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RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-009-00:on 920518,determined that missing seismic restraints in Foxboro equipment may have affected seismic qualification of TS-required equipment.Caused by inadequate installation instructions.Manual revised.W/920610 ltr.

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JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

192-00787-JML/TRB/RKR
June 10, 1992

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528 (License No. NPF-41)
Licensee Event Report 92-009-00
File: 92-020-404

Attached please find Licensee Event Report (LER) 91-009-00 prepared and submitted pursuant to 10CFR50.73. This LER reports that the operability requirements and associated actions were not met for Technical Specifications 3.3.2, 3.6.2.2, and 3.7.11 due to instrument channels associated with Foxboro equipment not being seismically qualified. 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/RKR/mh

Attachment

cc: W. F. Conway (all with attachment)
J. B. Martin
D. H. Coe
INPO Records Center

IE22
1/1

LICENSEE EVENT REPORT (LER)

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

TITLE (4)
Seismic Qualification of Foxboro Equipment

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 5	1 8	9 2	9 2	0 0 9	0 0	0 6	1 0	9 2	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)	3	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)	20.405(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
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 May 18, 1992, Palo Verde Unit 1 was in MODE 3 (HOT STANDBY) at normal operating temperature and pressure, Palo Verde Unit 2 was in MODE 1 (POWER OPERATION) at approximately 100 percent power, and Palo Verde Unit 3 was in MODE 1 (POWER OPERATION) at approximately 73 percent power, when APS engineering determined that missing seismic restraints in Foxboro equipment may have affected the seismic qualification of Technical Specification (TS) required equipment and that the instrument channels associated with the Unit 1 Train "A" Spray Chemical Storage Tank Level transmitter (LT-349), Unit 2 Train "A" Pressurizer Pressure transmitter (PT-103), Unit 2 Channel "A" Refueling Water Tank (RWT) Level transmitter (LT-203A), Unit 3 Train "B" Pressurizer Pressure transmitter (PT-104), and Unit 3 Channel "B" RWT Level transmitter (LT-203B) may not have been seismically qualified. The instrument channels for these transmitters are required to be OPERABLE by TS 3.6.2.2, "Iodine Removal System," TS 3.7.11, "Shutdown Cooling System," and TS 3.3.2, "Engineered Safety Features Actuation System Instrumentation." Since the instrument channels for these transmitters may not have been seismically qualified, the OPERABILITY requirements and the associated ACTIONs were not met for TS 3.6.2.2, TS 3.7.11, and TS 3.3.2.

The cause of this condition was determined to be inadequate installation instructions and requirements in vendor documentation.

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

TEXT

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

On May 18, 1992, Palo Verde Unit 1 was in MODE 3 (HOT STANDBY) at normal operating temperature and pressure during startup from its third refueling outage, Palo Verde Unit 2 was in MODE 1 (POWER OPERATION) at approximately 100 percent power, and Palo Verde Unit 3 was in MODE 1 (POWER OPERATION) at approximately 73 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 May 18, 1992, APS engineering personnel (utility, nonlicensed) completed an inspection and evaluation of the seismic qualification of Foxboro equipment installed in Units 1, 2, and 3. The inspection and evaluation determined that missing seismic restraints (upper and/or lower guide rails) in Foxboro equipment may have affected the seismic qualification of Technical Specification (TS) required equipment. The evaluation of the inspection results determined that during previous periods of operation, the instrument channels associated with the Unit 1 Train "A" Spray Chemical Storage Tank (SCST) Level transmitter (LT-349) (TK)(LT)(BE), Unit 2 Train "A" Pressurizer Pressure transmitter (PT-103) (PZR)(PT)(BP), Unit 2 Channel "A" Refueling Water Tank (RWT) Level transmitter (LT-203A) (TK)(LT)(JE), Unit 3 Train "B" Pressurizer Pressure transmitter (PT-104) (PZR)(PT)(BP), and Unit 3 Channel "B" RWT Level transmitter (LT-203B) (TK)(LT)(JE) may not have been seismically qualified. The instrument channel for these transmitters are required to be OPERABLE by TS 3.6.2.2, "Iodine Removal System," TS 3.7.11, "Shutdown Cooling System," and TS 3.3.2, "Engineered Safety Features Actuation System Instrumentation." Since the instrument channels for these transmitters may not have been seismically qualified, the OPERABILITY requirements and the associated ACTIONs were not met for TS 3.6.2.2, TS 3.7.11, and TS 3.3.2.

On October 28, 1991, APS engineering identified a potential problem with the seismic qualification of Foxboro equipment. APS was notified by the Institute of Nuclear Power Operations (INPO) that Arkansas Nuclear One had discovered that required seismic components were missing from cabinets (CAB) containing Foxboro equipment. APS was also notified by Foxboro of potential errors in the field installation of Foxboro equipment without proper seismic restraints. San Onofre Nuclear Generating Station (SONGS)

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also notified APS of potential problems with the seismic qualification of Foxboro equipment. Specifically, the concern was that instrument modules were installed in Foxboro SPEC 200 instrumentation cabinets without the required seismic restraints (i.e., upper and/or lower instrument module guide rails).

Based on the potential problem with the seismic qualification of Foxboro equipment, APS engineering developed an inspection plan for cabinets containing class 1E Foxboro equipment in Units 1, 2, and 3. The initial inspection looked at approximately ten percent of the class 1E Foxboro equipment installed in each unit, including modules that had been installed in the field by a design change. The initial inspection was completed on December 4, 1991. Based on the results of the initial inspection, APS engineering determined that an inspection of the remaining class 1E Foxboro equipment in Units 1, 2, and 3 was required.

During the initial and subsequent inspections, problems with the seismic restraints were immediately corrected. The instrument channels that had problems with the seismic restraints were also evaluated for TS OPERABILITY and declared inoperable, if required, until problems with the seismic restraints were corrected. The inspections and evaluation of the inspection results in Units 1, 2, and 3 were completed on May 18, 1992

The Foxboro seismic test criteria is significantly higher than the seismic criteria for PVNGS. Therefore, instrument modules which did not meet the Foxboro test report configuration may still have been capable of withstanding a PVNGS design basis seismic event. However, for this evaluation it was assumed that instrument modules without upper and/or lower guide rails would fail nonconservatively during a PVNGS design basis seismic event. The evaluation of the inspection results determined that during previous periods of operation, the instrument channels associated with the following transmitters may not have been seismically qualified due to instrument modules in the instrument channels missing upper and/or lower instrument module guide rails and therefore, may not have satisfied all of the operability requirements of their respective TSs:

1) Unit 1 Train "A" SCST Level transmitter (LT-349),

The Iodine Removal System (IRS) (BE) adds hydrazine to the Containment Spray System (CSS) (BE) to remove iodine from the Containment (NH) atmosphere following a Loss of Coolant Accident (LOCA). The hydrazine is stored in the SCST. Two suction lines (Trains "A" and "B") are provided, one to each CSS pump (P)(BE). There is a Spray Chemical Addition Pump (SCAP) [SIA-P05 (Train "A") or SIB-P05 (Train "B")] (P)(BE)

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and redundant isolation valves [SIA-UV681 and SIA-UV603 (Train "A"), or SIB-UV602 and SIB-UV680 (Train "B")] (ISV)(BE) in each suction line. The IRS is automatically actuated (i.e., pumps start and isolation valves open) upon receipt of a Containment Spray Actuation Signal (CSAS) (JE). The SCST has four level instruments, two for each train [LT-345 and LT-349 (Train "A"), and LT-344 and LT-348 (Train "B")]. Indication of a low-low SCST level by the level instruments results in the following actions:

a. Low-low level indicated by LT-345 closes isolation valve SIA-UV681.

b. Low-low level indicated by LT-349 closes isolation valve SIA-UV603 and stops SCAP SIA-P05.

c. Low-low level indicated by LT-344 closes isolation valve SIA-UV680.

d. Low-low level indicated by LT-348 closes isolation valve SIA-UV602 and stops SCAP SIB-P05.

