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 AUTH. NAME AUTHOR AFFILIATION
 WEEKSJ.W. Florida Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 90-004-00: on 900228, inadvertent partial actuation of 'A' train containment isolation & containment spray sys.

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EXTERNAL:	EG&G BRYCE, J.H		3	3		L ST LOBBY WARD		1	1
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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) ST. LUCIE, UNIT 1 DOCKET NUMBER (2) 0 | 5 | 0 | 0 | 0 | 3 | 3 | 5 | 1 | OF 0 | 3 | PAGE (3) 1 OF 0 | 3

TITLE (4) INADVERTENT PARTIAL ACTUATION OF 'A' TRAIN CONTAINMENT ISOLATION AND CONTAINMENT SPRAY SYSTEMS DUE TO EQUIPMENT MALFUNCTION

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)											
0	2	2	8	9	0	9	0	0	0	0	4	0	0	0	0	3	2	8	8	0	N/A	0 5 0 0 0 1 1

OPERATING MODE (8) 6 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR :
(Check one or more of the following) (11)

POWER LEVEL (10) 0 0 0	20.402(b)	20.405(c)	X	50.73(a)(2)(iv)	73.71(b)
	20.405(a)(1)(i)	50.36(c)(1)		50.73(a)(2)(v)	73.71(o)
	20.405(a)(1)(ii)	50.36(c)(2)		50.73(a)(2)(vii)	
	20.405(a)(1)(iii)	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)	OTHER Specify in Abstract below and in Text NRC Form 388A)
	20.405(a)(1)(iv)	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 JAY W. WEEKS, SHIFT TECHNICAL ADVISOR TELEPHONE NUMBER 4 | 0 | 7 | 4 | 8 | 5 | - | 3 | 5 | 5 | 0

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS

SUPPLEMENTAL REPORT EXPECTED (14) YES (if yes, complete EXPECTED SUBMISSION DATE) X NO

EXPECTED SUBMISSION DATE (15) MONTH | DAY | YEAR

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

On 28 February, 1990, St. Lucie Unit 1 was in Mode 6 in a refueling outage when an inadvertent partial actuation of the Engineered Safeguards Features Actuation System (ESFAS) was received. Train 'A' of the Containment Spray and Containment Isolation Systems were partially actuated. At the time of the event, Instrumentation and Controls (I & C) personnel were installing the NRC required Anticipated Transient Without a Scram (ATWS) plant modification in the actuation portion of the ESFAS cabinet. A jumper was being installed to ensure circuit continuity when the Containment Spray Actuation Signal (CSAS) and the Containment Isolation Signal (CIS) train 'A' annunciators were received on the Reactor Turbine Generator Board (RTGB). The 1A Emergency Diesel Generator started and the Instrument Air Containment Isolation Valve I-MV-18-1 closed.

The root cause of the event was equipment malfunction. Several screws on the terminal board being worked were found to be loose. Attaching the jumper to the terminal board caused the connections to be jarred loose, breaking the circuit, and partially initiating the ESFAS.

Corrective actions taken were to verify the partial actuation received was the correct response of the system and inspecting and tightening all connections in the ESFAS actuation cabinets.

IF 22
D11 Per
M. Harper

FACILITY NAME (1) ST. LUCIE, UNIT 1	DOCKET NUMBER (2) 0 5 0 0 0 3 3 5	LER NUMBER (6)				PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		9 0	0 0	4	0	0	0 2

TEXT (If more space is required, use additional NRC Form 366A's)(17)

DESCRIPTION OF THE EVENT

On 28 February, 1990, St. Lucie Unit 1 was in Mode 6 in a refueling outage. Installation of the Anticipated Transient Without a Scram (ATWS) plant modification, required by 10CFR50.62, was being performed by Instrumentation and Controls (I & C) personnel in the SA Engineered Safeguards Features Actuation System (EIS:JE) (ESFAS) cabinet. A jumper was being installed on terminal board TB519 from the bus bar to a wire on pin 11 to maintain circuit continuity while leads were being connected at pin 11. When the jumper was connected, Containment Spray (EIS:BE) and Containment Isolation (EIS:JM) train 'A' annunciators (EIS:IB) were received on the Reactor Turbine Generator Board (RTGB). The 1A Emergency Diesel Generator (EIS:EK) (EDG) started and the Instrument Air System (EIS:LD) Containment Isolation valve I-MV-18-1 closed. Licensed utility operators verified the actuation was spurious and reset and opened I-MV-18-1, reset the Containment Spray Actuation System (CSAS) and the Containment Isolation System (CIS), and secured the 1A EDG after the jumper had been removed. This event occurred at 1032.

