

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2	DOCKET NUMBER (2) 0 5 0 0 0 3 6 1	PAGE (3) 1 OF 0 4
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TITLE (4)  
HPSI ISOLATION VALVES

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQ. NUMBER	REV. NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		
0 6	2 9	8 4	8 4	0 3 6	0 0 0 8	1 7	8 4		UNIT 3		
									DOCKET NUMBER(S) 0 5 0 0 0 3 6 2		
									0 5 0 0 0 1 1 1		

OPERATING MODE (9) 5

POWER LEVEL (10) 0 0 0

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

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A) <b>Informational Report</b>
20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME J. G. HAYNES, STATION MANAGER	TELEPHONE NUMBER AREA CODE: 7 1 4 4 9 2 - 7 7 0 0
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	B Q	I S V	T O 2 0	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (if yes, complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

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

This submittal provides an informational Licensee Event Report for a deficiency identified with the High Pressure Safety Injection (HPSI) motor operated loop isolation valves. On 2/27/84, HPSI isolation valve 3HV9327 failed to stroke more than approximately 20 percent stem travel when attempting to open the valve during performance of a surveillance on HPSI check valves. The valve's internals were replaced, and the valve was retested satisfactorily and restored to service. An analysis of the removed internals revealed excessive wear on the stem and retaining ring. A special test was developed to measure the amount of "free stem movement" to determine if other valves had also worn excessively. Two other valves (3HV9332 and 3HV9323) which were operating satisfactorily, were identified as having excessive "free stem movement." One other valve (2HV9326) subsequently failed to stroke more than 20 percent stem travel during performance of a surveillance on HPSI check valves.

Valves exhibiting excessive free stem movement were repaired, retested and returned to service. The remaining valves are determined to be operable and capable of performing their safety functions.

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LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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		YEAR	SEQ. NUMBER	REV. NUMBER		
		8   4	-   0   3   6	-   0   0	0   2	OF 0   4

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

This submittal provides an informational Licensee Event Report for a deficiency identified with the High Pressure Safety Injection (HPSI) motor operated loop isolation valves (EISS Component Identifier ISV). These valves are two-inch Y-pattern globe valves manufactured by Target Rock Corp. (Model Number 74R002).

On February 27, 1984, during the performance of a surveillance on HPSI check valves, isolation valve 3HV9327 failed to stroke more than approximately 20 percent stem travel when attempting to open the valve. An inspection of the valve's internals determined that 0.280 inches of "free stem movement" (FSM) existed between the stem and disc assembly. Normal FSM on a newly assembled valve would be below 0.025 inches.

An analysis was performed on the stem assembly from 3HV9327 which revealed excessive wear on the stem and retaining ring. The material of the stem and retaining ring on the subject valves is 17-4PH hardened stainless steel. Under high stress, this material is susceptible to galling. When the valve is opened under pressure, the stem rotates relative to the disc, because the differential pressure holds the disc against the seat, momentarily keeping the disc from rotating with the stem. Galling is most severe at the point of greatest stress (the bearing surface between the bottom of the retaining ring and the stem), and repeated openings under pressure results in wear. As wear increases, the disc and stem become misaligned, and, ultimately, the valve will not open. The valve's internals were replaced, and the valve was retested satisfactorily and restored to service.

Following the repair to 3HV9327, a failure analysis was conducted, including an evaluation by an independent consultant, which concluded that data was needed for similar valves, and a special test with the units in Modes 4 or 5 would be required. Since no previous failures had occurred on this type of valve, operations continued until the remaining valves could be examined. Special Test Procedure S023-SPE-0024 which measures FSM as an indication of potential internal wear, was developed for the purpose of assessing the condition of similar valves.

These special tests were then conducted on HPSI cold leg and hot leg injection valves on Units 2 and 3 on June 21, 26, 30 and July 2, 1984. The following FSM data was obtained at the conclusion of the testing.

Unit 2

Train A

2HV9324 - 0.042 inches  
 2HV9327 - 0.088 inches  
 2HV9330 - 0.084 inches  
 2HV9333 - 0.180 inches  
 #2HV9420 - 0.070 inches

Train B

\*2HV9326 - 0.250 inches  
 2HV9329 - 0.180 inches  
 2HV9332 - 0.085 inches  
 2HV9323 - 0.050 inches  
 #2HV9434 - 0.038 inches

\* FSM after replacement of valve internals - 0.041 inches.

