CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9608130340 DOC.DATE: 96/08/02 NOTARIZED: NO DOCKET #
FACIL:50-335 St. Lucie Plant, Unit 1, Florida Power & Light Co. 05000335
AUTH.NAME AUTHOR AFFILIATION
NOBLE,R. Florida Power & Light Co.
STALL,J.A. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 96-008-01:on 960703,inadvertent actuation of safety injection actuation signal & containment isolation signal occurred due to loss of 15 VDC regulated power supply during maint.Design review performed.W/960731 ltr. ooting W/960731.

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TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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CATEGORY 1 DOCUMENT

Florida Power & Light Company, P.O. Box 128, Fort Pierce, FL 34954-0128

July 31, 1996

L-96-198
10 CFR 50.73

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

Re: St. Lucie Unit 1
Docket No. 50-335
Reportable Event: 96-008 Supplement 1
Date of Original Event: June 8, 1996
Date of Subsequent Event: July 3, 1996
Inadvertent Actuation of the Engineered Safety Features Actuation System During Maintenance

The attached Licensee Event Report is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the July 3, 1996 event and supplementary information for the June 8, 1996 event.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

JAS/REN

Attachment

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

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), 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)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
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TITLE (4)

Inadvertent Actuation of the Safety Injection Actuation Signal and Containment Isolation Actuation Signal Due to Loss of the 15 VDC Regulated Power Supply During Maintenance.

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 NAME	DOCKET NUMBER
7	3	96	96	008	1	8	2	96	NA	NA
									FACILITY NAME: NA	DOCKET NUMBER: NA

OPERATING MODE (9)	6
POWER LEVEL (10)	000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)	X	50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Rick Noble, Licensing	(561) 467-7160

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED 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 15 single-spaced typewritten lines) (16)

On June 8, 1996 at 1355, with Unit 1 in Mode 6, an inadvertent actuation of channel B safety injection actuation signal (SIAS) and containment isolation actuation signal (CIAS) occurred during performance of maintenance in the engineered safety features actuation system (ESFAS) SB cabinet. The B electrical train was out of service for maintenance and testing. The 1B emergency diesel generator was out of service pending completion of post modification testing. All technical specification required electrical loads were being supplied by the A electrical train.

The event was caused by a loss of the 15 volt dc regulated power supply to the channel B SIAS and CIAS logic circuits during maintenance. Instrumentation & control technicians were replacing a regulating power supply monitoring card which resulted in a blown fuse. Additionally, wiring discrepancies in the power supply circuit were discovered during system troubleshooting performed immediately following the event.

Troubleshooting to investigate the power supply wiring discrepancies was subsequently conducted. On July 3, 1996 at 1014, with Unit 1 in Mode 5, these troubleshooting activities resulted in an unexpected channel B recirculation actuation signal (RAS) and containment spray actuation signal (CSAS). The actuations were unexpected because operating personnel were not adequately briefed that a loss of the 15 vdc power supply to RAS and CSAS would result in actuation.

Corrective Actions Include: 1. Design review, visual inspection, and trouble shooting were performed. 2. The power supply wiring configuration was restored to the original design. 3. Precautions will be added to the design documentation regarding the failure mode of ESFAS circuits on a loss of 15 vdc power. 4. The lessons learned from this event will be investigated for inclusion in operator and maintenance training

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

DESCRIPTION OF THE EVENT

On June 8, 1996 at 1355, with Unit 1 in Mode 6, an inadvertent actuation of channel B safety injection actuation signal (SIAS) (EIIS:BQ) and containment isolation actuation signal (CIAS) (EIIS:JM) occurred. The B electrical train was out of service for maintenance and testing. The A electrical train was in service performing its design function. The 1B emergency diesel generator (EIIS:EK) was out of service pending completion of post maintenance testing. The 1B3 4160 volt electrical bus was energized from the 1B startup transformer. The 1B2 480 volt load center was being powered from the 1A2 480 volt load center and preparations were under way to restore it to its normal line up.

