



Fact Sheet

Aquifer Protection Permit
Place ID 3507 LTF 50468
Significant Amendment
Palo Verde Nuclear Generating Station
Area-wide APP Inventory No. 100388

The Arizona Department of Environmental Quality (ADEQ) proposes to issue an amended aquifer protection permit (APP) for the subject facility that covers the life of the facility, including operational, closure, and post closure periods unless suspended or revoked pursuant to Arizona Administrative Code (A.A.C.) R18-9-A213. This document gives pertinent information concerning the issuance of the permit. The requirements contained in this permit will allow the permittee to comply with the two key requirements of the Aquifer Protection Program: 1) meet Aquifer Water Quality Standards (AWQS) at the Point of Compliance (POC); and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). The purpose of BADCT is to employ engineering controls, processes, operating methods or other alternatives, including site-specific characteristics (i.e., the local subsurface geology), to reduce discharge of pollutants to the greatest degree achievable before they reach the aquifer or to prevent pollutants from reaching the aquifer.

I. FACILITY INFORMATION

Name and Location

Permittee's Name:	Arizona Public Service Company (Joint Owner, Operator, and Permittee)
Mailing Address:	Palo Verde Nuclear Generating Station P.O. Box 52034, M.S. 7626 Phoenix, Arizona 85072-2034
Facility Name and Location:	Palo Verde Nuclear Generating Station 5801 South Wintersburg Road Tonopah, Arizona 85354-7529

Regulatory Status

The Palo Verde Nuclear Generating Station (PVNGS) has been in operation since 1985. The facility is operated by the Arizona Public Service Company (APS) and is jointly owned by seven utility companies. The PVNGS submitted a Notice of Disposal in 1985 and operated under Groundwater Quality Protection Permit (GWQPP) No. G-0077-07 issued by ADEQ in 1988. An APP application was submitted for PVNGS on May 12, 1995. Additional information for the APP was submitted in 1999, 2000, 2002 and 2003. The original APP was issued to PVNGS on December 17, 2003. Amendments to the permit were issued in 2005, 2007, and 2008.

The APP authorizes the operation of industrial wastewater surface impoundments, water storage reservoirs containing cooling water, and landfills located at PVNGS.

In October of 2004 extensive damage was observed by APS in the primary Hypalon liner in the 85-acre Water Storage Reservoir (WSR). This was the subject of a Consent Order issued by ADEQ on November 12, 2004. The 85-acre WSR holds the treated cooling water for operation of three nuclear generating units. To address the 85-acre WSR, a backup reservoir was needed for storage of cooling water while the 85-acre WSR was emptied for reconstruction. A separate individual APP was issued by ADEQ to APS for a new 45-acre WSR on June 30, 2006 (Licensing Time Frame (LTF) Number 37182, Inventory No. 105665). The 45-acre WSR permit was processed and issued separately from the area-wide APP. The area-wide APP was already under amendment at that time. The new impoundment was constructed on an expedited schedule to provide storage of treated effluent/cooling water during reconstruction of the 85-acre WSR. A previous significant amendment merged the individual permit for the 45-acre WSR into the area-wide APP. As part of response actions, APS also added piezometers to assess the groundwater mound beneath the failed liner system, and APP-7, an intermediate aquifer POC monitoring well.

The compliance and permitting files for this facility contain numerous status reports filed by APS in accordance with the APP requirements for exceeded Indicator Alert Levels (IALs) in shallow aquifer groundwater monitoring wells and performance standard alert levels (ALs) for impoundment inspections. Issues that resulted in these notifications are being corrected through the compliance schedule of the permit and requirements to repair impoundments (described more completely below), and through improvements to the groundwater monitoring program in the permit.

Reports filed with ADEQ by APS also include notification of the discovery of tritiated shallow groundwater at a depth of 12 feet below ground surface (bgs) at Unit 3 on March 2, 2006, (with tritium concentrations in excess of the AWQS of 20,000 pico Curies per liter), notifications regarding discovery of problems with the liner systems/BADCT for the former retention basins (now replaced with exempt tanks), and follow up reporting associated with both notifications.

