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Florida Power & Light Company, 6501 South Ocean Drive, Jensen Beach, FL 34957

MAR 2 1 1997

L-97-081 10 CFR 50.73

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

Re: St. Lucie Unit 1 Docket 50-335 Reportable Event : 97-002 Date of Event: February 21, 1997 Operation in Excess of Maximum Rated Thermal Power Due to Digital Data Processor Calorimetric Error

The attached Licensee Event Report is a voluntary report submitted to provide notification of the subject event.

Very truly yours,

J.A. Stall Vice President St. Lucie Plant

JAS/RLD

Attachment

cc: Regional Administrator, USNRC Region II Senior Resident Inspector, USNRC, St. Lucie Plant

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NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION (4-95) LICENSEE EVENT REPORT (LER)								ISSION	APPROVED BY OMB NO. 3160-0104 EXPIRES 04/30/88 ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 60.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO MOUSTRY. FORWARD COMMENTS REGRADING BURDES STIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33) U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001								
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thorou	ughly	investi	igated	and	correcte	d. C	Dn N	March 1	, 199	7, St.	Luci	e Unit 1	was retur	rned t	:0 100%	RTP.	
The case of the control of the contr	The cause of this event was failure to implement effective configuration controls for the DDPS computer software. Corrective actions include: 1) Acceptable performance of all critical DDPS functions was verified prior to restoration of full power operations. 2) Review of accountabilities for software modifications and identification of program improvements. 3) Development of verification and validation requirements that challenge all critical attributes for software changes within the DDPS. 4) Development of controlled operating procedures to address DDPS operation. 5) Use of the St. Lucie Total Equipment Data Base or controlled procedures to ensure configuration control of critical DDPS constants. 6) Modification of																
requir	ed.		-										1				

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DESCRIPTION OF THE EVENT

On February 21, 1997, St. Lucie Unit 1 was operating at a steady-state power level of 100% Rated Thermal Power (RTP) as determined from the Digital Data Processing System (DDPS) [EllS:IO] display. Utility Instrumentation and Control (I&C) personnel were performing a feed water flow instrument loop calibration following maintenance on a feed water flow transmitter [EllS:SJ:PDT]. During this calibration, it was discovered that scaling constants for all six of the feed water flow input signals to the DDPS computer [EllS:IO:CPU] were incorrect, i.e., the input signal range of 4 - 20 milliamperes corresponded to a flow venturi [EllS:SJ:FE] differential pressure span of approximately 0 - 790 inches of water rather than the correct span of 0 - 800 inches of water. Since the DDPS uses the feed water flow parameter in calorimetric calculations of reactor [EllS:RCT] core thermal power, this discrepancy was non-conservative in that scaling constants corresponding to less than the full range of flow venturi differential pressures result in a calculated value of power that is less than the actual reactor output. Control room operators were notified by I&C personnel that the reactor was operating at a core thermal power level approximately 0.6% RTP greater than the value displayed on the DDPS, and action was promptly initiated to reduce power. At 17:55 EST on February 21, 1997, St. Lucie Unit 1 was stabilized at a conservative value of 99% RTP (indicated). The unit was returned to 100% RTP at 05:45 EST on March 1, 1997.

CAUSE OF THE EVENT

In June, 1994, feed water flow scaling constants were revised in accordance with approved plant procedures. These scaling constants were properly installed into the operating DDPS software, but were not updated in the control room DDPS data reference manual. In 1996, the software was modified by the vendor using the vendor's version of the source code to accommodate installation of a new core performance monitor that interfaces with the DDPS. When this modification was loaded into the DDPS computer during the 1996 refueling outage, the proper scaling constants were overwritten and replaced with the pre-1994 values based on the control room DDPS data reference manual. This condition was not discovered until the instrument loop calibration was performed on February 21, 1997.

The cause of this event was failure to implement effective configuration controls for the DDPS computer software.

ANALYSIS OF THE EVENT

In June 1994, a change to the span/static shift adjustment for each of the six DDPS feed water flow transmitters was implemented in accordance with an approved plant work order. To be compatible with the span adjustments, the existing feed water flow scaling constants corresponding to a span of 0 - 790.6 inches of water differential pressure were revised to correspond to a span of 0 - 800 inches of water differential pressure. The new scaling constants were loaded into the correct DDPS operating software locations, but were not recorded in the control room DDPS data reference manual which is maintained at the DDPS console.

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NRC FORM 366A		U.	S. NUCLEAF	REGULATO	RY COMN	AISSION			
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ST. LUCIE UNIT 1	05000335	97	002	00	30	F 5			
TEXT (If more space is required, use additional copies of NRC Form 366A	/ (17)	<u></u>							
ANALYSIS OF THE EVENT (continued)									
The DDPS software is considered quality related. At the time the 1994 revision was made to the feed water flow scaling constants, QI 2-PR/PSL-3, Revision 0, Control of Computer Software, provided generic administrative controls for computer software in which the output is used for safety related and quality related purposes. Significant revisions to strengthen this procedure have been made since 1994.									
During the refueling outage of April - July, 1996, an or interfaces with the DDPS was installed in accordance The DDPS software changes needed to accommodate using the vendor's version of the source code (which or Upon loading the modified software into the DDPS con overwritten with those corresponding to a range of 0 -	n-line core per with an appro this new insta did not contain nputer, the co 790.6 inches	rformanc ved Plant allation w n the 199 prrect fee s of wate	e monitor Change/ ere devel 94 revised d water f r differen	ing syster Modificati oped by t scaling c low const tial pressu	n whick fon (PC) he vend constan ants w ire.	h /M). dor hts). ere			
Administrative Procedure (AP) 4000060, Maintenance implemented February 26, 1996, to provide the metho support groups control the procurement, development, PR/PSL-3. The validation and verification (V & V) meth software configuration following modifications to acco procedure, but did not V & V other functions of the so were not related to the modification.	Departmental dology by wh , and revision hod that was mmodate the ftware, such	l Control hich the n of softw used to c 1996 PC as the ca	of Compu naintenan are to con confirm th C/M was s lorimetric	uter Softw ce departing mply with ne DDPS p selected fr calculation	vare, wa ment an QI 2- roper rom this on, that	as nd s t			
During post modification testing (PMT) for the 1996 PC reference manual was used to perform a verification of not a controlled document and had not been updated t scaling constants. This prevented discovery of the pro- feed water flow scaling constants were the same pre- had been loaded into the DDPS computer from the ven	C/M, the cont f each DDPS i to reflect the oblem at that 1994 values a idor source co	rol room nput con 1994 rev time, i.e. is those r ode.	copy of t stant. Ho ision to tl , the valu esiding in	he DDPS (owever, the he feed wa es used to the softw	data nis man ater flo o verify vare tha	ual is w the at			
The feed water flow scaling constant error was determ additional discrepancies, unrelated to the 1996 modific calibration and were determined to result in a combine calorimetric error was 0.43% non-conservative.	nined to be.no cation, were a d conservative	on-conser Ilso disco e error of	vative by vered in 1 0.2% R	0.63% R the calorin TP. There	TP. Tw netric fore, th	vo ne net			
Assessment_of_Safety_Significance									
An operability assessment was performed which deter combined with the calorimetric measurement uncertain accuracy requirement of 2% at maximum rated therma physics, and reactor fuel parameters impacted by the c assumptions made in the plant safety analysis provided evaluation concluded that the existing plant safety ana of the public were not adversely affected by this event	mined that the aty was less the al power. In a calorimetric er d sufficient mains alysis remains t.	e feed wa han the r iddition, i ror were argin to t valid. Th	ater flow equired o reactor pr evaluated bound this herefore,	scaling dia verall calo otection, d to ensur s event. T the health	screpar primetric core e that his and sa	ncy c afety			

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TEXT (//	f more space is required, use additional copies of NRC Form 366A	/ (17)	4			3			
CORB	ECTIVE ACTIONS								
1)	Facility operation was limited to a conservative investigated and corrected. Primary system maverify reactor power remained below 100% RT	value of 99% inual calorime P.	5 RTP u tric calc	ntil the pro culations w	blem was vere perfor	thoro med 1	oughly to		
2)	The correct feed water flow scaling constants of DDPS computers, and other calorimetric constants the plant Total Equipment Data Base (TEDB). The on the DDPS display was verified to be as predi- calculation was performed and results were with	were entered ints were veri The increase in icted. A prim thin 0.2% of t	into bot fied to b calcula ary syst DDPS in	h the on-li be correct ated calorin em manua dicated po	ne and the using info metric pov Il calorime wer.	e back rmatic ver sh tric	c-up on from Iown		
3)	The correct feed water flow scaling constants were documented, and master/backup copies of the upgraded system were filed in accordance with an approved St. Lucie Plant Software Configuration/Change Control, Computer Software Change Request (Administrative Procedure 4000060, Revision 2).								
4)	Acceptable performance of other critical DDPS functions was verified to ensure that other inadvertent software changes had not been made, and surveillances were performed for other plant systems whose calibrations can be influenced by DDPS calculated calorimetric power to ensure that these system calibrations had not been compromised.								
5)	I & C performed a three point calibration of all I constants and input circuit operation. Minor di Resistance Temperature Detector and Reactor (related to the event reported in this LER. Engir accounted for a combined conservative error of errors in the St. Lucie Unit 1 DDPS. The scalin the St. Lucie Unit 2 DDPS to ensure that simila	DDPS calorim screpancies v Coolant Pump neering detern f 0.2%. FPL g curves for t r discrepancie	etric inp vere ider KW sca nined th will revia hese co as did no	uts to veri ntified in th aling curve at these d se the soft mponents ot exist.	fy the pro he feed was s that we iscrepancion ware to co were also	per so ater re not es orrect verifi	these ed in		
6)	To ensure adequate post modification testing is performed, FPL will review software modification accountabilities and identify program improvements to be made.								
7)	FPL will develop generic V & V requirements to Unit 1 and Unit 2 DDPS for all software change	challenge all es.	critical	attributes	within bot	th St.	Lucie		
8)	Controlled operating procedures will be develop operation and identify specific point identificati	bed to address on and location	s both S ons.	t. Lucie U	nit 1 and l	Unit 2	DDPS		
9)	FPL will ensure configuration control for all crit entering them into the TEDB or ensuring they a	ical St. Lucie re documente	Unit 1 a ed in a c	and Unit 2 controlled p	DDPS con procedure.	istant:	s by		
10)	FPL's blanket purchase order with the software development of new software and upgrading/cl Administrative Procedure AP-4000060.	e vendor has l hanging exist	been mo ng soft	dified to c ware shall	larify that be per FPI	L's	, 		

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ADDITIONAL INFORMATION				
Company Failures				
Component Failures				*
None				
Previous Similar Events	٠			
LER 335/86-005, St. Lucie Unit 1, Technical Specifica	tion Deviation	Due to Perso	nnel Error, 07	/21/86.
LER 389/92-008, St. Lucie Unit 2, Digital Data Proces Calibration Error, Revision 1, 03/31/93.	s System Calc	primetric Error	due to Instrui	nent
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