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For Mr. B. D. Stewart,

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Alaska.

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TIEKEL

DISTRICT.

by

Pilgrim

For map file #17
See map file
B.D.S.

Mineral Resources of the Teikel Province.

The purpose of this report is to describe briefly the geology, mineral association, and distribution of the gold bearing veins found in that section commonly known as the Teikel District. The Teikel District receives its name from the Teikel River, the largest stream draining from this area, and a tributary of Copper River.

This district was visited by the writer in August 1931. An examination was made of mineral prospects especially the gold-bearing veins which have been opened up. Little attempt was made for a detailed study of stratigraphy or aerial geology. A few salient features were noted in the vicinity of the properties examined and are incorporated in this report.

Geography.

The Teikel district lies to the east and northeast of and adjoining the Valdez district. It lies wholly within the Chugach Mountains and is a region of strong relief. The higher ridges maintain an elevation of over 6,000 feet. The valleys are cut deeply through for over 4,000 feet to their present drainage elevations. The valley where the Tsina and Kanata rivers join to form the Teikel River shows a relief of 5,000 feet between it and the adjoining mountains.

It is an area of very recent glaciation and there remain a few small isolated valley glaciers at the heads of small alpine streams. Most of the smaller valleys end in cirques, and also exhibit the characteristic cirque hanging valleys bordering the main valleys where small branches of the glaciers were abandoned..

The principal drainages of the region flow to the north and east. Tonsina River receives its waters from Tonsina Lake which is an accumulation from a number of short streams entering from the west, south, and north; none of which are over 6 miles

in length. Quartz Creek which joins the Tonsina River a short distance below the lake is about 10 miles in length. Tonsina Lake lies in the northwest portion of the area here described. It is about 7 miles in length, in a north and south direction and 1½ miles east and west midway of its length. Tonsina River flows in a northeasternly direction for about 24 miles then turns to the southeast for 12 miles to its junction with the Copper River. Bernard Creek,14 miles, and Mosquito Creek 17 miles in length, both flowing northernly, join Tonsina River. Willow and Trout creeks are the largest tributaries entering the Tonsina River from the north. In the southern section of the region Teikel River is the largest stream. It receives its impetus from the confluence of the Kanata river from the north and the Tsina River from the south forming the Teikel which flows in an easternly direction for 15 miles to its junction with the Copper River.

Climate.

The region is peculiarly situated, being on the border between the Coastel North Temperate Zone and the Interior Continental Zone. It therefore posesses a climate somewhat between the two as represented by Valdez on the Coast and Copper Center in the Interior. Teikel Roadhouse is situated 34 miles northeast from Valdez and 46 miles south from Copper Center. Tables of weather conditions from the above stations are here listed:

Precipitation: Monthly, annual, and average amounts (in inches)

Valdez.

Year	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910	6.78	3.08	3.47	0.79	4.43	2.68	2.60	2.94	8.09	6.73	1.47	3.00
1911	2.81	7.43	5.98	4.52	2.72	2.46	2.81	1.07	2.52	3.75	3.00	9.27
1912	3.04	4.97	10.97	0.71	5.45	1.23	5.10	7.05	18.74	5.99	2.47	9.14
1913	4.00	8.63	1.43	2.62	1.78	0.64	4.38	6.20	6.95	4.66	6.20	8.03
1914	0.41	3.34	2.85	3.93	1.38	4.08	2.79	3.96	4.31	3.05	3.11	3.82
1915	4.29	2.63	3.08	9.65	0.62	1.65	1.16	4.44	5.22	3.73	4.08	4.42
1916	0.68	5.33	0.90	2.36	5.90	2.48	0.88	11.39	11.20	12.85	3.33	3.91
1917	5.27	3.49	1.56	0.41	1.32	1.24	4.54	8.15	10.88	5.83	4.58	0.14
1918	5.12	1.99	1.65	7.54	1.50	1.24	1.39	5.98	14.20	4.41	4.49	8.22
1919	3.37	1.48	0.77	2.35	2.30	1.63	1.71	5.45	7.14	4.46	1.87	6.59
1920	6.29	11.82	1.82	0.50	0.36	2.43	3.65	7.58	3.02	7.68	4.50	3.70

