D - F - A - F - T
(Subject to correction and revision)

INITIAL WAR MINERALS REPORT

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

W.M.R._____ Antimony March, 1944

TOK RIVER ANTIMONY PROSPECT
SLANA-TOK DISTRICT
TOK RIVER REGION, ALASKA

References:

1. Moffit, Fred H., "Geology of the Slana-Tok District, Alaska", Department of the Interior, Geological Survey Bulletin 904.

2. Joesting, Henry R., "Strategic Mineral Occurrences in Interior Alaska", Pamphlet No. 1, Department of Mine, Territory of Alaska, College, Alaska, May 1942.

D - R - A - F - T
(Subject to correction and revision)

INITIAL WAR MINERALS REPORT

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

W.M.R._____ Antimony March, 1944

TOK RIVER ANTIMONY PROSPECT
SLANA-TOK DISTRICT
TOK RIVER REGION, ALASKA

- - - o - - -

D - R - A - F - T
(Subject to correction and revision)

INITIAL WAR MINERALS REPORT *

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

W.M.R._____ Antimony March, 1944

TOK RIVER ANTIMONY PROSPECT
ALASKA-TOK DISTRICT
TOK RIVER REGION, ALASKA

SUMMARY

The Tok River antimony deposit outcrops at the toe of the east wall of Boulder Creek and is partially exposed along 36 feet of the strike and 41 feet of the dip. This mineralized zone is approximately 11.4 feet wide near the base of the exposure. Samples taken across this wide portion of the lode do not show the presence of a shipping grade ore. The nature of the mineralization, stibnite intergrown with quartz and disseminated through schist in small lenticular masses, indicates that the ore must be concentrated in order to produce a marketable product.

To date, there has not been sufficient exploratory work on

* This initial war minerals report has been prepared for the engineers and consultants of the Bureau of Mines for their technical review and criticism, and to keep them informed of the progress of the Bureau of Mines war minerals program. It is not to be made available to others, as the data are subject to correction and revision. The final report, when issued, will be distributed on a limited basis to officials of the Federal war agencies, the owners or operators of the properties described therein, and to certain others with specific concern in the production of minerals vital to the prosecution of the war.

this deposit to prove any potential ore reserves.

Should the demand for antimony again become acute additional exploration should be considered. This should include trenching, sampling and metallurgical testing, possibly followed by core drilling. No work by the Bureau of Mines is contemplated in the immediate future.

INTRODUCTION

Although antimony was known to occur in the Tok River region, it was not until the fall of 1940 when a deposit was staked by a prospector, Sam Gamblin, that it attracted any particular attention. During the ensuing years this deposit was examined and sampled by an engineer of the Alaska Territorial Department of Mines [1] and engineers of various active mining companies in Alaska.

In September 1942, an examination of this deposit was made for a private corporation [2] by one of its engineers. [3] Three days were spent on the property examining and sampling the deposit.

LOCATION AND ACCESSIBILITY

The antimony deposit of the Tok River region is located at approximate longitude 143° 48' W. and latitude 63° 15' N. in the northern part of the Chitina recording district, west central Alaska, on Boulder Creek, a northern headwater tributary of the Tok River. (Figure 1) This deposit is about 17 airline miles southwest of Tanana Crossing and approximately 250 miles by highway from tidewater at Valdez.

1/ Joesting, Henry R., Associate Mining Engineer.
2/ Gold Placers, Inc., Fairbanks, Alaska.
3/ Thomas, Bruce I.

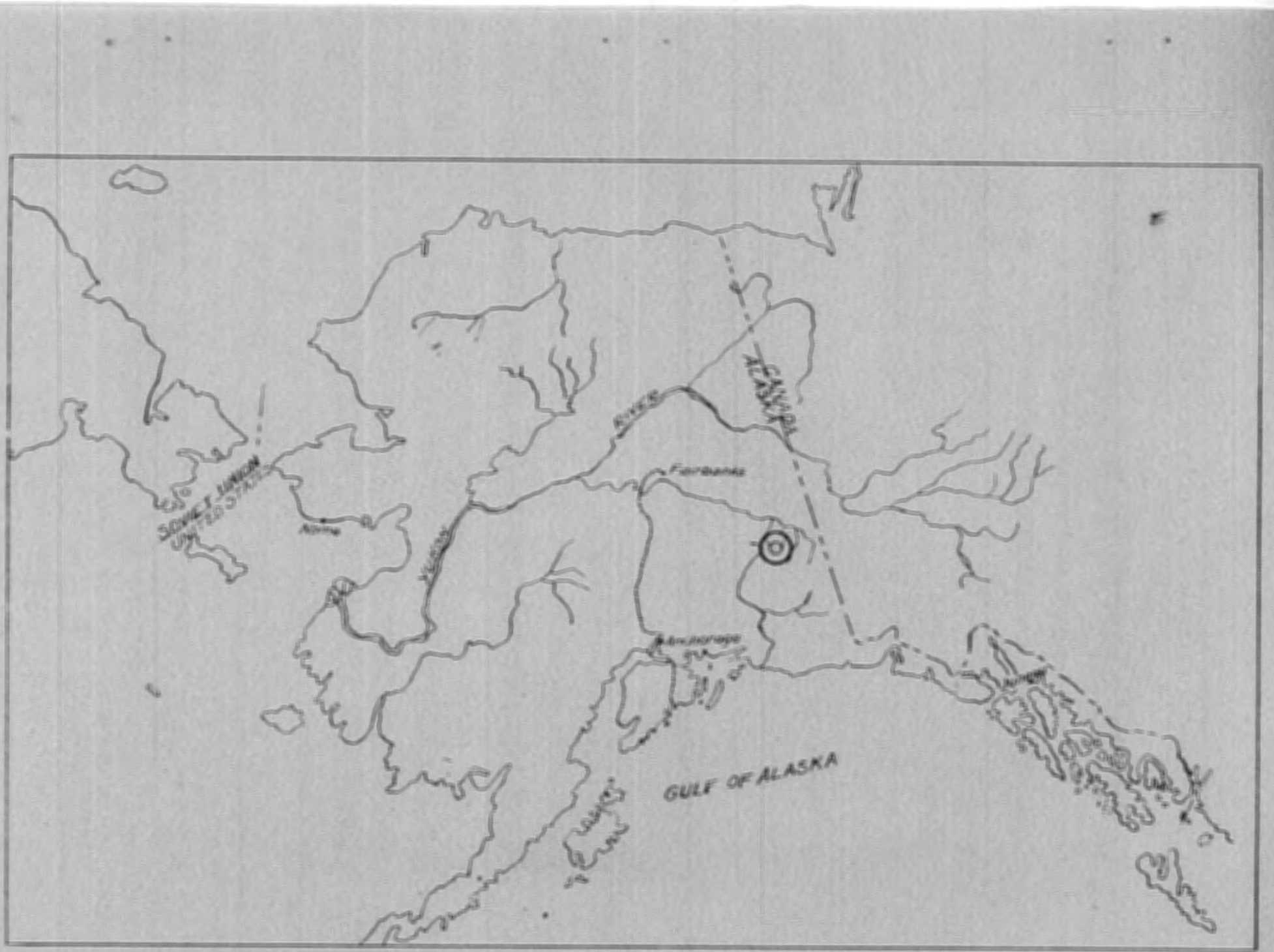


FIG. 1 INDEX MAP OF ALASKA SHOWING TOK RIVER AREA

The property may be approached to within 22 miles by automobile by way of the Richardson Highway and Slana Cut-off. The remaining distance can readily be traversed on foot by leaving the Slana Cut-off at the confluence of the Little Tok and Tok Rivers, and proceeding up the Tok River to Boulder Creek. (Figure 2)

There is a natural airplane landing strip about 1,800 feet in length, at the mouth of Boulder Creek on the valley floor of the Tok which is suitable only in the winter time for ski-equipped aircraft. This strip could be made safe for summer use by cutting some small patches of brush, and making a few small fills.

PHYSICAL FEATURES AND CLIMATE

The maximum local relief of the Boulder Creek area is approximately 4,000 feet. This area is characterized by high steep irregular mountains which rise abruptly above the valley floor of the Tok. The lower portions of these mountains near the base are covered with a thick mantle of moss, and sporadic growths of scrub spruce, alder and some birch.

