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AUTH.NAME AUTHOR AFFILIATION
SHRIVER,T.D. Arizona Nuclear Power Project (formerly Arizona Public Serv
HAYNES,J.G. Arizona Nuclear Power Project (formerly Arizona Public Serv
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SUBJECT: LER 88-014-01:on 880210,main steam safety valve setpoints
discovered out of tolerance.

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NOTES:Standardized plant. 05000528

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NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Palo Verde Unit 1	0 5 0 0 0 5 2 8	1 OF 0 9

TITLE (4)
Main Steam Safety Valve Setpoints Discovered Out Of Tolerance

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)
									Palo Verde Unit 2	0 5 0 0 0 5 2 9
0 2	1 0	8 8	8 8	– 0 1 4 –	0 1	0 4	2 5	8 9	N/A	0 5 0 0 0

OPERATING MODE (9): 1
POWER LEVEL (10): 1 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)	[X] 50.73(a)(2)(vii)	[ ] OTHER *(Specify in Abstract below and in Text, NRC Form 366A)*
[ ] 20.405(a)(1)(iii)	[X] 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	TELEPHONE NUMBER (AREA CODE)
Timothy D. Shriver, Compliance Manager	6 0 2 3 9 3 - 2 5 2 1

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

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

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

EXPECTED SUBMISSION DATE (15): MONTH | DAY | YEAR

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

During the period of February 12 through the 14, 1988, regularly scheduled ASME surveillance testing was conducted in Palo Verde Unit 2 to verify the relief settings of the Main Steam Safety Valves (SB)(RV). The results indicated that seventeen (17) of the twenty (20) valve relief settings were out of the tolerance limits specified in Technical Specification (TS) 3.7.1.1 and the testing requirements established by ANPP. Further investigation revealed that similar setpoint drifts were identified in Unit 1 during testing conducted on September 26 through 30, 1987.

Because of the variances identified in the as found data of the setpoints, a definitive root cause can not be identified. However, it has been determined that the permanent removal of lagging around the area of the valves' springs contributed to the setpoint drift.

As corrective action the valves have been reset and appropriate testing conducted.

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Palo Verde Unit 1	0 5 0 0 0 5 2 8	8 8	— 0 1 4	— 0 1	0 2 OF 0 9

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

This supplement is provided to revise the corrective actions described in Section III. Changes in plant conditions in Unit 3 (Reference Unit 3 LER 89-001-00) precluded testing prior to the refueling outage.

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions

Palo Verde Units 1 and 2 are two-loop pressurized water reactors (PWR). Each loop has a vertical U-tube steam generator (SG) with two outlet main steam lines (SB). Overpressure protection for the shell side of the steam generators and the main steam line up to the inlet of the turbine (TG) stop valve (SHV) is provided by twenty flanged, spring-loaded, direct acting, ASME Code safety valves (RV) which have open bonnets and discharge to the atmosphere. These safety valves are mounted on each of the main steam lines (SB) upstream of the steam line isolation valves (ISV) but outside the Containment (CTMT). The opening pressure of the valves is set in accordance with ASME Code and Technical Specification allowances. The valves are set to lift sequentially at 1250, 1290, and 1315 psig.

The main steam safety valves are required to be tested once per five (5) years. The testing is conducted utilizing an approved surveillance test procedure. The surveillance test procedure verifies by in-line testing that the set pressure and operation of the main steam safety valves are acceptable for continued service. The testing described herein was conducted utilizing the Furmanite Trevitest Method. The general principle involves utilizing hydraulic force to assist in overcoming the closing force of the valve spring. The applied force is measured, recorded, and analyzed to determine lift point settings. In order to have an acceptable test by current procedural requirements, it is necessary to have three (3) consecutive lifts within plus or minus one (1) percent of the given set pressure of the valve. The testing sequence involves declaring a safety valve inoperable, installing the testing device, and then testing until three consecutive, acceptable lifts are performed. If three consecutive, acceptable lifts cannot be made, the appropriate adjustments are made until the acceptance criteria can be satisfied. After three successful lifts are performed, the valve is returned to service. The process of testing, adjusting (where necessary) and testing until satisfactory results are achieved normally encompasses less than four (4) hours per valve. During the testing, the number of inoperable safety valves is maintained in accordance with Technical Specification Table 3.7-2.

On March 1, 1988 at approximately 1500 MST, engineering personnel (utility, licensed and non-licensed) were reviewing data obtained from main steam safety valve testing conducted in Unit 2 from February 12 through 14, 1988. During this review, it was noted that the "as-found" relief setpoint for sixteen (16) of the twenty (20)

safety valves did not meet Technical Specification acceptance criteria limits. Based upon this review, it was preliminarily determined that the event was potentially reportable in accordance with the guidelines provided in NUREG-1022. Specifically, it was determined that the event described herein was similar to example (f) on page 12, Section V of NUREG-1022. Consequently, this event was preliminarily evaluated to be reportable pursuant to 10CFR50.73(a)(2)(ii) (i.e. a condition that resulted in the plant being in an unanalyzed condition). A reportability evaluation document was then initiated for further action as appropriate.

In accordance with approved procedural controls, Compliance department personnel (utility, non-licensed) investigated to determine the reportability of the main steam safety valves being found out of tolerance during surveillance testing. As a result of this investigation, it was determined that the event was "not reportable" as required by 10CFR50.73(a)(2)(ii). This determination was based upon the fact that the maximum number of safety valves inoperable at any given time was maintained within allowable limits (since a safety valve discovered to be out of tolerance during testing is returned to an acceptable configuration prior to returning it to an operable status and proceeding to the next valve). This is consistent with the reportability guidelines provide in NUREG-1022. NUREG-1022, Supplement No. 1, Answer to Question 2.3 states, "In general, for evaluating the reportability of situations found during surveillance tests, it should be assumed that the situation occurred at the time of discovery, unless there is firm evidence to believe otherwise. For example, if a standby component with a 7-day LCO is found to be inoperable because it was assembled improperly during the maintenance conducted 30 days previously, then there is firm evidence that it had been inoperable for the entire 30 days, and a LER is required." Since firm evidence to believe that the out of tolerance situation had occurred prior to discovery could not be established, the situation was initially evaluated to be "not reportable." This evaluation also concluded that the event was not reportable pursuant to 10CFR50.73(a)(2)(i)(B) or 50.73(a)(2)(vii) since the plant had not operated in a condition prohibited by the Technical Specifications and a single cause or condition could not be determined to have rendered the safety valves inoperable.

This event was determined to be "not reportable" pursuant to 10CFR50.73(a)(2)(v) as a condition that alone could have prevented the fulfillment of a safety function since the safety valves could have performed their safety function even with the out of tolerance setpoints. The main steam safety valves are provided to ensure that steam generator (SG) pressure remains within 110 percent of design pressure. Design pressure is 1270 psia. Based upon the sequential lifting arrangement for the main steam safety valves and since none of the safety valve setpoints were discovered to be above 1397 psia,

it was determined that there was no potential affect on steam generator integrity. For the same reason, this event was further determined to be "not reportable" in accordance with 10CFR50.73(a)(2)(ii) as a condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly compromised plant safety.

Based upon the results of the preliminary evaluation described above, Compliance personnel determined that the safety valves being found out of tolerance was a non-reportable situation. However, investigation into this event continued. The continued investigation revealed that the event was reportable.

At the time of event discovery (i.e. when it was determined that the event described herein was reportable) on May 23, 1988, Palo Verde Unit 2 was in Mode 5 (COLD SHUTDOWN) at approximately 87°F. At the completion of main steam safety valve testing on February 14, 1988, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) operating at approximately 97 percent power.

The situation described herein was also identified to have occurred in Unit 1. At the time of event discovery, Unit 1 was in Mode 1 at approximately 100 percent power. At the completion of main steam safety valve testing on September 29, 1987, Unit 1 was in Mode 1 at approximately 97 percent power.

B. Event description (Including dates and approximate times of major occurrences and initial plant conditions)

Event Classification: Condition Prohibited by the Plant's Technical Specifications. Condition Which Caused Two Independent Trains to Become Inoperable In a Single System.

On May 23, 1988, engineering department personnel (utility, non-licensed) completed a root cause evaluation which identified that the permanent removal of insulation from the Unit 2 main steam safety valves' spring area contributed to the setpoints changing on sixteen (16) of the twenty (20) safety valves. Based upon this preliminary engineering evaluation, Compliance Department personnel determined that the setpoints being found out of tolerance in Unit 2 was reportable pursuant to 10CFR50.73.

