

CATEGORY 1

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 FACIL: 50-335 St. Lucie Plant, Unit 1, Florida Power & Light Co. 05000335
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 STALL, J.A. Florida Power & Light Co.
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 97-010-01: on 971027, inadvertant core alteration prohibited by TSs were noted due to stuck CEA. Caused by personnel error. CEA #24 was dislodged & transferred to spent pool for insp.W/980127 ltr.

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Florida Power & Light Company, 6351 S. Ocean Drive, Jensen Beach, FL 34957

January 27, 1998

L-98-013
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: 97-010-01
Date of Event: October 27, 1997
Inadvertant Core Alteration Prohibited by Technical Specifications
Due to Stuck Control Element Assembly (CEA)

The attached Licensee Event Report revision is being submitted pursuant to the requirements of 10 CFR 50.73 to provide the cause and corrective actions associated with the subject event.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

JAS/KWF

Attachment

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

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LICENSEE EVENT REPORT (LER)

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

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 INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20666-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20603.

FACILITY NAME (1)

ST LUCIE UNIT 1

DOCKET NUMBER (2)

05000335

PAGE (3)

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TITLE (4)

Inadvertant Core Alteration Prohibited by Technical Specifications Due to Stuck Control Element Assembly (CEA)

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
10	27	97	97	010	01	01	27	98	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
6	000	20.2201(b)	20.2203(a)(1)	20.2203(a)(2)(v)	X 50.73(a)(2)(i)
		20.2203(a)(2)(i)	20.2203(a)(2)(ii)	20.2203(a)(3)(i)	50.73(a)(2)(ii)
		20.2203(a)(2)(iii)	20.2203(a)(2)(iii)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)
		20.2203(a)(2)(iv)	20.2203(a)(4)	50.36(c)(1)	50.73(a)(2)(iv)
		20.2203(a)(2)(v)	50.36(c)(2)	50.73(a)(2)(v)	50.73(a)(2)(v)
		20.2203(a)(2)(vi)		50.73(a)(2)(vi)	50.73(a)(2)(vi)
					OTHER

Specify in Abstract below or in NRC Form 368A

LICENSEE CONTACT FOR THIS LER (12)

NAME

K. W. Frehafer, Licensing Engineer

TELEPHONE NUMBER (Include Area Code)

(561) 468-4284

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
A	AC	RCT	C490	N					

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 15 single-spaced typewritten lines) (16)

On October 27, 1997, St. Lucie Unit 1 was in Mode 6 with the reactor head removed in preparation for defueling. The containment equipment hatch and personnel access airlock were open, as allowed by Technical Specifications. Personnel commenced Upper Guide Structure (UGS) withdrawal from the reactor vessel in accordance with procedures. As the UGS cleared the alignment pins, a Control Element Assembly (CEA) was discovered attached to the UGS, which had been unexpectedly withdrawn from the core. This constituted a core alteration without the containment penetration status required by Technical Specifications. Containment integrity was set within 21 minutes of discovery of the stuck CEA. A safety evaluation was performed and a procedural revision made to continue the UGS move. Reactor cavity water level was raised to increase shielding. Anticipating elevated containment radiation levels, the Containment Isolation System (CIS) was manually actuated prior to continuing the lift. The UGS lift recommenced on October 28. A remote camera situated beneath the UGS monitored the progress, and the CEA remained attached throughout the transit. Once the transit to the refueling cavity was completed, the CEA was recovered from the UGS.

The cause of the event was personnel error during unlatching that resulted in CEA #24 remaining partially latched to its extension shaft. A high friction condition within the CEA #24 extension shaft was determined to be a contributing factor. Corrective actions included the development of procedural enhancements to preclude this condition, as well as replacement of the CEA #24 extension shaft.

This LER revision transmits the cause and corrective actions for this event.

