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UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

PROPERTY OF
FEDERAL BUREAU OF MINES

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

# REPORT OF INVESTIGATIONS

# EXPLORATION OF MOUNTAIN VIEW TUNGSTEN DEPOSIT
# HYDER, ALASKA

BY

ANER W. ERICKSON

R.I. 3944,
September 1946.

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

# EXPLORATION OF MOUNTAIN VIEW TUNGSTEN DEPOSIT, HYDER, ALASKA[1/]

By Aner W. Erickson[2/]

CONTENTS



## INTRODUCTION

Preliminary examination of tungsten deposits on the Mountain View property near Hyder, Alaska, was made by Neal M. Muir, an engineer of the Bureau of Mines during the summer of 1942. Fifteen samples were cut, rough estimates of ore reserves were made, and it was proposed to extend the drift on the scheelite-bearing vein 300 feet in a northwesterly direction.

From May 22 to October 24, 1944, an exploratory project was conducted on the property by the Bureau. In the course of this work, the camp buildings were rehabilitated; the dam, hydraulic line, and machinery were repaired; 226 feet of drift was driven; 80 groove samples aggregating 3.9 tons in weight were cut; a 6,000-foot surface and underground traverse was run; and the area was mapped in detail.

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1/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Report of Investigations 3944."

2/ Assistant mining engineer, Bureau of Mines.

## ACKNOWLEDGMENTS

In its program of exploration of mineral deposits, the Bureau of Mines has as its primary objective the more effective utilization of our mineral resources to the end that they make the greatest possible contribution to the national security and economy. It is the policy of the Bureau to publish the facts developed by each exploratory project as soon as practicable after its conclusion. The Mining Branch, Lowell B. Moon, chief, conducts preliminary examinations, performs the actual exploratory work, and prepares the final report. The Metallurgical Branch, R. G. Knickerbocker, chief, analyzes samples and performs beneficiation tests. Both these branches are under the supervision of Dr. R. S. Dean, assistant director.

Special acknowledgment is due Neal W. Muir, project engineer, and Robert S. Sanford, acting chief, Alaska Division, Mining Branch, for their supervision of the field work and revision of the report.

Acknowledgment is also made to Silbak Premier, Ltd., for rendering valuable assistance in the repair of equipment and for extending various courtesies to Bureau of Mines personnel during the conduct of this project.

## LOCATION AND ACCESSIBILITY

The Mountain View property is located at latitude 55° 59' north, and longitude 130° 03' west in the Salmon River mining district of southeastern Alaska, about 5 miles in a northwesterly direction from the town of Hyder, which lies at the head of Portland Canal, as shown in figures 1 and 2. Vein outcrops and surface workings are at an elevation of 950 feet and occupy the west flank of a low ridge between Skookum and Fish Creeks, as shown in figure 3. The portal of the long adit exposing the vein at depth is on Skookum Creek about 550 feet north of the confluence of Skookum and Fish Creeks.

Access to the property is over a 4-foot wide trail built and maintained by the United States Forest Service. This trail is suitable for pack animals and is adequate for transportation of supplies and material for exploratory work. During the periods of camp construction and past exploratory operations a 4,000-foot, single-cable, aerial tramway, now in disrepair, served for transportation of materials and all machinery from the Salmon River Highway to the property. The cost of such hauling was high, amounting to $12 a ton. Topography is suitable for construction of a "cat road" 2 miles in length, connecting the property with the Salmon River Highway. It is estimated that such a road could be built for $5,000 a mile, and supplies, machinery, and concentrates could be hauled over it at a cost of less than $2.50 a ton.

Good docks have been built at both Hyder and Stewart, British Columbia. Water transportation is available the year around, as the Union Steamship Co., Ltd., maintains a weekly schedule between Stewart and Vancouver, and the McKay Transportation Co. maintains a weekly schedule between Ketchikan and Hyder. Stewart and Hyder are connected by road.

