which cuts the alluvium. This fault is probably part of a young Basin-and-Range fault shown by Stewart and Carlson (1974) cutting the alluvium in southern Buena Vista Valley.

STOREY COUNTY

Comstock mining district [252]

The silver-gold mines along the Comstock Lode were known for their extremely hot, difficult working conditions (Lord, 1883, p. 389–406); the miners commonly worked in temperatures ranging from 100° to 125°F. Church (1879, p. 289) considered the Comstock mines "to be the hottest in the world." Smith (1943, p. 245) states that "no other mines in the world have encountered such heat and such floods of scalding water."

Because of variations in ventilation, air temperatures in the workings varied considerably over short distances and are difficult to interpret. Rock temperatures also were modified by ventilation and water removal, thus temperatures taken in drill holes or immediately after a rock face was exposed are more useful. As Locke (1912) put it, the "temperatures are deranged by the presence of the mine workings which make possible the presence of the observer."

In a general way rock temperatures in these mines increase 3½°F for every 100 feet of depth (Becker, 1882, p. 230; fig. 42). This gradient persisted for some distance away from the Lode, but water temperatures taken at the face of the Sutro drainage tunnel while it was being driven showed that temperatures rose rapidly as the Lode was approached, even though the depth of the tunnel below the surface remained relatively constant (fig. 43). Water presently flowing from the portal of the tunnel in Lyon County is 83°F (Glancy and Katzer, 1975).

The highest rock temperature recorded was 167° from a dry drill hole on the 3,000-foot level of the Yellow Jacket Mine (diary, Superintendent Thomas G. Taylor). Mr. Cosgrove, foreman of the Yellow Jacket measured rock temperatures of 139½° and 136°F on the 2,200-foot level. Temperatures of about 130°F were recorded at numerous spots at depths of 1,900 to 2,000 feet in the Ophir, Chollar, Potosi, Crown Point, and other mines. All these temperatures were measured in drill holes immediately after a hole was finished. The rock surface temperatures of workings in the same area were 123°F or less.

The highest temperature of any considerable quantity of water was recorded during the flooding of the 3,000-foot level of the New Yellow Jacket shaft in November, 1880 (Becker, 1882, p. 230); 170°F water under considerable pressure was struck in a drill hole at a depth of 3,080 feet in the bottom of the shaft and soon flooded the mine. On February 13, 1882, a flood of 157°F water from the 2,800-foot level of the Exchequer Mine again drowned the pumps in the New Yellow Jacket shaft; all the mines in the vicinity were flooded, the water rising to the level of the Sutro drainage tunnel (annual report, Superintendent Thomas G. Taylor, July 1, 1882). A small flow of water in the east crosscut on the 2,000-foot level of the Crown Mine had a temperature of 157°F (Church, 1879, p. 291). The body of water that flooded the Savage and Hale, and Norcross Mines in 1877(?) still had a temperature of 154°F two years later

