

ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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 FACIL:STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi 05000528
 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 88-008-00:on 880212,reactor coolant sys leakage monitor
 inoperable due to personnel error.

W/8 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 9
 TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:Standardized plant.

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Palo Verde Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 5 2 8					PAGE (3) 1 OF 0 16	
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TITLE (4) Reactor Coolant System Leakage Monitor Inoperable Due to Personnel Error																
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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)			
0 2	1 2	8 8	8 8	0 0 8	0 0	0 3	1 1	8 8	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 (8) 6		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)														
POWER LEVEL (10) 0 0 0	20.402(b)				20.406(c)				50.73(a)(2)(iv)				73.71(b)			
	20.406(a)(1)(i)				50.36(e)(1)				X 50.73(a)(2)(v)				73.71(c)			
	20.406(a)(1)(ii)				50.36(e)(2)				X 50.73(a)(2)(vii)				X OTHER (Specify in Abstract below and in Text, NRC Form 366A)			
	20.406(a)(1)(iii)				X 50.73(a)(2)(i)				50.73(a)(2)(viii)(A)				Special Report			
	20.406(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)							
20.406(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(iii)								

LICENSEE CONTACT FOR THIS LER (12)																
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NAME Timothy D. Shriver, Compliance Manager										TELEPHONE NUMBER 6 0 2 3 9 3 - 2 5 2 1						
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	

SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE) <input type="checkbox"/>										NO <input checked="" type="checkbox"/>				

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

On February 12, 1988, ANPP was notified by the manufacturer of the PVNGS Units' 1, 2, and 3 containment building radiation monitors (IJ)(MON) that particulate filter change-out frequencies in excess of 48 hours could adversely affect the performance of the monitors. ANPP was changing the particulate filters on a weekly basis; therefore, the monitors were declared inoperable in Units 2 and 3 on February 12, 1988. At the time of the notification, RU-1 was not required to be operable in Unit 1. The monitors' particulate channels have potentially been periodically inoperable in Units 1 and 3 since June 1987 and in Unit 2 since May 1987 when ANPP started changing the filter media on a weekly basis. The monitors are required for RCS leakage detection in accordance with Technical Specifications 3.3.3.1 and 3.4.5.1.

The root cause of this event is a cognitive personnel error in that the original equipment manufacturer (OEM) did not recognize the effect that extended filter change-out frequencies had on monitor operation.

As immediate corrective action, the filter change-out periodicity was revised to once per 24 hours in Units 2 and 3. ANPP is conducting an extensive review and test of the radiation monitor software utilized at PVNGS as described herein.

A previous similar occurrence was reported in Unit 1 LER 86-046-00.

This report also contains information for a special report.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO 3150-0104

EXPIRES: 8/31/88

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (8)			PAGE (3)		
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Palo Verde Unit 1	0500052888	88	008	00	02	OF	06

TEXT (If more space is required, use additional NRC Form 368A's) (17)

On February 12, 1988 ANPP was advised by Kaman Instrumentation Corporation that the containment building radiation monitors' (IJ)(MON) particulate channel may not be able to perform its intended function. The affected channel provides indication of potential reactor coolant pressure boundary (AB) leakage. These monitors are utilized in all three (3) units. At the time of the notification, Unit 1 was in Mode 6 (REFUELING), Unit 2 was in Mode 1 (POWER OPERATION) at approximately 98 percent power, and Unit 3 was in Mode 1 at approximately 100 percent power. As immediate corrective action, the Unit Shift Supervisors (utility, licensed) were notified and the monitors' particulate channels were declared inoperable at approximately 1505 and 1450 MST in Units 2 and 3 respectively. RU-1 was not required to be operable in Unit 1 pursuant to Technical Specifications at the time of notification. The appropriate ACTION requirements for Limiting Conditions for Operation (LCO) 3.4.5.1 and 3.3.3.1 were entered and required action taken.

The containment building atmosphere monitors (RU-1) are non-redundant monitors supplied by Kaman Instrumentation Corporation. The function of each monitor is to measure four containment (CTMT) atmosphere parameters that provide indication of reactor coolant pressure boundary (RCPB) leakage. These parameters are: particulate, iodine, and gaseous radioactivity, and dew point temperature. The particulate and gas channels provide two of the three means of detecting increased leakage from the RCPB in accordance with Regulatory Guide 1.45. The third method utilized is the containment sump level and flow monitoring system (IJ). The dew point and iodine channels provide an additional supportive means of verifying potential leakage.