The Tok River is a glacial stream which is constantly changing its course across its wide valley floor. There is evidence along the upper reaches of the river showing where it has at times covered the entire valley during a flood stage. Boulder Creek is not a glacial stream; its waters are derived from seasonal rains and melting snow from the high surrounding mountains. Although it flows in a V-shaped valley there is evidence of recent glaciation. During the summer months

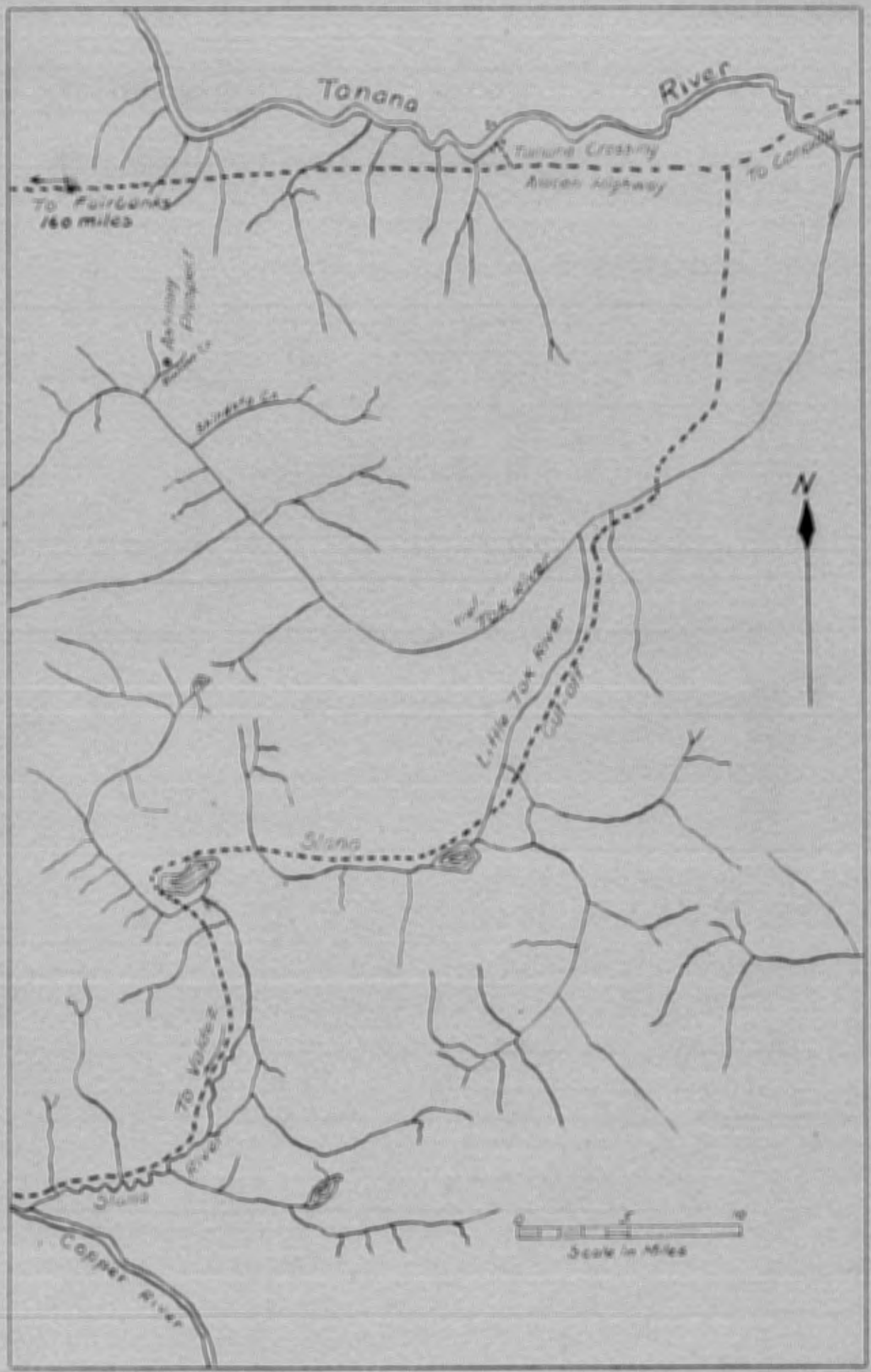


FIG 2 SLANA-TOK DISTRICT

Boulder Creek has sufficient water for mining, milling and other needs, but during the coldest winter months it is doubtful if there would be an adequate supply for all purposes.

The spruce trees that grow near the deposit are scattered and scrubby, and very few would be useful for mine timbers. However, 1-1/2 miles downstream at the mouth of Boulder Creek there is a considerable quantity of spruce which would be suitable for mine timber and saw logs. On this location many trees measure 18 inches and 24 inches in diameter. At another location about 2 miles down the Tok from the mouth of Boulder Creek, there is a much larger stand of spruce timber suitable for mining purposes.

The climatic conditions of the area are characterized by long cold winters with sub-zero temperature and fairly heavy snowfalls accompanied by strong winds. The summers are moderately warm with frequent rains that are quite prevalent in this high mountainous area.