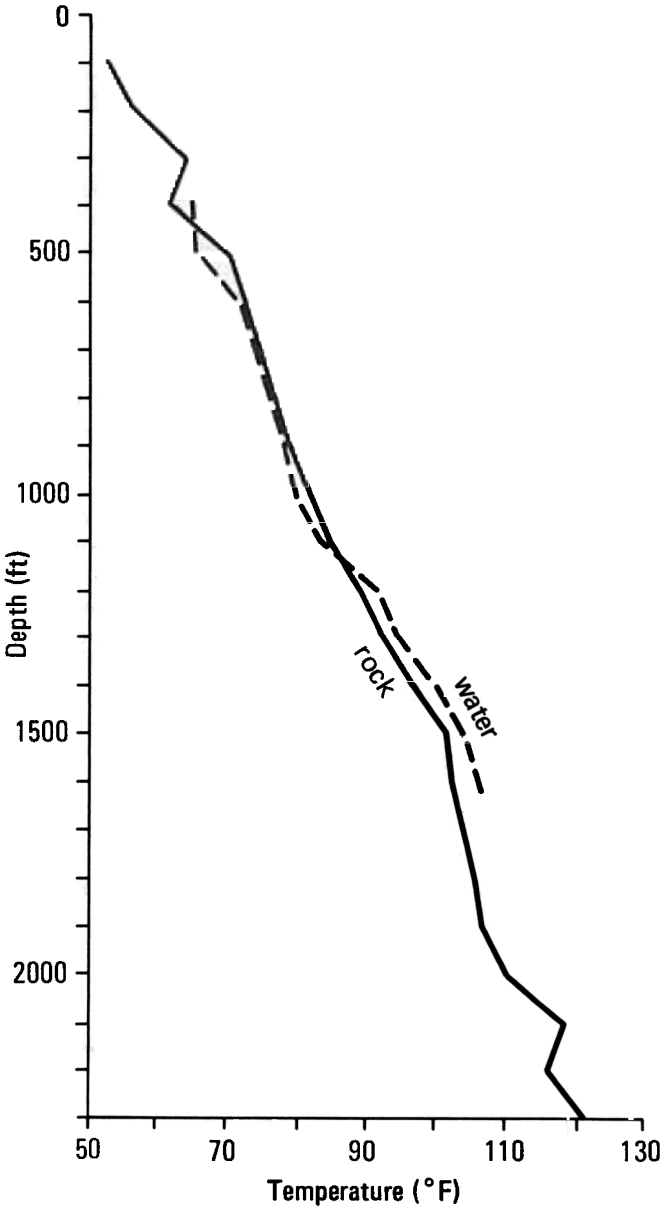

FIGURE 42. Temperatures in the Forman Shaft, Comstock Lode, Storey County (after Becker, 1888). Measured as the shaft was sunk.

(Church, 1879, p. 291) even though over a million tons of water had been removed.

As would be expected, the circulation of water was eccentric. Numerous clay seams sealed off the flow. Cutting such a clay seam frequently released dammed-up bodies of water which flooded the workings. The seams also appear to have greatly inhibited the upward convective flow of the hot water; there were no hot springs along the Lode's surface croppings, and the water encountered in the upper workings was cold, suggesting that the upward flow of hot water was feeble compared to the downward percolation of meteoritic water. The "perched," imprisoned nature of much of the water encountered is illustrated by the fact that once the water level was lowered below the Sutro tunnel, the water never rose to that level again (as long as the workings remained open to observation), even after pumping had stopped. The Comstock Lode obviously did not provide as easy a passageway for the upward flow of hot water as one might expect.

STOREY COUNTY (continued)

The restricted flow strongly suggests that the volcanic and intrusive wall rocks were the source of the heat, rather than the heat being introduced from some more distant source by hot-water flow. Exothermic reactions involving vein materials have been proposed as a possible source of the heat, but the low acidity and relatively unmineralized condition of the water (Appendix 1), and rarity of exothermic reaction products in the vein material suggest that little heat has been generated by this mechanism.

Other areas [249, 250, 251]

Although abundant hot water was encountered in the mine workings on the Comstock Lode, there are no hot springs in the vicinity. In fact, hot springs and evidence of past springs are rare in the entire county.

Waring (1965, Nevada no. 58) lists a warm (73°F) spring in T19N,R23E; probably this is Biddleman Springs, the only springs shown on the Churchill Butte 15′ topographic map. He mentions also a large area of travertine in S2,T17N,R22E (no. 251, pl. 1) and a small terrace and some fissure-filling of travertine in the center of the W/2 S21,T19N,R21E (no. 249, pl. 1).

WASHOE COUNTY

Truckee Meadows area

The Truckee Meadows area (fig. 44) includes the Reno–Sparks urban area between the Carson and Virginia Ranges on the west and east, respectively, and from Peavine Mountain to the north to the Steamboat Hills on the south. In general, the data in Appendix 1 in T17,20N and R19,20N would be generally considered to fall within the Truckee Meadows. This would include also a few warm-water wells in Pleasant Valley, which is technically outside of the Truckee Meadows. This area is just to the south of Steamboat Hot Springs and probably associated with that system. In Appendix 1 most of the water-quality data has been separated into several groups: Lawton Hot Springs, Moana Hot Springs, Steamboat Hot Springs, Pleasant Valley, etc. This separation, in a few cases, has been done somewhat arbitrarily.

Wedekind Mine [274]

In 1903 the Wedekind shaft in the Wedekind Mining District (SW/4 S28,T20N,R20E) encountered hot, acid water at 213 feet. A 150-gallon-per-minute pump was able to hold the water at the 100-foot level. The water was heavily charged with H_2S, and several miners in the bottom of the shaft were overcome by heat and H_2S (Morris, 1903; Overton, 1947, p. 84). No other evidence of thermal ground water is available, as there have been few recent water wells drilled in this area.

