

October 30, 2006

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

ULNRC05340



Ladies and Gentlemen:

**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 2006-008-00
COMS Inoperability, RHR Suction Relief Valve Failure**

The enclosed licensee event report is submitted in accordance with 10CFR50.73(a)(2)(i)(B), 10CFR50.73(a)(2)(v)(A) and 10CFR50.73(a)(2)(vii) to report a failure of a RHR suction relief valve while the pressurizer power operated relief valves were inoperable for cold overpressure protection.

Sincerely,

A handwritten signature in black ink, appearing to read "L. E. Thibault".

L. E. Thibault
Director Plant Operations

LET/CSP/slk
Enclosure

Handwritten initials "JE22" in black ink.

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 O-7D1
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

bcc: C. D. Naslund
A. C. Heflin
C. R. Younie
K. D. Young
G. A. Hughes
D. E. Shafer (470)
S. L. Gallagher (100)
L. M. Belsky (NSRB)
K. A. Mills
P. M. Bell
msp@nrc.gov
ded@nrc.gov
LEREvents@inpo.org
babrook@wcnoc.com
A160.0761

Certrec Corporation
4200 South Hulen, Suite 630
Fort Worth, TX 76109

***(Certrec receives ALL attachments
as long as they are non-safeguards
and public disclosed).***

Send the following without attachments:

Ms. Diane M. Hooper
Supervisor, Licensing
WCNOC
P.O. Box 411
Burlington, KS 66839

Mr. Scott Bauer
Regulatory Affairs
Palo Verde NGS
P.O. Box 52034,
Mail Station 7636
Phoenix, AZ 85072-2034

Mr. Scott Head
Supervisor, Licensing
South Texas Project NOC
Mail Code N5014
P.O. Box 289
Wadsworth, TX 77483

Mr. Dennis Buschbaum
TXU Power
Comanche Peak SES
P.O. Box 1002
Glen Rose, TX 76043

Mr. Stan Ketelsen
Manager, Regulatory Services
Pacific Gas & Electric
Mail Stop 104/5/536
P.O. Box 56
Avila Beach, CA 93424

Mr. John O'Neill
Pillsbury Winthrop Shaw Pittman LLP
2300 N. Street N.W.
Washington, DC 20037

LIST OF COMMITMENTS

The following table identifies those actions committed to by AmerenUE in this document. Any other statements in this document are provided for information purposes and are not considered commitments. Please direct questions regarding these commitments to:

COMMITMENT	Due Date/Event

NRC FORM 366 (6-2004)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB: NO. 3150-0104 Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.		EXPIRES: 06/30/2007		
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)								
1. FACILITY NAME Callaway Plant Unit 1				2. DOCKET NUMBER 05000483		3. PAGE 1 OF 9		
4. TITLE COMS INOPERABILITY, RHR SUCTION RELIEF VALVE FAILURE								
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR
8	30	2006	2006	- 008 -	00	10	30	2006
			8. OTHER FACILITIES INVOLVED					
			FACILITY NAME			DOCKET NUMBER		
			FACILITY NAME			DOCKET NUMBER		
9. OPERATING MODE		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)						
100		<input type="checkbox"/> 20.2201(b) <input type="checkbox"/> 20.2203(a)(3)(i) <input type="checkbox"/> 50.73(a)(2)(i)(C) <input checked="" type="checkbox"/> 50.73(a)(2)(vii)						
		<input type="checkbox"/> 20.2201(d) <input type="checkbox"/> 20.2203(a)(3)(ii) <input type="checkbox"/> 50.73(a)(2)(ii)(A) <input type="checkbox"/> 50.73(a)(2)(viii)(A)						
10. POWER LEVEL		<input type="checkbox"/> 20.2203(a)(1) <input type="checkbox"/> 20.2203(a)(4) <input type="checkbox"/> 50.73(a)(2)(ii)(B) <input type="checkbox"/> 50.73(a)(2)(vii)(B)						
		<input type="checkbox"/> 20.2203(a)(2)(i) <input type="checkbox"/> 50.36(c)(1)(i)(A) <input type="checkbox"/> 50.73(a)(2)(iii) <input type="checkbox"/> 50.73(a)(2)(ix)(A)						
		<input type="checkbox"/> 20.2203(a)(2)(ii) <input type="checkbox"/> 50.36(c)(1)(ii)(A) <input type="checkbox"/> 50.73(a)(2)(iv)(A) <input type="checkbox"/> 50.73(a)(2)(x)						
		<input type="checkbox"/> 20.2203(a)(2)(iii) <input type="checkbox"/> 50.36(c)(2) <input checked="" type="checkbox"/> 50.73(a)(2)(v)(A) <input type="checkbox"/> 73.71(a)(4)						
		<input type="checkbox"/> 20.2203(a)(2)(iv) <input type="checkbox"/> 50.46(a)(3)(ii) <input type="checkbox"/> 50.73(a)(2)(v)(B) <input type="checkbox"/> 73.71(a)(5)						
		<input type="checkbox"/> 20.2203(a)(2)(v) <input type="checkbox"/> 50.73(a)(2)(i)(A) <input type="checkbox"/> 50.73(a)(2)(v)(C) <input type="checkbox"/> OTHER						
		<input type="checkbox"/> 20.2203(a)(2)(vi) <input checked="" type="checkbox"/> 50.73(a)(2)(i)(B) <input type="checkbox"/> 50.73(a)(2)(v)(D)						
12. LICENSEE CONTACT FOR THIS LER								
FACILITY NAME K.A. Mills, Supervising Engineer, Safety Analysis/Regional Regulatory Affairs						TELEPHONE NUMBER (Include Area Code) 573-676-4317		
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
B	BP	RV	C710	Y				
14. SUPPLEMENTAL REPORT EXPECTED						15. EXPECTED SUBMISSION DATE		
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO						MONTH	DAY	YEAR
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)								
<p>Residual Heat Removal (RHR) suction relief valves EJ8708A and EJ8708B removed by Callaway Maintenance during Refueling Outage 14 (Fall 2005) were tested on August 30, 2006. Test results indicated EJ8708B relieved approximately 146 psig high; EJ8708A relieved correctly. The disc assembly pins of both valves were found broken when the valves were disassembled and inspected. An immediate action taken was to consider valve EJ8708B inoperable and EJ8708A operable but degraded from Refuel 12 to Refuel 14, and determine the overall effect as it relates to system operability. These mechanical failures were not known when the valves were in service from Refuel 12 to Refuel 14, and as a result, the Required Actions for Technical Specification 3.4.12 were not entered.</p> <p>The direct cause of pin failure is compression of the pre-load spring and shear of the disc assembly pin. The initiating event was a Safety Injection (SI), which was combined with a Power Operated Relief Valve (PORV) actuation on February 11, 2004. The inoperability of the RHR suction relief valves was coincident with the PORVs being inoperable for Cold Overpressure Mitigating System (COMS). The safety significance of this event is Technical Specification Required Actions were not entered as required, and COMS was out of service from the time of failure until the valves were replaced in Refuel 14.</p>								

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
Callaway Plant Unit 1	05000483	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 9
		2006	- 008	- 00	

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

I. DESCRIPTION OF THE REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

10CFR50.73(a)(2)(i)(B) – Operation or Condition Prohibited by Technical Specifications
 10CFR50.73(a)(2)(v)(A) – Event or Condition that Could Have Prevented Fulfillment of a Safety Function
 10CFR50.73(a)(2)(vii) – Common Cause Inoperability of Independent Trains or Channels

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

Plant was in MODE 1 at 100% power at the time the event was discovered.

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

See sections II.B and II.C of this report.

