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RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-002-00: on 920722, reactor coolant sys leakage monitor inoperable. Caused by test procedures not providing guidance. Unit Chemistry/RMS mgt notified. W/920820 ltr.

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JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

192-00798-JML/TRB/KR
August 20, 1992

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Mail Station P1-37
Washington, D.C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 3
Docket No. STN 50-530 (License No. NPF-74)
Licensee Event Report 92-002-00
File: 92-020-404

Attached please find Licensee Event Report (LER) 92-002-00 prepared and submitted pursuant to 10CFR50.73. This LER reports that the OPERABILITY requirements for Technical Specification (TS) Limiting Condition for Operation (LCO) 3.3.3.1 Radiation Monitoring Instrumentation and TS LCO 3.4.5.1 Reactor Coolant System (RCS) Leakage Detection Systems were periodically not met when inleakage due to a cracked gasket was potentially affecting the ability of the Containment Building Atmosphere Monitor (RU-1) to alarm within TS LCO 3.3.3.1 alarm/trip setpoints with respect to RCS leakage detection. RU-1 has potentially been periodically inoperable since May 23, 1991 when Unit 3 entered Mode 4 (HOT SHUTDOWN) following their second refueling outage. In accordance with 10CFR50.73(d), a copy of this LER is being forwarded to the Regional Administrator, NRC Region V.

If you have any questions, please contact T. R. Bradish, Compliance Manager, at (602) 393-5421.

Very truly yours,

James M. Levine

JML/TRB/KR

Attachment

cc: W. F. Conway (all with attachment)
J. B. Martin
J. A. Sloan
INPO Records Center

IE22

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 1 0

TITLE (4)
Reactor Coolant System Leakage Monitor Inoperable

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
0 7	2 2	9 2	9 2	- 0 0 2	- 0 0	0 8	2 0	9 2	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)		50.73(a)(2)(vii)	X	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)		Special Report
	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)
Thomas R. Bradish, Compliance Manager	6 0 2 3 9 3 - 5 4 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 July 22, 1992, at approximately 1011 MST, Palo Verde Unit 3 was in Mode 1 (POWER OPERATION), operating at approximately 100 percent power when Control Room personnel removed the Containment Building Atmosphere Monitor (RU-1) from service to investigate a sampling discrepancy and entered Technical Specification (TS) Limiting Condition for Operation (LCO) 3.3.3.1 ACTION 23 for radiation monitoring instrumentation and TS LCO 3.4.5.1 ACTION 'a' for reactor coolant system (RCS) leakage detection systems. Following the investigation, the Unit 3 Chemistry/Radiation Monitoring System (RMS) supervisor informed Control Room personnel that inleakage due to a cracked gasket was periodically diluting RU-1's gaseous sample suction line and reducing the flow rate through RU-1's particulate filter, and that RU-1 has potentially been periodically inoperable since May 23, 1991 when Unit 3 entered Mode 4 (HOT SHUTDOWN) following Unit 3's second refueling outage. RU-1's gaskets and seals had been replaced during the outage. RU-1's particulate and gaseous radioactivity channels would periodically underestimate actual Containment radioactive airborne concentrations, potentially affecting its ability to alarm within TS LCO 3.3.3.1 TABLE 3.3-6 particulate and gaseous alarm/trip setpoints. Therefore, the OPERABILITY requirements were periodically not met for TS LCO 3.3.3.1 and TS LCO 3.4.5.1. RU-1 was repaired and returned to service.

There have been no previous similar events reported pursuant to 10CFR50.73. This report also contains information for a Special Report.

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

At 1011 MST on July 22, 1992, Palo Verde Unit 3 was in Mode 1 (POWER OPERATION), operating 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.