A low-low level indicated by LT-349 closes isolation valve SIA-UV603 and stops SCAP SIA-P05. This stops hydrazine addition to the CSS from Train "A" of the IRS. If a seismic event of sufficient magnitude occurred, it could result in the SCST level indication for Level transmitter LT-349 failing low and isolating Train "A" of the IRS from the CSS.

TS 3.6.2.2, "Iodine Removal System," requires that "The Iodine Removal System be OPERABLE with: a. A spray chemical addition tank ..., and b. Two spray chemical addition pumps each capable of adding hydrazine solution from the spray chemical addition tank to a containment spray system pump flow." The ACTION for TS 3.6.2.2 requires that "With the iodine removal system inoperable, restore the system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours; restore the iodine removal system to OPERABLE status within the next 48 hours or be in COLD SHUTDOWN within the following 30 hours. Since the instrument channels for these transmitters may not have been seismically qualified, the OPERABILITY requirements and the associated ACTION were not met for TS 3.6.2.2.

2) Unit 2 Train "A" Pressurizer Pressure transmitter (PT-103) and Unit 3 Train "B" Pressurizer Pressure transmitter (PT-104),

The Shutdown Cooling System (SCS) (BP) is a forced

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circulation heat removal system designed to transfer reactor coolant sensible heat and core decay heat from the Reactor Coolant System (RCS) (AB) to the Essential Cooling Water System (ECWS) (BI). The SCS consists of two independent subsystems, each using one low pressure safety injection (LPSI) pump (P)(BP) to circulate reactor coolant through a Shutdown Cooling Heat Exchanger (SDCHE) (HX)(BI). The SCS is manually put into operation (i.e., valves opened and pumps started) after the reactor coolant temperature and pressure have been reduced to approximately 350 degrees Fahrenheit and 410 pounds per square inch absolute (psia). Two isolation valves (ISV)(BP) in each shutdown cooling suction line [SIA-UV651 and SIC-UV653 (Train "A"), and SIB-UV652 and SID-UV654 (Train "B")] provide automatic isolation of the SCS from the RCS. The isolation valves are provided with interlocks (IEL)(BP) which prevent these valves from opening when RCS pressure is above the design pressure of the SCS and automatically close these valves when RCS pressure exceeds the design pressure of the SCS. RCS pressure indication for the interlocks for the Train "A" valves is provided by Train "A" Pressurizer pressure transmitter, PT-103. RCS pressure indication for the interlocks for the Train "B" valves is provided by Train "B" Pressurizer pressure transmitter, PT-104.

If a seismic event of sufficient magnitude occurred, it could result in the interlocks associated with Unit 2 Train "A" Pressurizer Pressure transmitter PT-103 allowing the Train "A" SCS isolation valves to be manually opened with RCS pressure exceeding the design pressure of the SCS, and it could result in the interlocks associated with Unit 3 Train "B" Pressurizer Pressure transmitter PT-104 allowing the Train "B" SCS isolation valves to be manually opened with RCS pressure exceeding the design pressure of the SCS. APS procedures require that RCS pressure be below 410 psia prior to manually opening these valves. There is also a containment isolation valve (ISV)(NH) downstream of these valves that is normally locked closed that would isolate the SCS if the isolation valves were inadvertently manually opened when RCS pressure exceeded the design pressure of the SCS. If the SCS was operating, the seismic event could result in the interlocks closing the isolation valves.

TS 3.7.11, "Shutdown Cooling System," requires that "Two independent shutdown cooling subsystems shall be OPERABLE, with each subsystem comprised of: a. One OPERABLE low pressure safety injection pump, and b. An independent OPERABLE flow path capable of taking suction from the RCS hot leg and discharging coolant through the shutdown cooling

heat exchanger and back to the RCS through the cold leg injection lines." ACTION a. for TS 3.7.11 requires that "With one shutdown cooling subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within 1 hour and be in HOT SHUTDOWN within the next 6 hours and be in COLD SHUTDOWN within the next 30 hours and continue action to restore the required subsystem to OPERABLE status." Since the instrument channels for these transmitters may not have been seismically qualified, the OPERABILITY requirements and the associated ACTION were not met for TS 3.6.2.2.

