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COMSTOCK-SILVER CITY EXCURSION
1956

309
ITEM 223

COMSTOCK-SILVER CITY EXCURSION. March 29, 1956.

Leaving the State building in Reno, we proceed south on Virginia Street and Highway 395 southward through the Truckee Meadows. The Carson Range is seen to the west (right) and the Virginia Range to the east (left). Shortly we pass the Hufaker Hills in the central part of the valley with the drainage passing east of them in Steamboat Creek, which flows north between these hills and the Carson Range. In the Carson Range (to right) will be seen Mount Rose, the highest peak (10,800 ft.) in the region and Slide Mountain lies immediately to the south.

Mileage 9.1. Junction of Highway 395 and State Highway 17. Steamboat Springs ahead. To the southeast (left) on Highway 17 across the valley and ascend the Virginia Range by the Geiger Grade.

- 1.1 — 10.2--To the left 1/2 mile a rhyolitic dome can be seen rising above the alluvial fan.
- 2.0 — 11.1--To the left at the foot of the mountains, is a small area of granodiorite (Jurassic) covered by a growth of Pinyon pine. Many spheroidally-weathered boulders differentiate the granodiorite from the overlying Alta andesite (Oligocene) and the Kate Peak andesite (Mio-Pliocene). Here the highway ascends the Geiger Grade through many curves giving good views of the Truckee Meadows and also across the valley to the Carson Range, which forms the eastern front of the Sierra Nevada. Note the deeply weathered, and multi-colored Alta andesite. The vegetation consists mostly of pinyon juniper, and sagebrush. On the altered areas, where there is no soil, Yellow Pine (*Pinus jeffreyi*) grows to the exclusion of most other vegetation.
- 3.6 — 12.7--Here the Kate Peak andesite is faulted down to the west against the highly altered Alta andesite.
- 4.9 — 14.0--Geiger Lookout. A stop will be made to view various geological features, including the alteration of the andesite.
- 7.2 — 16.3--The old Geiger Grade can be seen in the deep canyon to the right. This road was built shortly after the discovery of the Comstock Lode. The present highway was constructed during the 1930's.
- 7.4 — 16.5--The highway leaves the canyon and crosses an old erosion surface probably formed during the Pliocene. Here we have a striking contrast with the youthful topography over which we have just passed.
- 9.5 — 18.6--Summit of Geiger Grade. The drainage to the west enters Steamboat Creek flowing northward through the Truckee Meadows and joins the Truckee River before it enters the canyon through the Virginia Range. Northward, and eastward the drainage is down Long Valley Creek to enter the Truckee River Canyon.

Remnants of the old erosion surface with drainage on gentle gradients are seen. The higher hills are commonly of Kate Peak andesite intrusive into the Alta andesite. The Highway passes along one of these intrusions a short distance directly ahead. As this intrusive is passed, a view to the north (left) is down Long Valley with the Flowery Range largely Mio-Pliocene andesites, along its eastern margin. In the distance the Chalk Hills composed of white Truckee sediments which are interbedded with Kate Peak andesite. Numerous fossil leaves have been collected here.

To the left of the Chalk Hills is a practically level-topped plateau underlain by Lousetown andesite which lies upon the tilted and beveled edge of the "Truckee" lake beds.

- 11.4 — 20.5--Divide between Long Valley and Seven Mile Canyon which drains to the Carson River.

The Flowery Range extends northwestward and southeastward, while a ridge of Alta Andesite and intrusive Davidson Diorite trends southward south, to McClellan Peak, overlooking Washoe Valley.

The Comstock Lode trends north-south along the eastern foot of Mount Davidson. In another mile we will come to the north end of the lode.

To the right on the hillside are several dikes of Kate Peak andesite standing conspicuously above the general surface.

- 13.0 — 22.1--The northern part of the Comstock Lode is crossed by the highway. Directly ahead is Virginia City and Mount Davidson. Many of the old mine dumps form conspicuous features of the landscape.

- 13.5 — 22.6--Ophir Ravine. To the right, where this gulch crosses the veins, placer miners discovered the outcroppings of the rich veins of the lode. The discovery was made in June 1859 and started the famous "Washoe Rush".

