

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

June 4, 1943

RUST RANCH (Report regarding chances for thermal well water).

Owner: Mrs. Herbert Thomson, 731 Ashurst Street, Palo Alto, California;
Mr. Miller, tenant.

Location: SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 31, T. 20 S., R. 46 E.; W $\frac{1}{2}$ NE $\frac{1}{4}$ sec. 6, T. 21 S.,
R. 46 E.; NW $\frac{1}{4}$ sec. 6, T. 21 S., R. 46 E. Malheur Co.

History: Mrs. Thomson called F. W. Libbey by phone in April, 1943, requesting that the State Department of Geology and Mineral Industries advise her whether or not a well drilled on lots 1 and 2, NW $\frac{1}{4}$ sec. 6, T. 21 S., R. 46 E. would strike hot water. The property was visited May 25, 1943 by W. D. Lowry. Mr. Miller, tenant, stated that Mrs. Thomson planned to move a small house on to the ranch and that if assurance of obtaining hot water could be obtained, she desired to drill a well. Apparently she thought that as there is a hot spring on the extreme southeast corner of Mitchell Butte, about one mile away, she might obtain similar water on her ranch.

Geology: Rust Ranch is on the west bank of the Owyhee River immediately north of Mitchell Butte, (figure 1). The property for the most part is on Recent alluvium deposited by the Owyhee River.

Mitchell Butte is made up mainly of tuffaceous sandstones and conglomerates which are commonly massively bedded. They are probably of late Miocene - Pliocene age and may belong to the Payette formation. Basalt, probably ^{Owyhee} ~~Stevens~~ of Miocene age, crops out on the lower northwest slopes at the irrigation canal level, and stratigraphically underlies the sedimentary beds.

The sedimentary beds on Mitchell Butte strike northwest and dip ~~to~~ as much as 10° northeasterly. Mitchell Butte represents the northeast side of a domal anticline which strikes northwest and has its crest in the vicinity of Deer Butte.

The hot spring at the extreme southeast side of Mitchell Butte emits steaming hot water and a strong sulfur odor. A sample of the encrustation on the pebbly conglomerate at the spring is mainly geyselite though more than 5 percent fluorite is present.

The spring is in a fracture zone, 6 feet wide, with the joints spaced from a few inches to several feet apart. The fractures strike N. 45° W. and dip 80° S. The south side has moved relatively downward. No other spring was known or seen on or around the butte though a number of springs occur in this region.

The south side of Mitchell Butte is a fault scarp and slumping effects were noted. A north-striking zone of fractures which dip steeply to the east are shown on the northeast side of the butte along the road. These fractures appear to represent the broken crest of an anticline that trends north. Dips of beds to the west of this zone of fractures are several degrees to the west; those to the east, several degrees to the east. This north-trending anticline may be a crosswarp in a general northwest-southeast structural alignment.

As shown by the massively bedded pebbly conglomerates that form the surface of the butte, no large displacements have taken place. The hot spring is at the best developed fracture zone. The fracturing is less well developed northward toward the Rust Ranch.

Sedimentary beds of a character similar to those on the butte crop out on the east bank of the Owyhee River. The continuity of their exposures is broken by patches of later basin sediments. The lower elevation of the beds on that side plus the zone of fractures along the road on the west side suggest that the rocks on the east may have been faulted down.

Conclusions and Suggestions: A. M. Piper of the U. S. Geological Survey, Water Supply Division, in a personal communication states that the hot springs of the Harney Basin and also of the region herein concerned

are situated on or along faults. He states further that wells in this region that have a considerable capacity from depths measured in the hundreds of feet are almost invariably thermal.

Mr. Miller, tenant, states that the well on the ranch has flowed since the Owyhee Reservoir canal above and west of the ranch has been built.

The structure of the rocks underlying the recent alluvium at the Rust Ranch is unknown. Possibly the north trending fracture zone paralleling the road at the northeast side of the butte may be extended this far northward.

No assurance can be given that a well drilled on this property will strike thermal water. The fact that the well at the ranch is flowing suggests that if a well be drilled, it will have to be cased at least part of the way.

There is a possibility that a thermal well might be had by drilling, yet there is uncertainty and it should be realized that money spent in drilling would be in the nature of a gamble.

Report by: W. D. Lowry