



Florida Power

CORPORATION

Crystal River Unit 3

Docket No. 50-302

May 13, 1996
3F0596-17

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555-0001

Subject: Licensee Event Report (LER) 96-010-00

Dear Sir:

Please find the enclosed Licensee Event Report (LER) 96-010-00. This report is submitted by Florida Power Corporation in accordance with 10 CFR 50.73.

Sincerely,

B. J. Hickle, Director
Nuclear Plant Operations

JAF:ff

Attachment

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

200034

9605200126 960513
PDR ADOCK 05000302
S PDR

EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.2 HOURS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, 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 7

PAGE (3)

TITLE (4)

Several Contributors Cause Low Flow in SW System Cooled Components resulting in Operation That Was Outside the Design Basis

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	4	1	2	9	6	9	6	0	1	0	N/A	0	5	0	0	0

OPERATING MODE (9)

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (CHECK ONE OR MORE OF THE FOLLOWING) (11)

POWER LEVEL (10)

20.402(b)

20.405(c)

50.73(a)(2)(iv)

73.71(b)

20.405(a)(1)(i)

50.36(c)(1)

50.73(a)(2)(v)

73.71(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 366A)

20.405(a)(1)(iii)

50.73(a)(2)(i)

50.73(a)(2)(viii)(A)

20.405(a)(1)(iv)

X

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

J. A. Frijout, Sr. Nuclear Regulatory Specialist

TELEPHONE NUMBER

AREA CODE

3 5 2 5 6 3 - 4 7 5 4

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

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 April 12, 1996, Florida Power Corporation's Crystal River Unit 3 was in MODE 5 (COLD SHUTDOWN). FPC personnel conducted a flow balancing procedure for the Nuclear Services Closed Cycle Cooling System (SW). During the performance of this procedure, twelve components required to perform a system safety function were determined to have "as-found" flow rates less than required values. Following completion of flow balancing, FPC personnel determined that this event constituted a Design Basis Issue.

Several causes have been identified. Corrective actions include a valve repair or replacement, revision of appropriate procedures, and an evaluation of a SW system thermal-hydraulic model to perform system flow balancing on-line. This report is submitted in accordance with 10 CFR 50.73(a)(2)(ii)(B) for operation that was outside the Design Basis of the plant.

EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HOURS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, 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

LER NUMBER (6)

YEAR

SEQUENTIAL
NUMBERREVISION
NUMBER

9 6

0 1 0

0 0

PAGE (3)

0 2 OF 0 7

TEXT (If more space is required, Use additional NRC Form 366A's (17))

EVENT DESCRIPTION

On April 12, 1996, Florida Power Corporation's (FPC) Crystal River Unit 3 (CR-3) was in MODE 5 (COLD SHUTDOWN), having previously entered the Refuel 10 outage. FPC personnel conducted a flow balancing procedure for the Nuclear Services Closed Cycle Cooling System [KE](SW). During the performance of this procedure, twelve components required to perform a system safety function were determined to have "as-found" flow rates less than required values.

FPC personnel were performing the flow balance procedure (PT-136A, SW System Flow Balance) as part of the corrective action for a previously identified reduced flow event involving the Decay Heat Closed Cycle Cooling System [BP](DC) and reported in LER 95-010-01. FPC committed to flow balance the SW system during the Refuel 10 outage as a corrective action. During the performance of PT-136A the SW cooling flow to twelve components required to perform a system safety function was determined to be less than their respective design flow rate. A listing of the twelve components, associated throttle valve identifications, design flow rates and "as found" flow rates are included in Attachment 1, Low SW Flow Components. Following the flow rebalancing, the "as-left" flow rate associated with eleven of the twelve components was above its minimum design flow rate. The twelfth component, throttle valve [SW,FCV](SWV-292), will require replacement or repair to achieve design flow to the Spent Fuel Pool Coolant Pump Air Handling Unit [DA,AHE](AHHE-29B). An evaluation subsequently determined that this component should not have been addressed in the Design Basis.

Subsequently, FPC personnel determined that this event constituted a Design Basis Issue when the plant operated in MODE 4 or Above. This report is submitted in accordance with 10 CFR 50.73(a)(2)(ii)(B) for operation that was outside the Design Basis of the plant.

EVENT EVALUATION

The SW system is a safety-related closed cycle cooling loop system. During normal plant operation, one of the SW pumps [KE,P](SWP-1A/B/C) circulates cooling water through parallel loads and back to the pump suctions through 3 of 4 Nuclear Services Heat Exchangers [KE,HX](SWHE). Cooling water to the Control Rod Drive Mechanisms [AA,DRIV](CRDM) is through one of two Nuclear Services Booster Pumps [KE,P](SWP-2A/B) and one of the two CRDM cooling water filters [AA,FLT](SWFL). The safety functions of the SW system are:

1. To remove heat from various safety-related equipment and apparatus following ES actuation and transfer this heat to the Ultimate Heat Sink [BS](UHS).

EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HOURS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON DC 20503.

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (8)

PAGE (3)

CRYSTAL RIVER UNIT 3 (CR-3)

YEAR		SEQUENTIAL NUMBER	REVISION NUMBER
0	5	0	0
0	3	0	2
9	6	0	1
0	1	0	0
0	0	0	3
0	7		

TEXT (If more space is required, Use additional NRC Form 366A's (17))

2. The SW system prevents the release of radioactivity to the sea (Gulf of Mexico) by acting as an intermediate barrier between the primary coolant or reactor building environment and the UHS, which uses seawater as its coolant.

Following the performance of the SW system flow balance and documentation of its deficiencies, a meeting was conducted by station personnel to address operability concerns involving the SW system. The concern was that the SW cooling water flow is low or can become low to components with low flow rates due to the accumulation of normal corrosion products in valves.

Several evaluations were conducted to establish the source and quantity of corrosion products circulating through the SW system. Visual observations of a new CRDM filter after cycling valves indicated no solid debris and only small thin flakes which were determined to be an iron compound consistent with that expected in carbon steel piping. An additional evaluation was performed which included sampling the SW system for total dissolved solids and filterable iron. A baseline sample was obtained and a second sample was taken following two sets of valve cycling. The results were the same, with all indicated readings less than detectable limits.

FPC personnel were unable to balance flow to one component, Spent Fuel Pump Air Handling Unit [DA,AHE](AHHE-29B). This unit provides cooling air for the Spent Fuel Pool Coolant Pump Motor. An evaluation was conducted and concluded that AHHE-29B is not part of the licensing basis for CR-3, is not described in the FSAR, and it has no Improved Technical Specification (ITS) requirement. Therefore, this component should not have been addressed in the Design Basis.

Since the SW system was returned to normal operation, continuous on-line particulate removal is provided by the CRDM filters. The operability meeting concluded that the SW system was Operable and fully qualified.

CAUSE

Several causes have been identified as contributors to the low as-found flow conditions. The original procedure (PT-136, DC and SW System Flow Measurements and EGDG-1A KW Loading Due to ES Pumps) failed to properly test and balance the SW flow to several components.

Since one of the goals of the flow balancing was to increase flow to certain components, the as-found flow to the smaller loads was reduced as a result of increasing flows to higher flow rate components. Therefore these component flows may have been acceptable if measured earlier in the balancing process.

EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HOURS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, 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	LER NUMBER (6)			PAGE (3) 9 6 --- 0 1 0 --- 0 0 0 4 OF 0 7
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	

TEXT (If more space is required, Use additional NRC Form 366A's (17))

Several of the low flow occurrences were caused by small amounts of system corrosion products at the valve seat. When these valves were cycled as part of the flow balance, the as-left valve position was essentially the same as the as-found, but the flows were higher. Cycling the valves caused the debris to loosen. The CRDM filter was placed in service to clean up the system. The valves which had flow restrictions were associated with small clearances between the valve disc and seat as a result of low component design flow rates. The small internal valve clearances tend to trap small pieces of corrosion products.

Trouble shooting of the low flow to AHHE-29B indicated that the throttle valve [SW,FCV](SWV-292) apparently has a disc separated from its stem, prohibiting valve adjustment.

IMMEDIATE CORRECTIVE ACTION

Problem Report #PR-96-0126 was issued documenting these deficiencies.

Valves were adjusted by throttling to achieve the desired flow through eleven of the twelve valves. Throttle valves for components with flow restrictions were opened an additional amount to increase flow through the seat. SWV-292 was not flow balanced.

An evaluation of the licensing basis for SWV-292 was conducted and concluded that AHHE-29B is not part of the licensing basis for CR-3. Further, it is not described in the FSAR and it has no Improved Technical Specification requirement.

ADDITIONAL CORRECTIVE ACTION

Valve SWV-292 will be repaired, flow adjusted, and the appropriate procedures will be revised to include the new valve position. Compensatory measures were taken during the system flow balancing to ensure that when SWV-292 is aligned to the system and flow balanced, the remainder of the system will remain properly balanced. Additionally, a root cause failure analysis will be performed on the valve.

