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SUBJECT: Special Rept 1-SR-92-004:on 920620, loose part detection sys
inoperable for more than 30 days.Caused by hardware
problems associated w/installation of loose part detection
sys mods.New computer processor board installed.

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JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

192-00793-JML/TRB/KR
June 27, 1992

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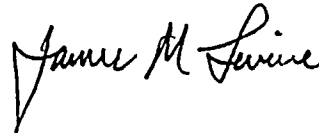
Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528 (License No. NPF-41)
Special Report 1-SR-92-004
File: 92-020-404

Attached please find Special Report 1-SR-92-004 prepared and submitted pursuant to Technical Specification 3.3.3.7 ACTION (a) and Technical Specification 6.9.2. This report discusses the inoperability of the Loose-Part Detection System for more than thirty (30) days. A copy of the Special Report is being forwarded to the Regional Administrator, NRC Region V.

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

Very truly yours,



JML/TRB/KR

Attachment

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

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PALO VERDE NUCLEAR GENERATING STATION UNIT 1

Loose-Part Detection System

License No. NPF-41

Docket No. 50-528

Special Report 1-SR-92-004

Initial Conditions:

This Special Report is being submitted pursuant to Technical Specification (TS) Limiting Condition for Operation (LCO) 3.3.3.7, ACTION (a) and TS Administrative Controls 6.9.2 to report the inoperability of the Loose-Part Detection System (LPDS) for more than thirty (30) days. TS LCO 3.3.3.7 states that the "loose-part detection system shall be OPERABLE with all [8] sensors". and is applicable in Mode 1 (POWER OPERATION) and Mode 2 (STARTUP). The thirty (30) day period for returning the channels to an operable status was exceeded at approximately 0034 MST on June 20, 1992.

System Information:

The Loose-Part Detection System (LPDS) is designed to detect the presence of loose parts within the Reactor Coolant System (RCS). The Palo Verde Unit 1 LPDS consists of eight (8) channels. Each channel consists of a piezoelectric monitor sensor and associated amplification, indication, and recording circuitry. The eight (8) sensors are positioned in the following locations: two (2) mounted on the Reactor Vessel upper head (Channels 1 and 2), two (2) mounted on the Reactor Vessel lower incore nozzle (Channels 3 and 4), and one (1) on each of the two (2) Steam Generators' inlet and outlet nozzles (Channels 5, 6, 7, and 8). The piezoelectric sensors detect loose parts using acoustic signals which are generated when loose parts impact a RCS component or structure. Signals in excess of the alarm setpoint will result in an alarm condition. The alarms are the "latch on" type (i.e., the alarm will remain on when the system returns to normal and will not clear until the alarm is manually reset). There is one (1) alarm indicator in the Control Room for the eight (8) channels.

Actions Taken:

During the 1992 Unit 1 third refueling outage, APS installed a LPDS modification that replaced an obsolete tape recorder with a 16-channel recording and analysis computer manufactured by Combustion Engineering (ABB-CE). The digital recording system includes a loose part event analysis computer (LPEAC) for analyzing collected data. Signals from all channels are sampled continuously and stored for time intervals, depending on the sampling rate and memory capacity of the analysis computer. Individual channels can be selected by the computer software for subsequent analysis. Signals from the eight (8) LPDS channels and from six (6) reactor core internal channels are monitored by the LPEAC.

Following installation of the LPEAC and during acceptance testing, hardware problems occurred with the LPEAC's computer processor board. The 18 month

CHANNEL CALIBRATION surveillance test was successfully completed on May 19, 1992. However, LPDS was not declared OPERABLE prior to entry into Mode 2 pending resolution of LPEAC's hardware problems (TSs permit entry into Mode 1 or Mode 2 with LPDS inoperable). Unit 1 entered Mode 2 at approximately 0034 on May 21, 1992, initiated compensatory actions (i.e., daily aural checks), and entered TS LCO 3.3.3.7 ACTION (a) (i.e., with one or more loose-part detection system channels inoperable for more than 30 days, prepare and submit a Special Report). During the 30 day TS ACTION time period, multiple attempts were made by APS to secure a replacement computer processor board from ABB-CE following the entry into Mode 2. In addition, Channels 1 and 5 were found to be spuriously activating.

Cause of the Malfunction:

Following the installation of modifications (i.e., 16-channel recording and analysis computer) to the system during the third refueling outage, a LPEAC's computer processor board failed. The replacement boards supplied by ABB-CE were for an upgraded equipment design and not compatible with the original equipment design installed in Unit 1. The cause of the excessive number of spurious alarms on Channel 1 may be attributed to an "as left" low alarm setpoint that was calculated and reset during the 18 month CHANNEL CALIBRATION surveillance test which was successfully completed on May 19, 1992. The most probable cause of the spurious alarms on Channel 5 is due to the sensitivity of the system as previously discussed in Special Report 1-SR-90-005. The LPDS channel response is reflective of the excitative energy from the RCS (i.e., at different power levels and during different plant transients, RCS excitation energies vary which affect the response of the LPDS).

Plans for Restoring the Channels to OPERABLE Status:

APS is pursuing the acquisition of the original designed computer processor board and is considering replacing the original equipment design with the upgraded equipment design. In the interim, another computer processor board is installed and LPEAC is functioning. However, the LPDS will remain inoperable due to the high spurious alarm rates from Channels 1 and 5. The inoperable LPDS is scheduled to be reworked and returned to service during the next scheduled refueling outage. Although the LPDS remains inoperable, the channels are capable of being used to monitor for loose parts. During the period of inoperability, the following enhanced monitoring is being performed.

1. Vibration Group personnel will perform weekly Preventive Maintenance checks on Channels 1 through 8 (this includes an analysis of system response to determine if a loose part exists).
2. The STAs and Operations personnel will perform twice daily aural checks on Channels 1 through 8 (i.e., during dayshift and nightshift).