Tehachapi Valley West Groundwater Basin

- Groundwater Basin Number: 5-28
- County: Kern
- Surface Area: 14,800 acres (23 square miles)

Basin Boundaries and Hydrology

This basin encompasses the western half of Tehachapi Valley. The basin is bounded on the north by the Sierra Nevada and on the south by the Tehachapi Mountains. A low-lying ridge connecting these two ranges forms the western boundary; a similar ridge with a narrow gap separates Brite Valley from Tehachapi Valley. An alluvial high (surface drainage divide) between this basin and the adjacent Tehachapi Valley East basin forms the eastern boundary. Brite Creek drains southern Brite Valley and joins Tehachapi Creek, which drains the western Tehachapi Valley, before the combined flows exit the basin toward the San Joaquin Valley. The average annual precipitation ranges from 10 to 14 inches.

Hydrogeologic Information

Paleozoic sediments, pre-Tertiary granitic rocks, and Tertiary sediments of the Sierra Nevada occur to the north and west; Paleozoic sediments and pre-Tertiary granitic rocks of the Tehachapi Mountains are the predominant rock types to the south. An alluvial high occurs to the east between the settlement of Monolith and City of Tehachapi (Smith 1964).

Water Bearing Formations

The Quaternary alluvium comprises the upper portion of the valley fill that extends to a depth of at least 600 feet (Michael 1962). Specific yield of the alluvium is estimated at 7 percent except for the northern, western, and southern edges of the basin (represented by the high portions of alluvial fans) where a value of 10 percent has been estimated (Michael 1962).

Subsurface outflow from the valley is limited by bedrock highs at the north end of Brite Creek and at Tehachapi Pass. Subsurface outflow to the east has been limited by the persistence of a groundwater pumping depression southeast of the City of Tehachapi. Very little groundwater escapes the basin except by surface flows in times of flood (Michael 1962).
Under natural conditions, groundwater flow was probably split near the drainage divide between Tehachapi Valley East and West basins and moves toward the east and west, respectively. Although there is still some groundwater outflow both east and west, most water leaves the basin only as streamflow in Tehachapi Creek during storm events (Michael 1962). Heavy pumping in areas south of Tehachapi and Monolith has altered the movement of groundwater due to the creation of a large pumping depression.

Restrictive Structures

Inferred southeast trending faults cross the southwestern portion of the basin and offset basement depths by up to 500 feet (Michael 1962). These faults appear to act as groundwater barriers based on the observation of different groundwater elevations on either side of the fault. Higher elevations on the southwest sides of the faults imply recharge from the southern watershed.

Recharge Areas

The principal sources of recharge in the basin are the percolation of streamflow originating in the watershed, and to a lesser extent, the deep percolation of direct rainfall. The areas of Antelope, China, and Brite Creeks are the main recharge areas of the basin and are capable of a moderate recharge rate. Usable groundwater supplies are derived from the recent and underlying older alluvial deposits (Michael 1962). Artificial recharge of state water was initiated in 1996 (Jasper 2000).

Groundwater Level Trends

Between 1951 and 1961, there was a loss of 73,000 af from the basin. This estimate is based on hydrographs from TCCWD (2000) showing an average water level decrease of 58 feet, a basin area of 18,000 acres, and a specific yield of 7 percent. From 1961 to 1978, there was a loss of 32,700 af of groundwater. This estimate is also based on hydrographs from TCCWD (2000), which shows an average water level decrease of 26 feet and the same basin dimensions and specific yield mentioned above. Groundwater levels came up 71 feet (based on hydrographs from TCCWD 2000) between 1978 to 1999, leading to an increase of 89,500 af of groundwater in the basin (based on the same basin dimensions and specific yield mentioned above).

Groundwater Storage

Groundwater Storage Capacity. Total storage of the basin is estimated at 225,000 af (based on an estimated basin volume of 3,250,000 af and a specific yield of 7 percent; Michael 1962).

Groundwater in Storage. The amount of groundwater in storage has not been determined.