- 13.8 — 22.9--Virginia City. A stop of twenty minutes will be made. Afterward geological features of the immediate area will be described. The production of the lode amounts to about \$435,000,000 in gold and silver.

Elevation about 6200 feet--about that of Lake Tahoe.

GEOLOGIC FORMATIONS AND HISTORY OF THE COMSTOCK LODGE.

The oldest rocks exposed in the region is a series of sediments overlain by meta-volcanics. These rocks were deformed and then intruded by Jurassic granodiorite and quartz monzonite porphyry. The older rocks are probably of Triassic age, and have a thickness of at least 2,000 feet.

A long period of erosion followed before the Eocene Hartford Hill rhyolite was laid down. Much of this formation is a welded tuff. Thickness about 800 feet.

Above the rhyolite are the Alta volcanics ³⁶⁰⁰
above the rhyolite are the Alta volcanics with a thickness of 3600 feet.
About 800 feet above the base is the Sutrö member ~~1000 feet~~ composed of tuff and sediments and containing an Oligocene flora.

All of the rocks, mentioned above, were tilted, and gently folded, before being intruded by the Davidson diorite and various andesite dikes. The mineralization of the district occurred during, and following, the intrusion of the diorite.

The fault along which the ores were deposited has a down-throw to the east of at least 2000 feet. It may well be much more than that figure.

After a long period of erosion, during which the fault scarp was removed, about 1200 feet of the Kate Peak series of andesites and breccias were extruded. They are intruded by andesitic domes of similar composition which are believed to have been intruded during the same period of volcanism as the flows and breccias.

Still younger is the Knickerbocker basaltic andesite.

The youngest igneous rock in the immediate vicinity is the American Ravine basalt which flowed down a canyon cut in the basin and range scarp that forms the front of the high ridge immediately west of Virginia City. The throw on this fault is about 1500 feet.

Seven miles to the northeast of Virginia the upper part of the Kate Peak volcanics are interbedded with the "Truckee" lake beds. At that place (Chalk Hills) Mio-Pliocene fossil leaves are found.

Near Chalk Hills the "Truckee" is tilted westward, bevelled by erosion, and covered by flows of the Lousetown andesitic basalt.

14.3 — 23.4 — Junction Highway 17 with road to Gold Hill.

Large Glory Hole on right at the base of Mount Davidson. In this excavation a large tonnage of ore was removed from the Comstock Lode. During this operation old mine workings were cut into, and, in places, the footwall of the lode was exposed. We continue on Highway 17 toward Silver City.

15.7 — 24.8 — Turnoff to the Foreman Shaft.

16.3 — 25.4 — Foreman Shaft. Stop for lunch.

46.2 — 55.3--Glacial Moraines or Mud Flows.

Here Ophir Creek descends through the gorge south of Slide Mountain. Its headwaters are in Tahoe Meadows beyond the high ridge and compete with Incline Creek which flows into Lake Tahoe.

49.2 58.3--Washoe City.

Here we cross the outlet where the overflow of Washoe Lake drains through the deep gorge to the left into Pleasant Valley and on to Steamboat Creek.

53.2 62.3--Steamboat Valley.

Geiger Grade may be seen along the mountain side ahead.

54.7 63.8--Steamboat Springs.

From this vantage point an exceptionally good view is had. Practically all of the major formations in the district can be seen as well as the Sierra Nevada to the south.

17.0 — 26.1--Back to Junction with Highway 17.

17.9 — 27.0--Occidental Lode and Sutro member of the Alta andesite.

This vein is two miles east of the Comstock Lode and strikes practically parallel to that vein system. The footwall and hanging wall are composed of Alta andesite. The croppings of the Sutro member is exposed in the gulch to the south (right).

21.1 — 30.2--Gold Canyon below Silver City.

The Dayton mine on the Silver City branch of the Comstock Lode lies directly across the canyon. We detour up Gold Canyon, through Silver City and Devils Gate, to the Hartford Hill mine where the Alta andesite, Hartford Hill rhyolite, old meta-volcanics, and faults along the lode, may be viewed.

23.1 — 32.2--Down Gold Canyon to Highway 17.

