NOV 19 1987

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:

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SUBJECT: ORDER MODIFYING LICENSE CONFIRMING LICENSEE COMMITMENTS ON 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 letters dated November 5 and 12, 1987, regarding an augmented vibration monitoring program for the reactor coolant pump shafts at Palo Verde Unit 2 and the planned modifications to the shafts during the refueling outage scheduled to start in February 1988.

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

Sincerely,

original signed by

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: Plant Service list

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11/18/87	/ /87	11/19/87				

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	)	
	)	
ARIZONA PUBLIC SERVICE COMPANY, ET AL.	)	Docket No. 50-529
	)	
	)	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. 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. On October 21, 1987, the licensees reported that an ultrasonic inspection that began on October 14, 1987 revealed that cracks of varying depths and lengths had been identified on the shaft of the first two pumps. Subsequently, cracks were detected in a third pump. The depth of the cracks identified by the ultrasonic inspection of the Palo Verde Unit 1 shafts 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.

No shaft failures have been experienced at Palo Verde. However, since the root cause of the current cracking phenomenon had not been identified and corrected, 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, as well as a potential failure mode which could involve the failure of more than one reactor coolant pump shaft. 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 had raised immediate concerns relative to the public health and safety.

On October 24, 1987, the licensees met with the NRC staff regarding this matter. In response to the staff's concerns, the licensees subsequently submitted a letter dated October 24, 1987 in which they committed to take a number of

actions with respect to Palo Verde Unit 2.[1/] On October 25, 1987 the Director, Office of Nuclear Reactor Regulation, issued a Confirmatory Order modifying the license of Palo Verde Unit 2 to include those commitments. Effective immediately, the licensees were ordered to implement an augmented vibration monitoring program for each of the four reactor coolant pumps that included 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.

III.

Following the issuance of the October 25, 1987 Confirmatory Order, the staff further investigated the cracked reactor coolant pump shaft problem in a meeting on November 4, 1987 with representatives of the licensees and representatives from Germany involved with the evaluation of this problem in the related

1/ Because Palo Verde Unit 1 is currently shut down 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 was necessary at that time for either Palo Verde Unit 1 or Palo Verde Unit 3.

European pumps. As a result, the staff has concluded that the effectiveness of the vibration monitoring program set forth in the October 25, 1987 Confirmatory Order should be enhanced by including a spectral analysis of the vibration data to provide earlier warning trends if a crack has started and is propagating. In addition, based upon additional study by the licensees, the licensees and the staff have concluded that crack initiation in the existing shafts is predominantly caused by the chrome plating in highly stressed areas of the pump shaft and that, therefore, modifications to the shaft are warranted to include removal of the chrome plating for extended shaft life.

In response to the above conclusions, in letters dated November 5 and 12, 1987, the licensees have committed to further augment the reactor coolant pump monitoring program by including a spectral analysis of the data. The licensees have also committed to install modified shafts with the chrome plating removed during the next refueling outage scheduled to start in February 1988.

I find the licensees' additional commitments as set forth in their letters of November 5 and 12, 1987 acceptable and necessary and conclude that with the additional commitments the plant's safety is reasonably assured. In view of the foregoing, I have determined that public health and safety require that the licensees' additional commitments in the November 5 and 12, 1987 letters 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 to include the following commitments by the licensees.

A. 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 pump 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.

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. In addition the affected pump shall be secured after entering HOT STANDBY.

5. 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: (a) 1.6 times the baseline value, (b) the mean plus three standard deviations, (c) 2 mils for the 2xRPM component, or

(d) 6 mils for the 1xRPM component. [2/] 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 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.

B. The licensees shall install modified reactor coolant pump shafts during the next refueling outage currently scheduled to start in February 1988 which include the modifications described in Figure DES-3 of the attachments to the licensees' November 5, 1987 letter.

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

V.

Any person other than the licensees adversely affected by this Confirmatory Order may request a hearing within twenty days of its issuance. Any request for hearing shall be submitted to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Copies shall also be

2/ 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.

sent to the Assistant General Counsel for Enforcement at the same address and the Regional Administrator, NRC Region V, 1450 Maria Lane, Suite 210, Walnut Creek, CA 94596. If such a person 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 shall address the criteria set forth in 10 CFR 2.714(d). A REQUEST FOR HEARING SHALL NOT STAY THE IMMEDIATE EFFECTIVENESS OF THIS CONFIRMATORY ORDER.

If a hearing is requested by a person whose interest is adversely affected, the Commission will issue an order designating the time and place of any hearing. If a hearing is held, the issue to be considered at such hearing shall be whether this Confirmatory Order should be sustained.

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas E. Murley, Director
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland
this 19th day of November, 1987