Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

November 24, 1995
3F1195-15

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

Subject: Licensee Event Report (LER) 95-023-00

Dear Sir:

Please find the enclosed Licensee Event Report (LER) 95-023-00. This report is submitted by Florida Power Corporation in accordance with 10 CFR 50.73.

Sincerely,

Ron Davis FOR BJ Hickle

B. J. Hickle, Director
Nuclear Plant Operations

JAF:ff

Attachment

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

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NRC FORM 366 (5-92)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 5/31/95

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.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
CRYSTAL RIVER UNIT 3 (CR-3)	0 5 0 0 0 3 0 2	1 OF 0 6

TITLE (4)

Inconsistent Design Assumptions Cause Building Spray Pump Flowrate Concerns Resulting In 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	2 7	9 5	9 5	0 2 3	0 0	1 1	2 4	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)
		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	TELEPHONE NUMBER
J. A. Frijouf, Sr. Nuclear Regulatory Specialist	AREA CODE 9 0 4 5 6 3 - 6 4 8 6

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)		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 October 27, 1995, Florida Power Corporation's (FPC) Crystal River Unit 3 (CR-3) was in MODE ONE (POWER OPERATION), operating at 100% RATED THERMAL POWER (RTP) and generating 878 megawatts. During a review of Emergency Operating Procedure (EOP) setpoints under the EOP Enhancement Program - Phase 2, FPC engineering personnel determined that Building Spray flow values used in various engineering calculations had not considered the correct instrument errors.

An operability assessment was conducted which concluded the Building Spray system was operable but degraded. The condition was also considered potential operation outside the design basis and was reported to the NRC in accordance with the requirements of 10 CFR 50.72.

The cause of this condition was a design analysis deficiency. The corrective actions include revision of the appropriate calculations, further analysis, and revision of design and analysis basis documents.

EVENT DESCRIPTION

On October 27, 1995, Florida Power Corporation's (FPC) Crystal River Unit 3 (CR-3) was in MODE ONE (POWER OPERATION), operating at 100% RATED THERMAL POWER (RTP) and generating 878 megawatts. During a review of Emergency Operating Procedure (EOP) setpoints under the EOP Enhancement Program - Phase 2, FPC Engineering personnel determined that BS flow values used in various engineering calculations were inconsistent. EOP-8, "LOCA (Loss of Coolant Accident) Cooldown," requires throttling of Building Spray System [BE](BS) flow to 1200 gallons per minute (gpm) just before, during, and after swapping suction from the Borated Water Storage Tank [BP,TK](BWST) to the Reactor Building [NH](RB) sump. The controller controls within an accuracy of +126, -88 gpm. Engineering calculations used a smaller (ie. less conservative) accuracy value based on control board indication rather than controller accuracy. This condition may lead to system operation that could potentially challenge long term off-site dose limits, Net Positive Suction Head (NPSH) requirements and long term pump flow criteria established by the pump vendor.

Immediately following the discovery of this condition, a Problem Report was issued. An OPERABILITY assessment was conducted in accordance with Compliance Procedure CP-150, "Identifying and Processing Operability Concerns." The evaluation concluded that the BS system was OPERABLE but degraded.

This condition was also considered potential operation outside the design basis of the plant. The event was reported to the Nuclear Regulatory Commission (NRC) at 1659 on October 27, 1995 via the Emergency Notification System (ENS) per the requirements of 10 CFR 50.72(b)(1)(ii)(B). It was assigned the NRC Event Number 29517. This report is submitted in accordance with 10 CFR 50.73(a)(2)(ii)(B).

EVENT EVALUATION

The Reactor Building Spray System has no normal duty function, but serves only in an Engineered Safeguards [JE](ES) capacity as part of the ES system. On an RB pressure of 4 pounds per square inch gauge (psig) the appropriate valve lineups occur and a high RB pressure signal of 30 psig coincident with a High Pressure Injection (HPI) start signal from the ES system actuates RB spray operation. The two pumps [BE,P](BSP-1A and BSP-1B) start and take suction from the BWST through the Low Pressure Injection [BP](LPI) system suction piping. In the event of a large break Loss of Coolant Accident (LOCA) the system sprays the RB atmosphere to remove the post-accident energy and Iodine. Each train of Building Spray must be able to deliver a minimum flow rate of 1200 gpm into the RB within 90 seconds in order to be considered OPERABLE. Analyses require at least one train of BS to be functional during an accident.

The concerns associated with BS and identified during the EOP setpoint review included the following:

1. The NPSH calculation for DH and BS flow with suction from the RB sump should consider controller accuracy.

2. Per the vendor's recommendation, the BS pumps should not be operated continuously at flow rates lower than 1,100 gpm.

3. The Enhanced Design Basis Document (EDBD) assumes a minimum BS flow of 1200 gpm in calculating the control room and offsite thyroid doses.

