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SUBJECT: LER 90-002-01:on 900713,unqualified air regulators in ADV control air sys.

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JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

192-00699-JML-TRB/SBJ
October 6, 1990

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

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528 (License No. NPF-41)
Licensee Event Report 90-002-01
File: 90-020-404

Attached please find Supplement 1 to Licensee Event Report (LER) No. 90-002 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 pursuant to 10CFR21 and includes the information requested in 10CFR21.21(b)(3). In accordance with 10CFR21.21(b)(2), three copies of this report are being provided to the Director, Office of Nuclear Reactor Regulation.

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

Very truly yours,

James M Levine

JML/TRB/SBJ/dmn

Attachment

cc: W. F. Conway (all with attachment)
J. B. Martin
D. H. Coe
S. R. Peterson
A. C. Gehr
A. H. Gutterman
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NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WTH 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Palo Verde Unit 1	0 5 0 0 0 5 2 8	1 OF 0 9

TITLE (4)

Unqualified Air Regulators in ADV Control Air System

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 7	1 3	9 0	9 0	0 0 2	0 1	1 0	0 6	9 0	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)	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)	X 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)	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)	10CFR21

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Thomas R. Bradish, 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)		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 13, 1990, Units 1 and 3 were in Mode 1 (POWER OPERATION) at 100 percent power and Unit 2 was in Mode 3 (HOT STANDBY) at normal operating pressure and temperature when an engineering evaluation was completed that determined that previously installed unqualified air regulators in the atmospheric dump valves (ADV) manual remote control air system were reportable pursuant to 10CFR21 and consequently reportable under 10CFR50.72 and 10CFR50.73.

On May 23, 1990, the Equipment Qualification Group identified that the Masoneilan model 77-4 air regulators installed in Units 1, 2, and 3 ADV nitrogen/air supply system did not have environmental or seismic qualification documentation. An operability evaluation was performed for ADVs required to be operable at that time and determined there were no immediate operability effects. Qualified air regulators were subsequently obtained and installed in all three units.

The condition was caused by a failure of the vendor to supply components that met procurement specifications.

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

This report is also being provided pursuant to the provisions of 10CFR21. The narrative below includes the information requested by 10CFR21.21(b)(3); however, it is being 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 on July 13, 1990, when it was determined that the failures described herein were reportable pursuant to 10CFR21 and consequently 10CFR50.72 and 10CFR50.73:

> Palo Verde Unit 1 was in Mode 1 (POWER OPERATION) at approximately 100 percent power, Palo Verde Unit 2 was in Mode 3 (HOT STANDBY) at normal operating pressure and temperature, and Palo Verde Unit 3 was in Mode 1 at approximately 100 percent power.

The following plant conditions existed on May 23, 1990, when the condition was identified:

> Palo Verde Unit 1 was in Mode 5 (COLD SHUTDOWN), Palo Verde Unit 2 was in Mode 6 (REFUELING), and Palo Verde Unit 3 was in Mode 1 at 100 percent power.

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

Event Classification: 10CFR21. A condition that alone 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 July 13, 1990, Arizona Public Service (APS) completed an engineering evaluation that concluded that the lack of environmental and seismic qualification for air regulators (RG) in Units 1, 2, and 3 atmospheric dump valve (ADV)(SB)(PCV) control air system was reportable under 10CFR21. Consequently the condition is also reportable under 10CFR50.72 and 10CFR50.73.

Prior to the determination, in April 1990 a work document was

initiated to inspect the Unit 1 ADV air/nitrogen(LE)(LK) lines for leaks and repair any identified leaks. Unit 1 was making preparations to return to power operation during a refueling outage. During the performance of the leak inspection, it was determined that the control air regulators to two ADV current-to-pressure (I/P) converters (CNV) required replacement because of air leakage. An Authorization for Material Transfer (AMT) was prepared to obtain the regulators from Unit 2 since there were no available parts in the warehouse. On May 17, 1990, an Equipment Qualification Group review of the qualification documentation for the ADVs and I/P converters discovered that the air regulators did not have environmental or seismic qualification documentation. Subsequently, a material non-conformance report (MNCR) was initiated on May 23, 1990 after it was determined that the qualification documentation was required.

Since the identified condition left the status of the ADVs in Unit 3 indeterminate, an operability evaluation was performed by Plant Management for the Unit 3 ADVs and concluded that there were no immediate operability concerns. Qualified regulators were procured and installed in all three units.