Year	Jan	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annul
1921	4.91	6.02	3.[illegible]	3.00	1.62	1.92	4.79	2.76	5.89	6.87	1.67	7.90	
1922	5.14	0.76	1.64	5.84	1.68	0.81	5.44	----	1.23	9.34	7.12	1.42	
1923	3.39	5.37	2.53	[illegible].75	0.33	2.25	3.25	2.00	18.60	13.[illegible]	0.01	2.77	
1924	8.10	5.47	9.95	---	----	0.08	2.87	4.89	9.32	8.99	6.48	2.59	
1925	1.10	1.34										7.87	
1926	10.86	2.36	12.89	---	1.44					11.49	4.29	6.41	
1927						3.29	3.28	9.88	7.85	4.81	1.30	3.54	
1928	6.39	14.24			2.43	3.47	4.75	9.27	14.74	9.57	11.16	16.66	
1929	4.11	10.69	7.07	3.87	4.01	1.54	3.89	4.07	12.70	15.01	13.38	3.05	
1930	1.32	3.73	13.55	8.93	5.05	1.41	5.77	5.91	10.41	4.15	13.17	7.61	
1931	8.07	6.79	4.15	1.39	3.88	2.66	6.66	3.42	4.81				

Copper Center.

1903		0.05	0.40	T	0.60	1.38	0.99	1.16	1.34	1.71	0.20	0.75	9.32
1904	0.67	0.22	0.02	0.24	0.92	1.11	1.80	2.09	0.73	0.48	0.36	0.68	9.32
1905	0.29	1.01	0.20	T	0.48	0.50	1.35	0.72	1.94	0.97	0.94	0.97	9.37
1906	1.14	0.19	0.69	0.36	0.43	1.19	2.14	0.69	0.37	0.84	0.99	0.35	9.38
1907	----	0.60	0.30	0.00	0.36	1.14	0.97	0.71	0.25	1.35	0.30	0.35	
1908	0.45	0.25	0.05	0.10	0.13	0.27	1.83	0.65	0.78	1.15	0.10	0.70	6.46
1909	0.70				0.88	0.72	3.43		0.52	0.40	0.20	0.60	
1910	1.25	0.33	0.21	0.00	----	0.48	1.66	0.85	1.02	0.31	0.50	0.30	
1911	0.10	1.73	0.19	0.06	0.18	0.20	1.12	2.72	1.85	0.74	0.65	----	
1912	0.20	0.24	0.11	0.00	0.16	1.60	0.56	0.82	3.79	0.65	----	----	
1913	0.83	0.27	----	----	0.15	0.89	1.30	0.99	1.46	0.25	2.35	----	
1914	0.10	0.68	0.44	0.35							2.05	1.20	
1915									2.50		0.20		
1918			0.28	1.23	0.07								
1919										0.55			
Means	0.57	0.51	0.26	0.21	0.40	0.86	1.56	1.10	1.32	0.93	0.82	0.61	9.15

Teikel.

1904			0.05	0.75	0.40	0.79	1.53	2.00	1.21	2.82	0.90	2.95	
1905	0.98	0.49	0.13	0.04	T	0.80	1.05	1.02	1.41	1.48	4.90	2.34	14.64
1906	2.50	0.20	1.87	0.58	0.25	1.39	2.70	0.72	0.62	2.90	3.52	0.36	17.61
1907	0.37	1.81	0.56	0.07	0.80	0.68	0.82	2.00	1.20				
Means	1.28	0.83	0.65	0.36	0.36	0.92	1.52	1.44	1.11	2.40	3.11	1.88	15.86

Monthly, annual, and seasonal snowfall:
Copper Center.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1902								0	2.0	13.0	15.0	2.0	
1903		0.5	4.0	T.	0.	0	0	0	0.0	15.2	3.0	14.5	
1904	8.2	4.5	0.2	1.5	0	0	0	0	1.0	3.2	4.2	9.6	32.4
1905	4.0	2.5	2.0	T	0	0	0	0	T	13.2	2.8	15.9	40.4
1906	17.2	2.8	9.2	3.0	T.	0	0	0	0	4.3	8.5	6.0	51.5
1907		6.0	3.0	0	0	0	0	0	0	11.5	8.0	3.5	
1908	4.5	2.5	0.5	1.0	0	0	0	0	T	12.0	1.0	7.0	28.5
1909	7.0								5.2	4.0	2.0	6.0	
1910	9.0	4.0	2.8	---	0	0	0	0	0	8.8	---	5.0	
1911	2.0	3.0	1.0	T	0	0	0	0	0	0	8.0		
1912		4.0	1.3	0	0.5	0	0	0	0	2.0			
1913	8.0	4.0								3.0	14.0		
1914	1.0	8.0	5.0	3.5	0	0	0	0	0	20.5	12.0		
1915	4.0												
1916											4.5	8.2	
1919										7.0	9.5		
Means	6.5	3.8	2.9	1.0	T	0	0	0	0.7	7.5	7.8	8.2	38.4