At approximately 1600, the event was repeated to verify the suspected cause. At this time the 1A EDG was taken out of service and its knife switch was opened to prevent inadvertent starting. The partial CSAS and CIS were anticipated. The jumper was reinstalled as earlier and the same partial actuation signal occurred. The 1A EDG did not start as was anticipated. Loose connections on the terminal board were believed to be the specific cause and troubleshooting continued. The 1A EDG was placed back in service.

On 2 March, 1990, I & C personnel checked the connections on TB519 and found terminal screw T10 loose. Terminal screws T8, T11, and T12 were judged as marginal. All were tightened. The 1A EDG was then taken out of service and the jumper reinstalled to verify the problem was corrected. The partial ESFAS actuation did not occur. The 1A EDG was returned to service and work on the NRC required ATWS modification was resumed.

CAUSE OF THE EVENT

The root cause of the event is equipment malfunction due to loose connections on TB519 in the SA ESFAS cabinet. The most likely cause for the loose screws is that they were not fully tightened during initial installation.

ANALYSIS OF THE EVENT

St. Lucie Unit 1 was in a refueling outage at the time of the event. 'B' train equipment was out of service as was the 1B EDG. Work was being performed in the SA ESFAS actuation cabinet to install the NRC required ATWS plant modification. A jumper was being installed to facilitate work on the modification and to preclude the possibility of an inadvertent actuation of the 'A' train ESFAS. However, a partial actuation of the 'A' ESFAS occurred while the jumper was being installed. As was discovered later during troubleshooting, several connections on the terminal board being jumpered were loose. When the jumper was physically attached, the force required to attach the clips was enough to break the connections that were loose on the terminal board and the circuit was interrupted. Loss of circuit continuity caused the partial ESFAS actuation to occur. When the jumper was removed, the external force was no longer applied to the connections and the circuit was again established. The CSAS and CIS could then be reset.



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TEXT (If more space is required, use additional NRC Form 366A's)(17)

The partial 'A' train ESFAS actuation was the correct system response. The portions of CIS and CSAS that did not actuate were unaffected because their circuits are either fed from other terminals in the actuation cabinet which remained undisturbed, or their breakers were racked out of service. The Containment Spray system is not required to be operable in Mode 6. Containment Integrity is not required in Mode 6 when refueling operations are not taking place. 'B' train equipment was out of service as was most 'A' train equipment that was not required to be operable. The 1A EDG started as it should and I-MV-18-1 closed as it should.

Thus, the health and safety of the public was not endangered at any time during this event.

CORRECTIVE ACTIONS

1. Work was immediately stopped on the ATWS plant modification to preclude additional inadvertent ESFAS actuations until the root cause could be determined.
2. I & C personnel performed troubleshooting for potential causes and implemented a plan for determining the cause while ensuring additional inadvertent actuations would not occur.
3. I & C personnel found terminal screws to be loose. These screws were tightened.
4. I & C personnel checked other screw connections in the ESFAS cabinets for tightness. A small percentage of others were found not fully tightened. The fact that the majority of the screws were tight supports the likelihood that some screws were not fully tightened during original installation, as compared to a more generic problem, such as vibration-induced looseness.

ADDITIONAL INFORMATION

Failed Component Identification:

There were no component failures associated with this event, other than the terminal screws found to be loose in the ESFAS actuation cabinet as previously discussed.

Previous Similar Events:

The following LERs describe similar inadvertent ESFAS actuations at St. Lucie:

- 335-86-001 335-85-011 335-84-008

