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SHRIVER,T.D. Arizona Public Service Co. (formerly Arizona Nuclear Power
LEVINE,J.M. Arizona Public Service Co. (formerly Arizona Nuclear Power
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SUBJECT: LER 88-008-02:on 881213,radiation monitoring sys invalid sample results.

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Arizona Public Service Company

PALO VERDE NUCLEAR GENERATING STATION
P O BOX 52034 • PHOENIX, ARIZONA 85072-2034

192-00528-JML/TDS/DAJ
September 28, 1989

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

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 3
Docket No. STN 50-530 (License NPF-74)
Licensee Event Report 88-008-02
File: 89-020-404

Attached please find Supplement Number 2 to Licensee Event Report (LER) No. 88-008-00 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,

J. M. Levine
Vice President
Nuclear Production

JGH/TDS/DAJ/kj

Attachment

cc: W. F. Conway (all w/a)
E. E. Van Brunt, Jr.
J. B. Martin
T. J. Polich
M. J. Davis
A. C. Gehr
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NRC FORM 366 (6-89) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

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

TITLE (4)

Radiation Monitoring System Invalid Sample Results

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)
									N/A	0 5 0 0 0
1 2	1 3	8 8	8 8	— 0 0 8	— 0 2	0 9	2 8	8 9	N/A	0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	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)	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	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

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 fifteen single-space typewritten lines) (16)

On February 20, 1989, PVNGS engineering personnel completed an evaluation of the effects of excessive moisture condensation in the particulate and iodine filters utilized in the Condenser Evacuation System effluent low range radiation monitors. It was determined that excessive moisture condensation occasionally discovered in Palo Verde Unit 3 resulted in invalid sample results. The invalid samples resulted in the inability to satisfy the sampling requirements of Technical Specification 3.3.3.8 ACTION 40 and Surveillance Requirement 4.11.2.1.2.

The cause of the excessive moisture buildup was cooling of the high humidity sample stream which resulted from inadequate electrical resistance heating applied to the sample stream piping in combination with wintertime ambient environmental conditions. Proper heat trace was not installed in accordance with design requirements at the time of initial monitor installation.

As interim corrective action, temporary heat tracing was installed in Units 2 and 3. As corrective action to prevent recurrence, permanent heat tracing has been installed in Unit 2 and will be installed in Units 1 and 3 prior to restart from their current refueling outages. Additional design enhancements to preclude moisture buildup in other areas of the monitor will be implemented during each unit's next refueling outage.

A previous similar event was reported in Unit 1 LER 85-37-01.

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

At the time the excessive moisture was discovered in Unit 3 on December 5, 1988, Palo Verde Unit 3 was in Mode 1 (POWER OPERATION) at approximately 100 percent power.

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

Event Classification: Condition prohibited by the plant's Technical Specifications.

On February 20, 1989, PVNGS engineering personnel (utility, non-licensed) completed an evaluation of the effects of moisture condensation in the particulate and iodine filters (FLT) utilized in the Condenser Evacuation System (SH) low range effluent monitor (RU-141)(IL)(RI). As a result of this evaluation, it was determined that excessive moisture condensation in the iodine filter resulted in invalid sample results. The invalid samples resulted in the inability to satisfy the sampling requirements of Technical Specification 3.3.3.8 ACTION 40 and Surveillance Requirement 4.11.2.1.2.

The Condenser Evacuation System low range effluent monitor (RU-141) continuously monitors the condenser vacuum pump/gland seal exhaust (COND)(P)(SH) for activity resulting from primary to secondary leakage. Low range monitor RU-141 automatically starts the post accident high range monitor (RU-142)(IL)(RI) and initiates filtration of the condenser vacuum pump/gland seal exhaust at pre-determined setpoints. The condenser vacuum pump/gland seal exhaust (COND)(P)(SH) effluent is normally at approximately 125 degrees Fahrenheit (F) and 100 percent Relative Humidity (RH). Therefore, cooling of the sample stream results in moisture condensation.