Year	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Ann/
1916						0	0	0	0	0.8	45.2	71.0	
1917	99.5	29.1	7.5	4.0	0	0	0	0	0		45.0	1.5	
1918	85.0	27.8	33.7	114.6	0	0	0	0	0	1.0	32.6	68.5	363.2
1919	54.5	35.5	16.6	5.5	3.0	0	0	0	0	3.8	13.0	88.5	225.4
1920	49.0	132.7	39.0	7.0	0	0	0	0	0	9.2	28.5	64.7	320.1
1921	66.7	59.2	31.2	3.0	2.0	0	0	0	0	4.8	0.8	80.0	247.7
1922	87.5	14.2	20.0	26.5	0	0	0	0	T.	4.5	50.0	2225	225.5
1923	59.2	62.5	44.5	T.	0	0	0	0	T	3.0	23.0	64.0	261.2
1924	115.3	65.0	87.0	---	---	0	0	0	1.0	---	21.0	40.5	329.8
1925	29.0	28.0	---	---	---	0	0	0	---	---	71.0	79.2	
1926	22.1	25.3	71.2	---	0	0	0	0	0	T	---	566.7	
1927	---	---	---	---	---	0	0	0	T	25.0	18.0	45.0	
1928	114.3	174.5	----	---	0	0	0	0	2.0	15.2	63.5	150.7	
1929	42.7	123.4	84.5	31.0	4.0	0	0	0	0	15.7	50.0	13.6	364.9
1930	16.0	48.0	117.1	22.9	11.5	0	0	0	0	22.2	110.3	79.3	437.3
1931	68.0	34.1	43.7	10.5	1.5	0	0	0	5.5				
Means	64.9	61.4	45.0	22.5	1.9	0	0	0	0.5	8.7	41.8	62.3	309.3

Teikel.

1904 to 1907 Average monthly and annual snowfall:

Mean	13.2	9.3	11.4	3.2	T	T	0	0	1.1	9.5	21.0	18.9	87.6

Monthly and annual mean temperature average for number of years:

Copper Center.

1902 to 1921	-11.5	3.8	12.7	28.8	44.8	54.0	56.3	53.5	42.8	27.4	5.1	-4.4	26.1

Valdez.

1909 to 1931	20.2	21.1	25.0	33.5	40.3	49.7	53.1	51.8	45.7	37.6	25.3	20.9	35.4

Vegetation.

Spruce is the principal tree found in the district with cottonwood and birch in lesser quantities all occupying the lower valleys below 2,000 feet elevation. Around Tonsina Lake however, spruce sufficiently large for mining purposes or for cabin logs are found at elevations as high as 2,600 feet. Willows and alder are plentiful to elevations of over 4,000 feet. The alder is a good fuel for heating and cooking even if burned green. Grasses for grazing horses are available during the months of July and August along the creek valleys to elevations of over 4,000 feet.

Animal Life.

Mountain goats, and bears (grizzly) inhabit the district. Moose are reported along the lower lakes. Caribou do not range in the reg-

gion regularly but at times are known to pay short visits. Grouse and ptarmigan are found during most seasons in abundance. Trout and grayling, and late in the summer, salmon are found in all clear streams. The lakes have large numbers of a large light colored trout.

Transportation.

Travel to this region is by the Valdez- Copper Center- Chitina section of the Richardson Highway. The section from Chitina to Copper Center and to Teikel Roadhouse is open from June 1 to November 1 and possibly later some seasons and could be easily kept open for automobiles considerably later in the fall if desired. The section from Valdez to Teikel Roadhouse is open for automobile travel about a month less, opening in the Spring somewhat later and closing earlier in the Fall. If sufficient traffic were obtainable both roads could be kept open much longer and probably during the full year. Travel by horses and dog sleds is possible during the winter months from Valdez.

Both freight and passenger service is available in winter and summer from Valdez, Copper Center, and Chitina by aeroplane to points within this region wherever a suitable landing field is available. A small lake was noted about ½ mile southwest from Mike Knowles' cabin on one of the upper forks of Stewart Creek, on which a small plane could probably land in winter or summer. A lake at the head of Boulder Creek might also be used for that purpose. Tonsina Lake of course is available at all times. Other landing places could undoubtedly be constructed along numerous long flat ridges but such available ridges are by no means plentiful.