4. EOP-8, "LOCA Cooldown," step 3.14, requires the operators to lower BS flow to 1200 gpm to establish suction from the RB sump. This value does not include errors associated with either the control board indication or the controller function.

These identified concerns were associated with the following five calculations:

1. Calculation I90-0015 Rev 1: Calculates flow error associated with the flow indicators (BS-1-FI 1/2) on the Main Control Board (MCB) vertical ES section. At a flowrate of 1200 gpm, calculations indicate an error of approximately +/-31 gpm.

2. Calculation I90-0022 Rev 0: Calculates instrument error for the flow controller. At a BS flowrate of 1200 gpm, calculations indicate errors of +126 and -88 gpm.

3. Calculation M90-0021 Rev 5: Calculates NPSH required for BS pump and Decay Heat Pump [BP,P](DHP) operation while aligned to the RB sump. This calculation assumed 1200 gpm BS flow with an additional 31 gpm flow error from Calc I90-0015.

4. Calc M86-0003 Rev 0: Calculates minimum allowable BS pump flow rate acceptable to assure adequate iodine removal in the RB. It uses a nominal value of 1200 gpm.

5. Calc M95-0005 Rev 1: Calculates minimum BWST level necessary to prevent vortexing during drawdown. This calculation assumed 1200 gpm BS flow with an additional 31 gpm flow error from I90-0015.

Based on the flow controller instrument errors from calculation I90-0022 Rev 0, actual BS flow rate could be as high as 1326 gpm and as low as 1112 gpm. Therefore, NPSH and iodine removal from the RB air space may not be bounded by current calculations. This condition was considered potential operation outside the design basis of CR-3.

An OPERABILITY assessment was conducted in accordance with CP-150. This procedure provides a structured, organized approach toward determining the OPERABILITY of plant components required for a safe shutdown of the plant and provides guidelines to ensure no loss of plant system or component safety function.

The CR-3 Probabilistic Safety Assessment (PSA) has identified that this plant condition does not increase the core melt frequency since Building Spray does not provide core cooling.

Each identified concern was further analyzed in view of the bounding BS flow limits established by Calculation I90-0022 Rev 0. These limits, as previously identified, were actual flows between 1112 gpm and 1326 gpm for a setpoint of 1200 gpm. Relative to the 1326 gpm high flow limit, the concern is NPSH available from the RB sump. Calculation M90-0021 Rev 5 establishes a maximum BS flow rate of 1231 gpm. Engineering personnel completed a draft revision of Hydraulic Calculation M90-0021 which identifies that at a maximum BS flow rate of 1326 gpm, adequate NPSH is available for the BS and DH pumps even when aligned to the RB sump. Relative to the 1112 gpm low limit, the concerns are: minimum continuous flow that BS pumps can operate without failure; and minimum continuous flow to assure iodine removal capacity in the RB. The EDBD, Section 6.4 and Calculation I86-0003 both specify a minimum required flow of 1200 gpm to reduce iodine levels in containment post-LOCA. FPC Engineering personnel have verified with the BS pump manufacturer (Worthington Corp.) that the BS pump can operate at 1100 gpm without concern for pump failure. Therefore, the low flow rate limit of 1112 gpm is not a concern relative to BS pump failure.

Calculation M95-0005 Rev 1, Minimum BWST Level to Prevent Vortexing employs the flow indicator instrument error rather than the more conservative flow controller instrument error. However, a review of this calculation indicated that when worst case flow conditions occur, BS pumps are not running. Therefore, the BS pumps are not bounding for the vortexing scenario.

Thus far, the low flow rate limit of 1112 gpm has not been totally justified as acceptable for iodine removal capacity. A contract was issued to Gilbert Associates to address this issue. The results of their analyses, which are currently under FPC engineering review, indicate that regulatory limits are not compromised by the reduced flow rates. This low flow rate related issue is the only remaining concern which has not been closed. Closure of this item is pending completion of the review of the Gilbert Associates deliverables by FPC Engineers.

Based on the available data and the analyses and evaluations conducted, FPC concludes that this event did not compromise the health and safety of the general public.

CAUSE

The cause of this condition was a design analysis deficiency. An incorrect instrument loop error was utilized in the following calculations:

1. M90-0021 Rev 5, Building Spray and Decay Heat Pump NPSH Available/Required (A/R); and

2. M95-0016 Rev 0, BWST Level Swapover and Min. Level Evaluation.

3. Calc M95-0005 Rev 1: Calculates minimum BWST level necessary to prevent vortexing during drawdown. This calculation assumed 1200 gpm BS flow with an additional 31 gpm flow error from I90-0015. (NOTE: These conditions are not bounding for the vortexing scenario).

