Searchlight Monitoring Well PVM-1

SB 62 Water Rights Technical Support Fund

FINAL REPORT

May 2009

Background

In 2005, the Las Vegas Valley Water District (LVVWD), on behalf of the Searchlight Water System, evaluated the hydrologic conditions in the Piute Valley Basin to determine possible locations for production and monitoring wells. Following a surficial geophysical survey, staff designated six locations for exploratory well drilling. In conjunction with the planned ground water development, hydrologists further recommended the establishment of a long-term monitoring wells network for the Piute Valley Basin to further characterize present aquifer conditions and to track any future changes. Specifically, data collected from the monitoring wells would provide information on groundwater levels and quality. The data would be used to support effective aquifer management in order to provide the Searchlight community with a safe and reliable drinking-water supply.

To assist with the development of a monitoring wells program, the LVVWD submitted a formal request for funds administered through the Water Rights Technical Support Fund (SB 62) in October 2005. On January 25, 2006, the Board for Financing Water Projects awarded the Searchlight Water System $150,000 in funds toward the development of one monitoring well.

Project Implementation

Environmental Documentation: In November 2005, the LVVWD submitted a rights-of-way application to the Bureau of Land Management (BLM) for exploratory well drilling. An environmental assessment (EA) document for the drilling activities at the six locations also was completed and submitted to the BLM. In December 2006, the BLM issued a Finding of No Significant Impact (FONSI) for the EA concerning the exploratory well drilling and issued a rights-of-way grant/temporary use permit to the LVVWD for the six locations.

In October 2007, the LVVWD completed drilling of four exploratory wells from four of the six locations to further characterize the extent of the alluvial aquifer. Sites for long-term groundwater monitoring wells within the Piute Valley Basin were determined based on these results. Water samples from the exploratory drilling were collected and analyzed to assess water quality in light of meeting drinking water standards, as well as long-term needs of groundwater monitoring.

In January 2008, the LVVWD filed a rights-of-way application to the BLM that included drilling up to seven permanent monitoring wells in the Piute Valley Basin, the first of which was funded by the SB 62 grant. The LVVWD also completed surveys, prepared documents and submitted draft environmental and biological assessments to the BLM.

In July 2008, the BLM and LVVWD held a meeting to discuss issues associated with issuance of site-type rights-of-way in Areas of Critical Environmental Concern, which resulted in the LVVWD removing a portion of the monitoring wells program from Searchlight's overall system improvements project. The LVVWD revised its environmental documents to exclude a portion of the monitoring wells program, and worked with BLM to prepare the final EA and additional documentation required before a final decision document was issued.

In May 2009, the BLM finalized all environmental documents, including the FONSI, Decision Record and rights-of-way grant, bringing the environmental-assessment phase of the System Improvements Project to a close.

Funding Agreement: On June 19, 2008, the State Board for Financing Water Projects approved a one-year extension to LVVWD's SB 62 grant funding agreement for the Searchlight Water System. Due to the significant amount of time dedicated to the environmental-assessment phase of the project, LVVWD requested and received an additional one-year extension to the SB 62 grant funding agreement on June 15, 2009.

From project inception through present, the Searchlight Water System submitted and was reimbursed for expenditures in the amount of $24,794.92 for the monitoring well project with a remaining balance of grant funds of $125,205.08. The remaining funds have been utilized entirely for completing the monitoring well drilling project and are included in the enclosed request.

Monitoring Well PVM-1

Hydrogeologic Purpose: PVM-1 was drilled to supplement the existing database of groundwater levels and quality in the Piute Valley Basin, and to provide a long-term data source for the aquifer management in the basin. The site is located near a border between alluvium and bedrock, and is between the area of existing and planned municipal water supply wells and the town of Searchlight (Figure 1, Geologic Map). PVM-1 will provide consistent data from a deeper groundwater source that will reveal short- and long-term fluctuations in the groundwater levels of this location. In addition, PVM-1 will be used to investigate the possibility of saturated alluvial deposits occurring between the volcanic bedrock layers, which was encountered in one borehole during exploratory boring.

Construction: PVM-1 construction began with the installation of a 10-inch diameter surface casing from ground surface to a depth of 60 feet. It was identified that Surficial alluvium extends to a depth of 20 feet below surface. Below that, volcanic tuff was encountered to a depth of 805 feet. The principal water bearing zone occurred between 340 and 500 feet below surface. Below 540 feet, water had to be added during the drilling process to remove cuttings, and was necessary to seal the zone for final well construction to prevent the migration of fluids from the water bearing zone downward. No saturated alluvium, similar to that which occurs in the area of existing and planned production wells, was encountered.

Figure 2 details the final PVM-1 construction. The lower, dryer zone was sealed with grout and 4-inch diameter casing. Screen was also installed from 520 feet deep to 1 foot above land surface. The principal water bearing zone was screened, gravel packed, airlift developed and air-lift pumped for water quality sampling. Because a small water zone was encountered at a depth of 120 feet, another seal was installed between the borehole wall and the well casing above the principal zone to prevent co-mingling of groundwater from different levels in accordance with Nevada Revised Statutes.

A 1-foot wide, circular concrete pad with a minimum thickness of 4 inches was emplaced around the 10-inch surface casing. The top of the 4 inch diameter well was covered with an 8-inch diameter steel casing that extended 2 feet above grade and was fitted with a locking cap. The inside of the 4 inch diameter casing and screen was inspected with a submersible video camera and found to be sound and in accordance with specifications.