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

EJ8708B, Residual Heat Removal (RHR) B suction relief was inoperable for the cold overpressure mitigation system (COMS) function at the same time the pressurizer power-operated relief valves (PORVs) were not operable for the COMS function. Inoperability of the RHR suction relief valve was discovered during surveillance testing on August 30, 2006, after Refuel Outage 14 (Fall 2005). Relief valve EJ8708B lifted at approximately 146 pounds per square inch (psi) high during surveillance testing. Relief valve EJ8708A, RHR A suction relief, lifted within the proper range during surveillance testing. EJ8708A was considered operable but degraded (refer to section I.E., Method of discovery of each component, system failure or personnel error). Inoperability of the pressurizer PORVs for COMS was previously reported in Licensee Event Report (LER) 2006-001-00.

The following information is provided as background material to aid in understanding the event. Technical Specification (TS) 3.4.12, COMS is applicable in Mode 4 with reactor coolant system (RCS) temperature less than or equal to 275F, Mode 5 and Mode 6 with the head on the reactor vessel. To meet the COMS requirements, TS 3.4.12 allows using one of the following pressure relief capabilities:

- a. Two power operated relief valves (PORVs) with lift settings within the limits specified in the PTLR, or
- b. Two residual heat removal (RHR) suction relief valves with setpoints ≥ 436.5 psig and ≤ 463.5 psig, or
- c. One PORV with a lift setting within the limits specified in the PTLR and one RHR suction relief valve with a setpoint ≥ 436.5 psig and ≤ 463.5 psig, or
- d. The RCS depressurized and an RCS vent of ≥ 2.0 square inches.

During a plant outage (generally a refueling outage), an RHR suction relief valve is removed from the RHR system and replaced with a pretested valve. Following the end of the outage, the relief valve that was removed from the system is sent to an offsite vendor for testing. The results are then evaluated for impact for the time the valve had been installed.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
Callaway Plant Unit 1	05000483	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 9
		2006	- 008	- 00	

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

On February 11, 2004, an inadvertent Safety Injection was initiated during a plant heatup after a forced outage – LER 2004-004-00. A review of plant data indicates the pressurizer PORVs lifted twelve times before operators terminated the safety injection. The lifting of the pressurizer PORVs caused a pressure transient on the pressurizer relief tank (PRT) relief valve common discharge header. This pressure transient damaged relief valves N66251-00-0003 and N66251-00-0020, which were installed as RHR suction relief valves EJ8708A and EJ8708B. No apparent indications were available to indicate that the relief valves had been damaged.

During Refuel 13 in the Spring 2004, various combinations of the inoperable pressurizer PORVs (LER 2006-001-00) and one inoperable RHR suction relief valve, EJ8708B, and one operable but degraded RHR suction relief valve, EJ8708A, were credited for COMS protection. Refer to the table in section II.B. DURATION OF SAFETY SYSTEM INOPERABILITY for dates and approximate timeframes.

During the cooldown and depressurization for Refuel 14 (Fall 2005), both inoperable Pressurizer PORVs were initially credited for COMS. Later, COMS was credited to PORV A and RHR A suction relief valve. All four relief paths were documented in the surveillance, but there is no objective evidence the two relief paths not credited were maintained until the next surveillance was performed. Later, COMS was credited to the PORV B and the RHR B suction relief valve. All four relief paths were documented in the surveillances.

On September 20, 2005, an equipment operator unisolated centrifugal charging pump (CCP) A during restoration from engineered safety features actuation system (ESFAS) testing by opening the A CCP manual discharge valve. (Note: This was documented in NRC inspection reports as apparent violation 05000483/2005004-01). At the time, the A CCP was isolated for COMS. It was determined that unisolating the CCP did not constitute an "Event or Condition That Could Have Prevented Fulfillment of a Safety Function" because the pump handswitch was in Pull-to-Lock and an automatic pump start would require "an additional random single failure." Therefore, this issue was determined to be not reportable. At the time of the event, RCS pressure was being maintained with a nitrogen bubble in the pressurizer, and COMS protection was being provided by the inoperable B pressurizer PORV and the inoperable B RHR suction relief valve.

In October 2005, during Refuel 14, RHR suction relief valves N66251-00-0003 (EJ8708A) and N66251-00-0020 (EJ8708B) were removed from the system and replaced with N66251-00-0004 and N66251-00-0019 respectively under plant work documents.