Teikel Roadhouse is situated on the Richardson Highway 52 miles from Valdez and 80 miles from Copper Center. It is the only stopping place in the region close to the gold prospects. A weather station is maintained at this roadhouse and telephoned to Valdez and Copper Center for aeroplane transportation. Valdez is the principal town and shipping port serving the Teikel section. It posesses a

bank, Hotels, restaurants, mercantile stores, and garages.

Valdez is a regular port of call for the larger freight and passenger ships from Seattle and Coastel towns. It is also the terminus for automobile freight and passenger stages between Valdez and Fairbanks during summer months over the Richardson Highway.

Geology.

The Teikel district covered by this report lies wholly within an area of metamorphosed sedimentary rocks. The district has not been covered by any of the government reports. Contact with the area has been made on the south and east however by previous surveys. The rocks of the Valdez district are found continuing north and east into the Teikel section, and the description given by Johnson[a] of these rocks, with reference to the Port Valdez district, fully applies to the rocks of the Teikel district. He states " The geologic section as now understood appears comparatively simple and consists of slate, greenstone, conglomerate, graywacke, and argillite deposited in the order named. The Sawmill Bay area, although closely folded and faulted, was found to offer the best clue to the stratigraphic succession in this district,--------- North of this area, however, the rocks have undergone greater dynamic metamorphism and present an intricately folded complex which so far as the present field work shows, includes slightly altered as well as schistose types of all members of the stratigraphic succession named above.---- Less deformed beds occur, however in the extreme northeastern part of the district, in the valley occupied by Valdez Glacier."

Sedimentary Rocks.

Johnson states " The pre-Quaternary rocks are almost entirely of regionally metamorphosed types. The variety of sedimentary rocks is not great. Four lithologic subdivisions may be made--(1) black slates, (2) greenstones, (3) conglomerates, (4) graywackes and argillites. The stratigraphic sequence is apparantly that in which they are

a Johnson, Bertrand L., The gold and Copper deposites of the Port Valdez District: U. S. Geol. Survey Bull. 622, pp. 140-188, 1914.

mentioned here. Other metamorphic varieties are found which have resulted from the regional metamorphism of these units. Rocks altered by the contact metamorphism produced by granitic intrusions also occur within the district but cover only small areas."

Black Slates, Greenstones, and Green Schists.

The black slates and greenstones are, it is believed by the writer, not present in this area and therefore will not be described. They occur in the Valdez section in the lower portion of the series and in the Teikel district only the rocks contained in the upper portion of the series were noted.

Conglomerate.

The conglomerate is described by Johnson " The small area covered by the conglomerate in this district is not a clue to the stratigraphic significence of the formation, whose existence and situation are indicative of a pronounced change in conditions--- a transition from the period of volcanic activity in which the basic lava flows occurred to the period of sedimentary deposition in which the thick graywacke and argillite series was laid down.---------

In the type locality the texture of the conglomerate varies markedly. Near the greenstone contact there are many large boulders, but farther away the pebbles are much smaller. They are mainly angular to subangular in shape; few are well rounded. The pebbles consist of greenstones, graywacke, argillite, and slate. The matrix is usually a dark- gray fine to medium grained graywacke material closely resembling in appearance the overlying graywackes"

Graywackes and Argellites.

" This graywacke and argillite series covers a much larger area then any of the other sedimentary rock groups of the Port Valdez district. Its rocks grade from the conglomeratic graywackes at the bottom through gray to dark-gray coarse-grained graywackes containing feldspathic material, small slate fragments, and pebbles of older rocks of similar nature, to the darker, finer grained argillites. The graywackes are the predominant members of the series. In places there

are alternating beds of characteristic dark argillites and equally distinct graywacke; the individual beds being but a few inches thick. The contrasting colors of the argillites and graywackes in these occurrences give, at a little distance, a distinctly banded or ribbon-like appearance to the rock. Elsewhere the graywackes are in massive beds several hundred feet thick, with only an occasional thin bed of the argillite. The graywackes are composed of subangular fragments of quartz and plagioclase felspar, comparatively little decomposed and a few grains of epidote, in a carbonaceous, calcareous, and argillaceous matrix. Small fragments of earlier graywackes and cherts are found in these graywackes."

Quaternary Deposites.

" The quaternary deposites are the youngest sediments of the district. They consist of unconsolidated material resting unconformably on the glaciated surfaces of the metamorphic rocks and include glacial deposites, fluvioglacial deposites, the sands and gravels of the present non glacial streams, lake deposites, beach deposites, talus cones and fans, and landslide material."

Intrusive Igneous Rocks.

