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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
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 89-005-00:on 890412,atmoshpere dump valve deficiencies noted.Caused by excessive leakage.W/890417 ltr.

W/8 ltr.

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NOTES:Standardized plant. 05000528

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	REG FILE 02	1	1	REGION 1	1	1
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EXTERNAL:	EG&G WILLIAMS,S	4	4	FORD BLDG HOY,A	1	1
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	LPDR	1	1	NRC PDR	1	1
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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)

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TITLE (4): Atmospheric Dump Valve Deficiencies

EVENT DATE (5) MONTH	DAY	YEAR	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	REPORT DATE (7) MONTH	DAY	YEAR	OTHER FACILITIES INVOLVED (8) FACILITY NAMES	DOCKET NUMBER(S)
0 4	1 2	8 9	8 9	— 0 0 5 —	0 0	0 4	1 7	8 9	Palo Verde Unit 2	0 5 0 0 0 5 2 9
									Palo Verde Unit 3	0 5 0 0 0 5 3 0

OPERATING MODE (9): 4

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)	[X] 50.73(a)(2)(vii)	[X] OTHER (Specify in Abstract below and in Text, NRC Form 366A)
[ ] 20.405(a)(1)(iii)	[ ] 50.73(a)(2)(i)	[ ] 50.73(a)(2)(viii)(A)	10CFR21
[ ] 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)

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

EXPECTED SUBMISSION DATE (15): MONTH 0 6 DAY 1 5 YEAR 8 9

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

On April 12, 1989 APS completed an evaluation of a deficiency identified by the manufacturer of the PVNGS Units 1, 2, and 3 Atmospheric Dump Valves (ADV's). The ADV's are manufactured by Control Components Incorporated (CCI). Based upon APS' evaluation, it was determined that the deficiencies reported by CCI constituted a reportable condition pursuant to 10CFR21 and consequently 10CFR50.72 and 73.

On April 4, 1989, CCI notified APS that an evaluation had been performed and that excessive internal valve leakage could result in the inability to remotely or manually operate the PVNGS ADV's. The cause of the excessive leakage is the result of an internal piston ring which fails to seat. Excessive leakage by the piston ring results in high internal pressures which would preclude opening of the valve.

A supplement to this report will be submitted to detail the final corrective actions developed as a result of APS's ongoing investigation.

No previous similar events have been reported pursuant to 10CFR50.73.

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This report is also being provided pursuant to the provisions of 10CFR21. The narrative below includes information requested by 10CFR21(b)(3); however, it is formatted to report this event in accordance with the requirements of 10CFR50.73.

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

The following plant conditions existed when the event described in this LER was determined to be reportable at approximately 1254 MST on April 12, 1989.

Palo Verde Unit 1 was in Mode 4 (HOT SHUTDOWN) at approximately 2000 pounds per square inch (psi) and 325 degrees Fahrenheit (F).

Palo Verde Unit 2 was in Mode 3 (HOT STANDBY) at normal operating temperature and pressure.

Palo Verde Unit 3 was in Mode 6 (REFUELING) at approximately 82 degrees F.

B. Reportable Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification: Condition which could have prevented the fulfillment of a safety function.

Note: This section includes information requested by 10CFR21 concerning the nature of the defect and dates for which information was obtained/developed.

On April 12, 1989 at approximately 1254 MST Arizona Public Service (APS) determined that deficiencies identified by the manufacturer of the PVNGS Unit 1, 2, and 3 Atmospheric Dump Valves (ADV)(SB)(V) constituted a reportable condition pursuant to 10CFR21 and 10CFR50.73.

On March 3, 1989, a Palo Verde Unit 3 reactor trip occurred from approximately 98 percent power (Reference Unit 3 LER 530/89-001-00). Following the reactor trip, Control Room personnel (utility, licensed and non-licensed) attempted to remove decay heat and control steam generator (AB)(SG) pressure utilizing the Atmospheric Dump Valves (ADV's)(SB)(V). Control Room personnel could not remotely operate the ADV's from the Control Room or Remote Shutdown Panel. Heat removal was subsequently established by manually opening the ADV's.

