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GEOCHEMICAL INVESTIGATION AT ANTIMONY CREEK ANTIMONY PROSPECT, NORTHERN TALKEETNA MOUNTAINS, ALASKA

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Geochemical investigation at Antimony Creek antimony prospect, northern Talkeetna Mountains, Alaska

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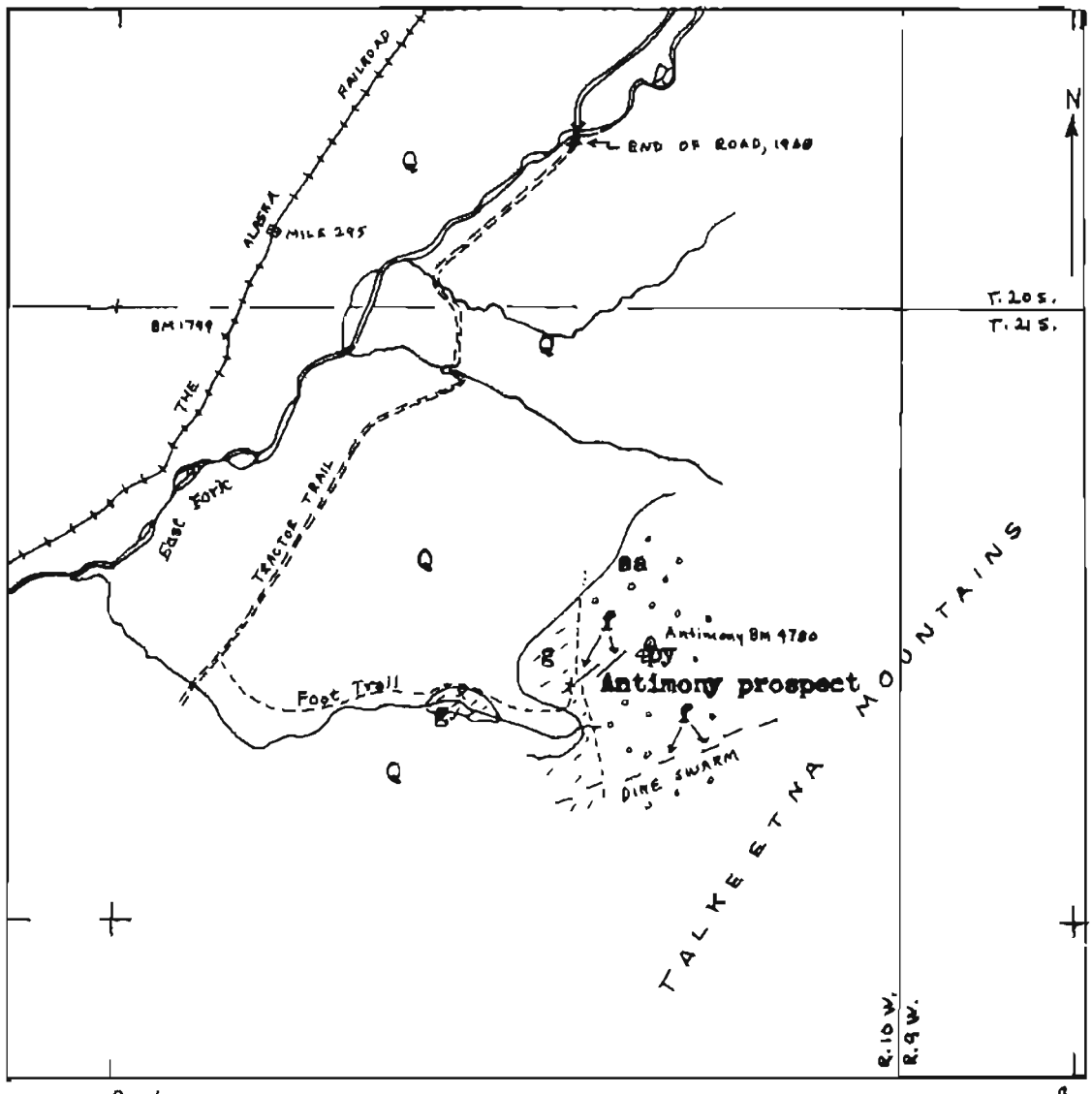
Abstract

A stibnite-quartz vein near Antimony Creek contains as much as 0.18 ounces of gold per ton. Geochemical reconnaissance suggests that the vein, although very small, is more continuous than previously assumed, and that other veins containing gold and some copper and zinc probably exist in the area.

