

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Callaway Unit 1 DOCKET NUMBER (2) 05000483 PAGE (3) 1 OF 05

TITLE (4) ESF Actuations On High Steam Generator (S/G) Level And A Reactor Trip On Low S/G Level Due To Improper Feedwater Control

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 NAMES		DOCKET NUMBER(S)
04	16	88	88	005	000	05	16	88			050000
050000 050000											

OPERATING MODE (9) 1

POWER LEVEL (10) 0108

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11):

20.402(b)	20.406(a)	20.406(a)(1)	20.406(a)(2)(i)	20.406(a)(2)(ii)	20.406(a)(2)(iii)	20.406(a)(2)(iv)	20.406(a)(2)(v)	20.406(a)(2)(vi)	20.406(a)(2)(vii)	20.406(a)(2)(viii)	20.406(a)(2)(ix)	73.71(b)	73.71(c)	OTHER (Specify in Abstract below and in Text, NRC Form 365A)
			X											

LICENSEE CONTACT FOR THIS LER (12)

NAME: W. R. Robinson - Assistant Manager Operations & Maintenance

TELEPHONE NUMBER: 314 676-8293

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) X NO

EXPECTED SUBMISSION DATE (15)

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

On 4/16/88 at 0221 CDT, a Feedwater (FW) Isolation (FWIS) and an Auxiliary FW actuation (AFAS) occurred on a high level in 'C' Steam Generator (S/G). On 4/17/88 at 1734 CDT, an AFAS, FWIS, and a reactor trip occurred on S/G levels. The plant was in Mode 1 - Power Operations for both events. The plant temperature, pressure, and reactor power for Events 1 and 2 were 554°F, 2235 psig, 8%, and 562°F, 2235 psig, 11% respectively.

The high S/G level in Event 1 occurred when transferring from the main feedwater regulator valves (FRV) to the FW bypass valves. The licensed operator's use of indications to anticipate plant response led to an erroneous decision as to the cause of the S/G level increase and the actions taken to correct it.

The low S/G level in Event 2 was due to the licensed operator's decision to control FW using only the main FRVs at a low power level.

To prevent recurrence, procedures for the FRV to FW bypass valve transfer have been revised and training will be conducted for licensed operators. A letter was issued to all Shift Supervisors to emphasize the necessity for addressing abnormal indications during transient periods.

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TEXT (if more space is required, use additional NRC Form 388A's) (17)

Basis For Reportability

Event 1:

On 4/16/88 at 0221 CDT, a Feedwater Isolation (FWIS) and an Auxiliary Feedwater Actuation (AFAS) occurred due to the water level in 'C' Steam Generator (S/G)⁽¹⁾ increasing to the high level trip setpoint.

Event 2:

On 4/17/88 at 1734 CDT, a Reactor Protection System (RPS) reactor trip occurred due to the water level in 'C' S/G decreasing to the low level trip setpoint after a FWIS and AFAS occurred due to high level in 'A' S/G.

This Licensee Event Report is submitted pursuant to 10CFR50.73(a)(2)(iv) to report the automatic actuation of the RPS and the Engineered Safety Features (ESF) actuations.

Conditions at Time of Event

Event 1: Mode 1 - Power Operations

Reactor Power - 8%

Reactor Coolant System (RCS)⁽²⁾

temperature (average) - 554 degrees F

RCS pressure - 2235 psig

Event 2: Mode 1 - Power Operations

Reactor Power - 11%

RCS temperature (average) - 562 degrees F

RCS pressure - 2235 psig

Description of Events

Event 1:

While performing a normal plant shutdown, a problem developed in maintaining the level of the S/G's when transferring from the main Feedwater Regulator Valves (FRV)⁽³⁾ to the feedwater (FW) bypass valves⁽⁴⁾. The Main Control Board (MCB)⁽⁵⁾ computer point display for 'C' S/G FW flow indicated that the feed flow was less than the steam flow in 'C' S/G and less than the other S/G feed flows. The level in 'C' S/G increased to 65 percent even though its indicated feed flow was lower than its indicated steam flow. Based on the indicated feed flow and steam flow mismatch, the operator expected the level to turn down prior to reaching the high level trip setpoint. The FW bypass valve AE-FCV-530 was opened further to try to match the feed flow to steam flow on 'C' S/G to minimize the expected S/G level swings in the opposite direction. Once the S/G levels reached 75%, the operator recognized that he was actually overfeeding the generator. Feed flow was then reduced; however, level in 'C' S/G had swelled to the 78% high level trip setpoint causing a turbine trip, a FWIS, and AFAS.

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

The licensed operators recovered from these actuations via plant procedures and verified that all equipment functioned properly.

Event 2:

On 4/17/88 a plant startup was in progress following a weekend planned maintenance outage. The 'A' Main FW pump⁽⁶⁾ was running with the four FW bypass valves in automatic supplying the S/G's. While rolling the turbine, procedure OSP-AC-00004, Main Turbine Trip Tests, was performed as a retest due to recent changes in the turbine control circuit. Subsequently, the FW control was transferred from the bypass valves to the main FRVs as additional FW was anticipated for the eventual turbine generator loading. The bypass valves were shut. The S/G levels began fluctuating⁽⁷⁾ ±10 percent from the normal 50 percent level. The main generator was then synchronized to the grid as expected loading would stabilize S/G levels. However, due to the coarse control of the FRVs at low power levels, the increased steam demand intensified the fluctuations of the S/G levels. A high level in 'A' S/G caused a turbine trip, AFAS, and a FWIS. The injection of relatively cold auxiliary FW in addition to the turbine trip caused a low level in 'C' S/G. This resulted in a reactor trip.