From here to Dayton, a distance of about 4 miles, was the scene of placer mining for a period of ten years immediately preceding the discovery of the ore-bearing veins at Gold Hill.

23.5 — 32.6--Crossing of vein along a fault which has downthrown the Alta on the north from Hartford Hill rhyolite on the footwall. The highway turns and follows along the hanging wall of the Silver City vein.

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The highway passes from the hanging wall (Alta andesite) across the vein to the footwall with Hartford Hill rhyolite overlying meta-volcanics. The vein, and the accent fault, crosses the valley (to the left) to the mine workings in the distance. Beyond that place, the vein is not seen.

Junction
26.7 — 35.8--Jogjwau 17 joins U. S. Highway 50.

Traveling southwest we traverse an old valley that apparently was an old drainageway before the Carson River cut its present canyon through the north end of the Pinenut Range (left).

27.5 — 36.6--Mound House gypsite deposits are visible to the right and in the hills beyond are the light-colored dumps from a gypsum mine in the old meta-sediments. These rocks are probably of Triassic age. Crossing a low divide the highway descends into Eagle Valley.

29.6 — 38.7--Highwy crosses a basalt flow that came down from the mountains to the right. The old, partially dissected, vent lies about three miles to the northeast.

29.9 — 39.0 -- To the left, about one half mile distant, is the Carson River where it turns to the east and enters its gorge through the Pinennt Mountains.

A short distance before entering Carson City, a recent fault 30 to 35 feet in height is seen to the right.

34.2 — 43.3 -- Junction U. S. 50 with U. S. Highway 395 in Carson City.

Turn left into town.

34.5 — 43.6 -- Stop for 20 minutes in Carson City.

Beautiful gold specimens may be seen at the Nugget Cafe. The old U. S. Mint is the gray stone building on the west side of the street.

35.5 — 44.6 -- North on Highway 395 at Junction with Highway 50.

38.5 — 47.6 -- Lakeview Summit.

Ahead may be seen Slide Mountain in the Carson Range and to the right is Washoe Lake in the southeastern corner of Washoe Valley. At the summit is the crossing, in an inverted syphon, of the water supply for Virginia City. The water is taken from Marlette Lake (Elevation 8200 feet) in the Carson Range above Lake Tahoe, through 40 miles of flume and pipe to the Comstock. The syphon is under a 1700 foot head of water.

40.9 — 50.0 -- Stop. In Washoe Valley on curve in Highway 395.

From here is a good view of Slide Mountain, Washoe Valley, and Washoe Lake. The annual precipitation in the south west corner of the valley averages over 30 inches. On the east side of the valley it is about 8 inches. Washoe Lake is here tilted southeasterly and washes against the foot of the Virginia Range. A gold-bearing Tertiary channel trends easterly from near Marlette Peak, overlooking Lake Tahoe, across Washoe Valley and into the Virginia Range beyond. The channel is cut by a series of north-south faults to that of the channel in Wahoe Valley is 3500 feet lower than that portion at Marlette Peak 7 miles to the west.

A north-south fault, along which there has been Recent movement, bounds the valley to the west, and another parallel fault lies along Little Valley beyond the first ridge to the west (left).

44.5 — 53.6 -- Franktown (Flying Me Ranch)

Franktown Creek, draining Little Valley, enters Washoe Valley through a deep and rugged gorge. Recent fault scarps (left) are conspicuous along the foot of the mountains from here to Bowers Mansion.

45.5 — 54.6 -- Bowers Mansion.

Granite is exposed in the footwall of a Recent fault where hot water issues from fractures in the rock.

STEAMBOAT SPRINGS

General relations: The springs emerge at northeast end of ENE-trending Steamboat Hills, up-faulted and up-warped in late Tertiary and early Quaternary time. On ridge south and west of springs, granodiorite overlain by pediment gravels, in turn overlain by late Pliocene or early Pleistocene basalt flow. A little hot spring sinter is earlier than basalt, much is early or middle Pleistocene; hot spring activity probably continuous since Sherwin glacial stage--sinter of High Terrace contemporaneous with probable Sherwin outwash.