On November 14, 2005, the Pressurizer PORVs were determined to be inoperable for COMS during the investigation of Callaway Action Request (CAR) 200509340. CAR 200509374 was written to resolve this issue.

On August 30, 2006 the RHR suction relief valves serial numbers N66251-00-0020 (EJ8708B) and N66251-00-0003 (EJ8708A) were tested at NWS Technologies in South Carolina. N66251-00-0020 failed its surveillance test, lifting at 596 psig. Lift acceptance criteria is 436.5 to 463.5 psig. N66251-00-0003 passed its surveillance test, lifting at 442.1 psig.

On September 12, 2006, a Root Cause Team started investigating the cause of the damaged RHR suction relief valves. On September 22, 2006, the cause of the pin failure of the RHR suction relief valves was determined to be a pressure transient on the PRT common relief valve discharge line. The pressure transient was caused by lifting the Pressurizer PORVs 12 times at normal operating pressure (NOP) prior to terminating a safety injection on February 11, 2004. A night order was issued to alert the Operating Crews.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Callaway Plant Unit 1	05000483	2006	- 008	- 00	4 OF 9

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

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

The failure of the RHR suction relief valves was discovered in August 2006 by surveillance testing followed by subsequent disassembly and inspection. Both of the RHR suction relief valves were replaced during the fall 2005 Refuel 14 outage as routine surveillance testing per the in-service testing program. The individual valves described in this LER were not installed in the plant when the failure was discovered.

On August 30, 2006, the RHR suction relief valves serial numbers N66251-00-0020 (EJ8708B) and N66251-00-0003 (EJ8708A) were tested at NWS Technologies in South Carolina. N66251-00-0020 failed its surveillance test, lifting at 596 psig. Lift acceptance criteria is 436.5 to 463.5 psig. During disassembly and inspection, the assembly pin was discovered broken in three pieces. Two of the pieces were located between the disc button and the bellows bushing, which increased the preload of the setpoint spring and raised the lift pressure to 596 psig. N66251-00-0003 passed its surveillance test, lifting at 442.1 psig. Pin impact marks were found on the disc button.

During disassembly and inspection of N66251-00-0003, the assembly pin was discovered broken in eight distinct pieces and a few fragments. Shavings of the pin jammed between the disc button and insert bushing caused an interference fit of the disc button and insert bushing. A 1/4 inch piece of the pin was located in the valve body at the base of the nozzle ring. The remaining parts of the pin were located between the disc insert and bushing. On both valves, pin impact marks were found on the disc button.

II. EVENT DRIVEN INFORMATION

A. SAFETY SYSTEMS THAT RESPONDED

Not applicable for this event.

B. DURATION OF SAFETY SYSTEM INOPERABILITY

TS 3.4.12, COMS, is applicable in Mode 4 with RCS temperature less than or equal to 275F, Mode 5 and Mode 6 with the head on the reactor vessel. To meet the COMS requirements, TS 3.4.12 allows using the pressurizer PORVs, Residual Heat Removal (RHR) system suction relief valves, a combination of PORVs and RHR suction relief valves, or the reactor coolant system (RCS) depressurized with a RCS vent ≥ 2.0 square inches.

The affected equipment is the pressurizer PORVs when used for COMS function and the RHR suction relief valves. The pressurizer PORVs function at normal RCS operating conditions is not affected.

From February 11, 2004 until the fall of 2005 Refuel 14 outage, EJ8708B RHR suction relief valve was inoperable for COMS. RHR suction relief valve EJ8708A was considered operable but degraded.

Per LER 2006-001-00, the pressurizer PORVs were considered inoperable for COMS before and during the same timeframes the RHR suction relief valve was inoperable.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
Callaway Plant Unit 1	05000483	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 9
		2006	- 008	- 00	

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

The following tables summarize when the COMS TS was applicable and what methods were considered to have been used to satisfy the TS.

