 396A)

20.405(a)(1)(iii)

X

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)

LICENSEE CONTACT FOR THIS LER (12)

NAME

W. A. Stephenson, Nuclear Safety Supervisor

TELEPHONE NUMBER

AREA CODE

9 0 4 7 9 5 - 6 4 8 6

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRCDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRCDS										
X	C	C	T	C	V	V	F	1	3	0	YES								

SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

YES (If yes, complete EXPECTED SUBMISSION DATE)

X NO

DATE (15)

MONTH DAY YEAR

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

On March 5, 1993, Crystal River Unit 3 (CR-3) was in Mode 4 (Hot Shutdown) and cooling down for a planned maintenance outage. Two reactor coolant system (RCS) pumps were operating and the RCS was being cooled by the steam generators. After switching from steam generator cooling to Decay Heat (DH) system cooling, a cooldown exceeding the limits of Technical Specification 3.4.9.1 was experienced.

After securing the RCS pumps, operators, unable to establish control of the DH cooling system from the control room, dispatched an auxiliary building operator to establish manual control. While using posted instructions to convert from automatic to manual control, a valve inadvertently opened causing additional RCS cooldown. The valve was immediately closed. After several minutes, the valve started to drift open due to apparent damage to a key connecting the valve to its actuator. The alternate DH train was then placed in operation, stabilizing RCS temperature.

The initial excessive cooling was caused by failure of a control valve controller. Additional cooling and damage to the valve stem key was caused by improper operation due to incorrect posted instructions. The valve was repaired and new valve operation instructions were posted. The valve operating procedure is being revised and an evaluation of this event is being conducted to determine if additional corrective actions are necessary.

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LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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DOCKET NUMBER (2)

0 5 0 0 0 3 0 2

LER NUMBER (3)

YEAR SEQUENTIAL NUMBER REVISION NUMBER

9 3 0 0 1 0 0 0 2 OF 0 4

PAGE (3)

TEXT (If more space is required, Use additional NRC Form 305A's (17))

## EVENT DESCRIPTION:

On March 5, 1993, Crystal River Unit 3 (CR-3) was in Mode 4 (Hot Shutdown) and cooling down for a planned maintenance outage. Two reactor coolant system (RCS) pumps [AB,P] were operating and the RCS was being cooled by the steam generators [AB,HX]. The RCS temperature was 263 degrees Fahrenheit (°F). RCS pressure had been reduced to 200 pounds per square inch gauge (psig) to allow the operators to place the Decay Heat (DH)[BP] system in service. While switching from steam generator cooling to decay heat system cooling, a cooldown that exceeded the limits of Technical Specification (TS) 3.4.9.1 was experienced.

At approximately 1239, the "A" DH train was placed in service with the two RCS pumps still in operation. The RC pumps were secured at 1245 after assuring DH system operation by verifying a drop in DH system outlet temperature. At this time, RCS cold leg temperature had dropped to 256°F.

When switching the mode of core cooling, the temperature monitoring point for the reactor vessel wall changes. With RCS pumps on, the bulk temperature of the RCS, as measured by cold leg temperature instruments [AB,TI], is an accurate measure of the actual temperature of the vessel wall. When RCS pumps are secured and DH is providing core cooling, the DH heat exchanger [BP,HX] outlet temperature is used. This is necessary because DH cooled RCS fluid is injected directly into the reactor vessel without the benefit of mixing with the bulk RCS fluid. At the time that the RCS Pumps were secured, the DH heat exchanger outlet temperature was 229°F.

After securing the RCS pumps, control room licensed operators, using the DH system temperature controller [CC,TC], attempted to control the cooling from the DH system. After several attempts to reduce the rate of cooling, an auxiliary building non-licensed operator was dispatched to the cooling water control valve [CC,TCV] providing cooling water to the DH system heat exchanger, DCV-177, to manually close it. At this time, the DH cooler outlet temperature was 210°F.

At 1322, while converting the cooling control valve, DCV-177, from automatic control to manual control, the valve inadvertently opened causing an additional RCS cooldown. The auxiliary building operator immediately closed the valve. Over the next several minutes, the valve started to drift open. At 1330, the DH cooler outlet temperature was 143°F.

At this time, it was apparent to the control room operators that the cooldown had not been stopped by manually closing the cooling water control valve. At 1331, the alternate "B" DH train was started and several minutes later the "A" DH train was secured. Starting the alternate DH train caused an additional brief DH cooler outlet temperature step change to 70°F, the ambient temperature of the alternate train.

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
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CRYSTAL RIVER UNIT 3 (CR-3)	0500030293	00	01	00	03 OF 04

TEXT (If more space is required, use additional NRC Form 365A's (17))

Using the B" DH train, the DH cooler outlet temperature was stabilized at 220°F. RCS temperature was maintained at this temperature for the next three hours to allow any stresses induced by the cooldown to diminish.

**CAUSE:**

Technical Specifications permit a step change of 25°F when transitioning to DH. The initial overcooling was approximately 25°F greater than permitted by TS and was caused by failure of the controller for control valve DCV-177 that directs cooling water through the DH system heat exchanger. CR-3 is continuing to investigate the root cause of the controller failure.

Additional cooling was caused by the control valve going full open when the operator attempted to take manual control. This was caused by an incorrect order of instruction steps posted on the valve operator addressing manual valve operation. These instructions apparently came with the valve and were provided by the manufacturer. Furthermore, when taking manual control of the valve, a valve key may have been damaged which apparently allowed the valve to drift open after it had been closed.

**EVENT EVALUATION:**

Reactor vessel cooldown limits are provided to assure analysis assumptions used to calculate the RCS pressure/temperature limits are not exceeded. The pressure/temperature limits, included in the Technical Specifications, assure that stresses induced by system pressure and thermal gradients across the vessel wall do not exceed the stress limits for cyclic operation. The calculation of these limits are based on RCS fracture toughness properties. CR-3 is continuing to evaluate the effects of this cooldown.

**CORRECTIVE ACTIONS:**

The control valve controller has been repaired. Additionally, the valve, DCV-177, has been repaired. CR-3 is continuing to evaluate this event in order to identify further corrective actions. Placards containing correct valve operation instructions have been installed for DCV-177 and similar valves servicing the DH coolers. The procedure addressing manual valve operations is being appropriately revised.

CR-3 is performing an engineering evaluation of this overcooling to determine the effects of this cooldown on the fracture toughness properties of the RCS. This evaluation will be complete before startup from the current outage. Additional corrective actions include evaluating procedure changes for placing a DH train in service and addressing the temperature consequences of placing an alternate DH train in operation.

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CRYSTAL RIVER UNIT 3 (CR-3)

YEAR

SEQUENTIAL  
NUMBERREVISION  
NUMBER

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TEXT (If more space is required, Use additional NRC Form 365A's (17))

## PREVIOUS SIMILAR EVENTS:

There have been no previous events involving a reactor vessel cooldown exceeding the TS limits.