Differing from the Port Valdez district, igneous rocks are quite plentiful, occurring as small stocks and dikes cutting the graywackes and argillites. They appear to be closely associated with the gold bearing veins areally and probably have an important connection with the mineralization of these veins. They are found close to the quartz veins, light colored acidic, ranging in composition from granite porphyry, to rhyolite porphyry and hornblend seyenite. They are generally light colored, containing considerable quartz and hornblende. They occur as small dikes of considerable length and a thickness of only a few feet, and as sheets lying along the bedding of the sediments. One dike noted on Myrtle Creek is considerably older than all others examined. It shows a slight schistocity which distinguishes it from other dikes in the vicinity.

Mineral Resources.

A number of gold bearing veins have been found within the region and considerable effort expended towards their development. A very small production has resulted from these efforts. Most of the ores are base, that is the gold or a considerable portion it is contained in the sulphides of arsenopyrite, galena and pyrite and is only freed by smelting or by cyanide. This prevents the use of a simple amalgamation process for the recovery of gold from any but the surface croppings of the veins. and has undoubtedly helped to prevent the early development of prospects which have been held for a number of years.

Veins and Prospects.

The Hurtle Creek Gold Mining Co.

The Hurtle Creek Gold Mining Co is holding 11 claims on the west fork of Hurtle Creek, consisting of the Quail Discovery, Quail No. 1 and No.2, Gem No. 1, No. 2, No.3, White Metal No. 1, No. 2, No. 3 and Jim No. 1 and No. 2, all situated in one group. The property is situated on the east side of the west fork of Hurtle Creek about 2 miles above its junction with the East Fork and about 3½ miles southeast from the end of Tonsina Lake,. The property is reached by a pack trail which leaves the Richardson Highway at about mile 55¼ at an elevation of about 1,400 feet, following along up the mountainside for about 4½ miles to a pass between the east fork of Hurtle Creek and the head of Quartz Creek at an elevation of 4,450 feet, and then cuts down into and follows along the East Fork downstream for about 2 miles, then across the ridge between it and the West Fork and up the latter for about 1½ miles to the camp at an elevation of 3,660 feet. The trail is solid and suitable for packing. A road could be constructed following the same general route but would involve a considerable expenditure and would necessarily have some heavy grades. Another route is to leave the first trail at a point about 4 miles from the highway and travel along the mountainside more westernly, passing through Black Canyon to the head of the East Fork and again resuming the

first trail. This route is considerably lower; the highest point reached being about 3,94[illegible] feet in elevation. A trail might be constructed by this route suitable for caterpillar or horse sled but would also involve considerable expense. An easy grade to this property over which any freight could be hauled in winter, is by way of Tonsina River and Tonsina Lake. This trail would be about 20½ miles in length from the junction of Mosquito Creek with Tonsina River at mile 75 on the Richardson Highway.

At least 7 veins have been found on this property, a description of which follows. On the Quail Discovery Claim 2 veins have been uncovered on the hillside south of the camp and at an elevation of about 3,781 feet. They are parallel, striking N. 4° W. The westernly vein dips 52° E., in a cut at the surface. This cut exposes the vein for about 80 feet along the outcrop, while a second cut shows 30 feet to the south. The vein shows from 0 to 18 inches of white crystalline quartz containing considerable free gold at several places. Sulphides were not observed in the vein or ore from these surface cuts, but cavities remaining in the oxidized quartz indicate the former presence of sulphides.

About 20 feet east from No. 1 vein the second vein outcrops parallel to and at about the same elevation. The dip of this vein was difficult to determine from a number of cuts along the outcrop for a distance of 175 feet, but it appears about the same as the first vein, 52° E. The width of this vein varies from 0 on the north end of the cuts to 18 inches along the middle and 0 on the south end. The quartz is white, crystalline, crumbly, and considerably oxidized. A number of samples taken from piles of ore along these cuts assayed as follows:

Sample from ore pile		Gold Oz.	Silver Oz.
½ ton near north end of	Vein No.1	0.54	2.00
1 ton 21 feet south	Vein No. 1	0.08	0.80
1½ tons 21feet south	Vein No. 1	0.34	0.20

	Gold Oz.	Silver Oz.
4 tons [illegible] feet south along side of shallow shaft Vein No. 1	2.76	[illegible]
Grab sample from 1 ton and 5 ton piles Vein No. 2	1.60	1.30

At elevation of 3,740 feet a tunnel has been driven in to intersect the two veins below the surface cuts. At a distance of 90 feet the first vein is intersected striking N. 15° W. and dipping vertical. The vein here varies between 3 and 16 inches in width of white quartz containing a considerable amount of arsenopyrite, galena, and pyrite. The vein is free on both walls with small amounts of gouge on each. The wallrock is a greenish gray graywacke showing some schist cleavage, striking N. 74° W. and dipping 47° S. A sample taken from this veinacross an average of 12 inches assayed, gold 1.96 oz., silver 0.70 oz. per ton.

