



November 27, 1996
LIC-96-0175

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

References: 1. Docket No. 50-285
2. Letter from OPPD (T. L. Patterson) to NRC (Document Control Desk) dated November 18, 1996 (LIC-96-0162)

Subject: Licensee Event Report 96-011 Revision 0 for the Fort Calhoun Station

Please find attached Licensee Event Report 96-011 Revision 0 dated November 27, 1996. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(i) and 50.73(a)(2)(v). If you should have any questions, please contact me.

Sincerely,

T. L. Patterson
Division Manager
Nuclear Operations

TLP/epm

Attachment

c: Winston and Strawn
L. J. Callan, NRC Regional Administrator, Region IV
L. R. Wharton, NRC Project Manager
W. C. Walker, NRC Senior Resident Inspector
INPO Records Center

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NRC FORM 366 (4-95)		U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 4/30/98						
LICENSEE EVENT REPORT (LER)								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 THE INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-4 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.			
(See reverse for required number of digits/characters for each block)											
FACILITY NAME (1) <div style="text-align: center;">Fort Calhoun Station Unit No. 1</div>					DOCKET NUMBER (2) <div style="text-align: center;">05000285</div>			PAGE (3) <div style="text-align: center;">1 OF 6</div>			
TITLE (4) <div style="text-align: center;">Loss of Containment Closure Due to a Maintenance Activity During Refueling</div>											
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	30	96	96	-- 011	-- 00	11	27	96	FACILITY NAME	DOCKET NUMBER	
										05000	
										05000	
OPERATING MODE (9)		5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more) (11)								
POWER LEVEL (10)		0	20.2201(b)		20.2203(a)(2)(v)		<input checked="" type="checkbox"/>		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)				50.73(a)(2)(iv)	OTHER	
			20.2203(a)(2)(iii)		50.36(c)(1)		<input checked="" type="checkbox"/>		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 <div style="text-align: center;">William J. Blessie, Shift Technical Advisor</div>						TELEPHONE NUMBER (Include Area Code) <div style="text-align: center;">(402) 533-6896</div>					
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)											
YES (If yes, complete EXPECTED SUBMISSION DATE)					<input checked="" type="checkbox"/> NO		EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)											
<p>On October 30, 1996, containment closure was breached while fuel was being moved. Maintenance activities were being conducted on YCV-1045 "Auxiliary Feedwater Pump FW-10 Inlet" de-energizing the valve and unexpectedly causing YCV-1045A "Main Steam Line 'A' to Auxiliary Feedwater Pump FW-10 Supply Valve" to open. This resulted in a flow path for containment atmosphere via a removed secondary side manway on Steam Generator RC-2A into the Auxiliary Building. When the condition was discovered, YCV-1045A was reclosed. As a result, containment closure was lost for approximately 30 minutes, from the time YCV-1045A was opened until it was shut. Two fuel bundles were moved during that time.</p> <p>One cause of this event was the failure to maintain valves for containment closure in the desired position per OI-CO-4 "Containment Closure." Valves that fail open were relied upon to maintain a containment boundary. The second cause was failing to follow and enforce the requirements of SO-G-20A "Equipment Tagging Procedure" to supply a listing of affected equipment when pulling fuses.</p> <p>Station policies and procedures governing the control and maintenance of containment closure will be reviewed and revised as necessary to provide appropriate direction to prevent recurrence of this event.</p>											

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

BACKGROUND

The Technical Specification (TS) for "Refueling Operations" 2.8(1) states that, "The equipment hatch and one door in the air lock shall be properly closed. In addition, all automatic containment isolation valves shall be operable or at least one valve in each line shall be closed." The bases of TS 2.8 state, in part, that, TS 2.8 "provide(s) assurance that no incident could occur during the refueling operations that would result in a hazard to public health and safety." TS 2.8 applies during shuffling, removal or replacement of nuclear fuel, Control Element Assemblies (CEAs) or startup sources. Operating Instruction OI-CO-4 "Containment Closure" is used to implement this TS.

During refueling outages, an Outage Control Center (OCC) is established and is used to direct and coordinate shift outage activities. The OCC organization includes a Shift Outage Manager, a Shutdown Safety Advisor, an OCC Shift Supervisor and other licensed and non-licensed personnel.