On June 6, 1990 a Reportability Evaluation Report (RER) was initiated to have the identified condition evaluated for 10CFR21 reportability and safety significance. On July 13, 1990 the RER was completed and the condition was determined to be reportable under 10CFR21, 10CFR50.72, and 10CFR50.73.

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

The Unit 1 ADVs were not required at the start of this event. Unit 1 was in Mode 5 and making preparations to return to operation following a refueling outage during which work had been performed on the ADVs.

The Unit 2 ADVs were not required at the start of the event. Unit 2 was in a refueling outage and in the refueling mode.

The Unit 3 ADVs were required and considered operable at the start of 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.

The cause of the air regulators being unqualified was the failure of Masoneilan to supply components that met purchase specifications. An extensive review of the purchase orders and the specification files indicate that the materials were purchased and received as Quality-Class with requirements for environmental and seismic qualification documentation.

The regulators were originally purchased between 1982 and 1984 under three Purchase Orders as Quality-Class regulators in accordance with an engineering specification. Receiving documentation for the first purchase order indicated that all required documentation was received. However, no qualification documentation can be located in APS files. The purchase specifications for the other two purchase orders were modified to not require delivery of seismic and environmental qualification documentation upon material receipt. However, the seismic and environmental qualification documentation was still required to be submitted by the specification and purchase order.

Additional regulators were procured for Unit 3 under another purchase order as Quality-class regulators but the qualification documentation was not required. The lack of qualification documentation for this purchase order was documented on a non-conformance report in 1986. The MNCR was dispositioned in March 1986 after a drawing was revised changing the regulator to a non-quality class. No justification for the change in quality classification has been identified.

Masoneilan was contacted by telephone during the documentation review. Masoneilan indicated that the sales file showed that APS did request the regulators meet the engineering specification. Masoneilan reiterated that these regulators were not supplied Quality-Class or environmentally/seismically qualified since they were not available other than as an "off the shelf" commercial item. Masoneilan also indicated that there was no record of any notification to APS that the regulators would be supplied differently than requested in the purchase order or engineering specification.

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

The function of the ADV remote manual control system is to reduce the control air pressure from air supply line pressure to approximately 23 pounds per square inch gauge (psig) as input into an I/P converter whose output is variable pressure air to the ADV positioner based upon an electrical input from the remote manual control station. Some postulated failures and the resultant effects, based upon the materials of construction, style of construction, and limited testing performed, follow below.

1. If the regulator fails high, full upstream air pressure would be allowed downstream of the regulator to the I/P convertor. This type of failure would give a false indication of an air demand and would affect the calibration of the I/P convertor and change the response of the ADVs to remote manual demand signals. Operation of the ADVs might still be possible since indication of ADV position is available in the control room, however ADV operation would not necessarily be similar to that when the calibration is correct nor is it certain that the valves could be closed without removing the ADV open permissive signal.

2. If the regulator fails low, reduced or zero downstream air flow to the I/P convertor would result. This failure would result in sluggish or no valve operation as well as premature depletion of the ADV nitrogen supply (if in use).

3. If the regulator age degradable material (e.g., cellulose filter, diaphragm, O-rings) deteriorates, this will allow particulate material to clog the regulator and/or downstream equipment. This type of failure could result in the unreliable operation of the regulator or other downstream equipment.

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

Not applicable - there were no failure of components with multiple functions. A review of the application of the 77-4 regulators to other components was conducted. The 77-4 regulators are not used in any other application requiring environmental and seismic qualification.

G. For 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:

While the condition was being evaluated, qualified replacement regulators were provided and installed in all three units. The condition did not render any safety train inoperable upon its discovery based on equipment operability evaluations.

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

The lack of environmental qualification documentation for the pressure regulator was discovered by the Equipment Qualification Group as discussed in Section I.B.

I. Cause of Event

The cause of the event is as described in Section I.D.

A contributing factor to the condition identified in this report was the preparation and approval of a Bechtel purchase order (PO) without a specification specifically addressing pressure regulators. The pressure regulators were originally to be procured as an accessory to the electro-pneumatic transducer, but Masoneilan would not supply the regulators as an accessory. At this point a specification specifically addressing pressure regulators should have been prepared to meet Bechtel's PO procedural requirements. However, the Bechtel PO was prepared and approved referencing the electro-pneumatic transducer specification which resulted in ambiguous requirements for the pressure regulators being provided to the vendor. Even with ambiguity, the purchase order is considered adequate to convey the requirement that a qualified regulator be supplied.