COMS TS Applicable (3 year history)

Start	Stop	Comment
10/23/2002 1452	10/28/2002 0720	Refuel 12 Cooldown
11/14/2002 1502	11/21/2002 0554	Refuel 12 Heatup
03/22/2003 0034	03/31/2003 0557	March 2003 outage
04/10/2004 1946	04/19/2004 0344	Refuel 13 Cooldown
05/18/2004 0312	06/07/2004 0514	Refuel 13 Heatup
09/17/2005 1635	09/22/2005 1713	Refuel 14 Cooldown
11/03/2005 0421	11/13/2005 1735	Refuel 14 Heatup
05/23/2006 1200	06/01/2006 1420	Spring 2006 Outage

Potential timeframes for noncompliance with TS 3.4.12:

Timeframe	COMS By
Refuel 12	
10/23/2002 1452 – 10/26/2002 0206	2 PZR PORVs
10/26/2002 0206 – 10/28/2002 0720	2 RHR suction relief valves
11/14/2002 1502 – 11/17/2002 0042	2 RHR suction relief valves
11/17/2002 0042 – 11/19/2002 0116	1 PZR PORV and 1 RHR Suction relief valve
11/19/2002 0116 – 11/19/2002 0153	2 RHR suction relief valves
11/19/2002 0153 – 11/21/2002 0244	1 PZR PORV and 1 RHR suction relief valves
11/21/2002 0244 – 11/21/2002 0544	2 PZR PORVs
Spring Outage	
03/22/2003 0034 – 03/24/2003 0022	2 PZR PORVs
03/27/2003 2210 – 03/31/2003 0557	1 PZR PORV and 1 RHR suction relief valve
Refuel 13	
04/10/2004 1946 – 04/19/2004 0344	2 PZR PORVs
05/18/2004 0312 – 05/23/2004 0052	2 RHR suction relief valves
05/23/2004 0052 – 05/24/2004 2308	2 PZR PORVs
05/24/2004 2308 – 05/26/2004 0007	1 PZR PORV and 1 RHR suction relief valve

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
Callaway Plant Unit 1	05000483	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 OF 9
		2006	- 008	- 00	

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

05/26/2004 0007 – 05/28/2004 0919	2 PZR PORVs
05/28/2004 0919 – 05/28/2004 1025	1 PZR PORV and 1 RHR suction relief valve
05/28/2004 1025 – 05/29/2004 0143	2 PZR PORVs
05/29/2004 0143 – 06/01/2004 0025	2 RHR suction relief valves
06/01/2004 0025 – 06/06/2004 0514	2 PZR PORVs
Refuel 14	
09/17/2005 1635 – 09/18/2005 1737	2 PZR PORVs
09/18/2005 1737 – 09/22/2005 1713	1 PZR PORV (B) and 1 RHR suction relief valve (B) (Note: Both CCPs were unisolated for approximately 20 minutes on 09/20/2005.)
11/03/2005 0421 – 11/08/2005 0433	2 RHR suction relief valves
11/08/2005 0433 – 11/09/2005 1143	2 PZR PORVs (Note: 2 RHR suction relief valves available for some of this time.)
11/09/2005 1143 – 11/09/2005 1502	1 PZR PORV and 1 RHR suction relief valve
11/09/2005 1502 – 11/13/2005 1735	2 PZR PORVs
The above dates and times were taken from control room narrative logs, watch relief checklists, plant computer data, and work control system data.	

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT.

From February 11, 2004 until they were replaced in October 2005 during Refuel 14, the RHR suction relief valve EJ8708B was inoperable for COMS and RHR suction relief valve EJ8708A was operable but degraded for COMS. During Refuel outages 13 and 14, various combinations of RHR suction relief valves and pressurizer PORVs were credited for COMS.

Concurrent with the inoperability of EJ8708B and the degraded condition of EJ8708A, the Pressurizer PORVs were discovered inoperable for COMS as described in LER 2006-001-00. The Pressurizer PORVs were inoperable for COMS for the entire period the B RHR suction relief was inoperable. Coincident with the degraded condition of the COMS relief paths, both CCPs were capable of injection into the RCS below 275°F for approximately 20 minutes as described in inspection reports 05000483/2005004 and 05000483/2005005, and apparent violation 05000483/2005004-01.