The ADEQ file contains written notices pertaining to the discovery of rips and tears in Evaporation Pond 2, and plant upset releases to lined gunite ditches. As a result of reports filed about Evaporation Pond 2 rips and tears and the recognition that the primary liner was reaching the end of its life, the permit Compliance Schedule required APS to take Evaporation Pond 2 temporarily out of service to perform repairs and upgrade the BADCT. Evaporation Pond 2 could not be taken out of service until the new Evaporation Pond 3 was constructed. One cell of Evaporation Pond 3 (3A) became operational in July 2008, allowing pump down of the fluid in Evaporation Pond 2 to commence. The transfer of water from Evaporation Pond 2 to Evaporation Pond 3 was been completed. Saturated sludge/salt material and the existing pond liner was removed and placed in the southeast corner of the existing Evaporation Pond 2. Rehabilitation of Evaporation Pond 2 began March 2009 and is expected to be complete by December 31, 2009.

In addition to the APP, PVNGS operates under other environmental permits, including a State of Arizona Reclaimed Water Permit (No. R100388) for the chlorination station associated with the effluent pipeline, a Hazardous Waste Identification Number for small quantity generation of hazardous wastes, and a Maricopa County Air Quality Operating Permit (No. 030132). The PVNGS is also regulated by the Arizona Radiation Regulatory Agency (ARRA) under Special Approval License No. 7-368 and the federal Nuclear Regulatory Commission (NRC) under a license. A full list of environmental permits for PVNGS is in the ADEQ project file and is available for review upon request.

Exempt Facilities

Several of the facilities located at the PVNGS have been determined to be exempt from APP requirements pursuant to Arizona Revised Statutes (A.R.S.) §49-250. The APP exempt facilities are: the Water Reclamation Facility (WRF); the Sewage Treatment Plant (STP) tanks (the discharge is not exempt but cycles back to the headworks of the WRF); the Spray Ponds for the Units which are located in concrete above ground tanks; the cooling towers and concrete aprons which are located on concrete pads; the Concrete/Inert Material Landfill; the Interim Spent Fuel Storage Facility which is regulated by NRC and contains spent fuel stored dry in concrete casks on a concrete pad; the truck washing station; and the Fire Training Facility.

Spray Ponds - The Spray Ponds are considered engineered structures designed not to discharge and are therefore exempt from APP requirements pursuant to A.R.S. § 49-250(B)(22). Each generating unit has a set of two Spray Ponds. The Spray Ponds provide cooling water for the emergency cooling of the reactors, and other emergency equipment. The six Spray Ponds are designed to meet NRC requirements for the Seismic Category I and are concrete containment structures designed not to discharge. APS has recently submitted documentation to ADEQ that states overspray from the ponds mixes with stormwater during storm events; however, this discharge spray does not reach the aquifer.

STP – The STP is a package plant contained in above-ground tanks. The discharge from the STP is directed to one of two places, the headworks of the WRF or to the exempt Retention Tanks. The discharge from the STP is not exempt.

Cooling Towers and Aprons - Each of the Units has three cross-flow, circular, concrete, low silhouette mechanical draft Cooling Towers used for cooling the water from the condenser cooling process. The treated wastewater from the WRF is the source of make-up water used in the Cooling Towers. A concrete apron is installed around each cooling tower to collect and return the majority of any overspray to the cooling tower. The Cooling Towers and related apron containment are exempt from APP requirements pursuant to A.R.S. § 49-250(B)(22). The industrial wastewater discharged from the cooling towers after maximum cycling through the system is discharged to the Evaporation Ponds 1 and 2, which are regulated under this permit. The average blowdown rate of each of the three units at PVNGS is 970 gallons per minute (GPM).

New Retention Tanks – APS constructed two above-ground, epoxy lined concrete tanks to receive ~~from the oily water separator, plant sumps, neutralization tank releases and other non-hazardous waste steams and process water discharges.~~ These concrete structures are tanks pursuant to A.R.S. § 49-250(B)(22) and are exempt from regulation. The two APP-regulated, gunite-lined impoundments that these tanks replace were closed under the compliance schedule in the permit. Issuance of the clean closure for the two retention basins is under review by ADEQ (LTF 43750 and Site Code 070100-04).