Excessive moisture condensation in the iodine filter results in the inability to comply with Technical Specification 3.3.3.8 ACTION 40 and Surveillance Requirement 4.11.2.1.2. Technical Specification 3.3.3.8 ACTION 40 states that, "With [RU-141 inoperable], effluent releases via the effected pathway may continue provided samples are continuously collected with auxiliary sampling equipment as required in Table 4.11-2..." Technical Specification Surveillance Requirement 4.11.2.1.2 states, "The dose rate due to I-131, I-133, Tritium and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents shall be determined to be

within [prescribed limits]... by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 4.11-2." Table 4.11-2 requires that condenser vacuum pump exhaust be continuously sampled.

On December 5, 1988 at approximately 2150 MST, the Unit 3 RU-141 was declared inoperable due to the presence of excessive moisture in the particulate and iodine filter holder. Pursuant to Technical Specification 3.3.3.8 ACTION 40, the alternate sampling equipment was installed. Installation of the alternate sampling equipment involves connecting a portable sample cart to the RU-141 sample line which is used for collecting samples from the effluent stream. Subsequently, Unit 3 Chemistry Department personnel (utility, non-licensed) identified an additional concern in that it was discovered that the auxiliary sample cart particulate and iodine filters were also accumulating water. The system engineer (utility, non-licensed) was contacted concerning the problem and indicated that this was a previously identified concern and was being addressed in accordance with PVNGS's design change policies. Unit 3 Chemistry personnel initiated an Engineering Evaluation Request on December 9, 1988 to have an evaluation performed regarding the validity of sample analysis results obtained from wet filter media.

On December 13, 1988, a meeting was held to discuss initial concerns regarding the validity of wet samples obtained in Unit 1, 2, and 3 Condenser Evacuation System effluent monitors. The meeting was held with Unit 1, 2, and 3 Chemistry and Operations Management representatives as well as engineering personnel. During the meeting, it was determined that the operability of the Unit 1 RU-141 was not in question since wet filter media had not been reported. The Unit 2 RU-141 was inoperable for reasons unrelated to wet filter media and wet filter media had not been observed. However, "moist" filter media had been periodically discovered in Unit 2 so implementation of appropriate corrective action would be prudent prior to returning RU-141 to service. In Unit 3, compliance with ACTION 40 of Technical Specification 3.3.3.8 was indeterminate since wet samples obtained from the auxiliary sample equipment were also suspect. Therefore, compensatory measures were developed to ensure compliance with Technical Specification 3.11.2.1. The following compensatory measures were taken in Unit 3:

- Steam Generator (SG)(AB) secondary samples were taken and analyzed daily (vice weekly).

- SG Blowdown Monitor readings were being logged hourly.

- RU-141 noble gas channels were still OPERABLE and being trended.

- previous release permit activities were researched to correlate Reactor Coolant System (RCS)(AB) activity/secondary activity to condenser air removal discharge activity.

- actions were being taken to restore the monitor to OPERABLE status as soon as possible.

The above measures were taken to enable a rapid determination of changes in secondary activity and to estimate condenser air removal discharge activity.

Concurrently, Engineering Evaluations personnel were developing a Temporary Modification to place electric resistance heating on the effluent sample lines in Unit 3 in order to prevent condensation of water within the lines and filter media. The design change which would provide permanent heat tracing for all three units had not been completed and would not be ready for installation in a timely manner. The installation of the Temporary Modification in Unit 3 was completed on December 14, 1988, and RU-141 was declared OPERABLE at approximately 1637 MST on December 14, 1988 after verifying that the particulate and iodine filters remained dry. A Temporary Modification to install electrical resistance heating was implemented in Unit 2 on March 8, 1989.