Introduction

An isolated antimony prospect near Antimony Creek, a tributary to the East Fork of the Chulitna River in south-central Alaska (fig. 1) was visited by Capps (1919, p. 229-230) in 1917; however, at that time the adit was inaccessible and the vein unexposed. In 1942 the prospect was restaked and was examined by Eskil Anderson (1942), then of the Territorial Department of Mines.

The prospect was examined by Hawley on July 31, 1967, to ascertain if gold accompanies the antimony, and to supplement the available geologic information on the prospect. The deposit can be reached by helicopter or on foot either from near Honolulu on the Alaska Railroad or from the present end of Alaska Highway 3 at the East Fork of the Chulitna (fig. 1). Harry Madson of Fox and Ernie Maurer of Fairbanks, the present owners of the claim, accompanied the author.



Base from Healy A-5 and A-6 quadrangles, 1:63,360 series

EXPLANATION

Q — Surficial deposits, undivided

f — felsite

py — Pyroxenite

g — Graywacke-argillite

sa — Siliceous argillite

Inferred contact

Caved adit

Prospect

FIGURE 1.--INDEX MAP SHOWING GENERALIZED GEOLOGY NEAR ANTIMONY PROSPECT

1 ½ 0 1 2 MILES

Geographic and geologic setting

The prospect is on the northwest flank of the low but rugged Talkeetna Mountains. It is south of the Alaska Range which is separated from the Talkeetna Mountains by the broad valley of the Chulitna River. The geology of the region is known only from reconnaissance mapping (Capps, 1940).

Rocks near the antimony prospect are dark-gray interlayered graywacke-argillite and pale-gray, very siliceous dense argillite (fig. 1). Both rock types are cut by light-colored, fine-grained dikes, here called felsites, and just south of the vertical-angle bench mark "Antimony" the siliceous argillite unit is cut by a small pyroxenite plug. The felsite dikes near the prospect are very steep and strike northeasterly; one extends to very near the antimony prospect. The pyroxenite, which is partly altered to serpentine minerals, is medium green and weathers pale orange brown.

Antimony deposit

Judged from material on the small prospect dump and from the description by Capps (1919, p. 229-230), the antimony deposit consists principally of stibnite and quartz. Some vein material is nearly pure stibnite in either granular or platy form; some is mainly quartz, stained with red and yellow secondary antimony minerals. According to data received by Capps (1919, p. 230), "The stibnite occurs in lenses or kidneys that have a maximum thickness of 2 feet and are only a few feet long...". At the time of Anderson's visit the adit had been cleaned out, and according to his report (1942):

"The tunnel was driven about N. 20° E., along the strike of a stibnite vein which dips 25°. Massive stibnite occurs in a thin lens which is about 8 inches wide at the portal of the old tunnel.... Apparently the ore occurred in a lens that was considerably thicker where the old tunnel was driven. This is indicated by the narrowing of the lens both downward and toward the face of the tunnel." At the face no trace of the vein was observed. A sample of ore from the dump collected by Anderson assayed 37.46 percent antimony.

Chemical analyses of large pieces of stibnite-rich and quartz-rich material collected from the dump or talus slope in 1967 showed more than 10,000 ppm antimony, about 6 ppm gold (or about .18 oz/ton), considerable arsenic in the quartz-rich sample, and only trace amounts of most other metallic elements (table 1).

Geochemical reconnaissance

The antimony prospect is on a steep hillside partly covered by fine-grained colluvium. It was believed that sampling these colluvial deposits along the contour of the hill might indicate an extension of the antimony vein to the northeast, and possibly other veins.

