Union Electric
Callaway Plant

PO Box 620
Fulton, MO 65251

March 13, 2000

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

ULNRC-4200

Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 2000-002-00
Automatic Reactor Trip Initiated by Reactor Coolant Pump Trip Caused by Motor Current Imbalance Due to Transmission System Disturbance

The enclosed licensee event report is submitted in accordance with 10CFR50.73(a)(2)(iv) to report an event that resulted in an automatic actuation of an Engineered Safety Feature and automatic actuation of the reactor protection system.

Warren A. Witt for
R. D. Affolter
Manager, Callaway Plant

RDA/ddm

Enclosure

IE22

cc: Mr. Ellis W. Merschoff
Regional Administrator
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

Senior Resident Inspector
Callaway Resident Office
U.S. Nuclear Regulatory Commission
8201 NRC Road
Steedman, MO 65077

Mr. Jack N. Donohew (2 copies)
Licensing Project Manager, Callaway Plant
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop OWFN-4D3
Washington, DC 20555-2738

Manager, Electric Department
Missouri Public Service Commission
PO Box 360
Jefferson City, MO 65102

Records Center
Institute of Nuclear Power Operations
700 Galleria Parkway
Atlanta, GA 30339

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
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TITLE (4) **Automatic Reactor Trip Initiated by Reactor Coolant Pump Trip Caused By Motor Current Imbalance Due to External Transmission System Disturbance**

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	Rev No.	MONTH	DAY	YEAR
0 2	1 3	2 0 0 0	2 0 0 0	- 0 0 2	- 0 0	0 2	1 3	2 0 0 0

OTHER FACILITIES INVOLVED (8)

FACILITY NAMES	DOCKET NUMBER(S)
	0 5 0 0 0
	0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR : *(Check one or more of the following)* (11)			
1		20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER LEVEL (10)	1 0 0	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 *(Specify in Abstract below or in Text, NRC Form 366A)*
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	
		20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
J. D. Schnack, Supervising Engineer, QA Corrective Action	AREA CODE 5 7 3 6 7 6 - 4 3 1 9

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

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO EPIX

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 fifteen single-space typewritten lines) (16)

At 07:34 on February 13, 2000, automatic actuation of the reactor protection system (RPS) was initiated due to a low reactor coolant flow condition. This condition resulted when a reactor coolant pump (RCP) motor's protective relay sensed an electrical disturbance occurring on the transmission system, subsequently tripping the pump. The cause of the disturbance was attributed to a transmission line breaker failing to operate due to a defective electrical connection within the neighboring electric cooperative's protective relaying scheme. This resulted in an eight-minute system disturbance. At the time of the event, the plant was operating in Mode 1 at 100 percent power. Upon receiving the RPS actuation, all safety-related and nonsafety-related systems functioned per design.

Ameren took corrective action to review the adequacy of their transmission system and RCP protective relaying setpoints. Completion of this review determined that Ameren's transmission system and RCP relay setpoints were adequate in the level of protection they provided and that the relays functioned per designed during the event. Ameren is also monitoring corrective actions of the electric cooperative, which has committed to installing backup relaying at the affected substation.

DESCRIPTION OF EVENT:

At 07:34:18 on February 13, 2000, an automatic reactor trip was initiated due to a low reactor coolant flow condition following a trip of the 'B' Reactor Coolant Pump (RCP) motor. The RCP trip was initiated by a current imbalance sensed by the motor's protective relay. The current imbalance was a result of a transmission system disturbance. At the time of the event, the plant was operating in Mode 1 at 100 percent power.

The system disturbance was initiated by a transmission line fault within a neighboring electric cooperative's transmission system. Due to a defective electrical connection within the electric cooperative's protective relaying scheme, the transmission line breakers protecting the affected line did not receive a trip signal to clear the fault. Since the breaker failure relaying scheme utilized the same circuitry containing the defective electrical connection, breaker failure logic was not initiated to trip the next breakers upstream of the transmission line fault. In addition, there was no redundant line relaying or local backup relaying on the substation transformer. As a result, the fault was not properly cleared from the electric cooperative's transmission system. For approximately the next eight minutes, multiple subsequent faults were introduced onto the system as the transmission line incurred damage and fell to the ground over an approximate distance of six miles. Ultimately, the fault condition was cleared following the failure of the distribution system transformer supplying the faulted transmission line.

