Twentynine Palms Valley Groundwater Basin

- Groundwater Basin Number: 7-10
- County: San Bernardino
- Surface Area: 62,400 acres (97.5 square miles)

Basin Boundaries and Hydrology

The Twentynine Palms Valley Groundwater Basin underlies an alluvial valley in the southern Mojave Desert. This basin includes the water-bearing sediments below Mesquite Lake (dry) and the town of Twentynine Palms. The basin is bounded on the north by a structural barrier named the "transverse arch" (Schaefer 1978; Mendez and Christensen 1997) and on the south by the Pinto Mountain fault. The basin is bounded on the east by the southern Bullion Mountains and extends west to the flank of the Copper Mountains. Average annual precipitation ranges from 4 to 6 inches.

Hydrogeologic Information

Water Bearing Formations

The water-bearing materials in this basin consist of unconfined, unconsolidated to partly consolidated Miocene to Quaternary continental deposits (Mendez and Christensen 1997). The deposits in the region are interpreted to range to 10,000 feet in thickness (Moyle 1984). However, in Twentynine Palms Valley, wells have been drilled to a depth of 1,250 feet without encountering bedrock.

The main productive water-bearing deposits are the interbedded gravels, conglomerates, and silts deposited in alluvial fan systems (Schaefer 1978). Other less productive deposits include alluvial channel sands and gravels; active silt, clay, and sandy-clay deposits in Mesquite Lake playa; and dune sands (Schaefer 1978; BEE 1994).

Restrictive Structures

The Pinto Mountain fault zone acts as a barrier to groundwater flow, with the water table lower by about 100 feet in the Twentynine Palms Valley Groundwater Basin than in the Joshua Tree Groundwater Basin to the south (DWR 1984; Mendez and Christensen 1997). The Mesquite fault is a strong barrier to movement of groundwater, with a drop of 240 feet in the water table to the east through the eastern part of the basin (DWR 1984). The northern boundary of the basin is the "transverse arch," an anticline that brings more consolidated deposits in its core toward the surface, which act as a partial barrier to groundwater flow to the south (Schaefer 1978; Mendez and Christensen 1997). This structure apparently plunges eastward and allows some subsurface groundwater flow from Deadman Valley Basin southward into Twentynine Palms Valley Basin (Schaefer 1978).

Groundwater Level Trends

Groundwater levels remained generally stable in the basin north of the Pinto Mountain fault (DWR 1984). The general regional groundwater flow pattern is from west to east toward Mesquite Lake (dry), although local faults and basement highs modify this basic pattern (DWR 1984; Mendez and Christensen 1997).

Groundwater Storage

Groundwater Storage Capacity. Total storage capacity of the basin is estimated to be 1,420,000 af (DWR 1975).

Groundwater in Storage. Groundwater in storage was estimated for a 100 foot thickness of saturated sediments to be about 132,000 af (DWR 1984).

Groundwater Budget (Type C)

The estimated natural recharge to the basin is 300 af/yr (DWR 1975). The estimated annual rate of depletion of groundwater in storage for the basin is about 1,500 af/yr. (DWR 1984).

Groundwater Quality

Characterization. North of the Pinto Mountain fault, the groundwater is predominantly sodium sulfate character, and TDS content ranges from about 300 to 1,300 mg/L, but reaches 3,100 mg/L (DWR 1984).

Impairments. Some wells in the basin exceed the recommended levels for drinking water in fluoride, TDS, and sulfate concentrations. Thermal waters also occur in this basin (DWR 1984).

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	1	0
Radiological	1	0
Nitrates	1	0
Pesticides	1	0
VOCs and SVOCs	1	0
Inorganics – Secondary	1	0

[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 Production characteristics

	Well yields (gal/min)
Municipal/Irrigation	
	Total depths (ft)
Domestic	
Municipal/Irrigation	Range: to1,250

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Water Levels	27
Department of Health Services and Cooperators	Title 22 Water Quality	2

Basin Management

Groundwater management:	The part of the basin that lies within the USMC base is managed by the NREA (USMC Base's Resource Management Agency).
Water agencies	
Public	NREA
Private	

References Cited

Bookman-Edmonston Engineering Inc. (BEE). 1994. *Regional water management plan:* Mojave Water Agency, Apple Valley California. 135 p.

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

_____, Southern District. 1984. *Twentynine Palms ground water study.* District Report. 109 p.

Mendez, G.O. and A.H. Christensen. 1997. *Regional water table (1996) and water-level changes in the Mojave River, the Morongo, and the Fort Irwin ground-water basins, San Bernardino County, California.* U.S. Geological Survey Water-Resources Investigations Report 97-4160. 34 p.

Moyle, W.R., Jr. 1984. *Bouguer gravity anomaly map of the Twentynine Palms Marine Corps Base and vicinity, California.* U.S. Geological Survey Water-Resources Investigations Report 84-4005.

Schaefer, D.H. 1978. *Ground-water resources of the Marine Corps Base, Twentynine Palms, San Bernardino County, California.* U.S. Geological Survey Water-Resources Investigations Report 77-37. 29 p.

Additional References

Akers, J.P. 1986. Geohydrology and potential for artificial recharge in the western part of the U.S. Marine Corps Base, Twentynine Palms, California, 1982-83. U.S. Geological Survey Water-Resources Investigations Report 84-4119. 18 p.

Bader, J.S. 1963. Effect of faulting in alluvium on the occurrence, movement, and quality of ground water in the Twentynine Palms area, California (abstract). Geological Society of America Special Paper 73. 22 p.

California Department of Water Resources (DWR). 1960. Data on water wells and springs in the Yucca Valley-Twentynine Palms area, San Bernardino and Riverside counties, California. Bulletin 91-2. 163 p.

Dutcher, L.C. 1960. Ground-water conditions during 1959 at the Marine Corps Base, Twentynine Palms, California. U.S. Geological Survey Open-File Report. 26 p.

Dyer, H.B. 1960. Ground-water conditions during 1960 at the Marine Corps Base, Twentynine Palms, California. U.S. Geological Survey Open-File Report. 32 p.

Giessner, F.W. 1965. Ground-water conditions during 1964 at the Marine Corps Base, Twentynine Palms, California. U.S. Geological Survey Open-File Report. 30 p.

Giessner, F.W. and S.G. Robson. 1966. Ground-water conditions during 1965 at the Marine Corps Base, Twentynine Palms, California. U.S. Geological Survey Open-File Report. 27 p.

Johnston, P.M. 1963. Ground-water conditions during 1963 at the Marine Corps Base, Twentynine Palms, California. U.S. Geological Survey Open-File Report. 37 p.

Lewis, R.E. 1972. Ground-water resources of the Yucca Valley-Joshua Tree area, San Bernardino County, California. U.S. Geological Survey Open-File Report. 51 p.

Moyle, W.R., Jr. 1974. Geohydrologic map of southern California. U.S. Geological Survey Water-Resources Investigations Report 48-73.

Riley, F.S. and J.S. Bader. 1961. Data on water wells on Marine Corps Base, Twentynine Palms, California. U.S. Geological Survey Open-File Report. 72 p.

Weir, J.E., Jr. 1962. Ground-water conditions during 1962 at the Marine Corps Base, Twentynine Palms, California. U.S. Geological Survey Open-File Report. 42 p.

Weir, J.E., Jr. and H. B. Dyer. 1962. Ground-water conditions during 1961 at the Marine Corps Base, Twentynine Palms, California. U.S. Geological Survey Open-File Report. 50 p.

Whitt, A. and K. Jonker. 1998. Groundwater survey of the Joshua Tree and Copper Mountain Subbasins, Joshua Tree California. Consultant's report prepared by Western Water Surveys, for Joshua Basin Water District.

Errata

Changes made to the basin description will be noted here.