Because of the ADV problems encountered during the Unit 3 reactor trip event, APS engineering personnel have been conducting an extensive evaluation of the ADV design and operation. The original equipment manufacturer, Control Components Incorporated (CCI), has been assisting during the APS evaluation. On April 4, 1989 CCI sent a letter to APS providing notification that a "potential significant deficiency" existed with the ADV design. Following receipt of this information, APS conducted an evaluation pursuant to 10CFR21 to determine the reportability of the information contained in the CCI notification. Further information was received from CCI on April 10, 1989 informing APS that local manual operation of the ADV's would not be possible if the deficient condition were to occur.

On April 12, 1989, PVNGS Engineering completed the evaluation and determined that the deficiency identified by CCI constituted a reportable condition.

The following discussion is intended to assist the reader in understanding the ADV's principle of operation. The disk stack (Figure 1) permits changes in flow rate while limiting flow velocity through the control element. The disk stack consists of a number of disks into which labyrinth flow passages have been etched to allow a fixed impedence. Impedence in the passages is developed by a series of right-angle turns, with a specific number of turns in each passage to limit the velocity to an acceptable level. Since each disk has a known flow capacity, flow through the control element can be accurately measured and controlled. The position of the plug within the disk stack bore determines flow by exposing more or fewer disk passages.

With the valve in the closed position, upstream pressure fills the chamber above the plug by way of a controlled leak across the piston ring. This provides a seating load equal to the inlet pressure times the full area of the plug.

When a signal to open the valve is received, the actuator lifts the stem, opening the pilot seat which results in the chamber pressure above the plug equalizing with the downstream pressure. Upstream pressure acts upon the differential plug area and provides an axial biasing force which causes the plug to remain on the main seat.

As the valve stem continues to move in the opening direction, the pilot valve shoulder engages the plug to lift it off the main seat. The axial biasing force causes these opposing faces to remain in contact under all operating conditions.

When the plug is in the modulated mode, biasing force provided by

pressure acting on the differential area overcomes fluctuating pressures from the fluid jets exiting the disk stack.

When a signal to close the valve is received, the actuator moves the stem in the closing direction. The biasing force on the plug causes it to follow the stem until the main seat is contacted. The actuator then seats the pilot section. Controlled leakage by the piston ring then fills the chamber above the plug providing additional seating force.

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

Other than the ADV problems discussed in this LER, there were no structures, systems, or components inoperable at the start of the event which contributed to the event.

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

Note: This section includes information requested by 10CFR21 concerning the nature of the defect and dates for which information was developed.

As a result of the ADV malfunctions experienced at Unit 3, APS engineering contracted with CCI to assist in the root cause investigation. The Unit 1, 2, and 3 ADV's were tested in accordance with approved test instructions. The purpose of the testing was to determine the force involved in the operation of the ADV's and to characterize the positioner operation at normal operating temperature and pressure. The results of the testing are summarized below:

1. Test Results

Unit 1

ADV 184 was the first valve to be tested on March 14, 1989 using nitrogen gas supply at 95 psig. The valve did not stroke when given up to a 50 percent open demand signal. A bonnet pressure tap was not installed at this time which made the valve malfunction difficult to analyze.

Following the malfunction of ADV 184, one operable ADV was required to allow Unit 1 to remain in Mode 3 for completion of additional testing. ADV 179 was tested on March 16, 1989 and given 10 percent incremental open demand signals up to 50 percent. Nitrogen was used to stroke the valve with an initial pressure of 93 psig. It stroked very smoothly and followed within 6 percent of the demand signal. As a result

of this test, ADV 179 was confirmed to be operable.

On March 18, 1989, ADV 178 was given both incremental and step demand signals initially using nitrogen at 95 psig. As the valve opened through the disk stack transition region (approximately 15 to 20 percent open) it oscillated between 20 and 60 percent for several seconds. During this test, a close signal was given to the valve and the valve closed. After repeated testing, it was observed that the ADV did not oscillate, but would stroke relatively smoothly. The testing of ADV 178 was repeated using instrument air at normal supply pressure; all strokes were smooth, and no oscillations were observed.

ADV 185 experienced substantial oscillations when originally tested using nitrogen supply. During the first testing on March 18, 1989, a 20 percent open demand signal was given and the valve oscillated and closed. During additional testing the valve exhibited damped oscillation. It was observed that the more the valve was exercised, the more smoothly it would stoke. The valve was manually stroked and then observed to operate smoothly. ADV 185 testing was repeated using instrument air; all cycles were smooth, the valve closely followed the input demand signal.