Steam is supplied to the steam driven Auxiliary Feedwater (AFW) pump (FW-10) from the Main Steam (MS) lines through two supply line valves YCV-1045A "Main Steam Line 'A' to Auxiliary Feedwater Pump FW-10 Supply Valve" and YCV-1045B "Main Steam Line 'B' to Auxiliary Feedwater Pump FW-10 Supply Valve." The supply lines join to feed FW-10 through a common isolation valve YCV-1045 "Auxiliary Feedwater Pump FW-10 Inlet."

YCV-1045A and B are slaved to YCV-1045 so that when YCV-1045 opens so do YCV-1045A and B. When the relay for YCV-1045 is energized YCV-1045 is closed, and maintains the solenoids for YCV-1045A/B energized (closed) through contacts in their respective control circuits. If the fuses for YCV-1045 were pulled its relay would de-energize and open contacts in the YCV-1045A/B control circuits. This in turn would de-energize the solenoid valves maintaining YCV-1045A/B closed, and the valves would open. This control feature can be overridden using the override switches for YCV-1045A and B which, when taken to OVERRIDE, bypass the input from YCV-1045 and close the valves.

EVENT DESCRIPTION

On October 30, 1996, Fort Calhoun Nuclear Station (FCS) was in Mode 5, Refueling Shutdown, with refueling operations in progress. When refueling operations are in progress, containment closure is required to be established and maintained. Operations established containment closure per OI-CO-4, "Containment Closure," Attachment 1, "Refueling Operations/Core Alterations" prior to starting refueling operations. Operations was performing shiftly verifications of Steam Generator (SG) related penetrations to ensure closure was maintained. This additional precaution had been implemented because of an earlier event where containment closure had been lost while

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moving fuel (LER 96-010).

The secondary manways on SG RC-2A were removed to support SG maintenance activities. Containment closure was established by closing isolation valves outside containment on the MS line, Main Feedwater line and Auxiliary Feedwater line. MS line isolation for RC-2A was established with MS safety valves either installed or blank flanged and the following valves closed: MS-102, "RM-064 Isolation" (Radiation Monitor (RM)), HCV-1041A, "Main Steam Line "A" Isolation," HCV-1041C, "Main Steam Bypass for HCV-1041A," and YCV-1045A.

An electrician requested clearance from the OCC to replace the solenoid valve for YCV-1045. The OCC Tagging Coordinator created a tag out intended to place YCV-1045 in the CLOSED position with the fuses pulled. When the electrician requested that the Control Room release the equipment, a Licensed Operator (LO) in the Control Room identified that YCV-1045 was to be tagged in the closed position and recognized that the valve would fail open on loss of power. The LO sent the electrician back to the OCC with instructions to add a tag to handjack YCV-1045 closed prior to pulling any fuses.

Tags to handjack YCV-1045 closed and pull its fuses were added to the existing tag out. YCV-1045 was then handjacked closed. The electrician was then allowed to pull the fuses for YCV-1045. When the fuses were pulled, although YCV-1045 stayed closed, valves YCV-1045A and B opened. The plant computer provided an audible alarm and print out indicating that YCV-1045A and B opened at 01:13 CST on October 30, 1996.

The plant computer audible alarm was immediately acknowledged, but, recognition that this indicated a potential breaching of containment closure was not immediately recognized due to a high level of activity in the Control Room. When the operators recognized the condition as a potential containment closure problem, the override switches for YCV-1045A and B were taken to OVERRIDE and the valves were closed at 01:44 CST. Initially the Operators assumed that containment closure had been maintained, since YCV-1045 had remained closed. However, it was later determined that the 1/2 inch diameter warm-up lines for FW-10 were still open.

Each of the two steam supply lines for FW-10 is connected to the MS bypass lines through two 1/2 inch valves, one (MS-365 for the 'A' steam line) is an isolation valve and the other (MS-366 for the 'A' steam line) is a throttle valve. A check of the valves in this warm up line showed MS-365 open and MS-366 one-sixteenth (1/16) of a turn open. This provided a path from containment, through RC-2A, down the MS line, through YCV-1045A, back through MS-366 and MS-365 to the MS line downstream of MS-1041A to atmosphere through other openings in the MS header. (See Figure 1.) During the time that this condition existed, two fuel assemblies were loaded into the core.

