AmerenUE
Callaway Plant

PO Box 620
Fulton, MO 65251

April 9, 2004

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

ULNRC04980

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 2004-005-00
Inadequate feedwater heating during plant startup causes turbine trip and subsequent reactor trip.

Ladies and Gentlemen:

The enclosed licensee event report is submitted in accordance with 10CFR50.73(a)(2)(iv)(A), to report an event where inadequate feedwater preheating during a plant startup causes a main turbine generator trip and subsequent reactor trip.

Sincerely,

Warren A. Witt

Warren A. Witt
Manager, Callaway Plant

Enclosure

IE22

Mr. Bruce S. Mallett
Regional Administrator
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-4005

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 7E1
Washington, DC 20555-2738

Missouri Public Service Commission
Governor Office Building
200 Madison Street
PO Box 360
Jefferson City, MO 65102-0360

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

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

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LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
CALLAWAY PLANT UNIT 1	05000 483	1 OF 5

4. TITLE

Inadequate feedwater heating during plant startup causes turbine trip and subsequent reactor trip.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
2	15	2004	2004	- 005 -	00	4	9	2004	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	1
10. POWER LEVEL	26

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR : (Check all that apply)

20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
20.2203(a)(1)	50.36(c)(1)(i)(A)	X 50.73(a)(2)(iv)(A)	73.71(a)(4)
20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER
20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Mark A. Reidmeyer	(573) 676-4306

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

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

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On 2/15/04, during plant startup and synchronizing to the grid, Callaway experienced oscillations in Steam Generator (S/G) levels which resulted in a main turbine generator trip and subsequent reactor trip. After the reactor trip occurred, to reduce the plant cooldown rate, operators attempted to secure the Turbine Driven Auxiliary Feedwater Pump (TDAFP). However, due to an automatic actuation signal being present, the TDAFP experienced an electrical and mechanical overspeed trip.

Post trip investigations determined that the S/G oscillations were due to not having aligned extraction steam to provide feedwater preheating. The overspeed trip of the TDAFP was per system design. A TDAFP actuation signal was present when the operators closed the steam supply valves, causing the valves to reopen automatically and in such a sequence as to cause an overspeed condition.

A Root Cause Analysis team was assembled and identified four Root Causes, plus several Corrective Actions to Prevent Occurrence.

I. DESCRIPTION OF THE REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

This event is being reported per 10CFR50.73(a)(2)(iv)(A), system actuation.

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

Callaway Plant was in Mode 1 having just completed synchronizing the main turbine generator to the electrical grid, and preparations were underway to transfer from the Main Feedwater Regulating Bypass Valves to the Main Feedwater Regulating Valves.

C. STATUS OF STRUCTURES, SYSTEMS OR COMPONENTS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT

None.

D. NARRATIVE SUMMARY OF THE EVENT, INCLUDING DATES AND APPROXIMATE TIMES

On 2/15/04, Callaway Plant was in the process of synchronizing the main turbine generator to the electrical grid and increasing power to 30 percent using procedure OTG-ZZ-00003, PLANT STARTUP HOT ZERO POWER TO 30% POWER, which provides instructions for plant operations necessary to increase power from 0 percent up to 30 percent. Main turbine chest and shell warming had been completed and feed water preheating had been established to High Pressure Feedwater Heaters 6A, 6B, 7A, and 7B. Due to inconsistent guidance between procedure OTG-ZZ-00003 and OTN-AF-00001, HIGH PRESSURE AND LOW PRESSURE FEEDWATER HEATER SYSTEM, extraction steam had not been aligned to the High Pressure Feedwater Heaters. At 1456 the main turbine generator was paralleled with the electrical grid by closing switchyard breakers MDV53 and MDV55. Reactor power was increased as main generator loading was raised in preparation for transferring Steam Generator (S/G) feedwater supply from the Main Feedwater Regulating Bypass Valves (MFRBV) to the Main Feedwater Regulating Valves (MFRV).

Four minutes after synchronizing with the electrical grid, feedwater temperature, which had been approximately 323 degrees F, experienced a rapid decrease in temperature of 99 degrees F in 18 minutes. Procedure guidance directed that main generator loading and S/G levels be stable before beginning the transition. Despite this guidance, insufficient time was allowed for S/G levels and main generator loading to stabilize prior to commencing the S/G feedwater supply alteration. S/G levels began oscillating with levels in two S/G's cycling in opposite directions to those in the remaining two S/G's. At 1519, the level in "C" S/G reached a high-high level trip setpoint (P14) and caused a main turbine generator trip, main feedwater isolation, S/G blowdown isolation, and a motor-driven auxiliary feedwater (MDAFW) actuation. Upon trip of the main turbine generator, the Control Room staff entered OTO-AC-00001, TURBINE TRIP. Actions were commenced to reduce reactor power by inserting control rods, and immediate borating. The Turbine Driven Auxiliary Feedwater Pump (TDAFP) was started manually to assist the two operating Motor Driven Auxiliary Feedwater Pumps (MDAFP) that had started upon receiving the previous AFW actuation signal, in maintaining S/G levels. Despite these efforts, at 1524 the reactor tripped on low S/G water level.