Lawton Hot Springs [275]

Hot springs along the Truckee River about 6 miles west of downtown Reno (SW/4 NE/4 S13,T19N,R18E) were named for Sam L. Laughton, who was the proprietor of a spa on the site in the mid-1880's. They were originally called Granite Hot Springs, but the name Lawton was used for a station on a spur of the Southern Pacific Railroad

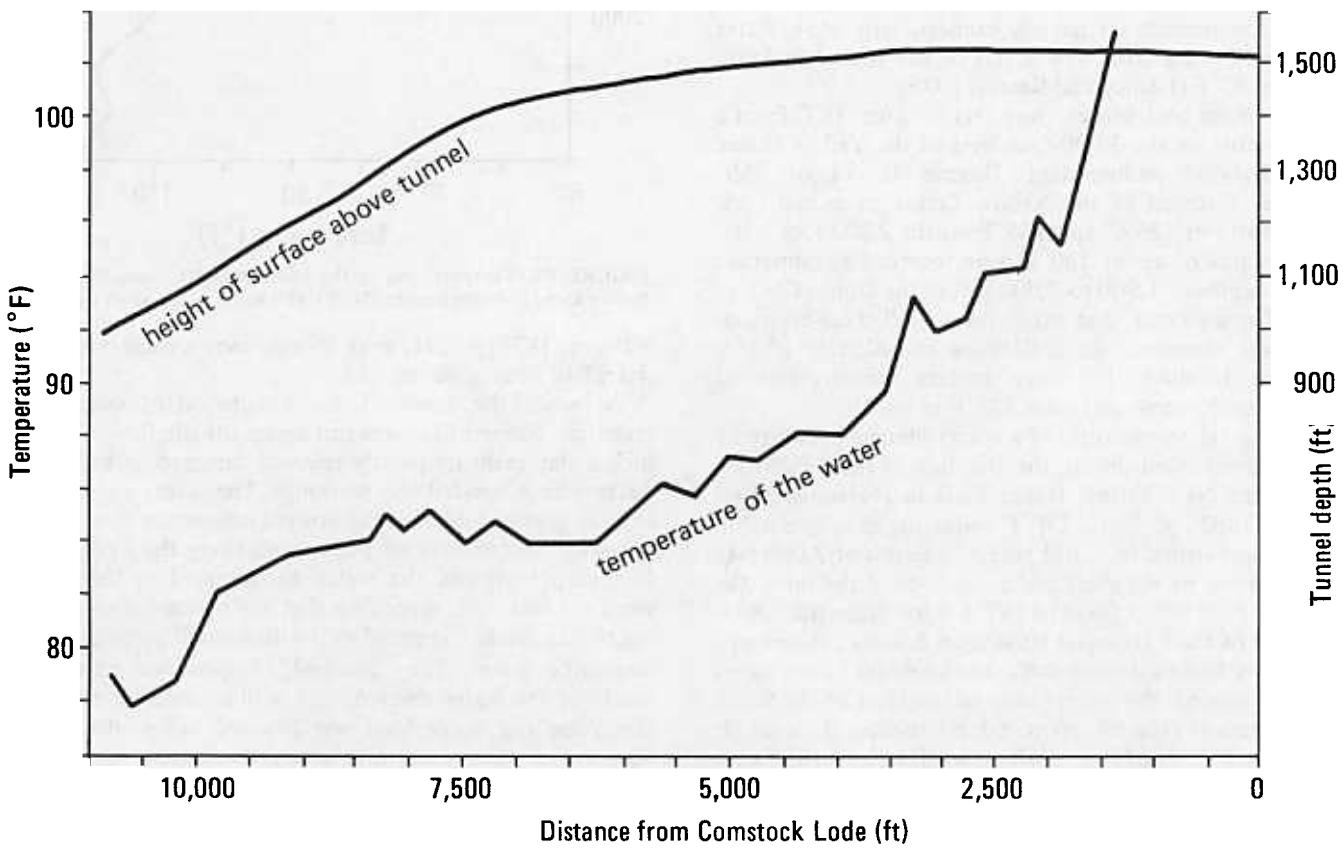

FIGURE 43. Water temperatures in the Sutro Tunnel (after Becker, 1888). Measured as the tunnel was advanced.