Tijuana Groundwater Basin

- Groundwater Basin Number: 9-19
- County: San Diego
- Surface Area: 7,410 acres (11.6 square miles)

Basin Boundaries and Hydrology

The Tijuana Groundwater Basin underlies the portion of the Tijuana River Valley that lies within California. The basin's southern boundary is the international border with Mexico. The eastern and northern boundaries are the contacts with semi-permeable Pleistocene and Pliocene marine deposits. The western boundary is the Pacific Ocean. The intermittent Tijuana River and several ponds are hydrologic surface features in the basin.
Hydrogeologic Information

Water Bearing Formations

The water-bearing units in the basin are the San Diego Formation (SDCWA, 1997) and Quaternary age alluvium. The marine terraces can also be water bearing; however, these deposits are frequently above the regional groundwater surface.

Quaternary Alluvium. The most productive unit in the basin is the alluvium which consists of river and stream deposits of gravel, sand, silt, and clay. The thickness of the alluvium is less than 150 feet (Izbicki 1985) and averages about 80 feet thick (SDCWA 1997). Wells yield as much as 2,000 gpm, but the average yield is 1,000 gpm (SDCWA 1997). Groundwater in this unit is unconfined and the specific yield is about 15 percent (SDCWA 1997).

San Diego Formation. This unit consists of Pliocene age well-sorted, medium to coarse sand, silty and clayey sand, sandy silt, and sandy clay (Huntley and others 1996). Thickness of this unit ranges to at least 1,700 feet in the basin (Dudek and Associates 1994). Well yields average about 350 gpm with discharges as high as 1,000 gpm being recorded. Groundwater in the San Diego Formation is confined with a storage coefficient of about 0.001 (SDCWA 1997).

Restrictive Structures

The La Nacion fault and several smaller faults cross the basin. The smaller faults may be associated with the Rose Canyon fault, located 20 miles north of the basin (Wiegand, 1970). Faulting has probably contributed to difficulty in correlating deep well logs in the basin (Izbicki 1985). It is unknown whether these faults impede groundwater movement within the basin.

Recharge Areas

Recharge to the basin is mainly from the Tijuana River and controlled releases from the Barrett and Morena Reservoirs in San Diego County and Rodriguez Reservoir in Mexico. Some applied irrigation waters recharge the basin by deep percolation and discharges from septic tanks also contribute to

recharge. The irrigation water accounts for more than one third of the recharge in the basin (DWR 1984).

Groundwater Level Trends

Water levels declined in the alluvial aquifer during the 1950s through the early 1970s, eventually reversing the historical westward groundwater flow. This reversal allowed seawater to infiltrate the alluvial aquifer and move eastward, degrading the groundwater quality and the productivity of agriculture in the western part of the valley (Dudek and Associates 1994). Changes in pumping in the 1970s allowed water levels to rebound. By the early 1990s, groundwater had resumed its historical flow direction (Dudek and Associates 1994).

Groundwater Storage

Groundwater Storage Capacity. Groundwater storage capacity is about 50,000 to 80,000 af (DWR (1984).

Groundwater in Storage. DWR (1984) assumed a 5,000-acre surface area for the basin, and estimated storage to be between 50,000 and 80,000 af. However, these estimates are based on slightly different basin boundaries than in this report.

Groundwater Budget (Type A)

San Diego County Water Authority (1997) reports about 1,500 af/yr of groundwater is pumped from the Quaternary alluvium and extraction data for the San Diego Formation are not available.

Groundwater Quality

Characterization. The alluvium contains water of sodium chloride character. TDS content for this water typically ranges from 1,120 to 3,620 mg/L, although, less than 1,000 mg/L is found beneath some side canyons (Izbicki 1985). Groundwater in the San Diego Formation is sodium chloride in character and TDS content ranges from 380 to 2,360 mg/L (Izbicki 1985).

Impairments. Chloride and sulfate concentrations have exceeded the MCL in some wells in the basin (Izbicki 1985). The MCL for aluminum, barium, lead, selenium, and silver concentrations are exceeded individually in some wells in the basin (Dudek and Associates 1994).

Well Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Alluvium: Range: to 2,000 gal/min	Average: 1,000 gal/min
	San Diego Fm.: Range: to 1,000 gal/min	Average: 350 gal/min
	Total depths (ft)	
Domestic	Range:	Average:
Municipal/Irrigation	Range:	Average:

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
International Boundary and Water Commission	Groundwater levels	28
International Boundary and Water Commission	Miscellaneous water quality	28
Department of Health Services and cooperators	Title 22 water quality	

Basin Management

Groundwater management:	A groundwater management plan (AB3030 plan) was adopted by Tia Juana Valley County Water District on February 7, 1995.
Water agencies	
Public	San Diego County Water Agency, Tia Juana Valley County Water District
Private	California-American Water Company

References Cited

Izbicki, John A. 1985. Evaluation of the Mission, Santee, and Tijuana Hydrologic Subareas for reclaimed Water use, San Diego County, California. U.S. Geological Survey Water-Resources Investigations Report 85-4032. 99 p.

California Department of Water Resources, (DWR) Southern District. 1984. San Diego County Cooperative Ground Water Studies, Reclaimed Water Use, Phase II. 95 p.

Dudek and Associates. 1994. *Groundwater Management Plan for the Tijuana River Basin, Phase II.* Consultant's report for Tia Juana Valley County Water District. April 1994.

Huntley, D., Biehler, S., Marshall, C.M. 1996. Distribution and Hydrogeologic Properties of the San Diego Formation, Southwestern San Diego County. San Diego Formation Task Force, Report of Investigation. 65 p.

San Diego County Water Authority (SDCWA). 1997. Groundwater Report, June 1997. San Diego, California.

Wiegand, J. W., 1970. Evidence of a San Diego-Tijuana fault. Association of Engineering Geologists Bulletin, v. 7. 107-121 pp.

Additional References

Strand, Rudolf. ed. 1962. *Geologic Map of California, San Diego-El Centro Sheet.* Olaf P. Jenkins Edition. California Department of Conservation, Division of Mines and Geology. Scale 1:250,000.

Errata

Updated groundwater management information and added hotlinks to applicable sites. (1/20/06)