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Facility Description

The power plant began operations in 1985 and is anticipated to remain in operation for approximately 40 to 60 years. The 4,280-acre facility is located west of Phoenix, Arizona (Figure 1, Site Location and Property Boundaries). PVNGS is an electric generating baseload power plant, utilizing nuclear fission for generation of electrical power. PVNGS is owned by a consortium of utilities and operated by APS. The facility consists of electric generating units and cooling towers, solid waste handling and storage facilities (landfills), wastewater containment facilities (surface impoundments), a package water treatment plant, a WRF and storage reservoirs, plant operation and maintenance warehouses, and administration buildings.

The generating facility consists of three separate, identical generating units/reactors each equipped with three cooling towers. Following steam generator replacements and thermal uprates each of the three generating units (Units 1, 2 and 3) has a nominal net electrical output of approximately 1,346 megawatts (MW) for a total plant capacity of about 4,038 MW. Each generating unit also includes associated structures: auxiliary building; radioactive waste building; fuel building; control building; diesel generator building; main steam support structure; access building; spray ponds and cooling towers; and an oil/water separator. PVNGS also includes hazardous waste storage areas; low-level radioactive waste interim storage facilities; railroad and road facilities; fire protection and security facilities; control room simulators and other training facilities; and emergency facilities. A 500 kilovolt (KV) switchyard is also located at the facility and is managed and operated by Salt River Project (SRP). The switchyard is not regulated by this APP.

This area-wide APP authorizes the operation of seven surface impoundments (including the two unlined sedimentation basins), and operation of a sludge disposal landfill and a rubbish landfill, all visible in the aerial photograph of the facility (Figure 1). Reclaimed wastewater, domestic wastewater, and industrial process wastewater is managed on site by recycling wastewater within the facility for 20 cycles or more, and maintaining wastewater collection systems and the storage reservoir. Discharging facilities regulated by the APP can be seen in Figure 2.

The surface impoundments that contain water and wastewater regulated by this APP include the 85-acre WSR, the 45-acre WSR, Evaporation Ponds 1 and 2 (cells 2A, 2B and 2C), unlined Sedimentation Basins 1 and 2, and Evaporation Pond 3 (cells 3A and 3B). This permit also regulates the Sludge Disposal Landfill (which receives WRF sludge and cooling tower sludge) and the Rubbish Landfill.

There are two construction water holding ponds, both covered under separate Type 3.01 General Permits. Authorization to discharge under this general permit for the first pond was issued on July 2, 2007, Inventory Number 105892, LTF Number 44339, and Site Code (USAS) Number 508739-00. This lined pond will hold WRF and Water Treatment Facility wastewaters and water that will be used on site for dust control as authorized by the area-wide APP. Authorization to discharge under the general permit for the second construction water holding pond is under review by ADEQ (Inventory Number 106109, LTF Number 49897, and Site Code (USAS) 070100-00.

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PVNGS purchases secondary treated effluent from the Phoenix 91st Avenue, Tolleson and Goodyear Wastewater Treatment Plants (WWTPs) for beneficial use as make-up cooling water and for other approved uses on-site. The effluent is transported through 36 miles of underground pipe originating at the City of Phoenix 91st Avenue WWTP. The Water Reclamation Supply System (WRSS) pipeline passes through the Hassayampa Pump Station, which is permitted under a separate APP. The WRF also receives wastewater from the STP at the facility for reuse, and groundwater.

The WRF is exempt from APP requirements pursuant to A.R.S. §49-250(B)(22), but is described here for the purpose of clarifying APP permit-related inspections. The on-site WRF is an advanced WWTP, utilizing a multi-phase, biochemical treatment process. The WRF process includes 6 trickling filters, 6 first-stage solids contact clarifiers, 6 second-stage clarifiers, and 24 gravity filters. The WRF treats a combination of reclaimed wastewater from the pipeline, STP industrial wastewater/effluent, and groundwater. The WRF also has treatment facilities to provide domestic, demineralized and fire protection water. The final treated effluent discharged from the WRF is pumped to the 85-acre WSR and 45-acre WSR prior to use on-site.

