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Arizona Corporation Commission
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Commissioner Kristen K. Mayes
1200 West Washington
Phoenix, Arizona 85007

RE: Staff's Investigation of the Frequency of Unplanned Outages at Palo Verde
Nuclear Generating Station
Docket No. E-01345A-05-0826

Dear Commissioner Mayes:

I am writing in response to your January 18, 2006 letter to Jack Davis, in which you asked for information related to the recent operation of Palo Verde Unit 1. This letter includes some of the information that I presented to the Arizona Corporation Commission (Commission) on January 26, 2006, but will also provide additional information in response to your specific questions.

Palo Verde Unit 1 is currently operating at 25 percent power. It has not operated above 32 percent since it returned to operation on December 25, 2005, and we will not go higher than the current level until we have resolved the issue currently causing us to operate the unit at lower power levels. At APS and Palo Verde, safety always takes priority over production, and although the current situation poses no safety issues, we will not take the unit to higher operating levels and risk exceeding our internal administrative parameters.

When Unit 1 returned to service after a 77-day outage to refuel the unit and replace its steam generators (the second Palo Verde unit to undergo this kind of replacement), temporary plant monitoring equipment identified an increase in operational vibration levels on the train 'A' shutdown cooling system suction piping. Vibration amplitude increased significantly relative to the vibration amplitude on this line during the previous cycle and before steam generator replacement. This condition is believed to be flow induced and the result of acoustic excitation of the shutdown cooling suction line which is isolated (closed) during normal operation. The acoustic excitation, not unlike the sound effect of air being blown across the top of a glass soda bottle, is created by the flow of water in the reactor coolant system (RCS) across the opening to the shutdown cooling suction line. The resultant forcing function (i.e. acoustic pressure pulsation) is believed to have increased within the shutdown cooling system piping after steam generator replacement, resulting in the increased vibration levels. There are administrative limits on the amount of vibration that can be allowed on safety-related piping, and the shutdown cooling system is designated as part of a safety system.

Increasing the power level on Unit 1 could cause the vibration amplitude to exceed predetermined administrative limits. These limits are based on ensuring that the structural integrity of the shutdown cooling piping, associated fittings and components remain within design limitations per applicable codes and standards. These limits also ensure the ability of the shutdown cooling valve to perform its safety function. Simply put, observing administrative limits is part of the conservative operating philosophy of the nuclear industry in general and is especially sacrosanct at Palo Verde.

It is not correct to say that "this problem of excessive vibration has been identified for more than five years." Rather, the vibration only became more pronounced, approaching administrative limits, after the most recent outage, which concluded at the end of December.

Your letter seems to imply that APS has ignored the acoustic effect and related vibration issue for five years, which is not at all the case. In fact, since we discovered the elevated operational vibration levels on the shutdown cooling suction line we have devoted a significant level of resources to its resolution. It's worth noting that during the four operating cycles (operating cycles 9, 10, 11 and 12) during which the vibration problem has been monitored, Unit 1 achieved capacity factors of 89 percent in 2002, 97 percent in 2003, 85 percent in 2004 and 66 percent in 2005. During operating cycle 10, Unit 1 operated uninterrupted from breaker to breaker (that is, there were no planned or unplanned shutdowns between refueling outages). During 2005, when the capacity factor was most affected, Unit 1 underwent an extended *planned* outage of 77 days (compared with 33 and 38 days just for refueling and maintenance in 2002 and 2004) for a capital replacement outage to replace the unit's two 800 ton steam generators.

As I related in my January 26 presentation to the Commission, since discovering the vibration issue in early 2001, we have taken a series of actions based on the amount of measured vibration. Even with the clarity of hindsight, it's not obvious how we should have expended more resources to eliminate an issue that did not impair safety or unit operations until a month ago and that, to our knowledge, no other nuclear unit has experienced. In fact after these years of data gathering, computer modeling, demonstration in actual mock-ups, and reviews by independent experts, we implemented a modification during this last outage which most likely would have resolved the vibration issue in this line. Unfortunately the modification caused a separate issue with the adequacy of flow in this line under limited operating scenarios and had to be removed prior to start-up of the unit.

To be more specific, to help us resolve the vibration issue, we relied not just on our Palo Verde engineering staff; we also consulted with industry flow induced vibration and hydraulics experts and with Westinghouse, the Nuclear Steam Supply System (NSSS) supplier. When the vibration levels trended upward during Unit 1's operating cycle 12 (from May 2004 to October 2005), we also engaged an industry expert review panel from the

Electric Power Research Institute and other outside experts. When their recommendations were consistent with our preferred modification, we tested that solution at Arizona State University. In short, we responded prudently and in a timely manner to what was previously elevated but acceptable operational vibration with cost-effective solutions that, unfortunately, have not succeeded.

