Palo Verde Valley Groundwater Basin

- Groundwater Basin Number: 7-38
- County: Imperial, Riverside
- Surface Area: 128,000 acres (200 square miles)

Basin Boundaries and Hydrology

The Palo Verde Valley Basin is located in the southeastern part of California along the state border with Arizona. The eastern boundary of the basin is the Colorado River, which also defines the state border. The Palo Verde Dam and the Big Maria Mountains bound the basin on the north. The Palo Verde Mesa abuts the western boundary and the Palo Verde Mountains bound the southern part of the basin. Surface and groundwater drain to the Colorado River.

Hydrogeologic Information

The principal water-bearing deposits in this basin are alluvium, the Bouse Formation, and a fanglomerate deposit (Metzger 1973).

Alluvium. The alluvial deposits range in age from Pliocene to Holocene, compose the shallow floodplain aquifer, and are the principal source of groundwater in the basin (Owen-Joyce 1984). The alluvium is composed of sand, silt, and clay with lenses of gravel, and ranges in thickness from 160 to 600 feet. Most wells in the basin are screened in the coarser grained deposits and have moderate to high yields (Metzger 1973).

Bouse Formation. The upper Miocene to Pliocene age Bouse Formation underlies the alluvial deposits. Few wells produce from the formation except near the City of Blythe. The upper Bouse Formation ranges from 500 to 600 feet below land surface and consists of interbedded clay, silt, and sand. The upper Bouse Formation is considered an aquifer while the lower formation is considered an aquitard. Well yields can be variable depending on the degree of formation consolidation and stratigraphic location of the perforations (Metzger 1973).

Fanglomerate. A Miocene (?) age fanglomerate is considered a water bearing deposit, though no wells are known to have been completed in it because of its relative depth to other water bearing deposits. Estimated depth to the top of fanglomerate can be greater than 800 feet below land surface but varies widely throughout the basin (Metzger 1973).

Restrictive Structures

Some small scale normal faulting has occurred in the area; however, the affects on groundwater movement by faulting is unknown.

Recharge Areas

The Colorado River recharges the shallow aquifer by seepage in some reaches and by diversions from the Colorado River in the form of seepage from canals and irrigated land (Metzger 1973).

Groundwater Level Trends

Groundwater levels have tended to remain relatively stable in the basin (Owen-Joyce 1984).

Groundwater Storage

Groundwater Storage Capacity. The total storage capacity is estimated at 4,960,000 af (DWR 1975).

Groundwater in Storage. Unknown.

Groundwater Budget (Type A)

Surface-water diversions at Palo Verde Dam into the Palo Verde Valley for crop irrigation during 1981 through 1984 averaged about 1,000,000 af/yr (Owen-Joyce 1984). About half of this diverted water returned to the river by natural drainage or via a drainage system that is hydraulically connected to the shallow aquifer. The remaining water is taken up by consumptive use, pumpage and evaporation (Owen-Joyce 1984).

Groundwater Quality

Characterization. Groundwater in the basin is constantly being mixed with Colorado River water that is used for irrigating large parts of the valley. Colorado River water is generally of a calcium-sodium chloride-sulfate type. Colorado River water in this reach has historically averaged about 600 mg/L for TDS (USGS 1971). Groundwater in the shallow alluvial aquifer is generally of poorer quality than Colorado River water; however, water quality improves at depth in some parts of the basin, such as beneath Blythe (USGS 1971). Data for 10 public wells in the basin show TDS concentrations ranging from 658 to 1,030 mg/L with an average of 840 mg/L.

Impairments. Because of higher than recommended values of TDS, some groundwater in the basin is unsuitable for domestic and irrigation purposes. Fluoride concentration in excess of recommended limits has been found in the older geologic units such as the Bouse Formation and the Miocene(?) fanglomerate (USGS 1971).

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	11	0
Radiological	12	0
Nitrates	11	0
Pesticides	11	0
VOCs and SVOCs	11	0
Inorganics – Secondary	11	10

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).

[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.
[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range:	Average:
	Total depths (ft)	
Domestic	Range:	Average:
Municipal/Irrigation	Range:	Average:

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
Department of Health Services and cooperators	Title 22 water quality	19/as required
United States Geological Survey	Water levels	11/as required

Basin Management

Groundwater management:	
Water agencies	
Public	Palo Verde Irrigation District
Private	

References Cited

California Department of Public Works. 1954. *Ground Water Occurrence and Quality, Colorado River Basin Region.* Water Quality Investigations Report No. 4.

California Department of Water Resources (DWR). 1975. *California's Ground Water.* Bulletin 118. 135 p.

Metzger, D.G. and others. 1973. *Geohydrology of the Parker-Blythe-Ciboloa Area, Arizona and California.* U.S. Geological Survey Professional Paper 486-G. 130 p.

Owen-Joyce, S.J. 1984. *A Method for Estimating Ground-Water Return Flow to the Colorado River in the Palo Verde-Cibola Area, California and Arizona.* U.S. Geological Survey. Water-Resources Investigations Report 84-4236. 48 p.

Owen-Joyce S.J. and Steven L. Kimsey. 1987. *Estimates of Consumptive Use and Ground-Water Return Flow Using Water Budgets in Palo Verde Valley, California.* U.S. Geological Survey. Water-Resources Investigations Report 87-4070. 50 p.

Additional References

Bookman-Edmonston Engineering, Inc. 1976. *Reduction of Salt Loading to the Colorado River from Palo Verde Irrigation District.* Report prepared for U.S. Bureau of Reclamation. 75 p.

Errata

Changes made to the basin description will be noted here.