

Geologic Report

New York Canyon Property, Pershing and Churchill Counties, Nevada

Introduction

The geologic mapping forming the basis for this report was undertaken to define and characterize the recent geothermal activity in and around the New York Canyon Property. The Property was mapped by the author during the period, June 12-20, 1980. The base map was prepared from a 2 $\frac{1}{2}$ X enlargement of the Fencemaker, Buffalo Mtn., and Dixie Hot Marsh U.S.G.S. 15' Quadrangles. In addition to the use of standard field techniques, a short aerial reconnaissance flight was made to facilitate in the location of fault scarps and zones of alteration.

The Property, consisting of three separate parcels totalling 37 sections, is located in T25,26N;R35,36E of Pershing and Churchill Counties, Nevada. The parcels are distributed along the alluvial fans bordering the west side of the Stillwater Range. Access to the Property is by paved and graded roads leading from I-80, 5 miles north of Lovelock, to the Buena Vista Valley. Numerous dirt roads lead east from the Buena Vista Valley road to most parts of the Property. The Property has a maximum relief of 3000 feet and is covered by sage and sparse grass with pinyon pine and juniper forests above 6000 feet elevation.

Background material for this study was taken from Nevada Bureau of Mines and Geology Bulletin No. 83 by R. Willden and R. C. Speed and Bulletin No. 89 by M. G. Johnson. Rock unit names and symbols were adopted for this study from the above references, but lithologic descriptions of the rock units are based on hand-lens examination by the author.

Regional Geologic Setting

The New York Canyon Property is bounded on the east by the Stillwater Range which is typically complex, north-south trending range of the Basin and Range Province. Much of the Range consists of folded and thrust-faulted Triassic and Jurassic carbonate, clastic and volcanic rocks intruded by

Jurassic and Cretaceous gabbros and monzonites. Relatively flat-lying Tertiary basalts cover much of this Mesozoic sedimentary-intrusive complex. Steeply dipping, north-south trending normal faulting with displacement of several thousand vertical feet has produced the present high relief and extensive alluvial fans along the range front.

Description of Map Units

Grass Valley and Osobb Formation

This unit, which outcrops at the entrance to Fencemaker Canyon, may be divided into two members in the map area. The lower unit consists of a light brown, fine-grained argillaceous sandstone which is coarsely laminated and fissile. The upper member is a light pinkish gray, fine-grained, well-sorted quartz sandstone with very minor interstitial clay.

Auld Lange Syne Formation

This unit outcrops along the eastern margin of the Property and contains much of the economically important mineralization in the area. It consists of massive, dark gray, fine-grained limestone interbedded with siltstone and argillites. It contains extensive quartz veining along bedding planes near its contact with the quartz monzonite of New York Canyon.

Jurassic Volcanic Rocks

This unit, which outcrops at the south end of the Property, consists of medium to light gray microcrystalline to aphanitic basalt. The unit is primarily non-vesicular and weathers to small angular shards.

Boyer Ranch Formation

This Jurassic clastic unit outcrops at Red Hill in the northern lease parcel. It consists of a brown to buff, well sorted, fine-grained massive sandstone with minor calcareous cement. Outcrops break into large angular

blocks.

Jurassic Gabbro

This unit outcrops along the east-central margin of the Property. It contains 60% black ophitic pyroxene and 40% white subhedral to euhedral plagioclase imbedded in the pyroxene. Grain size varies from 3-10mm with occasional very coarse lamprophyre of the same composition. Andesite and aplite dikes cut the gabbro at a number of exposures.

Quartz Monzonite of New York Canyon

This Cretaceous Quartz Monzonite outcrops south of New York Canyon where it intrudes the Auld Lange Syne Group. It consists of hypidiomorphic, equigranular, medium-grained leucocratic quartz monzonite with auxillary muscovite. The unit is massive and forms large blocky outcrops on steep slopes. The intrusion of the monzonite is apparently the cause of low grade metamorphism and quartz veining found in the intruded phyllites and argillites of the Auld Lange Syne Group.

Tertiary Sedimentary Rock

This unit, which outcrops along the western range front, consists of well-bedded white to light brown water-deposited tuffs, tuffaceous sandstone and siltstone. The unit is of very low density, friable and weakly indurated. It is directly overlain by Quaternary-Tertiary Basalts.