Beyond the above vein 31 feet in the tunnel a small well defined fissure shows striking N. 4° W. and dipping 65° E. This fissure shows from 1 to 2 inches of white quartz. No sulphides were noted in this quartz. It is not certain if this is the No. 2 vein or a different vein altogether. A drift has been driven on this stringer for 38 feet to the south without any appreciable change occurring in its general appearance. The tunnel has been driven ahead for about 10 feet or to a total length of 131 feet, without encountering any other evidence of another vein.

A light colored dike of hornblend seyenite outcrops 280 feet north of the above tunnel. It is several feet in width and strikes about S.80° E. parallelling the cleavage of the graywacke. The graywacke is a hard dark-gray variety showing a slight schistocity.

South from the tunnel about 3,000 feet and on the White Metal Claim, a vein shows in a surface cut at 4,145 feet elevation striking in a north and south direction. This vein is about 32 inches wide, in the cut, of crumbly white quartz. The vein at this point is said to assay $ 12.00 in gold. No other openings have been made on this vein. A few hundred feet south from the above cut is another dike

35 feet in width striking east and west. This granodiorite dike is exposed for over a hundred feet on the hillside. There is little overburden along this side of the valley above 3,300 feet elevation except at the base of rocky bluffs.

About 300 feet southwest from the above dike is another large light-colored dike. It is older than the two previously described. It is considerably fractured and shows a slight schistose structure. Its composition is similar to the granodiorite described above. It strikes southeasternly.

Lying along the upper wall of the above dike at an elevation of 4,030 feet, is a quartz vein over 12 inches in width. The quartz is white, crystalline; and shows no evidence of a sulphide mineralization.

Directly below this dike, in a small gulch, another quartz vei vein over 24 inches wide outcrops at an elevation of 3,980 feet. This vein strikes N. 35° W. dipping steeply to the north. A few specks of pyrite were observedin the white quartz. Both walls are dark schisty graywacke. The vein is said to carry some values in gold.

About 175 feet west from the above outcrop another vein outcrops at 3,935 feet elevation on the Quail No. 3 Claim. This vein has a strike of N. 18° W. and a dip of 70° N. and is from 12 to 18 inches in width. The quartz is crystalline, white, and shows a slight amount of sulphides. The vein is uncovered for about 75 feet by a shallow trench. The vein is said to pan a small amount of free gold.

About 375 feet northwest from the latter exposure and at an elevation of 3,774 feet another vein of white crystalline quartz containing some sulphides outcrops in a small watercourse. The quartz varies from 6 to 12 inches in width. The vein strikes N. 10° W. and dips steeply to the east.

Higher up on the mountain above the claims described, 3 veins are reported as outcropping. They are said to pan free gold.

Several years ago an attempt was made to install a 10 stamp mill on this property and part of the machinery was transported as far as the Teikel Roadhouse. The officers of the Hurtle Creek Gold Mining Company are Edward Wood, president, J. L. Reed, Secretary, and Charles Wetzler, Manager.

Boulder Creek.

A trail commencing at the Teikel Roadhouse leads up the mountain along the south side of Boulder Creek, for 3½ miles, to an elevation of about 2,925 feet, at a point about ½ mile above the junction of the two forks of Boulder Creek where the trail splits. The main trail crosses the East Fork at this point and continues up the West Fork. The other branch follows along the East Fork for 1¼ miles to within ½ mile of its head.

South ~~West~~ Fork.

In 1910 a vein was discovered on the east slope of the valley and some work done which is said to have uncovered some high grade ore. No work has been done on this vein for several years. A visit was made to the locality by the writer but any workings were caved and inaccessible to examination. A tunnel at elevation of 3,812 said to have been driven in for over 100 feet on the east side of the valley was caved. The tunnel appears to have had a direction of N. 85° E. The wallrock is a slightly schistose graywacke. A grab sample of quartz float below the old tunnel assayed, gold 1.06 oz., silver 0.60 oz. per ton. The quartz is coarsely crystalline, white, and contains visible sulphides.

West ~~East~~ Fork.

