

Omaha Public Power District

P.O. Box 399 Hwy. 75 - North of Ft. Calhoun Fort Calhoun, NE 68023-0399
402/636-2000

June 30, 1992
LIC-92-140L

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

Reference: Docket No. 50-285

Gentlemen:

Subject: Licensee Event Report 92-019 for the Fort Calhoun Station

Please find attached Licensee Event Report 92-019 dated June 30, 1992. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(A). If you should have any questions, please contact me.

Sincerely,

W. G. Gates

W. G. Gates
Division Manager
Nuclear Operations

WGG/lah

Attachment

c: R. D. Martin, NRC Regional Administrator, Region IV
S. D. Bloom, NRC Acting Project Manager
R. P. Mullikin, NRC Senior Resident Inspector
INPO Records Center

000100

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Fort Calhoun Station Unit No. 1

DOCKET NUMBER (8)

0 5 0 0 0 2 8 5 1 OF 0 4

PAGE (8)

TITLE (4)

Control Element Assembly Drop and Subsequent Plant Shutdown Due to Clutch Coil Failure

EVENT DATE (6)			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	5	3	1	9	2	9	2	0	1	9	0	5	0	0	0			
										N		0	5	0	0	0		
												0	5	0	0	0		
OPERATING MODE (8)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 50. (Check one or more of the following): (11)																
1																		
POWER LEVEL (10)		20.405(a) 20.405(b) 50.73(a)(2)(v) 73.71(b)																
1		20.405(a)(1)(i) 50.73(a)(2)(vi) 73.71(c)																
0		20.405(a)(1)(ii) 50.73(a)(2)(vi) 73.71(c)																
		20.405(a)(1)(iii) 50.73(a)(2)(vi) 73.71(c)																
		20.405(a)(1)(iv) 50.73(a)(2)(vi) 73.71(c)																
		20.405(a)(1)(v) 50.73(a)(2)(vi) 73.71(c)																
		20.405(a)(1)(vi) 50.73(a)(2)(vi) 73.71(c)																

LICENSEE CONTACT FOR THIS LER (12)

NAME

William J. Blessie, Shift Technical Advisor

TELEPHONE NUMBER

AREA CODE

4 0 2 5 3 3 1 - 6 8 9 6

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC										
B	A	A	D	R	I	V	C	4	9	0	Y								

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)		NO		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
		X					

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

On May 31, 1992, Fort Calhoun Station was in Mode 1 (Power Operation) operating at 100% power with all Control Element Assemblies (CEA's) withdrawn. At 2255, indication was received that CEA 35 had dropped into the reactor core. Control Room Operators verified that the CEA had actually dropped into the core and took action to minimize the mismatch between primary and secondary systems power by reducing turbine loading. Power was then reduced below 70%, and following an unsuccessful attempt to recover the CEA, a Notification of Unusual Event (NOUE) was declared and the plant was shutdown in accordance with Technical Specifications.

The safety significance of this event is minimal since this is an Anticipated Operational Occurrence and because of prompt action taken by the operators to minimize power peaking.

The root cause of this event was the material failure of the clutch coil in Control Element Drive Mechanism (CEDM) 35.

The failed clutch assembly was replaced. Additional corrective actions will include evaluating potential means of gathering data to trend clutch coil condition, taking resistance readings on each CEDM clutch coil, and evaluating the results of an independent testing laboratory examination of the failed clutch coil assembly.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 300 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-580), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20549, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (3)			PAGE (4)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Fort Calhoun Station Unit No. 1	0 5 0 0 0 2 8 5 9 2 — 0 1 9 — 0 0 0 2 OF 0 4						

TEXT (If more space is required, use additional NRC Form 360A's)(17)

The Control Element Drive System at Fort Calhoun Station (FCS) provides a means to position the control elements for reactivity control during reactor startup, power operation and reactor shutdown. The control elements act in conjunction with the Reactor Protection System to provide a means for rapid reactor shutdown when limiting conditions are reached.

The Control Element Drive Mechanisms (CEDM's) provide controlled linear motion and prevent bounce-back of the Control Element Assemblies (CEA's). The CEDM's utilize a rack and pinion mechanism to vertically position the CEA's. A drive shaft running parallel to the rack drives the pinion gear through a set of bevel gears. The shaft is driven by an electric motor operating through a reducing gear box and an electromagnetic, anti-reversing clutch. The drive train is equipped with an electromechanical brake to maintain the CEA position. Upon releasing (tripping) the magnetic clutch, the rack with the attached CEA drops into the core due to gravity. The anti-reversing clutch stops any CEA bounce-back.

A CEA drop incident is defined in the FCS Updated Safety Analysis Report (USAR) as the inadvertent release of a CEA causing it to drop into the reactor core. A CEA drop may occur due to an electrical or mechanical failure of the mechanical brake, or interruption of power to or failure of the CEA holding coil (magnetic clutch). The CEA drop event is classified as an Anticipated Operational Occurrence which does not require a Reactor Protection System trip to maintain the Departure from Nucleate Boiling Ratio (DNBR) greater than or equal to 1.18 and peak linear heat rate less than the limiting condition for operation and limiting safety system setting.