On February 20, 1989, the Engineering Evaluation Request to determine the effects of moisture collecting in the particulate and iodine filters was completed. PVNGS engineering determined that excessive moisture buildup in the particulate/iodine filter invalidated iodine sample results. Therefore, it was determined that excessively wet auxiliary sampling equipment iodine filters occasionally discovered in Palo Verde Unit 3 resulted in noncompliance with Technical Specification 3.3.3.8 ACTION 40 and 4.11.2.1.2.

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

Other than the Condenser Evacuation System low range effluent monitor inoperability described in Section I.B, no structures, systems, or components were inoperable at the start of the event which contributed to this event.

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

Not applicable - no component or system failures were involved.

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

Not applicable - no component failures were involved.

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

Not applicable - no component failures were involved.

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:

Not applicable - no failures were involved. However, the excessive moisture problem resulted in the Unit 3 RU-141/142 monitors being inoperable for approximately nine (9) days as described in Section I.B.

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

Not applicable - there were no component or system failures or procedural errors.

I. Cause of Event:

As discussed in Section I.B, the Condenser Evacuation System effluent is at approximately 125 degrees F and 100 percent Relative Humidity. Therefore, cooling which occurs primarily during the winter months results in moisture condensation. Some of the condensed moisture collects in the particulate and iodine filter assembly resulting in invalid iodine sample results. As a result of an APS investigation of the moisture problems, it was determined that the cause of the excessive moisture buildup was an original installation error in that the Condenser Evacuation System low range monitors were not installed in accordance with Final Safety Analysis Report requirements or the original equipment manufacturer drawings. The manufacturer's drawings state that additional heat tracing must be installed to ensure sample temperatures of 137 degrees F into the monitor.

There were no operator actions that affected the course of the event. There were no cognitive errors or procedure deficiencies that contributed to the event. There were no unusual characteristics of the work location which contributed to this event.

J. Safety System Response:

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

K. Failed Component Information:

Not applicable - no component failures were involved.

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

The Condenser Evacuation System radioactive gaseous effluent instrumentation is provided to monitor and control the releases of radioactive materials in gaseous effluents during actual or potential releases. The alarm/trip setpoints for these instruments are calculated and adjusted in accordance with the methodology and parameters in the Offsite Dose Calculation Manual to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. There are two separate Condenser Evacuation System radioactive gaseous effluent monitoring channels: the low range effluent monitor (RU-141) for normal radioactive gaseous effluents and the high range effluent monitor (RU-142) for post-accident plant radioactive gaseous effluents. The low range monitor operates at all times until the concentration of radioactivity in the effluent becomes too high during post-accident conditions. The high range monitor only operates when the concentration of radioactivity in the effluent is above a pre-determined setpoint in the low range monitors. The low range monitor also provides for automatic initiation of condenser vacuum pump/gland exhaust filtration. There were no other systems or components which perform the same functions as the Condenser Evacuation System monitors.

There are no safety consequences or implications resulting from this event. The inability to accurately assess information obtained from excessively wet iodine filters in the low range monitor does not effect the monitor's ability to initiate exhaust filtration or activate the high range monitor at the correct effluent levels. The iodine filters from the auxiliary sampling equipment and RU-141 were analyzed to the extent practical and no abnormal activity levels were noted. Iodine samples taken prior to and after the excessively wet filters were discovered did not indicate excessive levels of activity.

III. CORRECTIVE ACTIONS:

A. Immediate:

Replacement iodine filters were installed in the Palo Verde Unit 3 low range monitor and auxiliary sampling equipment. In order to

ensure that cooling of the sample stream did not occur, temporary electrical resistance heating was installed in Units 2 and 3 as discussed in Section I.B.

B. Action to Prevent Recurrence:

An evaluation of the PVNGS Condenser Evacuation System radiation monitor performance was conducted. The evaluation was performed by APS engineering and included an independent assessment by a consulting firm specializing in radiation monitoring. As a result of the APS evaluation, it was determined that installation of permanent electrical resistance heating will ensure that sample stream design temperature requirements are met and preclude moisture buildup. The permanent electrical resistance heating has been installed in Unit 2 and will be installed in Units 1 and 3 prior to restart from their current refueling outages. Furthermore, additional design modifications will be implemented which are intended to ensure that moisture buildup does not occur in other parts of the monitor. These design enhancement modifications will be implemented during each unit's next refueling.

