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Docket No.: 50-529

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

Dear Mr. Van Brunt:

SUBJECT: ORDER MODIFYING LICENSE CONFIRMING LICENSEE COMMITMENTS ON
MONITORING VIBRATION OF REACTOR COOLANT PUMP SHAFTS AT PALO
VERDE NUCLEAR GENERATING STATION, UNIT NO. 2, EFFECTIVE
IMMEDIATELY

The Commission has issued the enclosed immediately effective Order confirming your commitments provided by letter dated October 24, 1987, regarding an augmented vibration monitoring program for the reactor coolant pump shafts at Palo Verde Unit 2.

A copy of this Order is being filed with the Office of the Federal Register for publication.

Sincerely,

Original signed by:
George W. Knighton

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

Enclosure:
As stated

cc: See next page

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

Palo Verde

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UNITED STATES

NUCLEAR REGULATORY COMMISSION

In the Matter of)	Docket No. 50-529
ARIZONA PUBLIC SERVICE COMPANY, ET AL.)	License No. NPF-51
(Palo Verde Nuclear Generating Station,)	
Unit 2)		

CONFIRMATORY ORDER MODIFYING LICENSE (EFFECTIVE IMMEDIATELY)

I

Arizona Public Service Company, 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 (collectively, the licensees) are the holders of Facility Operating License No. NPF-51 issued by the Nuclear Regulatory Commission (NRC/Commission) on April 24, 1986. The license authorizes the operation of the Palo Verde Nuclear Generating Station, Unit 2 in accordance with conditions specified therein. The facility is located on the licensees' site in Maricopa County, Arizona.

II

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. These data show that 19 out of 24 pumps shafts inspected had cracks of 1.0 mm to 8.0 mm in depth and two shafts had failed. The actual failures occurred after 47,000 and 37,000 hours of pump operation.

As a result, the licensees informed the Commission that they planned to inspect the shafts of the pumps at Palo Verde Unit 1 during the current refueling outage, October-December 1987. In the licensees' letter of October 21, 1987, they reported that the inspection began on October 14, 1987. Upon completion of an ultrasonic inspection of the shaft of the first two pumps, cracks of varying depths and lengths had been identified. Subsequently, cracks were detected in a third pump. No shaft failures have been experienced at Palo Verde.

The licensees met with the Commission staff on October 24, 1987 to review the history of pumps shaft cracking in Europe as well as the findings at Palo Verde Unit 1, and to discuss the available information to determine actions to be taken with respect to operation of Palo Verde, Units 1, 2 and 3. Although the pump shaft cracking phenomenon is also of concern with respect to Palo Verde, Units 2 and 3, the staff's immediate concerns are with the continued operation of Unit 2 which is currently operating at 100% power.

In Europe, the cracking and subsequent failure of the pump shafts were determined to be due to the shaft material exceeding fatigue limits. A number of possible causal factors have been identified (i.e. corrosion assisted fatigue, high thermal stresses associated with seal injection, and reduction in fatigue strength caused by chrome plating). The depth of the cracks indicated by the Palo Verde Unit 1 shaft ultrasonic inspections exceeded those reported for the European plants for the shafts which have not failed. In addition, the operating hours for the Palo Verde Unit 1 pumps were significantly less than the operating hours for the European pumps exhibiting the maximum reported crack depth.

The Palo Verde plant design has been analyzed to address the possible failure of one reactor coolant pump shaft. However, since the root cause of the current cracking phenomenon has not yet been identified and corrected, the staff is concerned that the European data, as well as the information obtained from Palo Verde Unit 1, indicate an increased probability of a reactor coolant pump shaft failure, as well as a potential failure mode which could involve the failure of more than one reactor coolant pump. The failure of more than one pump is an unanalyzed condition and thus beyond the current license design basis. Although the existing reactor protection system would shut the reactor down upon a pump shaft failure, the significantly increased probability of a shaft failure at this time and the potential for an unanalyzed event involving multiple shaft failures, raise immediate concerns relative to the public health and safety.

III

In response to the staff's concerns on this matter, the licensees submitted a letter dated October 24, 1987 in which they committed to take the following actions with respect to Palo Verde Unit 2. */ The licensees will implement an augmented vibration monitoring program for each of the four reactor coolant pumps that includes the following elements:

1. Every four hours, monitor and record the vibration data on each of the four reactor coolant pumps,

*/ Inasmuch as Palo Verde Unit 1 is presently shutdown until December 1987 and Palo Verde Unit 3 is a recently licensed facility which is limited to operation not to exceed 5% of full power, no action is necessary at this time for either Palo Verde Unit 1 or Palo Verde Unit 3.

2. On a daily basis, perform an evaluation of the pump vibration data obtained in 1 above, by using an appropriately qualified engineering individual,
3. 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, and
4. 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.

This program, which is based upon documented European experience, should provide evidence of impending pump shaft failure approximately two days prior to failure, which is sufficient time to place the unit in safe shutdown condition in an orderly manner. Thus, the program will provide protection of public health and safety consistent with the current licensing bases.

I find the licensees' commitments acceptable and conclude that the plant's safety is reasonably assured. In view of the foregoing, I have determined that public health and safety require that the licensees' commitments in the October 24, 1987 letter be confirmed by this Order. I have also determined that the public health and safety require that this Order be effective immediately.

IV

Accordingly, pursuant to Sections 103, 161b and 161i of the Atomic Energy Act of 1954, as amended, and the Commission's regulation in 10 CFR 2.204 and 10 CFR Part 50, IT IS HEREBY ORDERED, EFFECTIVE IMMEDIATELY, THAT Facility Operating License No. NPF-51 is hereby modified as follows:

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

1. Every four hours, monitor and record the vibration data on each of the four reactor coolant pumps,
2. On a daily basis, perform an evaluation of the pump vibration data obtained in 1 above, by using an appropriately qualified engineering individual,
3. 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, and
4. 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.

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

V

The licensees or any person who has an interest adversely affected by this Order may request a hearing within 20 days of the date of this Order. A request for hearing shall be addressed to the Director, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, with copies to the Assistant General Counsel for Enforcement, at the same address, Regional Administrator, Region V at 1450 Maria Lane, Suite 210, Walnut Creek, CA 94956-5368, and the NRC Resident Inspector, Palo Verde Nuclear Generating Station. If a person other than the licensees requests a

hearing, that person shall set forth with particularity the manner in which the petitioner's interest is adversely affected by this Order and should address the criteria set forth in 10 CFR 2.714(d). A request for hearing shall not stay the immediate effectiveness of this Order.

If a hearing is to be held the Commission will issue an Order designating the time and place of any such hearing. If a hearing is held, the issue to be considered shall be whether this Order should be sustained.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, reading "Thomas E. Murley". The signature is written in a cursive style with a long, sweeping underline that extends to the right.

Thomas E. Murley, Director
Office of Nuclear Reactor Regulation

Dated at Bethesda Maryland
this 25 day of October 1987