

May 10, 1988

Docket No.: STN 50-528

Mr. E. E. Van Brunt, Jr.  
Executive Vice President  
Arizona Nuclear Power Project  
Post Office Box 52034  
Phoenix, Arizona 85072-2034

DISTRIBUTION

Docket File  
NRC & L PDRs  
GHolahan  
JLee (3)  
EALicitra  
MDavis  
OGC-WF (info.)  
DHagan  
EJordan

JPartlow  
TBarnhart (4)  
WJones  
EButcher  
ACRS (10)  
GPA/PA  
ARM/LFMB  
Region V (4cys)  
PD5 Plant File

Dear Mr. Van Brunt:

SUBJECT: ISSUANCE OF AMENDMENT NO. 32 TO FACILITY OPERATING LICENSE  
NO. NPF-41 FOR THE PALO VERDE NUCLEAR GENERATING STATION,  
UNIT NO. 1 (TAC NO. 67442)

The Commission has issued the subject Amendment, which is enclosed, to the Facility Operating License for Palo Verde Nuclear Generating Station, Unit 1. The Amendment includes a new license condition in response to your amendment application dated March 2, 1988.

The Amendment incorporates as a condition to the license the commitments you currently have in effect for the monitoring of RCP shaft vibration.

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's next regular bi-weekly Federal Register notice.

Sincerely,

*1/2/*

E. A. Licitra, Senior Project Manager  
Project Directorate V  
Division of Reactor Projects - III,  
IV, V and Special Projects

Enclosures:

1. Amendment No. 32 to NPF-41
2. Safety Evaluation

cc: See next page

DRSP/PDV *EM*  
EALicitra:  
*4/19/87*

DRSP/PDV  
JLee  
*4/28/87*

OGC-WF  
*4/27/87*

*HR-606K*  
DRSP/D:PDV  
GWKnighton  
*5/13/87*

8805190085 880510  
PDR ADDCK 05000528  
PDR

Mr. E. E. Van Brunt, Jr.  
Arizona Nuclear Power Project

Palo Verde

cc:

Arthur C. Gehr, Esq.  
Snell & Wilmer  
3100 Valley Center  
Phoenix, Arizona 85073

Mr. James M. Flenner, Chief Counsel  
Arizona Corporation Commission  
1200 West Washington  
Phoenix, Arizona 85007

Charles R. Kocher, Esq. Assistant  
Council

James A. Boeletto, Esq.  
Southern California Edison Company  
P. O. Box 800  
Rosemead, California 91770

Mr. Mark Ginsberg  
Energy Director  
Office of Economic Planning  
and Development  
1700 West Washington - 5th Floor  
Phoenix, Arizona 85007

Mr. Wayne Shirley  
Assistant Attorney General  
Bataan Memorial Building  
Santa Fe, New Mexico 87503

Mr. Tim Polich  
U.S. Nuclear Regulatory Commission  
P. O. Box 97  
Tonopah, Arizona 85354-0097

Regional Administrator, Region V  
U. S. Nuclear Regulatory Commission  
1450 Maria Lane  
Suite 210  
Walnut Creek, California 94596

~~Kenneth Berlin, Esq.  
Winston & Strawn  
Suite 500  
2550 M Street, NW  
Washington, DC 20037~~

Ms. Lynne Bernabei  
Government Accountability Project  
of the Institute for Policy Studies  
1901 Que Street, NW  
Washington, DC 20009

Mr. Ron Rayner  
P. O. Box 1509  
Goodyear, AZ 85338

Mr. Charles B. Brinkman, Manager  
Washington Nuclear Operations  
Combustion Engineering, Inc.  
7910 Woodmont Avenue Suite 1310  
Bethesda, Maryland 20814

Chairman  
Arizona Corporation Commission  
Post Office Box 6019  
Phoenix, Arizona 85003

Arizona Radiation Regulatory Agency  
ATTN: Ms. Clara Palovic, Librarian  
4814 South 40 Street  
Phoenix, Arizona 85040

Mr. Charles Tedford, Director  
Arizona Radiation Regulatory Agency  
4814 South 40 Street  
Phoenix, Arizona 85040

