

Florida Power

CORPORATION
Crystal River Unit 3
Docket No. 50-302

January 20, 1995
3F0195-13

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

Subject: Licensee Event Report (LER) 94-014-00

Dear Sir:

Enclosed is voluntary Licensee Event Report (LER) 94-014-00 which is submitted in accordance with 10 CFR 50.73.

Sincerely,

G. L. Boldt
Vice President
Nuclear Production

GLB/JAF:ff

Attachment

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

240041

EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)

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.

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TITLE (4)
Reactor Building Fan/Cooler Operation Develops Cooling System Flow Imbalance and Heat loading Having the Potential for Operation 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)														
1	0	3	1	9	4	9	4	0	1	4	0	0	0	1	2	0	9	5	N/A	0	5	0	0	0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (CHECK ONE OR MORE OF THE FOLLOWING) (11)									
POWER LEVEL (10)	1	0	0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)				
	1	0	0	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)				
	1	0	0	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A)				
	1	0	0	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)					
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LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
J. A. Frijouf, Nuclear Regulatory Specialist	AREA CODE 9 0 4 5 6 3 - 4 7 5 4

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

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

SUPPLEMENTAL REPORT EXPECTED (14)

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

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

On October 31, 1994, Florida Power Corporation's (FPC) Crystal River Unit 3 (CR-3) was in MODE ONE operating at 100% reactor power and generating 879 megawatts. FPC personnel determined that an inconsistency existed between the design and operation of the plant relative to Nuclear Service Closed Cycle Cooling (SW) system reactor building (RB) fan/cooler heat loads during a postulated design basis Loss of Coolant Accident (LOCA). Certain three RB fan/cooler operating scenarios establish a condition which may cause reduced component flows and the allowable SW supply temperature to be exceeded for a short period of time post LOCA.

The cause of the potential challenge to the SW system performance resulting from three RB fan/cooler operation is personnel error by the FPC design organization. A series of corrective actions are being implemented which include both procedural and administrative changes and an evaluation of potential plant modifications.

On December 20, 1994 as a result of an evaluation of this issue, FPC management determined that this issue should be reported as a voluntary Licensee Event Report (LER) under 10CFR50.73.

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EVENT DESCRIPTION:

On October 31, 1994, Florida Power Corporation's (FPC) Crystal River Unit 3 (CR-3) was in MODE ONE operating at 100% reactor power and generating 879 megawatts. At 0800, during the performance of a Service Water System Operational Performance Inspection (SWSOPI) Self Assessment, FPC personnel determined that an inconsistency existed between plant design and operation relative to Nuclear Service Closed Cycle Cooling [KE](SW) system reactor/building (RB) fan/cooler [FAN BK](RBCU) heat loads during a postulated design basis (DB) Loss of Coolant Accident (LOCA).

The SW system Enhanced Design Basis Document (EDBD) currently states that the DB heat load on the SW system is 193×10^6 Btu/hr. This value is based on three RBCUs in service after a DB LOCA. Three RBCU operation post LOCA differs from the Improved Technical Specifications (ITS) in that ITS Limiting Condition for Operation (LCO) 3.6.6 requires only two containment cooling trains be operable in MODES ONE through FOUR. Although three RBCU operation is conservative from a RB heat removal standpoint, it challenges the operability of the SW system in that the SW system must be able to reject all of the heat transferred to it while not exceeding the system temperature limit of 110 degrees Fahrenheit (deg. F.), assuming a maximum ultimate heat sink (UHS) temperature of 95 deg. F.

The RBCUs consist of water cooled coils and a ventilation fan to circulate containment air through the coils. During normal operation, the RBCUs are supplied with cooling water from the industrial cooling water system (CI). In the event of an ES actuation, the RBCUs are aligned with the SW cooling system and provide RB emergency cooling (see Figure 1 - SW system Simplified Functional Flow Diagram). SW also supplies component cooling water to various safety related components. All ES components must receive at least their minimum cooling water flow at a temperature below that recommended by the vendors of the equipment to assure adequate component cooling.

