APS

A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station

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July 28, 2006

Mr. Stuart A. Richards, Deputy Director
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Richards:

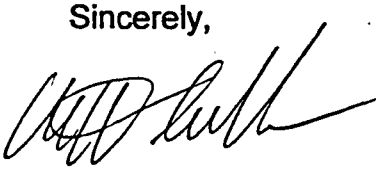
Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket No. STN 50-528/529/530
Groundwater Protection – Data Collection Questionnaire

The nuclear industry, in conjunction with the Nuclear Energy Institute, has developed a questionnaire to facilitate the collection of groundwater data at commercial nuclear reactor sites. The objective of the questionnaire is to compile baseline information about the current status of site programs for monitoring and protecting groundwater and to share that information with the NRC. The completed questionnaire for Palo Verde Nuclear Generating Station is enclosed.

This submittal contains no new regulatory commitments.

Should you have any questions about the enclosed information, please contact Scott Bauer (623)393-5978.

Sincerely,



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Enclosure

cc: USNRC Document Control Desk
B. S. Mallett NRC Region IV Regional Administrator
M. B. Fields NRC NRR Project Manager - (send electronic and paper)
G. G. Warnick NRC Senior Resident Inspector for PVNGS

ENCLOSURE

Industry Groundwater Protection Initiative

Voluntary Data Collection Questionnaire

For Palo Verde Nuclear Generating Station

Plant: Palo Verde Nuclear Generating Station

1. **Briefly describe the program and/or methods used for detection of leakage or spills from plant systems, structures, and components that have a potential for an inadvertent release of radioactivity from plant operations into groundwater.**

Operations, Engineering, and Radiation Protection personnel perform routine surveillance in their area of responsibility. Observed leaks and spills are reported to supervision for resolution and documentation in the corrective action program.

Palo Verde's spent fuel pools and fuel transfer canals are equipped with a leakage detection system. This system consists of a number of structural steel channel sections situated between the stainless steel liner and the concrete structure. Leakage is directed to a drain collection system which is monitored by Operations personnel.

Palo Verde's two evaporation ponds are designed to evaporate process wastewater. These ponds are equipped with leakage and vadose zone monitoring systems. In addition, there are seventeen aquifer monitoring wells located around the evaporation ponds to detect potential leakage.

Palo Verde's two retention basins receive wastewater destined for the evaporation ponds. These basins are gunnite lined with an underlying hypalon liner. Three aquifer monitoring wells are located around the retention basins. The retention basins are being replaced by above ground tanks to preclude leakage and increase detection capability.

The Environmental Department ensures compliance with Aquifer Protection Permit (APP) groundwater monitoring program requirements and monitors the aquifer around surface impoundments at Palo Verde. The groundwater monitoring program includes sampling shallow aquifer monitoring wells, intermediate aquifer monitoring wells and regional aquifer monitoring wells. These APP wells are designed to provide indication of leakage from the impoundments. The Radiological Environmental Monitoring Program (REMP) monitors the regional aquifer onsite. The combination of the APP and REMP wells would provide indication of onsite leakage into the regional aquifer. In addition, Water Reclamation and Environmental personnel routinely inspect the lined impoundments for observable exterior defects that could impact the integrity of the impoundment and monitor the leak detection in accordance with APP requirements.

2. **Briefly describe the program and/or methods for monitoring onsite groundwater for the presence of radioactivity released from plant operations.**

The REMP includes groundwater monitoring of two onsite deep regional aquifer production wells as well as drinking water monitoring of four offsite residence wells. The onsite wells serve as a source of drinking water for the site and are sampled quarterly and analyzed for tritium and gamma emitting isotopes. Offsite residence wells are sampled weekly. A monthly composite is analyzed for gross beta and gamma emitting radionuclides. A quarterly composite is analyzed for tritium. The required lower limit of detection (LLD), as specified in the Offsite Dose Calculation Manual for tritium in drinking water, is 2,000 pCi/l. The typical tritium LLD is 300 pCi/l. The LLD for gamma emitting radionuclides varies depending on the specific radioisotope.