The production rate of the WRF is estimated to be 45,000 GPM, or 64.8 million gallons per day (MGD). Approximately 4,650 GPM (6.7 MGD) is piped to the Redhawk Power Plant. The PVNGS uses approximately 769 GPM of domestic and demineralized water, averaged over a 24-hour period, or approximately 1.1 MGD. Non-effluent process water is supplied by two, on-site regional aquifer groundwater wells and a third is planned:

Cadastral Location	Latitude (N)	Longitude (W)	ADWR Reg. No.	Well Depth (ft. bgs)	Annual Gallons Pumped/Year (gpyr) ¹
T1N R6W Sec 27	33E 23'34"	112E 51' 16"	55-613123	1,050	Up to 1,685,000,000
T1N R6W Sec 34	33E 23' 30"	112E 51' 31"	55-613124	1,413	Up to 1,685,000,000

¹ The pumpage rate is regulated by the Arizona Department of Water Resources and is provided here for informational purposes only. This permit in no way restricts rates or volumes of groundwater withdrawn by the permittee.

PVNGS utilizes WRF-treated reclaimed water and untreated groundwater for dust suppression at the site. Dust suppression is required by Air Permit No. 8600896 for PVNGS site operations. Use of this water for on-site dust suppression is authorized by this permit, based on water quality data provided by the permittee.

Significant Amendment Description

APS initiated this Significant Amendment to:

- Revise sections of the permit to address the upgraded Evaporation Pond 2
- Update compliance schedule to:
 - reflect completed items
 - require an amendment for changes to the monitoring program
 - revise intended purpose and location of five planned wells in light of intended changes to the monitoring program
- Typographical revisions

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The permit requires changes to the operating requirements, discharge limitations, monitoring requirements and contingency plans for Evaporation Pond 2 to reflect the upgrade to BADCT.

Hydrologic Setting

The ground surface elevation at the facility slopes roughly north to south across the site with elevations ranging from 960 to 910 feet above mean sea level (amsl). Multiple groundwater aquifers appear to be located beneath the site. A shallow aquifer is located at an approximate depth of 73 feet bgs in the northern portion of the site or a groundwater elevation of 876 feet amsl (2001 data for Well PV-206A located south of the Units). In the southern portion of the site, the depth to the shallow aquifer ranges from 40 to 61 feet bgs, with observed groundwater elevations of 866 feet amsl (Well PV-14H in 2001), 872 feet amsl (Well PV-34H), and 876 feet amsl (PV-33H). Groundwater elevations in the shallow aquifer are in general declining, and groundwater has declined as much as 20 feet since the start up of plant operations in the 1980's. The decline may be related to drought conditions in Arizona coupled with pumpage in the lower aquifer south and southwest of the facility. However, in spite of declining water elevations in the shallow aquifer, some wells show slight increasing trends in groundwater elevation or a flat trend (which is neither increasing nor decreasing). Hydrographs of key wells submitted to ADEQ by APS are a part of the permit file and can be reviewed upon request.

The shallow or "upper-most" aquifer is located above and in the Middle Fine Grained Unit (MFU), which reportedly acts as an aquitard, limiting downward/vertical migration of groundwater and pollutants. The top of the aquifer is the top of the MFU and can be correlated in geophysical logs and cross sections throughout the Hassayampa groundwater basin. The MFU is characterized by massive, continuous layers of clays and silty clays interbedded with thinner layers and scattered lenses of clayey silt, clayey sand, and silty sand. The lower portion of the MFU includes a basal sub-unit, the Palo Verde Clay, which ranges in thickness from 60 to 80 feet. Review of cross-sections presented in the original

application suggests that the Palo Verde Clay aquitard laterally extends north, east, west and south of the site, but lays unconformably above a bedrock surface that outcrops near the southwestern boundary of the site, south and west of the evaporation ponds.

The regional aquifer, which is used as the source of the majority of local drinking water, is located in the Lower Coarse-grained Unit (also referred to as the Lower Alluvial Unit or LAU), beneath the Palo Verde Clay sub-unit. Beneath this site, the regional aquifer is reported to be confined to semi-confined, exhibiting potentiometric surfaces above the coarser grained aquifer materials. In well PV-216R, a potentiometric groundwater elevation of 701 feet amsl and a depth to groundwater ranging from 195 to 205 feet bgs is observed. Studies conducted in the northern portion of the site and also at the Redhawk Power Plant suggest that the regional aquifer may be under confined to semi-confined conditions in these areas.