A second attempt to test ADV 184 was made on March 21, 1989 using instrument air. This time ADV 184 began to open when given a 30 percent demand signal, but quickly shut on its own. A 40 percent demand signal was then applied. The valve oscillated slightly, then opened 40 percent. The test was repeated several more times to a maximum open signal of 50 percent. Each time the valve stroked smoothly.

Unit 2

All Unit 2 ADV's were stroked utilizing nitrogen at normal pressure (95 psig) and most utilizing instrument air at approximately 110 psig. A total of 22 tests were performed stroking the ADV's to 20 percent or more. No oscillations were observed and no instances occurred wherein the valves did not open.

Unit 3

Unit 3 ADV's with the exception of 179 were stroked utilizing nitrogen after the plant had been cooled down in Mode 5. (ADV 179 could not be tested since the actuator was damaged following the March 3, 1989 Unit 3 trip.) When ADV 178 was given a 10 percent open demand signal, the valve moved to 6

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percent smoothly and the actuator force required to move the valve more than twice the expected force. Additional stroking consistently required excessive force to move the valve. In order to identify the source of the excessive resistance, the packing gland follower was loosened and approximately 50 percent of the packing was removed from the valve. Retesting the valve showed a significant reduction in the actuator force required to open the valve; however, it was still much higher than originally predicted. The actuator was decoupled from the valve. Stroking the actuator alone required approximately twice the predicted force. When the actuator was disassembled, an extra spring was found (two springs are specified by CCI). This explained the excessive force required to stroke the actuator.

ADV 184 and 185 were both stroked and actuator forces were observed to be on the high end of the predicted range. Both ADV's 184 and 185 experienced a reduction in the opening force when the packing gland follower was loosened. During disassembly of both ADV actuators, a third spring was discovered to be improperly installed in both valves.

Summary

During the testing described above, APS determined that the Unit 1 ADV 184 malfunction caused excessive bonnet pressure and, therefore, the force necessary to open the valve to exceed the capability of the actuator when the valve was being operated on the nitrogen gas supply. This discovery led to the development of revised test instructions to be performed on the ADV's in Units 1 and 2. The purpose of the procedure was to verify all the ADV's would operate on both the non-Class 1E Instrument Air supply and the Class 1E nitrogen gas supply. The valves were stroked using the safety-grade nitrogen system and then repeating the test using the Instrument Air (IA) system. The IA system provides additional force for opening the valve since it is maintained at 110 psig while the nitrogen system pressure regulator maintains pressure at 95 psig. An abnormally high bonnet pressure was suspected of causing the excessive force holding valve ADV 184 closed. As a result, a bonnet pressure tap was added and appropriate pressure measurements were taken.

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Since ADV 184 had already been tested using the nitrogen accumulator, that portion of the test was deleted and the valve was stroked using the normal IA supply. The valve was tested in the following sequence and with the following results:

1) A 10 percent demand open signal was given. The valve did not move in response to the demand signal as expected.

2) A 20 percent demand was then given and the pilot valve opened. This allowed the bonnet pressure to decrease and the condition of the seal ring to be determined. Bonnet pressure decreased to 60 psig and then slowly increased to 110 psig (this is approximately 6 to 10 times higher than design).

3) Next, a 30 percent demand signal was given. The pilot valve opened and the bonnet pressure decreased to approximately 42 psig. The valve rapidly opened to 20 percent, the bonnet pressure rapidly increased from 42 psig to 110 psig, and the valve shut.

4) A 40 percent demand signal was given. The bonnet depressurized to between 44 and 34 psig and the valve rapidly opened to 38 percent, closed to 6 percent, and then opened smoothly to 40 percent.

5) The valve was then given another 40 percent open demand signal. The bonnet depressurized to between 2 and 8 psig, and the valve opened smoothly to 45 percent.

6) A 30 percent demand was then repeated. The bonnet depressurized to approximately 2 to 7 psig and the valve stroked smoothly to 32 percent. The valve was then given an incremental signal from 10 percent to 50 percent pausing at each 10 percent increment to allow the valve to stabilize prior to increasing demand.

The bonnet pressure measured on ADV 184 initially was 110 psig. This would require approximately 14,000 pounds-force (lbf) to open the valve. Based upon the available Instrument Air (IA) or nitrogen supply pressures, the IA system will not provide enough force to open the valve unless the bonnet pressure is less than approximately 80 psig . Also, the nitrogen gas supply will not provide adequate force to open the valve unless the bonnet pressure is approximately 60 psig.