Instrument and control technicians were installing two replacement regulated power supply monitor cards (A10 / A11) in the engineered safety features actuation system (ESFAS) (EIIS:JE) SB cabinet when the actuation occurred. These cards monitor the condition of the two 15 volt DC power supplies (S3/M3 and S4/M4) to the SIAS, CIAS, recirculation actuation signal (RAS) (EIIS:BP), containment spray actuation signal (CSAS) (EIIS:BE), and steam generator isolation actuation units. During the installation of regulated power supply monitor card A10, an inadvertent channel B SIAS and CIAS occurred.

It was discovered that fuse F3 in the M3 15 volt dc power circuit had opened and the voltage on power supply S3 was indicating approximately zero volts. In addition to the open fuse, the S3 power supply was crow barred (a protection feature which shunts the output on high voltage, 19 volts dc). This resulted in a loss of both auctioneered supplies (S3/M3) for one of the 15 vdc power supplies. The F3 fuse was replaced and the A10 regulated supply monitor card installation was completed.

Operations verified that appropriate component actuations for CIAS and SIAS occurred for this configuration. The components were then reset to their initial configuration prior to the event. Channel B SIAS reset when the fuse in the S3/M3 power supply was replaced. In accordance with 10CFR50.72, the Nuclear Regulatory Commission was notified at 1600 on June 8, 1996.

Review of vendor manual drawings, during troubleshooting, indicated that the 15 volt dc power supply (S3/M3) should have been associated with CSAS and RAS functions and not with the SIAS or CIAS function. Troubleshooting activities were stopped at this point and an event response team (ERT) was formed.

As part of the ERT investigation, additional troubleshooting was conducted to investigate the power supply wiring discrepancies. The troubleshooting involved deenergizing the (S4/M4) 15 vdc power supply. On July 3, 1996 at 1014, with Unit 1 in Mode 5, these troubleshooting activities resulted in an unexpected channel B RAS and CSAS. All work in the ESFAS cabinets was immediately suspended. Actuation of RAS resulted in

the B low pressure safety injection (LPSI)(EIIS:BP) pump being secured as designed. This removed one of the operating trains of shutdown cooling (SDC) from service. The operating crew entered the appropriate off normal procedure and, following reset of the CSAS and RAS, the B shutdown cooling loop was placed back in service. The NRC was notified of the unexpected ESFAS actuation in accordance with 10CFR50.72.

CAUSE OF THE EVENT

The cause of the S3/M3 15 vdc power supply failure was determined to be a blown fuse resulting from re-installation of the A10 card. Insertion of the card resulted in an electrical transient or short which caused the fuse to open.

The channel B SIAS and CIAS actuation was a direct result of the maintenance activity (i.e., a result of the S3/M3 power supply failure) and not due to a coincident external event. The ESFAS cabinets contain two 15 vdc (auctioneered S3/M3 and auctioneered S4/M4) and two 24 vdc power supplies. The 15 vdc supplies power the logic circuits and the 24 vdc supplies power the actuation relays. According to the vendor manual drawings, the S3/M3 power supply is associated with CSAS and RAS, therefore, loss of the S3/M3 power supply would not be expected to result in a SIAS or CIAS. Because a loss of the S3/M3 power supply did result in SIAS/CIAS, it was apparent that the field wiring configuration of this power supply differed from the vendor technical manual drawings (Figure 1 illustrates the documented/design power supply configuration). The actual as-found field wiring condition was later determined to be as shown in Figure 2. In this configuration, the S3/M3 supply powers SIAS and one module of CIAS; and the S4/M4 supply powers the other seven modules of CIAS, CSAS, RAS, and MSIS. This difference was a vendor configuration issue only, and did not affect the safety function of the CIAS circuits.