An intermediate aquifer has been identified above the top of the Palo Verde Clay, between the shallow and regional aquifers (referred to in APP documents as the Palo Verde Clay Aquifer). While APS and ADEQ may have different hydrologic models regarding the degree of saturation between this aquifer and the uppermost/shallow aquifer, this aquifer represents the lowest water bearing unit that can be monitored and that is separated from the regional aquifer by a regional clay layer. It is therefore a suitable location for assessing any groundwater impact before the regional drinking water aquifer is reached by downward vertical migration.

Shallow /Uppermost Aquifer Groundwater Flow

Groundwater contour maps prepared by ADEQ and PVNGS suggest that groundwater flow in the shallow aquifer radiates outwards from the center of the Palo Verde site. This radial groundwater flow pattern may be the result of several factors: loss of fluid from operation of the 85-acre WSR for an unknown period of time with a failed liner system, discharge to the unlined sedimentation basin including stormwater runoff, and possibly the influence of past irrigation during former agricultural use of the property. Data in the APP files and ADWR records indicate that the radial groundwater flow pattern observed in the uppermost aquifer was present at the time of site development in 1985.

The radial flow pattern observed in the shallow aquifer was the basis of the perimeter groundwater monitoring program required by the permit. The perimeter program will be evaluated to assess whether or not there are data gaps to be addressed through installation of additional wells.

Recently, ADEQ and APS teams have begun to use the term “uppermost aquifer” in place of “shallow aquifer.” Wells at the perimeter of the property exhibit groundwater potentiometric surfaces (groundwater elevations) that are between those observed in the intermediate aquifer and the shallow aquifer at the center of the site. This suggests a steeply sloping gradient in the uppermost aquifer at the property margins, and the possibility of downward (vertical) gradients between water-bearing units.

Intermediate or Palo Verde Clay Aquifer Groundwater Flow

To date, only a limited number of monitoring wells have been installed to monitor this aquifer. Five monitoring wells have been installed to intersect and monitor the Palo Verde Clay Aquifer: APP-4, APP-5, APP-7, APP-8, and APP-13.

With the limited number of wells screened in this aquifer and the distance between wells, contouring groundwater flow in this aquifer provides only a rough estimate of flow conditions. As more wells are added to this unit, contouring will become more meaningful.

Regional Aquifer Groundwater Flow

Groundwater in the regional aquifer directly beneath the center of the facility appears to flow due south/southwest. The affect of basement structures and rock outcrops on groundwater flow directly south of the evaporation ponds has not been fully assessed to date and cannot be assessed with the limited number of wells at the site. Groundwater modeling results suggest that the flow direction in the regional aquifer trends southwest to west in the portion of the site located south of the evaporation ponds (Mock, 2003).

II. BEST AVAILABLE DEMONSTRATED CONTROL TECHNOLOGY

One of the primary requirements of the APP Program is BADCT. Facilities must be designed and operated in a manner to achieve the greatest degree of discharge reduction that is achievable. BADCT serves to protect groundwater quality by preventing discharges from moving through the subsurface soils to underlying groundwater. In general, it is more cost effective to prevent groundwater contamination from occurring through use of engineering controls than it is to clean up groundwater after impact.

BADCT for the PVNGS facility includes the engineering design of the wastewater reservoirs and liner systems, liner leakage monitoring systems, operational and maintenance practices for pollution control, water and wastewater treatment, water reclamation and reuse, water conservation, and the geological characteristics of the site. The APP addresses the design, construction, operation, and closure requirements for the APP-regulated facilities listed in the table in Section 2.1 of the permit. With the exception of the facilities listed in permit Section 16.1, Active Compliance Schedule Items, and the two unlined sedimentation basins, information in the application and subsequent submittals support the identified facilities as meeting BADCT. Detailed descriptions of BADCT can be found in the APP permit for the following APP regulated facilities: 85-acre WSR, 45-acre WSR, Evaporation Pond 1, Evaporation Pond 2 (cells 2A, 2B and 2B), Evaporation Pond 3 (cells 3A and 3B), the Sludge Disposal Landfill, and the Rubbish Landfill.