CCI believes that the cause of the valve being able to stroke only to the pilot open position is excessive bonnet pressure due to excessive piston ring leakage. To investigate this hypothesis, CCI fabricated a fixture in order to flow test the 12 inch piston ring. The flow test was conducted utilizing air at 1200 psi. CCI tested the design currently installed at PVNGS for 100 open-shut cycles. During one of the tests, excessive leakage resulting in high bonnet pressure was observed. These tests were performed in late 1986 as a result of erratic performance observed on the non-safety related valves at another nuclear facility. The excessively leaking piston ring condition is random and cannot be predicted.

During further testing, CCI intentionally placed a 0.010 inch high spot on the piston ring to simulate dirt. CCI then measured the leakage flow coefficient (Cv). The measured Cv corresponds to a leak which would be expected to result in excessive bonnet pressure.

A second series of tests were performed by CCI to investigate potential problems in the pilot plug area. CCI constructed full size models of the existing pilot plug and also designed a new pilot area. Both models were flow tested on a low pressure air flow system to determine their Cv and develop improvements to the design.

Prior to the malfunctions which occurred at PVNGS, CCI installed pressure taps on numerous valves which had failed to open at other facilities. The valves were always operable after instrumentation was installed. Consequently, CCI did not have any evidence that excessive bonnet pressure was the cause of the failure. The test at PVNGS on SG-HV-184 is the first valve failure during which representative pressure measurements could be taken.

Mechanical binding due to thermal expansion mismatch, hoop deflection due to pressure, and flow and galling due to high piston ring hub forces have also been postulated to be the cause. However, many valves have been disassembled and examined by CCI. No inordinate rubbing has been found and no visible reason for binding has been observed. CCI has performed thermal and stress calculations and did not find any mismatch or fit problems.

2. Root Cause

CCI has over 200 similarly constructed valves in other nuclear facilities which have been in service for the last

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several years. The "stuck at pilot open" problem has occurred least often with 8 inch plug valves, and most often with 12 inch plug valves. The sticking seems to be most likely when the valve is not stroked over a period of time. Based upon previous CCI experience, when a valve exhibits the problem observed at PVNGS, it has been discovered that stroking the valve for 3 to 4 cycles "re-seats" the piston ring and the valve operates properly.

The following root causes have been provided by CCI based on their investigation of the ADV problems experienced at PVNGS.

a) Dirt or foreign material such as corrosion products (magnetite) is building up on sealing surfaces of the piston ring when the valve is closed. The piston ring would not be energized due to equal pressures on both sides of the piston ring. When the pilot plug is opened during attempted operations, there is excessive piston ring leakage since the contamination holds the piston ring off the sealing surfaces. Cycling of the ADV's three (3) or four (4) times allows the contamination to "wash" away and the piston ring seal operates properly.

b) There is a vertical clearance of approximately 0.005 inch between the piston ring and the upper sealing surface. CCI believes that, when the pilot valve is opened, the fluid rushing past this 0.005 inch upper clearance results in a dynamic pressure holding the piston ring down, away from its sealing surface. To address this scenario, CCI proposed "wave springs" which hold the piston ring in contact with its upper sealing surface at all times. There has been at least one instance of a valve not opening as required with a wave spring installed to energize the piston ring.

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

The failure mode, mechanism, and effect of potential ADV failures are discussed in Sections I.D and II.

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

Not applicable - the ADV's do not have multiple functions.

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

The information requested by the above is not considered appropriate for the event being described in this LER. There have been no ADV failures at PVNGS wherein the capability to remotely and locally operate the ADV's was lost as a result of the causes described in Section I.D.

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

The inability to remotely operate the ADV's was originally discovered during the reactor trip event discussed in Section I.B. Subsequent malfunctions were discovered during testing conducted after the Unit 1 trip. The cause of the ADV malfunctions was identified by CCI and provided to APS on April 4, 1989 as discussed in Section I.B. There have been no procedural errors discovered.

I. Cause of Event:

The cause of the event being reported in this LER has been determined to be an inadequate design by the original equipment manufacturer. Further investigation of the ADV problems is continuing and will be discussed in a supplement to this report expected to be submitted by June 15, 1989.