RU-1 is required to be OPERABLE in accordance with PVNGS Technical Specifications Section 3/4.3.3 and 3/4.4.5 as follows:

- a. The RCS leakage detection systems shall be operable in modes 1, 2, 3, and 4: (a) containment air particulate monitoring system (RU-1), (b) containment sump level and flow monitoring system, and (c) containment gaseous monitoring system (RU-1). When the required gaseous or particulate radioactivity monitoring system (RU-1) is inoperable, plant operation may continue for 30 days provided grab samples of containment atmosphere are obtained and analyzed once every 24 hours. The RCS leakage is limited to (a) one gpm unidentified leakage and (b) ten gpm identified leakage in modes 1, 2, 3 and 4. The operator determines whether the RCS leakages are within these limits by monitoring the containment atmosphere gaseous and particulate radioactivity at least once every 12 hours and by using the other leakage detection methods.
- b. The particulate channel alarm/trip setpoint shall be less than or equal to $2.3E-6$ uCi/cc with a measurement range of $1.0E-9$ to $1.0E-4$ uCi/cc. The gaseous channel alarm/trip setpoint shall be less than or equal to $6.6E-2$ uCi/cc with a measurement range of $1.0E-6$ to $1.0E-1$ uCi/cc.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

RU-1 calculates the containment particulate activity by utilizing a rate of change algorithm. Containment atmosphere is constantly drawn through RU-1 and passes first through the particulate channel where the particulate is deposited on a paper filter (FLT). A beta scintillation detector (DET) measures gross activity of the deposit. As the activity on the paper increases, the count rate from the detector also increases. The measurement is transmitted to a microprocessor which is pre-programmed with the flowrate and detector efficiency. The algorithm in the microprocessor of RU-1 calculates the slope of the increase in counts per unit time and uses this slope to calculate the containment particulate activity which is utilized for display and alarm functions.

RU-1 was supplied to PVNGS in late 1982. At that time, the particulate monitoring channel was provided with an adjustable automatic particulate filter stepping device. The default stepping time was set at 24 hours. The stepping interval was variable with no operational limits provided by the OEM. Operational problems were experienced with the automatic stepping device which adversely affected the reliability and availability of the particulate channel. In order to increase the reliability of the monitor, it was determined (in conjunction with the manufacturer) that the filter stepping device could be removed and the filter media manually changed on a periodic basis. It was determined that the removal of the automatic filter stepping device did not impact the calculation of particulate activity as there was no operational difference between adjusting the automatic stepping device to step at weekly intervals or manually changing the filter media weekly. The stepping device was removed and manual change-out of the filter media every week was implemented in May 1987 in Unit 2 and in June 1987 in Units 1 and 3. It should be noted that RU-1 was not required to be operable in Unit 3 prior to the initial entry into Mode 4 (HOT SHUTDOWN) on October 1, 1987.

In early 1988 ANPP engineering personnel (contractor, non-licensed) were investigating the feasibility of changing the filter media monthly vice weekly. During this investigation, it was identified that extended filter change-out periods could potentially prevent the monitor from responding to radiation increases. The manufacturer was contacted on February 11, 1988 to review ANPP's findings. On February 12, 1988 the manufacturer contacted ANPP and identified that, based upon initial testing results, filter change-out periods in excess of 48 hours could adversely affect the ability of the particulate channel to provide the required alarm function following increases in containment activity. As immediate corrective action, control room personnel (utility, licensed) were notified and the monitors' particulate channels declared inoperable on February 12, 1988 at approximately 1505 MST, and 1450 MST in Units 2 and 3 respectively. The approximate elapsed time from the time of discovery until the monitoring systems were returned to service was 1.5 hours for Unit 2 and 44 hours for Unit 3. In Units 2 and 3 the filter media was replaced and, after appropriate surveillance testing, the monitors were returned to service at approximately 1627 MST on February 12, 1988, and approximately 1100 MST on February 14, 1988, respectively. In Unit 1, the filter media will be replaced and the monitor returned to service prior to an operational mode for which RU-1 is required. The filter media change-out interval has been reduced to once per 24 hours in all three units.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

The root cause of this event has been determined to be a cognitive personnel error on the part of the original equipment manufacturer (OEM). The OEM did not provide limitations or precautions for the filter stepping interval which would have forewarned ANPP that extended filter change-out intervals could have impacted the ability of the monitor to operate per design. Additionally, when the automatic stepping device was removed and weekly change-out of the filter media implemented, the OEM did not specify that extended filter change-out intervals would impact the ability of the monitor to operate per design.

As corrective action, the monitors were declared inoperable in Units 2 and 3 and a reduced filter change-out interval implemented. The filter change-out interval will be maintained at less than or equal to 48 hours in all three units until appropriate software modifications are made which would allow extended filter change-out intervals.