The engineering determination was based upon a review of an approved site modification which prescribed that the insulation be removed concurrently with the removal of the valves' manual lifting device. The lifting device was being removed as a prudent measure since it had earlier been identified in Inspection and Enforcement Notice 84-33 that a manual lifting device had caused a safety valve to stick open. The insulation was being removed based upon the original equipment manufacturer's recommendations. As a result of the

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

engineering evaluation, it was determined that the main steam safety valve settings would be affected by the insulation removal.

Assuming that the lagging removal was the cause of the valve setpoints being outside the specified parameters, there was the potential that the valves were inoperable prior to February 12 through 14, 1988 when they were tested and reset. Based upon this assumption, Palo Verde Unit 2 is considered to have operated in a condition prohibited by Technical Specification 3.7.1.1. Additionally, it would be assumed that the lagging removal resulted in a condition which caused two independent trains to become inoperable in the main steam safety valve relief system.

Based upon a review of the actual test results, seventeen (17) of twenty (20) safety valves' setpoints were out of tolerance; thirteen (13) were discovered with setpoints above specifications and four (4) were discovered with setpoints below specifications. The following information is provided concerning the Unit 2 safety valves:

° Three (3) safety valves' relief setpoints were acceptable with no problems noted.

° Eleven (11) safety valves' relief setpoints were discovered out of tolerance upon initial testing and required adjustment.

° Three (3) safety valves' relief setpoints were discovered out of tolerance on the initial lift; however, no adjustments were necessary since subsequent lifts were within limits.

° Three (3) safety valves' relief setpoints were discovered acceptable on the initial lifts; however, subsequent lifts were out of tolerance and adjustments were necessary in order to obtain three consecutive, acceptable lifts.

During the investigation of the event described above, a similar condition was identified in Palo Verde Unit 1. Investigation revealed that the insulation in Unit 1 had been removed on August 31, 1987 as a result of implementing the site modification described above. Therefore, it is assumed that the valves were inoperable for approximately twenty-six (26) to thirty (30) days until the valves were retested and reset on September 26 through 30, 1987.

During scheduled ASME surveillance testing conducted in Unit 1 September 26 through 30, 1987, fourteen (14) of the twenty (20) safety valves' setpoints were discovered out of tolerance; nine (9) were discovered with setpoints above limits and five (5) were discovered with setpoints below limits. The following information is provided concerning the Unit 1 safety valves:

- Six (6) safety valves' relief setpoints were acceptable with no problems noted.

- Seven (7) safety valves' relief setpoints were discovered out of tolerance upon initial testing and required adjustment.

- Four (4) safety valves' relief setpoints were discovered out of tolerance on the initial lift; however, no adjustments were necessary since subsequent lifts were within limits.

- Three (3) safety valves' relief setpoints were discovered acceptable on the initial lifts; however, subsequent lifts were out of tolerance and adjustments were necessary in order to obtain three consecutive, acceptable lifts.

C. Status of structures, systems, or components that were inoperable at the start of the event which contributed to the event:

Other than the main steam safety valves, no structures, systems, or components were inoperable which contributed to the event.

D. Cause of each component or system failure, if known:

Not applicable - no failures were involved.

E. Failure mode, mechanism, and effect of each failed component, if known:

Not applicable - no failures were involved.

F. For failures of components with multiple functions, list of systems or secondary functions that were also involved:

Not applicable - no failures were involved.

G. For failures that rendered a train of a safety system inoperable, estimated elapsed time from the discovery of the failure until the train was returned to service:

Not applicable - no failures were involved.

H. Method of discovery of each component or system failure or procedural error:

There were no failures involved. The procedural errors involved (discussed in item I. below) were discovered as a result of the investigation into this event.

I. Cause of Event:

As discussed in Section B, the as found data of the safety valve settings was inconsistent and did not establish a pattern which could be attributed to a single root cause. The engineering evaluation did identify that a change in the temperature of the spring has a direct impact on the spring constant. The spring constant is directly proportional to the modulus of elasticity which is affected by the temperature of the material. As temperature increases, the modulus of elasticity decreases, which results in a "softer" spring. Stratification of the temperatures of the valve parts has an impact on the set pressure. A calculation indicates that the spring temperature change as a result of the lagging removal experienced at Palo Verde changed the setpoints by approximately 1.4 percent. This setpoint differential produces a lift pressure increase of approximately 1.4 percent which is beyond the maximum allowed by Technical Specifications (+/- 1 percent). ANPP believes that this factor in conjunction with other factors such as the potential of normal spring relaxation, and the tolerance of the testing equipment combined to affect the results identified during the valve testing.

