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THE HUDSON CINNABAR PROSPECT, TOLOVANA DISTRICT, ALASKA

The occurrence of cinnabar near Livengood in the Tolovana District has been known for a number of years. Placer cinnabar is found in considerable quantities in Olive Creek and in smaller amounts in Ruth and Lillian Creeks. All of these creeks head in the same area. One lode occurrence - the Hudson Cinnabar Prospect - was discovered and opened up in 1917. Both surface and underground prospecting were done and about a flask of mercury is reported to have been produced.

In 1940 and 1941, Fred Crane of Livengood reopened the old Hudson Tunnel and drove a second adit known as the Crane Tunnel. Some surface prospecting was also done. On May 13 - 14, 1941, the writer and R. D. Ohrenschall examined and sampled the Hudson Tunnel. On October 7, after the Crane Tunnel had been driven, a second examination was made by the writer and Eskil Anderson.

PREVIOUS INVESTIGATIONS

Irving Reed examined the Hudson Prospect in 1931, but no sampling was done. His report is filed in the Juneau Office of the Territorial Department of Mines. Previously the occurrence of cinnabar in this district was noted by J. B. Mertie, Jr., in U.S. Geological Survey Bull. 662, as well as by earlier writers cited in Mertie's and Reed's reports.

LOCATION

The Hudson Prospect is about two miles south of Livengood, near the head of the West Fork of Olive Creek. Olive Creek is a small, south-flowing tributary of the Tolovana River. The road connecting Fairbanks and Livengood crosses Olive Creek about a half mile below the prospect. A cat road, traversible by autos during dry weather, leads from the highway to within a few hundred feet of the Hudson Tunnel.

DEVELOPMENT WORK

Before the Hudson Tunnel was driven, surface prospecting was done on the east and middle forks of Olive Creek, as well as on the west fork, and a tunnel was driven into the hill on the west side of the east fork, about a half mile from the present prospect. This tunnel is now caved, but the showings were apparently not promising.

The accessible underground work at the Hudson Prospect is shown in the accompanying map. Not accessible are an 85 foot tunnel running northeast from the main Hudson Tunnel

about 110 feet from the portal, and a winze in the west crosscut near the main tunnel. A total of 415 feet of tunnels, crosscuts and raises was accessible in October, 1941. All work had been done by hand, but costs were not excessive because of the soft nature of the rock. It was found necessary, however, to lag tightly all walls and roofs.

GEOLOGY

In the vicinity of upper Olive Creek, according to Mertie, are Middle Devonian rocks consisting of sandstone, chert, argillite, and slate. The cinnabar and at least part of the gold mineralization are believed to be derived from small intrusions of soda rhyolite porphyry and related granitic rocks of Tertiary age that outcrop at the head of Olive, Lillian, and Ruth Creeks.

In the Hudson Tunnel the cinnabar-bearing rock is a light-colored decomposed quartz feldspar porphyry that was probably originally similar to the rhyolite porphyry described by Mertie. The rock contains crushed white feldspar phenocrysts up to a quarter inch, in a light gray to white ground mass of quartz, talc and clay minerals. Few dark minerals occur in the main mass of the rock; near the contact, however, there is considerable biotite and the rock assumes the appearance of a fine-grained biotite granite. Many iron-stained streaks in the porphyry are caused by oxidation of arsenopyrite-bearing quartz veins, which also carry some gold.

Toward the face of the tunnel and in the crosscut, this rock is intruded as an irregular, low-angle dike into a well indurated argillite with incipient slaty cleavage. The argillite is also altered by weathering and to a lesser extent by the intrusion of the dike. A smaller dike, apparently connected with the main dike is exposed in the incline. The relations are shown in Section A - B - C on the accompanying map. Toward the portal the contact of the intrusion is not exposed; it is believed, however, to be irregular in outline.

The Crane Tunnel is driven into rock which was probably originally similar to the porphyry in the Hudson Tunnel, but which is more completely decomposed. When examined, the tunnel was lagged nearly to the face, but where the rock could be observed it consisted of soft light gray clay, talc and fine quartz. Some ferruginous seams were also observed. This rock may be part of a larger igneous mass from which the Hudson Tunnel dikes are

derived, or it may be another dike. No contacts were visible, consequently its form could not be determined.

Cinnabar occurs sparsely disseminated through the dike in the Hudson Tunnel, but only occasionally could any be seen in place. A number of stringers containing arsenopyrite, pyrite and some gold were encountered; these apparently represent a mineralization distinct from the cinnabar. Most of the stringers have been altered to limonite. In the Crane Tunnel several gold-bearing arsenopyrite stringers were crossed, but apparently there was no visible cinnabar.

