Deadman Valley Groundwater Basin, Deadman Lake Subbasin

- Groundwater Basin Number: 7-13.01
- County: San Bernardino
- Surface Area: 89,000 acres (139 square miles)

Boundaries and Hydrologic Features

The Deadman Lake Subbasin underlies part of Deadman Valley in the northwestern part of the Colorado Desert hydrologic Region. This subbasin is located about 10 miles north of the town of Twentynine Palms within the Twentynine Palms Marine Corps base and includes the water-bearing sediments below and adjacent to Deadman Lake (dry). The western boundary of the subbasin is the Surprise Spring fault, which divides this subbasin and the Surprise Spring Subbasin. Contact with consolidated rocks of the Bullion Mountains forms the eastern boundary. This subbasin is bounded on the north by a combination of the Calico fault and consolidated rocks of Hidalgo and Argos Mountains (Moyle 1984). The southern boundary is a structural divide, named the "transverse arch", which lies between this subbasin and the Twentynine Palms Valley Groundwater Basin (Schaefer 1978; Mendez and Christensen 1997). Average annual precipitation to the subbasin is about 4 to 6 inches. Ephemeral streams flow toward Deadman Lake, a dry lake located in the southern part of the subbasin.

Hydrogeologic Description

Water Bearing Formations

The productive water-bearing materials in this subbasin consist of unconsolidated to partly consolidated Miocene to Quaternary age continental deposits (Mendez and Christensen 1997). Wells in this subbasin reach a maximum depth of 800 feet without encountering bedrock; however, gravity anomalies suggest that the continental deposits reach 10,000 feet in thickness (Moyle 1984).

The main productive water-bearing deposits are 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 Deadman Lake playa; and dune sands (Schaefer 1978; BEE 1994). These deposits have an estimated average specific yield of about 13 percent (Lewis 1972) and well production yields range from 30 to 2,000 gpm. Groundwater is unconfined in the subbasin.

Restrictive Structures

Several northwest trending faults occur in this subbasin. Water table elevations step down to the east across two of these faults, indicating that they are barriers to groundwater flow. The water table is displaced about 300 feet across the Surprise Spring fault and about 10 feet across the Calico fault (Elkins fault of Mendez and Christensen 1997). The "transverse arch," which is the southern boundary of the subbasin, is an anticline with more consolidated deposits in its core that act as a partial barrier to groundwater flow toward the south (Schaefer 1978; Mendez and Christensen 1997).

Recharge Areas

Natural recharge in the subbasin is derived mainly from direct percolation of precipitation and percolation of ephemeral streamflow (Mendez and Christensen 1997; BEE 1994). Subsurface inflow appears to come from the Surprise Spring Subbasin, and subsurface outflow appears to go toward Mesquite Lake (dry).

Groundwater Level Trends

Water levels remained essentially constant in the subbasin from 1950 to 1996 (Mendez and Christensen 1997). The regional groundwater flow pattern is from west to east, although local faults and basement highs modify this basic pattern. Contours of water table elevation suggest that groundwater in the Deadman Lake Subbasin is eastward from the Surprise Spring Subbasin toward Deadman Lake (Mendez and Christensen 1997). Quackenbush Lake (dry), in the northern Deadman Lake Subbasin, is another local topographic low within the subbasin; however, because no wells exist in the immediate area, groundwater flow cannot be determined. Water table elevations suggest that groundwater flows out of the Deadman Lake Subbasin southward into the Twentynine Palms Valley Groundwater Basin, toward Mesquite Lake (dry).

Groundwater Storage

Groundwater Storage Capacity. DWR (1975) reported total storage capacity to be 1,270,000 af for the Deadman Valley Groundwater Basin. The Deadman Lake Subbasin underlies about 75 percent of the surface extent of the Deadman Valley Groundwater Basin. By proportion, a reasonable estimate for the total storage capacity would be about 950,000 af.

Groundwater in Storage. Groundwater in storage in the Deadman Lake Subbasin was estimated to be 290,000 af during 1953 (Riley and Worts, *in* Schaefer 1978). Due to the limited development of the subbasin a current storage value is probably about the same as the 1953 value.

Groundwater Budget (Type C)

A published groundwater budget for the subbasin is not available.

Groundwater Quality

Characterization. Schaefer (1978) reported the dominant water types in the subbasin to be sodium sulfate and sodium bicarbonate. Two wells had TDS concentrations of 311 mg/L and 985 mg/L and specific conductance values of 517 and 1,600 μmhos (Schaefer 1978).

Impairments. The two wells tested by Schaefer (1978) exceeded the recommended limit of 1.4 mg/L for fluoride with one well reaching 9.6 mg/L. One well also showed high sulfate and boron concentrations (Schaefer 1978).

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	Range: 30 to 1,500 gpm (Weir and Dyer 1961).
	Total depths (ft)
Domestic	
Municipal/Irrigation	Maximum of about 800 (Moyle 1984).

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Water Levels	28
USGS	Water Qulaity	3
DHS	Title 22 Water Quality	1

Basin Management

Groundwater management:	The subbasin is managed by the Twentynine Palms Marine Corps Base. Hydrologic data has been collected and analyzed since the 1950s by the USGS and utilized to manage the water resources.
Water agencies	
Public	USGS (Data collection agency); NREA (USMC Base's Resource Management Agency)
Private	

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Errata

Changes made to the basin description will be noted here.