With filter SWFL-1 in service, several valves were cycled during plant startup to dislodge any corrosion products trapped in the SW system. Engineering personnel inspected SWFL-1 to determine the type and quantity of loose debris collected. Subsequently, the next time SWFL-1 is changed out due to high differential pressure, engineering will inspect and evaluate the filter media.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

EXPIRES 5/31/96

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HOURS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, 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

LER NUMBER (6)

YEAR

SEQUENTIAL
NUMBERREVISION
NUMBER

PAGE (3)

9 6

0 1 0

0 0

0 5 OF 0 7

TEXT (If more space is required, Use additional NRC Form 366A's (17))

ACTION TO PREVENT RECURRENCE

Based on information derived from the filter inspection and evaluation FPC may require additional corrective actions.

FPC will perform an evaluation to determine what plant modifications or changes to maintenance and/or operations practices can be made to minimize valve blockage. This evaluation is expected to be completed by the end of August, 1996.

The appropriate procedures were revised to reflect the new valve positions consistent with the flow balancing. Engineering personnel will review all future changes to these procedures which may have an effect on the system flow balance.

An evaluation will be conducted to determine if the AHHE-29A/B cooling units are actually needed or if they may be abandoned.

Corrective actions developed for a previous Problem Report (PR-94-0320 titled PT-136 Flow Balance Inconsistencies) and applicable to this event include an evaluation of a SW system thermal-hydraulic model to perform system flow balancing on-line. The results of the Refuel 10 flow balancing will be used to verify the accuracy of the flow model.

PREVIOUS SIMILAR EVENTS

There have been two previous reportable events involving low SW flow. LER 95-010-01 reported low cooling water flow to a makeup purification pump. As a result of corrective actions for that LER, LER 95-022-00 identified and reported low flow to a motor cooler and Decay heat Removal Heat Exchanger.

ATTACHMENT

Attachment 1 - LOW SW FLOW COMPONENTS

Attachment 2 - ABBREVIATIONS, DEFINITIONS AND ACRONYMS

EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HOURS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, 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 9 8 --- 0 1 0 --- 0 0 0 6 OF 0 7

LER NUMBER (6)

PAGE (3)

YEAR

SEQUENTIAL
NUMBERREVISION
NUMBER

TEXT (If more space is required, Use additional NRC Form 366A's (17))

ATTACHMENT 1 - LOW SW FLOW COMPONENTS

<u>COMPONENT</u>	<u>THROTTLE VALVE</u>	<u>ACCEPT. CRITERIA</u>	<u>AS-FOUND FLOW</u>
AHHE-32B	SWV-159	53	35
CHHE-1B	SWV-64	860	752
SWP-1A	SWV-426	7	2
SWP-1B	SWV-427	7	1
MUP-1B	SWV-187	16	15
MUP-1B	SWV-188	11	3
MUP-1A	SWV-279/DCV-41	53	41
EFP-1	SWV-509	48	43
CAHE-1	SWV-171	11	3
CAHE-2A	SWV-172	11	1
CAHE-2B	SWV-173	11	2
AHHE-29B	SWV-292	97	1

EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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 (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20565-0001, 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

LER NUMBER (6)

YEAR

SEQUENTIAL
NUMBERREVISION
NUMBER

9 6

0 1 0

0 0

PAGE (3)

0 7 OF 0 7

TEXT (If more space is required, Use additional NRC Form 366A's (17))

ATTACHMENT 2 - ABBREVIATIONS, DEFINITIONS AND ACRONYMS

AHHE	Motor Cooler
CAHE	Sample Cooler
CHHE	Water Chiller
CR-3	Crystal River Unit 3
EFP	Emergency Feedwater Pump
FPC	Florida Power Corporation
DC	Decay Heat Closed Cycle Cooling System
EGDG	Emergency Diesel Generator
ITS	Improved Technical Specifications
KW	Kilowatt
MODE FIVE	Cold Shutdown
MUP	Makeup Pump
NRC	Nuclear Regulatory Commission
OPERABILITY	Capable of Performing its Design Function
PT-136	DC and SW System Flow Measurements and EGDG-A KW Loading Due to ES Pumps (procedure)
PT-136A	SW System Flow Balance (procedure)
PT-136B	DC System Flow Balance and EGDG KW Loading (procedure)
RCP	Reactor Coolant Pump
REFUEL 10	Refueling Outage currently scheduled to begin February 29, 1996
RWP	Nuclear Services Seawater Pump
SW	Nuclear Services Closed Cycle Cooling System
SWFL	Nuclear Services Closed Cycle Cooling System Filter
SWP	Nuclear Services Closed Cycle Cooling System Pump
SWHE	Nuclear Services Closed Cycle Cooling System Heat Exchanger
UHS	Ultimate Heat Sink

NOTES: ITS defined terms appear capitalized in LER text (e.g. MODE ONE)

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

EIIS codes appear in square brackets (e.g. Makeup Tank [CB,TK])