In response to your question about the effect of new steam generators on the previously observed acoustic effects and associated vibration impacts, it is possible that changes in flow patterns resulting from installation of new steam generators in Unit 1 increased the vibration levels. However, this "steam generator hypothesis" has not been confirmed, and similar effects were not observed after the installation of new steam generators in Unit 2 in 2003.

With respect to your questions about current Palo Verde operations and power markets, it's important to note that Palo Verde Units 2 and 3 have operated continuously at full power for more than 100 days, and APS has more than enough generating capacity available to meet customer demand. But as long as Unit 1 remains at reduced power, APS will incur additional purchased power costs and/or fuel costs. To date, the costs associated with reduced power operation is approximately \$12 million after taxes; however going forward the exact amount can not be precisely calculated since there are a number of variables that will change the cost on a daily basis such as: availability of excess power on the market; availability of power from our coal plants; natural gas prices; and other factors.

We have made no off-system sales from any Palo Verde unit for at least five years and normally never sell power from Palo Verde as the plant is our least-cost source of electricity and is first dedicated to service our customers. Recognizing that APS' share of Palo Verde is a little over 1100 megawatts and APS' daily low load is roughly 3000 megawatts, you can see that all available Palo Verde power goes to our customers.

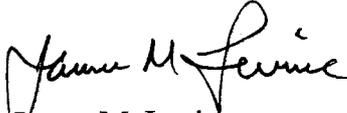
A list of Palo Verde planned and unplanned outages during 2005, and thus far in 2006, is provided as an Attachment.

We are continuing intensive engineering efforts on two options that could provide near-term resolution of the vibration issue. The first is installation of "tuned mass absorbers," a system of springs and weights that models and analysis indicate should reduce the vibration and allow us to increase the unit's output. This solution should be installed by mid-February. The second proposed solution, whose design should be completed by the end of February, is the installation of "hydraulic snubbers," which analysis indicates could also reduce the vibration. Design of a longer-term solution involving relocation of the shutdown cooling system valve is under way. All of these potential modifications are in the engineering stage; therefore scope, content and timing may change.

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Commissioner Kristen K. Mayes
February 1, 2006

Let me assure you and the other Commissioners that APS is committed to resolving this issue as quickly as possible while observing safe operating parameters. We believe that safety and excellent operations cannot be separated, and we will not be satisfied until we have safely returned Palo Verde to its accustomed place among the top performing nuclear stations in the country.

Sincerely,



James M. Levine

cc: Chairman Jeff Hatch-Miller
Commissioner William A. Mundell
Commissioner Marc Spitzer
Commissioner Mike Gleason
Ernest Johnson
Brian McNeil
Heather Murphy
Docket (Original + 13 copies)

Attachment: Outages at Palo Verde in 2005-06 (as of 1/31/2006)

The following is a listing of the planned and unplanned outages for the Palo Verde units in 2005 through the present time. For those outages that were planned, the length of time that was planned for the outage and the actual length of time for the outage is provided.

Planned Outages

April 2, 2005 – May 20, 2005

Unit 2 12th Refueling Outage

Purpose: Refuel, Major Maintenance and Surveillance Testing

Schedule 35 Days

Actual 48 Days, 21 Hours, 50 Minutes

May 22 - June 24, 2005

Unit 3 Short Notice Outage

Purpose: Replace 9 pressurizer heaters and Reactor Coolant Pump 1A thrust bearing oil seal

Schedule 12 days, 10 hours

Actual 32 days, 4 hours

July 6, 2005 – July 13, 2005

Unit 3 Short Notice Outage

Purpose: Replace Reactor Coolant Pump 1A thrust bearing oil seal

Schedule 6 Days / 16 Hrs.

Actual 7 Days / 4 Hrs.

October 2 - October 7

Unit 3 Short Notice Outage

Purpose: Replace Reactor Coolant Pump 1A thrust bearing oil seal

Schedule: 6 days, 16 hours

Actual: 5days, 1 hour

October 8 - December 24, 2005

Unit 1 12th Refueling Outage

Purpose: Refueling Outage and Capital Equipment Replacement outage

Schedule 75 Days

Actual 77 Days, 1 Hour, 44 Minutes

January 17 – January 20, 2006

Unit 1 Short Notice Outage

Purpose: Install modification design to reduce vibration in shutdown cooling line

Schedule 80 hours

Actual 89 hours

Unplanned Outages

Outages to ensure compliance with Palo Verde Technical Specifications and NRC Regulations

February 9, 2005 – February 19, 2005

Unit 1

Reason: Electrical bus outage

March 18, 2005 – March 21, 2005

Unit 1

Reason: Diesel generator failed governor

August 11, 2005 – August 28, 2005

Unit 1

Reason: Diesel generator voltage regulator

August 22, 2005 – August 26, 2005

Unit 2

Reason: Core protection calculator software provided by vendor not to specifications

October 11, 2005 – October 20, 2005

Unit 2

Reason: Refueling Water Tank question

October 11, 2005 – October 21, 2005

Unit 3

Reason: Refueling Water Tank question