At approximately 1011 MST, on July 22, 1992, Control Room personnel (utility, licensed) removed the Containment Building (NH) Atmosphere Monitor (RU-1) (IJ) from service to investigate a sampling discrepancy and entered Technical Specification (TS) Limiting Condition for Operation (LCO) 3.3.3.1 ACTION 23 for radiation monitoring instrumentation (IL) and TS LCO 3.4.5.1 ACTION 'a' for reactor coolant system (RCS) (AB) leakage detection systems (IJ). Following the investigation, the Unit 3 Chemistry/Radiation Monitoring System (RMS) supervisor (utility, nonlicensed) informed Control Room personnel that inleakage due to a cracked gasket was periodically diluting RU-1's gaseous sample suction line and reducing the flow rate through RU-1's particulate filter, and that RU-1 has potentially been periodically inoperable since May 23, 1991 when Unit 3 entered Mode 4 (HOT SHUTDOWN) following Unit 3's second refueling outage. RU-1's gaskets and seals had been replaced during the outage.

Both TS LCO 3.3.3.1 and TS LCO 3.4.5.1 ACTIONs are applicable in Modes 1 through 4 (POWER OPERATION, STARTUP, HOT STANDBY, and HOT SHUTDOWN) and both require that "with either/or both containment atmosphere gaseous radioactivity and containment atmosphere particulate radioactivity monitors INOPERABLE, operation may continue for up to 30 days provided the containment sump level and flow monitoring system is OPERABLE and gaseous and/or particulate grab samples of the containment atmosphere are obtained at least once per 12 hours and analyzed within the subsequent 3 hours; otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours." Chemistry/RMS and Control Room personnel were unaware that inleakage was periodically diluting RU-1's gaseous sample suction line and reducing the flow rate through RU-1's particulate filter, and that RU-1's particulate and gaseous radioactivity channels would underestimate actual Containment radioactive airborne concentrations, potentially affecting its ability to alarm within

TEXT

TS LCO 3.3.3.1 TABLE 3.3-6 particulate and gaseous alarm/trip setpoints. The inleakage caused RU-1 to be periodically inoperable throughout a 14 month period while in Modes 1 through 4. Therefore, the OPERABILITY requirements were periodically not met for TS LCO 3.3.3.1 and TS LCO 3.4.5.1. At approximately 1704 MST on July 22, 1992, following corrective maintenance, satisfactory retest, and completion of the CHANNEL CHECK, RU-1 was declared operable and Control Room personnel exited TS LCO 3.3.3.1 ACTION 23 and TS LCO 3.4.5.1 ACTION 'a'.

RU-1 is a non-redundant radiation monitor that is part of the RCS leak detection system to detect leakage from the reactor coolant pressure boundary (RCPB). RU-1 samples Containment atmosphere, measuring particulate and gaseous parameters in order to detect an indication of RCPB leakage. The particulate and gaseous channels provide two of the three means of detecting increasing leakage from the RCPB, as required by TS LCO 3.4.5.1. The third method of detecting increasing leakage from the RCPB is the Containment sump level and flow monitoring system (IJ). RU-1's iodine channel provides information on gaseous radioiodine concentrations in Containment.

Prior to the event, on July 20, 1992, the Unit 3 Chemistry/RMS supervisor was performing a review of a completed Containment purge release permit when it was noted that RU-1's hourly gaseous radioactivity channel readings dropped significantly (i.e., from 8.88E-06 uCi/cc to 3.14E-07 uCi/cc over a 2 hour period) during a non-standard Containment purge (NSCP) [NOTE: NSCPs are performed weekly during power operation to maintain Containment internal pressure between TS LCO 3.6.1.4 limits of -0.3 and 2.5 pounds per square inch gauge (psig). Purge exhaust fans are not in operation during a NSCP. Radioactive airborne concentrations would not be expected to decrease significantly during a NSCP to reduce Containment internal pressure. A Containment purge release permit is initiated for a NSCP. Pre-release grab samples and RU-1 hourly average readings when a NSCP is in progress are used to update the release permit.] The Chemistry/RMS supervisor compared RU-1's gaseous radioactivity channel readings to the pre-release noble gas grab samples and determined that RU-1's gaseous radioactivity channel readings were comparable to pre-release noble grab sample readings at higher Containment internal pressures of approximately 1.0 psig or greater. However, during a NSCP, while Containment internal pressure was being reduced to atmospheric pressure (i.e., 0.0 psig), RU-1's gaseous radioactive channel readings decreased and were significantly lower than the pre-release noble gas grab sample readings. RU-1's gaseous radioactive channel readings were also significantly lower than a post-release noble gas grab sample reading taken in support of the initial review. The Chemistry/RMS

