faults are projected on the basis of geophysical evidence plus the presence of thermal water in springs and wells along the fault. Also, the alluvial units are altered in the vicinity of the faults, and spring deposits are present at several areas. These spring deposits consist of both siliceous sinter and travertine (Cohen, 1962b). The deposit in S33 is at the approximate maximum level of Pleistocene Lake Lahontan, and is possibly related. In that case, the deposit would be younger than approximately 50,000 years. White (1955a) describes the travertine at one spring terrace (probably in NE/4 NW/4 S33,T35N,R36E) as being light brown in color and very porous. One sample contained 9 percent Mn and 0.3 percent WO_3. The present spring is not depositing travertine.

Tungsten-bearing manganese veins in E/2 SE/4 S5,T34N, R36E are along the west border of the East Range, and near the East Range fault. This property has been called the Victory Lode, and is located just inside Pershing County, but is included with this Humboldt County description because of its possible relation to the fault. The veins consist largely of calcite with films of manganese and iron oxides. Other gangue minerals are quartz, chalcedony, and gypsum. R. J. Roberts (quoted in White, 1955a), believes that these veins are the "roots" of spring deposits now removed by erosion. They are no doubt older than the travertine deposits to the north, but are probably genetically related (White, 1955a).

Sulphur area [141]

The Sulphur Mining District is an old sulfur-mining area, with minor associated mercury. No thermal activity is now evident, but White (1955a) reported that a strong odor of H_2S can be noticed in some of the short adits of the Devil's Corral workings (S30,T35N,R30E).

The sulfur was deposited by hot springs, and these probably had their greatest discharge when the level of Pleistocene Lake Lahontan and the surrounding ground-water level was high. All of the deposits are at or near the upper level of the lake, except for the Peterson deposit, which is in a fault zone considerably above the upper level of Lake Lahontan (Willden, 1964, p. 111).

LANDER COUNTY

Beowawe Geysers [94]

The geothermal activity at Beowawe Geysers is found in both Eureka and Lander Counties but most of the spring area is in Eureka County, and for simplicity the descriptions and water quality data are included in that county.

Spencer Hot Springs [162]

The hot springs and wells at Spencer Hot Springs are mainly located in the SE/4 S13,T17N,R45E (projected). There are also springs to the east of the main spring area (fig. 30), in S14,T17N,R45½E (Fiero, 1968). Meinzer (1917, p. 50, 91) reports the presence of a travertine terrace nearly 1 mile long and half a mile wide with spring deposits not more than 50 feet thick. According to Meinzer (1917), the main spring is 144°F, the north spring 117°F, and the east spring "normal." Hot water from the main spring is conducted by steel pipe to a concrete-lined pool

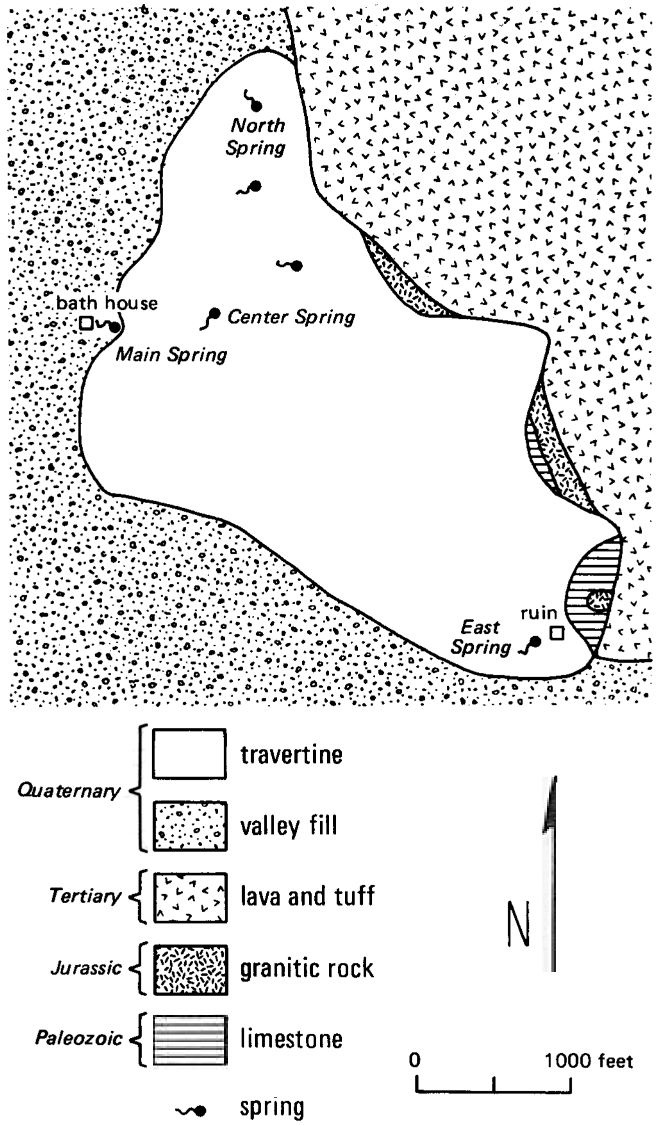

FIGURE 30. Geologic map of Spencer Hot Springs area, Lander County (modified from Meinzer, 1917).