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

DESCRIPTION OF THE EVENT

On October 27, 1997, St. Lucie Unit 1 was in Mode 6 with the reactor head [EIS:AB:RCT] removed in preparation for reactor defueling. The containment equipment hatch and personnel access airlock [EIS:NH] were open, as allowed by Technical Specifications. Control Element Assemblies (CEAs) [EIS:AA] had been unlatched by personnel in accordance with procedure OP1-0110022, "Coupling and Uncoupling of CEA Extension Shafts." At approximately 1510, the reactor cavity water level was raised to 55 feet 6 inches to maintain adequate shielding in preparation for lifting the Upper Guide Structure (UGS) [EIS:AC]. Normally during the lift, only the UGS lift rig is raised above the surface of the water.

At approximately 1658, contract personnel commenced UGS withdrawal from the reactor vessel in accordance with procedure 1-M-0015, "Reactor Vessel Maintenance - Sequence of Operations." During the evolution, a camera mounted at the reactor vessel flange level was used to verify lift alignment and clearance. At approximately 1744, as the UGS cleared the alignment pins, a CEA was discovered attached to the UGS, which had been unexpectedly withdrawn from the core. Operations ordered containment integrity to be set, and this was achieved by 1805.

The cause of the CEA remaining attached to the UGS could not immediately be determined. A safety evaluation was performed which concluded that there would be no adverse impact on plant safety or operation should the CEA fall onto the core while completing the UGS move. Procedure 1-M-0015, "Reactor Vessel Maintenance - Sequence of Operations," was revised to accommodate movement of the UGS with a CEA attached. Since the UGS and lift rig were to be lifted much higher than normal, reactor cavity water level was adjusted to 60 feet to increase shielding. This action was completed at approximately 2222 hours.

In anticipation of receiving high enough containment radiation levels to initiate a Containment Isolation Actuation Signal (CIAS), unnecessary personnel left containment and the Containment Isolation System (CIS) [EIS:JM] was manually actuated at approximately 0253 on October 28. This was a preplanned actuation performed in accordance with procedure OP1-1600023, "Refueling Sequencing Guidelines."

The UGS lift recommenced at approximately 0320 with only essential personnel in containment. A remote camera situated beneath the UGS monitored the progress, and the CEA remained firmly attached throughout the transit. At approximately 0324, CIAS channels indicated that containment radiation levels had reached the CIAS initiation threshold. Channel MD, with the most direct exposure to the UGS, registered an area radiation rate of approximately 7 REM per hour, while the other three channels indicated approximately 100 millirem per hour. CIS actuates automatically with two channels greater than or equal to 90 millirem per hour.

Once the transit to the refueling cavity was completed, attempts were made to free the CEA but were initially unsuccessful. Subsequently, the CEA was disengaged by operating personnel. The CEA was retrieved and moved to the spent fuel pool for storage. It was identified as CEA 24, a Type 1, full length CEA manufactured by Combustion Engineering.

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CAUSE OF THE EVENT

The cause of the event was failure of the CEA to detach from the UGS. CEA #24 was pulled from the core because it was partially latched to its extension shaft. The partial latching condition existed because of personnel error during unlatching. A key part of the investigation was review of underwater video recordings made by ABB of the unlatching process. The video shows that technicians struggled with this CEA more than others. Problems were experienced with engaging the Gripper Operating Tool. After engaging the Plunger Operating Tool, the CEA was lifted. The CEA extension shaft plunger operating pin was pulled to the 3 position within the seven slot and the CEA released (see Figure 1 for details of the CEA shaft, seven slot, and CEA extension shaft plunger operating pin positions). The CEA extension shaft plunger operating pin is then observed to move between the 2 and 3 position of the seven slot, during the period when the technicians would have been inserting the plunger into the gripper. After additional manipulation, the pin moved further downward, but remained between the 2 and 3 positions of the seven slot. The reweigh was completed without an apparent problem. The technicians struggled again in releasing the Gripper Operating tool. The video revealed that the final seven 7 slot CEA extension shaft plunger operating pin position was between 2 and 3, not the 1 position as required by procedure. With the CEA extension shaft plunger operating pin left between 2 and 3 positions, the gripper was not expanded by the plunger. When the extension shaft was set on the CEA in this condition, it became partially latched to the CEA hub, which allowed the CEA to be lifted with the UGS. This discrepancy was not detected or recorded by technicians performing the unlatching.