The licensed operators recovered from the reactor trip via plant procedures and verified that all equipment functioned properly.

Root Cause

Event 1:

The licensed operator's use of steam flow and feed flow indications to anticipate plant response led to an erroneous decision as to the cause of the level increase and the actions necessary to correct it. Several indications are available which provide level as well as anticipatory information (steam flow/feed flow) for control during this evolution. Inaccuracies exist in steam flow/feed flow indications at low power levels. Recognition of these inaccuracies had not been stressed to operators.

Event 2:

The root cause was the licensed operator's decision to control feedwater using only the main FRVs at a low power level.

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TEXT (If more space is required, use additional NRC Form 386A's) (17)

Contributing factors to this event:

- (1) Instrument air pressure on the FW bypass valve controllers was found to be set too low (80 psig) which caused the valves only to open 75% when indicating 100% open on the MCB open demand signal on three of the four FW bypass valves. This condition directly affected the operator's ability to control the S/G levels with only the FW bypass valves while rolling the turbine. An air pressure of 90 psig is recommended. Preventive Maintenance (PM) Work Request instructions for these valves required 80 psig due to a misinterpretation of a vendor technical manual. The instrument air regulators had been recently replaced in January 1988 using these instructions.
- (2) The unavailability of full FW heating due to planned FW heater maintenance tended to amplify the S/G level transients. This caused S/G level swings to be experienced at the time of the FW control transfer.

Corrective Actions and Actions to Prevent Recurrence

- (1) Procedures OTG-ZZ-00003 and OTN-AE-00001 have been revised to provide an improved method for the FRV to FW bypass valve transfer. Training will be conducted on these revisions in the next session of licensed operator requalification.
- (2) A letter was issued to all Shift Supervisors to emphasize the necessity for addressing indications or controls during critical transient periods.
- (3) The instrument air regulators were adjusted to approximately 90 psig with control system calibrations on the FW bypass valves following Event 2. The stroke of the valves was verified. The Maintenance Department has revised the PM's for each FW bypass valve to change the setting of the positioner air regulator from 80 psig to 90 psig. This event will be reviewed with the appropriate Maintenance and Planning and Scheduling Department personnel.
- (4) The methodology for removal of FW heaters from service for maintenance at low power levels is under evaluation.

Safety Significance

The RPS and ESF systems performed as required for both events in response to the S/G water levels. There were no detrimental effects on plant equipment as a result of the actuations and there were no adverse affects on the public health and safety.

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TEXT (if more space is required, use additional NRC Form 388A's) (17)

Previous Occurrences

LER 84-057-00; ULNRC-983 dated 11/21/84
 LER 84-065-00; ULNRC-1016 dated 1/16/85
 LER 86-013-00; ULNRC-1310 dated 5/12/86

LER 84-057-00 described a reactor trip, FWIS, and AFAS which occurred as a result of a low level in 'A' S/G. The low S/G level occurred during the transfer of FW flow from the main FW bypass valves to the main FRVs. Since a blown fuse prevented opening of the FRV while the bypass valve was being closed, the root cause is not the same as the current event.

LER 84-065-00 describes two events in which ESFs were actuated by S/G level oscillations. A FWIS and an AFAS were initiated by a high level in 'C' S/G during the first event. A high S/G level actuated a turbine trip and FWIS during the second event. The subsequent drop in S/G levels then initiated a reactor trip. A failed current-pressure converter in the control circuit for the 'C' main FRV was the cause of the first event. During the second event, FW control was being transferred to the main FRVs when it became apparent the 'C' FRV was not operating correctly, and S/G level oscillations increased until the above actuations occurred. Investigation revealed that the FRV was not seated properly. LER 84-065-00 therefore had a different root cause and corrective action on that problem and could not have been expected to prevent the current event.

LER 86-013-00 describes a reactor trip, FWIS, and AFAS which occurred as a result of a low level in 'A' S/G. The low S/G level occurred as a result of S/G level oscillations initiated due to an excessive loading rate of the main generator after paralleling to the grid. Therefore, the root cause of LER 86-013-00 is not similar to the current event.

Footnotes

The system and component code listed below are from IEEE Standards 805-1983 and 803A-1983, respectively.

- (1) System - AB, Component - SG
- (2) System - AB
- (3) System - SJ, Component - FCV
- (4) System - SJ, Component - FCV
- (5) System - IU, Component - MCB
- (6) System - SJ, Component - P
- (7) System - TB



Callaway Plant

May 16, 1988

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

ULNRC-1773

Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 88-005-00
ESF ACTUATIONS ON HIGH STEAM GENERATOR (S/G) LEVEL AND
A REACTOR TRIP ON LOW S/G LEVEL DUE TO IMPROPER FEEDWATER CONTROL

The enclosed Licensee Event Report is submitted for two events pursuant to 10 CFR 50.73(a)(2)(iv) concerning Engineered Safety Features actuations on high Steam Generator level and an unplanned reactor trip on low Steam Generator level. Both events occurred during low power feedwater control transfer evolutions.

John D. Blosser
J. D. Blosser
Manager, Callaway Plant

TPS/LAM:jlh

Enclosure

cc: Distribution attached

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cc distribution for ULNRC-1773

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