IV. PREVIOUS SIMILAR EVENTS:

A previous similar event was reported in Unit 1 LER No. 85-037. In order to investigate concerns regarding the apparent inadequate and untimely engineering disposition of a problem which had been identified as early as 1983, a Special Plant Event Investigation is being conducted.

The chance to prevent moisture related problems was missed during the original design stages of the system. The manufacturer of the radiation monitors provided calculations indicating that the Architect Engineer would have to provide heat trace and insulation in order to provide a sample stream temperature of 137 degrees F at the inlet to the monitor. This, in conjunction with the manufacturer supplied heat trace and insulation on the monitor itself, would prevent excessive moisture accumulation in the sample lines. This information was apparently missed during the original design stage, as none of the RU-141's had any heat trace applied to the sample lines upstream of the monitor inlet flanges. There is also a note on the manufacturer's system drawing for RU-141 which provides inlet temperature requirements for the lines going from RU-141 to RU-142, yet these lines are not insulated or heat traced. Both of these omissions were apparently missed during turnover of the systems to PVNGS and were not discovered during initial engineering evaluations of the excessive moisture problem.

The excessive moisture problem was initially discussed as a concern in 1983 by a PVNGS Radiation Monitoring System Task Force. The initial

Engineering Evaluation Request for the moisture problem was submitted on March 1, 1984. The Engineering Evaluation Request was closed out with a disposition that deferred the evaluation until plateout testing could be performed and the results evaluated by Nuclear Engineering. The plateout testing was performed and evaluated; however, the resolution of the excessive moisture problem was not completed.

The problem of excessive moisture was again identified in April 1985 and reported in Palo Verde Unit 1 LER No. 85-037. The Condenser Evacuation System low range effluent monitor was declared inoperable on April 23, 1985 and the auxiliary sampling system was placed in service pursuant to Technical Specification 3.3.3.8 ACTION 40. On April 29, 1985, it was discovered that excessive moisture had destroyed the particulate filter and saturated the iodine filter in the auxiliary sampling equipment. To prevent recurrence, a moisture trap was installed on the auxiliary sampling equipment.

The installation of the moisture trap in the auxiliary sampling equipment was not effective in preventing moisture accumulation in the radiation monitoring system iodine filters. Engineering continued to evaluate the problem; however, it was not until December 1988 when the events described in Section I.B occurred that it was identified that the original design specification required the installation of heat tracing and insulation in order to prevent cooling of the sample stream.

A Special Plant Event Investigation of these concerns was performed. Based upon this evaluation, the following factors contributed to the inadequate and untimely engineering resolution of the moisture problem:

The method for prioritizing design changes did not ensure that the design evaluation occurred in a timely manner.

The appropriate cross-disciplinary reviews did not occur.

In order to address these concerns, the following actions are being taken:

Current APS methods for assigning priorities to develop and implement design changes have been evaluated and determined to be adequate. In May, 1989, APS instituted a Plant Modifications Committee. The Plant Modification Committee is a management review group responsible for approving or disapproving proposed design changes and assigning priorities for developing and implementing approved design modifications.

Current APS procedures governing Engineering Evaluation Requests and Design Changes have been evaluated and determined to be adequate for requiring cross discipline reviews.

Subsequent to the occurrence of problems discussed in this LER and as a result of concerns which were identified during unrelated events, the System Engineering Program has undergone extensive evaluation and is in the process of being upgraded. The improvements being implemented and the changes which have been made concerning System Engineer accountabilities and responsibilities are considered to be sufficient to prevent recurrence of an excessive delay in resolution of a problem in their system.