The approval of changes to the pressure regulators installation drawing in 1986 also contributed to the condition described in this report. This change identified the regulators as commercial grade and allowed installation of the regulators in Unit 3 without qualifying documentation.

The Quality Control receiving of the pressure regulators was performed in accordance with the procedures in place at the time. There were no procedural errors associated with the material receipt identified by the investigation into this condition.

J. Safety System Response

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

K. Failed 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 valves at Palo Verde.

A Masoneilan model 77-4 pressure regulator was installed in each ADV nitrogen/air control system. There are four ADVs in each unit (twelve total).

Component described in this report was the Masoneilan model 77-4 pressure regulator. Further information concerning the number and location of model 77-4 pressure regulators supplied to other facilities should be obtained from Masoneilan.

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

Note: This section contains the information requested by 10CFR21 concerning the nature of the safety hazard which is created or could be created.

Atmospheric dump valves (ADV), capable of remote manual operation from either the control room or remote shutdown panel by means of a pneumatic actuator, or direct manual operation using the handwheel installed on each valve are provided in each of the four main steam lines. The ADVs allow cooldown of the steam generators when the main steam line isolation valves are closed, or when the main condenser is not available as a heat sink. Each ADV is capable of maintaining the plant at hot standby dissipating core decay and reactor coolant pump heat and allowing controlled cooldown from hot standby to shutdown cooling system initiation conditions. To accomplish the above, each ADV has sufficient capacity to meet the saturated steam flow condition in Palo Verde Nuclear Generating Station (PVNGS) Updated Final Safety Analysis Report (UFSAR).

The Masoneilan model 77-4 regulator was installed in line with the air/nitrogen supply to the remote control system for operation of the Atmospheric Dump Valves. Control air/nitrogen must pass through this regulator to reach the ADV positioner/actuator therefore, the regulator

is necessary for the manual remote operation of the ADVs. The UFSAR safety analysis does not take credit for the local manual operation of the ADVs.

The Masoneilan regulators were not qualified for service in the Palo Verde units. However, it is reasonable to believe that these regulators could have been qualified for use in this application since the materials of construction and style of construction of the Masoneilan 77-4 regulator are representative in many respects to those utilized in other qualified nuclear applications. The regulator would very likely have a qualified life substantially less than the life of the plants, therefore, requiring refurbishment or replacement prior to the end of the qualified life. An expected replacement interval for these regulators would probably have been on the order of five years based upon the age degradable materials of construction. This replacement interval is partially supported by recent maintenance history. It should be noted that the major changes made by Masoneilan for their nuclear grade qualified regulator were to change the elastomeric materials of construction to elastomers which had better thermal and radiation resistance qualities and the filter material from cellulose to bronze. Since none of the units had exceeded the five year expected qualified life, there were no significant safety consequences or any affects on the health and safety of the public.

Additionally it should be noted that only one ADV is required for plant cooldown. Therefore, the four regulators must be failed concurrently during an event requiring ADV operation for this condition to result in a loss of safety function or two regulators must be failed concurrently and one train be disabled (e.g. main steam line break) during an event requiring ADV operation.

III CORRECTIVE ACTION

A. Immediate

An operability evaluation was performed on the air regulators in the operating unit (Unit 3) and determined that there were no immediate operability effects. The ADV nitrogen system performance testing performed the previous week demonstrated that the nitrogen/air system did not contain any significant leaks. The stroking of the ADVs had demonstrated that the system was fully capable of performing as designed. In addition, the frequency of the ADV testing would ensure ADV capability to perform.

B. Action to Prevent Recurrence

Qualified air regulators were installed in Units 1, 2, and 3.

Current Palo Verde and Bechtel Nuclear Quality Assurance Manuals provide definitive guidance on writing of procurement documents. Therefore, no additional corrective actions are required to ensure purchase specifications are adequately prepared.

The current Palo Verde design change procedures provide more stringent controls with regard to review of design bases impact prior to issuance of design changes. Therefore, no additional corrective actions are required for design change approvals.

A sample program is being implemented to evaluate the transportability of the lack of adequate engineering specifications and the inadequate PO review and approval process. This program should be complete by November 30, 1990. Corrective actions, if required, will be developed within 30 days of the program completion.

IV. PREVIOUS SIMILAR EVENTS

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