LABOR AND LIVING CONDITIONS

The only housing facility in the area is a small 18 by 20 foot log cabin which is located about 1/2 mile down Boulder Creek from the deposit. Miners and other skilled labor would have to be brought into the area from other Alaskan points such as Fairbanks, Valdez and Anchorage. Indians living at Tanana Crossing would be available for unskilled labor.

HISTORY AND PRODUCTION

It has been reported that this antimony deposit was discovered about 40 years ago by a man named Frank Caulk. Mr. Caulk drove a small adit, about 12 feet in length, diagonally across the lode and then abandoned it. It was not until the summer of 1940 that any consideration was given the deposit. At this time Mr. Sam Gamblin staked the lode and did a small amount of exploration work. During this period of exploration Mr. Gamblin and his assistants hand-sorted and stockpiled several tons of material with the express purpose of shipping the higher grade material. Unfortunately the stockpiles were washed away by the flood waters of Boulder Creek, and he was unable to make any shipment. When the property was visited about 18 months later, much of this material could be seen scattered along the creek banks several hundred feet below the workings.

Up to the present time there has been no further work done, except sampling by various engineers.

PROPERTY AND OWNERSHIP

The mining rights of the claims covering this property are held by Sam Gamblin of Fairbanks, Alaska. A group of four claims, approximately 600 feet by 1,500 feet in size, were recorded in the recording office at Chitina, Alaska, and are as follows:

Name of Claim	Date Staked	Date Recorded
Rambler No. 1	6-10-40	9-24-40
Rambler No. 2	6-10-40	9-24-40
Rambler No. 3	9- 9-42	not known
Rambler No. 4	9- 9-42	not known

GENERAL GEOLOGY 4/

"The prospect in the Tok Valley is on a tributary of the river flowing in from the north and joining it 7 miles above the mouth of the Dry Tok, or 2-1/2 miles above Shindata Creek. This tributary stream has two branches, which come together about 1 mile above its mouth. On the south side of the eastern branch, nearly half a mile from the forks, an old prospect hole was driven in a mass of stibnite cropping out in the canyon wall at the edge of the gravel bar.

"The country rock is chiefly metamorphosed sedimentary deposits which are nearly everywhere siliceous and have been folded, faulted, and cut by granular intrusive rocks, now considerabley altered. Near the forks of the creek soft gray or black schist that plainly lies in a zone of faulting forms a high wall on the south. It dips southwest and is underlain by the siliceous schistose beds, which show some differences in appearance from place to place and extend up the creek beyond the tunnel. The siliceous schist appears to be a succession of altered quartzite beds but presents phases that possibly indicate altered siliceous intrusive rock. Exposed surfaces of the schist commonly show a fine banding caused by alternating thin layers or lenses and sheets of granular quarts and brownish mica. The appearance of a clean surface is striking and at a short distance suggests a sheef of white or gray paper ruled with straight, closely spaced, parallel lines. At the tunnel the banded schist is interrupted by a finer-grained siliceous rock with rusty weathering on exposed surfaces and joint faces, which appears to be a silicified sedimentary bed but possibly is an altered fine-grained intrusive. It is 100 feet thick, strikes N. 67° - 73' W., and dips about 50° S. Like the other rocks of the vicinity, it is much faulted and is filled with veins of glassy bluish-gray and white quartz.

"The ore body forms the base of a projecting ledge or spur of the silicified rock about midway between the two schist boundary lines and lies mostly in a single bed or block about 8 feet thick, which is more massive than the adjacent rock and makes the nose of the spur. Stibnite that occurs chiefly as a granular mass but in part in coarse shining crystals replaces the siliceous rock completely in the lower part of the deposit. Elsewhere it partly replaces the country rock, is disseminated through it, or cuts it in well-defined veins. This mineralized block shows a triangular face about 25 feet high and 20 feet across the base at the gravel bar.

4/ Moffit, Fred H., "Geology of the Slana-Tok District, Alaska", Department of the Interior, Geological Survey Bulletin 904.

"The floor of the short tunnel is 5 feet above the gravel bar and follows a small vein of stibnite in or near a fault in loose caving ground. It shows much less of the ore body than is exposed on the surface below and west of it, and this fact and the general appearance of the mineralized part of the spur suggest that the continuation of the mineralized body may be below the level of the bars rather than up the canyon wall.

"The original owner of the property has done nothing on it for many years and was not available for consultation regarding his findings, but recent assays show that the ore contains a little gold."