A contributing factor to this event was that the extension shaft 24 plunger had a high friction condition. Testing of extension shaft 24 by ABB and FPL personnel confirmed that the plunger would not fully expand the grippers without additional (light) force applied to the magnet housing.

ANALYSIS OF THE EVENT

This event is reportable under 10 CFR 50.73 (a)(2)(i)(B) as "Any operation or condition prohibited by the plant's Technical Specifications." The Technical Specification violated is Unit 1 Technical Specification 3.9.4:

"The containment penetrations shall be in the following status:

- a. The equipment door closed and held in place by a minimum of four bolts,
- b. A minimum of one door in each airlock is closed, and
- c. Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be... (several configurations given).

APPLICABILITY: During CORE ALTERATIONS or movement of irradiated fuel within the containment."

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ANALYSIS OF EVENT (cont'd)

The Technical Specifications define "core alteration" as "movement or manipulation of any fuel, sources, reactivity control components, or other components affecting reactivity within the reactor vessel with the vessel head removed and fuel in the vessel." Normally, lifting a UGS is not a core alteration, since the UGS does not contain fuel, sources, or components that control or affect reactivity. However, since a reactivity control component (a CEA) was moved with the UGS in this event, a core alteration was performed. Moreover, the core alteration was performed without the containment penetration status required by the Technical Specification. Penetrations were placed in the required state within approximately 20 minutes of discovery of the stuck CEA.

The CIS actuation was not reportable under 10 CFR 50.72, since the actuation was part of a preplanned sequence addressed by procedure. The CIS is designed to mitigate the consequences of accidents which release large amounts of energy within the containment structure. There was no such accident in this case, and the CIS actuation was intentional rather than the result of accident conditions.

Withdrawal of the stuck CEA from the reactor core did not place the plant in an unanalyzed condition, nor did it place the plant in a condition outside its design basis. Plant procedures address the case of a single CEA not inserted in the core, and substantial shutdown margin was maintained during the course of this event.

LER 97-001-00 for St. Lucie Unit 2 documented an event with radiological conditions similar to this event. In the Unit 2 event, an expected CIS actuation occurred as the UGS was withdrawn from the reactor. The elevated radiation levels were caused by irradiated incore instrumentation segments [EIS:IG] which had broken during removal of incores. The Unit 2 event, however, was unlike this event in that there was no core alteration.

CORRECTIVE ACTIONS

1. CEA # 24 was dislodged and transferred to the spent fuel pool for inspection.
2. The CEA #24 extension shaft involved with this event was removed and examined. The high friction condition found was determined to be a contributing factor to this event. The CEA#24 extension shaft was replaced during reactor assembly.
3. CEA #24 was inspected in the spent fuel pool. No anomalies were noted. CEA condition was ruled out as a factor in this event.



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CORRECTIVE ACTIONS (cont'd)

4. Procedure 1-0110022, "Coupling and Uncoupling of CEA Extension Shafts" (Procedure rewritten in its entirety as 1-NOP-67.01) was enhanced to include the following additional barriers to prevent further latching or unlatching errors:
 - Included requirement in "Initial Conditions" to use underwater video equipment with audio input to monitor extension shaft coupling/uncoupling activities. This equipment will be used to verify proper pin position and to record any difficulties experienced during coupling/uncoupling.
 - Provided note warning that improper 7 slot pin position can result in inadvertent recoupling.
 - The procedure now requires weight verification for all CEAs as a group after all latching/unlatching rather than as each CEA is latched/unlatched. This will eliminate the possibility of human error in uncoupling the Plunger Operating Tool during weight verification.
5. This event will be evaluated for applicability to Unit 2.

ADDITIONAL INFORMATION

Failed Components Identified

None

Previous Similar Events.

LER 50-335/97-010-00, "Inadvertant Core Alteration Prohibited by Technical Specifications Due to Stuck Control Element Assembly (CEA)."