supervisor initiated a work request to investigate the sampling discrepancy.

On July 22, 1992, the monitor was removed from service to investigate the sampling discrepancy. Troubleshooting and rework were performed under an approved work document. The RMS Maintenance technicians performing the troubleshooting found that RU-1's iodine channel drawer gasket was cracked and outside air was leaking past the gasket into RU-1's sample stream. The inleakage was periodically diluting RU-1's gaseous sample suction line with outside atmosphere and reducing the flow rate through RU-1's particulate filter, resulting in potentially erroneous readings. Further evaluation confirmed that the inleakage was most prominent during lower Containment internal pressure periods (i.e., 0.0 psig) due to the increased vacuum required to maintain the sample flow. As Containment internal pressure increased, inleakage decreased due to a declining vacuum. Therefore, RU-1's particulate and gaseous radioactivity channels would underestimate actual Containment concentrations at lower Containment internal pressure. RU-1's particulate and gaseous radioactivity channels would accurately reflect actual Containment concentrations in approximately 3 days as Containment internal pressure increased.

An investigation was initiated in accordance with the APS Incident Investigation Program. Previous NSCP release permits were reviewed and it was determined that the inleakage first occurred following Unit 3's second refueling outage when RU-1's gaskets and seals were replaced. It was also determined that the inleakage could potentially prevent the gaseous channel on RU-1 from responding to radiation increases within Containment due to RCS leakage and that the inleakage could adversely affect the ability of RU-1's particulate and gaseous channels to provide the required alarm function with respect to RCS leak detection.

Chemistry/RMS and Control Room personnel were unaware that inleakage was periodically diluting RU-1's gaseous sample suction line and reducing the flow rate through RU-1's particulate filter, and that RU-1's particulate and gaseous radioactivity channels would underestimate actual Containment (NH) radioactive airborne concentrations, potentially affecting its ability to alarm within TS LCO 3.3.3.1 TABLE 3.3-6 particulate and gaseous alarm/trip setpoints. The inleakage caused RU-1 to be periodically inoperable throughout a 14 month period while in Modes 1 through 4. Therefore, the OPERABILITY requirements were periodically not met for TS LCO 3.3.3.1 and TS LCO 3.4.5.1.

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

As discussed in Section I.B, RU-1 was determined to have been periodically inoperable throughout a 14 month period while in Modes 1 through 4. Other than RU-1, there were no other structures, systems, or components inoperable at the start of the event that contributed to the event.

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

As discussed in Section I.B, the inleakage through RU-1 and the resultant sampling discrepancy were due to a cracked gasket.

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

RU-1's iodine channel drawer gasket was found to be cracked and outside air was leaking past the gasket into RU-1's sample stream. The inleakage was periodically diluting RU-1's gaseous sample suction line with outside atmosphere and reducing the flow rate through RU-1's particulate filter, resulting in potentially erroneous readings. The inleakage was most prominent during lower Containment internal pressure periods (i.e., 0.0 psig) due to the increased vacuum required to maintain the sample flow. As Containment internal pressure increased, inleakage decreased due to a declining vacuum. Therefore, RU-1's particulate and gaseous radioactivity channels would underestimate actual Containment concentrations at lower Containment internal pressure. RU-1's particulate and gaseous radioactivity channels would accurately reflect actual Containment concentrations in approximately 3 days as Containment internal pressure increased.