Site Characteristics and BADCT

Site characteristics such as presence of the MFU and a shallow depth of this unit beneath the facility contribute to BADCT, but were not used as part of the BADCT demonstration. Wastewater reclamation and conservation are a significant contribution to BADCT at this facility. Wastewater from local WWTPs is utilized for cooling water in the generating units. Water is cycled an estimated 20 times to conserve water prior to being discharged to

Evaporation Ponds as wastewater. The vadose zone beneath the site was characterized with field and laboratory testing for unsaturated flow, performed by Harding Lawson Associates in 1994 (HLA, 1994). Nine soil borings were drilled and sampled for a total of 469 vertical feet of borehole drilled. The predominant soil type encountered was silt with differing amounts of fine sand or clay and ranged from silty sand, sandy gravel to silty clay. Samples were submitted for geotechnical assessment, including flexible wall permeability testing. Permeabilities in the vadose zone ranged from 1.3×10^{-5} centimeters per sec (cm/s) in clayey sand to 6.29×10^{-9} cm/s in silty clay (HLA, 1994). These permeabilities meet the ADEQ surface impoundment BADCT definition of low permeability soil used for engineering design. These permeability estimates by HLA were based on unsaturated flow in the vadose zone. In the event of liner failure, saturated flow conditions would be expected to exhibit higher rates of fluid movement.

Evaporation Pond 2

The Compliance Schedule of the permit required BADCT upgrades for Evaporation Ponds 1 and 2. Rehabilitation of Evaporation Pond 2 is underway. Evaporation Pond 2 shall consist of three cells; 2A, 2B and 2C, double-lined with a LCRS. The double-lined system consists of a 60-mil high density polyethylene (HDPE) liner installed above the LCRS, a second 60-mil HDPE liner installed below the LCRS, and a geosynthetic clay liner below the second HDPE liner. The new design meets BADCT requirements.

III. COMPLIANCE WITH AQUIFER WATER QUALITY STANDARDS

OPERATIONAL MONITORING AND REPORTING REQUIREMENTS

Piezometer Vadose Zone Monitoring

ADEQ required piezometers to be installed at the 85-acre WSR as a follow up action in response to the failure of the east side of the liner in the impoundment prior to its reconstruction. The liner system in the 85-acre WSR has been replaced. Water level monitoring is required in these piezometers for the purpose of water level contouring in Section 17.2, Table 17.2-34, Water Level Measurement and Contouring, List of Wells. Mounding associated with the failed liner system is dissipating and should eventually reach equilibrium. Piezometer monitoring indicated high concentrations of nitrates in several wells. APS agreed to install two more wells APP-16 and PV-173R to monitor off-site migration of groundwater with concentrations that are above numeric AWQS.

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Fluid Level Monitoring - Evaporation Pond 1 and Reservoirs

The applicant is required to collect fluid elevation measurements for Evaporation Pond 1 and the Water Storage Reservoirs on a weekly basis. The permit requires the permittee to use this data to monitor and evaluate changes in fluid levels and sudden drops in fluid levels for the purpose of maintaining freeboard requirements and allowing assessment of liner failure or abnormal liner leakage. The permit contains contingency plan requirements for responding to performance standard/alert level exceeded conditions, an exceeded freeboard level, and overtopping of the impoundment.

Evaporation Pond 1 - Under Drain and Toe Drain Sump Monitoring

Evaporation Pond 1 is equipped with toe drains and an under drain for capturing liner leakage. Both systems terminate in sumps located in the southeast and southwest corners of the pond. Each drainage system has an inflow line to the sump and a total of six inflow lines feed the sump. The permit requires monitoring of fluid levels in the southeast and southwest sumps and inflow lines on a weekly basis and recording the information in the inspection log. The permittee is required to gauge fluids levels in the sumps, and if sufficient volume has accumulated, to pump/remove the fluid in the sump to allow assessment of re-accumulation in the next weekly inspection and comparison of volumes to alert levels for liner leakage. This monitoring was removed from the requirements for Evaporation Pond 2 and replaced with leakage monitoring, which is conducted through LCRS monitoring.

Evaporation Ponds 2 and 3 – LCRS System Monitoring for Liner Leakage

The permit requires daily comparisons of fluid in the LCRS sumps with liner leakage alert levels (AL1 for normal liner leakage and AL2 for excessive liner leakage) that are in the permit. LCRS monitoring is required for Evaporation Pond 2 under the amended permit.