J. Safety System Response:

Not applicable - there were no safety system responses and none were necessary.

K. Component Information:

Note: This section includes information requested by 10CFR21 concerning the identification of the firm supplying the basic component and the number and location of the relays at Palo Verde.

The PVNGS design incorporates the use of four (4) ADV's per unit (twelve total) as a means of providing decay heat removal in the event of a loss of offsite power. These valves are located between the steam generator and Main Steam Isolation Valves (SB)(V). The ADV's are manufactured by Control Components, Inc. (CCI) in accordance with Specification 13-JM-601A. They are model number B3G9-10-12P8-31NAS1. The valves are pilot operated, pneumatically actuated drag valves. The valves are powered by a double acting, spring to close, pneumatic piston actuator. The actuator area is approximately 111 square inches developing over 10,000 lbf of

thrust when one side is fully pressurized and the other side is vented to atmosphere. The design relieving capability is 1.47 x 10E06 pounds-mass (lbm) per hour.

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

The ADV's are used to remove decay heat from the steam generator in the event that the main condenser (SG) is unavailable for service for any reason including a loss of ac power. The decay heat is dissipated by venting steam to the atmosphere. In this way, the reactor coolant system (RCS)(AB) can either be maintained at hot standby conditions or cooled down. The system instrumentation and controls for the atmospheric dump valves are described below.

- Initiating Circuits and Logic

  There are no automatic initiating circuits for operation of the atmospheric dump valves.

  The atmospheric dump valves are positioned manually by a controller (manual loading station) from either the main control room or the remote shutdown panel as part of the capability for emergency shutdown from outside the control room. Each valve has two separate permissive control circuits. Valve position indication is provided at each remote control station. A handwheel is also provided with the atmospheric dump valve for local manual operation.

- Bypasses, Interlocks, and Sequencing

  No bypasses, interlocks, or sequencing are provided for the atmospheric dump valves.

- Redundancy

  Two (2) redundant, atmospheric dump valves are provided for each steam generator.

The major accident scenarios which credit the use of the ADV's are:

- 6.3.3.4 - Post Loss of Coolant Accident (LOCA) Long Term Cooling
- 15.1.4 - Inadvertent Opening of a Steam Generator Relief or Safety Valve (MSSV)
- 15.3.1 - Total Loss of Reactor Coolant Flow
- 15.4.1 - Uncontrolled Control Element Assembly (AA)

Withdrawal from a Subcritical or Low Power Condition

° 15.6.3 - Steam Generator Tube Rupture

In the event that all four (4) ADV's could not be opened upon demand (due to a failure of the pneumatic actuators to provide sufficient opening force by themselves as a result of the reported deficiency), reactor decay heat will be removed through the Main Steam Safety Valves (MSSV's). The MSSV's will open when pressure in the steam generator reaches the pressure relief setpoints. Steam release will continue until the pressure is reduced to the safety valve reset pressure. The safety valves will continue to cycle in this manner as steam generator pressure increases and decreases. The RCS will remain at hot standby conditions during this pressure relief cycling. Hence, the RCS pressure boundary integrity will be maintained and the safety analysis will bound the consequences of the reported deficiency.

APS has reviewed Chapters 6 and 15 of the Combustion Engineering Standard Safety Analysis Report (CESSAR) and the PVNGS Updated Final Safety Analysis Report (UFSAR) and determined that the earliest the ADV's are required for any of the accident scenarios is 30 minutes from the onset of the particular accident. In these scenarios, the ADV's are used to cooldown the plant in the event of a loss of offsite power coincident with the particular accident. APS has reviewed the Chapter 15 CESSAR events and has found several instances wherein manual operation of the ADV's is credited. However, it should be noted that the safety analyses do not make a distinction between "remote manual" or "local manual" operation of the ADV's. APS considers that remote or local manual operation of the ADV's are equally valid methods of performing the manual operation discussed in the safety analyses.