Chairman  
Maricopa County Board of Supervisors  
111 South Third Avenue  
Phoenix, Arizona 85003



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-528

PALO VERDE NUCLEAR GENERATING STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 32  
License No. NPF-41

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment, dated March 2, 1988, by the Arizona Public Service Company (APS) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority (licensees), complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter 1;
  - B. The facility will operate in conformity with the application, the provisions of Act, and the regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public;
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, paragraph 2.C of Facility Operating License No. NPF-41 is hereby amended to include the following additional condition:

8805190090 880510  
PDR ADOCK 05000528  
P PDR

(13) RCP Shaft Vibration Monitoring Program (Section 5.4.1, SSER 12)

APS shall implement an augmented vibration monitoring program for each of the four reactor coolant pumps that includes the following elements:

- (a) Every four hours, monitor and record vibration data on each of the four reactor coolant pumps.
- (b) On a daily basis, perform an evaluation of the pump vibration data obtained in (a) above, by using an appropriately qualified engineering individual.
- (c) When any one vibration monitor on the reactor coolant pumps indicates a vibration level of 8 mils or greater, the Nuclear Regulatory Commission shall be notified within four hours via the Emergency Notification System. In addition, when the vibration on any pump exceeds 8 mils due to a shaft crack or unknown cause, within four hours the affected pump shall have its orbit and spectra continuously monitored and evaluated by an appropriately qualified individual.
- (d) When any one vibration monitor on the reactor coolant pumps indicates a vibration level of 10 mils or greater, within one hour, initiate action to place the unit in at least HOT STANDBY within the next six hours, and at least COLD SHUTDOWN within the following 30 hours. In addition, the affected pump shall be secured after entering HOT STANDBY.
- (e) On a daily basis a spectrum analysis shall be performed on the reactor coolant pump shaft vibration data and shall be evaluated for trends by using an individual qualified in that technique. The evaluation shall consist of comparing the running speed (1xRPM) and twice running speed (2xRPM) spectral components to limits computed from the baseline vibration. The limits shall be based on the lowest of: (i) 1.6 times the baseline value, (ii) the mean plus three standard deviations, (iii) 2 mils for the 2xRPM component, or (iv) 6 mils for the 1xRPM component <sup>1/</sup>. When the amplitude exceeds any limit, further analysis shall be performed. This analysis shall consist of an inspection of the amplitude versus time plots for a steadily increasing trend, and a review of other plant data which might explain the change in amplitude. If it is confirmed that the trend is not caused by plant or pump conditions unrelated to a shaft crack, the trend shall be extrapolated manually and/or by computer to predict the time at which the vibration is expected to reach 10 mils. If the projected time for reaching 10 mils is one week or

---

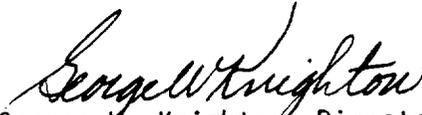
<sup>1/</sup> In the event new limit methods are chosen, they shall be evaluated by the licensees to assure that the new methods are equal to or better than the above method. The Commission shall be advised within one week if new methods are chosen.

less, within one hour, initiate action to place the Unit in at least HOT STANDBY within the next six hours and at least COLD SHUTDOWN within the following 30 hours. In addition, the affected pump shall be secured after entering HOT STANDBY.

The Regional Administrator, Region V may relax or rescind, in writing, any of the above vibration monitoring conditions upon a showing by the licensees of good cause.

3. This license amendment is effective as of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

  
George W. Knighton, Director  
Project Directorate V  
Division of Reactor Projects - III,  
IV, V and Special Projects

Date of Issuance: May 10, 1988



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 32 TO FACILITY OPERATING LICENSE NO. NPF-41  
ARIZONA PUBLIC SERVICE COMPANY, ET AL.  
PALO VERDE NUCLEAR GENERATING STATION, UNIT NO. 1  
DOCKET NO. STN 50-528

1.0 INTRODUCTION

By letter dated March 2, 1988, the Arizona Public Service Company (APS) on behalf of itself, the Salt River Project Agricultural Improvement and Power District, Southern California Edison Company, El Paso Electric Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority (licensees), requested an amendment to Facility Operating License No. NPF-41, for the Palo Verde Nuclear Generating Station, Unit 1. The proposed amendment would incorporate as a condition to the license the acceptable commitments currently in place for monitoring the vibration of the reactor coolant pump shafts.