The unexpected RAS and CSAS occurred while troubleshooting the power supply wiring configuration discrepancies. Despite a precaution in the troubleshooting procedure that stated that precautions should be taken in the event that any ESFAS signal actuates, precautions were only taken for the "deenergize to actuate signals". RAS and CSAS use normally deenergized actuation relays that will not actuate on a loss of power (i.e. energize to actuate). Therefore, plant personnel did not correctly anticipate the CSAS and RAS actuations and subsequent stopping of one LPSI pump.

The 15 vdc power supply configuration had not been modified since original installation. Therefore, the differences between the actual wiring of the 15 vdc power supplies and the design documentation were a result of errors in the vendor supplied documentation.

ANALYSIS OF THE EVENT

The original event was reportable under 10 CFR 50.72 (b) (2) (ii) and 10 CFR 50.73 (a) (2) (iv) as "Any event or condition that resulted in a manual or automatic actuation of any engineered safety feature...". The subsequent event, that occurred during troubleshooting, is also reportable under 10 CFR 50.72 (b) (2) (ii) and 10 CFR 50.73 (a) (2) (iv) as an actuation of ESFAS that was not preplanned as part of a test of reactor operation.

The S3/M3 power supply failed during reinstallation of the A10 card as a result of an electrical short or transient. Failure of the S3/M3 power supply resulted in a SIAS and partial CIAS, because the logic circuits for SIAS and one module of CIAS were powered from this supply, contrary to the vendor manual drawings. The subsequent actuation of the B channel SIAS and CIAS components occurred as designed. The power supply wiring discrepancies found would not compromise the function of any engineered safety feature actuation under design bases assumptions and therefore, were not apparent during previous ESFAS testing. The B train ESF equipment was out of service and the Technical Specification required equipment was supplied from the A electrical train. There was no interruption to any equipment on the A electrical train. The unit was shutdown at the time of the event.

The unexpected ESFAS initiation that occurred during troubleshooting, resulted from a loss of the S4/M4 15 vdc power supply. Because the 24 vdc power supply to the actuation relays was not affected, an actuation of RAS and CSAS occurred. This was not properly anticipated by personnel involved in the trouble shooting, due to a miscommunication that the "energize to actuate" signals would not actuate. Actuation of RAS resulted in the securing of one LPSI pump (as designed) and consequently the loss of one of the operating SDC trains. Proper operator actions were taken to restore the pump and SDC train.

The as-found wiring configuration did not affect the ability of the ESFAS to perform its safety function as demonstrated by system performance testing (e.g. safeguards testing). Separation criteria between ESFAS channels were also not affected by this configuration. The failure modes of the ESFAS considering a single failure are the same for either configuration. Failure of a single supply S3, M3, S4, or M4 will not result in a loss of power to any ESFAS modules due to the auctioneered design. On a loss of one of the two 120 vac feeds, the actuation modules will go to their appropriate fail safe state. Therefore the health and safety of the public were not adversely affected.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

CORRECTIVE ACTIONS

A. A preliminary design review and visual inspection of the ESFAS cabinet was conducted. No additional anomalies (e.g., incorrect connections, damaged wires) were detected.

B. The ESFAS cabinet channel A and B power supply configuration was restored to original design and tested prior to return to service.

C. An action item has been issued to Engineering to add precautions and explanations to the vendor manual and Design Basis Documents regarding the failure mode of the energize to actuate circuits on a loss of a 15 vdc power supply when 24vdc power is available.

D. Signs have been placed on ESFAS panels SA and SB warning that deenergizing the auctioneered 15 vdc power supplies will result in ESFAS actuation.

E. An action item has been issued to Engineering to review the Unit 2 ESFAS power supply configuration.

F. An action item has been issued to the Training Department to investigate the lessons learned from this event for inclusion in operator and maintenance training programs.

ADDITIONAL INFORMATION

Component Failure

none

Previous Similar Event

LER 94-010 revision 0
"Inadvertent B Train Engineered Safeguards Features Actuation Signal (ESFAS) due to a Deficient Instrument and Control Test Procedure."

