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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 Dawns FOR BJHICKIE

B. J. Hickle, Director Nuclear Plant Operations

JAF: ff

11300145 951124

PDR

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PDR

Attachment

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

270066

CRYSTAL RIVER ENERGY COMPLEX: 15:'60 W Power Line St + Crystal River, Florida 34428-6708 + (904) 795-6486

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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 EOP-8, "LOCA (Loss of Coolant Accident) Cooldown," requires inconsistent. 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.

(6-42)	LICENSEE EVENT REPORT (LER) TEXT CONTINUATION	EGULATORY COMMESSION	ESTIMATED B INFORMATION COMMENTS R AND REPORTS REGULATORY	APPROVED OMB NO. EXPIRES 6/ NURDEN PER RESPOR I COLLECTION REQU EGARDING BURDEN 8 MANAGEMENT BRM COMMISSION, WAS	3150-0104 31/96 NBE TO COM EBTIMATE TO NCH (MNBB T HINGTON, DC	PLY WITH THIS URS. FORWARD) THE RECORDS 7714), U.S. NUCLEAR 2056-0001.
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The c inclu	oncerns associated with BS ded the following:	and identified o	during the	EOP setpo	oint re	eview
1.	The NPSH calculation for DH consider controller accuracy	and BS flow with /.	suction f	rom the RB	sump sh	ould
2.	Per the vendor's recommend continuously at flow rates 1	lation, the BS lower than 1,100	pumps sho gpm.	ould not b	e oper	ated
3.	The Enhanced Design Basis Do gpm in calculating the contr	cument (EDBD) as rol room and offs	sumes a mi site thyro	inimum BS f id doses.	low of	1200
4.	EOP-8, "LOCA Cooldown," step to 1200 gpm to establish su include errors associated w controller function.	3.14, requires action from the ith either the c	the opera RB sump. control boa	tors to low This valu ard indicat	wer BS We does tion or	flow not the
These	identified concerns were ass	ociated with the	following	g five calc	ulation	ns:
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2.	Calculation I90-0022 Kev C controller. At a BS flowrat +126 and -88 gpm.): Calculates i te of 1200 gpm, o	nstrument calculatio	error for ns indicate	• the e error	flow s of
3.	Calculation M90-0021 Rev 5: Heat Pump [BP,P](DHP) oper calculation assumed 1200 gpm from Calc 190-0015.	Calculates NPSH ation while al n BS flow with a	required igned to n additior	for BS pump the RB su hal 31 gpm	o and D Imp. flow e	ecay This rror
4.	Calc M86-0003 Rev O: Calc acceptable to assure adequat value of 1200 gpm.	ulates minimum e iodine removal	allowable in the Ri	BS pump B. It uses	flow sanom	rate inal
5.	Calc M95-0005 Rev 1: Calcu vortexing during drawdown. an additional 31 gpm flow er	lates minimum B This calculation ror from 190-001	WST level n assumed 1 5.	necessary 1200 gpm BS	to pre S flow	vent with
Based actua There curre	on the flow controller inst 1 BS flow rate could be as fore, NPSH and iodine remova nt calculations. This condit	rument errors fr high as 1326 from the RB a tion was consider	om calcula gpm and ir space m red potent	ation 190-0 as low as ay not be ial operati	1112 bounder	v O, gpm. d by side

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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 Calculation M90-0021 Rev 5 establishes a maximum BS flow rate of 1231 RB sump. Engineering personnel completed a draft revision of Hydraulic Calculation qpm. 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.

(5-92) LICENSEE EVENT REPORT (TEXT CONTINUATION	LER)	ESTI INFO COM AND REG AND OFFI	MATEL FIMAT MENTI REPOI ULATO TO TH ICE OF	D BURE ION CO S REGA RT'S MA HEY CO E PAPE MANA	E DEN PEI KLLECTI VRDING WAGEN MMISSH GEMEN	KPIFIE R RESI ON RE BURD IENT I ON, W C RED T AND	8 5/31 PONS OUES EN ES BRAN ASHI UCTIO	ADE ETO CON ST: 60.0 HK BTIMATE T CH (MINBB NGTON, DI DIN PROJEC BET, WASH	IPLY 1 XURS. O THE 7714), C 2065 ST (31 HINGT	MTH TH FORWA RECOI U.S. N 50-010 ON DC	HIS ARD RDS IUCLE 4), 20603.	AR
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CAUSE

NEED EXCEPTION CORE

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

- M90-0021 Rev 5, Building Spray and Decay Heat Pump NPSH Available/Required (A/R); and
- 2. M95-0016 Rev O, 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

- 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

- 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.
- Calculations M95-0016 Rev O, 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.

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

NEC FORM SEGA	U.S. NUCLE/	AR REGULATORY COMMISSION	MISSION APPROVED OWB NO. 3150-0104						
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	ATTACHMENT 1 - ABB	REVIATIONS, DEFINI	TIONS	AND A	ACRONYM	15			
ABD	Analysis Basis Docu	ment							
A/E	Architect/Engineer								
A/R	Available/Required								
BWST	Borated Water Stora	ge Tank							
BS	Building Spray								
CMIS	Configuration Manag	ement Information	Syste	m					
CP-150	Procedure "Identify	ing and Processing	Oper	abilit	y Conc	erns	."		
CR-3	Crystal River Unit	3							
DH	Decay Heat								
DHP	Decay Heat Pump								
ECCS	Emergency Core Cool	ing System							
EDBD	Enhanced Design Bas	is Document							
EFIC	Emergency Feedwater	Initiation and Co	ntrol						
ENS	Emergency Notificat	ion System							
EOP	Emergency Operating	Procedures							
ES	Engineered Safeguar	ds							
FPC	Florida Power Corpo	ration							
GPM	Gallons per Minute								
HPI	High Pressure Injec	tion							
I&C	Instruments & Contro	ols							
LOCA	Loss of Coolant Acc	ident							
LPI	Low Pressure Inject	ion							

NRC FORM 386A (5-92)	U.S. NUCLE	AR REGULATORY COMMISSION			APP	ROVE	OMB	NO.	3150-0	2104		****	entre anno 10		
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TEXT (If more apace is require	d. Uae adollanai NRC Form 3664 a (17)														
MCB	Main Control Board														
MODE ONE	Power Operation														
MU	Makeup System														
NPSH	Net Positive Suctio	n Head													
NRC	Nuclear Regulatory	Commission													
OPERABLE	Capable of Performi	ng its Design Func	tion												
OPERABIL:	ITY Capable of Performi	ng its Design Func	tion												
OTSG	Once Through Steam	Generator													
PSA	Probabilistic safet	y Assessment													
PSIG	Pounds Per Square I	nch Gauge													
RB	Reactor Building														
RPS	Reactor Protection	System													
RTP	RATED THERMAL POWER														
NOTES:	ITS defined terms a	ppear capitalized	in LE	R te	ĸt	(e.9	g. M	10D	E O	NE)					
	Defined terms/acron first used (e	yms/abbreviations .g. Reactor Buildi	appea ng (R	r in (B))	pa.	rent	thes	sis	wh	en					

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