Quaternary-Tertiary Basalts

This unit covers much of the Stillwater Range along the eastern margin of the Property. It consists of up to 2000 feet of basalt flows with occasional breccia layers. The basalt is dark gray, fine-grained holocrystalline to aphanitic and varies from non-vesicular to highly vesicular often within the same flow. Euhedral colorless plagioclase laths and anhedral black pyroxene

make up the bulk of the crystalline flows. The unit weathers to a dark red-brown and forms smooth scree slopes interrupted outcrops of more resistant beds.

Quaternary Alluvium

Quaternary Alluvium forms extensive coalescing alluvial fans radiating from the mouths of major canyons along the west side of the Stillwater Range and is the predominant rock type found in the New York Canyon Property. The unit consists of angular to subangular sedimentary volcanic and intrusive clasts derived from outcrops of the Stillwater Range immediately to the east. Clast size varies from 70%-80% cobbles and boulders near range front to 70%-80% silt sand and gravel along the western margin of the Property. The subaerial slope of the fans varies from 5° in the east to nearly flat-lying in the west. The fans are cut by several north-south trending fault scarps with offsets of up to 15m'. Above the fault scarps the fans are usually dissected to broad, rounded ridges with relief of 10-20m'.

Recent Structure and Geothermal Activity

Recent structure in the Property is dominated by normal faulting, steeply dipping to the west along the western margin of the Stillwater Range. Large vertical movement along this fault system is evidenced by several hundred to several thousand feet of displacement of the Mesozoic-Tertiary stratigraphic column. Along the axis of the Stillwater Range the Mesozoic-Tertiary sequence reaches an elevation of 7000 feet, while three miles to the west the section is displaced downward approximately 3000 feet and probably considerably more toward the center of Buena Vista Valley. Fault scarps in the Quaternary alluvial fans give evidence of recent movement along the range front system. These scarps consist of topographic offsets of 5-15 meters which are highly linear and cross-cut present drainage. Up to three parallel scarps may be found trending N-NW within 3 miles of the range front.

Geothermal activity on and near the Property is demonstrated by hydrothermal alteration zones and high heat flow in close proximity to the recent

range front faulting.

A 200-300 foot wide hydrothermal altered zone extends along the range front for approximately one mile northeast and southwest from the mouth of New York Canyon. The alteration zone occurs in rocks of both the Auld Lange Syne Group and the New York Canyon Quartz Monzonite. In the sedimentary unit the alteration is manifested by extensive and sometimes complete kaolinization of the country rock, deposition of platy and massive siliceous sinter consisting of chalcedony and opalite with cinnabar inclusions and pockets and stringers of elemental sulfur. The quartz monzonite is altered by complete kaolinization of the feldspars, producing a white incompetent and friable rock. The zone forms a low, discontinuous ridge crosscutting at right angles the general slope of the range front. A highly altered outcrop of Jurassic Gabbro at the southwest end of Red Hill indicates that the altered zone may extend under the alluvium for an additional two miles from its northeasternmost outcrop.

Heat flow measurements of 7.2H.F.U. at Station 12, 4.4H.F.U. at Station 21 and 3.0H.F.U. at the Buena Vista Windmill indicate anomalously high heat flow along the range front fault system. These relatively high heat flow measurements, coupled with occurrences of siliceous, elemental, sulfur-bearing sinters indicate moderate to high-temperature geothermal activity along the range front fault system included in the New York Canyon Property.

References

Johnson, Maureen G., Geology and Mineral Deposits of Pershing County, Nevada, Bulletin No. 89, Nevada Bureau of Mines and Geology, 1977.

Willden, Ronald and Robert C. Speed, Geology and Mineral Deposits of Churchill County, Nevada, Bulletin No. 83, Nevada Bureau of Mines and Geology, 1974.

tectonic activity has resulted in the displacement of the Shoshone Mountains and development of the present topography.

