GL02320

ROADLOG - BEOWAWE

Eric Struhsacker

Mileage	Cumulative Mileage	
0.0.	0.0.	Town of Battle Mountain
6.1	6.1	The highway crosses the valley of the Reese River, a southern tributary to the Humboldt River. The Sheep Creek Range, composed of Miocene lava flows capping Paleozoic rocks (Stewart and McKee, 1977), lies to the left, north of the Humboldt River (Figure 1 Struhsacker, this volume). The Argenta Rim, the northern end of the Shoshone Range comprises the skyline ahead and to the right. The Argenta Rim is a cuesta composed of Miocene pyroxene dacite and basaltic andesite flows capping Tertiary tuffaceous sedimentary rocks and the Ordovician Valmy and Devonian Slaven Formations. The Argenta Mine produces barite from the Paleozoic formations.
7.5	13.6	Milchem Barite Plant
4.0	17.6	Dunphy Pass. The gap in the cuesta (Figure 1) to the right marks the location of a major north-northwest-trending normal fault that controlled the distribution of Miocene lava flows and has influenced hydrothermal activity in the Beowawe area up to the present. The Miocene flows dip gently to the southeast above tuffaceous sedimentary rocks exposed at the base of the scarp slope.
9.7	27.3	Beowawe Rest Area Stop 1. Discussion of the Beowawe Area Geology. The Whirlwind Valley extends to the southwest from the Humboldt River. The Beowawe Geysers lie at the base of the Malpais Rim on the southeast side of the Whirlwind Valley.

2.2	29.5	Exit to the south at the Crescent Valley interchange.
4.6	34.1	A hot spring at the Horseshoe Ranch lies on the Malpais Fault trend (see Table in Struhsacker, this volume for fluid geochemistry).
0.7	34.8	Humboldt River.
0.4	35.2	Town of Beowawe; iron oxides deposited by hydrothermal solutions circulating in the Malpais Fault and cross-cutting faults have discolored the siliceous siltstone, quartzite, and pebble conglomerate of the Valmy Formation in the slopes to the right. The Malpais Fault traverses the base of the hill to the right.
0.6	35.8	The mine dumps to the right to mark the location of the Red Devil Mine. Roberts and others (1967) describe the mine. Intermittant operations between 1918 and 1943 produced approximately 150 flasks of mercury. The workings penetrate a zone of silicified fault breccia in quartzite, siliceous siltstone, and pebble conglomerate. The ore mineral, cinnabar, occurs with pyrite in the breccia as veinlets and fracture or cavity coatings. Pyroxene dacite and basaltic andesite flows cap the hills west of the mine and form the dip slope of Malpais scarp (Figure 2 Struhsacker, this volume). The Crescent Valley lies to the south. The prominent Cortez Mountains form the southeast margin of the valley. The range is composed of lower Paleozoic siliceous and carbonaceous sedimentary rocks and Mesozoic volcanics with Jurassic granitic plutons (Muffler, 1964). The Dry Hills, in the middle distance on the left are similar in composition. The hot springs of Hot Springs Point lie at the southwest end of the Dry Hills on trend with the Dunphy Pass Fault.
1.2	37.0	Turn right on the gravel road at the sign for Beowawe Geysers. Climb the dip slope of Malpais Rim.

1.6	38.6	Crest of the Malpais Rim.
1.5	40.1	Bedded barite deposit of probable diagenetic origin in the Valmy Formation.
3.4	43.5	Park at the entrance to an unimproved dirt road. Walk 0.5 miles south to the mouth of White Canyon.

Stop 2. White Canyon

Examine hydrothermal alteration at the intersection of the Malpais and Dunphy Pass Faults. See text for detailed description.

NOTE: Sturdy shoes needed for this stop; rock is sharp and loose.

Return to gravel road.

0.6	44.1	Northeast edge of the Quaternary sinter deposit; Magma Batz wellsite lies to the left at the base of the sinter terrace.
0.6	44.7	Wellhead (Sierra Pacific #4) with hot springs and geysers just to the north side of the road.

Continue right at the fork in the road; proceed to wellhead enclosed by fence.

1.5	46.	Stop 3. Chevron-ATR Ginn 1-13.