OCCURRENCE OF DEPOSIT

The antimony deposit outcrops near the water's edge, at the toe of a high bench on the east wall of Boulder Creek. The valley floor is approximately 150 feet wide at this point and the steep valley walls give a decided canyon effect.

The rock near and enclosing the antimony deposit is a quartz-mica schist which has been subjected to much folding and faulting. The average of strike and dip readings taken at several places close to and adjoining the deposit shows the planes of schistosity strike about N 10° W and have an average dip of 49° to the southwest.

The mineralized zone bounded by two fault planes, one along the footwall and one along the hanging wall, measures about 11-1/2 feet in width, strikes N 10° W and dips about 46° to the southwest.

CHARACTER OF MINERALIZATION

The mineralized body contains the mineral stibnite, the sulphide of antimony. The stibnite occurs as both coarse crystalline and massive granular varieties. The coarse crystalline stibnite is intermixed with quartz and occurs as small irregular lenticular-shaped masses disseminated through quartz mica schist. The massive variety,

found as a vein two feet above the footwall, is 1.5 feet wide and can be traced for 41 feet along the dip. (Figure 3) The gangue mineral is quartz together with clay and schist.

SAMPLING AND ASSAYING

Fourteen samples were secured: thirteen of these were channel samples taken from the outcrop and one was a sample given by Mr. Gamblin which was reputedly a representative sample of the highest grade stock pile. Two samples came from the uppermost portion of the mineralized zone and three from the floor of an excavation for a proposed adit. (Figure 3)

Where possible, all channel samples were 5 inches wide and 2 inches deep. These samples were dried, broken in a mortar, rolled on clean canvas, coned and quartered with opposite quarters saved for analysis.

All samples were analyzed at the Territorial Assay Office, Anchorage, Alaska. The results are shown in Table 1.

ORE RESERVES

With the limited amount of development work that has been accomplished, and this being confined to the wide lower portions of the exposed deposit, it was not possible to obtain sufficient samples to formulate a basis for calculating ore reserves.

The granular stibnite which occurs as a vein two feet above the footwall of the lode averages 1.4 feet wide and has an average antimony content of 32.9 percent. The remaining 10 feet of the lode,