References

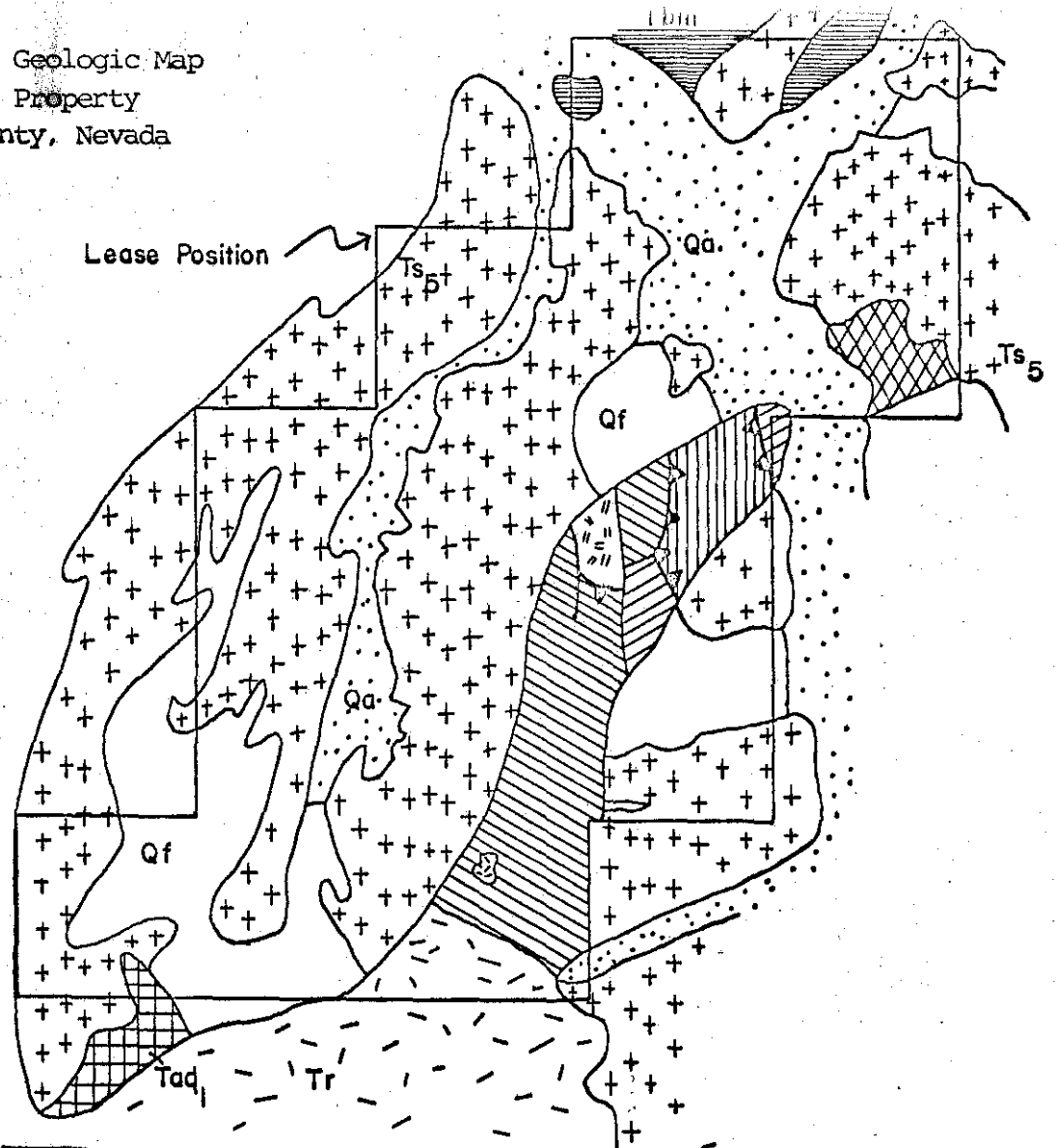
Stewart, J., et. al., Geology and Mineral Deposits of Lander County, Nevada, Bulletin 88, Nevada Bureau of Mines and Geology, 1977.

Stewart, J. and J. Carlson. Geologic Map of North-Central Nevada.

Preliminary Geologic Map
 Shoshone Property
 Lander County, Nevada



SCALE 1:62,500



<u>Holocene</u>		Valley alluvium & stream deposits		Valmy Formation		
				Alluvial fan deposits		Carbonate transitional assemblage
<u>Miocene</u>		Tuffaceous sed. rocks, some non-welded ash flow tuff & air fall tuff				
					Rhyolitic intrusive rocks	
					Bates Mountain tuff	
<u>Oligocene</u>		Andesite to dacite extrusive and intrusive rocks				
<u>Permian-Pennsylvanian</u>		Havallah Formation - shale, sandstone, siltstone				
		Pumpnickel Formation - chert, siltstone, above Golconda thrust fault				
		Antler sequence - conglomerate, sandstone, shale, limestone, below Golconda thrust fault				