In addition to the REMP, Palo Verde currently monitors groundwater pursuant to an APP issued by the Arizona Department of Environmental Quality (ADEQ). The APP became effective on December 17, 2003 and was modified on June 24, 2005. The primary objective of the APP groundwater monitoring program is to detect leakage from lined surface impoundments that hold either tertiary treated sewage effluent for cooling water make-up or wastewater from Palo Verde processes.

The APP Groundwater Monitoring Program includes quarterly water level monitoring and water quality sampling of:

- Thirteen shallow aquifer and two intermediate aquifer monitoring wells located around the Evaporation Ponds;
- Two shallow aquifer monitoring wells and one intermediate aquifer monitoring well located down gradient from the Retention Basins;
- One shallow aquifer monitor well, one intermediate aquifer monitoring well and eighteen shallow or perched aquifer piezometers located around the Water Storage Reservoir; and
- Two deep or regional monitoring wells located down gradient of the Evaporation Ponds.

Tritium, Iodine-131, Cesium-137 and Cobalt-60 are included in the water quality parameters of the APP groundwater monitoring program. These radiological parameters were selected as "trace" indicators of process or treated water in the Palo Verde surface impoundments.

3. **If applicable, briefly summarize any occurrences of inadvertent releases of radioactive liquids that had the potential to reach groundwater and have been documented in accordance with 10 CFR 50.75(g).**

03/19/1993.	A spill of approximately 4,000 gallons of condensate water occurred in the Unit 2 yard area north of the Turbine Building. This condensate water contained tritium at a concentration of 4.23E+6 pCi/l. (Reference condition report disposition request (CRDR) 230116).
03/01/2006.	Tritium was discovered in subsurface water in the Unit 3 radiological controlled area yard at a concentration of 7.14E+4 pCi/l. (Reference CRDR 2869959).

4. **If applicable, briefly summarize the circumstances associated with any onsite or offsite groundwater monitoring result indicating a concentration in groundwater of radioactivity released from plant operations that exceeds the maximum contaminant level (MCL) established by the USEPA for drinking water.**

   Currently tritium has not been detected in any onsite or offsite groundwater monitoring wells. Tritium however has been detected above the aquifer quality limit (AQL) of 20,000 pCi/l in subsurface water within the Unit 3's Radiological Controlled Area. It has also been detected in shallow subsurface water at concentrations on the order of 1,000 to 10,000 pCi/l in other locations. The water that has been detected is not believed to be connected to the underlying aquifer but rather captured in sand and loose fill around buried underground utilities. It appears that the compacted soil, with its lower permeability, acts as a barrier and traps the water within the courser grained soils surrounding or underlying buried utilities. The origin of the tritiated water cannot be absolutely identified but is believed to be from the historical operation of the boric acid concentrator (BAC) during rain events causing washout of tritiated water vapor or from small (less than 10 gallons) spills of tritiated water that did not evaporate but rather seeped into the subsurface collection areas. Atmospheric modeling conducted at the facility indicates that washout of tritiated water vapor will still occur at the facility during rain events due to normal ventilation releases (i.e., releases from the fuel building and plant ventilation system without the BAC in operation). However, the concentration of tritiated water in the rain will be less than the AQL and on the order of that detected in other locations (1,000 to 10,000 pCi/l).

5. **Briefly describe any remediation efforts undertaken or planned to reduce or eliminate levels of radioactivity resulting from plant operations in soil or groundwater onsite or offsite.**

   Plans have been submitted with the ADEQ to install monitoring and remediation wells in the areas where subsurface tritiated water has been detected. During the installation of these wells, geological and chemical data will be collected on the soils in order to obtain a better understanding of the soil properties and to confirm that the underlying soils are highly impermeable limiting the transport of tritiated water to the underlying aquifers. The accumulated water in these areas will be pumped out in accordance with ADEQ requirements and approval through the monitoring / remediation wells and disposed of through the plant's radioactive waste treatment systems. In addition, modifications will be installed to minimize water infiltrating into these areas and accumulating again.

   Finally, new monitoring wells are being installed to monitor the underlying aquifer down gradient from the units to confirm that no tritiated water has migrated into the onsite aquifer thus identifying any tritiated water prior to it being transported offsite or prior to affecting any drinking water aquifers.