It was determined that the inleakage could potentially prevent the gaseous channel on RU-1 from responding to radiation increases within Containment and that the inleakage could adversely affect the ability of RU-1's particulate and gaseous radioactivity channels to provide the required alarm function with respect to RCS leak detection. The cause of the cracked gasket could not be determined. There have been no previous occurrences of cracked gaskets for this type of monitor.

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

Not applicable - no failures of components with multiple functions were involved.

G. For a failure 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 that rendered a train of a safety system inoperable were involved.

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

As discussed in Section I.B, RU-1's sampling discrepancy was discovered during a review of a completed Containment purge release permit. The cracked gasket was discovered during troubleshooting performed in accordance with an approved work authorization document. The procedural deficiencies discussed in Section I.I were discovered during the investigation.

I. Cause of Event:

An investigation was initiated in accordance with the APS Incident Investigation Program. As part of the investigation, a review of existing procedural controls was performed. The following procedural weaknesses were determined to have collectively caused the event (SALP Cause Code D: Defective Procedures):

1. The surveillance testing procedures to verify operability by performing a shiftly CHANNEL CHECK (i.e., qualitative assessment of channel behavior by observation) did not provide appropriate guidance to allow for the detection of the inleakage. Control Room personnel are responsible for the performance of the TS Surveillance Requirement (SR) 4.3.3.1 and TS SR 4.4.5.1 shiftly CHANNEL CHECKs for demonstrating operability of RU-1. The surveillance testing procedures require that the Control Room personnel "Verify that any trends indicated by the 24 one-hour averages [for RU-1] were consistent with plant conditions during the same time frame." Control Room personnel recognized that radioactive airborne concentrations would not be expected to decrease significantly during a NSCP to reduce Containment internal pressure. However, the procedures did not provide the steps or guidance which would enable Control Room personnel to quantitatively assess the significance of the reduction in RU-1's hourly trends. Therefore, based on their interpretation of RU-1's hourly trending in relationship to plant conditions (e.g., NSCP in progress), RU-1 met the acceptance criteria and was determined to be operable throughout the 14 month period.

2. The investigation determined that the sampling discrepancy should have been identified at the initial indication immediately following Unit 3's second refueling outage. In accordance with the gaseous radioactive release permits and offsite dose assessment procedure, a Chemistry/RMS technician acquires pre-release grab samples, and during the NSCP, a Chemistry/RMS technician records hourly RU-1 readings. At least once per shift, when a purge is in progress, a Chemistry/RMS technician monitors the RMS effluent channels and appropriate RU-1 channels for unusual changes in release rates or activity and evaluates if the release should be terminated and a new permit issued if Containment activity concentration changes significantly. Guidelines are provided for determining significant changes (e.g., plant evolutions that may have occurred which could result in potentially changed Containment atmosphere concentrations, such as mode changes, increased RCS leakage, or primary system venting). Following the NSCP, the Chemistry/RMS technician calculates the noble gas ratio and the adjusted average noble gas isotopic concentrations for the release period using the average of the recorded hourly RU-1 readings along with the pre-release grab samples. The Chemistry/RMS technicians recognized that RU-1's post-release gaseous radioactive channel readings were significantly lower than the pre-release noble gas grab sample readings. However, the Chemistry/RMS technicians were not cognizant that the lower noble gas ratio values were inappropriate for a NSCP (i.e., not consistent with plant conditions) and therefore did not identify equipment failure for RU-1. The procedure only provided the methodology to calculate the noble gas ratio. Guidance as to expected RU-1 gaseous channel response during a NSCP was not provided.

3. RMS Sample Collection procedure provides for a step to verify that o-rings located in RU-1's filter drawers are present, undamaged, and correctly installed. However, there is no provision to check the filter drawer gaskets.