One accident scenario involves no loss of offsite power (LOOP) at the initiation of a LOCA with two RBCUs ES selected and running in high speed and the third running in slow speed. An ES actuation would result in all three RBCUs aligned and operating with SW cooling. Alternately, guidance in the Emergency Operating Procedures (EOP) directed the operator to align "all available RB fan/coolers" during post-LOCA cooldown. These situations could have resulted in three RBCU operation on SW cooling. The effect of three RBCU operation post LOCA on cooling flow to ES components, with the SW system flow balanced for two RBCU alignment, is indeterminate. The SW temperature impact is also indeterminate.

A short term operability assessment was conducted by FPC engineering personnel to justify allowing plant operations with three RBCUs post LOCA considering UHS conditions. The thermal analysis was successful for a UHS temperature of 80 deg. F. However, implicit in this analysis was that all ES components were receiving their design level of cooling water flow. A review of the hydraulic calculations

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indicated that the SW system is flow balanced for two RBCU operation. Valving in the third RBCU with the system balanced for two may result in some or all of the ES components receiving less than their design level of cooling water flow. FPC management determined, as an interim action, to administratively preclude three RBCU operation post ES, rather than to attempt to perform a hydraulic analysis for the system and a subsequent thermal analysis for all affected ES components at reduced, and difficult to accurately estimate, cooling water flow rates.

On December 20, 1994 as a result of a management review team evaluation of this SW issue, FPC management determined this issue should be reportable as a voluntary Licensee Event Report (LER) under 10CFR50.73.

EVENT EVALUATION

The SW system safety functions include providing RB cooling following a DB LOCA, and removing heat from various safety related equipment following an ES actuation. Redundancy to the safety functions of the SW system are provided by the RB spray system, which provides reactor building cooling in lieu of the RB fan/coolers, and the DC system which assures key heat removal functions are maintained. The current issue would not disable the SW system. In a hypothesized worst case scenario, the reduced flow to some ES components following an ES actuation with no LOOP, and with no operator intervention, may have resulted in some ES components overheating as a result of the reduced cooling water flow. It is unlikely that any component would be totally starved of flow. Reduced flow to the three RBCUs would probably provide adequate containment heat removal relative to two RBCUs receiving design flow. The rate of heat rejection which could cause the SW supply temperature to approach its maximum value is a short-lived transient period occurring in the early stages of a DB LOCA with the UHS at its maximum temperature of 95 deg. F. It is unlikely that the ES components served by SW would have been detrimentally affected by exceeding the maximum cooling water temperature over this short term. However, in the absence of test data or a benchmarked hydraulic model, the exact hydraulic effect of three RBCU ES operation in a system flow balanced for two RBCUs is indeterminate.

CAUSE

The primary cause of the inconsistency between the EDBD and ITS resulting in a potential challenge to the heat loading limits of the SW system is a cognitive personnel error by the FPC design organization which led to this design deficiency. A plant modification to require ES selection of only two RBCUs was developed to minimize emergency diesel generator (EGDG) loading. The third fan, if running in slow speed and no LOOP occurred, was not dropped from the ES bus. A later modification added new SW thermal and hydraulic loads. The mechanical engineer recognized the impact on the SW system and had the I&C design engineer ensure that

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SW flow was isolated to any non-running RBCU. At that time neither discipline of design engineering, or any other organization, recognized that the scenario described could occur. This failure of the project team members to recognize the connection between the two RBCU system flow balance and the ES logic which controls RBCU operation post LOCA resulted in the present condition.

CORRECTIVE ACTION

Corrective actions to address the potential problems relative to the RBCUs includes the following.

1. A design review board concept will be implemented to ensure project designs receive multi-disciplinary roundtable review which should identify similar problems in the future.
2. An administrative instruction was issued to preclude post LOCA operation with three RBCUs.
3. The design basis configuration documents will be revised as necessary to reflect the correct design basis information.
4. A plant modification to trip the third RBCU on an ES actuation signal will be evaluated.

PREVIOUS SIMILAR EVENTS

There have been two previous reportable events directly involving the RBCUs. The first, LER 87-20-02 addressed RBCU operation with UHS temperature outside the DB. The second, LER 90-011-00 addressed MODE ascension with only one RBCU operable.