APS was informed by the valve manufacturer on April 10, 1989 that neither the pneumatic actuator nor handwheel alone can produce sufficient force to open the valve for valve inlet pressures of 1150 psia and the worst case piston ring seal leakage is assumed. However, CCI has indicated that if the pneumatic actuator is given a signal to open (remote manual operation) and the handwheel (local manual operation) is used to open the valve in conjunction with the pneumatic actuator, the combination will provide sufficient opening force to open the valve even with the valve inlet pressure equal to the lowest set MSSV plus accumulation (approximately 1302 psia) and worst case piston ring seal leakage assumed. Although the procedures are in place for remote or local operation of the ADV's, no procedures were in place for the combined remote/local operation of the valve at the time the ADV failed to open remotely at PVNGS. Hence, credit is not taken for the combined remote/local manual operation from a 10CFR21 reportability standpoint.

The loss of the remote and local manual operation (no credit taken for the combined remote/local operation) of the ADV's will not allow the

successful completion of recovery operations from postulated accidents for entry to shutdown cooling conditions (350 degrees F).

Based on the above, the failure of all 4 ADV's to open due to a failure of their pneumatic actuators and handwheel assemblies has been determined to be safety significant. Loss of the remote and local operation of the ADV's adversely affects the ability of the plant to achieve or maintain safe shutdown conditions.

The consequences of the reported deficiency (loss of both remote and local valve operation) will result in the loss of the safety function (i.e., decay heat removal) of the ADV's to the extent credited in the safety analyses presented in Chapter 6 and 15 of the UFSAR/CESSAR.

III. CORRECTIVE ACTIONS:

This section contains the information requested by 10CFR21 concerning the corrective action which has been, is being, and will be taken; the organizations responsible for the corrective action; and the length of time for accomplishing the corrective action.

A. Immediate:

PVNGS initiated an extensive investigation of the ADV malfunctions. As a result of APS concerns regarding the operability of the ADV's, Palo Verde Unit 1 remained shutdown following a reactor trip on March 5, 1989. Palo Verde Unit 2 was shutdown on March 15, 1989. Palo Verde Unit 3 remained shutdown and began a refueling outage on March 8, 1989.

In order to ensure the continued operability of the Unit 2 ADV's, APS has installed the capability to determine bonnet pressure. This will enable the detection of excessive piston ring leakage. APS is developing administrative controls for periodically monitoring for excessive piston ring leakage in the Unit 2 ADV's. If excessive piston ring leakage is determined to exist during the periodic monitoring, the ADV(s) will be declared inoperable. These administrative controls will be in place and implemented prior to restarting Unit 2.

B. Action to Prevent Recurrence:

CCI has provided the following recommendations to eliminate the valve deficiency.

- Increase the pilot valve capacity. This requires rework of the plug to enlarge the pilot flow area and a new stem to seal the pilot valve when closed.

- Use a two piece wedge style piston ring to ensure a good

NRC Form 366A (9 83)

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

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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 9	0 0 5	0 0	1 4 OF 1 5

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

seal. CCI tested a two piece piston ring manufactured by Dover Corporation. This piston ring provided the lowest and most consistent Cv of the alternative piston ring designs.

APS is preparing site modifications to incorporate these CCI recommendations and expects to install these modifications prior to the completion of the next refueling outages for each Unit. APS is also trending ADV performance by instituting a periodic stroking program for the ADV's. CCI believes there is evidence that cycling of the valve reduces the probability of the excessive piston ring leakage that causes the valves' failure to open (i.e., excessive valve bonnet pressure). Previous experience with CCI valves supports energizing the piston ring regularly to improve its effectiveness. APS is continuing to evaluate potential corrective actions for the ADV problems. Based upon the evaluation, APS will develop final corrective actions. A supplement to this report will be submitted to describe the final corrective actions. The development of final corrective actions is expected to be completed by May 15, 1989 and the supplement submitted by June 15, 1989.

IV. PREVIOUS SIMILAR EVENTS:

There have been no previous similar events reported pursuant to 10CFR50.73.