In 1911 the Eaglerock Lode was located by H. E. Ellis on the east slope of the West Fork. The property is about 3½ miles from Teikel Roadhouse. In 1918 the property was leased and about $ 2,000. recovered from ore milled in a small arrastre driven by water power. Later the property was worked by Ellis and associates and several thousand dollars recovered. No work has been done on the property

for several years.

On the slope above the camp at an elevation of 3,300 feet a tunnel has been driven in a direction of S. 13° W. for 93 feet. At a point 45 feet in a small vein, of white quartz, 6 inches in width showing no sulphides, with a strike of N. 9° E. and dip of 45° E., shows for some distance along the tunnel to where it intersects a second vein crossing the tunnel 69 feet in. The outer end is cut off by a fault. The cross vein has a strike of N. 83° W. and a dip of 85° S. A drift has followed this cross vein for 48 feet to the east. The vein shows a width of from 12 to 24 inches of iron-stained crystalline quartz containing considerable graywacke breccia. Samples taken across the vein in this drift assayed, gold 0.66 oz., silver 0.40 oz., and gold 0.24 oz., silver 0.10 oz per ton. The first sample was 24 inches in width at the face of the tunnel, while the second was 24 inches in width and 25 feet back from the face.

In the last 10½ feet of the tunnel a series of quartz veinlets and stringers show cutting across in an east-west direction. No sulphides were noted in this quartz. The wallrock is a platy graywacke with a tendency towards slatyness. The cleavage of the wallrock strikes N. 75° E. and dips 60° S. A sample of these stringers in the tunnel across a width of 10½ feet assayed, gold 0.08 oz., silver 0.10 oz. per ton.

150 feet east of this tunnel another vein outcrops on the steep mountainside. This vein strikes N.7° W. dips 79° E. and averages about 8 feet in width of iron-stained quartz. The walls are platy graywacke. The vein shows for over 200 feet outcropping along the slope diminishing in width until finally it does not show quartz at all.

Cutting across the valley in a direction of slightly east of south a quartz diorite porphyry dike shows for over a mile. It crosses the valley about 150 feet south of the small frame house. It outcrops at a number of places along the slope and along the cliffs to the south. It varies in width from about 15 feet to over 30 feet. It dips about 60° E.

On the ridge above the tunnel a cut at elevation of 4,053 feet

shows a vein striking N. 76° E., about 24 inches wide of iron-stained quartz containing some pyrite and galena. A grab sample across the vein in this cut assayed gold 0.14 Oz., silver 0.1[illegible] Oz. per ton.

Directly above the tunnel, at an elevation of 4,031 feet, at the discovery cut of the Eaglerock Lode, a vein is exposed over 36 inches in width which strikes N. 41°E. and dips vertical. The quartz is iron-stained, crystalline containing some pyrite and galena. The walls are platy graywacke. The cleavage of the graywacke strikes N. 75° E and dips 60° S. A sample taken across 28 inches of the vein assayed gold 2.86 oz., silver 1.70 oz. per ton.

A lake, 150 yards in length east and west by 75 yards north and south whose surface is at an elevation of 4,021 feet, lies about 900 feet southwest of the tunnel. About 2 second feet of water was flowing from the lake when visited by the writer, August, 4, 1931. Above this lake at elevations of 4,053 feet, 4,162 feet, and 4,433 feet are three lakes within 1 mile all emptying into the lower one and capable of furnishing a positive supply of water for operating a a small plant.

This property is above timber and all lumber, timbers, and supplies would have to be packed from the Highway, a distance of at least 5½ miles.

Stewart Creek.

A trail from the Ellis camp on the West Fork of Boulder Creek leads up the west side of the creek past the fourth or upper lake which is at the summit of the divide between that stream and a tributary of Stewart Creek. The fourth lake could be diverted into the Stewart Creek side. For over a mile along the valley of this tributary the bedrock is exposed on the valley floor and also on the steep walls. The bedrock is a dark gray slightly schistose graywacke striking N. 70°80° E. and dipping 50°-75° N.

A considerable number of nearly vertical light-colored, granitic dikes show cutting these graywackes in a general north and south direction. They vary in width from 16 inches or smaller to

over 10 feet.

There are two systems of quartz mineralization in this valley, a vein and stringer system following the cleavage of the graywacke and another crossing the graywacke in a general north and south direction paralleling the intrusives.

About ½ mile south of the divide and on the west side of the the valley floor a quartz vein was noted striking N.9° E. and dipping 45° W. This vein showed from 2 to 4 inches of white quartz. The walls are sharp and distinct. The quartz is not frozen to the walls although no gouge is present.