According to Reed's report, previously cited, the light colored porphyry in the Hudson Tunnel was heavily impregnated with cinnabar, which was evenly distributed through the rock in small specks and grains. Since only very minute amounts of cinnabar were seen during the present examination, it is likely that the tunnel was driven on a small segregation or stockwork of more or less high-grade ore that has been completely removed by prospecting.

Whether or not other high-grade pockets of ore are present at greater depth cannot be determined with certainty without actual prospecting; however, the distribution of placer cinnabar in Olive Creek may offer indirect evidence as to its lode occurrence. The placers richest in cinnabar are about three-quarters of a mile below the Hudson Prospect, where hard, rounded pieces up to an inch in diameter have been found, as well as finer pieces. Further upstream the gravel becomes progressively leaner and the cinnabar is generally finer. In an opencut about 300 yards below the Hudson Prospect cinnabar was still fairly plentiful but few large pieces were seen. Above this opencut small specks of cinnabar may be panned from the slide and silt overburden clear up to the prospect.

It is evident that at least part of the cinnabar originated in or near the Hudson Tunnel. Since the richest placers are at a considerable distance downstream and since they become progressively leaner upstream, it may be postulated that the larger and richer portions of the lode have long since been eroded and the deposit has become leaner with depth. According to this view, and taking into account the usual shallow nature of cinnabar deposits, it is unlikely that more ore will be found at greater depths in the Hudson Prospect. Although it cannot be considered as conclusive proof, the lack of cinnabar in the Crane Tunnel bears out this hypothesis.

It is also possible that some of the cinnabar further down on Olive Creek is derived from a separate source - possibly downstream from the Hudson Prospect. The overburden is thicker here and no lode prospecting has been done. If any fairly large, high-grade lodes exist above the Hudson Prospect, the float would probably have been found by surface prospecting, as the overburden is relatively shallow.

SAMPLING

Because cinnabar is commonly spotted in occurrence, relatively large samples were taken. From 20 to 100 pounds were cut from each channel; the samples were then reduced by quartering on canvas to about 10 pounds each. In the Hudson Tunnel it was necessary to cut away the old lagging in order to obtain complete channel samples. In the Crane Tunnel, which was newly lagged and where no good prospects were known to have been found, channel samples were taken only from the face.

The results of sampling are shown in the following tables and on the accompanying map. Unless otherwise noted, the samples were taken from channels cut in the walls and roof.

HUDSON TUNNEL

Sample Number	Mercury Percent	Gold Ounces per ton	Silver Ounces per ton	Weight of Sample-lbs	Remarks
1	0.03	0.02	nil	20	from walls and roof at face
2	0.02	0.38	trace	40	
2 A	0.10	trace	nil	20	check on 2
3	0.06	trace	nil	40	
3 A	nil	trace	nil	20	check on 3
4 A	0.01	0.04	nil	30	from NW wall of incline
4 B	trace	trace	nil	30	from SW wall of incline
5 A	0.01	0.02	nil	5	from 4" iron-stained seam, NW wall of incline
5 B	trace	trace	nil	40	from SE wall of incline
6	trace	trace	nil	5	Grab sample, S wall of crosscut, near footwall of dike
7	trace	trace	nil	5	Same as 6, from N wall of crosscut
8	0.05	nil	nil	100	from S wall of crosscut
9	nil	trace	nil	5	grab sample, S wall of crosscut
10	nil	trace	nil	30	from W wall of tunnel
11	0.01	trace	nil	30	from W wall of tunnel
12	trace	nil	nil	10	grab sample from W wall of tunnel near roof
13	0.08	trace	1.78	20	from top of E wall; contained visible cinnabar
14	0.02	trace	trace	10	grab sample from W wall near roof
15	trace	0.02	trace	10	from slide in W wall near floor
		CRANE TUNNEL			
16	trace	nil	trace	10	from W wall at face
17	trace	nil	trace	10	from E wall at face
18	----	0.12	nil	2	from 3/4" arsenopyrite stringer

Analyses by A. E. Glover, Assayer, Territorial Department of Mines, College, Alaska

CONCLUSIONS

According to the analyses, no workable cinnabar ore is at present in sight in the Hudson Prospect. In view of the progressive decrease in tenor of the placer cinnabar toward the head of Olive Creek it is considered probable that the higher grade parts of the Hudson Prospect have been removed by erosion and that the deposit will become leaner at greater depths.

It is also considered likely that since a fair amount of surface prospecting has been done in the upper part of Olive Creek valley, with results that were not encouraging, the chances of finding a workable cinnabar lode in this area are not good.

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