Lucerne Valley Groundwater Basin

- Groundwater Basin Number: 7-19
- County: San Bernardino
- Surface Area: 148,000 acres (230 square miles)

Basin Boundaries and Hydrology

Lucerne Valley Groundwater Basin underlies Lucerne and North Lucerne Valleys in the northwest part of the Colorado River Hydrologic Region. The basin is bounded on the south by the San Bernardino Mountains and on the west by the Granite Mountains and the Helendale fault. The Ord Mountains bound the basin on the north. The Camp Rock fault and Kane Wash Area Groundwater Basin bound this basin on the east and the Fry Mountains bound this basin on the southeast. Parts of the eastern and southeastern boundaries are surface drainage divides.

Surface water drains toward Lucerne (dry) Lake in the western portion of the basin, which has an altitude of 2,850 feet above sea level (Schaefer 1979). Average annual precipitation is 4 to 6 inches in the lower part of the valley and 6 to 8 inches in the upper parts of the valley.

Hydrogeologic Information

Water Bearing Formations

The principal water-bearing deposits are Quaternary age alluvium, and dune sand. The deposits are unconsolidated or semi-consolidated and the alluvium is composed of gravel, sand, silt, clay, and occasional boulders. Where saturated, the alluvium yields water freely to wells. The average specific yield for these deposits is 11 percent. Irrigation wells in the basin yield as much as 1,000 gpm (Schaefer 1979).

Thickness of the alluvial deposits varies throughout the basin and reaches at least 1,800 feet along the Helendale fault. Water well and oil well logs indicate that the thickness of the alluvium averages about 600 feet (Schaefer 1979).

Fine-grained playa deposits in the western part of the basin yield little water to wells and the water is usually of poor quality (Schaefer 1979). In the western part of the basin, between Lucerne Lake and Helendale faults, a thick layer of playa deposits separates the groundwater system into an upper unconfined aquifer and a lower, confined aquifer. Throughout the rest of the basin, groundwater is unconfined (Schaefer 1979).

Restrictive Structures

Two northwest-trending faults transect the basin and form barriers to groundwater flow. The Helendale fault is most prominent and crosses the southwestern part of the basin; the Lucerne Lake fault lies about two miles to the northeast (Schaefer 1979). Evidence that these faults impede groundwater flow is shown by water-level differences across the faults ranging from 60 to 100 feet (Schaefer 1979). Along the southern edge of the valley, several small faults form part of the North Frontal fault system of the

San Bernardino Mountains. Springs along the base of the mountain range are associated with some of these faults (Schaefer 1979).

Recharge Areas

The basin is principally recharged by runoff from the San Bernardino Mountains and secondarily by runoff from the Granite, Ord, and Fry Mountains to the north. Groundwater generally flows from areas of recharge toward Lucerne Lake (Schaefer 1979).

Groundwater Level Trends

Depth to water varies from several feet below land surface, near the Helendale fault, to more than 300 feet along the flanks of the San Bernardino Mountains; however, in most parts of the basin, it is about 150 feet (Schaefer 1979).

Water levels have declined in parts of the basin since 1917 (Schaefer 1979). Water level declines of 40 to 100 feet affecting both the unconfined and confined aquifers have occurred in the southwestern part of the basin. Some wells in the basin have declined as much as 100 feet since the early 1950s, indicating that overdraft is occurring (Mendez and Christensen 1997). Land subsidence was noted by 1977 and had apparently been occurring in parts of the basin for many years because of overdraft of the aquifer system (Fife 1977).

Groundwater Storage

Groundwater Storage Capacity. Total groundwater storage capacity for the basin is reported to be about 4,740,000 af (DWR 1975) and 2,000,000 af (Schaefer 1979). The 2,000,000 af capacity was calculated for 1917 water levels, and presumably represents a steady-state full basin (Schaefer 1979).

Groundwater in Storage. Groundwater in storage was estimated to be 1,750,000 af in 1977 (Schaefer 1979).

Groundwater Budget (Type A)

A hydrologic budget for the basin using 1976 data was estimated by Schaefer (1979). Recharge was reported at 1,000 af, discharge was 10,000 af, and change in storage was 9,000 af. Groundwater overdraft of 9,000 af/yr was calculated using this data. Recharge has been estimated to be 1,000 af/yr (DWR 1967).

Groundwater Quality

Characterization. Calcium-magnesium bicarbonate water is found in the southwestern part of the basin. TDS content range from 200 to 500 mg/L in the southwestern part of the basin except near Rabbit Springs where they are as high as 2,000 mg/L (Schaefer 1979). In the southeastern part of the basin, there is a mixture of calcium bicarbonate and magnesium-sodium sulfate water. Where magnesium-sodium sulfate water predominates, TDS concentrations range from 300 to 1,200 mg/L and average about 800 mg/L. Groundwater near Lucerne Lake is sodium chloride in character and has TDS concentrations that range from 1,200 to 7,000 mg/L and average about 5,000 mg/L (Schaefer 1979). In a shallow aquifer zone, TDS concentrations

average about 2,700 mg/L; whereas, in the deeper aquifer zone, they average about 1,300 mg/L (Schaefer 1979).

Impairments. High nitrate and TDS concentrations associated with irrigation are found in the shallow aquifer (Schaefer 1979).

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	5	0
Radiological	4	0
Nitrates	6	0
Pesticides	4	0
VOCs and SOCs	4	0
Inorganics – Secondary	5	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 Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range: 10 – 1,000 gal/min (Schaefer 1979)	Average:
	Total depths (ft)	
Domestic	Range: 85-314 ft (Schaefer 1979)	Average:
Municipal/Irrigation	Range: 209-778 ft (Schaefer 1979)	Average:

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Water Quality	9
Department of Health Services	Title 22 Water Quality	3
USGS	Water Levels	22

Basin Management

Groundwater management:	A Regional Water Management Plan has been in use since 1994.
Water agencies	
Public	Mojave Water Agency
Private	

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