About 700 feet farther down the valley are a number of small par allel veins striking northernly. A small dike 15 inches wide shows along the side of these veins striking N. 13° W. and dipping 80° E. at an elevation of 4,350 feet.

About 200 feet southwest of this dike a vein shows outcropping on the hillside at an elevation of 4,362.feet. This vein shows over 6 feet of white crystalline quartz with no visible sulphides present. This outcrop appears as an isolated body of quartz.

A few feet west from this quartz is a group of stringers of white quartz striking N. 32° E. and dipping 54° E. These stringers vary in width from 1 to 12 inches and cover a width of several feet.

Just a few hundred feet north of the frame house in the same valley and at an elevation of 4,118 feet, a group of stringers of white quartz,containing no sulphide mineralization, outcrop. This mineralization covers a width of over 8 feet. The strike of the stringers is N. 70° E. and dip is 75° N. A section across this outcrop from the northwest to southeast shows as follows: quartz 6 inches graywacke 15 inches, quartz 4 inches, graywacke with a few cross stringers of quartz 24 inches, quartz 4 inches, graywacke 12 inches, quartz 2 inches, graywacke 12 inches, quartz 12 inches.

150 feet west of the camp at elevation of 4,064 feet, a vein from 6 to 14 inches in width, outcrops. This vein strikes N. 17° E. and dips 62° E. Another vein shows about 40 feet east

and just above the creek. This vein is parallel but slightly narrower in width.

About 800 feet northeast from the camp at an elevation of 4,035 feet a vein outcrops which strikes N. 15° E. and dips 59° W. This vein consists of several quartz stringers alternating with graywacke. A section from south to north is as follows: Quartz 3 inches, graywacke 15 inches, quartz 12 inches, graywacke 5 inches, quartz 30 inches. The quartz is white and crystalline showing slight evidence of mineralization. A cut about 6 feet in depth has been made on this outcrop.

About 350 feet southwest from the above cut, at an elevation of 4,616 feet, a vein has been opened by a cut which is in about 8 feet. The vein strikes N.13° E. and dips 82° E. It has a width of about 9 inches of white quartz with regular walls not frozen to the graywacke. A sample taken across 9 inches of this vein assayed gold 0.06 oz., silver 0.30 oz. per ton.

Several of the last described veins are now being held by Mike Knowles. A two story frame house is situated in the valley near the outcrops. A small lake possibly large enough to use as a landing field is situated about ½ mile from the camp. The property is above timber. The best route for freighting is by way of Stewart Creek from the Highway in winter, about 9½ miles.

Tsina River.

At mile 39½ from Valdez on the Richardson Highway, 2 claims are being held by location, the Tsina No. 1 and No. 2. Two veins discovered several years ago which had considerable work done on them were later abandoned and have been recently relocated, by William Holland and Louis L. Townsend.

The property lies across the Highway north of the Tsina River. A tunnel said to be in about 500 feet, in a northeasternly direction, starts at an elevation of 1,383 feet and about 83 feet lower than the highway under which the tunnel crosses. The tunnel

is through gravel for about 60 feet until it encounters the country-rock in place. This outer part of the tunnel was caved and not accessible for examination when visited in August 1931. A raise from the tunnel driven from a point about 220 feet in, connects with the surface. The vein shows on the surface from the top of this raise for about 60 feet with a strike of N. 64° E. and a vertical dip. The vein is from 12 to 13 inches in width, along the surface, of white crystalline quartz. The wall rock is a gray schisty graywacke whose cleavage strikes N. 35° E. and dips 70° N. A sample taken by Townsend across the vein at the collar of the raise and 62 feet above the tunnel assayed gold 0.36 oz., silver 0.20 oz. per ton. A second vein outcrops below the road about 185 feet west from the first tunnel. A tunnel has been driven in on this vein to a distance of 157 feet. The tunnel follows the vein for about 75 feet in a direction N. 39° E. At this point the tunnel bends to the east crossing the slaty cleavage diagonally for a short distance, then following the cleavage the remainder of its length. The cleavage strikes east and dips 80°S. The vein shows from 6 to 18 inches in width dipping 80° E. in the first part of the tunnel. The walls are schisty graywacke but at 75 feet they become more slaty. Here the vein has broken into a number of stringers and disappeared. A grab sample across the vein at several places assayed, gold 0.01 oz., silver 0.02. oz. per ton.

Timbers suitable for fuel and mining is available along the Tsina River. The river water could be used for power development.

Very Respectfully Submitted,

Earl R. Pilgrim

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Feb. 5, 1932.