Although Chemistry/RMS and Control Room personnel recognized that radioactive airborne concentrations would not be expected to decrease significantly during a NSCP to reduce Containment internal pressure, contributing to the event was that Chemistry/RMS and Operations (i.e., Control Room) training did not explicitly discuss the appropriate particulate and gaseous channel responses for RU-1 during a NSCP. No unusual characteristics of the work location (e.g., noise, heat, poor lighting) directly

contributed to this event. The event was not a result of personnel errors.

J. Safety System Response:

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

K. Failed Component Information:

RU-1 was manufactured by Kaman Instrumentation Corporation. The model number is 952140-002.

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

During the period that inleakage occurred, RU-1 was capable of detecting changes in Containment activity levels, and thus provided indication of possible RCS leakage. The effect of the inleakage was to reduce particulate and gaseous channel sensitivity such that it may not have alarmed per design requirements. However, Control Room personnel periodically monitor the activity levels detected by RU-1 and would have perceived unexplained increases in indicated activity as potential RCS leakage. If RU-1 insufficiently indicated increases in Containment radiation levels as a result of RCS leakage, the Containment radwaste sump flow alarm would have been initiated in the Control Room (NA) alerting Control Room personnel that the Containment sump flow had increased by one gallon per minute 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.

The event did not result in any challenges to the fission product barriers or result in any releases of radioactive materials. The impact of this event on offsite dose assessment is that, under worst case conditions, the noble gas activity and the resultant offsite dose from NSCPs were underestimated by a factor of two. However, since noble gas dose from all releases from Unit 3 were typically less than 1 percent of the quarterly and annual TS limits, no dose limits would have been exceeded. Therefore, there were no safety consequences or implications as a result of this event. This event did not adversely affect the safe operation of the plant or the health and safety of the public.

III. CORRECTIVE ACTION:

A. Immediate:

Unit Chemistry/RMS management were notified of the event and made aware that RU-1 readings should not decrease following a NSCP.

In addition, Unit Chemistry/RMS personnel have been briefed on the details of the event

B. Action to Prevent Recurrence:

The surveillance testing procedures to verify operability of RU-1 by performing a shiftly CHANNEL CHECK will be revised to include a caution statement providing guidance as to appropriate particulate and gaseous channel responses for RU-1 during a NSCP (i.e., change in internal pressure) as opposed to a Containment Purge (i.e., change in atmosphere). Per the existing procedures, if information received from the 24 hour trend is suspect or otherwise judged questionable, Control Room personnel should contact Chemistry/RMS personnel to perform an evaluation of RU-1. The procedures are expected to be changed by September 4, 1992.

The gaseous radioactive release permits and offsite dose assessment procedure will be revised to include specific instructions as to appropriate particulate and gaseous channel responses for RU-1 during a NSCP. The procedure is expected to be changed by September 4, 1992.

RMS Sample Collection procedure will be revised to require that Chemistry/RMS technicians include the filter drawer gasket in the inspection of seals and gaskets for visible damage and proper placement during routine filter changes. The procedure is expected to be changed by September 4, 1992.

This event will be evaluated by the Training Department in accordance with an approved procedure for inclusion in industry events training for Operations (i.e., Control Room) and Chemistry/RMS personnel. This evaluation is expected to be completed by October 1, 1992.

Following issuance, this LER 530/92-002-00 will be required reading for Unit Chemistry/RMS personnel.

Affected NSCP release permits will be reviewed and updated using the original grab sample activities. Corrected activity and dose totals for previous reporting periods will be included in the next Semiannual Radioactive Effluent Release Report. The report is expected to be issued by March 1, 1993.

IV. PREVIOUS SIMILAR EVENTS:

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

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
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TEXT

V. ADDITIONAL INFORMATION:

This report also contains information for a Special Report required pursuant to TS LCO 3.3.3.1 ACTION 27 and TS 6.9.2 for both channels of RU-1 being periodically inoperable for greater than 72 hours.