The subject calculations utilized instrument loop error associated with flow indicators BS-1-FI 1 and 2, which are non-qualified instruments rather than using the error associated with safety-related, qualified flow controllers BS-92-FC 1 and 2.

IMMEDIATE CORRECTIVE ACTION

1. Upon identification of this deficiency a Problem Report was issued documenting the condition.

2. A CP-150 Evaluation was conducted to determine OPERABILITY. Based on engineering judgement, the slight reduction in flow rate is expected to have minimal impact on system operation and containment iodine removal. Low flow and NPSH have been confirmed to be adequate. Further work is being performed to confirm the judgements relative to iodine removal.

ADDITIONAL CORRECTIVE ACTION

1. Calculation M90-0021 Rev 5, Building Spray and Decay Heat Pump NPSH A/R will be revised to identify that adequate NPSH from the RB sump level is available to satisfy the upper BS flow rate limit of 1326 gpm as controlled by flow controllers BS-92-FC 1 and 2. This task will be completed by December 30, 1995.

2. Calculations M95-0016 Rev 0, BWST Level Swapover and Min. Level Evaluation and M95-0005 Rev 1, Minimum BWST Level Necessary to Prevent Vortexing During Drawdown will be revised to incorporate appropriate instrument loop error values. This task will be completed by March 4, 1996.

3. The FPC Configuration Management Information System (CMIS) will be reviewed for tag numbers associated with BS, DH and Makeup (MU) pumps to determine if system references identify hydraulic/thermal calculations which may have utilized incorrect controller/indicator loop error information. This task will be completed by March 4, 1996.

ACTION TO PREVENT RECURRENCE

1 An analysis, performed by a vendor, was performed to evaluate the establishment of a 1000 gpm BS flow rate to assure adequate iodine removal in the RB. This analysis was expected to justify the low actual flow rate limit of 1112 gpm. The deliverables have been received by FPC, and concluded that "The results of the analyses show that the regulatory limits are not compromised with the changes in the flows." FPC Engineers are currently reviewing the document.

2. Based on the previous corrective action, the EDBD and Analysis Basis Document (ABD) will be revised to incorporate a lower BS flow rate limit acceptable for iodine removal capacity in the RB. If the analysis is unable to establish expected minimum flow values, alternative corrective actions will be established. This task will be completed by February 2, 1996.

3. The EOP Enhancement Program will continue to review EOP values for conditions requiring evaluation.

4. A copy of this LER will be sent to all FPC Nuclear Engineering Design Mechanical, Instrument & Controls (I&C), and Electrical Engineers for their review.

PREVIOUS SIMILAR EVENTS

There have been six previous reportable events relating to setpoints. LER 88-008-00 reported Emergency Feedwater Initiation and Control (EFIC) low level Once Through Steam Generator (OTSG) setpoint deficiencies. LER 93-003-00 discussed core flood tank level measurement errors. LER 94-006-01 reported instrument errors relating to the Reactor Protection System (RPS) and EFIC setpoints. LER 95-005-00 discussed instrument errors relating to NPSH for certain Emergency Core Cooling System (ECCS) configurations. LER 95-015-00 reported EFIC low level setpoint errors, and LER 95-016-00 reported EFIC natural circulation level setpoints.

ATTACHMENT

Attachment 1 - Abbreviations, Definitions and Acronyms

ATTACHMENT 1 - ABBREVIATIONS, DEFINITIONS AND ACRONYMS

ABD	Analysis Basis Document
A/E	Architect/Engineer
A/R	Available/Required
BWST	Borated Water Storage Tank
BS	Building Spray
CMIS	Configuration Management Information System
CP-150	Procedure "Identifying and Processing Operability Concerns"
CR-3	Crystal River Unit 3
DH	Decay Heat
DHP	Decay Heat Pump
ECCS	Emergency Core Cooling System
EDBD	Enhanced Design Basis Document
EFIC	Emergency Feedwater Initiation and Control
ENS	Emergency Notification System
EOP	Emergency Operating Procedures
ES	Engineered Safeguards
FPC	Florida Power Corporation
GPM	Gallons per Minute
HPI	High Pressure Injection
I&C	Instruments & Controls
LOCA	Loss of Coolant Accident
LPI	Low Pressure Injection

MCB	Main Control Board
MODE ONE	Power Operation
MU	Makeup System
NPSH	Net Positive Suction Head
NRC	Nuclear Regulatory Commission
OPERABLE	Capable of Performing its Design Function
OPERABILITY	Capable of Performing its Design Function
OTSG	Once Through Steam Generator
PSA	Probabilistic safety Assessment
PSIG	Pounds Per Square Inch Gauge
RB	Reactor Building
RPS	Reactor Protection System
RTP	RATED THERMAL POWER

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])