ANPP considers that the calculated 1.4 percent variance due to the insulation removal could have caused the valves to exceed their one percent tolerances, therefore, this event is considered reportable. However, there are other factors which have a predominate effect on a safety valve's setpoint as described above. This is evidenced by the observed variation in with the safety valves' as found settings. Therefore as discussed, the root cause of the safety valves' setpoints being discovered out of tolerance can not be definitively established.

During the investigation of this event, two (2) additional items were identified which are addressed in the corrective actions described in Section III.

The final modification package issued to remove the hand lifting device and the lagging from the spring area did not include retest instructions. As discussed in Section I the removal of the lagging could potentially affect the relief valve settings. Therefore, the modification instructions should have included directions to perform the appropriate retests to ensure that the proper settings were maintained. This is considered a cognitive personnel error (utility, licensed, non-licensed). The omission of the retest requirements was contrary to approved procedures. The procedural controls have been evaluated and are considered adequate. There were no unusual characteristics of the work location that contributed to the event.

Also during the investigation, it was identified that the lagging around the valve spring area had been removed prior to the implementation of the modification in Unit 2. Investigation into

this aspect of the event is continuing. If additional information is discovered that would alter the information contained within this report or require additional corrective actions, a supplement to this report will be submitted.

J. Safety System Responses:

No safety system responses occurred and none were necessary.

K. Failed Component Information:

Although there were no failed components associated with this event the following data is provided for your information:

Manufacturer: Dresser Valve and Controls Division
Dresser Industries, Inc.

Model No: 6" 3707R Consolidated Main Steam Safety Valves

II. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:

There were no safety consequences or implications resulting from this event. As described above, the safety valves are intended to provide overpressure protection for the secondary side of the steam generators and main steam lines up to the main steam isolation valves (MSIV). The safety valves' protective function is to ensure that steam generator pressure remains within 110 percent of design pressure. None of the safety valves' setpoints were discovered to be above 110 percent of steam generator design pressure and the sequential lifting scheme will ensure that steam generator integrity is not compromised. Additionally, if an event occurred which did not require closure of the MSIV's, overpressure protection could have been provided by the Steam Bypass Control System. For the events which would have required operation of the main steam safety valves, there are no other components or systems which could have performed the same function as the main steam safety valves.

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III. CORRECTIVE ACTIONS:

A. Immediate:

As immediate corrective action, the safety valves' relief setpoints were adjusted to within tolerance limits and returned to service.

Additionally, an investigation was conducted to determine if the condition described herein existed in Unit 3. Based upon this investigation, it was determined that the insulation in the area of the springs had not been installed in the same manner as in Units 1 and 2. Therefore, this condition was determined not to be applicable to Unit 3.

B. Action to Prevent Recurrence:

As discussed in Section I.A, the required ASME test interval for the safety valves is on a five (5) year cycle. In order to obtain additional data for performance evaluation and to ensure continued operability, the valves will be tested in Units 1, 2, and 3 prior to or during each unit's next refueling outage.

In response to unrelated events, an overall enhancement program was developed in the engineering areas and is being implemented in stages consistent with previously established schedules. Additionally, administrative controls for the development of retests have been implemented. The personnel errors which are described in Section I.I occurred prior to the implementation of the engineering enhancement program and retest procedures. APS considers that these corrective actions are adequate in preventing this type of event.

IV. PREVIOUS SIMILAR EVENTS:

There have been no previous similar events reported involving main steam safety valves being found out of tolerance.

Arizona Nuclear Power Project
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

192-00473-JGH/TDS/DAJ
April 25, 1989

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

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528 (License NPF-41)
Licensee Event Report 88-014-01
File: 89-020-404

Attached please find Supplement No. 1 to Licensee Event Report (LER) No. 88-014-00 prepared and submitted pursuant to the requirements of 10CFR 50.73. In accordance with 10CFR 50.73(d), we are herewith forwarding a copy of this report to the Regional Administrator of the Region V Office.

If you have any questions, please contact T. D. Shriver, Compliance Manager at (602) 393-2521.

Very truly yours,

JG Haynes

J. G. Haynes
Vice President
Nuclear Production

JGH/TDS/DAJ/kj

Attachment

cc: D. B. Karner (all w/a)
E. E. Van Brunt, Jr.
J. B. Martin
T. J. Polich
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