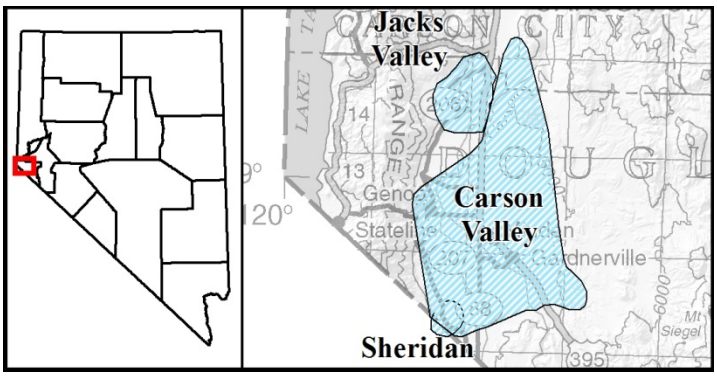
Site Description

Carson Valley
(updated 2014)



Geologic setting:

The Carson Valley is bounded on the west by the Carson Range, and on the east by the Pine Nut Mountains. Deposits on the northern portion of the valley are primarily alluvial, playa and lakebed deposits, the southern portion are mostly Pliocene volcanics and Pleistocene nonmarine (Ramelli et al., 2003).

The valley is a fault bounded basin, with multiple small normal faults on the east end, and one major normal fault on the west side, exposing Cretaceous granodiorite and Jurassic to Triassic metavolcanics of the Carson Range. Walleys Hot Springs is situated along the trace of the major fault (figure), along the edge of the range, within a mixture of undifferentiated alluvium and floodplain deposits (Ramelli et al., 2003). This fault has had recent movement, though the visible scarp existed prior to 1854. Lawson (1912) measured 13.4 m of recent fault displacement at Walleys Hot Springs, and believed it to represent movement from a single earthquake. The springs flow from a topographic low that occurs along the trace of the fault.

Hobo Hot Springs sits on a northern splay of the same fault that extends in to Carson Valley and continues in to Jacks Valley to the north. The springs sit at the base of Miocene to Jurassic felsic phaneritic intrusive granite, and Jurassic to Triassic metavolcanics,that are exposed within the valley itself. To the south, Sheridan is situated on the east side of the fault and in primarily alluvium and gravel deposits (Crafford, 2010).

On the east side of the valley is Hot Springs Mountain, a mixture of Jurassic to Triassic Volcanigenic, carbonate, and clastic rocks of the Pine Nut Assemblage. The area is surrounded by undifferentiated alluvium of the Carson Valley, with tuffaceous sedimentary rocks to the east (Crafford, 2010).

Geothermal features:

Genoa

Walleys Hot Springs: Walleys Hot Springs are about 4 km south of Genoa on the west edge of Carson Valley (Secs. 21, 22, T13N, Rl9E). The springs are named for David Walley, who built a large hotel and spa on the site in 1862. The resort had 40 bedrooms and, for a time, a physician in attendance. Later the hotel was partly destroyed by fire, and completely demolished in 1929-1930 (Dangberg, 1972). In the 1970s, Ed and Helen Johnson had a bar and dining room in their home on the site of the old hotel. The Johnsons provided copies of the U.S. Steel Corp. maps and well logs from geothermal investigations done there in 1962 and 1963. A modern spa and hotel, Walley's Hot Spring Resort, was built on the site in the early 1980s and is currently in use today (2013). In addition to use of the geothermal fluids for bathing and domestic hot water, the buildings are heated with geothermal energy (Lienau and others, 1988).

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The hot springs themselves occur over an area of several acres, and range in temperature from 57.8 to 71.1°C (Waring, 1965). The flow of the springs of the area has been estimated at 2,727 L/min (Lamke and Moore, 1965); Reed and others (1983) reported a flow rate of 75 L/min, probably from only one spring. Mariner and others (1974) have estimated the reservoir temperature at 85°C from a Na-Ca-K geothermometer. Lyles (1985) estimated the reservoir temperature to be 90±20ºC.

In 1962 and 1963, Columbia Iron Mining Co., subsidiary of U.S. Steel Corp. explored the hot springs area for geothermal energy. They drilled 26 shallow holes to determine the area of maximum water temperature. These were 30-60 m deep, and encountered temperatures up to 82.8°C (see figure). Two deeper wells were also drilled in the area (figure).

