

December **22, 2005**

Mr. Dan Frenette

(b)(6)

Dear Mr. Frenette:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to a request from Senator John **McCain** that the NRC respond directly to you regarding your request for information about the October 11, **2005**, shutdown of the **Palo Verde** Nuclear Generating Station (**Palo Verde**), Units **2** and **3**.

The information is enclosed, both in summary form and as detailed responses to your questions. Please note that some of your questions are not within the purview of NRC.

I believe that our response will help address your specific questions regarding safe operation of the **Palo Verde** units. I appreciate your interest in this matter.

Sincerely,

/RA/

Luis A. **Reyes**
Executive Director
for Operations

Enclosures:

1. Summary Response to Mr. Frenette's Questions
2. Detailed Response to Mr. Frenette's Questions

cc: The Honorable John McCain

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Summary Response to Mr. Frenette's Questions

There were two distinct reasons for the shut down of the Palo Verde Nuclear Generating Station, Units 1, **2**, and 3: (1) Unit 1 had already shut down for a refueling outage on October 11, **2005**; such refueling outages occur on a regular basis, and **(2)** Units **2** and 3 at the facility were shut down following a Nuclear Regulatory Commission (NRC) team inspection, which began on October 3, to ensure the operability of the Emergency Core Cooling System (ECCS) pumps at each unit.

During a thorough examination, the licensee, working with engineering consultants and the NRC team of inspectors, determined it could not rule out the possibility that air could be introduced into the operating ECCS pumps, which could render them inoperable.

Based on its determination, the licensee declared the ECCS systems at both units inoperable. This led to a shutdown in order to comply with technical specifications. In the meantime, the licensee worked to resolve the ECCS operability issue.

During the shutdown of the two units, and after evaluating several options, the licensee was able to demonstrate that air could not be introduced into the ECCS pumps. With the ECCS system found to be operable, Units **2** and 3 were returned to full power on October **22**.

The licensee shut down the two units to comply with conditions in the plant licenses, not in response to any specific NRC action, a fact that we believe illustrates the agency did not overreact.

As noted, Units **2** and 3 returned to full power operations on October **22**, and Palo Verde Unit 1 will return to power following completion of its current refueling outage. The NRC has made available to the public two agency reports on the shutdown, which can be accessed on its web site, at www.nrc.gov.

In terms of employees being paid during the shutdown, licensee compensation of its workers is not within the purview of the NRC. However, the NRC staff is not aware of any licensee employee layoffs during the short period of time the two units were shut down.

As to the question of timing, while the Palo Verde licensee was unable to demonstrate continued operability of the ECCS as a result of NRC inquiries during the week of October 3, the public health and safety were never endangered. Rather, the operability issue resulted from the licensee's incomplete understanding of its ECCS design requirements. This design issue was resolved.

Regarding the personal feelings of licensee personnel, this area is not within the purview of the NRC. However, we do recognize the importance of nuclear plant operators establishing and maintaining a strong safety culture – a work environment in which management and employees put safety first.

The **NRC** has several initiatives to enhance its oversight of the safety culture at U.S. commercial nuclear power plants and additional information on this topic also can be found on our web site.

Finally, concerning the amount of information made available to the public on the **Palo Verde** shutdown, we have been very pro-active with the public and, as previously mentioned, have made available on our web site two reports that provide details on the issue. Additionally, the **NRC** has been very forthcoming with representatives of the media and members of the public who have inquired about the shutdown.

Detailed Response to Mr. Frenette's Questions

Question 1 What caused the two reactors to be shut down?

The **Palo Verde** licensee began shutting down Units **2** and **3** on October **11, 2005** (Unit **1** was already shut down for a refueling outage). The reason for the shutdowns was as follows: During the Nuclear Regulatory Commission (NRC) team inspection that began the week of October 3, **2005**, the inspectors asked whether there was reasonable assurance that air would not be ingested into the emergency core cooling system (ECCS) pumps for the period of time it is required to operate, for certain postulated accident scenarios.

During a loss-of-coolant accident, the ECCS pumps take suction from the refueling water tank (RWT) and inject borated water into the reactor coolant system (RCS). When the water level is at approximately the 7 percent RWT level, the ECCS pumps automatically shift from the RWT to the containment sump for the source of borated water to inject into the RCS. The NRC inspectors asked the licensee why water from the RWT would not continue to draw down until air could enter into the RWT outlet lines and be sucked into the ECCS pumps. The licensee said the containment pressure and water level would provide sufficient pressure to close the check valve in each RWT outlet line, preventing the introduction of air into the ECCS.