Groundwater Budget (Type A)

A detailed budget for this basin was established in 1996. Natural recharge of the basin is calculated as 3,000 af. This value is based on safe yield values determined by the Court which approximate the estimated combined annual recharge of 10,000 af for Cummings, Brite, and Tehachapi Valleys (Michael 1962). Brite and Tehachapi Valleys receive about 60 percent of this recharge or 6,000 af. The Tehachapi Valley West basin occupies about 60 percent of the combined Brite/Tehachapi Valley watershed and would be assigned 60 percent of the recharge (or 3,600 af). However, because less rainfall is recorded in this portion of the watershed, a 50 percent split would be more appropriate, giving a value of 3,000 af. Artificial recharge and applied water recharge are 1,217 af and 380 af, respectively (TCCWD 2000). There is no subsurface inflow, although some flow is pulled to the groundwater pumping depression southeast of Tehachapi. Annual urban extraction and annual agricultural extraction are estimated at 2,600 af and 200 af respectively, and other extractions come to 735 af (TCCWD 2000). There is no subsurface outflow (Michael 1962).

Groundwater Quality

Characterization. The characterization of the basin has not been determined. TDS values range from 280 to 365 mg/L, with an average value of 315 mg/L (based on three wells) (DHS 1991). EC values range from 460

to 620 µmhos/cm, with an average value of 520 µmhos/cm (based on three wells) (DHS 1991).

Impairments. Nitrate levels exceed 30 mg/L in Tehachapi municipal wells (DHS 1991) and 45 mg/L in two former supply wells in an annexed subdivision northeast of Tehachapi (DHS 1991; Jasper 2000). To remediate this nitrate plume, this water is extracted and piped to surrounding agricultural land for use as irrigation supply (Jasper 2000).

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	28	3
Radiological	23	0
Nitrates	30	2
Pesticides	23	0
VOCs and SVOCs	22	0
Inorganics – Secondary	28	2

[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: 60 – 1,500	Average: 454 (11 well completion reports)
Domestic:	Range: 3 – 300	Average: 42 (60 well completion reports)
	Total depths (ft)	
Domestic	Range: 150 – 620	Average: 317 (72 well completion reports)
Municipal/Irrigation	Range: 300 - 750	Average: 451 (12 well completion reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
TCCWD	Groundwater levels	64 Semi-annually
City of Tehachapi	Title 22 water quality	7 Varies
Golden Hills CSD	Title 22 water quality	12 Varies

Basin Management

Groundwater management:	Tehachapi Valley West is an adjudicated basin; the Tehachapi-Cummings County Water District (TCCWD) is Watermaster.
Water agencies	
Public	TCCWD; City of Tehachapi; Golden Hills CSD
Private	Ashtown Mutual Water System

Comments:

Since the start of basin adjudication in the early 1970s, groundwater levels have increased to those present during the late 1940s when the valley's groundwater overdraft problem became apparent. The importation of State water to supplement groundwater supplies starting in 1973 has also had a significant affect on reducing basin overdraft. While initially treated and used as municipal supply, most imported water is now used conjunctively in groundwater recharge programs**.**

References Cited

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Jasper, Bob, General Manager Tehachapi-Cummings Water District. 2000. Conversation with Bruce Myers, California Department of Water Resources, San Joaquin District. August 29, 2000.

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Smith, AR (compiler). 1964. Bakersfield Sheet of *Geologic Map of California*. California Division of Mines and Geology (CDMG). Scale 1:250,000.

Tehachapi-Cummings County Water District (TCCWD). June 2000. *Twenty-Sixth Annual Watermaster Report for Tehachapi Basin*. 48 p.

Additional References

California Department of Health Services, Drinking Water Field Operations Branch (DHS). 1999. Engineering Report*. Permit Amendment, Golden Hills Comm. Service Dist., Tehachapi, CA, Water Permit No. 03-12-99PA-10*. Central Valley Region. 6 p. + appendices.

Lorens, P.J. 1952. *Pollution Survey of Tehachapi Creek Spring Area. A Contribution to a Report Prepared by the Bureau of Sanitary Engineering for the Central Valley Regional Water Pollution Control Board.* Unnumbered Report.

Errata

Changes made to the basin description will be noted here.