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At 1205 CST on October 30, 1996, the Shift Supervisor with the Acting Operations Manager's concurrence determined that this situation constituted a reportable condition pursuant to 10 CFR 50.72. At 1608 Eastern Standard Time (EST), October 30, 1996, the NRC Operations Center was notified of this event in accordance with 10 CFR 50.72(b)(2)(iii)(C) in that the loss of containment closure could have prevented the systems needed to prevent the release of radioactivity to the environment from fulfilling their intended function. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(B) and 50.73(a)(2)(v)(C).

SAFETY SIGNIFICANCE

A radiological analysis performed to determine the consequences of this event verified that a release through MS-366 (1/16 turn open) under accident conditions would be within the criteria found in both 10 CFR and TS 5.16. Based upon the results of this analysis, the release path did not pose a nuclear safety significant condition.

CONCLUSION

A root cause analysis was performed and determined that there were two causes of this event. One cause of this event was the failure to maintain valves for containment closure in the desired position per OI-CO-4. Valves that fail open were relied upon to maintain a containment boundary. A power failure or loss of air could cause the valves relied upon for containment closure to change position and go un-noticed by the Control Room depending upon the indication. Handjacking shut the fail open valves would ensure valves remained in the required position. This deficiency was recognized at the time of the event when YCV-1045A/B, HCV-1107A/B and HCV-1108A/B were then handjacked closed. HCV-1107A/B and HCV-1108A/B are the Auxiliary Feedwater Supply to the Steam Generators.

The second cause was failing to follow and enforce the requirements of SO-G-20A "Equipment Tagging Procedure" to supply a listing of affected equipment when pulling fuses. If this expectation had been enforced, the consequences could have been recognized and appropriate compensatory actions taken.

This is the second reportable occurrence of this kind (See LER 96-010) within the last 30 days. An evaluation of the generic implications of these two events was performed. In the first event (documented in LER 96-010), a penetration valve inside containment was disassembled for maintenance. The root cause analysis conducted for that event (LER 96-010) listed the inability of OI-CO-4 to maintain containment closure as a contributing cause. In this event, the inability of OI-CO-4 to maintain containment closure has been identified as the root cause.

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Another problem common to both incidents, was the release of a work package by the OCC which impacted a boundary required to maintain containment closure. The generic implication is that maintenance work documents are being released with no tie to containment closure requirements. This conclusion was contained in the root cause analysis for LER 96-010.

CORRECTIVE ACTIONS

- 1) Procedure OI-CO-4 will be revised to require that valves that fail open and are used to maintain containment closure will be manually overridden (e.g., handjacked) into the closed position. This procedure change will be completed by March 31, 1997.
- 2) Operations Management is providing additional supervisory oversight to ensure that the operations staff is fully complying with SO-G-20A. The heightened level of supervisory oversight will continue until the Operations Manager is satisfied with Operations compliance.
- 3) Licensed Operators will be retrained on the requirements of SO-G-20A. Fuse control requirements when tagging will be emphasized during this training. In addition the training will include a discussion of the events in LER 96-010 as well as this LER. This training will be completed by March 31, 1997.
- 4) Station procedures, including outage related administrative procedures, will be reviewed and revised as necessary to ensure adequate controls exist to allow containment closure to be established and maintained during fuel movement in containment and other activities requiring containment closure. The review and any revisions will be completed no later than July 1, 1997. The training of Operations Personnel, OCC Shift Supervisors and OCC Tagging Coordinators on these changes will be completed no later than the start of the next refueling outage (Spring 1998).