Plant operators transitioned to emergency procedure E-0, REACTOR TRIP OR SAFETY INJECTION. After completing the initial actions required, it was recognized that an excessive cooldown was in progress and the Control Room staff transitioned to ES-0.1, REACTOR TRIP RESPONSE. Directions

were given to throttle auxiliary feedwater to the S/G's, ensure the S/G atmospheric dumps were closed, and secure the TDAFP. All of these actions were accomplished, but when the operators secured the TDAFP steam supplies, those valves immediately reopened. At this point, the operators realized that a Trip Time Delay (TTD) circuit had actuated earlier when multiple S/G low-low level signals had been present simultaneously, and that with this signal still present, the TDAFP would automatically restart. When the TDAFP steam supply valves re-opened, the TDAFP tripped on both electrical and mechanical overspeed. After securing all unnecessary steam loads and throttling AFW to the S/G, the excessive cooldown situation was corrected, and a normal recovery from a plant trip was completed.

During post trip investigations:

- It was determined that without extraction steam aligned to the high pressure feedwater heaters, insufficient feedwater heating would occur which in turn would result in the excessive S/G level oscillations experienced.
- It was determined that the overspeed trip of the TDAFP was an expected result from the method operators used in trying to secure the TDAFP. With a TDAFP actuation signal present, when the operators manually stopped the TDAFP, the trip and throttle valve began closing, however, the governor valve started opening in an effort to maintain rated speed. When the trip and throttle valve stroked shut, it automatically reset and reopened due to the existing TDAFP actuation signal still present. The governor valve control circuitry had not reached its reset value which would allow control of the pump during startup. Therefore, with the trip and throttle valve opening, the supply of steam was sufficient to overspeed the TDAFP.

E. METHOD OF DISCOVERY OF EACH COMPONENT, SYSTEM FAILURE, OR PROCEDURAL ERROR

The main turbine generator trip was recognized by the Control Room staff due to Main Control Board (MCB) alarm and display indications.

The reactor trip was also recognized by the Control Room staff due to additional MCB alarm and display indications.

Control room operator recognized that the TDAFP was tripped when the normal lamp indication was absent on the MCB.

II. EVENT DRIVEN INFORMATION

A. SAFETY SYSTEMS THAT RESPONDED

The Reactor Protection System and Auxiliary Feedwater System both were actuated as a result of conditions experienced during this event.

B. DURATION OF SAFETY SYSTEM INOPERABILITY

No safety system was inoperable during this event. The two motor-driven auxiliary feedwater trains remained operable and supplied sufficient auxiliary feedwater throughout this event.

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT.

A probabilistic risk assessment (PRA) determined that the reported event was of very low risk significance.

III. CAUSE OF THE EVENT

A multi-disciplinary Root Cause Analysis (RCA) team was assembled to investigate this event. This RCA team was conducted for both LER 2004-004-00 and 2004-005-00. These two events were found to have related root causes and corrective actions. The RCA team conclusions for this event were:

Root Cause 01 (RC-1)
Policy Guidance regarding Pre-Job Briefs is not strict enough and allows interpretation, resulting in varying degrees of quality of Pre-job Briefs.

Root Cause 02 (RC-2)
Operations supervisory oversight and standards reinforcement need improvement.

Root Cause 03 (RC-3)
Training coursework needs to be improved in the areas of operating Secondary Plant and situational awareness of indications.

Root Cause 04 (RC-4)
General Operating procedures (OTGs) are cumbersome and difficult to follow.

IV. CORRECTIVE ACTIONS

The following Corrective Actions were developed by the RCA team. Corrective Actions to Prevent Recurrence (CATPR) are actions that will be taken in order to prevent a similar event from occurring in the future.

CATPR 01
Expectations for Pre-Job Briefs (PJB) have been strengthened in Operations. The Plant Manager and Superintendent of Operations conducted briefings with each crew affirming the expectations for pre-job briefs. The Shift Supervisors and Operations management conducted an all-day performance review meeting where the expectation for performing pre-job briefs was reaffirmed. In addition, the Senior Reactor Operators met as a group and discussed the importance and expectations of pre-job briefs.

Improved site-wide guidance for pre-job briefs is being evaluated for implementation.

CATPR 02
The Shift Supervisor and Senior Reactor Operator meetings discussed under CATPR 01 also emphasized the following Operations standards:
- Ensure the level of supervisory oversight compensates for infrequency of evolutions, experience level of crew members, and evolutions of high consequence.
- Ensure standards address the roles and responsibilities of crew members and supervisors.
- Ensure leadership is engaged and is conducting observations and coaching personnel.

CATPR 03
Operations and Training are conducting an effectiveness review of the current training courses developed to provide instruction for routine and atypical secondary plant manipulations.

CATPR 04
OTG-ZZ-00003 was revised to clarify the requirements for extraction steam alignment to feedwater heaters

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

prior to rolling the turbine. OTG procedures are being revised to address layout, formatting, and sequencing issues.

V. PREVIOUS SIMILAR EVENTS

Even though LER 2004-004-00 and 2004-005-00 are not similar events, the RCA team determined they have related root causes and corrective actions, as discussed previously in this LER.

A review of the Callaway Action Request System (CARS) historical data between 2/15/01 and 2/15/04 and searching for similar reactor trips did not reveal any additional trips of this nature.

A similar CARS review was conducted to determine if there were any similar failures of the TDAFP. No CARs were identified where a TDAFP trip occurred as a result of operator actions while an actuation signal was present.

A historical review of Callaway LERs from 2001 until present did not document any similar LERs.

VI. ADDITIONAL INFORMATION

The system and component codes listed below are from the IEEE Standard 805-1984 and IEEE Standard 803A-1984 respectively.

System: Not applicable. There were no component failures associated with this event.

Component: N/A