

**RI** bureau of mines  
report of investigations **5991**

**INVESTIGATION OF MERCURY-ANTIMONY  
DEPOSITS NEAR FLAT, YUKON RIVER  
REGION, ALASKA**

By R. P. Maloney



UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

1962

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UNITED STATES DEPARTMENT OF THE INTERIOR  
Stewart L. Udall, Secretary

BUREAU OF MINES  
Marling J. Ankeny, Director

This publication has been cataloged as follows:

**Maloney, Raymond P**

Investigation of mercury-antimony deposits near Flat, Yukon River region, Alaska. [Washington] U. S. Dept. of the Interior, Bureau of Mines [1962]

44 p. illus., tables. 27 cm. (U. S. Bureau of Mines. Report of investigations, 5991)

1. Mercury. 2. Antimony. I. Title. (Series)

TN23.U7 no. 5991 622.06173

U. S. Dept. of the Int. Library

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# INVESTIGATION OF MERCURY-ANTIMONY DEPOSITS NEAR FLAT, YUKON RIVER REGION, ALASKA<sup>1</sup>

by

R. P. Maloney<sup>2</sup>

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## SUMMARY AND INTRODUCTION

Since mining operations began in 1900, Government geologists and mining men have periodically recorded the presence of the minerals of mercury and antimony in the extensive gold placer deposits near Flat in the Iditarod district of the Yukon River region, Alaska. No serious effort was made to recover the cinnabar contained in the gold placer gravels, and there is no evidence that veins of cinnabar and stibnite exposed in the placer operations (as reported by the Geological Survey) were ever explored or developed.

A large monzonitic intrusive, which is the dominant geologic feature of the immediate area, is believed to be the lode source of the valuable minerals in the placer deposits. In contact with the monzonite are argillite and quartzite, metamorphic products from the Cretaceous shales and sandstones.

A reconnaissance of the Flat district was made in 1955 as a part of the Bureau of Mines investigation of mercury and other strategic mineral resources of the Yukon and Kuskokwim River regions. In 1956 information obtained by this reconnaissance and data from Government reports led to a program of bulldozer trenching and soil sampling in the Glen and Black Gulch areas and soil sampling on upper Chicken Creek. These areas contained the greatest concentrations of placer cinnabar; veins of cinnabar were reported to have been exposed by the mining operations.

During the Bureau's investigations bedrock was exposed in over 10,000 lineal feet of bulldozer trenches from which 83 channel samples were taken; 307 soil samples were taken over selected areas. The only mercury in place was found in the monzonite, where a small quartz vein contained visible cinnabar. In a 1,500-foot section of trenched area, along and adjacent to the quartz monzonite-shale contact, small gold-bearing quartz and arsenopyrite veins, quartz veins with stibnite, and short lenses of stibnite were exposed in the highly altered sedimentary rocks.

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<sup>1</sup>Work on manuscript completed September 1961.

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Channel and specimen samples from several of the trench exposures contained interesting amounts of gold and/or antimony. Because of the highly erratic nature of this mineralization, and also because of the absence of mercury, no attempt was made to follow the ore-bearing structures beyond the width of the bulldozer trenches. The results of soil sampling to determine the distribution of antimony in overburden covering known stibnite veins indicated that this method of sampling may be of value as a guide to the discovery of stibnite, which may be gold bearing.

This report summarizes general information on the Flat area and describes the work done by the Bureau of Mines.

#### ACKNOWLEDGMENTS

Acknowledgment is made to the Alaska Road Commission for use of vehicles and to John Stevens, William Burns, Julian Struver, and the Miscovich Bros., all of Flat, for information on previous mining operations. Appreciation is expressed to W. E. Dunkle (deceased), formerly of Anchorage, Rasmus Nielson (deceased), formerly of Flat, and Patrick Savage of Ruby for information on the Golden Horn mine and to the latter for the use of buildings on that property.

#### LOCATION AND ACCESSIBILITY

Flat is in the western half of the Yukon River region, Iditarod district,<sup>3</sup> at approximately latitude 62°27' N., longitude 158°01' W. (fig. 1); it is at the confluence of Flat and Otter Creeks, approximately 90 air miles southwest of McGrath. Heavy mining machinery, fuel oil, and general supplies formerly were brought by riverboat and barge via the Yukon, Innoko, and Iditarod Rivers (formerly, Haiditarod River) to Iditarod, then 7 miles by road to Flat, which is the principal distribution center for what was once a large placer-mining district. The town now has an airfield that will accommodate twin-engine planes, and most supplies, including fuel oil, are presently brought in by air. Iditarod, now a ghost town, and the principal placer mines in the area are accessible to Flat via good dirt and graveled roads.

At the time of the Bureau's investigation (1956), Flat had a permanent population of 15. During the summer about 40 additional workers were employed at the placer mines. At one time the town supported a population of about 500; consequently there are a number of vacant buildings. A general store, post office, and U.S. Weather Bureau Station are maintained throughout the year.

#### HISTORY AND PRODUCTION

Early Russian explorations in Alaska were generally confined to the coast and yielded little information regarding the Kuskokwim and Yukon River basins. The first trip to these interior regions was recorded in 1829 by Russian

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<sup>3</sup>Ransome, A. L., and Kerns, W. A., Names and Definitions of Regions, Districts, and Subdistricts in Alaska: Bureau of Mines Inf. Circ. 7679, 1954, pp. 65, 78.

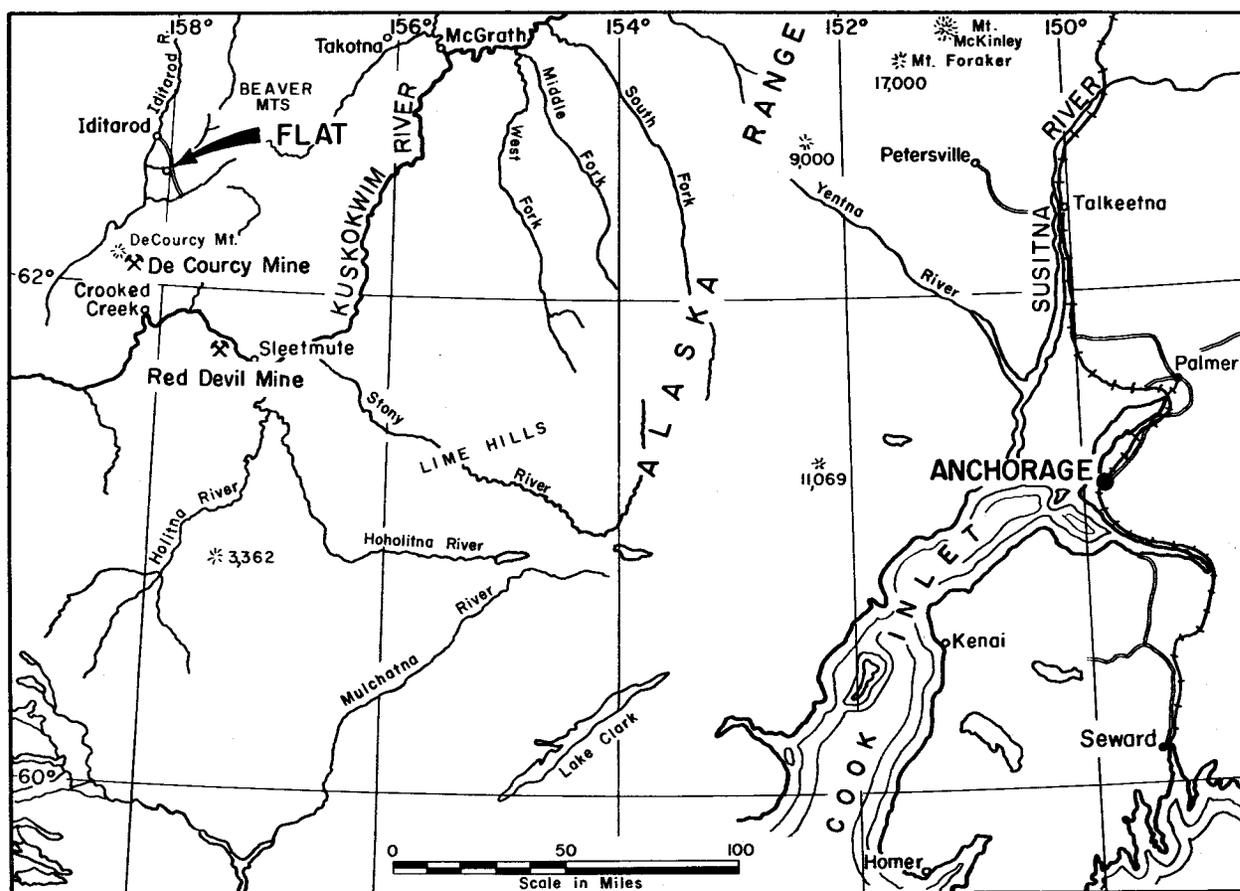


FIGURE 1. - Index Map, Southwestern Alaska. (Adapted from Geological Survey map.)

explorers who followed the Holitna River (then called the Chulitna) to the Kuskokwim, which they descended to its mouth.<sup>4</sup> In 1832 the explorers may have ascended the Kuskokwim as far as the mouth of the Takotna River, near the present site of McGrath. Trips were made into the Innoko River basin around 1840, and maps made by the Russians at that time show a trading post on the Kuskokwim about 30 miles below McGrath, near the abandoned native village of Vinasale.<sup>5</sup> Apparently the Russians had little interest in the district other than fur trade and made few trips to areas not easily accessible by river. As early as 1889 prospectors were in the Kuskokwim Valley.<sup>6</sup> In 1906 gold was found near the headwaters of the Innoko River, and on Christmas Day 1908, gold was discovered on Otter Creek, near the present town of Flat, by two prospectors from the Innoko district, W. A. Dikeman and John Beaton.<sup>7</sup>

<sup>4</sup>Smith, Philip S., The Lake Clark-Central Kuskokwim Region, Alaska: Geol. Survey Bull. 655, 1917, pp. 13-14.

<sup>5</sup>Maddren, A. G., The Innoko Gold-Placer District, Alaska: Geol. Survey Bull. 410, 1910, pp. 20-21.

<sup>6</sup>Work cited in footnote 5.

<sup>7</sup>Maddren, A. G., Gold Placer Mining Developments in the Innoko-Iditarod Region: Geol. Survey Bull. 480-I, 1911, pp. 237-238.

In 1910 about 2,500 people were in the area. Iditarod was the commercial center of the district with a population of 1,000 people; it supported a bank, several large stores, and other business houses. Several other small towns were established adjacent to the gold placer mines in the area: Otter City, with a population of 50, was located at the mouth of Otter Creek; Dikeman, on the Iditarod River, had a population of about 100; Bowler and Discovery, with a combined population of about 300, were located 3 miles above Flat on Otter Creek; Flat supported about 500 people. All but Flat are now abandoned, and Bowler, Discovery, and Otter City are completely destroyed; only the vestige of a trading post remains at Dikeman. The resident population of the area has steadily declined from about 1,600 in 1912 to 15 in 1956.

Gold production was first recorded in 1910; the output of the Iditarod district that year was 24,187 ounces of gold and 4,254 ounces of silver,<sup>8</sup> about two-fifths coming from Otter Creek and the remainder from Flat. The total recorded gold production of the area from 1910 to 1955 is 1,469,711 ounces. Incomplete records indicate that about 1 ounce of silver was produced for every 6 ounces of gold. Although considerable placer cinnabar occurred with the gold, no attempt was made to save it.

The Golden Horn mine was the only productive lode mine in the area; the first year of production was 1922, and ore shipments were made in 1922, 1935, 1936, and 1937. A total of 528 tons of ore shipped to the smelter contained 2,706 ounces of gold, 2,620 ounces of silver, 9,336 pounds of lead, and 653 pounds of zinc. Records state that the pumps were removed from the mine in 1935; some exploration and development work was done in 1936-37 but the mine has not operated since 1935.

#### PHYSICAL FEATURES AND CLIMATE

All of the placer and lode mines in the vicinity of Flat are included in an 8- by 10-mile area which is drained by tributaries of the Iditarod River. A monzonite intrusive rises to approximately 2,850 feet altitude near the center of this area; all placer operations are on creeks that either head in or cross this intrusive.

Most of the creek beds have been mined, and the old placer tailings are covered by a dense growth of brush, willows, and alders. Spruce trees up to 18 inches in diameter are found along creeks that were not mined and on a few of the slopes. However, most trees have been cut, and the ridges and hills that were once timbered are now covered with a mantle of sphagnum moss and scattered patches of brush. Incongruously, an occasional large granitic boulder is exposed on the hillsides. The terrain is such that road and trail construction is relatively inexpensive.

The climate is typical of the Yukon Valley; the winters are long and cold, with temperatures to minus 60° F.; the summers are short and warm, with temperatures occasionally to 90° F. The Weather Bureau Station at Flat records

<sup>8</sup>Eakin, Henry M., The Iditarod-Ruby Region, Alaska: Geol. Survey Bull. 578, 1914, p. 34.

the annual precipitation at about 20 inches, mostly as rain from June through September. High winds and fog occur frequently.

#### PROPERTY OWNERSHIP AND MINE WORKINGS

Intensive prospecting in the Flat area resulted in the early discovery of numerous placer-gold deposits, many of which are now worked out. During the 1956 season only six placer mines were active: North American Dredging Co. and Otter Dredging Co. operated floating dredges on Flat and Otter Creeks respectively; Gus Backstrom conducted hydraulic mining operations on Flat Creek; nonfloat plants were operated on Otter Creek by the Miscovich Bros., and on Prince Creek by the Prince Creek Mining Co., and Julian Struver did a small amount of hydraulic mining on Flat Creek. The Golden Horn is the only lode mine of significance in the area (figs. 2 and 3) and is reported to be developed by a 200-foot shaft, 350 feet of adit, 1,100 feet of drifts, and 200 feet of raises. All of the workings have been inaccessible for years; the mine machinery and shafthouse were in poor condition, but the bunkhouse and assay office were in good repair. The mine is owned by Robert F. Lyman and Roger Markle of Red Devil, Alaska.