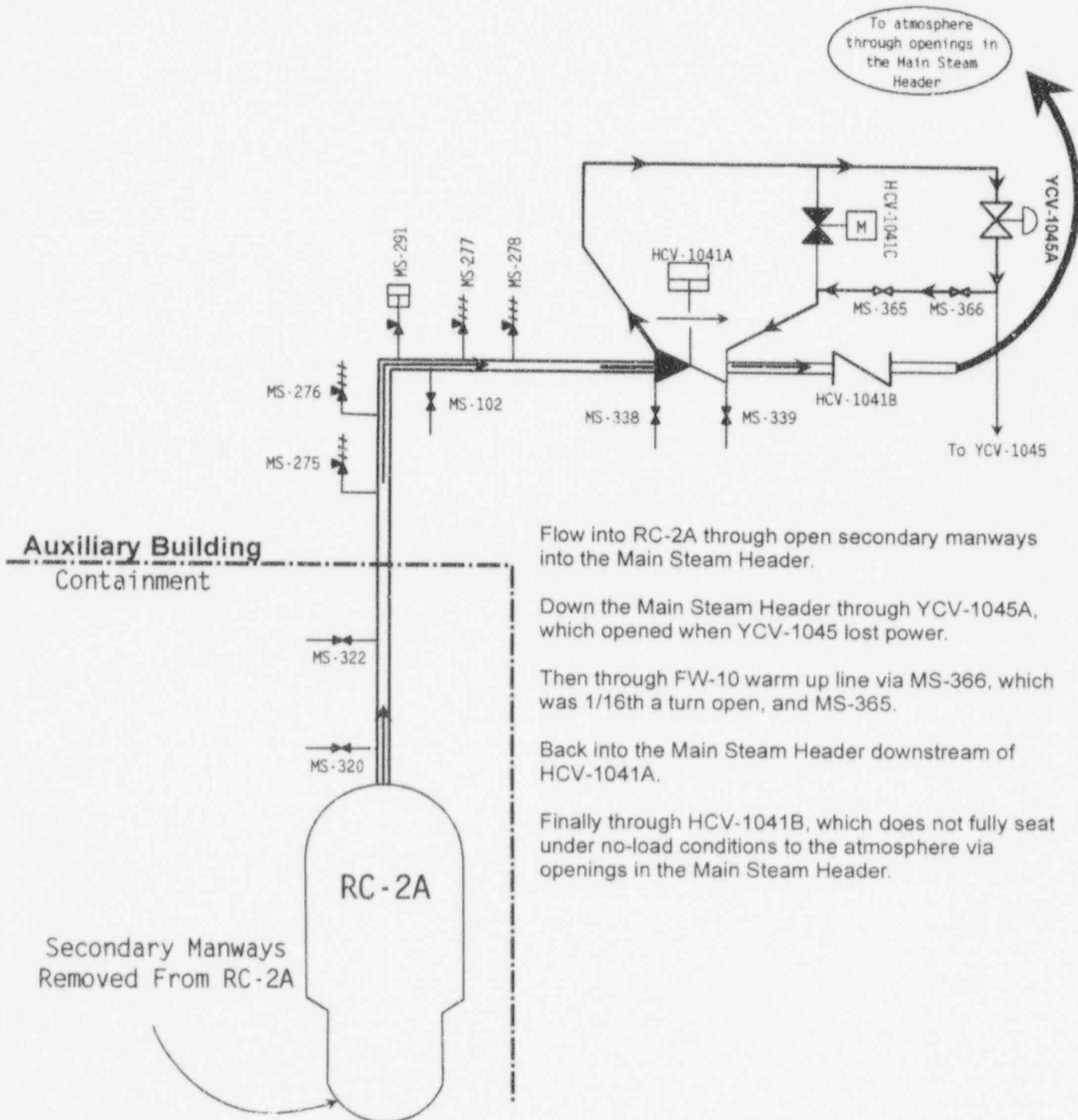
PREVIOUS SIMILAR EVENTS

LERs 88-011 and 91-027 document events where containment closure was not strictly maintained during power operation. LER 96-010 reported a similar event while the plant was shutdown.

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Flow into RC-2A through open secondary manways into the Main Steam Header.

Down the Main Steam Header through YCV-1045A, which opened when YCV-1045 lost power.

Then through FW-10 warm up line via MS-366, which was 1/16th a turn open, and MS-365.

Back into the Main Steam Header downstream of HCV-1041A.

Finally through HCV-1041B, which does not fully seat under no-load conditions to the atmosphere via openings in the Main Steam Header.

Figure 1