3) Unit 2 Channel "A" Refueling Water Tank (RWT) Level transmitter (LT-203A) and Unit 3 Channel "B" RWT Level transmitter (LT-203B).

The Recirculation Actuation System (RAS) (JE) changes the operation mode of the Safety Injection System (SIS) (BP)(BQ) from injection with suction from the RWT to recirculation with suction from the containment sump. RAS is a four channel system that is initiated by a 2-out-of-4 low RWT level signal. There are four low RWT level transmitters (LT-203A, LT-203B, LT-203C, and LT-203D) which provide the low RWT level signal.

If a seismic event of sufficient magnitude occurred, it could result in Channel "A" of the Unit 2 RAS tripping on low RWT level, and it could result in Channel "B" of the Unit 3 RAS tripping on low RWT level. Since RAS is a four channel system that is initiated by a 2-out-of-4 low RWT level signal, tripping one channel would not result in a RAS actuation.

TS 3.3.2, "Engineered Safety Features Actuation System Instrumentation," requires that "The Engineered Safety Features Actuation System (ESFAS) instrumentation channel and bypasses shown in Table 3.3-3 shall be OPERABLE..." and Table 3.3-3, section V.A., requires four channels of low RWT sensors/trip units. ACTION 13 of TS 3.3.2 requires that "With the number of channels OPERABLE one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may continue provided the inoperable channel is placed in the bypassed or tripped condition." Since the instrument channels for these transmitters may not have been seismically qualified, the OPERABILITY requirements and the associated ACTION were not met for TS 3.3.2.

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

Other than the instrument channels described in Section I.B, no structures, systems, or components were inoperable which contributed to the event.

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

Not applicable - no 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 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:

Not applicable - there have been no component or system failures or procedural errors identified. These problems were discovered as a result of information received from INPO and SONGS regarding experience with similar problems as described in Section I.B.

I. Cause of Event:

This condition was investigated in accordance with the APS Incident Investigation Program. The cause of this condition was determined to be inadequate installation instructions and requirements in vendor documentation (SALP Cause Code B: Design, Manufacturing, Installation Error). The construction documentation provided by the vendor did not provide clear installation instructions for the qualified seismic configuration of the equipment. The qualification test report and seismic analysis provided by the manufacturer did identify the qualified seismic configuration. However, the Foxboro instruction manual

did not provide clear requirements for the qualified seismic configuration. The Foxboro instruction manual is used for the preparation of work documents for installation and maintenance of Foxboro equipment.

No unusual characteristics of the work location (e.g., noise, heat, poor lighting) directly contributed to this condition. There were no procedural errors which contributed to this condition. There were no personnel errors which contributed to this condition.

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:

APS has evaluated the safety significance of the conditions described in Section I.B. The Foxboro seismic test criteria is significantly higher than the seismic criteria for PVNGS. Therefore, instrument modules which did not meet the Foxboro test report configuration may still have been capable of withstanding a PVNGS design basis seismic event. However, for this evaluation it was assumed that instrument modules without upper and/or lower guide rails would fail nonconservatively during a PVNGS design basis seismic event. The following is a discussion of the safety significance of a failure in the instrument channel for the conditions described in Section I.B:

1) Unit 1 Train "A" SCST Level transmitter (LT-349),

As discussed in Section I.B, Level transmitter LT-349 supplies level indication for Train "A" of the IRS. A low-low level indicated by LT-349 closes isolation valve SIA-UV603 and stops SCAP SIA-P05. This stops hydrazine addition to the CSS from Train "A" of the IRS. If a seismic event of sufficient magnitude occurred, it could result in the SCST level indication for Level transmitter LT-349 failing low and isolating Train "A" of the IRS from the CSS. The Updated Final Safety Analysis Report (FSAR) assumes that the IRS will meet its functional requirements even with the failure of a single active component. The Combustion Engineering Standard Safety Analysis Report (CESSAR) states that the IRS is made up of two independent subsystems, either of which provides the required iodine removal capacity. Therefore, the

missing guide rails for the Foxboro modules that interface with this transmitter are not safety significant since the redundant train would still be capable of providing the required iodine removal capability.