Performance Level Monitoring – All Lined Impoundments

The permit requires routine inspections of all impoundments regulated by this permit in accordance with Section 17.2, Table 17.2-1, Surface Impoundment and BADCT Performance Standard Inspection & Alert Monitoring. The impoundments are inspected for a series of performance levels including: maintaining freeboard (the separation required between the operating level and the top of the berm); overtopping; fluid level and sudden loss of fluid; liner integrity; dam and berm integrity; LCRS function; and stormwater diversion and control.

Wastewater Sampling – Evaporation Pond 1

This permit amendment requires the permittee to continue to perform routine characterization of wastewater in Evaporation Pond 1 only until such time as the liner system in the impoundment is upgraded. Repairs will be performed in accordance with the Compliance Schedule in Section 16.1, Active Compliance Schedule Items. After the impoundment has been upgraded, ADEQ may consider either reducing the frequency of this monitoring or eliminating the requirement from the permit. Currently sampling is performed to allow comparison of groundwater quality/geochemical trends with the quality of wastewater in the impoundments to assess potential impact. The previous amendment reduced the frequency of sampling required in Evaporation Pond 1 to annually.

Sludge Characterization

The permit requires the permittee to routinely sample the two types of sludge that are deposited in the Sludge Landfill: WRF sludge and Cooling Tower Sludge. Limitations for types of materials that can be deposited in the landfill are stipulated in the permit and restrict the landfill to non-hazardous sludge that meets ARRA requirements. Sampling frequencies were clarified in the previous permit amendment.

As part of assessing the source of nitrates at the site, APS has sampled cooling tower and WRF sludge. Elevated nitrate concentrations in groundwater prior to site development (in the 250 milligrams per liter [mg/L] range) have been documented. APS has conducted a nitrate study for the area around the 85-acre WSR that was submitted under the compliance schedule for the last amendment and reviewed as part of this amendment.

GROUNDWATER MONITORING AND REPORTING REQUIREMENTS

This area-wide APP has a pollutant management area (PMA) that circumscribes all the APP discharging facilities (Figure 2). The perimeter groundwater monitoring program is intended to ensure detection of impacted groundwater prior to any off-site migration. To date no Aquifer Quality Limits (AQLs) have been exceeded for any wells at the site and the monitoring program suggests that the drinking water aquifer and off-site uses are protected.

Groundwater Monitoring and Compliance with AWQS at the POC

Previous significant amendments included substantial revision to the groundwater monitoring program to the permit. The demonstration of compliance with standards for this permit focuses on the regional and Palo Verde Clay aquifers. Only two wells screened in the shallow aquifer have been established as POCs: APP-9 and APP-10. These wells are located downgradient of Unit 3. Unit 3 is the unit that had tritium detected in shallow saturated soils (12 feet bgs) in concentrations exceeding the numeric AWQS on March 2, 2006. With the exception of the two shallow aquifer monitoring wells that are POCs, AQLs are or shall be established for all constituents in all other POC wells, with numeric standards that are on the biennial constituent list. The two POC wells located in the shallow aquifer, APP-9 and APP-10, only have AQLs established for radionuclides: Tritium, Iodine-131, Cesium-134, Cesium-137 and Cobalt-60.

Alert Wells

Perimeter shallow aquifer monitoring wells at the boundaries of surface impoundments and inside the property boundary provide groundwater protection by allowing detection of liner leakage from impoundments in the shallow aquifer where timely implementation of corrective actions such as liner repair can prevent impact to the underlying regional drinking water aquifer or shallow aquifer beyond the property boundaries. These wells provide an early warning mechanism to allow the permittee to take preventative action.

IV. STORM WATER AND SURFACE WATER CONSIDERATIONS

Stormwater runoff is controlled at the site by various stormwater management systems. Stormwater runoff from the power plant area is diverted and collected in a series of gunite-lined canals and earthen ditches and diverted to the two sedimentation basins located at the plant site. Sedimentation Basin 2 also receives limited amounts of discharges that meet the requirements of A.R.S. § 49-250(B)(23). Both sedimentation basins have received unauthorized wastewater discharges in the past during plant emergencies/upset conditions. All non-stormwater and non-exempt discharges to the sedimentation basins are regulated by this APP.

