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A subsidiary of Pinnacle West Capital Corporation

James M. Levine
Executive Vice President
Generation

TEL (602) 250-2095
FAX (602) 250-3002

Mail Station 9046
P.O. Box 53999
Phoenix, AZ 85072-3999

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AZ CORP COMMISSION
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March 29, 2006

Commissioner Kristin K. Mayes
1200 West Washington
Phoenix, Arizona 85007

RE: Palo Verde Unit 1 Outages and Summer Preparedness: Docket No. E-01345A-05-0816; Docket No. E-01345A-06-0009

Dear Commissioner Mayes:

I am writing in response to your March 7, 2006 letter to Jack Davis in which you asked a number of questions regarding the decision by APS to shut down Palo Verde Unit 1 this summer in order to make repairs that are designed to correct the high level vibration condition that has limited Unit 1's output. In particular, this letter responds to your questions regarding APS' efforts to correct this issue and whether APS considered making the contemplated repairs during the Unit 1 steam generator replacement ("SGR") outage that was completed in December, 2005. This letter also responds to your questions regarding what operational and organizational changes and improvements have been made at Palo Verde that are designed to improve plant performance.

I recognize that you had requested that APS respond to the above questions at the Commission's March 30, 2006 Summer Preparedness meeting. Unfortunately I, and other members of the Palo Verde management team, will be meeting with the NRC staff in NRC Region IV in Arlington, Texas on that date. This is why I am responding to the questions from your letter in writing.

At the outset, let me state that since the date of your letter, our plans have changed. On March 18, 2006, Unit 1 was taken off line in order to gather data and perform tests in preparation for moving the location of the SI-651 isolation valve on the shut down cooling line. These tests support the plan for moving the location of the valve. Additionally, the tests performed over the past week identified non-standard operating conditions that could impact operations. Specifically, after the unit was taken off-line, the vibrations in the subject shutdown cooling line increased above our administrative limits as one of the four reactor coolant pumps was shut down and the unit could not return to operation unless further analysis was done to demonstrate this non-standard 3-pump condition was acceptable. Therefore, APS made the decision to keep Unit 1 shut down and to move forward as expeditiously as possible with the planned modification for moving the location of the SI-651 isolation valve on the shut down cooling line. By taking this action, we are reducing the chance of the June outage extending into the peak summer months when the unit is most needed.

As you know, at APS and Palo Verde, protecting the health and safety of the public and the environment is our number one priority. Therefore, all of the actions that we have taken to address the vibration issue in Unit 1 have been made with this priority in mind. As discussed in my presentation to the Commission on January 26, 2006, and in my February 1, 2006 letter to you, since discovering the vibration issue in early 2001, we have taken a series of actions over the years based on the amount of measured vibration. In fact, after these years of data gathering, computer modeling, demonstration in actual mock-ups, and reviews by industry recognized experts, we did implement a major modification during the fall 2005 Unit 1 SGR outage which was expected to resolve the vibration issue.

This modification is referred to as the "vortex plate modification" and it involved inserting a grid plate at the intersection of the 42 inch reactor coolant pipe and the 16 inch shut down cooling pipe. A picture of the grid plate is contained on page 45 of the presentation I provided to the Commission on January 26, 2006. At the time it was installed, it was believed that the vortex plate modification was the best technical and most cost effective approach for addressing the vibration issue. At the time the decision was made in early 2004 to move forward with the vortex plate modification, we also considered relocation of the SI 651 isolation valve (which is the repair that we are currently pursuing), as an option for addressing the vibrations in the shut down cooling line.

Our decision that the vortex plate modification was the preferred approach for addressing the vibration issue was based on a number of factors including: 1) analyses conducted by the Palo Verde engineering staff, 2) input from industry flow induced vibration and hydraulics experts, 3) input from Westinghouse, the company that owns the Palo Verde design, and 4) a review by a panel of industry experts from the Electric Power Research Institute (EPRI). Additionally, based on the recommendations from these experts, we developed a test program at Arizona State University (ASU) which included a 1/4 scale mock-up that successfully tested the vortex plate modification, prior to installing it in Unit 1. Additional testing was performed with the final design to assess the hydraulic performance of the vortex plate and the potential operational impacts on the shut down cooling system. Model tests performed by Westinghouse demonstrated that there would not be any detrimental effects on system performance, particularly those associated with air becoming entrained in the water due to surface vortexing during reduced reactor coolant system level operations. Unfortunately, after successfully installing the vortex plate modification in Unit 1 during the fall 2005 SGR outage, design validation performance testing demonstrated significantly more air entrainment, contrary to the scaled modeling test results conducted by Westinghouse. Therefore, even though the vortex plate modification would have addressed the vibration issue, in order to ensure operational flexibility of Unit 1, and for long-term maintenance considerations, the vortex plate was removed prior to start-up of the unit.

