NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

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LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Palo Verde Nuclear Generating Station-Unit 1	05000528	1 OF 6

TITLE (4)

Missed ECCS Surveillance Requirement Due to Procedure Non-compliance

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 NAME	DOCKET NUMBER
10	27	1996	1996	- 009 -	00	08	18	1999	N/A	
									FACILITY NAME	DOCKET NUMBER
									N/A	

OPERATING MODE (9)	3
POWER LEVEL (10)	0

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

	20.2201(b)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)
	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)		50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Daniel G. Marks, Section Leader, Nuclear Regulatory Affairs	623-393-6492

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	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 15 single-spaced typewritten lines) (16)

On July 8, 1999 with Unit One operating in MODE 1, Power Operation, at approximately 100 percent power, engineering personnel identified that a Technical Specification violation may have occurred due to a missed surveillance test. During the Unit 1 October 1996 refueling outage, modification activities were performed on a high pressure safety injection motor operated valve that inadvertently affected the flow characteristics of the system by setting limit switches to the incorrect setpoint band. The condition was not recognized at the time and the Surveillance Requirement for performing an emergency core cooling system flow balance test following maintenance that affected the system flow characteristics was not met. On July 20, 1999, Regulatory Affairs determined a violation had occurred on October 27, 1996 at approximately 1654 MST when Unit 1 was in Mode 3, Hot Standby, with pressurizer pressure at 1837 psia at which point both trains of high pressure safety injection were required to be Operable.

The system flow characteristic was restored when the affected valve limit switches were properly set on June 8, 1999 however, it was not determined that a Technical Specification violation had occurred until July 20, 1999. The change in system flow characteristics was minimal and the system remained capable to perform its required functions.

1. REPORTING REQUIREMENT(S):

This LER (50-528/96-009-00) is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(B), to report a condition prohibited by the Technical Specifications (TS) which occurred on October 27, 1996. Specifically, TS Surveillance Requirement (SR) 4.5.2.h required a flow balance test be performed following completion of modifications to the ECCS subsystems that alter the subsystem flow characteristics. A modification to a high pressure safety injection cold leg injection valve that affected the subsystem flow characteristics was made in October 1996 however, the required flow balance test was not performed.

2. DESCRIPTION OF STRUCTURE(S), SYSTEM(S) AND COMPONENT(S):

The emergency core cooling system (ECCS)(EIIS:BP) is divided into two subsystems; high pressure safety injection (HPSI)(EIIS:BQ) and low pressure safety injection (LPSI)(EIIS:BP), to provide core cooling and negative reactivity to ensure that the reactor core is protected after certain accidents. Control valves (EIIS:FCV) and orifices (EIIS:OR) are used to balance the flow to the reactor coolant system (RCS)(EIIS:AB). This flow balance directs sufficient flow to the core to meet the analysis assumptions following a Loss of Coolant Accident in one of the RCS cold legs.

The HPSI cold leg injection flow control valves use a Limitorque motor actuator on a Borg Warner globe valve.

There were no structures, components, or systems that were inoperable at the start of the event that contributed to the event.

3. INITIAL PLANT CONDITIONS:

On October 27, 1996, Unit One was in Mode 3, Hot Standby, and in the process of start-up following a refueling outage. RCS temperature was being increased from 350 degrees to normal operating temperature and RCS pressure was approximately 1837 psia and increasing in support of the plant start-up.

4. EVENT DESCRIPTION:

On June 8, 1999, during routine preventive maintenance, valve services maintenance personnel found the limit switch (EIIS: ZIS) settings for rotors 1 and 3 on valve 1JSIAUV0647 out of the setpoint band specified in design drawing 01-J-ZZI-004. A corrective action document was initiated (CRDR 190103) to evaluate the as found condition. The evaluation concluded the deficiency

occurred during the Unit 1 6th refueling outage in October 1996, when a design modification was performed to install a new valve operator and install a modification kit to change the stem from a rising-rotating stem to a rising non-rotating stem on HPSI valve 1JSIAUV0647.

The evaluation discovered that on day shift October 11, 1996, during post-modification installation design validation testing, it had been determined that limit switch rotor 1, used to de-energize the actuator in the open direction, could not be set into the new setpoint band specified in the modification. Valve design engineering personnel were contacted and a new setpoint was provided and installed however, no documentation has been found that approved this change. After the night shift arrived it was determined that the setpoint specified in the modification documents was not in error but that the valve stroke length was not per the requirements of the design modification. The valve stem and bonnet assembly supplied by the vendor had a stroke length that was approximately .875 inches instead of the specified design stroke length of 1-inch.

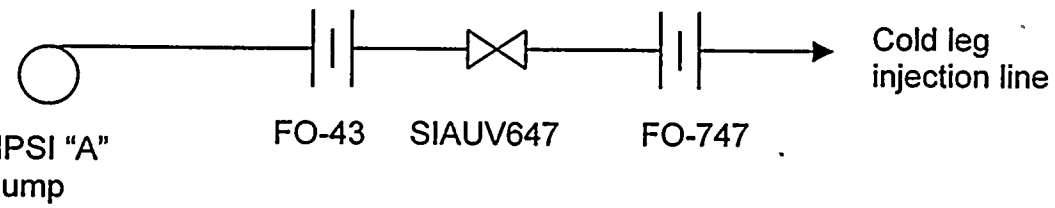
The problem with the valve modification kit was the valve open backseat shoulder of the stem contacted the bonnet backseat before the valve could travel the full design stroke. Valve design engineering personnel contacted the vendor and it was determined that the vendor inadvertently cut the stem backseat shoulder to the wrong dimension. The decision was then made to restore the valve to a 1-inch travel, which required the removal of the valve actuator and the installation of a machined valve stem and bonnet assembly. The valve actuator was then reinstalled on October 14, 1996, however, the valve limit switches were not adjusted to the original modification setpoints that would allow the valve to travel the full 1 inch stroke, which resulted in the valve having an approximately 0.8 inch stroke. It was not recognized that the valve had not been restored to the 1-inch stroke length.