Findings: Groundwater quality data provided by the Southern Nevada Water Authority indicates that the water at PVM-1 is moderate in total dissolved solids (410 mg/L) and hardness (110 mg/L), and there is potential for calcium carbonate scaling. Primary drinking water standards are met, with an arsenic value of 0.0086 mg/L. In addition, no above-standard organic or metallic contaminants occurred, and radiological analyses are within drinking water standards.

Since its installation, the groundwater level at PVM-1 has remained approximately 211 feet below land surface, showing minor fluctuations in response to barometric pressure changes. This is more than 100 feet higher than the area where screening was installed, indicating a confined to semi-confined condition for this aquifer.

The elevation head of the well's static water level is nearly 300 feet higher than that observed at production well S-2, suggesting a gradient or potential for subsurface flow southwestward from the PVM-1 aquifer out to the alluvial aquifer. Although the potential exists, the possibility of hydraulic connection is low due to the volcanic bedrock's low capacity to transmit water.

Long-term monitoring records will be utilized to determine seasonal and long-term trends in groundwater levels at this site. Any potential changes in water levels and/or water quality could result from continued recovery of the aquifer following the pumping episode in nearby private wells, or variations in natural recharge or discharge. Data collected at this monitoring well will provide important information concerning potential impacts of additional groundwater development from private wells near Searchlight, or from municipal well pumping to the west of PVM-1 in the alluvial aquifer.

The driller's well log, which lists water level, water location and rocks encountered during drilling in the area, has been filed with the Nevada Division of Water Resoures and is publicly accessible.

Figure 1: Geologic Map of Piute Valley Basin and the area surrounding Searchlight, Nevada

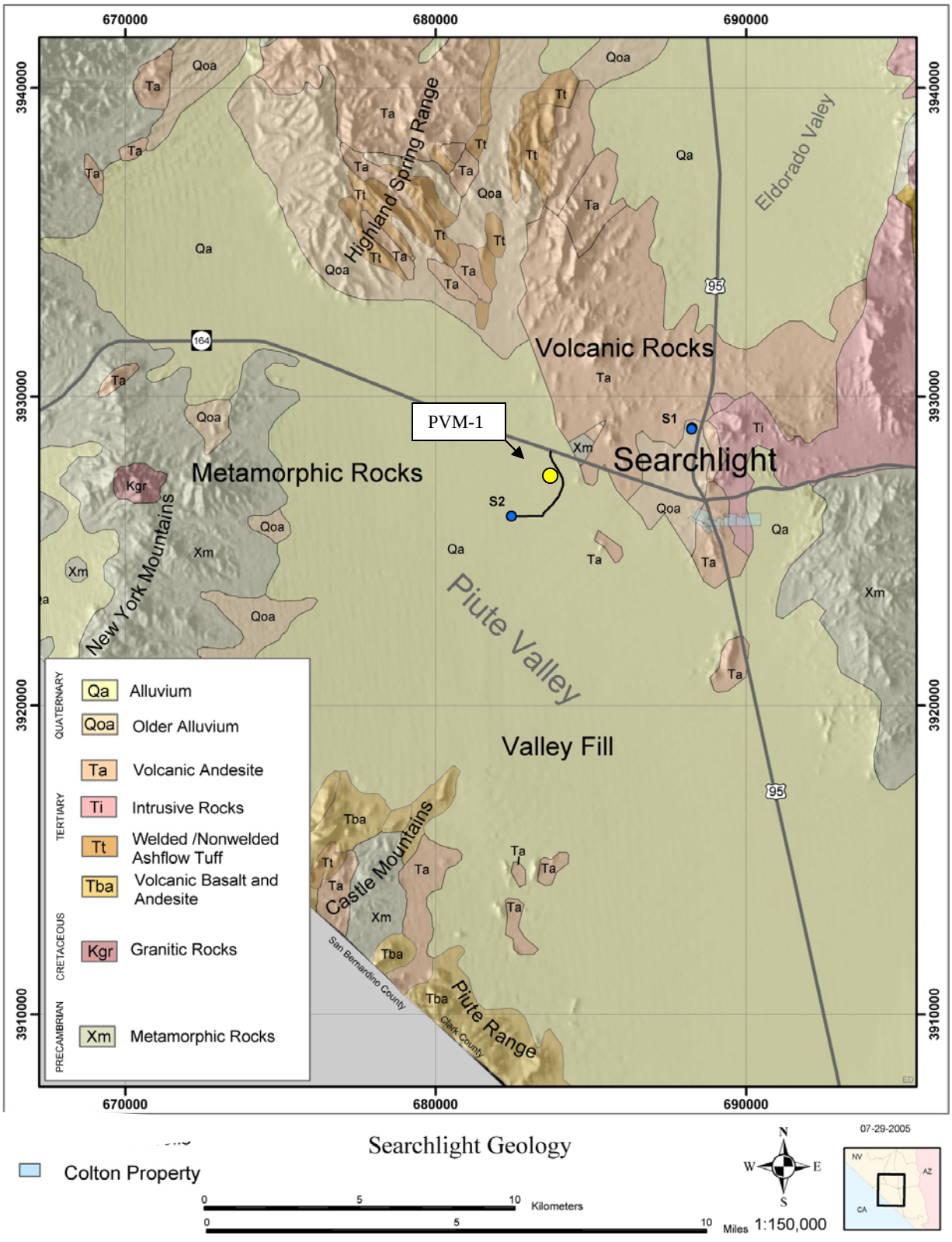

Figure 2: PVM-1 Final Well Completion Diagram