2.0 BACKGROUND

By letter dated October 8, 1987, the licensees informed the Commission that European reactor coolant pumps, similar to the Palo Verde pumps in design and manufacture, had exhibited shaft cracking. As a result, the licensees inspected the four pump shafts at Palo Verde Unit 1 during the first refueling outage, October 1987 to January 1988. The inspection revealed that cracks of varying depths and lengths were present on the shaft of all four pumps. No shaft failures have been experienced at Palo Verde. However, the NRC staff was concerned that the European data, as well as the information obtained from Palo Verde Unit 1, indicated an increased probability of a reactor coolant pump shaft failure.

Although the existing reactor protection system would shut the reactor down upon a pump shaft failure, the increased probability of a shaft failure suggested by the data had raised immediate concerns relative to the public health and safety. (These concerns also applied to Palo Verde Units 2 and 3 since they have the same reactor coolant pump design).

On October 24, 1987, the licensees met with the NRC staff regarding this matter and provided an interim report on the inspection findings to that date. Subsequently, a meeting was held on November 4, 1987, with representatives of the licensees and representatives from Germany involved with the evaluation of this problem in the related European

pumps. As a result of these meetings, the licensees and the staff concluded that crack initiation in the existing shafts is predominantly caused by the chrome plating in highly stressed areas of the pump shaft; therefore, modifications to the shaft, including removal of the chrome plating, are warranted for extended shaft life. In addition, the licensees and the staff concluded that a pump shaft vibration monitoring program, which includes a spectral analysis of the vibration data, would provide early warning trends if a crack has started and is propagating.

In response to these conclusions, in letters dated November 5 and 12, 1987, the licensees committed to install modified shafts, with the chrome plating removed, in the Palo Verde reactor coolant pumps during a refueling outage and to immediately augment the reactor coolant pump shaft vibration monitoring program, including a spectral analysis of the vibration data. (These commitments apply to all three Palo Verde units. For Palo Verde Unit 1, the shaft modifications were completed during the current refueling outage. For Palo Verde Units 2 and 3, the licensees committed to install modified shafts during the next refueling outage which began in February 1988 for Unit 2 and is scheduled to begin in 1989 for Unit 3.)

The Commission found the licensees' commitments, as set forth in their letters of November 5 and 12, 1987, acceptable and necessary and concluded that with these commitments the plant's safety is reasonably assured. (These commitments by the licensees have been included in a Confirmatory Order issued to Palo Verde Unit 2 on November 19, 1987 and as a license condition in the full power license issued to Palo Verde Unit 3 on November 25, 1987.)

### 3.0 EVALUATION

In the March 2, 1988 amendment request, the licensees proposed to incorporate as a condition to the Palo Verde Unit 1 license, the acceptable commitments currently in effect for monitoring the vibration of the reactor coolant pump shafts. The proposed condition is identical to the condition currently included in the licenses for Palo Verde Units 2 and 3.

Since the proposed condition for the Unit 1 license is identical to the condition issued for the Unit 2 and 3 licenses, the staff finds the proposed amendment to be acceptable.

### 4.0 CONTACT WITH STATE OFFICIAL

The Arizona Radiation Regulatory Agency was advised of the proposed determination of no significant hazards consideration with regard to this amendment. No comments were received.

### 5.0 ENVIRONMENTAL CONSIDERATIONS

This amendment involves a change in the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20, which imposes additional limitations and surveillance requirements. The

staff has determined that this amendment involve no significant increase in the amount, and no significant change in the type, of any effluent that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued proposed findings that the amendment involves no significant hazard consideration, and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of this amendment.

#### 6.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public. We, therefore, conclude that the proposed license condition is acceptable.

Principal contributor: E. A. Licitra

Dated: May 10, 1988