On June 25, 1991, APS submitted a TS amendment request to the NRC to delete TS section 3/4 3.6.2.2 and BASES from the Units 1, 2, and 3 TS. The TS amendment request provides justification for deletion of the IRS and concludes that deletion of the hydrazine spray additive does not impact the environmental or radiological consequences of a LOCA.

2) Unit 2 Train "A" Pressurizer Pressure transmitter (PT-103) and Unit 3 Train "B" Pressurizer Pressure transmitter (PT-104),

As discussed in Section I.B, Unit 2 Pressurizer Pressure transmitter PT-103 provides RCS pressure indication to the interlocks that automatically close the Train "A" SCS isolation valves or prevent the opening of the Train "A" SCS isolation valves, and Unit 3 Pressurizer Pressure transmitter PT-104 provides RCS pressure indication to the interlocks that automatically close the Train "B" SCS isolation valves or prevent the opening of the Train "B" SCS isolation valves whenever RCS pressure exceeds the design pressure of the SCS. If a seismic event of sufficient magnitude occurred, it could result in the interlocks associated with Unit 2 Train "A" Pressurizer Pressure transmitter PT-103 allowing the Train "A" SCS isolation valves to be manually opened with RCS pressure exceeding the design pressure of the SCS and it could result in the interlocks associated with Unit 3 Train "B" Pressurizer Pressure transmitter PT-104 allowing the Train "B" SCS isolation valves to be manually opened with RCS pressure exceeding the design pressure of the SCS. APS procedures require that RCS pressure be below 410 psia prior to manually opening these valves. There is also a containment isolation valve downstream of these valves that is normally locked closed that would isolate the SCS if the isolation valves were inadvertently manually opened when RCS pressure exceeded the design pressure of the SCS. If the SCS was operating, the seismic event could result in the interlocks closing the isolation valves. The Updated FSAR and CESSAR state that one train of the SCS is capable of providing the required cooling capability. Therefore, the missing guide rails for the Foxboro modules that interface with these transmitters are not safety significant since the redundant SCS train would provide the required cooling capability.

3) Unit 2 Channel "A" Refueling Water Tank (RWT) Level transmitter (LT-203A) and Unit 3 Channel "B" RWT Level transmitter (LT-203B).

As discussed in Section I.B, Unit 2 RWT Level transmitter LT-203A

provides the RWT level signal to Channel "A" of the Unit 2 RAS, and Unit 3 RWT Level transmitter LT-203B provides the RWT level signal to Channel "B" of the Unit 3 RAS. If a seismic event of sufficient magnitude occurred, it could result in Channel "A" of the Unit 2 RAS tripping on low RWT level, and it could result in Channel "B" of the Unit 3 RAS tripping on low RWT level. Since RAS is a four channel system that is initiated by a 2-out-of-4 low RWT level signal, tripping one channel would not result in a RAS actuation. Therefore, the missing guide rails for the Foxboro modules that interface with these transmitters is not safety significant since the other three channels of RAS would be OPERABLE.

Based on the above conditions, there were no adverse safety consequences or implications as a result of this condition. This condition would not have resulted in any challenges to fission product barriers or resulted in any releases of radioactive material. This condition did not adversely affect safe operation of the plant or the health and safety of the public.

III. CORRECTIVE ACTION:

A. Immediate:

An inspection of all cabinets containing class 1E Foxboro equipment was completed in Units 1, 2, and 3. During the inspection, problems with seismic restraints were immediately corrected.

B. Action to Prevent Recurrence:

1. The Foxboro instruction manual has been revised to include installation instructions for the seismic restraints. A note has been added to the affected drawings referencing the installation instructions for the seismic restraints.

2. I&C technicians have been trained on the required seismic installation for Foxboro equipment.

V. PREVIOUS SIMILAR EVENTS:

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