On May 31, 1992, FCS was in Mode 1 (Power Operation) operating at 100% power with all CEA's withdrawn. At 2255, indication was received that CEA 35 had dropped into the reactor core. CEA 35 is a dual CEA in Shutdown Group "A". Control Room Operators verified that the CEA had actually dropped into the core, took action to minimize the mismatch between primary and secondary systems power by reducing turbine loading, and entered Abnormal Operating Procedure AOP-02, "CEA and Control System Malfunctions." Technical Specification 2.10.2(4)e was entered which requires power to be reduced to less than or equal to 70% within one hour with a full length CEA misaligned from any other CEA's in its group by 18" or more. A power level of 69.7% was attained at 2354.

Once power was reduced below 70%, an attempt was made to recover CEA 35 and realign it with the rest of the group, however, the CEA would not move. At 2357, the CEA was declared inoperable and a plant shutdown was commenced in accordance with Technical Specification 2.10.2(4)e(iii) which specifies that the plant be in Hot Shutdown within an additional five hours. A Notification of Unusual Event (NOUE) was declared as a result of initiation of a Technical Specification required shutdown, and a calculation was performed to verify that adequate shutdown margin could be achieved. The states of Nebraska and Iowa were made aware of the NOUE at 0002 on June 1, 1992, and the Senior Resident Inspector was informed at 0007. The NRC was notified at 0019 pursuant to 10 CFR 50.72(a)(1)(i) and 10 CFR 50.72(b)(1)(i)(A).

Hot Shutdown was entered at 0410 and the NOUE was terminated. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(A).

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-535), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (3)			PAGE (4)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Fort Calhoun Station Unit No. 1	0 5 0 0 0 2 8 5 9 2 —	0 1 9	—	0 0	0 3	OF 0 4

TEXT (If more space is required, use additional NRC Form 588A (8-88))

An electrician called to the site to aid in troubleshooting the clutch coil circuitry measured the resistance of the circuit at two ohms. The expected resistance of this circuit is approximately 18 ohms. Additionally, the voltmeter of the power supply which feeds CEA 35 was reading 10 volts low. Maintenance Work Order 922494 was generated to further troubleshoot and repair the circuitry.

Investigation into the incident revealed that the clutch coil for CEA 35 had failed, allowing the CEA to drop into the core. The failed clutch assembly was removed and replaced. CEA 35 was then tested and found to be operable. The clutch power supply voltage and current readings also returned to normal.

The reactor was returned to criticality at 0211 on June 2, 1992. Power was subsequently increased, and Fort Calhoun returned to 100% power operation on June 4, 1992.

The failed clutch assembly was taken out of Containment, decontaminated and disassembled. A resistance reading of the clutch coil was taken and indicated an open circuit existed. The coil outer casing was discolored and appeared to have experienced significant overheating. A noticeable amount of the coil potting material had left the coil casing. Some of the potting material had spread across the clutch faces, and the electricians who replaced the clutch assembly noted this same material splattered onto the inside of the CEDM.

An examination of the mechanical components of the clutch assembly revealed that the ball bearing directly above the coil turned roughly and should be replaced. The plastic seal face was distorted by heat on the coil side of the bearing. No significant wear or other damage was noted. The failed clutch coil from CEA 35 was shipped to an independent testing laboratory for failure analysis.

The safety significance of this event is minimal since this is an Anticipated Operational Occurrence and analyzed in the USAR. Additionally, the prompt action taken by the operators to rectify the power mismatch between the primary and secondary systems and the reduction in power to below 70%, minimized power peaking and peak linear heat rate.

The root cause of this event was the material failure of the clutch coil in CEDM 35. Pending detailed analysis of the clutch coil, the most likely cause of the failure was determined to be an internal short-circuit due to insulation breakdown because of age.

The following corrective actions have been completed:

1. The failed clutch assembly was replaced and the replacement assembly tested and found to be operable.
2. A preliminary examination of the failed clutch assembly was performed as described above.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATE BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Fort Calhoun Station Unit No. 1	DOCKET NUMBER (2) 0500028592	LER NUMBER (3)			PAGE (3)	
		YEAR 92	SEQUENTIAL 019	REVISION 00	04 OF 04	

TEXT (If more space is required, use additional NRC Form 308A's)(17)

The following corrective actions will be completed:

1. OPPD will evaluate potential means of gathering data to trend clutch coil condition for predictive maintenance. This evaluation will be completed within three months following the 1993 Refueling Outage.
2. Resistance readings will be taken on each CEDM clutch coil during the next shutdown of sufficient duration.
3. Data from monitoring activities will be reviewed, and if necessary, selected CEDM coils replaced prior to the end of the next refueling outage.
4. The failed clutch coil assembly has been shipped to an independent testing laboratory for detailed examination. OPPD will evaluate the results of this analysis by August 1, 1992. If significant additional corrective actions are found to be required, a supplement to this LER will be submitted.

It has been approximately 17 years since the last occurrence of a CEA dropping due to a failure of a CEDM clutch coil.