With the above as background, although APS was aware of the option of moving the location of the SI 651 isolation valve on the shut down cooling line to address the vibration issue, APS did not pursue this option during the Unit 1 fall 2005 SGR outage because the available

research and information pointed to the vortex plate modification as the preferred technical and cost effective approach for addressing the vibration issue.

When Unit 1 returned to service in late December, baseline vibration levels had significantly increased and vibration amplitude on the shut down cooling line increased during power ascension for the unit's 13th operating cycle. Unit 1 reached the administrative vibration limits prior to full power operation. Accordingly, APS immediately began exploring a number of options for near-term and longer-term resolution. Near-term options focused on mitigating the vibration so that the Unit could increase output for the remainder of its 18 month operating cycle. Long term resolution concentrated on relocation of the SI 651 isolation valve on the shut down cooling line during the unit's next refueling outage. Unfortunately, none of the near-term options have proven viable and, as a result, APS is now concentrating all of its efforts on designing, engineering and planning for the relocation of the SI 651 isolation valve during the present cycle.

As I am sure you can imagine, because this modification involves reconfiguring the reactor coolant system by moving the location of a valve that weighs approximately 7000 lbs this is not a modification that can be easily or quickly made. In fact, this modification requires extensive up-front analysis, as well as the development, review and qualification of numerous calculations before the new design can be implemented. The following provides examples of some of the analyses and calculations that must be conducted in order to support moving the isolation valve to its new location: 1) mass energy release analysis, 2) pressure/temperature analysis, 3) radiological analysis, 4) seismic analysis, 5) high energy line break analysis, 6) numerous hydraulic evaluations, 7) environmental qualifications, and 8) various stress calculations. Many of these analyses and calculations must be conducted in a sequential fashion as opposed to in parallel, which explains why APS did not believe that we could be in a position to start the actual work of moving the location of the SI 651 isolation valve until some time in June. However, now that we have the results of the tests that were conducted last week, we have made the decision to conduct some of the physical work associated with relocating the SI 651 isolation valve at the same time that some of the above analyses and calculations are being completed. Starting the physical changes to the plant in parallel with the design analysis is an acceptable approach; however, the design analysis is generally completed before installation work begins.

Moreover, the physical work associated with putting the system in a position to be worked on in order to implement the modification to relocate this valve is substantial. The modification will require APS to remove the reactor vessel head and off-load all 241 fuel assemblies. After this is completed, the reactor coolant system will be drained and then the work of moving the location of the valve can begin. This work will require APS to cut the shut down cooling line, remove the valve, and move it to a new location inside the bio-shield wall. Control and power circuits will be relocated to support the revised design. Additionally, significant modifications are required to structurally support the reconfigured shut down cooling line and branch piping. Finally, before Unit 1 can restart, extensive testing will be

required to ensure that all affected systems, structures and components will perform their respective design functions given the new configuration.

Let me assure you and the other Commissioners that APS is committed to resolving this issue in Unit 1 as quickly as possible while ensuring that we meet our obligation of protecting the health and safety of the public and the environment.

With regard to your question regarding operational and organizational changes and improvements at Palo Verde, pages 53 and 54 of my presentation that was provided to the Commission on January 26, 2006 provides information on our efforts to improve performance at the plant. Unfortunately, due to time constraints, I was not able to discuss this information with the Commission on January 26, 2006, so let me take the opportunity to do so here. In the fall of 2005, in order to better align Palo Verde resources to support performance improvement, I announced a significant reorganization at the plant. This included adding two new senior management positions, the General Manager of Emergency Services and Support and the General Manager of Regulatory Affairs & Performance Improvement. Additionally, as a part of this reorganization, a new department entitled the Performance Improvement Team was established. The Performance Improvement Team is comprised of about 60 individuals who are responsible for overseeing performance improvement initiatives at Palo Verde, and ensuring that appropriate actions are being taken to return Palo Verde to excellence. At this time, we are not planning any additional operational or organizational changes because I believe that we are seeing a positive impact in a number of areas as a result of the changes that we have made.

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
Steve Olea
Docket (Original + 13 copies)