Ten samples collected at 25-foot intervals parallel to the contour of the hill (fig. 2), were analyzed by atomic absorption methods for gold, antimony, and copper, and by spectrographic methods for molybdenum, zinc, and other metals. Some of the analyses indicate anomalous concentrations of antimony, gold, copper, zinc, and molybdenum. Except for antimony these anomalies do not correlate with the known vein. The antimony distribution (fig. 2) is consistent with the geologic data given by Anderson (1942), but it shows that antimony mineralization is more

Table 1.--Analyses of samples from the Antimony prospect

(in parts per million)

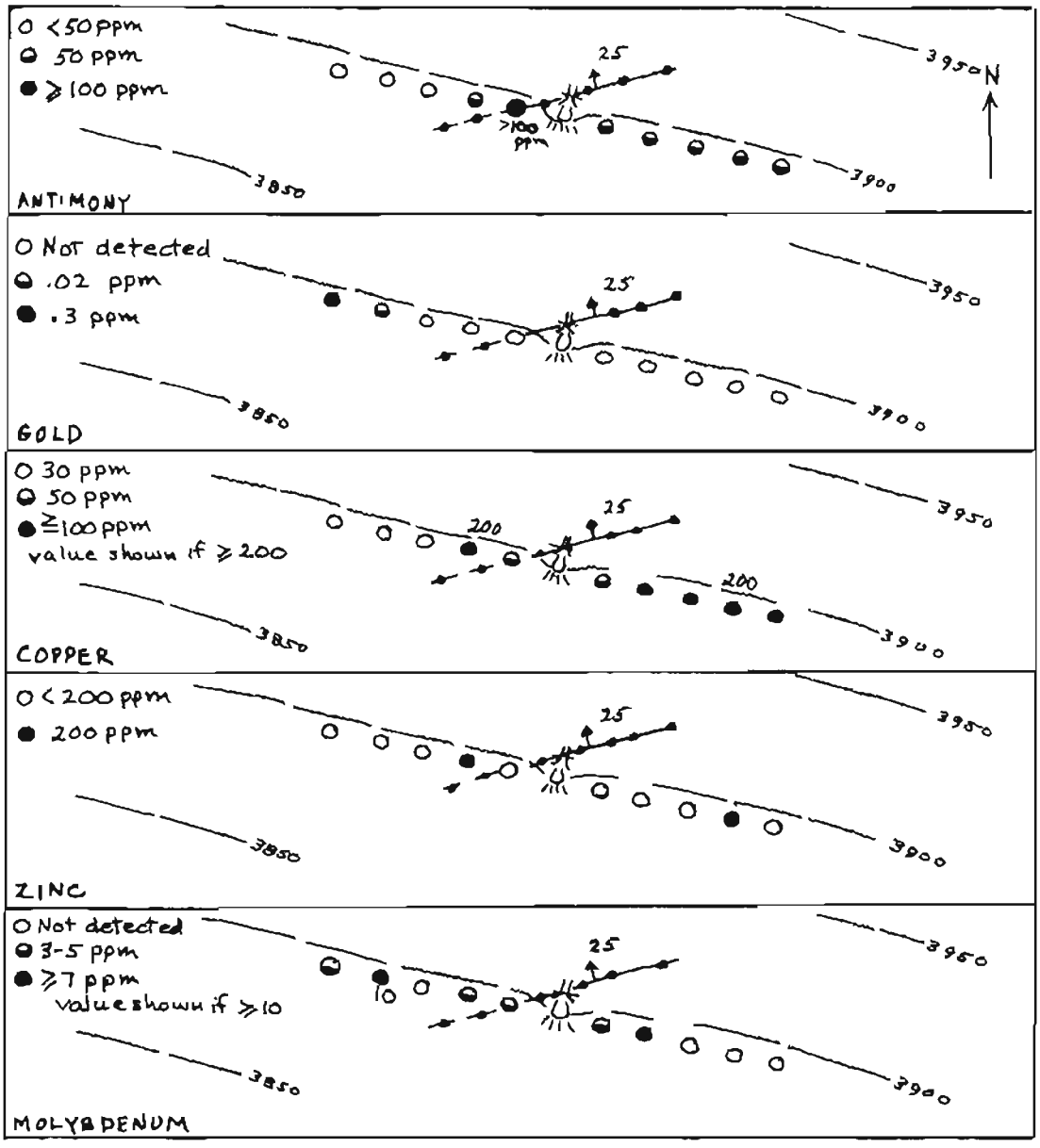
	Lab No.	Field No.	As	Au 1/	Au 2/	B	Ba	Be	Co	Cu	La	Mo	Mn	Nb	Ni	Pb	Sb	V
1. Quartz-rich	ACE619	67AHx151W	700	6.5	<10	10	30	<1	10	50	70	<5	150	10	30	70	>10,000	10
2. Stibnite-rich	ACE620	67AHx151S	0	5.5	<10	10	0	1	5	20	50	0	<10	<10	15	30	>10,000	<10

1/ Atomic absorption

2/ Spectrographic

Unless otherwise noted, the analyses are semiquantitative spectrographic determinations made by E. E. Martinez; gold concentrations were determined by atomic absorption by A. L. Meier, R. L. Miller, and T. A. Roemer.

Ag, Bi, Cd, Ce, Sc, Si, Sn, W, Zn, and Zr were looked for but not found.



Analyses by A. L. Meier, R. L. Miller, T. A. Roemer and E. E. Martinez

EXPLANATION

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Antimony vein showing dip
(Dashed where inferred)

Caved adit and dump

FIGURE 2.--METAL ANOMALY MAPS AT THE ANTIMONY PROSPECT

100 0 100 200 Feet

Datum is approximate mean sea level as estimated from U.S. Geol. Survey Healy A-5 quadrangle

extensive than previously known because anomalous antimony values persist to the east for over 100 feet. Gold was detected west of the maximum antimony concentrations and is probably best interpreted as indicating another vein. The zinc, copper, and molybdenum values and their distribution are very ambiguous. These elements are anomalous constituents of the surficial deposits but only subordinate constituents of the quartz-stibnite vein (table 1), and apparently they are not directly related to the antimony deposit.

Conclusions

The significance of the antimony occurrence is uncertain. The host rocks of the deposit are probably favorable for only fissure deposits, and the known vein is a small one. On the other hand, the occurrence of stibnite and anomalous amounts of other elements indicate mineralization in a poorly prospected region. The antimony deposit is pure enough so that it could be hand cobbed easily, and its gold content is appreciable. The completion of Alaska Highway No. 3, scheduled by 1971, will allow easy access to the area.

The diversity of mineralization indicated by the trace elements at Antimony Creek is consistent with that found east of the Chulitna River. At the Silver King prospect (Hawley and Clark, 1968) stibnite-rich veins occur with gold, arsenic, copper, and trace amounts of other elements, and are associated with dikes of porphyritic igneous rocks. The mineralization at Antimony Creek is also associated with dikes, and, although speculative, it is reasonable to assume that the anomalous amounts of gold, copper, and zinc are derived from small veins in or near the high-angle dikes of the area. The stibnite-rich vein is in a low-angle

fracture fissure; its podlike configuration is consistent with an origin by filling of tension or gash fractures possibly opened by movement on the steep dike-filled fissures. If this mode of origin is valid, then other lenticular stibnite veins probably exist near the felsite dikes.

References cited

Anderson, Eskil, 1942, Report on a stibnite prospect at Antimony Creek, Broad Pass district, Alaska: Unpublished report of the Territory of Alaska, Department of Mines on file at Technical Data Section, Alaska Geology Branch, U.S. Geol. Survey, 345 Middlefield Road, Menlo Park, Calif. 94025.

Capps, S. R., 1919, Mineral resources of the Chulitna region: U.S. Geol. Survey Bull. 692, p. 207-232.

_____, 1940, Geology of the Alaska Railroad region: U.S. Geol. Survey Bull. 907, 201 p.

Hawley, C. C., and Clark, Allen L., 1968, Occurrences of gold and other metals in the upper Chulitna district, Alaska: U.S. Geol. Survey Circular No. 564, 21 p.