The correct limit switch setpoints were installed on June 8, 1999, at the time of discovery of the setpoint deficiency. The condition was not recognized as being a reportable condition until the system engineer identified that a TS violation may have occurred during the time the HPSI valve had a short valve stroke. This was based on the TS Surveillance Requirement (SR) 4.5.2.h and an APS internal letter stating that a modification to the ECCS system flow characteristics exists any time the flow resistance coefficient (Cv) of a fixed valve in the ECCS system is changed. On July 20, 1999 Regulatory Affairs personnel determined that a condition prohibited by the TS had occurred on October 27, 1996 and an LER was required to be submitted.

5. ASSESSMENT OF SAFETY CONSEQUENCES:

System engineering personnel evaluated the impact of the shortened valve stroke on the HPSI subsystem performance and determined that the as-found condition of 1JSIAUV647 would not have

significantly affected system performance. The HPSI flow is actually controlled by orifice plates installed on either side of the cold leg injection valves. The orifices associated with SIAUV647 are FO-43 and FO-747. FO-43 is approximately .75 in diameter (0.44 square inches) and FO-747 is approximately 1" in diameter (0.78 square inches). The purpose of the installed orifice plates is to limit HPSI flow so that a cold leg pipe rupture would still allow approximately 3/4 of the total HPSI flow to be delivered through the 3 intact cold legs. (The flow area of SIAUV647 was estimated to be approximately 4.52 square inches).



The current (performed in April 1998) HPSI Pump and Check Valve Full Flow Test results were reviewed. This test manually throttles the four cold leg injection train valves as evenly as possible to achieve a flow rate of 1040 gpm. At this flow rate the differential pressure is measured and is used for trending pump degradation. These test results show that the SIAUV647 short stroke condition did not prevent the full flow testing conditions from being achieved.

Similarly, the dynamic MOV test results from before and after the modification were reviewed. This test strokes the HPSI cold leg injection valves individually with the HPSI pump running while monitoring various valve and system parameters. The documented flow in April 1993, (pre-mod) was 404 gpm (when flow instrument is corrected for temperature) and in November 1996, (post-mod) was 400 gpm.

ECCS Flow Balance Test results were reviewed for the last HPSI "A" test performed in Unit 1. These test results demonstrated that the maximum flow rate expected out of SIAUV647 during cold leg injection is 272 gpm. The full flow tests performed demonstrated that at least 260 gpm can be achieved. Worst case then is that the short stroke condition may have reduced flow by 12 gpm.

The minimum required cold leg injection flow rate is 950 gpm as credited in the large break and small break LOCA analyses. It is assumed that a guillotine break occurs in one of the injection lines and therefore only three-fourths of the total minimum HPSI flow reaches the core. Consequently, an actual HPSI delivered flow of greater than 712.5 gpm must be met. An Evaluation of Allowable Leak

Rate Test Criteria for the HPSI pump discharge check valves documented that a 12 gpm HPSI flow diversion is acceptable. In addition, the HPSI System Performance Evaluation and Surveillance Requirement Basis documents the required cold-leg injection flow rate to satisfy Technical Specification requirements is 781 gpm which represents three-fourths of the total flow. Development of the minimum delivered flows and specification of the pump and system performance requirements is predicated on a maximum system leakage of 20 gpm and degraded diesel generator frequency of 0.3 Hz.

Conclusion:

A conservative estimate of 12 gpm flow degradation (engineering believes the actual degraded flow is less) as a result of a short stroke for SIAUV647 did not impact the safety analysis. If the SIAUV647 flow is assumed to be 260 gpm and added to the next 2 lowest flow cold legs the total flow is 808 gpm which is greater than the specified flow of 781 gpm that includes a conservative assumption of 20 gpm for system leakage.

6. CAUSE OF THE EVENT:

An independent investigation of this event is being conducted in accordance with the APS corrective action program. Although additional investigative activities remain to be completed, a preliminary evaluation has determined the apparent cause to be human error in that personnel (other utility personnel) revised setpoint documents in a manner that was not per approved procedures and which bypassed programmatic barriers that would have identified the problem.

No unusual characteristics of the work location (e. g., noise, heat, poor lighting) directly contributed to the event.

7. CORRECTIVE ACTIONS TO PREVENT RECURRENCE:

On June 8, 1999 the setpoint for the limit switches for valve 1SIAUV647 were corrected to allow the valve to achieve a 1-inch stroke length. This returned the HPSI subsystem flow characteristics to the pre-modification condition and removed the necessity to perform an ECCS flow balance test. Any additional corrective actions identified by the investigation will be input and tracked in the Corrective Action Tracking System for CRDR 990835.

If information is subsequently developed that would significantly affect the readers' understanding or perception of this event, a supplement to this LER will be submitted.

8. PREVIOUS SIMILAR EVENTS:

Although previous events involving missed surveillance tests have been reported in the last three years, none involved the inadvertent change of a system that lead to a missed surveillance requirement.

9. ADDITIONAL INFORMATION:

It should be noted that APS implemented Improved Technical Specifications in August 13, of 1998 and that the surveillance requirement for performing an ECCS flow balance is no longer in the TS. The requirement to perform a flow balance is contained in the Technical Requirements Manual. In this particular event the low safety significance of the shortened valve stroke would not have met the threshold of a reportable condition if the condition occurred today.