Springs: Average discharge only about 50 gpm. Discharge at altitudes of 4667 or lower, 10' or more below crest of terrace (except for occasional geyser near crest). Deposit mud containing up to 1/3 oz. Au and 1 1/4 oz Ag per ton, 0.02% Hg, and 4% Sb. Individual springs change greatly in activity with time; discharge up to 25 gpm; some geysers have erupted to 25'.

Total discharge of system: Natural springs, 50 gpm; erupting wells 300 gpm; subsurface escape into Steamboat Creek 350 gpm (determined by chloride in inventory). Total, 700 gpm.

Temperatures: Up to boiling in springs (94°C); t's increase with depth to about 350', 170°C. Five drill holes to greater depths and different structural circumstances encountered no significantly higher t's.

Isotopes: Stable isotopes and tritium prove water is dominantly meteoric, almost certainly no more than 5 to 10 percent volcanic.

Circulation: Meteoric water circulates to great depths (believed to be in order of 2 miles), is heated, and mixes with some volcanic steam. Mixing temp. of 700 gpm believed a little above 170°C. The hot water rises because of low density, probably with little loss of temperature until boiling occurs near surface with loss in pressure.

Heat flow: 700 gpm x 160 cal/gm (heat content above mean annual temp.) is 7×10^6 cal/sec. from 5 sq. km. of main thermal area. Equivalent to "normal" for 500 sq. km., or 120 x "normal".

Volcanic source demanded: Assuming magma will supply 175 cal/gm on crystallizing and cooling from 900°C to 500°C (heat of fusion 75 cal/gm; heat capacity 1/4 cal/gm/°C), Steamboat requires 1.6×10^6 met. tons magma per year; 50 km³ or 12 mi³ in 100,000 years.

First Stop: Main Terrace. See flowing springs, fissure system. Latter are surface expression of minor faults in granitic bedrock, with total vertical displacement of bedrock surface not exceeding 50 ft. Faults and veins dip to east but may be in hanging wall of deeper west-dipping reverse fault. Open fissures have grown by acid attack and disintegration of walls of fractures, not by separation of walls.

GS-5 drill hole to be erupted (stand to leeward and to west about 100 ft. from hole for best pictures).

Drilled 575', maximum temp. 172°C. 0-84', sinter; 84-135', altered sand and gravel cemented by chalcedony and adularia; 135-154', altered Kate Peak lava; 154 to bottom, altered granodiorite except for dikes 465-546' and numerous quartz-chalcedony-calcite veins.

Second stop; Silica Pit, 1 1/2 mile walk to west, not accessible by bus. Spectacular alteration of basalt flow, pre-basalt gravels, and granodiorite to white rocks of very similar appearance and chemical composition. Acid-sulfate alteration caused by oxidation of H_2S rising above water table, which is here about 110' below surface.

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16.5--The highway leaves the canyon and crosses an old erosion surface probably formed during the Pliocene. Here we have a striking contrast with the youthful topography over which we have just passed.

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22.6--Ophir Ravine. To the right, where this gulch crosses the veins, placer miners discovered the outcroppings of the rich veins of the lode. The discovery was made in June 1859 and started the famous "Washoe Rush".

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24.8--Turnoff to the Foreman Shaft.

25.4--Foreman Shaft. Stop for lunch.

From this vantage point an exceptionally good view is had. Practically all of the major formations in the district can be seen as well as the Sierra Nevada to the south.

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27.0--Occidental Lode and Sutro member of the Alta andesite.

This vein is two miles east of the Comstock Lode and strikes practically parallel to that vein system. The footwall and hanging wall are composed of Alta andesite. The croppings of the Sutro member is exposed in the gulch to the south (right).

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38.7--Highway crosses a basalt flow that came down from the mountains to the right. The old, partially dissected, vent lies about three miles to the northeast.

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44.6--North on Highway 395 at Junction with Highway 50.

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50.0--Stop. In Washoe Valley on curve in Highway 395.

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Franktown Creek, draining Little Valley, enters Washoe Valley through a deep and rugged gorge. Recent fault scarps (left) are conspicuous along the foot of the mountains from here to Bowers Mansion.

54.6--Bowers Mansion.

Granite is exposed in the footwall of a Recent fault where hot water issues from fractures in the rock.

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Geiger Grade may be seen along the mountain side ahead.

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