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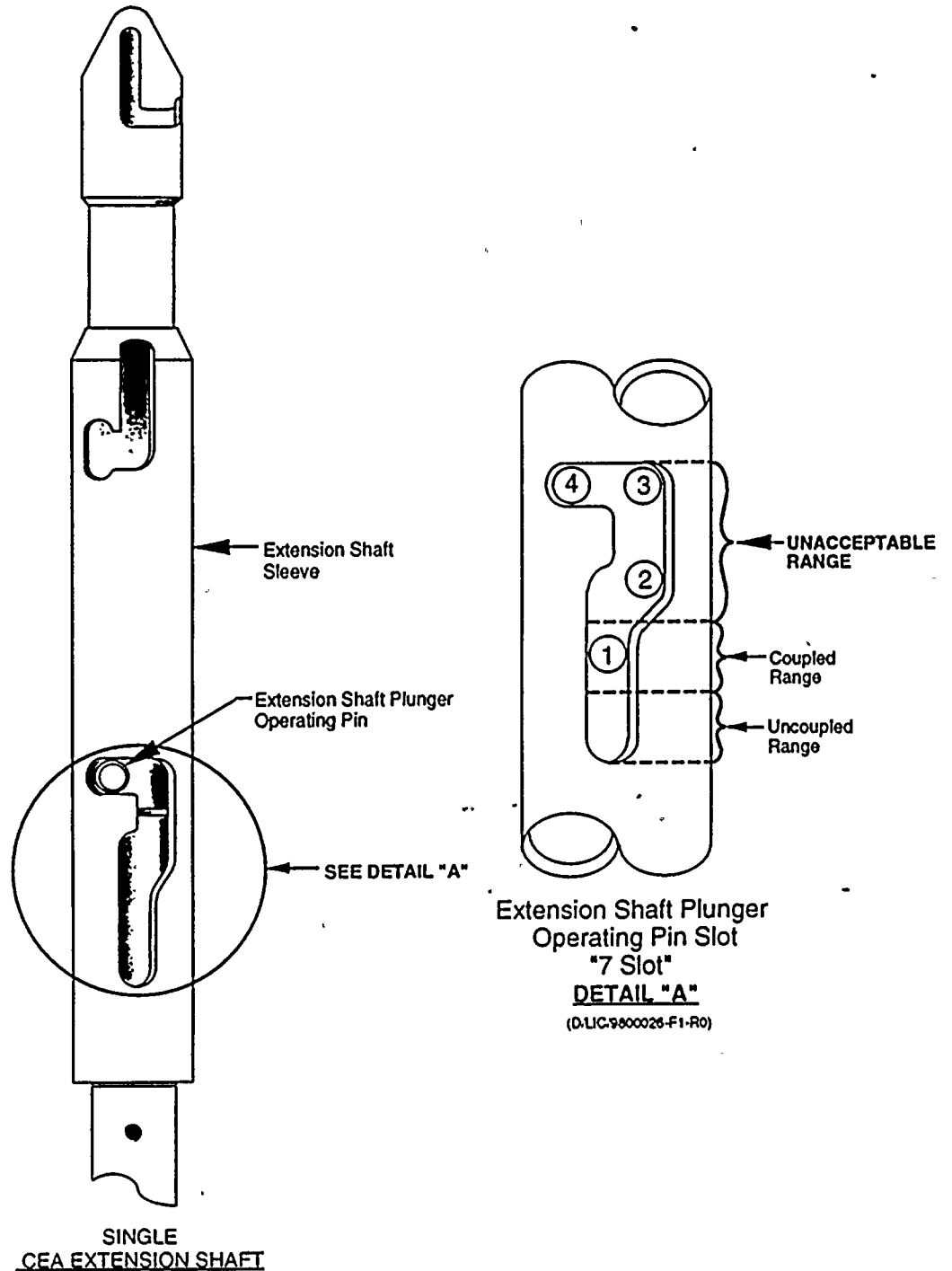


Figure 1