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 9	— 0 0 5 —	0 0	1 5 OF 1 5

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

ATMOSPHERIC DUMP VALVE VALVE POSITIONS

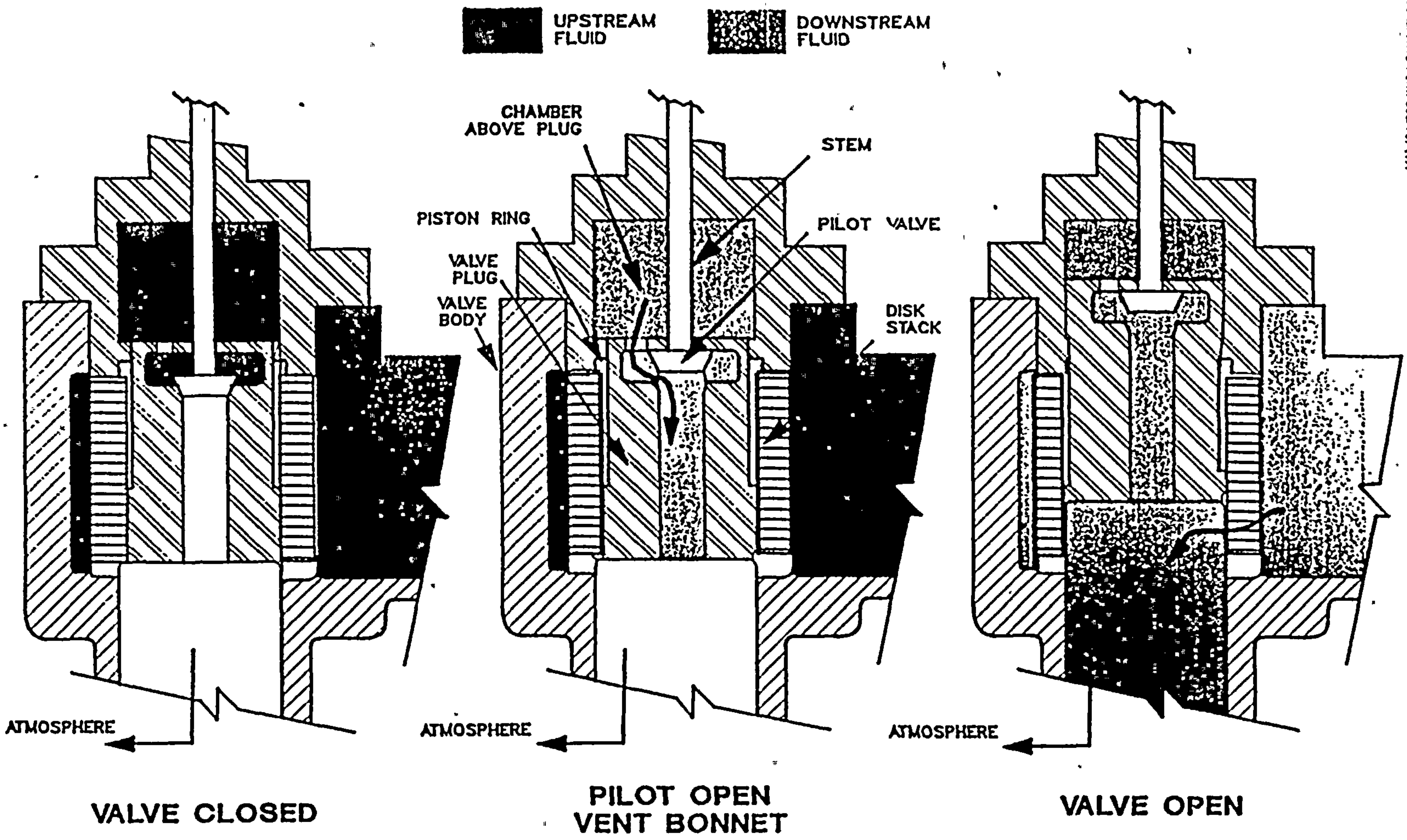

FIGURE 1

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

192-00467-JGH/TDS/DAJ
April 17, 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 No. NPF-41)
Licensee Event Report 89-005-00
File: 89-020-404

Attached please find Licensee Event Report (LER) No. 89-005-00 prepared and submitted pursuant to 10CFR50.73. In accordance with 10CFR50.73(d), we are herewith forwarding a copy of the LER to the Regional Administrator of the Region V office.

This report is also being submitted to include the information requested by 10CFR21. In accordance with 10CFR21.21(b)(2), three copies three copies of this report are being provided to the Director, Office of Nuclear Reactor Regulation.

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

Very truly yours,

J. G. Haynes
Vice President
Nuclear Production

JGH/TDS/DAJ/kj

Attachment

cc: D. B. Karner (all w/a)
E. E. Van Brunt, Jr.
T. E. Murley (3 copies)
J. B. Martin
T. J. Polich
M. J. Davis
A. C. Gehr
INPO Records Center
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