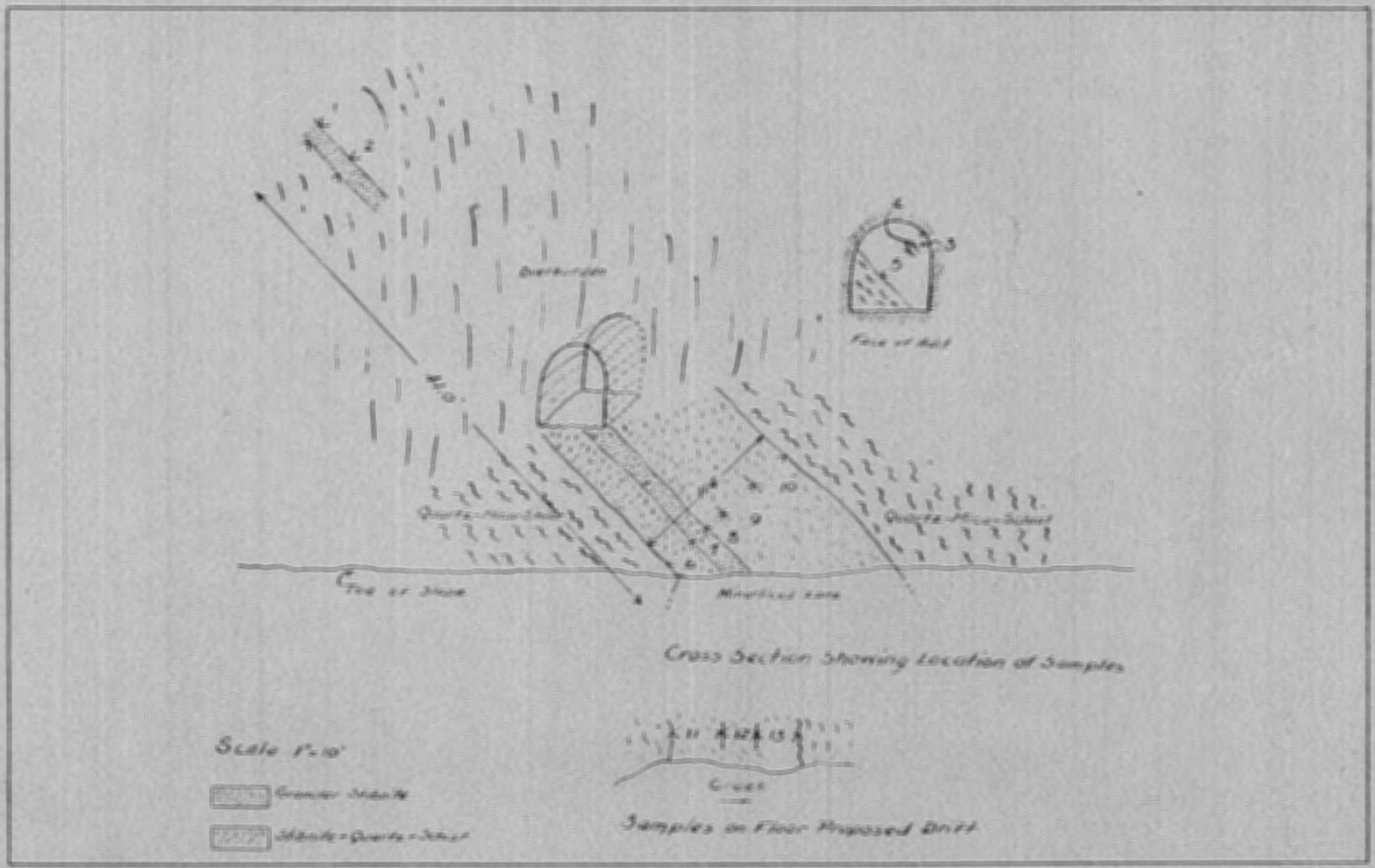


FIG 3 SKETCH SHOWING LOCATION OF SAMPLES

Table No. 1 - TABULATION OF SAMPLING RESULTS

Sample Number	Percent Sb	Percent Au	Percent Cu	Width ft. rt. angle to dip	Description
1	34.48	0.06	Trace	1.3	Granular stib. from top exposure
2	26.76	0.10	Trace	1.3	3.6 feet down dip from No. 1 - gran. stib.
3	3.90	0.40		1.5	From hanging wall in old adit - quartz and stibnite
4	20.80	0.2	Trace	0.45	Coarse crystalline stibnite from old adit
5	14.92	0.10		2.7	From footwall in old adit - quartz and stib.
6	13.62	0.05		2.4	From footwall of wide mineralized zone. Qtz. and coarse cryst. stib. qtz. predominant
7	35.04	0.06	Trace	1.5	From wide zone above No. 6-solid gran. stib.
8	20.48	0.30		1.5	From wide zone above No. 7 - stibnite with some quartz
9	Trace	0.18		3.0	From wide zone above No. 8 - crushed schist, quartz and stibnite
10	0.87	0.30		3.0	From wide zone above No. 8 - at hang. wall quartz with stibnite
11	19.58	0.20		2.5 hor. meas.	From floor proposed drift - gran. stib.
12	3.08	0.20		2.3	From floor proposed drift - quartz, schist, stibnite
13	9.40	0.20		2.8	From floor proposed drift - quartz, stib.
14	32.80	Trace	Trace		Sample of stockpile hi-grade - hand sorted

coarse crystalline stibnite intermixed with quartz and occurring as irregular lenticular masses disseminated through schist, has an average antimony content of 8.7 percent.

A sample from the hand-sorted stockpile, which had been washed away by flood waters, shows an antimony content of 32.8 percent.

DEVELOPMENT

During the fall and winter of 1940-41, a log cabin was constructed about one-half mile below the property and a small blacksmith shop built just across the creek from the outcrop. At this time preliminary work, preparatory to driving an adit from the creek level along the strike of the mineralized zone, was started. The hand methods used were inadequate for making any amount of progress and after leveling off a portion of the outcrop the work was discontinued. The excavated material was hand-sorted and put in the stockpiles that were washed away.

To date the deposit is only partially exposed; approximately 36 feet along the strike and 41 feet along the dip. No attempt was made to do any trenching on the bench directly above to expose the mineralized zone to the north along its strike, nor has any attempt been made to trace the mineralized zone across Boulder Creek to the south. (Figure 4)

PROPOSALS

At present, February 1944, antimony is in Group III of the Material Substitution and Supply List of the War Production Board. Group III includes materials that are in excess of current essential