Approximately one minute into the event, the "B" RCP tripped due to a motor current imbalance, which resulted from the transmission system disturbance. The automatic reactor trip was initiated for a low reactor coolant flow condition due to the RCP trip. Shortly after the reactor trip, the three remaining RCPs and all main condenser circulating water pumps also tripped because of motor current imbalance.

Due to the tripping of all RCPs, the pressurizer spray system was unavailable. Additionally, all main condenser circulating water pumps tripping affected the ability to use the main condenser as a heat sink. This resulted in reliance on the atmospheric steam dumps causing reactor coolant system average temperature (RCS Tavg) to increase from 557 to 562 degrees F. The combination of establishing natural circulation due to the loss of all RCPs and increasing RCS Tavg, caused a pressurizer in-surge raising RCS pressure to the pressurizer power-operated relief valve (PORV) setpoint. Prior to re-establishing the pressurizer spray system, both PORVs momentarily lifted once, relieving RCS pressure to the pressurizer relief tank. RCPs were restored approximately 32 minutes after initiation of the event.

During this entire event, all safety-related and nonsafety-related systems and components functioned per design.

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		YEAR	SEQUENTIAL NUMBER	REV NO.	
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TEXT (If more space is required, use additional NRC Form 366A's)(17)

BASIS FOR REPORTABILITY:

The event is reportable per 10CFR50.72(b)(2)(ii) as an event resulting in automatic actuation of an Engineered Safety Feature (ESF), including the Reactor Protection System (RPS).

CONDITION AT TIME OF EVENT:

Mode 1: Power operations at 100% power.

ROOT CAUSE:

The cause of the transmission system disturbance, which created the RCP motor current imbalance, was attributed to a defective electrical connection within the neighboring electric cooperative's protective relaying scheme. This prevented proper breaker operation to clear their transmission system fault.

CORRECTIVE ACTIONS:

1) Ameren is monitoring actions that are under way by the electric cooperative for implementing improvements to the protective relaying scheme at the affected substation. The electric cooperative has committed to installing backup relaying on the substation transformer before it is re-energized.

2) Since breakers within the Ameren transmission system did not operate to clear the system disturbance prior to the RCPs tripping on motor current imbalance, the Ameren transmission system protective relaying setpoints were reviewed for adequacy. This review determined that the relaying functioned as designed during this event and that the relay setpoints were appropriate for providing the proper level of overlap in fault protection between the two company's protective relaying schemes. It was determined that the protective relay settings provided the optimal level of system protection and that they were consistent with North American Electric Reliability Council (NERC) and Mid-America Interconnected Network (MAIN) regional reliability council standards.

3) RCP motor current imbalance relaying setpoints were also reviewed for adequacy as a result of this event. This review determined that the relay setpoints were appropriate for providing the proper level of motor protection and that the relay functioned as designed during the event.

SAFETY SIGNIFICANCE:

A probabilistic risk assessment (PRA) was conducted to evaluate the reactor trip and resulting plant response to the voltage transient. The PRA took into account the plant conditions immediately following the event and was considered to be a conservative estimate of the conditional probability of core damage. The PRA determined that the event was not significant with respect to the health and safety of the public. In response to the automatic reactor trip, the plant's engineered safety

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

features functioned per their design. There was no release of radioactive material to the environment resulting from the event.

PREVIOUS OCCURRENCES:

There have been no previous reactor trips due to a system disturbance that was caused by malfunctioning equipment of a neighboring electric utility's transmission system.

FOOTNOTES:

The system and component codes listed below are per IEEE Standard 805-1984 system codes:

AB Reactor Coolant System
FK Switchyard System
JE Engineered Safety Features Actuation System
KE Heat Rejection System

and IEEE Standard 803A-1983 component code:

RLY Relay