ATTACHMENT

Figure 1 - SW system Simplified Functional Flow Diagram

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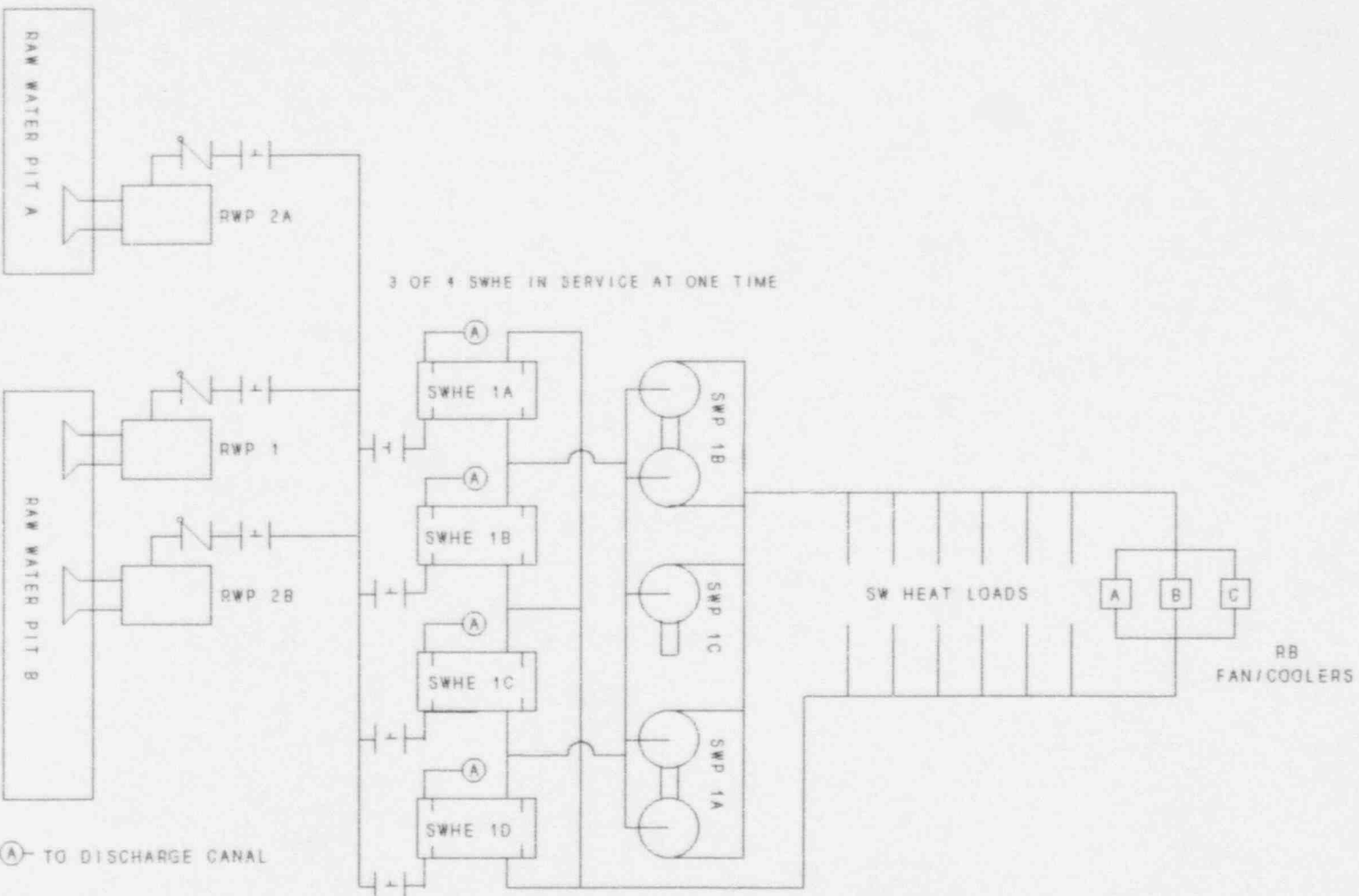
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SW SYSTEM SIMPLIFIED FUNCTIONAL FLOW DIAGRAM