(Sanders and Miles, 1974). Wollenberg (1974b) reports that the spring has slightly anomalous radioactivity (19 μR/hr).

Except for Sanders and Miles (1974), who report that the springs are at the boiling point, the highest temperature, 162°F, was recorded by Mariner and others (1974), who suggest that the best estimate of the reservoir temperature is 253°F, using the silica geothermometer. Fiero (1968) believes that the water discharging at Spencer Hot Springs may originate in Monitor Valley to the east after flowing through the intervening Paleozoic carbonate and clastic rocks. The geology of the hot springs and surrounding area is also shown on the 1:62,000 geologic map by McKee (1968).

Smith Creek Valley [159, 160]

At least four hot springs are reported from widely separated areas in Smith Creek Valley. The northernmost of these (no. 102, pl. 1) is in NW/4 NW/4 S36,T20N,R40E at Peterson's Mill (Mount Airy 7½-minute sheet). Everett and Rush (1964) report an 85°F well at this location. The hot

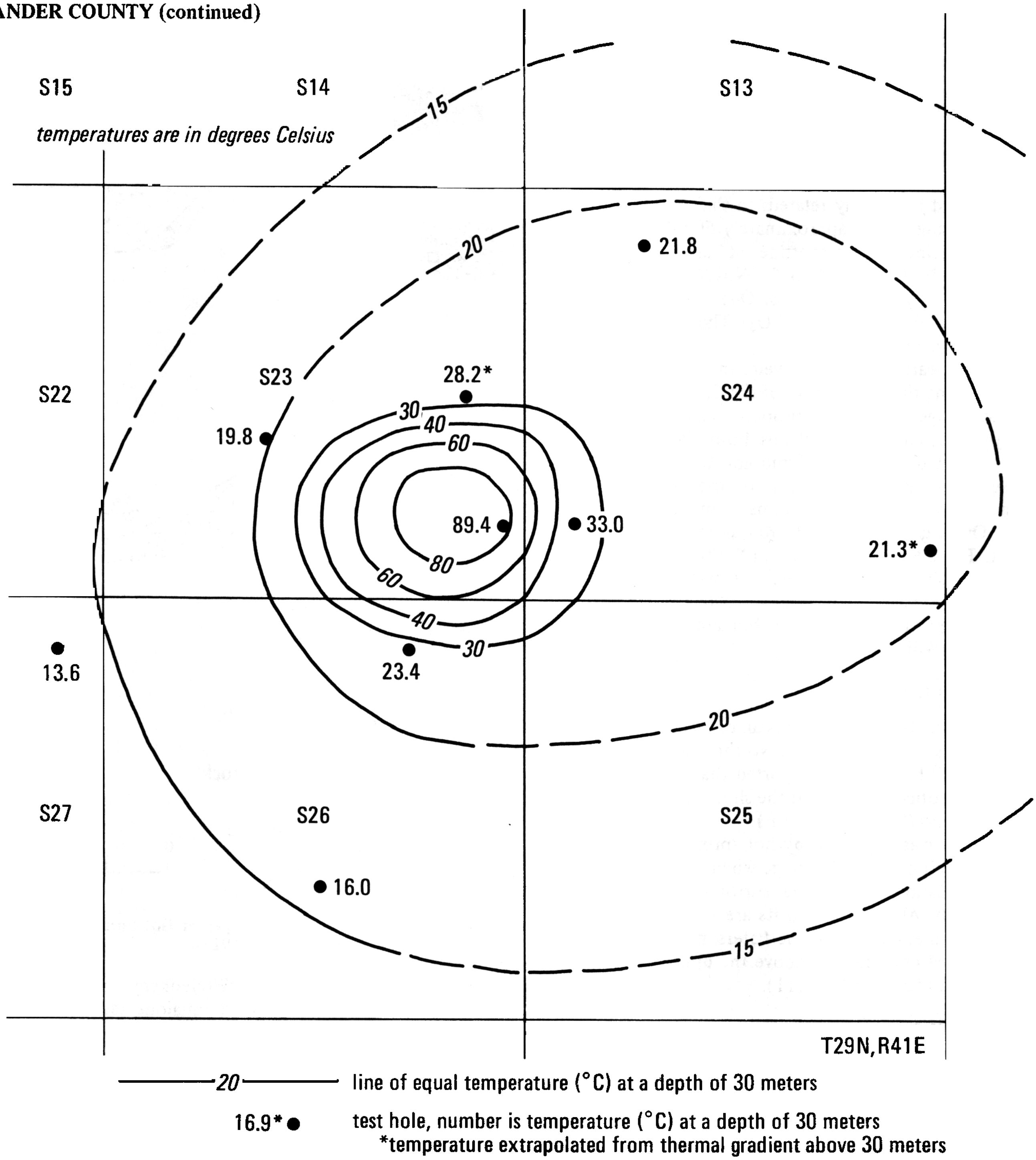

FIGURE 31. Map of Buffalo Valley Hot Springs thermal area, Lander County, showing temperature at a depth of 30 meters, fall 1973 (from Olmsted and others, 1975).

spring at Peterson's Mill is just down-gradient from a northeast-trending concealed fault in the alluvium (Stewart and Carlson, 1976b). Warm springs are also reported 6 miles north of Smith Creek Valley Hot Springs in S27(?),T18N, R39E by Waring (1965). No temperature information is available for these springs.

Mariner and others (1974) measured a temperature of 187°F at a spring in S11,T17N,R39E. A trace of travertine is reported, and the estimated thermal reservoir temperature is between 289° and 315°F for various chemical geothermometers. Smith Creek Valley Springs, in S25,26, T17N,R39E, consist of about 20 hot springs which are near boiling. The springs appear to be associated with recent faults which cut the younger alluvium (Everett and Rush, 1964). A hot spring is also reported in S25,T17N,R40E by Waring (1965). No spring is shown on the Iron Point 7½-minute sheet, and the location may refer to Smith Creek Valley Springs.

Buffalo Valley Hot Springs [151]

Buffalo Valley Hot Springs are located in SE/4 S23, T29N,R41E and have reported surface temperatures up