Other lode prospects include a short adit driven on a quartz vein, near the head of Black Creek (fig. 2) and a small shaft driven on a quartz vein exposed on the ridge above Malemute Gulch. Both workings were inaccessible in 1956, but examination of the dumps and reports of local residents indicate that no ore was encountered. About 400 feet west of the mouth of Malemute Gulch, a caved adit approximately 70 feet long is reported by local prospectors to have small stringers of cinnabar associated with gold-bearing quartz veins exposed in the face. The ownership of these lode prospects was not determined.

The Bureau's trenching operations were confined to the vicinity of Minnie Gulch and Glen Gulch on or adjacent to placer claims owned by the Miscovich Bros. and on the Golden Horn lode claims (fig. 3).

#### GENERAL GEOLOGY

The general geology of the Iditarod district, where the Flat deposits are located, has been described in several publications by the Geological Survey to which the reader is referred for details. In addition to the authors already cited,<sup>9</sup> Brooks<sup>10</sup> and Mertie<sup>11 12</sup> contributed much detailed information on the geology and mines of the district.

The following brief discussion of the general geology is summarized from Geological Survey bulletins by Brooks and Mertie.

<sup>9</sup>Works cited in footnotes 4, 5, and 8.

<sup>10</sup>Brooks, Alfred H., Antimony Deposits of Alaska: Geol. Survey Bull. 649, 1916, pp. 47-49.

<sup>11</sup>Mertie, Jr., J. B., and Harrington, G. L., The Ruby-Kuskokwim Region, Alaska: Geol. Survey Bull. 754, 1924, pp. 33-34, 67-71, 108-117.

<sup>12</sup>Mertie, Jr., J. B., Mineral Deposits of the Ruby-Kuskokwim Region, Alaska: Geol. Survey Bull. 864-c, 1936, pp. 135-137, 140-143, 198-223, 225-226, 242-244.

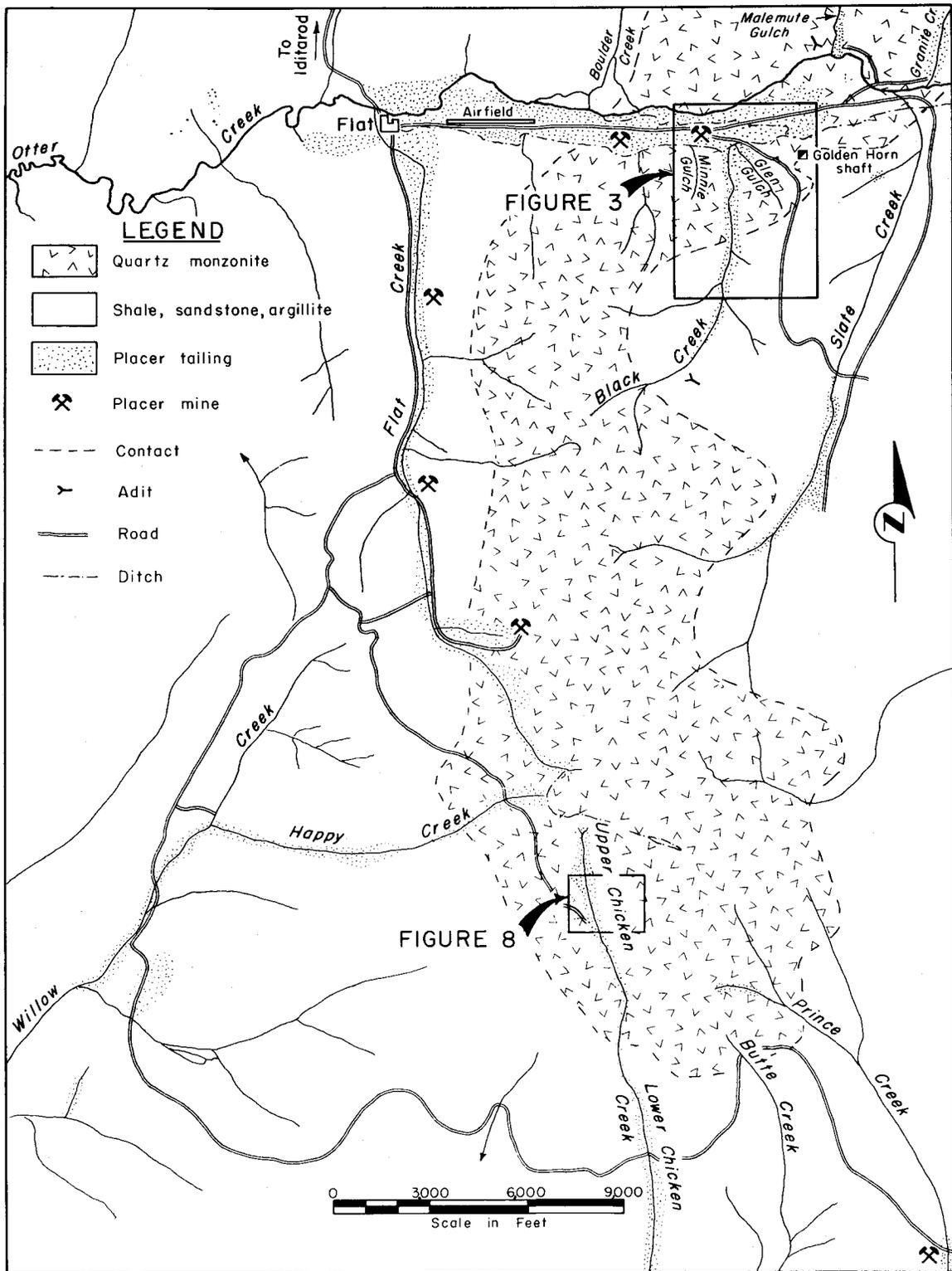


FIGURE 2. - Aerial Geology, Flat, Alaska. (Adapted from Brunton survey, aerial photo, and Geological Survey map.)

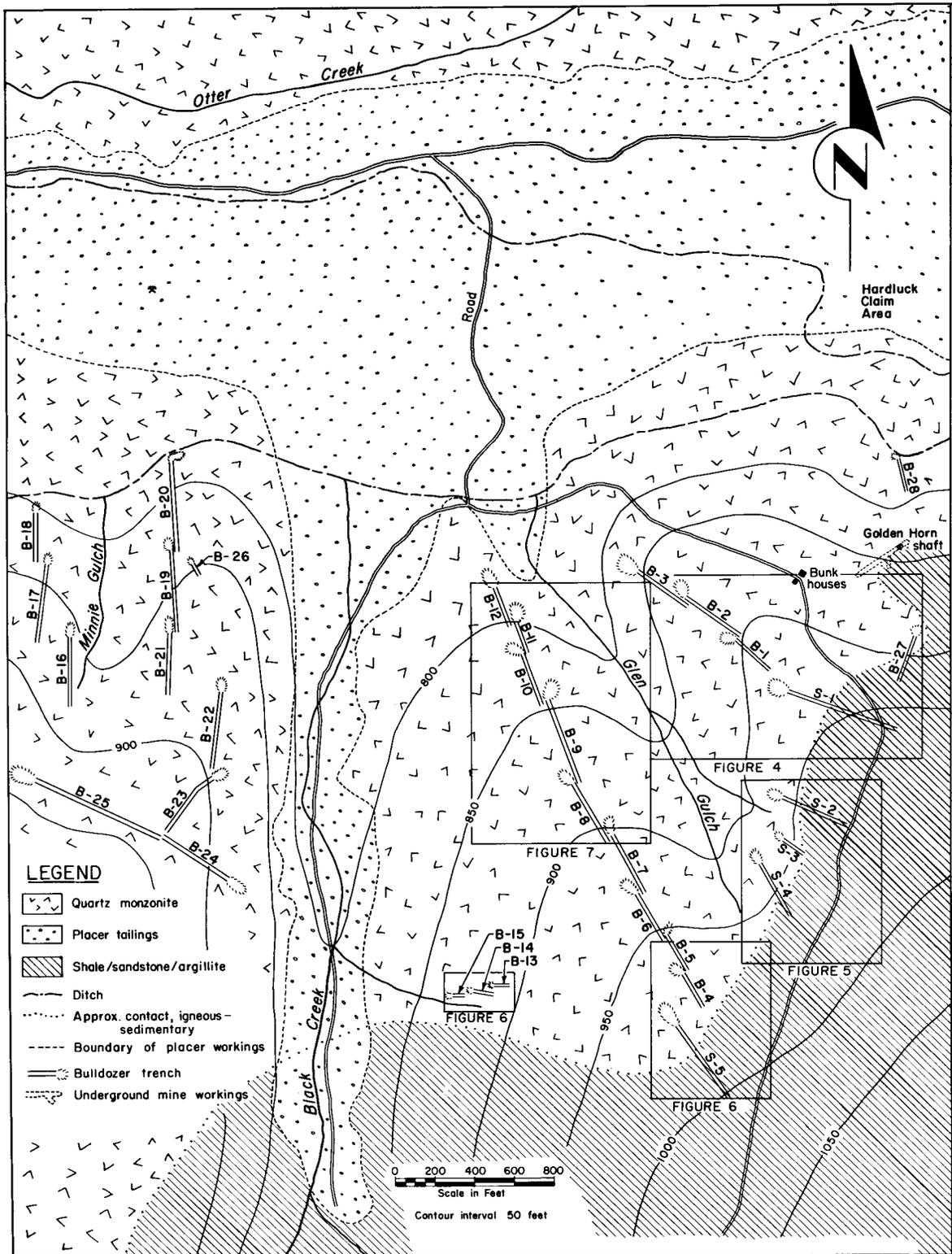


FIGURE 3. - Geology and Topography of Trench Area, Flat, Alaska. (Adapted from Brunton survey, aerial photo, and Geological Survey map.)

The mineral deposits of the Flat area are underlain by Upper Cretaceous and Eocene sediments, principally sandstone, shale, and conglomerate, but with some quartzite and slate. These sediments are intruded by basic rocks of late Eocene or post-Eocene age, which in turn are intruded by quartz monzonite. Evidence of close genetic relationship between the basic and acidic intrusives indicates a comparatively short time interval between the periods of intrusion. The quartz monzonite intrusive on Flat and Otter Creeks is believed to be the source of the gold as well as of the stibnite, cinnabar, and lesser scheelite commonly found in the heavy mineral concentrates from both the alluvial and residual types of placer deposits that are found in the district. Early reports note that placer-mining operations at a number of localities uncovered stibnite-bearing veins and stringers; specific mention is made of such lode discoveries on Otter and Slate Creeks, Glen Gulch, and Black and Chicken Creeks, all of which are located in or adjacent to the quartz monzonite intrusive. Except as noted in the previous chapter, little or no attempt was made to explore or develop the veins, and all traces of their outcrops have been covered by subsequent placer operations.

#### WORK BY THE BUREAU OF MINES

##### Preliminary Investigations

Attention was directed to the mercury production potential of the Iditarod mining district when laboratory studies of samples, collected by Bureau of Mines engineers from placer-mining operations throughout Alaska, revealed that the heavy mineral concentrates from several washing plants near Flat contained abundant cinnabar as well as small to trace amounts of scheelite, stibnite, and cassiterite. Interest in the area was further stimulated by a careful review of the Geological Survey reports on the Iditarod district (previously cited), all of which made special note of the presence of cinnabar in the gold placers near Flat.

As a result of these studies, a reconnaissance of the district was made during the 1955 field season by a Bureau of Mines engineer R. P. Maloney. Placer-concentrate samples were obtained from deposits on upper Chicken, Prince, and Otter Creeks (including Glen and Minnie Gulches), Malemute Gulch, and Slate and Happy Creeks (fig. 2), and specimen samples of bedrock and mineralized float were collected for laboratory study and analyses. The workings of the Golden Horn lode mine were inaccessible, but a number of specimen samples of ore and wall rock were collected from the mine dumps, as well as from a 5-foot vein of quartz exposed to the north of the mine shaft. Chemical analyses of the concentrate and specimen samples are given in table 1; petrographic and spectrographic studies of selected samples are summarized in tables 4 and 5.

The preliminary samples and information supplied by the local mine operators indicated that placer cinnabar occurred in relative abundance at the mouths of Glen Gulch and Black Creek, in lesser amounts on upper Chicken, upper Happy, and upper Prince Creeks, and in trace amounts elsewhere throughout the district. In the Glen Gulch-Black Creek area, occasional nuggets of cinnabar as large as 3 by 10 inches in size and weighing as much as 10 pounds

were found; smaller nuggets (3 inches and less in diameter) were common. Mercury content of the nuggets ranged from 42 to 60 percent, with 0.1 or less percent antimony detected (table 1, samples 40, 41, and 93); quartz was the principal gangue mineral. Abundant quartz monzonite float indicated that this area was underlain by, or adjacent to, the igneous intrusive believed to be the source of the placer minerals. The proximity of the Golden Horn lode-gold mine, the workings of which are reported to be in quartz monzonite, and the adjoining sedimentary rocks was considered to be further evidence of conditions favorable to the discovery of lode-mercury deposits, particularly in the vicinity of Glen Gulch. Based on these observations, a program of trenching and sampling was conducted during the period from June through September 1956.

### Trenching and Channel Sampling

#### Procedures

A crawler-type tractor equipped with a 13-foot bulldozer (straight blade) was used to expose approximately 10,120 lineal feet of bedrock in 31 trenches located to explore critical areas in the vicinity of the Golden Horn mine, Glen Gulch, Black Creek, and Minnie Gulch (fig. 3); the work included the widening and deepening of five old trenches (S-1 to S-5, fig. 3) having a total length of 1,820 feet. Depth of overburden ranged from 1.5 to 14 feet.

During the first part of the season, the ground was frozen to about 2 feet below the insulating cover of moss, but by early August most of the frost was gone. Until then, the moss was stripped from the area to be trenched, and the overburden was left exposed for several days to allow it to thaw before trenching operations were started.

After reaching solid formation with the bulldozer, handscrapers and wire brushes were used to clean a strip 2 feet wide down the center of each trench to plainly expose the bedrock. Where significant mineralization was exposed by the center strip, the entire width of the trench was thus cleaned and both channel and specimen samples were taken. All trenches were carefully mapped and logged in detail.

#### Results

The series of bulldozer trenches that were excavated southward from the Golden Horn mine shaft (fig. 3) explored a section of the quartz monzonite-shale contact which, although covered, was already fairly well located by geological evidence and previous prospecting. No mercury lodes were discovered, but some of the trenches did partially expose a strongly altered mineralized zone containing stringers, narrow veins, short lenses, and pockets of quartz, stibnite, and arsenopyrite associated with widely varying amounts of gold. The limited number of exposures indicates that this mineralized zone extends along the contact from the vicinity of trench B-27 through trench S-4 (fig. 3); a distance of over 1,500 feet. Trench S-5, located on the contact about 450 feet southwest of trench S-4, did not expose significant mineralization; there were no trenches on the contact west of S-5 or east of B-27.

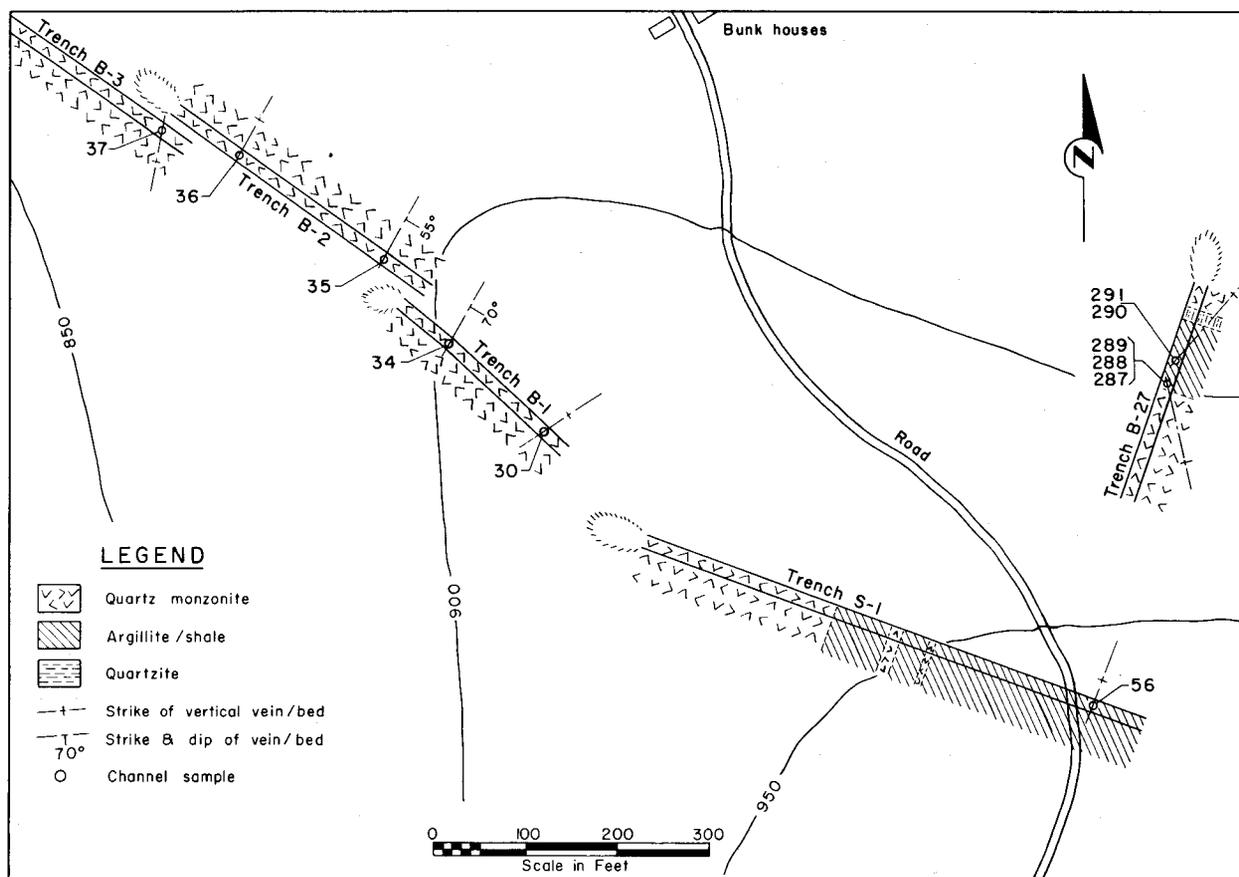


FIGURE 4. - Geologic and Sample Plan of Trenches S-1, B-1 to B-3, and B-27.

Trench B-27 (figs. 3 and 4) exposed two quartz veins, each about 1 foot wide, in which auriferous stibnite occurred in lenses of erratic size, grade, and distribution. Samples were taken at various places along the short strike exposures to determine the character of mineralization rather than the average grade of the narrow veins. Analyses indicated that these veins contained antimony in the range of from less than 0.1 to 42 percent and gold ranging from 0.06 to 1.58 ounces per ton. Both veins were vertical and had apparent strikes to southwest and northwest respectively. No attempt was made to follow them beyond the trench exposures. The southwest-striking vein, if continuous, should have been intersected by trench S-1 but was not detected in that trench.

Other trenches in this immediate vicinity (trenches S-1, B-1, B-2, and B-3, fig. 4) exposed several stringers and small veins of quartz or quartz and arsenopyrite that were either barren of valuable minerals or too small to be of interest. Trench S-1 crossed the contact zone, but trenches B-1, B-2, and B-3, were entirely within the quartz monzonite.

Trenches S-2, S-3, and S-4 (fig. 5) were spaced at 200-foot intervals to explore a 400-foot section of the contact zone near the head of Glen Gulch.

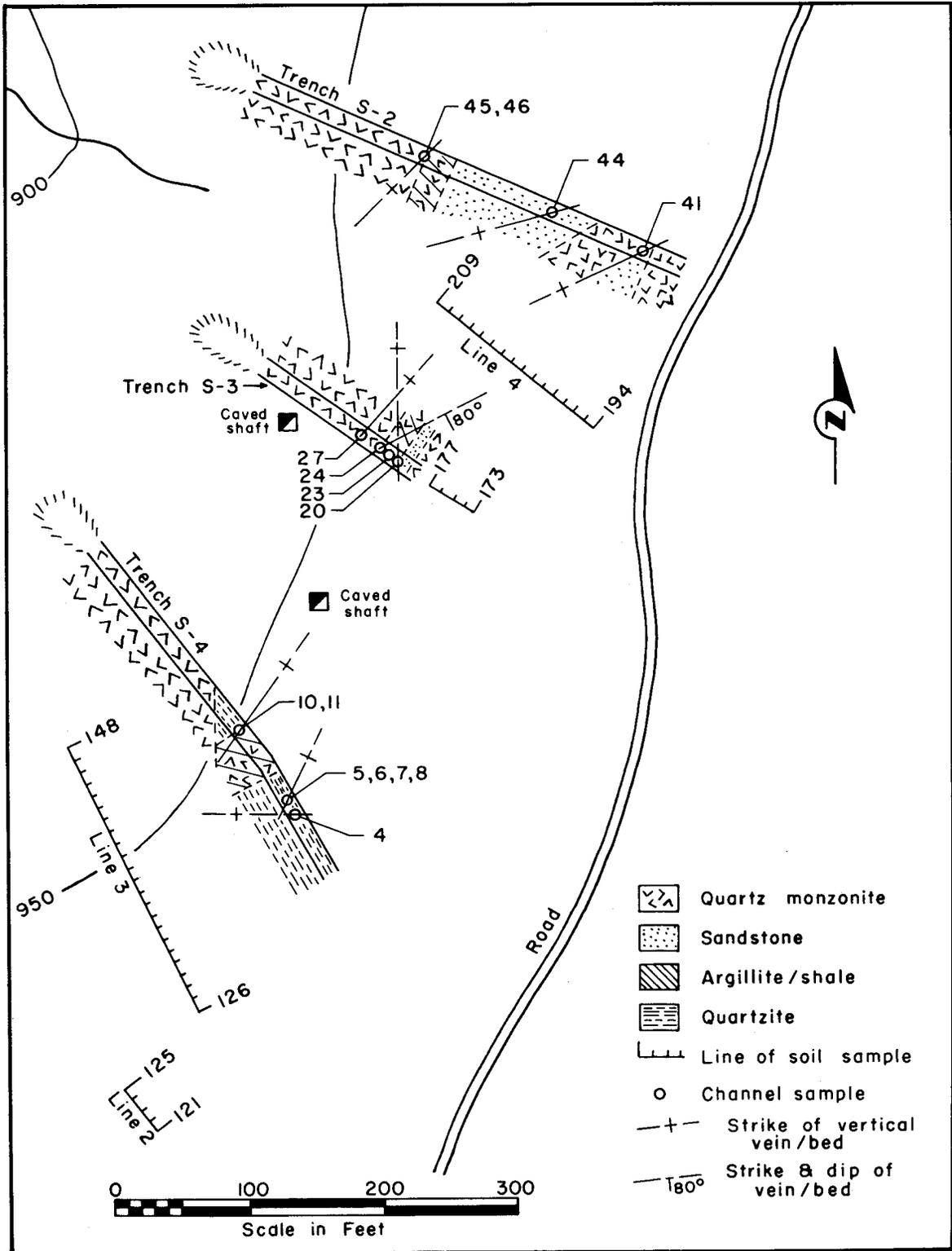


FIGURE 5. - Geologic and Sample Plan of Trenches S-2 to S-4.

A number of stringers, small veins, and short lenses, containing auriferous quartz, stibnite, and arsenopyrite in various proportions and combinations, were exposed.

Where sampled, the mineralized exposures ranged in width from 0.2 to 4.6 feet. Samples contained antimony in amounts ranging from less than 0.1 to 29.3 percent and gold ranging from a trace to 2.16 ounces per ton; no significant amount of mercury was detected. All of the deposits exposed in this area were extremely erratic in width and ore mineral content; wide variations in both were common over short strike distances. Because of these characteristics, and also because mercury was not found, no attempt was made to follow individual structures beyond the comparatively narrow limits of the bulldozer trenches.

Trenches B-4 through B-15 were located on the slopes of the ridge between Glen Gulch and the valley of Black Creek (fig. 3). The trenches exposed the quartz monzonite bedrock almost continuously along a line extending approximately 2,400 feet northwestward from the contact zone. Only a few mineralized stringers were found and sampled (figs. 6 and 7). The largest of these was a 6-inch-wide vein of arsenopyrite and rusty-colored quartz, a sample of which contained 0.76 percent  $WO_3$  and 0.64 ounce of gold per ton (trench B-9, sample 77.) This was the only sample of vein material exposed in the trenches that contained scheelite in sufficient quantity to be readily detected with the ultraviolet light, although this mineral is fairly common in placer deposits throughout the district. No attempt was made to follow the narrow vein beyond the limits of the discovery trench. A 6-foot-wide zone of argillite and arsenopyrite in trench B-15 contained 0.21 ounce of gold per ton (sample 250, fig. 6).

Trenches B-16 through B-26, on the slopes of Minnie Gulch, and trench B-28, north of the Golden Horn mine shaft (fig. 3), explored for the lode source of the residual-type placer deposits found in these areas. All of the trenches encountered quartz monzonite in various stages of weathering, ranging from fresh to completely decomposed material. Generally, there was considerably less alteration of the bedrock and fewer mineralized stringers in this area than was encountered in the trenches in the vicinity of Glen Gulch. A few quartz stringers, all less than 2 inches wide, contained a maximum of 0.24 ounce of gold per ton. Trench B-19 exposed a quartz stringer 1-1/4 inches wide that contained visible cinnabar in small pockets. Sample 88 of a cinnabar-bearing pocket and sample 90 of the stringer contained 0.24 and 0.11 percent mercury, respectively. These were the only trench samples obtained in which cinnabar was readily visible. In contrast to samples from the contact zone, samples from the Minnie Gulch area contained only trace amounts of antimony.

All samples from the trenches, as well as the miscellaneous samples from the region, were checked for fluorescence and radioactivity. Type samples were examined spectrographically and petrographically. Chemical analyses of all samples are summarized in table 2, the results of petrographic studies are given in table 3, and spectrographic analyses are tabulated in table 4. Detailed logs of all trenches are given in the appendix.

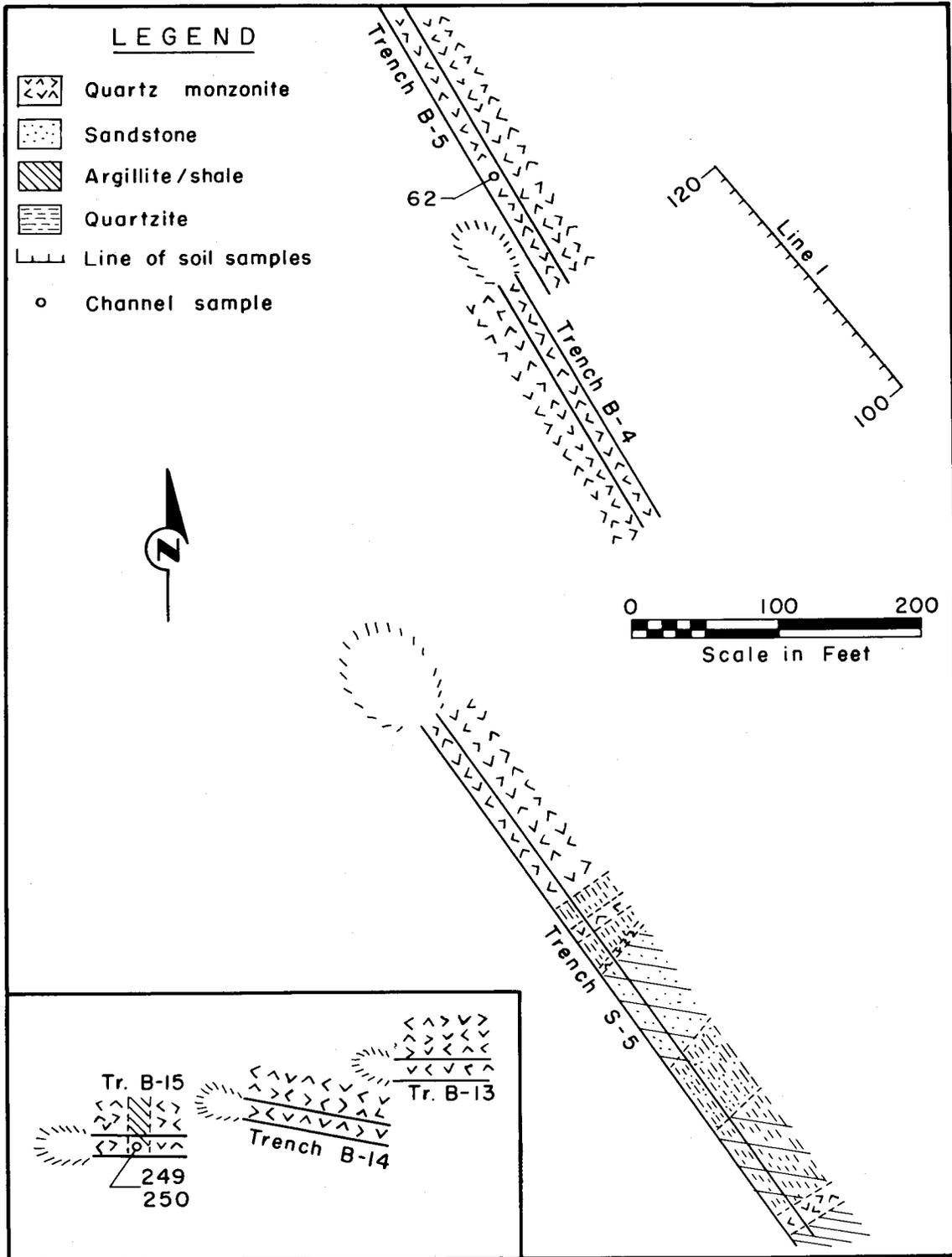


FIGURE 6. - Geologic and Sample Plan of Trenches S-5, B-4, B-5, and B-13 to B-15.

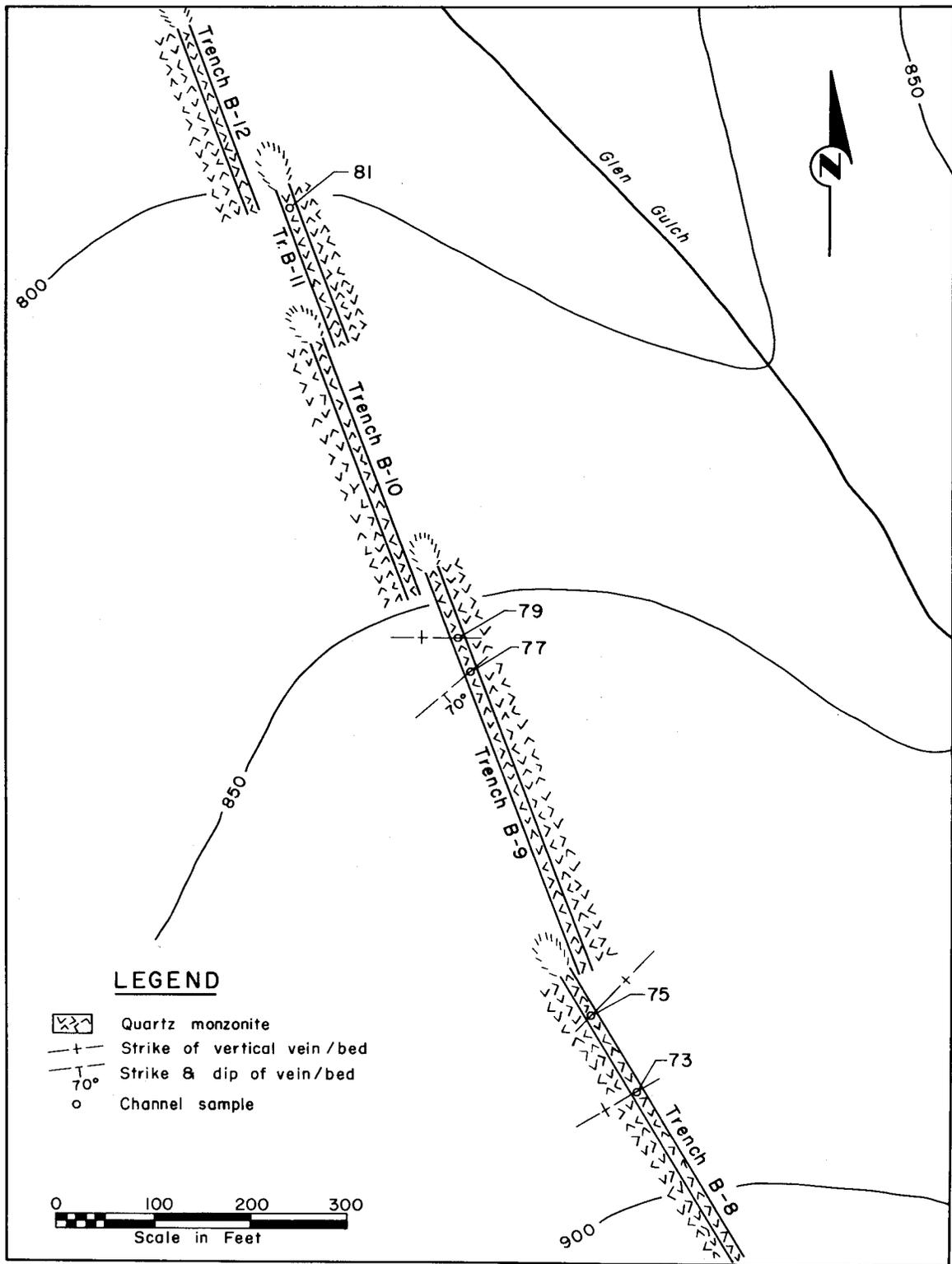


FIGURE 7. - Geologic and Sample Plan of Trenches B-8 to B-12.

### Soil Sampling

The relative abundance of gold-bearing stibnite stringers in trenches on or near the quartz monzonite-shale contact indicated that antimony might be present in the overburden and might occur in sufficiently variable amounts to sharply mark the location of the contact zone or the larger veins. To check this possibility, soil-sampling methods were employed in selected areas.

The soil samples were taken by hand auger at a uniform depth of 18 inches below the bottom of the moss cover. Samples were taken at 10-foot intervals along the sides of trenches S-2, S-3, and S-4, where veins of stibnite were exposed in the bottoms of the trenches. Average depth of overburden in these trenches ranged from 5 to 6 feet, but maximum depths were considerably greater. Parts per million of antimony in the samples increased sharply over the known stibnite veins, often increasing from less than 100 parts per million to more than 1,000 parts per million in a single sample interval. Trench-side soil-sampling data are tabulated in table 5.

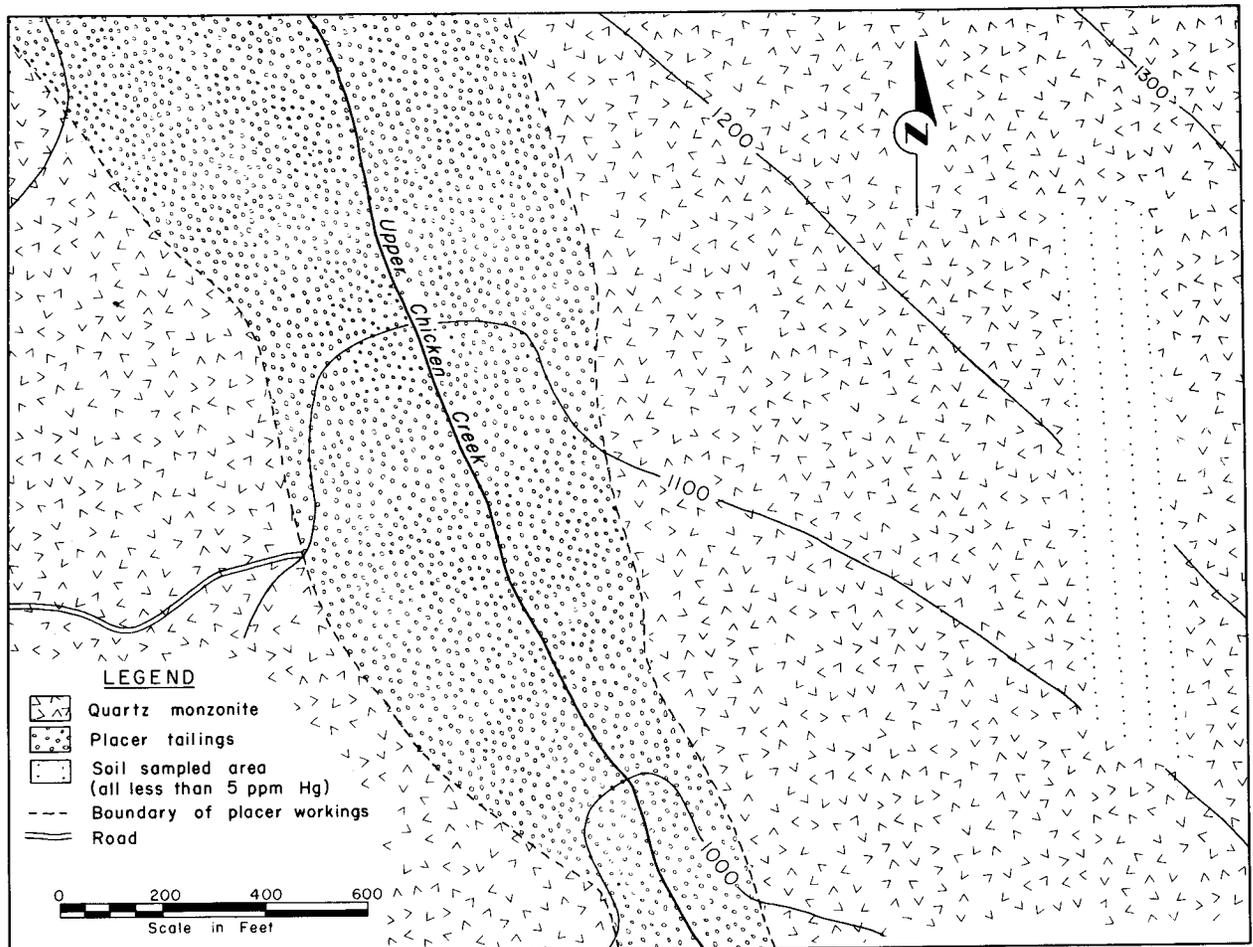


FIGURE 8. - Soil-Sampled Area, Upper Chicken Creek. (Adapted from Brunton survey, aerial photo, and Geological Survey map.)

Several lines of soil samples were taken between trenches; one short line extended southeast from the end of trench S-3. The locations of these lines and assay data are shown on figures 5 and 6. Samples that contained less than 10 parts per million of antimony were not mapped. The line extending southeast from trench S-3 is of particular interest because of the high average parts per million. Projections of vein exposed in trench S-4 pass through this line.

A hillside area above a cinnabar-bearing residual-type placer deposit on upper Chicken Creek was sampled for mercury content of the soil (fig. 8). Results of this work were negative; all of the soil samples contained less than the 5 parts per million of mercury that constituted the limit of detection of the analytical method employed. The location of the soil-sampled area is shown on figure 8.

All samples were shipped to Juneau, Alaska, for chemical analyses at the Bureau's laboratory. Because of the time lag between shipment and completion of analyses, soil-sampling data were not available for guidance during the trenching program. The results of the work, however, indicate that soil sampling for antimony may be useful in prospecting for the covered gold-bearing stibnite veins that appear to be most abundant on and adjacent to the quartz monzonite-shale contact.

TABLE 1. - Summary of miscellaneous surface sampling data

Sample	Description	Percent					Ounces per ton	
		Hg	Sb	WO <sub>3</sub>	Cu	Pb	Au	Ag
11	Placer concentrate, upper Chicken Creek, visible Au removed.	53.3	<0.05	-	-	-	0.06	0.52
14	Stibnite float, 3 in. wide with 1/2-in. quartz as wall rock at head of Happy Creek.	.02	18.8	<0.02	-	-	.02	2.46
16	Placer concentrate, near dam on Chicken Creek, visible Au removed.	1.13	.15	-	-	-	.61	.26
17	Float on lower Flat Creek tailings, cinnabar with quartz and basalt, quartz predominating, Hg in 1-by 1/2-in. lenses, in 4-in. wide waterworn specimen.	31.2	<.05	.36	-	-	.41	.15
18	Stibnite and cinnabar float, upper Chicken Creek.	5.2	11.6	<.02	-	-	.03	.17
19	Placer concentrate, upper Chicken Creek.	.07	<.05	<.02	-	-	7.29	1.35
20	do.	13.0	<.05	1.38	-	-	1.42	.01
21A	Dredge concentrate, Otter Creek.	16.1	<.05	.48	-	-	4.57	4.63
21B	do.	.08	30.2	<.02	-	-	.07	1.46
25	5- by 5-in. stibnite float from shaft between trenches S-3 and S-4.	Nil	17.4	-	-	-	.12	2.10
26	Quartz on dump, at Golden Horn shaft, said to be ore.	.02	.66	<.02	.03	.21	.40	.88
27	Placer concentrate, Malemute Gulch, visible Au removed.	1.76	.05	1.80	-	-	3.37	2.05
28	do.	.25	<.05	.32	-	-	.34	.84
29	Arsenopyrite float, Malemute Gulch.	Nil	<.05	<.02	-	-	.23	.60
30	Placer concentrate, Slate Creek, Au removed.	.08	<.05	.03	-	-	.82	.35
31	do.	.28	<.05	<.02	-	-	8.51	2.61
32	Placer cinnabar 1/4 to 1/2 in. in size from Glen Gulch.	53.5	<.05	-	-	-	.68	Nil
34	Quartz and monzonite float on Glen Gulch.	.12	<.05	<.02	-	-	.35	.97
35	Dump, Golden Horn mine, sandstone.	Nil	.1	<.02	<.02	<.02	Trace	.18

TABLE 1. - Summary of miscellaneous surface sampling data (Con.)

Sample	Description	Percent					Ounces per ton	
		Hg	Sb	WO <sub>3</sub>	Cu	Pb	Au	Ag
37	Placer concentrate, head Happy Creek.	17.9	<0.05	0.80	-	-	38.89	7.35
38	do.	5.68	.05	.26	-	-	15.20	2.80
39	do.	.49	.05	.10	-	-	6.63	1.64
40	Placer cinnabar up to 3 in. from Glen Gulch or Hard- luck claim.	59.9	<.05	-	-	-	.01	.26
41	10- by 3-in. piece placer cinnabar from Hardluck claim, flat sides.	42.1	<.1	<.02	-	-	.01	.01
42	5-ft. quartz vein on Hardluck claim.	.10	-	-	-	-	Trace	Nil
77	Dump, Golden Horn mine, dark quartzite.	Nil	<.05	<.02	<.02	<.02	Trace	.02
78	Dump, Golden Horn mine, decomposed quartz, quartzite, argillite.	Nil	<.05	<.02	.02	<.02	.49	.91
79	Dump, Golden Horn mine, dark quartzite, quartz.	.04	<.05	<.02	.02	<.02	.10	.38
80	Dump, Golden Horn mine, iron-stained quartz, dark quartzite, shale.	Nil	<.05	<.02	.02	<.02	1.03	.76
81	Dump, Golden Horn mine, quartz, quartzite.	.03	<.05	.15	.03	<.02	.71	.39
82	Dump, Golden Horn mine, iron-stained quartz, quartzite.	.05	<.05	.12	.03	.20	1.42	2.20
83	Dump, Golden Horn mine, quartz, some quartzite.	.07	.52	.07	.07	.26	2.80	5.16
93	Placer cinnabar, 1/4 in., mouth Black Creek.	58.7	<.1	-	-	-	-	-
278	Float, Prince Creek, 1/16-in. cinnabar string- ers in fine-grained basalt.	2.1	<.1	-	-	-	<.01	-

TABLE 2. - Summary of trench-sampling data

Sample	Trench	Location in trench, ft. <sup>1</sup>	Sample width, ft. <sup>2</sup>	Description <sup>3</sup>	Percent,		Ounces per ton, Au
					Hg	Sb	
1	S-4	4.5	0.15	Decomposed quartzite.	-	<0.1	-
4	S-4	54.9	.30	do.	<0.02	<.1	0.03
5	S-4	63.0	1.0	Stibnite and yellow quartz.	<.02	3.8	.23
6	S-4	63.0	1.0	Yellow weathered quartz, gouge, no stibnite.	<.02	13.8	.39
7	S-4	63.0	1.0	Stibnite, minor quartz.	<.02	29.3	.05
8	S-4	65.5	.5	Weathered quartz vein.	<.02	.5	.03
9	S-4	120.0	.2	Weathered yellow quartz vein.	<.02	.1	-
10	S-4	132.0	2.5	Massive stibnite lens with quartzite, argillite.	<.02	16.6	.09
11	S-4	132.0	.3	Decomposed, rusty zone in quartzite.	<.02	4.8	.12
14	S-4	182.0	.1	Rusty-colored decomposed quartz.	<.02	-	-
15	S-4	213.5	1.0	Shattered and decomposed quartz monzonite.	<.02	<.1	-
20	S-3	18.5	1.5	Stibnite vein.	<.02	23.0	.19
22	S-3	17.2	1.3	Light-brown to yellow sandstone and shale with sulfides in fractures.	<.02	.1	<.02
23	S-3	26.4	.15	Vein of shattered quartz and shale.	.02	.5	1.18
24	S-3	34.3	.35	Stibnite vein.	<.02	14.8	.38
25	S-3	45.0	.2	Rusty red-colored weathered quartz stringer.	<.02	<.1	-
27	S-3	101.5	.5	Quartz and arsenopyrite vein.	<.02	<.1	2.16
28	S-3	118.5	1.5	Light-gray broken and fractured quartz monzonite.	<.02	<.1	<.01
29	B-1	9.4	.1	Rusty-red weathered quartz.	<.02	<.1	-
30	B-1	30.6	.05	Vein of quartz, arseno- pyrite, limonite.	<.02	<.1	.32
34	B-1	186.0	.2	Quartz vein.	<.02	<.1	<.01
35	B-2	56.0	1.5	Shattered quartz vein.	<.02	<.1	<.01
36	B-2	253.0	.4	Quartz vein.	<.02	<.1	<.01
37	B-3	34.0	.5	Disintegrated quartz vein.	<.02	<.1	<.01

See footnotes at end of table.

TABLE 2. - Summary of trench-sampling data (Con.)

Sample	Trench	Location in trench, ft. <sup>1</sup>	Sample width, ft. <sup>2</sup>	Description <sup>3</sup>	Percent,		Ounces per ton, Au
					Hg	Sb	
41	S-2	31.7	0.2	White talclike material.	<0.02	<0.1	-
44	S-2	107.0	2.0	Yellowish-white soft igneous material.	<.02	<.1	-
45	S-2	209.0	.5	Stibnite and yellow vuggy quartz.	<.02	21.8	0.13
46	S-2	209.0	.5	do.	<.02	19.3	-
56	S-1	58.0	.4	Gray, claylike material.	<.02	.1	-
62	B-5	91.0	.1	White quartz vein.	<.02	<.1	-
73	B-8	210.0	.2	Quartz vein.	<.02	<.1	<.01
75	B-8	303.0	.5	do.	<.02	<.1	.09
<sup>4</sup> 77	B-9	340.0	.5	Quartz vein with scheel- ite, arsenopyrite, and iron stain.	<.02	<.1	.64
79	B-9	377.0	.2	Quartz vein.	<.02	<.1	.12
81	B-11	155.0	.3	do.	<.02	<.1	.04
86	B-19	46.0	.1	do.	<.05	<.05	<.02
88	B-19	159.0	.1	do.	.24	<.05	<.02
90	B-19	159.0	.1	do.	.11	<.05	<.02
248	B-15	29.0	3.0	Argillite, iron pyrite.	.02	<.1	-
249	B-15	36.0	.4	Quartz, arsenopyrite.	<.02	<.1	.07
250	B-15	32.0	6.0	Arsenopyrite, argillite.	.04	<.02	.21
251	B-23	55.0	.05	Quartz vein.	.04	<.1	.13
253	B-24	51.0	.2	do.	.02	<.1	<.01
287	B-27	133.0	.3	Yellow vuggy quartz.	<.02	3.3	1.58
288	B-27	133.6	.4	Light-gray quartz and stibnite.	<.02	35.0	.10
289	B-27	134.3	.2	Fractured quartz vein.	<.02	3.8	.14
290	B-27	160.0	1.0	Stibnite pocket.	<.02	42.0	.06
291	B-27	160.0	1.0	Vuggy quartz vein.	<.02	<.1	1.29
305	B-22	142.0	Compos- ite	Composite of small quartz veins, from 142-388.	<.02	<.1	<.01
307	B-16	24.0	.02	Quartz stringer.	<.02	<.1	.24
308	B-16	69.0	.05	do.	<.02	<.1	.14
309	B-16	108.0	.3	Quartz vein.	<.02	<.1	<.01

<sup>1</sup>Measured from ends of trenches.

<sup>2</sup>Measured normal to strike.

<sup>3</sup>See appendix for detailed log of trenches.

<sup>4</sup>Sample contains 0.76 percent WO<sub>3</sub>.

TABLE 3. - Summary of petrographic analyses

Sample	Type of sample	Location	Description
19 and 20 (composite)	Placer concentrate	Upper Chicken Creek	Essentially contains monzonitic rock fragments and feldspar, less quartz; some biotite, pyroxene, amphibole, cinnabar, and scheelite, and small amounts of allanite, epidote, tourmaline, chlorite, sericite, ferberite, magnetite, limonite, chromite, zircon, olivine, and ilmenite. Also present is a trace amount of gold. A radiometric test indicated the presence of radioactivity in the amount of 0.01 percent uranium equivalent.
21A	Dredge concentrate	Otter Creek	Essentially contains cinnabar and rock fragments, less amphibole and chromite, some ilmenite, magnetite, pyrite, scheelite, quartz, feldspar, galena, and pyroxene, and small amounts of amalgam, zircon, goethite, limonite, sericite, chlorite, epidote, garnet, cassiterite, and tramp iron.
27 and 28 (composite)	Placer concentrate	Malemute Gulch	Essentially contains rock fragments and feldspar, less amphibole, some sericite and scheelite, small amounts of ferberite, chlorite, ilmenite, magnetite, pyrite, chromite, biotite, realgar, cinnabar, zircon, epidote, allanite, pyroxene, and limonite, and trace amounts of cassiterite, gold, and pyromorphite. Slight radioactivity (0.01 percent uranium equivalent) was noted.
33	Type specimen of igneous rock common in trenched area	Trench B-1	Classified as a quartz monzonite. The mineral composition is abundant andesine, biotite, hornblende, and sanidine; subordinate augite and chlorite; and minor hydromuscovite. The presence of sanidine rather than either orthoclase or microcline indicates a rock formed at high temperatures.
37, 38, and 39 (composite)	Placer concentrate	Happy Creek	The composite consists primarily of monzonitic rock fragments, cinnabar, feldspar, and pyroxene, less quartz and amphibole, some zircon, scheelite, biotite, magnetite, ilmenite, and chromite, small amounts of ferberite, gold,

TABLE 3. - Summary of petrographic analyses (Con.)

Sample	Type of sample	Location	Description
37, 38, and 39 (composite) con.	Placer concentrate	Happy Creek	amalgam, monazite, chlorite, sericite, clay minerals, tourmaline, realgar, and epidote, and trace amounts of cassiterite and garnet.
141	Sorted material	Prince Creek placer mine	Composed of cinnabar and chert and cinnabar and quartz pebbles. One pebble, however, is a porphyritic basalt composed chiefly of labradorite and a little hornblende.
143	Specimen containing cinnabar	Prince Creek placer mine	A fine-grained monzonite composed of approximately 30 percent andesine, 25 percent biotite, 20 percent actinolite, 15 percent sanidine, and 10 percent augite. Cinnabar is present.
144	Specimen containing small amount of cinnabar	do.	Composed of chert and quartz. Small amounts of cinnabar, limonite, and chlorite are present.
145	Specimen of igneous rock common to Prince Creek placer	do.	A metamorphosed monzonite with porphyroblastic growths of feldspar. The approximate mineral composition is 30 percent anorthoclase, 30 percent oligoclase, 20 percent biotite, 20 percent actinolite, and traces of chlorite and augite. The rock is probably derived by the metasomatic alteration of an earlier more basic igneous rock.
146	Specimen of sedimentary rock common to Prince Creek placer	do.	A sandy shale composed of approximately 55 percent illite and mixed layer clays, 25 percent chlorite, 10 percent quartz, 7 percent feldspar, 2 percent biotite, and 1 percent calcite.
291	Quartz vein	Trench B-27	Essentially contains quartz with relatively small amounts of associated scorodite and sericite, small amounts of limonite, chlorite, and arsenopyrite, and trace amounts of galena, chromite, and gold.

TABLE 4. - Summary of spectrographic analyses

Legend: A - Over 10 percent.  
 B - 5 to 10 percent.  
 C - 1 to 5 percent.  
 D - 0.1 to 1 percent.

E - 0.01 to 0.1 percent.  
 F - 0.001 to 0.01 percent.  
 G - Under 0.001 percent.  
 - - Not detected.

Sample (from Table 1):	Ag	Al	As	Au	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu
19 and 20 (composite).....	F	A	-	F	E	E	-	-	C	-	-	D	F
21A.....	E	B	-	E	E	-	-	E	C	-	E	B	E
27 and 28 (composite).....	F	A	-	F	F	E	-	-	C	-	-	C	F
27, 38, and 39 (composite)	F	A	-	E	E	E	-	E	C	-	-	C	E
Sample (from Table 1):	Fe	Ga	Ge	In	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb
19 and 20 (composite).....	B	-	-	-	-	B	D	-	C	-	E	-	E
21A.....	A	-	-	-	-	C	D	-	D	-	D	-	B
27 and 28 (composite).....	A	-	-	-	-	B	D	-	C	-	D	-	D
37, 38, and 39 (composite)	A	-	-	-	-	B	D	-	D	-	D	-	D
Sample (from Table 1):	Pd	Pt	Sb	Si	Sn	Sr	Ta	Te	Ti	V	W	Zn	Zr
19 and 20 (composite).....	-	-	E	A	-	-	-	-	D	E	A	-	D
21A.....	-	-	E	A	D	-	-	-	C	E	B	-	D
27 and 38 (composite).....	-	-	-	A	E	-	-	-	C	E	A	-	D
37, 38, and 39 (composite)	-	-	-	A	E	-	-	-	B	E	A	-	C

TABLE 5. - Summary of soil-sampling data

Sample	Trench	Location on trench from "0" end, ft.	Sb, p.p.m. <sup>1</sup>	Sample	Trench	Location on trench from "0" end, ft.	Sb, p.p.m. <sup>1</sup>
210	S-2	"0" or east end trench	5	179	S-3	22	>1,000
211	S-2	10	7	180	S-3	32	66
212	S-2	20	24	181	S-3	42	60
213	S-2	30	12	183	S-3	52	10
214	S-2	40	18	184	S-3	62	6
215	S-2	50	13	185	S-3	72	<5
216	S-2	60	15	186	S-3	82	<5
217	S-2	70	16	187	S-3	92	5
218	S-2	80	10	188	S-3	102	8
219	S-2	90	10	189	S-3	112	7
220	S-2	100	6	190	S-3	122	14
221	S-2	110	31	191	S-3	132	<5
222	S-2	120	7	192	S-3	142	5
223	S-2	130	9	193	S-3	152	23
224	S-2	140	10				
225	S-2	150	12	149	S-4	"0" or east end trench	18
226	S-2	160	11	150	S-4	10	16
227	S-2	170	17	151	S-4	20	23
228	S-2	180	26	152	S-4	30	8
229	S-2	190	39	153	S-4	40	18
230	S-2	200	16	154	S-4	50	5
231	S-2	210	>1,000	155	S-4	60	8
232	S-2	220	47	156	S-4	70	42
233	S-2	230	20	157	S-4	80	14
234	S-2	240	76	158	S-4	90	10
235	S-2	250	10	159	S-4	100	58
236	S-2	260	26	160	S-4	110	32
237	S-2	270	36	161	S-4	120	31
238	S-2	280	10	162	S-4	130	28
239	S-2	290	6	163	S-4	140	>1,000
240	S-2	300	12	164	S-4	150	450
				165	S-4	160	>1,000
173	S-3	+48 ft. E. "0" end trench	215	166	S-4	170	380
174	S-3	+38	>1,000	167	S-4	180	26
175	S-3	+28	600	168	S-4	190	18
182	S-3	+18	128	169	S-4	200	17
176	S-3	+ 8	58	170	S-4	210	16
177	S-3	2 (0 + 2) in trench	560	171	S-4	220	10
178	S-3	12	106	172	S-4	230	8

<sup>1</sup>Parts per million.

## APPENDIX. - LOGS OF TRENCHES

Trench S-1

Bearing: N. 70° W.  
 Width: 13 feet.  
 "0" is E. end.

Length: 580 feet.  
 Average depth: 5.5 feet.

Distance, feet		Sample	Description
From	To		
0.0	41.0	56	Argillite, much limonite stain.
41.0	41.3		Gray-white claylike material, strike N. 22° E.
41.3	58.0		Argillite, much limonite stain.
58.0	58.4		Gray-white claylike material, strike N. 22° E.
58.4	175.0		Argillite, much limonite stain, a few small quartz stringers.
175.0	228.0		Road and cave, no exposure, material on bank is argillite.
228.0	243.0		Decomposed argillite and quartzite, much iron stain.
243.0	250.0		Medium-gray quartz monzonite.
250.0	273.0		Partially decomposed argillite.
273.0	279.0		Argillite and decomposed quartz monzonite.
279.0	293.0		Decomposed quartz monzonite.
293.0	318.0		Gray to dark-gray argillite, much iron stain.
318.0	357.0		Rusty-colored argillite which on a fresh break is light gray, a few small biotite crystals.
357.0	478.0		Partially decomposed quartz monzonite with numerous reefs of dark-gray quartz monzonite containing much biotite.
478.0	522.0		Partially decomposed quartz monzonite with numerous reefs of dark-gray quartz monzonite containing much biotite. More rusty colored. A few red decomposed iron veins that strike N. 20° - 40° E.
522.0	523.3		Light-gray quartz monzonite, well-fractured and partially decomposed.
523.3	534.0		Dark-gray quartz monzonite with much biotite.
534.0	555.0	Light-gray quartz monzonite.	
555.0	580.0	Decomposed dark-gray quartz monzonite; a few small quartz and iron stringers, all striking N. 60° E.	

Trench S-2

Bearing: N. 66° W.  
 Width: 13 feet.  
 "0" is E. end.

Length: 348 feet.  
 Average depth: 5 feet.

Distance, feet		Sample	Description	
From	To			
0.0	25.0	41	Partially decomposed rusty-colored quartz monzonite crisscrossed with claylike material.	
25.0	31.7		Argillite and sandstone.	
31.7	31.97		White talclike material; strike N. 65° E., vertical dip, 0.2 ft. wide.	
31.97	56.0		Dark-gray to black fine-grained sandstone, much iron stain.	
56.0	61.5		Decomposed brown quartz monzonite, with lenses of sandstone or quartzite, very little biotite.	
61.5	76.0		Decomposed brown quartz monzonite, with lenses of sandstone or quartzite, very little biotite. Monzonite-sandstone contact at 76 ft., strikes N. 60° E.	
76.0	107.0		Sandstone.	
107.0	109.7		44	Yellow-white to white soft claylike material. Strike N. 75° E., vertical dip, 2.0 ft. wide.
109.7	188.4			Argillite and sandstone; at 178 ft., a lens 18 in. wide of same material as in 107-109 ft. interval.
188.4	194.0			Light-brown to tan decomposed quartz monzonite, small amount of argillite.
194.0	205.0		Light-brown to tan decomposed quartz monzonite, no argillite.	
205.0	209.0		Light-brown to tan decomposed quartz monzonite, small amount of argillite.	
209.0	209.54	45	Vein of stibnite and yellow, vuggy quartz. Strike N. 45° E., vertical dip, 0.5 ft. wide.	
		46	Apparently sulfides are leached out of quartz. Samples are taken across two different sections of vein.	
209.54	233.0		Decomposed light-brown to gray quartz monzonite.	
233.0	239.0		Decomposed light-brown to gray quartz monzonite with small amount of argillite, 1/4-in. decomposed iron vein at 239 ft.	
239.0	248.0		Decomposed light-brown to gray quartz monzonite with small amount of argillite, 1/4-in. decomposed iron vein at 239 ft.	
248.0	297.0		Decomposed light-brown to gray quartz monzonite, but a reddish-brown color, and with considerable dark-gray fine-grained quartzite with a blocky fracture with limonite stain on fractures. Small amount of gray quartz monzonite is not decomposed.	
297.0	303.0		Light-gray quartz monzonite.	
303.0	342.0		About half reddish-brown decomposed quartz monzonite with a few small boulders of the same material and half dark-gray quartzite with much limonite stain on fractures.	
342.0	348.0		Light-tan decomposed quartz monzonite.	

Trench S-3

Bearing: N. 55° W.  
 Width: 13 feet.  
 "O" is SE. end.

Length: 142 feet.  
 Average depth: 5.5 feet.

Distance, feet		Sample	Description
From	To		
0.0	8.5		Light-tan partially decomposed quartz monzonite.
8.5	17.2		Dark-brown shattered sandstone (almost a quartzite) and shale, limonite stain.
17.2	18.5	22	Light-brown to yellow sandstone (almost a quartzite) and shale, appears to be sulfides in fractures.
18.5	20.3	20	Stibnite vein, strike N. and S., vertical dip, 1 ft. wide.
20.3	26.4		Argillite and decomposed quartz monzonite.
26.4	26.55	23	Reddish shattered quartz and shale.
26.55	34.3		Argillite and decomposed quartz monzonite.
34.3	34.65	24	Stibnite vein, strike N. 62° E., dip 80° to SE., 0.35 ft. wide.
34.65	45.0		Decomposed quartz monzonite, with large boulders of dark-gray quartz monzonite containing much biotite.
45.0	80.5	25	Decomposed quartz monzonite, with large boulders of dark-gray quartz monzonite containing much biotite, with a few rusty decomposed stringers of quartz. Some are as much as 0.2 in. wide, but most are 0.1 in. or less. All strikes about N. 45° E. Sample 25 from 45.0 to 45.2 ft. is of a representative stringer.
80.5	80.7		Veinlike, light-gray partially decomposed quartz monzonite with a soft flaky texture and containing very small biotite crystals.
80.7	96.5		Gray decomposed quartz monzonite.
96.5	101.5		Massive, blocky, dark-gray quartz monzonite.
101.5	102.0	27	Rusty-red vein of quartz and arsenopyrite, some of quartz has a faint green color. Strike N. 40° E., vertical dip. This vein strikes directly toward an old shaft 15 ft. to the south. Stibnite float is found at the collar of the shaft.
102.0	111.1		Decomposed quartz monzonite.
111.1	111.3		Veinlike, light-gray partially decomposed quartz monzonite with a soft flaky texture and containing very small biotite crystals.
111.3	118.5		Decomposed quartz monzonite.
118.5	120.0	28	Light-gray badly broken and fractured quartz monzonite. Contact strikes N. 57° E.
120.0	142.0		Very dark-gray partially decomposed quartz monzonite with many large boulders.

Trench S-4

Bearing: 0 to 100 feet - N. 30° W.

Length: 306 feet.

100 to 306 feet - N. 38° W.

Average depth: 6.0 feet.

Width: 13 feet.

"0" is SE. end.

Distance, feet		Sample	Description
From	To		
0.0	4.5	1	Light- to medium-gray fine-grained sandstone and quartzite with limonite stain on fractures.
4.5	4.65		Light-gray decomposed quartzite.
4.65	36.3		Medium-gray to dark-gray very fine-grained sandstone and quartzite. A few small crystals of biotite. Several 1/4-in. veins of same material as 4.5 to 4.65 ft., which appear to fill fractures. Most strike E. and W., as do the fracture lines of the country rock.
36.3	37.0		Decomposed yellow sandstone and quartzite, with many very small iron veinlets.
37.0	45.0		Medium-gray to dark-gray very fine-grained sandstone and quartzite. A few small crystals of biotite. Several 1/4-in. veins of same material as 4.5 to 4.65 ft., which appear to fill fractures. Most strike E. and W., as do the fracture lines of the country rock.
45.0	45.8		Decomposed yellow sandstone and quartzite, with many very small iron stringers.
45.8	63.0	4	Medium-gray quartzite, limonite stain on fractures. At 54.9 ft. is a 0.3-ft.-wide yellow-brown decomposed quartzite which strikes E. and W. (Sample 4).
63.0	64.2	5	Stibnite and quartzite vein 1 ft. wide, strike, N. 25° E., vertical dip. Occurrence of stibnite is erratic; there will be pieces of stibnite up to 1 in. in size concentrated in approximately 1 ft. of vein, then 1 to 3 ft. of medium-gray quartzite and decomposed quartzite containing fewer and smaller pieces of stibnite. A yellow ring of sulfides is formed around many of the larger pieces of stibnite; a rusty iron stain is on the fractures. The country rock has a slaty cleavage but is a quartzite. Samples are across different sections of vein.
		6	
		7	
64.2	65.5		Medium-gray quartzite and argillite.
65.5	66.6	8	Vein of decomposed quartz, much iron stain, strike E. and W., width 0.5 ft.
66.6	73.5		Gray quartzite and argillite.
73.5	73.8		Vein decomposed quartz, strike E. and W.
73.8	74.0		Argillite.
74.0	74.2		Decomposed quartz vein.
74.2	89.2		Medium-gray quartzite, fractures strike N. 60° W.
89.2	89.4		Decomposed quartz, strike E. and W.

## Trench S-4 (Con.)

Distance, feet		Sample	Description
From	To		
89.4	100.0		Argillite, shale, and sandstone.
100.0	105.0		Fractured argillite and quartzite.
105.0	105.2		Decomposed quartz vein, strike N. 75° W.
105.2	107.5		Fractured argillite and quartzite.
107.5	107.8		Decomposed quartz vein, strike N. 75° W.
107.8	120.0		Fractured argillite and quartzite.
120.0	132.0	9	Well-fractured argillite and quartzite with quartz vein 0.2 ft. wide which starts at 115 ft. and continues down the center of the trench to stibnite mineralization at 132 ft. Sample 9 is from the quartz vein.
132.0	136.6	10	Mineralized zone in argillite and quartzite with lenses of stibnite 2 by 1 ft. and larger. No continuous stibnite vein. Strike of zone is N. 35° E., vertical dip. Very friable rusty quartz vein 0.3 ft. wide (132.0 to 132.3 ft.) parallel to zone. Sample 10 is of a stibnite lens; sample 11 is of 0.3-ft. quartz vein.
		11	
136.6	157.8		Well-fractured quartzite dipping slightly to NW.
157.8	179.4		Light-yellow decomposed quartz monzonite; contact at 157.8 ft. is sharp and strikes N.
179.4	182.0		Light rusty-brown to light-gray decomposed quartz monzonite crisscrossed by numerous 1/8-in. veins which are soft and claylike and light-gray to white in color, containing no biotite.
182.0	182.1	14	Rusty-red iron-stained quartz vein; strikes N. 50° E.
182.1	213.5		Light rusty-brown to light-gray decomposed quartz monzonite crisscrossed by numerous 1/8-in. veins which are soft and claylike and light-gray to white in color, containing no biotite. Large boulders of a very dark quartz monzonite which are composed of about 50 percent biotite.
213.5	216.2	15	Shattered and decomposed light-gray quartz monzonite, strikes N. 16° W., 1 ft. wide.
216.2	306.0		Light rusty-brown to light-gray decomposed quartz monzonite crisscrossed by numerous 1/8-in. veins which are soft and claylike and light-gray to white in color, containing no biotite. Large boulders of a very dark quartz monzonite which are composed of about 50 percent biotite.

Trench S-5

Bearing: N. 35° W.  
 Width: 13 feet.  
 "O" is SE. end.

Length: 445 feet.  
 Average depth: 6 feet.

Distance, feet		Sample	Description
From	To		
0.0	10.0		Blocky argillite and sandstone.
10.0	17.0		Decomposed quartz monzonite, strike of contact at 10 ft. is N. 50° E.
17.0	26.0		Yellow-brown decomposed quartz monzonite and argillite.
26.0	40.5		Dark-gray quartzite and argillite.
40.5	48.5		Indurated sandy shale.
48.5	49.0		Light-gray to light-tan soft claylike material, probably a decomposed feldspar. Strike N. 35° E.
49.0	71.0		Well-shattered and fractured sandy shale and quartzite, much limonite stain.
71.0	71.2		Light-gray to light-tan soft claylike material, probably a decomposed feldspar. Strike approximately N. and S.
71.2	94.3		Well-shattered and fractured sandy shale and quartzite, much limonite stain.
94.3	100.0		Decomposed gray quartz monzonite.
100.0	107.0		Light-gray shattered sandy shale and sandstone, limonite stain.
107.0	122.7		Sandstone, quartzite.
122.7	123.0		Decomposed quartz and feldspar, white in color, and has a soft claylike appearance.
123.0	148.0		Sandstone, quartzite.
148.0	231.5		Yellow brecciated argillite and sandstone.
231.5	234.5		Light-gray quartz monzonite, 50 percent or more quartz and small amount biotite.
234.5	235.0		Chill zone, strike N. 40° E.
235.0	257.5		Dark fine-grained quartzite with occasional small biotite crystals.
257.5	267.5		Yellow decomposed quartz monzonite.
267.5	284.0		Blocky fine-grained sandstone and quartzite, fractures appear to strike N. 67° E. and dip vertically or steeply to the south. Much limonite stain.
284.0	312.0		Decomposed rusty quartz monzonite.
312.0	312.5		Light-gray fresh quartz monzonite.
312.5	356.0		Decomposed rusty quartz monzonite.
356.0	377.0		Dark-gray decomposed quartz monzonite with boulders 1 to 2 ft. in diameter which contain 50 percent of more biotite, and a small amount of green quartz.
377.0	387.0		Decomposed rusty quartz monzonite.
387.0	391.5		Light-tan decomposed quartz monzonite.
391.5	445.0		Tan decomposed quartz monzonite, with numerous boulders as in 356.0 to 377.0 ft.; numerous small disintegrated iron and quartz stringers striking generally N. 45° to 60° E.

Trench B-1

Bearing: 0-168, N. 47° W.  
168-240, N. 50° W.

Length: 240 feet.  
Average depth: 7.6 feet.

Width: 13 feet.  
"0" is E. end.

Distance, feet		Sample	Description
From	To		
0.0	9.4		Light-tan decomposed quartz monzonite with numerous small red disintegrated iron and quartz veins.
9.4	9.5	29	Rusty-red disintegrated iron and quartz vein. Strike N. 46° E., vertical dip.
9.5	16.2		Light-tan decomposed quartz monzonite with numerous small red disintegrated iron and quartz veins.
16.2	16.3		Rusty-red disintegrated iron and quartz vein; strike N. 46° E., vertical dip.
16.3	30.6	30	Decomposed gray and tan quartz monzonite. Very much the same as that in trenches S-1 to S-5 but lighter in color and lacks the crisscross network of small claylike veins as in trench S-4. At 30.6 ft., a 1/2-in. vein of arsenopyrite and quartz, with a small amount of green quartz, strikes N. 57° E. and dips vertically. Sample 30 is of this vein.
30.6	160.0		Light-gray to light-tan decomposed quartz monzonite with reefs of light-gray unaltered quartz monzonite containing about 25 percent biotite in small crystals. Much limonite stain. 1/4- to 1/2-in. rusty, disintegrated iron and quartz stringers at 48.5 ft., 56.1 ft., and 98.5 ft., that strike N. 45° E.
160.0	168.0	33	Reef of unaltered light-gray quartz monzonite containing approximately 10 percent biotite in small crystals. No iron stain. Contact at 168 ft. is sharp and strikes N. 40° E.
168.0	206.5	34	Brown decomposed quartz monzonite. At 186 ft., a 1/2- to 2-1/2-in. quartz vein partially weathered to a flaky texture. Strike N. 30° E., dip 70° to SE. Sample 34 is of this vein.
206.5	207.0		Unaltered reef of light-gray quartz monzonite; strike N. 70° E.
207.0	236.6		Brown decomposed quartz monzonite.
236.6	236.8		Rusty iron and quartz stringer; strike N. 60° E.
236.8	240.0		Brown decomposed quartz monzonite.

Trench B-2

Bearing: N. 66° W.  
 Width: 13 feet.  
 "0" is E. end.

Length: 348 feet.  
 Average depth: 8.6 feet.

Distance, feet		Sample	Description
From	To		
0.0	56.0	35	Brown decomposed quartz monzonite, 1/2- to 1-in. stringers of quartz and iron at 36.4 ft., 46.5 ft., and 51.0 ft.; strikes are approximately N. 50° E.
56.0	57.5		A 1.5-ft. solid quartz vein which divides into two veins of shattered quartz, 0.3 and 0.2 ft. wide separated by decomposed quartz monzonite; strike N. 30° E., dip 55° to SE. Sample 35 is of solid part.
57.5	71.5		Brown decomposed quartz monzonite.
71.5	76.0		Dark-gray argillite and quartzite.
76.0	96.0		Black-to-brownish decomposed quartz monzonite.
96.0	97.0		Black-to-brownish decomposed quartz monzonite but much iron stain; strike N. 60° E.
97.0	253.0		Brownish decomposed quartz monzonite crisscrossed with a network of 1/8-in. stringers of a soft claylike material light gray to white in color and numerous small stringers of disintegrated quartz and iron which strike N. 40° to 60° E.
253.0	253.4		36
253.4	264.0	Brownish decomposed quartz monzonite crisscrossed with a network of 1/8-in. stringers of a soft claylike material light gray to white in color and numerous small stringers of disintegrated quartz and iron which strike N. 40° to 60° E.	
264.0	308.0	Decomposed light-gray quartz monzonite with web of tiny disintegrated quartz veins.	
308.0	348.0	Yellow decomposed quartz monzonite.	

Trench B-3

Bearing: N. 55° W.  
 Width: 13 feet.  
 "0" is E. end.

Length: 310 feet.  
 Average depth: 8.8 feet.

Distance, feet		Sample	Description
From	To		
0.0	34.0	37	Light-gray to light-brown decomposed quartz monzonite.
34.0	34.54		Disintegrated quartz vein, strike N. 12° E., width 0.5 ft., probably same vein as sample 36 in trench B-2.
34.54	81.0		Light-gray to light-brown decomposed quartz monzonite.
81.0	82.2		Rusty-yellow decomposed quartz monzonite with a clay-like appearance, very little biotite, strike N.
82.2	140.0		Light-gray to light-brown decomposed quartz monzonite.
140.0	140.4		Light-gray unaltered quartz monzonite with considerable vuggy quartz on both walls. Strike N. 75° E.
140.4	200.0		Light-gray to light-brown decomposed quartz monzonite.
200.0	310.0		Light-tan decomposed quartz monzonite, with numerous reefs of fresh unaltered quartz monzonite that contains about 5 to 10 percent biotite.

Trench B-4

Bearing: N. 30° W.  
 Width: 13 feet.  
 "0" is SE. end.

Length: 200 feet.  
 Average depth: 3.8 feet.

Distance, feet		Sample	Description
From	To		
0.0	21.0		Decomposed light-tan quartz monzonite crisscrossed with numerous 1/8-in. veinlets of disintegrated quartz.
21.0	22.0		Hard reef of light-tan quartz monzonite. Strike N. 56° E.
22.0	40.0		Decomposed light-tan quartz monzonite crisscrossed with numerous 1/8-in. veinlets of disintegrated quartz.
40.0	41.0		Light-gray unaltered quartz monzonite.
41.0	78.0		Decomposed light-tan quartz monzonite crisscrossed with numerous 1/8-in. veinlets of disintegrated quartz.
78.0	200.0		Light-tan decomposed quartz monzonite with occasional patches of light-gray quartz monzonite, with numerous 1/4-in. rusty disintegrated quartz veins. Numerous 2- to 4-ft. boulders of unaltered dark-gray quartz containing 50 percent or more biotite.

Trench B-5

Bearing: N. 30° W.  
 Width: 13 feet.  
 "O" is SE. end.

Length: 240 feet.  
 Average depth: 3.7 feet.

Distance, feet		Sample	Description
From	To		
0.0	80.0		Decomposed light-tan quartz monzonite, with numerous boulders of quartz monzonite containing much biotite, numerous rusty disintegrated 1/4-in. quartz stringers that strike approximately E. and W.
80.0	80.5		Light-gray unaltered quartz monzonite, strike N. 76° E.
80.5	91.0		Decomposed light-tan quartz monzonite, with numerous boulders of quartz monzonite containing much biotite, numerous rusty disintegrated 1/4-in. quartz stringers that strike approximately E. and W.
91.0	91.1	62	Powdery white quartz, with rusty iron stain, strike N. 40° E.
91.1	116.0		Decomposed light-tan quartz monzonite, with numerous boulders of quartz monzonite containing much biotite, numerous rusty disintegrated 1/4-in. quartz stringers that strike approximately E. and W.
116.0	116.5		Light-gray unaltered quartz monzonite.
116.5	240.0		Decomposed light-tan quartz monzonite, with numerous boulders of quartz monzonite containing much biotite, numerous rusty disintegrated 1/4-in. quartz stringers that strike approximately E. and W.

Trench B-6

Bearing: N. 30° W.  
 Width: 13 feet.  
 "O" is SE. end.

Length: 277 feet.  
 Average depth: 3.6 feet.

Distance, feet		Sample	Description
From	To		
0.0	86.0		Decomposed dark-gray to almost-black quartz monzonite with much biotite, numerous quartz monzonite boulders containing 5 to 50 percent biotite, few stringers of rusty, flaky quartz.
86.0	92.0		Decomposed medium gray-quartz monzonite with 10 percent biotite; few stringers of rusty, flaky quartz.
92.0	222.0		Decomposed dark-gray to almost-black quartz monzonite with much biotite, numerous quartz monzonite boulders containing 5 to 50 percent biotite, few stringers of rusty, flaky quartz.
222.0	241.0		Light-gray decomposed quartz monzonite.
241.0	277.0		Decomposed dark-gray to almost-black quartz monzonite with much biotite, numerous quartz monzonite boulders containing 5 to 50 percent biotite, few stringers of rusty, flaky quartz.

Trench B-7

Bearing: N. 30° W.  
 Width: 13 feet.  
 "0" is SE. end.

Length: 350 feet.  
 Average depth: 3.7 feet.

Distance, feet		Sample	Description
From	To		
0.0	98.5		Light-gray decomposed quartz monzonite, about 5 percent quartz.
98.5	100.0		Unaltered light-gray very fine-grained quartz monzonite, very small biotite crystals.
100.0	200.0		Light-gray decomposed quartz monzonite, about 5 percent quartz.
200.0	208.0		Unaltered coarse-grained light-gray quartz monzonite.
208.0	256.0		Light-gray to yellow decomposed quartz monzonite.
256.0	262.0		Light-yellow completely decomposed quartz monzonite, looks like a fine-grained sand.
262.0	291.0		Light-gray to yellow decomposed quartz monzonite, with iron stain.
291.0	293.0		Unaltered light-gray very fine-grained quartz monzonite very small biotite crystals.
293.0	300.0		Decomposed light-gray quartz monzonite, with numerous boulders of a dark-gray to almost black quartzite, which contains a small amount of biotite.
300.0	350.0		Dark-gray to black fine-grained quartzite containing a small amount of biotite.

Trench B-8

Bearing: N. 30° W.  
 Width: 13 feet  
 "0" is SE. end.

Length: 356 feet.  
 Average depth: 5.3 feet.

Distance, feet		Sample	Description
From	To		
0.0	18.0		Dark-gray quartzite and decomposed dark-brown quartz monzonite with numerous small reefs and boulders of dark-brown quartz monzonite. Quartzite is predominant with numerous small biotite crystals.
18.0	43.0		Light-gray decomposed quartz monzonite.
43.0	56.5		Very dark-gray partially decomposed quartz monzonite, containing much dark quartz and biotite.
56.5	56.8		Vein of white quartz with a few small disseminated biotite crystals.
56.8	200.0		Mostly decomposed dark-gray to almost-black, fine-grained quartz monzonite, containing much dark quartz and biotite, a few light-gray boulders up to 2 ft. in diameter, composed mostly of quartz and feldspar.

Trench B-8 (Con.)

Distance, feet		Sample	Description
From	To		
200.0	210.0	73	Mostly unaltered dark-gray to almost-black fine-grained quartz monzonite containing much dark quartz and biotite.
210.0	210.2		Quartz vein, strike N. 60° E.
210.2	279.0		Mostly unaltered dark-gray to almost-black fine-grained quartz monzonite containing much dark quartz and biotite.
279.0	281.0	75	Light-gray quartz monzonite, strike N. 60° E.
281.0	294.0		Dark-gray partially decomposed quartz monzonite.
294.0	303.0		Light-gray quartz monzonite, strike N. 60° E.
303.0	303.52		Decomposed rusty-to-yellow-colored quartz vein with small amount of arsenopyrite, strike N. 45° E., 0.2 ft. wide.
303.52	327.0		Dark-gray partially decomposed quartz monzonite.
327.0	329.0		Light-gray quartz monzonite, strike N. 60° E. Contacts are very sharp between these light- and dark-gray monzonites.
329.0	356.0		Dark-gray partially decomposed quartz monzonite.

Trench B-9

Bearing: N. 20° W.  
 Width: 13 feet.  
 "O" is SE. end.

Length: 457 feet.  
 Average depth: 5.1 feet.

Distance, feet		Sample	Description
From	To		
0.0	236.0		Light-gray to rusty-gray decomposed quartz monzonite, with a few boulders of quartz monzonite containing much biotite.
236.0	237.0		Rusty zone of decomposed quartz monzonite, strike N. 15° E.
237.0	262.0		Light-gray to rusty-gray decomposed quartz monzonite, with a few boulders of quartz monzonite containing much biotite.
262.0	326.0		Unaltered gray quartz monzonite with much quartz, about 10 percent biotite.
326.0	340.0		Decomposed quartz monzonite, dark gray.
340.0	340.53	77	Rusty vein quartz, scheelite, and arsenopyrite, strike N. 50° E., dip 70° to SE.
340.53	377.0	79	Decomposed light-gray quartz monzonite.
377.0	377.21		Quartz vein, strike E. and W.
377.21	457.0		Decomposed light-gray quartz monzonite. Few 1/2-in. quartz stringers that strike N. 60° E.

Trench B-10

Bearing: N. 20° W.  
 Width: 13 feet.  
 "0" is SE. end.

Length: 288 feet.  
 Average depth: 4.5 feet.