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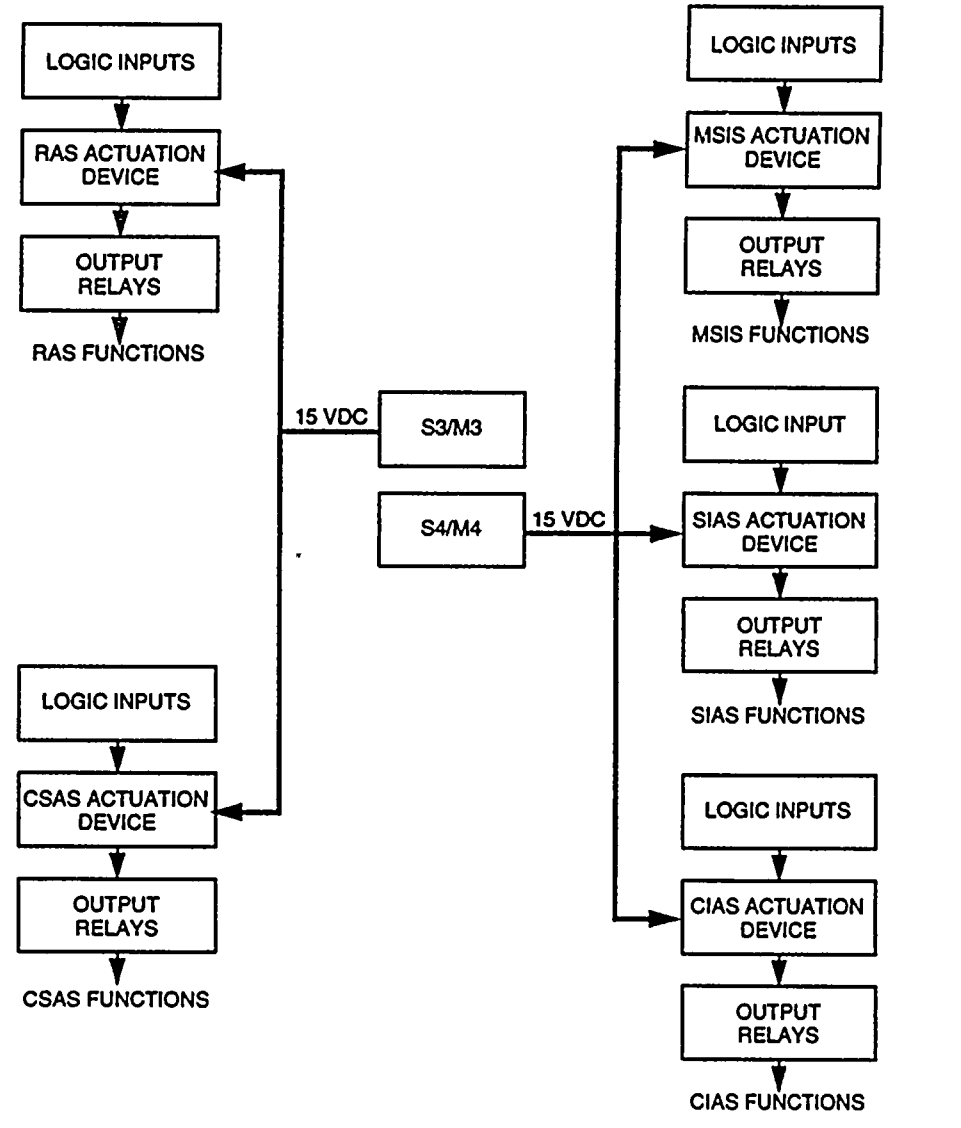
FIGURE 1

SIMPLIFIED 15 VDC POWER SUPPLY INPUTS TO ESFAS ACTUATION LOGIC
(DESIGN CONFIGURATION)



(DLC/LER-008-F1-R0)

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FIGURE 2

SIMPLIFIED 15 VDC POWER SUPPLY INPUTS TO ESFAS ACTUATION LOGIC
(FIELD CONFIGURATION)