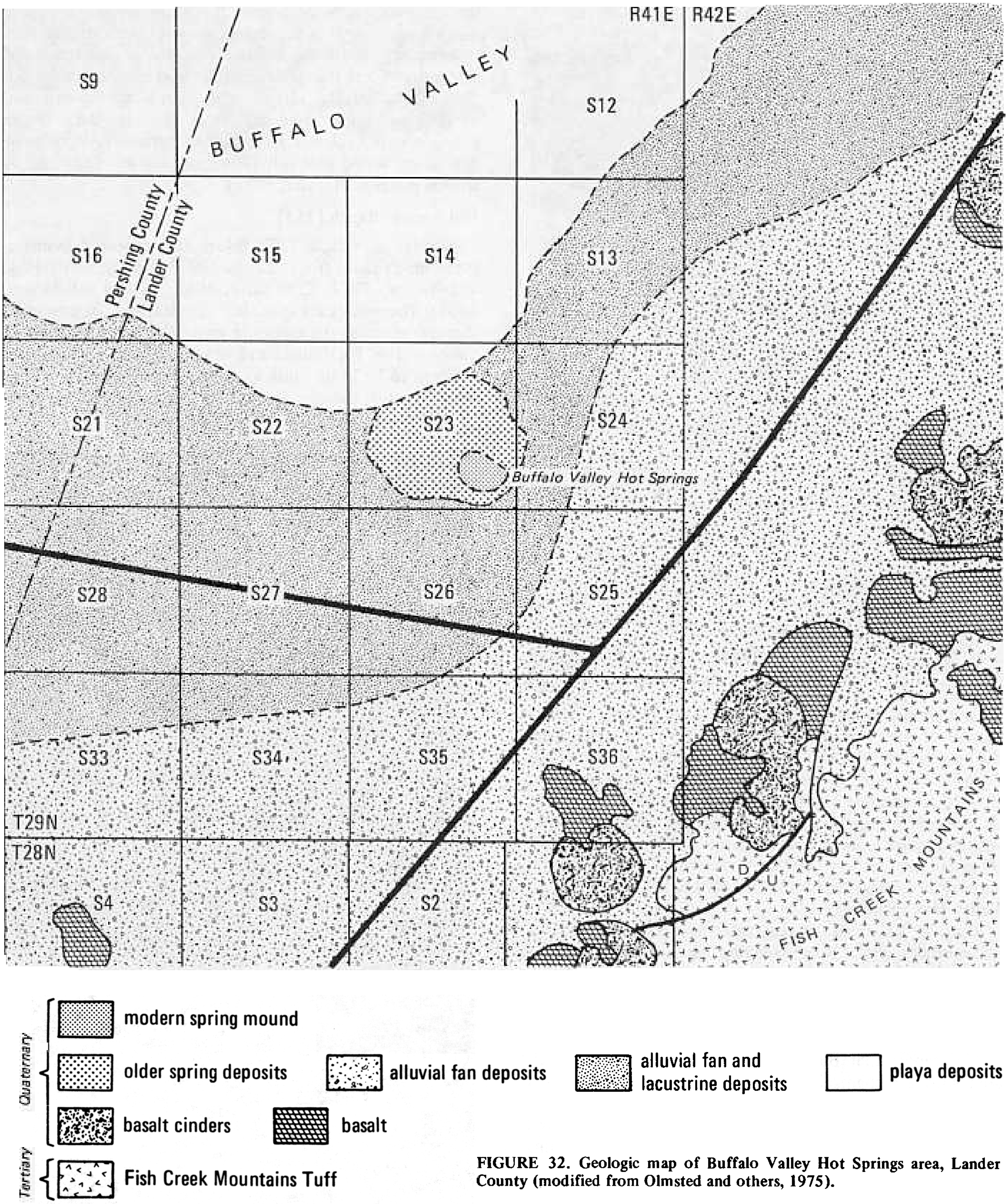

FIGURE 32. Geologic map of Buffalo Valley Hot Springs area, Lander County (modified from Olmsted and others, 1975).

to 174°F (Olmsted and others, 1975) mainly from 11 springs over an area of 3 acres (Waring, 1919). The estimated thermal reservoir temperature using the silica geothermometer is 257°F (Mariner and others, 1974). Thermal ground water is present over an area of approximately 2 square miles (fig. 31), with temperatures up to 193°F encountered in shallow test holes (Olmsted and others, 1975). Heat-flow studies in Buffalo Valley indicate that the heat flow is near normal for this area of Nevada (2–3 HFU) and rises to greater than 50 HFU near the springs (Sass and others, 1976; Wollenberg and others, 1975; Olmsted and others, 1975). Hot springs are also present in S6,T29N,R41E (Wollenberg and others, 1977).

The Buffalo Valley Hot Springs are a subcircular group

LANDER COUNTY (continued)

of numerous springs of low flow. They emerge from a mound of marly material which is a few feet higher than the surrounding flat (fig. 32). A few of the hottest springs deposit travertine, but many are too cool or have too low a flow to accumulate any deposits (Hose and Taylor, 1974). A modern spring mound of about 40 acres is located within approximately 400 acres of older spring deposits (Olmsted and others, 1975). Wollenberg (1974b) reports anomalous radioactivity (30 to 38 μR/hr) from Buffalo Valley Hot Springs.

Buffalo Valley is an assymmetrical graben, closed at its southern end. North-trending basin-and-range faults bound the valley on the west at the base of the Tobin Range (Wollenberg and others, 1975). Range-boundary faults are not as conspicuous on the east side of the valley where the hot springs are located. Wollenberg and others (1975) report that Buffalo Valley Hot Springs are associated with a recognizable fault which extends to the north of the springs along the west edge of the Fish Creek Mountains. In addition, Quaternary basalt cinder cones and flows are aligned along the west edge of the Fish Creek Mountains for approximately 12 miles (Wollenberg and others, 1975, fig. 7), suggesting that they were extruded along a basin-and-range fault or fault zone. The age of these basalts is in question. Olmsted and others (1975) cite an age of approximately 3 m.y., from oral communication of E. H. McKee (1974). More recent dating by M. L. Silberman (written communication, 1977) indicates that basalt in NW/4 S31,T29N,R42E can be dated by K-Ar methods at approximately 1.4 m.y. (for 3 samples: 1.24 ± 0.21 m.y., 1.29 ± 0.04 m.y., 1.40 ± 0.14 m.y.). The morphology of the cinder cones also suggests that they are quite young. The younger age is further substantiated by the thin alluvial covering which overlies basalt penetrated in two test holes at depths of less than 100 feet (Olmsted and others, 1975). They suggest a slow rate of deposition along the east side of Buffalo Valley based on the 3 m.y. age date. If the younger date (1.3 m.y.) is assumed correct then rates of deposition would probably be normal for this thickness of alluvial material (Trexler, 1977).

Hot Springs Ranch [153]

Springs in S23,26,T27N,R43E have reported temperatures which range from 122° to 129°F (Waring, 1919; Hose and Taylor, 1974; Crostwaite, 1963; Lamke and Moore, 1965). The waters are quite low in silica, and the estimated thermal reservoir temperature using the silica geothermometer is 198°F (Mariner and others, 1974). The water is believed to be heated due to deep circulation along a fault which passes through the area (Waring, 1919). At least 11 springs are present, and the spring deposits are travertine.