However, on October **11, 2005**, while working with engineering consultants, the licensee found errors in the design calculations. Because of the errors, the licensee could not adequately demonstrate that the check valve in each RWT outlet line would seat properly. Failure to seat would allow water to continue being drawn from the RWT, possibly allowing air to be introduced into operating ECCS pumps, which might make them inoperable. Based on this operability determination, the licensee declared the ECCS in both Units **2** and **3** inoperable and began placing the operating units in cold shutdown to comply with the technical specifications until the design issue could be resolved.

Units **2** and **3** were returned to full-power operation on October **22, 2005**. While the units were shut down, the licensee evaluated several options to address the ECCS operability concerns. The licensee was able to demonstrate that the errors in the **Palo Verde** design calculations would not result in the introduction of air into the ECCS pumps. Therefore, the ECCS was operable in both units.

The NRC has reviewed the licensee's analysis and is confident that the ECCSs will perform their safety-related functions.

Question 2 Is the NRC overreacting?

The licensee shut down the two operating **Palo Verde** units to comply with the conditions in the plant licenses and not in response to any NRC action taken during this time. Compliance with the conditions set forth in the plant licenses provides reasonable assurance that the operation of the **Palo Verde** units will be conducted in a manner that does not endanger public health and safety.

Based on the information available at the time, the staff agrees that the plant shutdowns were appropriate because the licensee did not fully understand the ECCS design basis. The licensee eventually demonstrated through detailed analysis that the operability of the ECCSs of the **Palo Verde** units was not adversely affected by the errors found in the design calculations. Nonetheless, shutdown of the units was appropriate at that time because the systems were in an unanalyzed condition and the licensee did not have reasonable assurance of operability.

Question 3 How long until the plant comes back online? (Are we talking about months or years?)

The licensee began shutting down **Palo Verde** Units 2 and 3 on October 11, 2005, and the **two** units returned to full-power operation on October 22, 2005. **Palo Verde** Unit 1 returned to full power operation following completion of the refueling outage.

Question 4 Are employees being paid during shutdown?

Although the NRC staff is not aware of any employee layoffs during the short period of time **Palo Verde** Units 2 and 3 were shut down, licensee compensation of its employees is not within the purview of the NRC.

Question 5 Was it a breakdown in the cooling system, a flaw in the design, or another problem that caused the shutdown?

See the answer to question 1. The NRC has also made two NRC reports on the shutdown available to the public :

<http://www.nrc.gov/reading-rm/doc-collections/event-status/prelim-notice/2005/>

<http://www.nrc.gov/reading-rm/doc-collections/event-status/event/2005/20051012en.html>

Question 6 Why did the NRC wait until now?

The NRC conducts periodic inspection activities at all U.S. nuclear power plants where inspectors usually ask questions about the design basis of safety components, systems, and structures. In most cases, licensees are able to answer NRC questions in a timely fashion and provide reasonable assurance that plant operation will be conducted in a manner that does not endanger public health and safety. Occasionally, as was the case for **Palo Verde**, licensees are unable to show that safety systems meet all operability requirements. In such cases, licensees must comply with the conditions in the plant license.

The licensee's inability to demonstrate continued operability of the **Palo Verde** ECCSs in response to **NRC's** questions raised during the week of October 3, 2005, never endangered public health and safety. The operability issue resulted from the licensee's incomplete understanding of the requirements of the ECCS design. The NRC determined that the **Palo Verde** ECCSs were in an operable but degraded condition after considering how the system would respond when it automatically shifted from the RWT to the containment sump for the source of borated water.

Question 7 What is the mood among the management at the plant (flustered, peeved, worried, other)?

While the personal feelings of licensee personnel are not within the purview of the NRC, the NRC recognizes the importance of nuclear plant operators establishing and maintaining a strong safety culture — a work environment where management and employees are dedicated to putting safety first. The licensee management did make the correct safety decision on October 11, 2005, to shut down the two Palo Verde units and interacted with the NRC staff in an appropriately professional manner.

Question 8 Why the lack of information to the public?

NRC has been very open with the public. The two reports mentioned are available on NRC's website. NRC has also been very open with the press and very responsive to members of the public who ask questions.