Hot Springs Mountain

Saratoga Hot Spring: A hot spring is present in the SW¼ SW¼ SE¼ Sec. 21, T14N, R20E near the west side of Hot Springs Mountain on the eastern margin of the Carson Valley (Glancy and Katzer, 1975). The reported temperature is 50-51°C (Lyles, 1985; Glancy and Katzer, 1975), with a flow rate of 1,330 L/min (Reed and others, 1983, p. 38). Mariner and others estimated a reservoir temperature of 31ºC using a silica geothermometer (Mariner 1983, p. 105), although more recent (fall 2013) samples indicate geothermometer temperatures at and only slightly above discharge temperatures. The spring is located along the trace of a north-striking fault having Quaternary displacement; it has reportedly been diverted about 30 m west of its original discharge point (Lyles, 1985).

Hastie Well and others: Hot water wells are reported from about 1 km south of the hot springs along the trend of the fault, and 38°C springs are reported in a marsh area about 1.5 km northwest of Saratoga Hot Springs in an area developed for the Incline Village Sewage Treatment Facility (NE¼ NE¼ Sec. 20, T14N, R20E; Lyles, 1985). The geothermal anomaly that extends south of the spring was confirmed by a 2-m temperature probe survey (Flynn and others, 1980). Trexler and others (1980) reported gravity and temperature gradient data for the area. Lobster aquaculture had been proposed for Saratoga Hot Springs, but no facilities were developed.

NBMG staff sampled two house wells SSE of Hot Springs Mountain. The first, a 15.0°C site, yielded similar geothermometry to a 27°C well located at 119.73851 W, 39.04935 N. Geothermometer values for both wells are low: the cold well has reservoir temperatures of 36.3°C (Na-K-Ca-Mg) and 46.7°C (chalcedony), and the warm well has temperatures of 35.3°C (Na-K-Ca-Mg) and 31.4°C (chalcedony) (Great Basin Groundwater Geochemical Database).

Jacks Valley

Hobo Hot Springs: Several hot springs in S½ Sec. 23, T14N, R19E are found over a 0.65 km^2 area. These springs are named Hobo Hot Springs on the Genoa 7.5-minute Quadrangle, but the Reno 1:250,000 topographic map shows Hobo Hot Springs to be about 2.5 km to the northeast, at another group of warm (24-32ºC) springs located in NW¼ NW¼ Sec. 19, T14N, R20E (Center for Water Resources Research, 1973). The springs are located on several linked fault strands, created when the single range-front fault (Genoa Fault) splayed northward into several faults.

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Both spring groups were sampled in May 2008 by NBMG staff. Sample results suggest a common reservoir between the two clusters. The respective geothermometry of two springs, a 28ºC spring in the eastern group and a 56ºC spring in the western, is 95.0ºC and 94.5ºC (Na-K-Ca-Mg), and 98.4ºC and 94.9ºC (quartz). The western spring, a 4m x 1m orifice, is located on a hillside where pond outflow travels into a marsh area. At 56ºC, the spring is the hottest measured. The eastern spring flows into a small 3 x 5m pond, where a pipe drains water further downslope into a larger pond. Travertine deposits have been reported ~5 km northwest of Hobo Hot Springs (in parts of Sec. 3, 4, 9 and 10, T14N, R19E), covering approximately 2 km^2 (Pease, 1980), although no travertine deposits could be located by field crews in these locations in the summer of 2013 (Great Basin Groundwater Geochemical Database).

Earlier work by Glancy and Katzer (1975) reported Hobo Hot Springs in SE¼ SE¼ Sec. 23, T14N, R19E; temperatures of 30 to 50°C have been recorded (Trexler and others, 1980). Mariner and others estimated the reservoir temperature to be 69ºC and 70ºC using silica and Na-K-Ca geothermometers, respectively (1983, p. 105). Tropical aquarium fish (Birk, 1987) and Malaysian prawns were raised in the spring waters in the 1980s, but the site has been inactive since then.

Additional work was conducted at the site in the summer and fall of 2013 by the Washoe Tribe who contracted Lumos Associates (Geothermal Development Associates and ***ATLAS*** Geosciences). Work conducted included additional water sampling, 2-m shallow temperature surveys and CO2 soil gas surveys and construction of a GIS of all historical and new data. At the time of this writing, these data were being held confidential.

Sheridan

Benson Spring: Benson Spring is a 10m x 10m seep covered with dense meter-high grasses. NBMG samplers measured the spring at 20°C in June 2008, when they visited the Jim Richardson property. The reservoir temperature was estimated at 67.2°C (Na-K-Ca-Mg) and 42.5°C (chalcedony). A 31°C well has been measured 100m north of Benson Spring, with a pH of 9.3 (see NWIS Well 105 N12 E19 26ACCB1 at http://waterdata.usgs.gov). Too few cations were measured to calculate charge balance or geothermometry for the well (Great Basin Groundwater Geochemical Database).

Leasing information:

N/A

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