Chevron Resources Company and American Thermal Resources, Inc., drilled the Ginn 1-13 well in 1974 to a depth of 9563 feet with the objective of expanding the known productive area by intersecting the Malpais Fault or the Roberts Mountain Thrust at depth (Figure 3 Struhsacker, this volume). The well penetrated 4550 feet of Tertiary lava flows and tuffaceous sedimentary rocks before entering the Valmy Formation (Figure 5 Struhsacker, this volume). Numerous diabase dikes, probably related to the Tertiary flows, cut the Valmy Formation. Iovenitti and Lane (1979) maintain that the hole bottomed within the Malpais Fault zone as evidenced by a drill core bearing open fractures in quartzite. They also report that drill stem testing and temperature surveys indicate the presence of commercial temperatures and flow rates.

Chevron drilled the Rossi 21-19 in 1976 to a depth of 5686 feet. They attempted to intersect the Malpais Fault at a shallow depth (Iovenitti and Lane, 1979). The well did not encounter commercial flow rates though temperatures resembled those of the Ginn well. They deepened this hole in 1979 to 7215 feet. The Rossi well encountered a sratigraphic section similar to that in the Ginn well. The hole probably crossed faults subsidiary to the Malpais Fault within the first 5500 feet.

Return to sinter terrace.

1.5 47.7 Stop 4. Beowawe Geysers.

NOTE: Water emanating from wells is not toxic but does contain abundant silica which will precipitate on eyeglasses. Stay out of spray and/or remove glasses.

NOTE: The sinter terrace contains old well debris, very hot water, live steam vents, and mud pots. Rocks are often slippery, and some areas of the sinter are hollow. USE EXTREME CARE!

The surface expression of the Beowawe geothermal system is a 2 sq. km (0.75 sq mi.) sinter apron with two clusters of hot springs fumaroles, and weakly active geysers (Figure 1). Recent hot spring activity along a mapped fault bounding the Malpais Rim has produced a narrow, .8 km (0.5 mi.) long sinter terrace.

Several hot springs boil at 95°C (Rinehart, 1968). Various chemical geothermometers indicate reservoir temperatures ranging from 200°C to 250°C (Muffler, 1978).

The western end of the terrace supports numerous fumaroles, some reputed to be depositing sulfer (Iovenitti and Lane, 1979). Small mudpots occur on the eastern end of the terrace.

The vigorous geothermal activity prompted 950s for a resource amenable to an electrical power generation. Magma Power Co., Vulcan Thermal Power Co., and Sierra Pacific Power Co., drilled a total of 12 shallow wells between 1959 and 1965 (Garside, 1974; Figure 3). Several of these wells tapped fluid in excess of 200oC at depths of less than 300 m (1000 feet) directly below the terrace. Two wells drilled for the Sierra Pacific Power Co., test potential in the fractures on the crest of the Malpais Rim. These wells all appear to have been designed to test the reservoir potential of the Malpais fault zone beneath the sinter terrace. This work, however, did not result in commercial energy production.

The three best wells on the sinter terrace produced mass flows of approximately 1.5 million pounds each (Oesterling, 1962). Their combined power potential was probably 30-50 megawatts (Iovenitti and Lane, 1979). Magma Energy, Inc. drilled the 1829 m (6000 ft) Batz No. 1 well at the base of the sinter terrace in 1975 (Zoback, 1979). Temperature and flow rates were reported to be not commercial.

Iovenitti and Lane (1979) report that vandals dynamited several wellheads producing large artificial geysers in August, 1972. Reduction of the borehole gauge by silica precipitation and the release of reservoir pressures may account for the gradual decline in flow rates observed through 1979. Chevron's observation well, 33-17, on the terrace drilled in October 1979 and their new production well drilled in 1980 have apparently diverted all flow from the blowing wells.

Since 1973 Chevron Resources Company has been actively involved in Beowawe geothermal exploration. Chevron has aggressively tested the prospect with geophysical methods. Thermal gradient holes, dipole-dipole resistivity, and self-potential surveys appear to have been the most effective methods for delineating the resource. Chevron has been drilling an exploratory well during the past winter and spring. This well tests a structural intersection at the west end of the geyser terrace and will extend to a total depth of 4000 feet.

End of trip - Return to highway.