# Hot leg injection valve

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

Unit 3Train A

3HV9324 - 0.112 inches  
 \*\*3HV9327 - 0.280 inches  
 3HV9330 - 0.170 inches  
 3HV9333 - 0.005 inches  
 #3HV9420 - 0.060 inches

Train B

3HV9326 - 0.135 inches  
 3HV9329 - 0.030 inches  
 \*\*\*3HV9332 - 0.320 inches  
 \*\*\*\*3HV9323 - 0.225 inches  
 #3HV9434 - 0.028 inches

- # Hot leg injection valve  
 \*\* FSM after replacement of valve internals - 0.025 inches  
 \*\*\* FSM after replacement of valve internals - 0.019 inches  
 \*\*\*\* FSM after replacement of valve internals - 0.040 inches

On June 21, 1984, during performance of a surveillance on HPSI check valves conducted in parallel with S023-SPE-0024 data gathering, 2HV9326 could not be stroked beyond approximately 20 percent stem travel. All other Unit 2 and 3 valves opened satisfactorily. However, based on the failure of 2HV9326 at 0.250 inches free stem movement, a criterion of 0.187 inches (75 percent of 0.250 inches) was established as the basis for repair. As a result, 3HV9323 and 3HV9332 were repaired in addition to 2HV9326. The stem assembly for 3HV9332 was replaced with a spare assembly. The retaining rings for 2HV9326 and 3HV9323 were redesigned using a different material alloy and shape to reduce wear. The valves were retested and restored to service.

An evaluation of the flow characteristics of the HPSI System with the reduced valve stroke was conducted. It was concluded that an average 0.187 inch stroke reduction (free stem movement) and subsequent flow reduction, is within the present safety analysis. The actual average stroke reduction is less than 0.187 inches, therefore, HPSI system flow remains acceptable.

The investigation was then expanded and the plant valve list was reviewed for similar valves which could show the same type degradation. Six additional valves per unit were identified as having a similar design. Two of the six valves are three-inch HPSI hot leg injection isolation valves (Model 74R003), and four are eight-inch Low Pressure Safety Injection (LPSI) System (EIIS System Identifier BP) isolation valves. Free stem movement test was conducted on each unit's HPSI hot leg injection valves, and the results are included in the FSM tabulation discussed above. Although some wear was observed, there was no significant reduction in flow, and these valves were considered acceptable for use. The free movement test will also be conducted each time a unit enters Mode 5 from Mode 1 on hot leg injection valves that have been stroked under differential pressure. The LPSI valves, although similar in design to the HPSI valves, were found to have significant differences. The stem and retainer ring surface area is greater, and the differential pressure across the valve is considerably less. Additionally, the disc is in a guide cage during its travel. No failures have occurred on these valves, and no corrective action is planned.

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In summary, valves exhibiting excessive FSM (3HV9327, 2HV9326, 3HV9332, 3HV9323) were repaired, retested and restored to service. We have also determined that the remaining valves are operable and capable of performing their safety functions.

As long-term corrective action, during the first refueling on each unit, stem assemblies on the model 74R002 valves will be replaced with stem assemblies of a different alloy which has a greater resistance to galling. Additionally, a new stem and retaining ring design will be used which increases the surface area and lowers stress levels. The 74R003 valve stem assemblies will also be replaced during a suitable subsequent outage. Until the stem assemblies have been replaced with the new design, the free stem movement testing in Procedure S023-SPE-0024 will be conducted each time a unit enters Mode 5 from Mode 1 on valves that have been stroked under differential pressure. Valves with FSM of greater than 0.187 inches will be repaired. Procedure S023-5-1.3 will be changed to include the performance of free stem movement test Procedure S023-SPE-0024 as part of the integrated system operation required to bring the plant from Mode 5 to Mode 3. In addition, Procedure S023-SPE-0024 will be changed to include the criterion of 0.187 inches free stem movement as the basis for valve repair.

We are confident the actions taken are adequate to ensure and maintain the operability and reliability of the HPSI System until the new redesigned stem assemblies are installed.



*Southern California Edison Company*

**SCE**

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STATION MANAGER

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August 17, 1984

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

Subject: Docket No. 50-361  
Information Report  
Licensee Event Report No. 84-036  
San Onofre Nuclear Generating Station, Units 2 and 3

This submittal provides an informational Licensee Event Report (LER) for an occurrence involving the High Pressure Safety Injection System. Neither the health and safety of plant personnel nor the public were affected by this event.

If you require additional information, please so advise.

Sincerely,

*J.G. Haynes/wem*

Enclosure: LER No. 84-036

cc: A. E. Chaffee (USNRC Resident Inspector, Units 1, 2 and 3)  
J. P. Stewart (USNRC Resident Inspector, Units 2 and 3)

J. B. Martin (USNRC, Regional Administrator)

Institute of Nuclear Power Operations (INPO)

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