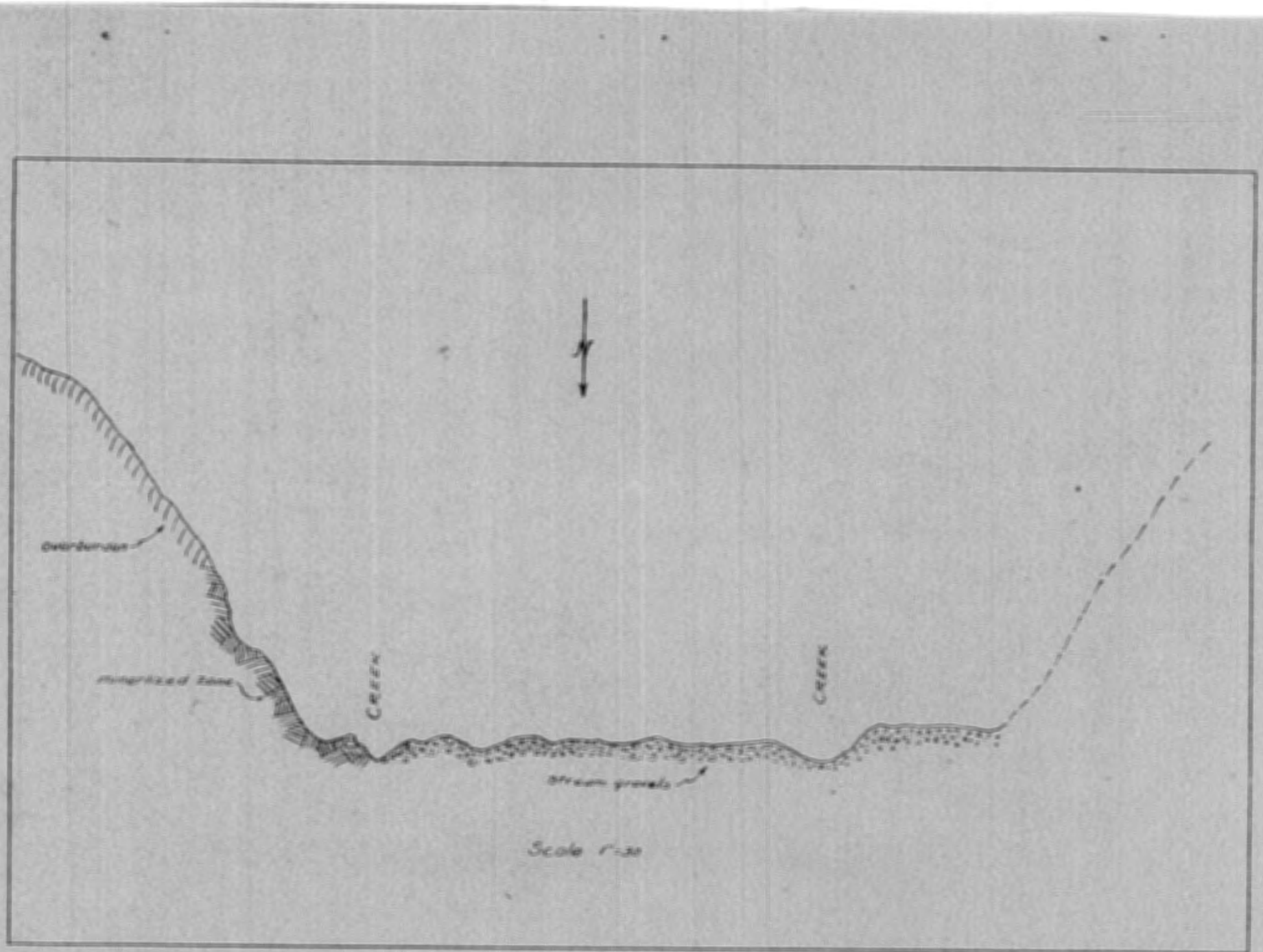


FIG. 4 SKETCH SHOWING PROFILE OF BOULDER CREEK AT ANTIMONY DEPOSIT

needs. In the event that the demand for antimony again becomes acute, additional exploration should be considered. This would include trenching, sampling and metallurgical testing, possibly followed by core drilling. No exploration is recommended under present conditions.

CONCLUSIONS

Under present economic conditions, a minimum of 50 percent antimony would constitute a shipping grade ore in this locality. Hand sorting of mineral from the entire lode produced a product containing 32.8 percent antimony. The high grade vein, 1.4 feet wide, within the lode has an average antimony content of 32.9 percent.

The nature of the mineralization of the deposit, stibnite finely intergrown with quartz, eliminates it as a possible source of shipping grade ore and puts it in the milling class, with the orebody showing good indications but as yet not proven.