Determination that the one RHR suction relief valve (EJ8708B) was inoperable and the other (EJ8708A) was degraded was made after both valves were removed from the system during Refuel Outage 14. Determination that the pressurizer PORVs were inoperable for COMS was also an after the fact determination, which was made after Refuel 14. RHR suction relief valve EJ8708A did relieve within the proper range when it was tested. Valve EJ8708B relieved approximately 146 psi high when tested. The pressurizer PORVs were capable of providing some cold overpressure protection for the RCS when they were aligned for that purpose. As discussed in LER 2006-001-00, the response time to a pressure transient had not been tested to verify that it was within the time assumed in the accident analysis. As documented in LER 2006-001-00, the expected pressure increase was approximately 11 psi. During the period the RHR suction relief valves were inoperable or degraded for COMS, RCS pressure did not exceed 436.5 psig (the lower range of the lift pressure) with the RHR loop suction open. Additionally,

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
Callaway Plant Unit 1	05000483	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	7 OF 9
		2006	- 008	- 00	

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

Solid Plant Operations were not conducted during this period.

As noted in LER 2006-001-00, the analysis (for cold overpressure protection) includes assumptions that also qualitatively allow this potential pressure increase. These include:

- Safety Factor of 2 for primary stresses
- Assumes an initial flaw equal to 1/4 the reactor vessel wall thickness. Actual NDE techniques detect smaller flaws.
- Conservative mass and heat injection rates.

The bases for TS 3.4.12 states, "Two RCS relief valves are required for redundancy. One RCS relief valve has adequate relieving capability to prevent overpressurization for the required coolant input capability." TS 3.4.12 also notes that two CCPs may be made capable of injecting for ≤ 1 hour for pump swap capabilities.

The inoperability of EJ8708B and the pressurizer PORVs and the failure to complete the Required Actions within the Completion Time is a condition prohibited by Technical Specifications. The failure mechanism for the RHR suction relief valves is a common mode failure. The damage to the RHR suction relief valves is a condition that could have prevented fulfillment of a safety function needed to maintain the reactor in a safe shutdown condition. A pressure transient similar to the one that damaged the RHR suction relief valves is possible but unlikely. We cannot predict the effect on the RHR suction relief valve setpoint because of the way the broken assembly pin fragments arranged themselves in the valves. For the specific case discussed in this LER, the damage to the RHR suction relief valves resulted in EJ8708B lifting higher than the required setting. EJ8708A lifted within the proper range. In addition, the pressurizer PORVs were functionally able to provide overpressure relief although they were technically inoperable. The safety function of providing cold overpressure protection for the RCS was capable of being fulfilled for the conditions in the plant.

The RHR suction piping is designed for 600 psig at 400 degrees F. The as-found lift setpoints for the RHR suction relief valves were not so high as to cause an overpressure concern with the RHR pump suction piping.

Operability is not a concern for the RHR suction relief valves currently installed in the plant. The valves were surveillance tested by NWS Technologies during fuel Cycle 13 and installed in October 2005 during Refuel 14. No events causing the Pressurizer PORVs to lift have occurred since the RHR suction relief valves were installed in October 2005.

The current PRT Relief Valve Common Discharge Header piping design still allows the same degradation of design function to occur if an RCS PORV actuation event occurs at normal operating pressure (NOP). This risk has been identified and Operations has been informed of the potential degradation of the RHR suction relief valves. The current course of action, if a PORV actuation event occurs, is to declare the RHR suction relief valves inoperable for COMS. Longer range solutions are being considered under the corrective action program.

III. CAUSE(S) OF THE EVENT AND CORRECTIVE ACTION(S)

N66251-00-0020 failed its surveillance test, lifting at 596 psig (acceptance criteria is 436.5 to 463.5 psig).