V. COMPLIANCE SCHEDULE

Interim steps needed to achieve compliance with the APP program over time are presented in the amended permit in the active compliance schedule. The detailed compliance schedule can be found in Section 16.1, Active Compliance Schedule Items, of the permit. In general it contains requirements for assessment of groundwater quality trends every 5 years, submittal of annual reports, requirements for scheduling and repairing Evaporation Pond 1, as needed. Five items were added to the compliance schedule during this amendment:

- Submittal of Evaporation Pond 2 Final Construction Report and Engineer's Certificate of Completion
- Submittal of a Request for Amendment to revise the permit monitoring plan
- Notification of ADEQ when Evaporation Pond 1 is taken out of service
- Request for amendment for refurbished Evaporation Pond 1
- Submittal of Evaporation Pond 1 Final Construction Report and Engineer's Certificate of Completion

The compliance schedule from the previous versions of the permit remains in the amended permit as Section 16.2. This preserves information regarding steps taken by APS to achieve compliance with the APP program in the permit for reference. Several completed items were moved to this table during this permit amendment.

VI. OTHER REQUIREMENTS FOR ISSUING THIS PERMIT

Technical Capability

APS has demonstrated the ability to maintain the technical competence necessary to carry out the terms and conditions of the APP in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A202(B).

Updated plant contact information was provided to ADEQ by APS as a part of the previous significant amendments to ensure that technical capability requirements are maintained. The permit requires that appropriate documents be sealed by an Arizona registered geologist or professional engineer. This requirement is a part of on-going demonstration of technical capability.

Financial Capability

APS has demonstrated the financial responsibility necessary to carry out the terms and conditions of the permit in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A203. The permittee is expected to maintain financial capability throughout the life of the facility. The financial capability was demonstrated in accordance with A.A.C. R18-9-A203(C)(1)(b).

The financial capability for this amendment was demonstrated through the financial test for self-assurance under A.A.C. R18-9-A203(C)(1)(b). Updated closure costs were submitted for discharging facilities. Previous demonstrations were under A.A.C. R18-9-A203(C)(1) for the original APP issued in December 2003 and subsequent amendments in 2005 and 2007. Financial capability for the previous significant amendment was demonstrated through A.A.C. R18-9-A203(F) and (G).

Zoning Requirements

The PVNGS has been properly zoned for industrial use and the permittee has complied with all Maricopa County zoning ordinances in accordance with A.R.S. § 49-243(O) and A.A.C. R18-9-A201(B)(3).

VII. ADMINISTRATIVE INFORMATION

Public Notice (A.A.C. R18-9-108(A))

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a draft permit or other significant action with respect to a permit or application. The basic intent of this requirement is to ensure that all interested parties have an opportunity to comment on significant actions of the permitting agency with respect to a permit application or permit. This permit was public noticed in a local newspaper after a pre-notification review by the applicant and other affected agencies. Public notice was published on [REDACTED], 2009, in the Arizona Business Gazette.

Public Comment Period (A.A.C. R18-9-109(A))

Public notice was published in the Arizona Business Gazette for this permit amendment. Comments were solicited by the public notices for during a 30-day public comment period.

Public Hearing (A.A.C R18-9-109(B))

Not applicable for this amendment.

VIII. ADDITIONAL INFORMATION

Additional information relating to this proposed amended permit may be obtained from:

Arizona Department of Environmental Quality
Water Quality Division – Groundwater Section
Attn: Carrollette Winstead, APP & Drywell Unit Manager
1110 W. Washington St., Mail Code 5415B-3
Phoenix, Arizona 85007
Phone: (602) 771- 4616

Or, directed to the Expedited APP Agent for ADEQ for this project:
Engineering and Environmental Consultants, Inc. (EEC)
Lisa Spahr, Project Manager
7878 North 16th St., Suite 140

Phoenix, Arizona 85020
(602) 248-7702 ext. 314

IX. LIST OF FIGURES

Figures

- 1- Site Location and Property Boundaries
- 2- APP-Regulated Discharging Facilities and Area-Wide Pollutant Management Area (PMA)