Distance, feet		Sample	Description
From	To		
0.0	38.0		Decomposed light-gray quartz monzonite.
38.0	62.0		Unaltered light-gray quartz monzonite.
62.0	112.0		Light-tan decomposed quartz monzonite.
112.0	130.0		Unaltered light-gray quartz monzonite.
130.0	187.0		Light-tan decomposed quartz monzonite crisscrossed with 1/8-in. disintegrated quartz veins; 1-in. quartz stringer at 175.5 ft. that strikes N. 55° E.
187.0	192.0		Light-tan decomposed quartz monzonite crisscrossed with 1/8-in. disintegrated quartz veins; much more iron stain.
192.0	283.0		Light-tan decomposed quartz monzonite crisscrossed with 1/8-in. disintegrated quartz veins.
283.0	288.0		Light-tan decomposed quartz monzonite crisscrossed with 1/8-in. disintegrated quartz veins; much more iron stain.

Trench B-11

Bearing: N. 20° W.  
 Width: 13 feet.  
 "0" is SE. end.

Length: 177 feet.  
 Average depth: 4.5 feet.

Distance, feet		Sample	Description
From	To		
0.0	53.0		Decomposed light-yellow quartz monzonite.
53.0	64.0		Unaltered light-gray quartz monzonite.
64.0	106.0		Slightly decomposed light-gray quartz monzonite.
106.0	123.0		Yellow partially decomposed quartz monzonite.
123.0	155.0		Lighter yellow partially decomposed quartz monzonite.
155.0	155.3	81	Light-greenish quartz vein.
155.3	177.0		Light-yellow partially decomposed quartz monzonite.

Trench B-12

Bearing: N. 20° W.  
 Width: 13 feet.  
 "0" is SE. end.

Length: 212 feet.  
 Average depth: 4.5 feet.

Distance, feet		Sample	Description
From	To		
0.0	24.0		Light-yellow decomposed quartz monzonite.
24.0	24.3		Quartz vein as in trench B-11 at 155.0 to 155.3 ft.
24.3	157.0		Light-yellow decomposed quartz monzonite.
157.0	171.0		Reef of slightly decomposed quartz monzonite.
171.0	212.0		Light-yellow decomposed quartz monzonite.

Trench B-13

Bearing: E. and W.  
 Width: 13 feet.  
 "O" is E. end.

Length: 70 feet.  
 Average depth: 3.5 feet.

Distance, feet		Sample	Description
From	To		
0.0	70.0		Dark-gray decomposed quartz monzonite with dark-gray quartz monzonite boulders containing much biotite. Formation is much darker than that on west side of Black Creek.

Trench B-14

Bearing: N. 80° W.  
 Width: 13 feet.  
 "O" is E. end.

Length: 108 feet.  
 Average depth: 4.0 feet.

Distance, feet		Sample	Description
From	To		
0.0	84.0		Decomposed dark-gray quartz monzonite.
84.0	84.4		Unaltered gray quartz monzonite; strike N. 65° E.
84.4	108.0		Decomposed dark-gray quartz monzonite.

Trench B-15

Bearing: E. and W.  
 Width: 13 feet.  
 "O" is E. end.

Length: 67 feet.  
 Average depth: 2.5 feet.

Distance, feet		Sample	Description
From	To		
0.0	23.0		Decomposed quartz monzonite crisscrossed with 1/8-in. stringers of decomposed quartz veins.
23.0	29.0		Zone of shattered and partially decomposed sandstone, light-rusty color, much quartz and stain.
29.0	32.0	248	Partially shattered, almost-black argillite, considerable iron pyrite.
32.0	38.0	249	Reddish-colored and shattered argillite with arsenopyrite. From 36.0 to 36.4 ft. is vein of quartz and arsenopyrite (sample 249). Sample 250 is from 32 to 38 ft. inclusive.
38.0	67.0	250	Decomposed quartz monzonite and quartz monzonite boulders.

Trench B-16

Bearing: N. and S.  
 Width: 13 feet.  
 "O" is S. end.

Length: 355 feet.  
 Average depth: 2.5 feet.

Distance, feet		Sample	Description
From	To		
0.0	37.0	307	Light-gray decomposed quartz monzonite, with a few quartz monzonite boulders. Sample 307 is of a 1/4-in. rusty quartz vein at 24 ft. Strike N. 37° E.
37.0	40.0		Light-gray decomposed quartz monzonite, with a few quartz monzonite boulders; much more iron stain.
40.0	285.0	308	Light-gray decomposed quartz monzonite, with a few quartz monzonite boulders. At 69.0 ft. is 1/2-in. quartz vein, strike N. 40° E. (sample 308).
		309	At 108.0 ft. is 4-in. quartz vein with a small amount of biotite, strike N. 50° E., vertical dip (sample 309).
285.0	290.0		Unaltered very light-gray quartz monzonite, over 50 percent quartz, very little biotite.
290.0	355.0		Light-gray decomposed quartz monzonite.

Trench B-17

Bearing: N. 8° E.  
 Width: 13 feet.  
 "O" is S. end.

Length: 400 feet.  
 Average depth: 2.7 feet.

Distance, feet		Sample	Description
From	To		
0.0	16.0		Very dark-gray decomposed quartz monzonite, much biotite.
16.0	16.7		Unaltered very light-gray quartz monzonite. Sharp contact, strike N. 60° E.
16.7	67.0		Very dark-gray decomposed quartz monzonite, much biotite, a few quartz monzonite boulders.
67.0	84.0		Light-brown quartzite, limonite stain on fractures.
84.0	400.0		Decomposed medium- to dark-gray quartz monzonite, containing much biotite and iron stain; a few disintegrated, iron-stained quartz stringers that strike N. 60° E.

Trench B-18

Bearing: N. and S.  
 Width: 13 feet.  
 "O" is S. end.

Length: 257 feet.  
 Average depth: 1.6 feet.

Distance, feet		Sample	Description
From	To		
0.0	257.0		Mostly unaltered, very fine-grained, dark-gray quartz monzonite, with many boulders which contain a small amount of decomposed material.

Trench B-19

Bearing: N. 4° W.  
 Width: 13 feet.  
 "O" is S. end.

Length: 425 feet.  
 Average depth: 3.3 feet.

Distance, feet		Sample	Description
From	To		
0.0	46.0		Partially decomposed brown quartz monzonite with limonite stain, and a few boulders.
46.0	46.14	86	Three-fourth-inch barren white quartz vein with 1/16-in. siderite on footwall and hanging wall, strike N. 40° E., dip 65° to NW.
46.14	159.0		Partially decomposed quartz monzonite.
159.0	159.18	88 90	One and one-fourth-inch white-to-gray quartz vein, with few yellow vuggy areas. Very small amount of cinnabar noticed in small inch-square section of vein. Strike N. 30° E., dip 48° NW. Sample 88 is of section carrying cinnabar and sample 90 is of vein.
159.18	204.0		Partially decomposed quartz monzonite, more iron stain from 199.0 to 204.0 ft.
204.0	242.0		Unaltered fresh gray quartz monzonite.
242.0	425.0		Slightly decomposed gray quartz monzonite.

Trench B-20

Bearing: N. 4° W.  
 Width: 13 feet.  
 "O" is SE. end.

Length: 469 feet.  
 Average depth: 3.3 feet.

Distance, feet		Sample	Description
From	To		
0.0	70.0		Light-brown, decomposed, quartz monzonite.
70.0	105.0		Water hole, no exposure.
105.0	437.0		Partially decomposed gray quartz monzonite with numerous 4- to 5-ft. boulders. Occasional reddish patches of decomposed quartz monzonite.
437.0	469.0		Water hole, no exposure.

Trench B-21

Bearing: N. 2° E.  
 Width: 13 feet.  
 "0" is S. end.

Length: 318 feet.  
 Average depth: 3.2 feet.

Distance, feet		Sample	Description
From	To		
0.0	318.0		Light-brown, decomposed, quartz monzonite with numerous large boulders of light-gray quartz monzonite; 1/2-in. quartz vein at 17 ft., strike N. 35° E.

Trench B-22

Bearing: N. 7° E.  
 Width: 13 feet.  
 "0" is S. end.

Length: 400 feet.  
 Average depth: 3.2 feet.

Distance, feet		Sample	Description
From	To		
0.0	132.0		Partially decomposed light-brown to light-gray quartz monzonite with numerous large boulders. At 17 ft., a 1/4-in. decomposed rusty quartz vein, strike N. 24° W.
132.0	142.0		Light-brown to light-tan decomposed quartz monzonite, several small rusty decomposed iron-veins striking approximately N. 85° W.
142.0	388.0	305	Partially decomposed light-brown to light-gray quartz monzonite with numerous large boulders. Sample 305 is composite of numerous small quartz veins and specimens of disintegrated quartz.
388.0	394.0		Light-brown to light-tan decomposed quartz monzonite, several small rusty decomposed iron veins striking approximately N. 85° W.
394.0	400.0		Partially decomposed light-brown to light-gray quartz monzonite with numerous large boulders.

Trench B-23

Bearing: 0 to 280 - N. 36° E.  
 280 to 380 - N. 54° E.  
 Width: 13 feet.  
 "0" is S. end.

Length: 380 feet.  
 Average depth: 3.5 feet.

Distance, feet		Sample	Description
From	To		
0.0	380.0	251	Light-gray to light-tan decomposed quartz monzonite with numerous large boulders. At 55 ft., a 3/8-in. horizontal quartz vein (sample 251).

Trench B-24

Bearing: N. 56° W.  
 Width: 13 feet.  
 "0" is NW. end.

Length: 397 feet.  
 Average depth: 2.5 feet.

Distance, feet		Sample	Description
From	To		
0.0	51.0	253	Decomposed light-gray to light-tan quartz monzonite.
51.0	51.2		Quartz vein.
51.2	273.0		Decomposed light-gray to light-tan quartz monzonite.
273.0	293.0		Bright light-tan quartz monzonite with much iron mineralization, contacts are sharp and strike N. and S. Very little biotite.
293.0	327.0		Decomposed quartz monzonite with numerous quartz monzonite boulders.
327.0	336.0		Decomposed quartz monzonite with numerous quartz monzonite boulders; much limonite stain.
336.0	397.0		Decomposed light-gray quartz monzonite. A few small biotite crystals, much white quartz, very little iron stain.

Trench B-25

Bearing: 0 to 450 - N. 64° W.  
 450 to 700 - N. 66° W.  
 Width: 13 feet.  
 "0" is SE. end.

Length: 700 feet.  
 Average depth: 2.7 feet.

Distance, feet		Sample	Description
From	To		
0.0	387.0		Decomposed light-tan to light-gray quartz monzonite.
387.0	405.0		Decomposed light-tan to light-gray quartz monzonite; much iron mineralization, strike of mineralized contact, N. 26° E.
405.0	700.0		Partially decomposed quartz monzonite with numerous boulders, a fine-grained, very dark-gray quartz monzonite composed of over 50 percent smoky quartz, with much biotite in small crystals, numerous mud sills. A few disintegrated quartz and iron stringers that strike N. 26° E.

Trench B-26

Bearing: N. 30° W.  
 Width: 13 feet.  
 "0" is SE. end.

Length: 72 feet.  
 Average depth: 3.0 feet.

Distance, feet		Sample	Description
From	To		
0.0	43.0		Light-gray to medium-gray decomposed quartz monzonite, with numerous 1- to 3-ft. boulders of fairly fine-grained quartz monzonite. No trace of cinnabar-bearing quartz vein that was in trench B-19.
43.0	72.0		Light-gray to medium-gray decomposed quartz monzonite, with numerous 1- to 3-ft. boulders of fairly fine-grained quartz monzonite. No trace of cinnabar-bearing quartz vein which was in trench B-19; slightly more iron mineralization.

Trench B-27

Bearing: N. 19° E.  
 Width: 13 feet.  
 "0" is S. end.

Length: 245 feet.  
 Average depth: 5.0 feet.

Distance, feet		Sample	Description
From	To		
0.0	9.0		Decomposed light-brown quartz monzonite.
9.0	9.5		Ninety-five percent light-gray to white feldspar and white quartz, rest appears to be small biotite crystals.
9.5	27.0		Decomposed light-brown quartz monzonite.
27.0	27.5		Ninety-five percent light-gray to white feldspar and white quartz, rest appears to be small biotite crystals. Strike N. 80° E.
27.5	124.0		Decomposed light-brown quartz monzonite. Contact at 124 ft. strikes N. 71° W.
124.0	133.0		Medium-gray argillite.
133.0	134.7	287 288 289	Stibnite and quartz, erratic stibnite mineralization, strike N. 13° W., vertical dip. Measurement of vein normal to strike is 0.9 ft., and all samples are taken normal to strike. Sample 287, 133.0 to 133.6 ft., light-yellow quartz and feldspar, much yellow sulfides; sample 288, 133.6 to 134.3 ft., smoky quartz with small amount green quartz and stibnite, which appears to have entered after quartz. Sample 289, 134.3 to 134.7 ft., light-yellow quartz and smoky quartz.
134.7	160.0		Medium-gray argillite.

Trench B-27 (Con.)

Distance, feet		Sample	Description
From	To		
160.0	161.4	290 291	Quartz and argillite with 5 percent stibnite in small lenses. Stibnite is in elongated lenses with the long axes normal to the quartz vein, and does not extend into the argillite; mineralization is erratic. Some associated scorodite and sericite, and chlorite. Very small amount of arsenopyrite, and limonite. Sample 290 is a composite of stibnite pockets or lenses. Sample 291 is of yellow vuggy quartz and argillite and a cross portion containing no stibnite. Width of vein or zone is 1.0 ft.
161.4	193.0		Medium-gray argillite.
193.0	204.0		Fractured argillite.
204.0	218.0	292	Light-gray fine-grained quartzite.
218.0	245.0		Partially decomposed brown quartz monzonite.

Trench B-28

Bearing: N. 15° W.  
 Width: 13 feet.  
 "O" is S. end.

Length: 180 feet.  
 Average depth: 5.0 feet.

Distance, feet		Sample	Description
From	To		
0.0	100.0		Brown decomposed quartz monzonite with dark-gray quartz monzonite boulders.
100.0	180.0		Brown decomposed quartz monzonite with dark-gray quartz monzonite boulders, with more biotite.