



Site Description

Carson City

(updated 2010)

Geologic setting:

Geothermal features:

Carson Hot Springs: Carson Hot Springs, also referred to in the past as Swift's or Shaw's Hot Springs, are located in the north part of Carson City, north of Hot Springs Road, and west of the west end of the Carson City Airport. Water for a swimming pool and spa is pumped from a shallow well north of the pool (Garside and Schilling, 1979, p. 6). The springs apparently have their source at the contact between Mesozoic bedrock and alluvial deposits of Carson Valley (Trexler, 1977; Trexler and others, 1980). No faults have been mapped there, but several possibilities exist for nearby faults to be the source of rising thermal groundwater, which could then follow the bedrock-alluvium contact to the surface.

Stable isotope data for water at Carson Hot Springs indicate it is depleted isotopically compared to most water in the basin, suggesting that recharge for the springs is not from within the basin (Szecsody and others, 1984). The water at the springs was dated by the ^{14}C method at 12,000 to 14,000 years, suggesting that recharge for these springs probably took place in a colder climate (Szecsody and others, 1984). However, it is likely that there is mixing of thermal and nonthermal groundwater in the northern part of the Eagle Valley basin (Szecsody, 1982). The maximum temperature reported in Carson Hot Springs is about 48.9°C (Szecsody, 1982). Because the range of estimates based on several chemical geothermometers is narrow for Carson Hot Springs, the temperature estimates may reflect the maximum temperature to be expected at economic drilling depths. Trexler and others (1980) suggested this estimated maximum temperature may be $75\text{-}79^{\circ}\text{C}$.

An approximately 7 km^2 area of thermal groundwater around and to the south and west of Carson Hot Springs can be postulated (Tingley and others, 1998, figs. 5-10) based on contours of groundwater temperature of Szecsody (1982, p. 138) and the locations of Carson Hot Spring and a warm well (Carson City No. 7 well, near the center of the east edge of Sec. 6, T15N, R20E).

Nevada State Prison Spring: A warm spring at the present site of the Nevada State Maximum Security Prison was used in a bathhouse on the site of Curry's Warm Springs Hotel, which was used for Nevada's first territorial legislature session in 1861 (Guy Rocha, Reno Gazette Journal,



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8/18/2002). The Warm Springs Hotel was in operation adjacent to the old State Prison in 1867 (Gillis, 1868). In 1983 the flow from a spring at or near this site issued in alluvium inside an abandoned greenhouse just west of the main gate of the prison. The flow was probably only a few liters/minute at the surface although it could have been greater in the shallow subsurface. The maximum temperature measured at that time was 30°C (L. Garside, unpub. information, 1983). A water well at the Carson City Sewer Treatment Plant, 500 m or more east of the spring at the prison, is reported to be 60 m deep and have a water temperature of 32°C (Trexler and others, 1980, p. 25). Another(?) well there is reported to be 82 m deep and have a temperature of about 21°C, based on water well records in the office of the Nevada Division of Water Resources (L. Garside, unpub. information, 1983). The spring is apparently along the trace of a N15°E fault which separates Pliocene sandstone from alluvium there (Bingler, 1977).

The 21°C water from the sewer plant well probably should not be considered anomalously warm for this area, although the well does produce warmer water than most cold-water wells in the Carson City area. However, the 32°C water from a different(?) well is clearly anomalous. Possibly the geothermal groundwater in this well results from mixing of somewhat warmer water rising along north-striking faults to the east (see Bingler, 1977) with colder groundwater in the shallow alluvium. This situation would be analogous to the fault-related spring at the prison. Szecsody and others (1984) also suggest mixing of thermal and cold waters in this area, based on stable isotope data; ¹⁴C and tritium data on the warm water at the prison suggest the water is between 30 and 500 years old (Szecsody, 1982). If these interpretations are correct, circulation to depths great enough to warm this water must be fairly rapid. Recharge in this area is probably by infiltration from the Carson River (Szecsody, 1982). An area of anomalously warm groundwater is projected to the west of the prison about 1.5 km. based mainly on a water temperature of 28°C (Garside, 1994) from the Carson City No. 4 well (184 m deep). Contours of groundwater temperature (Szecsody, 1982) suggest that the area of warm groundwater may extend along the northwest flank of Prison Hill as well. As described below in the section on the Pinyon Hills area, that area is believed to be separate from the area of thermal groundwater at the prison.

Pinyon Hills: Warm groundwater has been encountered in nearly 50 shallow domestic water wells in the Pinyon Hills subdivision, located in the vicinity of Pinyon Hills Drive (E½ Sec. 23, T15N, R20E) in the low hills just east of the Carson River. Water temperatures range from 25°C to 46°C in wells 38-150 m deep (Trexler and others, 1980; Garside and Schilling, 1979). Flynn and others (1980) reported temperatures as high as 60°C. There is no surface discharge in the area, and the water quality is poor. The wells in this area were not drilled for geothermal applications, but rather for water for drinking and other domestic uses. Some residents of the area have considered or



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attempted space-heating applications (Trexler and others, 1980), but the temperatures are relatively low for direct use.

The area of thermal wells is elongate in a northerly direction along Pinyon Hills Drive, and is on line with a northerly striking fault shown by Bingler (1977) about 1.5 km to the north (McKinney, 1976; Flynn and others, 1980; Trexler and others, 1980). The area of potential thermal groundwater can be extended to the vicinity of that fault based on thermal groundwater contours developed by Szecsody (1982, p. 138). No data area available on the age of the water, but the Pinyon Hills thermal water is isotopically depleted, similar to the Carson Hot Springs water, suggesting the Pinyon Hills water was recharged during a colder climate, possibly 12,000-14,000 years ago (Szecsody, 1982, p. 175). Apparently the area of thermal groundwater is separate from the one in the vicinity of the State Prison, as a temperature gradient drill hole drilled west of the southern end of the Pinyon Hills geothermal area encountered cold groundwater to about 153 m (Trexler and others, 1980).

Leasing information: