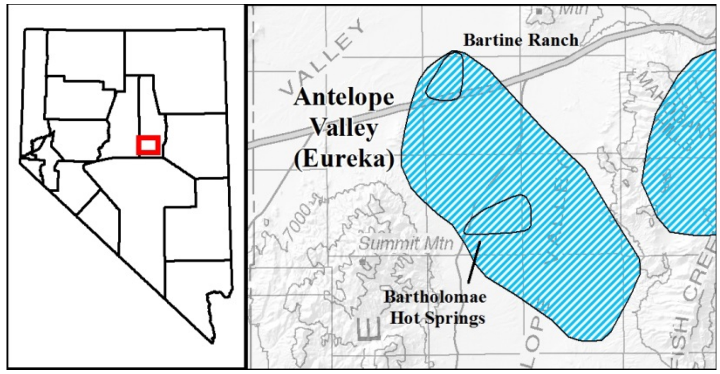
Site Description

Antelope Valley (Eureka)

(updated 2014)



Geologic setting:

Bartine Ranch springs are hosted within the Bartine Member, a resistant, fossiliferous carbonate unit within the McColley Canyon Formation. The Bartine Member is more widespread and persistent than the Kobeh and Coils Creek carbonates near Eureka, Nevada (Murphy and Gronberg, 1970). No Quaternary faults pass through either Bartine Hot Springs or, 18 km south, Bartholomae Hot Springs (Machette et al., 2003), and there is little (apparent) association between the Bartine Member and the Lone Mountain district ~10 km NE of Bartine Hot Springs. Lone Mountain, a tilted Paleozoic carbonate block, was mined for zinc carbonate between 1942 and the 1960's (Tingley and Smith, 1982).

The Mahogany Hills east of Antelope Valley have high thermal gradients, as discussed below. This dolomite and limestone range has limited geologic data apart from paleostratigraphic surveys of chert nodules and fossil material.

Geothermal features:

The large thermal anomaly in Antelope Valley may be connected to hot groundwater in the Mahogany Hills. Anomalous temperatures cover a 30 km east-west expanse between Bartholomae Hot Springs and Mahogany Hills, and an 18 km north-south distance between Bartine Hot Springs and Bartholomae Hot Springs.

Bartine Hot Springs: There are three thermal zones at Bartine Ranch (Sec. 17, T19N, R50E) in north-central Antelope Valley: (1) Bartine Hot Springs 4 km north of the ranch house, (2) warm springs 2 km west-northwest, and (3) a hot artesian well 200-m west.

1. Waring (1965) recorded two Bartine Hot Springs pools at 41 and 42°C, issuing from a "tufa" mound (Sec. 5NE, T19N, R50E). Reed et al. (1983, p. 40, 124) measured Bartine Hot Springs at 44 and 46ºC, with estimated reservoir temperatures of 47 to 130ºC. University of Nevada Reno staff measured the hottest orifice at 47.2°C (Penfield et al., 2011), which may be the 46°C site measured by Reed et al. (1983). The NBMG sample indicated far lower geothermometry than Reed's, though, at 66.1°C (Na-K-Ca; Fournier, 1981) and 52.2°C (chalcedony; Fournier, 1981).
2. The Bartine Ranch 7.5' topographic quadrangle indicates four warm springs in T19N, R50E Sec. 18NW. None have recorded temperature or chemistry data.
3. Mariner et al. (1983) calculated a 57ºC reservoir temperature for the 46.7ºC artesian well 200-m west of Bartine Ranch (p. 46). Nearby artesian wells have temperatures of 14°C. These cold-water wells probably draw from the same water horizon; their drilling did not affect the hot-water well (Sec. 17E, T19N, R50E).

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Millet AMSPP Company drilled the Fed. 1-33 gradient hole 7 km SW of the Bartine Ranch area (Sec. 35 T19N R49E). The uncorrected gradient measured 52.8 °C/km; total well depth is unknown. The gradient hole dataset is maintained by the Geothermal Laboratory at Southern Methodist University [http://www.smu.edu/geothermal]. In 1993, Mt. Wheeler Power, Inc. proposed drilling a 135-foot well for domestic use (Barton and Purkey, 1993).

Bartholomae Hot Springs / Klobe Hot Springs / Clobe Hot Springs: Thermal features are widely distributed over the southern portion of Antelope Valley near Bartholomae Ranch. The hottest feature, Bartholomae Hot Springs (Sec. 28, Tl8N, R50E), reaches 69°C in surface springs (Fiero, 1968) and 70°C in a 12 m-deep well (Rush and Everett, 1964). Mariner et al. (1974) reported a reservoir temperature of ~73°C (Na-K-Ca geothermometer). Other geothermometry analyses range from 62.6 ± 1.4°C (Na-K-Ca) / 91.9 ± 2.2°C (chalcedony) for the 21°C spring, 64.4 ± 11°C (Na-K-Ca) / 101.4 ± 1.0°C (chalcedony) for the 54°C spring, 38.7°C (Na-K-Ca) / 98.6°C (chalcedony) for the 67°C spring, and 59.5 ± 16°C (Na-K-Ca) / 94.4 ± 2.4°C (chalcedony) for the 69°C spring (Great Basin Groundwater Geochemical Database). About 6 km east of Bartholomae Hot Springs, two Bartholomae Corp. wells have water temperatures of 22 and 23°C (Secs. 18,30, T18N, R51E). Neither well has water chemistry data.

In 1978, AMAX Mineral Exploration drilled three hot gradient holes 11, 13, and 16 km ESE of Bartholomae Hot Springs (Blackwell and Richards, 2010). The first well has an uncorrected temperature gradient of 160°C/km, the second is 155°C/km, and the third, 159°C/km. The AMAX exploration effort continued into Mahogany Hills east of Antelope Valley, where five gradient holes ranged from 152 to 175°C/km.

Leasing information:

In 2009, Allied Nevada Gold Corp staked 2,568 acres of geothermal leases near Bartholomae Hot Springs. The project's progress is unknown (Shevenell et al., 2010).

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