There were no unusual characteristics of the work location which contributed to the event. ANPP procedures were evaluated and determined to be adequate. There were no automatic or manually initiated safety responses and none were necessary. Other than discussed herein, there were no structures, systems, or components inoperable at the start of the event which contributed to the event. No safety limits were approached and no fission product barriers were challenged. During the period that the filter was being replaced on a weekly basis, the particulate channel of RU-1 was capable of detecting changes in containment activity levels, and thus providing indication of possible RCS leakage. The affect of the extended filter change-out intervals was to reduce particulate channel sensitivity such that it may not have alarmed per design requirements. However, control room personnel (utility, licensed) periodically monitor the activity levels detected by RU-1 and would have perceived unexplained increases in indicated activity as potential RCS leakage.

If the containment atmosphere particulate channel insufficiently indicated increases in containment radiation level as a result of increases in RCS leakage, then either (1) the gaseous channel would have responded to increasing radiation levels and alerted the operators of a potential problem and/or (2) the containment radwaste sump flow alarm would have been initiated in the main control room (NA) alerting control room personnel (utility, licensed) that the containment sump flow had increased by one gpm above normal flow for one hour. If indications occur that a potential leak exists, control room personnel are required to verify the rate and take the appropriate actions.

Based upon the above, there were no safety consequences resulting from this event.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

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

Palo Verde Unit 1 LER 86-046-00 reported a previous similar event wherein ANPP personnel (utility, non-licensed) discovered that software conversion constants supplied by Kaman for RU-1 were in error. This resulted in a reduced alarm capability due to the incorrect conversion of activity levels detected (i.e. counts) into displayed activity. This problem was also addressed in Deficiency Evaluation Report (DER) 86-25 and Notice of Violation (NOV) 528/86-28-01.

As a result of the previous software problem, ANPP implemented the following programmatic corrective actions to prevent recurrence:

1. A software control evaluation program for Kaman radiation monitors was initiated.
2. An independent validation and verification on Radiation Monitoring System (RMS) software in use was initiated.
3. A procedure was developed to require proper documentation and testing of software activities in the RMS system.

As previously discussed, the problem with the manner in which RU-1 calculates containment activity was discovered by ANPP personnel. This discovery was a result of the programs described above. ANPP believes that these programs are sufficient. However as an additional measure, ANPP had initiated a Reliability Improvement Project for the ANPP radiation monitoring system prior to this event. This is intended to evaluate methods for improving the operability and reliability of the radiation monitoring systems.

RU-1 INFORMATION:

Manufacturer: Kaman Instrumentation Corporation
Model No: 952140-002

Transportability

The deficiency with the manner in which RU-1 calculates activity levels is also applicable to other radiation monitors utilized at PVNGS. The following monitors are affected:

- RU-51, 52, 53 - Moveable Airborne Monitors (utilized as backups for RU-1)
- RU-8 - Auxiliary Building (NF) Ventilation Exhaust Filter Inlet Monitor
- RU-14 - Radwaste Building (NE) Ventilation Exhaust Filter Inlet Monitor
- RU-13A - Technical Support Center Monitor
- RU-13B - Emergency Operations Facility (NC) Monitor
- RU-143 - Plant Vent (VL) Monitor

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO 3150-0104

EXPIRES: 8/31/88

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

Monitors RU-8, 13A, 13B, 14, 51, 52, and 53 are not required pursuant to Technical Specifications and are not considered reportable. When RU-51, 52, and 53 are utilized as replacements for RU-1, the corrective actions described herein will be implemented (i.e., reduced filter change-out intervals). The affected particulate channel in RU-143 is required by Technical Specification 3.3.3.1 only to collect particulate samples. Therefore RU-143's operability is not affected by the algorithm deficiency described herein. A corrective action plan for the other affected monitors is currently being developed. If additional information which could change the readers perception or understanding of the event is identified during the development of this corrective action plan, a supplement to this report will be provided.

Based upon the problem described herein, an evaluation for 10CFR Part 21 reportability is being conducted.

This report also contains information for a special report required pursuant to Units 1, 2, and 3 Technical Specifications 3.3.3.1 and 6.9.2 for RU-1 being periodically inoperable for greater than 72 hours.



Arizona Nuclear Power Project

P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

192-00352-JGH/TDS/DAJ

March 11, 1988

NRC Document Control Desk
U.S. Nuclear Regulatory Commission
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 88-008-00
File: 88-020-404

Attached please find Licensee Event Report (LER) No. 88-008-00 prepared and submitted pursuant to 10CFR 50.73. In accordance with 10CFR 50.73(d), we are herewith forwarding a copy of the LER 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. G. Haynes
Vice President
Nuclear Production

JGH/TDS/DAJ/kj

Attachment

cc: O. M. DeMichele (all w/a)
E. E. Van Brunt, Jr.
J. B. Martin
T. J. Polich
R. C. Sorenson
E. A. Licitra
A. C. Gehr
INPO Records Center

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