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
Callaway Plant Unit 1	05000483	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	8 OF 9
		2006	- 008	- 00	

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

N66251-00-0020 was installed as RHR suction relief valve EJ8708B during fuel Cycles 13 and 14. During disassembly and inspection, the assembly pin was discovered broken in three pieces. Two of the pieces were located between the disc button and the bellows bushing, increasing the preload of the set point spring and raising the lift pressure to 596 psig.

N66251-00-0003 passed its surveillance test, lifting at 442.1 psig. N66251-00-0003 was installed as RHR suction relief valve EJ8708A during fuel Cycles 13 and 14. During disassembly and inspection, the assembly pin was discovered broken in eight distinct pieces and a few fragments. Shavings of the pin jammed between the disc button and insert bushing caused an interference fit of the disc button and insert bushing. A 1/4 inch piece was located in the valve body at the base of the nozzle ring. The remaining parts of the pin were located between the disc insert and bushing. On both valves, there were pin impact marks on the disc button.

The RHR suction relief valves, EJ8708A and EJ8708B, share a common discharge header with the Pressurizer PORVs and Safety Relief valves. The cause of the damage has been determined to be a pressure pulse transient induced in the water solid tailpipe lines of the RHR suction relief valves when the Pressurizer PORVs lifted 12 times over approximately eight minutes following the inadvertent Safety Injection on February 11, 2004. The direct cause of pin failure is compression of the preload spring and shear of the disc assembly pin.

The root cause of the assembly pin failure is that the common relief valve discharge piping to the Pressurizer Relief Tank (PRT) is designed such that the 4-inch RHR suction relief valve discharge piping becomes water solid when PRT pressure exceeds six psig. Once water solid, repeated PORV actuation at normal operating pressure produces sufficient backpressure forces in the 4-inch discharge header to fail the disc assembly pin. A water solid discharge, or mostly water solid with gas pockets, establishes conditions to transmit a significantly higher backpressure force (shock) on the valve internals than a gas-filled discharge during PORV and or Pressurizer Safety Valve actuation at full operating pressure.

Actions that have been taken or will be taken:

The Operations Department has been informed of the potential for degradation of the RHR suction relief valves. The current course of action, if a PORV actuation event occurs, is to declare the RHR suction relief valves inoperable for COMS.

The PRT Relief Valve Common Discharge Header piping design is such that a pressure transient developed from the lifting of a Pressurizer PORV at NOP is transmitted through water solid piping to the discharge side of the RHR suction relief valves. We are pursuing a change to the common relief valve discharge piping configuration to the PRT to prevent development of a water solid condition.

Actions related to the pressurizer PORVs are discussed in LER 2006-001-00.

Inadequate investigation and corrective action from past events did not identify some root causes. The extent of condition of past events was not fully investigated. The cause of the assembly pin failure discovered on valve N66251-00-0003 under W159359 in 1994 was never determined. Determination of the cause of an earlier assembly pin failure (refer to section IV Previous Similar Events) could have enabled the plant to make necessary design changes. A latent organizational weakness, which was identified in 2005, has been addressed in the corrective action program

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
Callaway Plant Unit 1	05000483	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	9 OF 9
		2006	- 008	- 00	

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

IV. PREVIOUS SIMILAR EVENTS

On February 13, 1988 (CAR 198800045), a Low Steam Line Pressure Safety Injection was inadvertently automatically initiated after a plant trip when RCS temperature was allowed to cool down to 491 degrees Fahrenheit (F), 615 psig steam pressure. The Safety Injection flow caused the pressurizer steam bubble to compress, resulting in the Pressurizer PORVs to lift 12 times. The transient in the PRT common relief valve discharge header caused by the lifting of the Pressurizer PORVs damaged the A Train RHR suction relief valve. The damage was not discovered until 1994 during the investigation of CAR 199301774 – EJ8708A lifted at 350 psig causing RCS pressure to lower to 100 psig.

V. ADDITIONAL INFORMATION

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

System: BP. Residual Heat Removal/Low-Pressure Safety Injection (PWR)

Component: RV, valve, relief