The Bureau of Mines does not propose to carry on any exploratory work on this deposit at the present time.

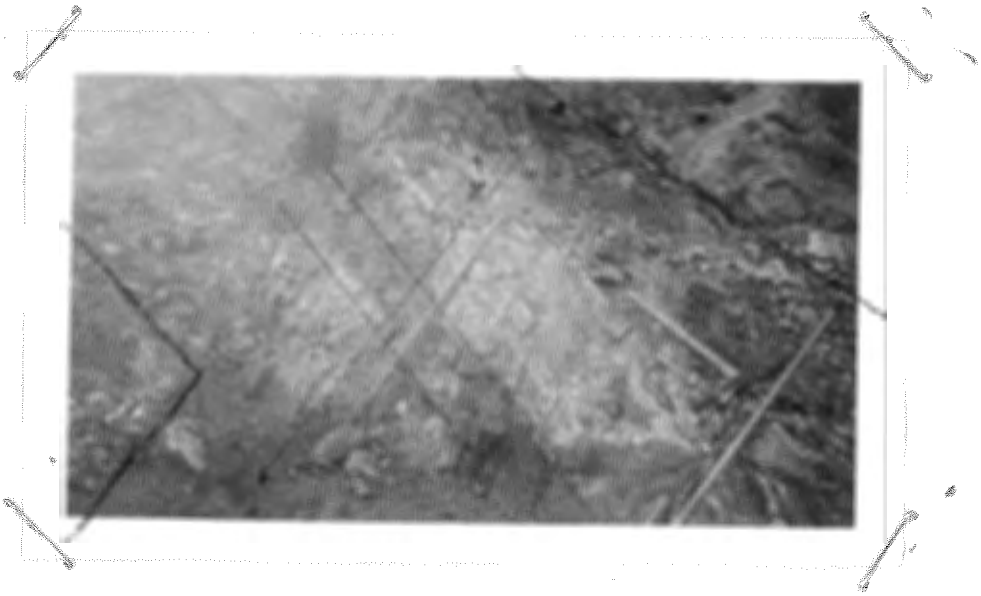
Outcrop at the base of bench east wall of Boulder
(Looking upstream)

Looking down Boulder to Tok Valley

Looking up the Tok River from the mouth of Boulder

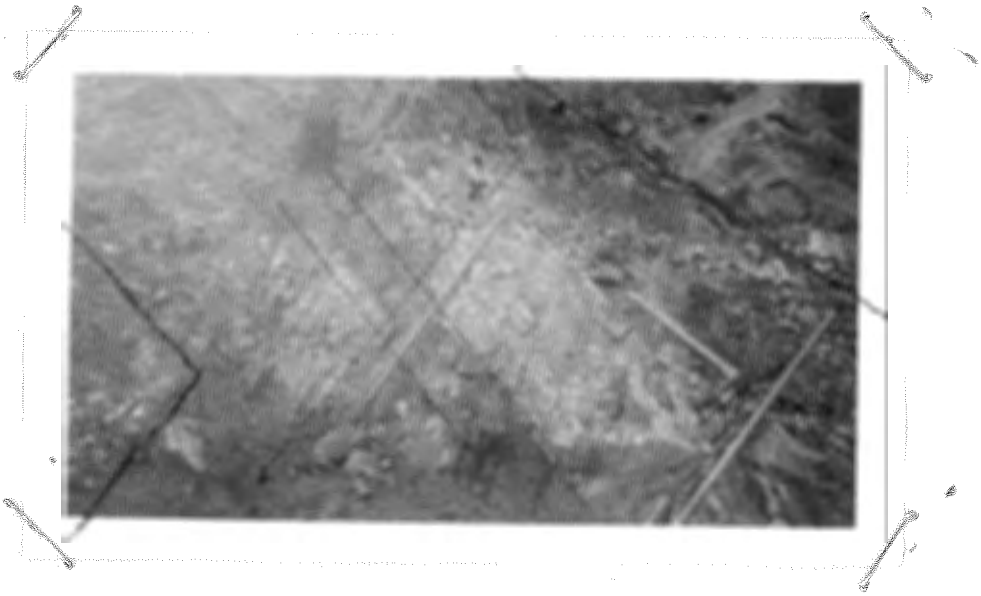
Lobking down the Tok River from the mouth of Boulder

Looking down Boulder - outcrop
upper left



Vein in mineralized zone - old adit
upper left

Looking down Boulder - outcrop
upper left



Vein in mineralized zone - old adit
upper left

Close-up of mineralized zone