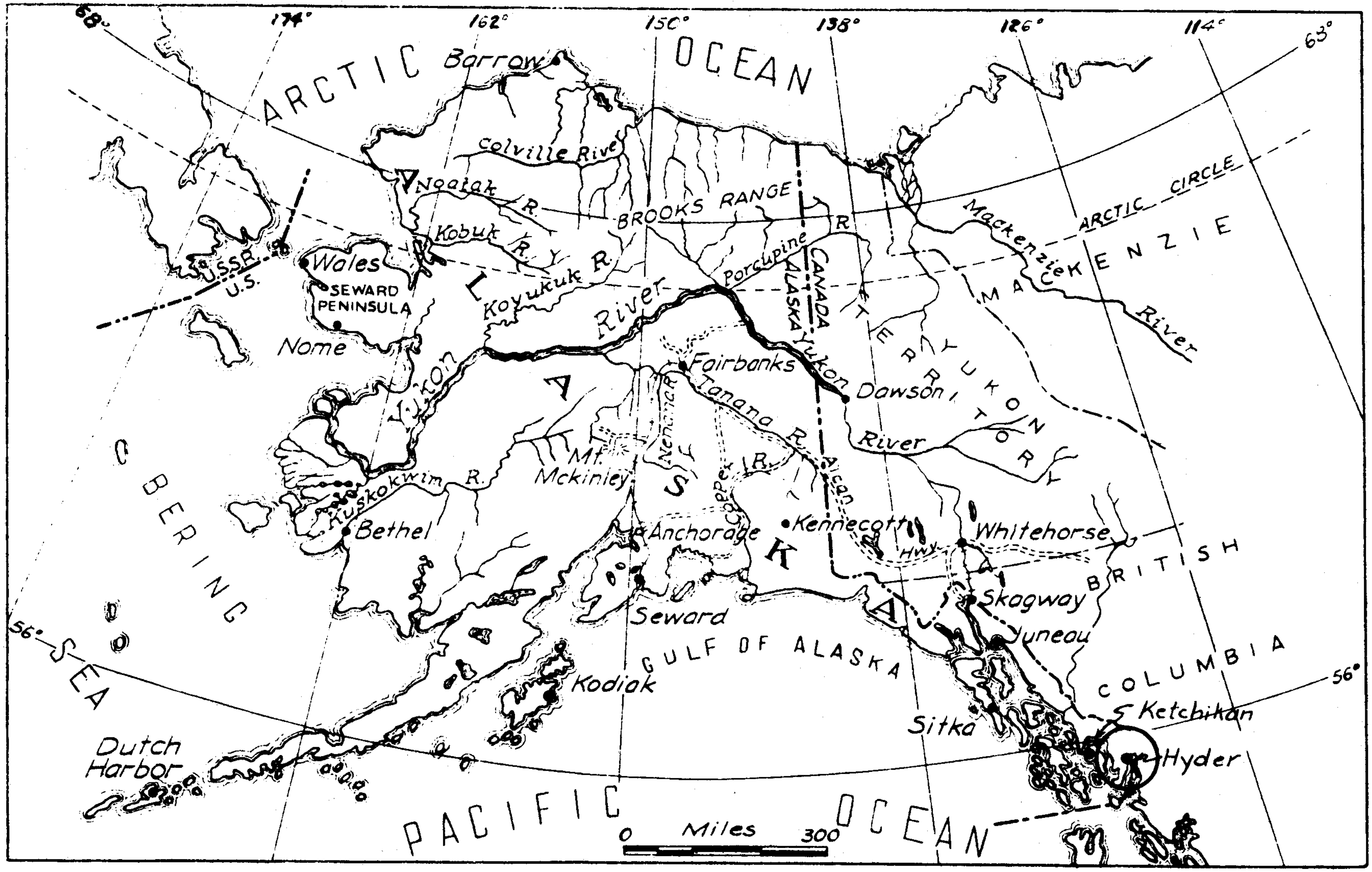



FIG. 1 INDEX MAP OF ALASKA SHOWING LOCATION OF HYDER

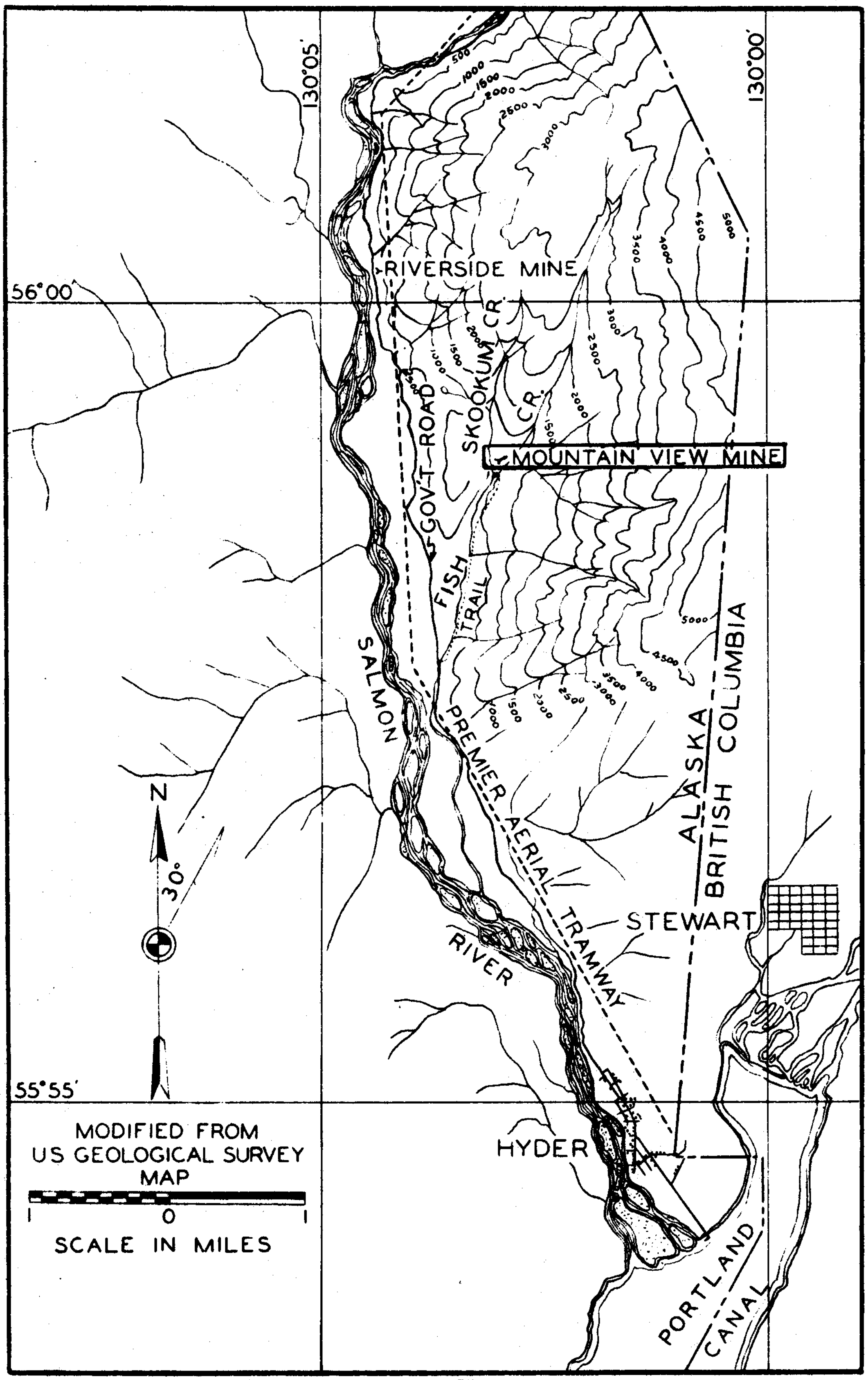



FIG. 2 HYDER AND VICINITY

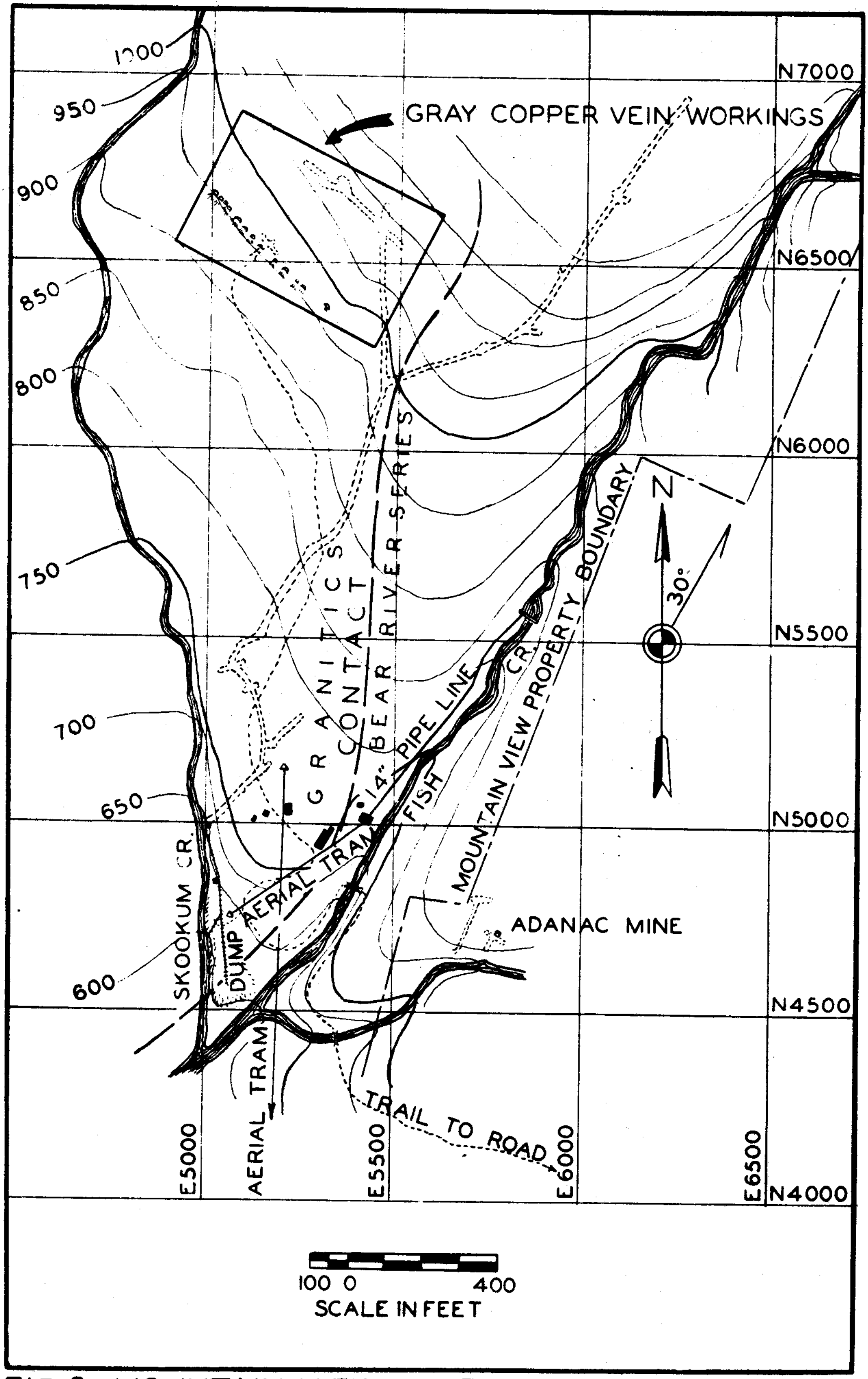



FIG. 3 MOUNTAIN VIEW MINE AND VICINITY

## PHYSICAL FEATURES AND CLIMATE

The Salmon River mining district lies at the head of Portland Canal, a deep-water fiord cutting obliquely across the Coast Range batholith. Topographically, the area is one of great relief, the highest peaks rising 4,000 to 7,000 feet above the valley bottoms. Intense glaciation is evidenced to an altitude of 6,000 feet by glacially rounded mountains, above which the peaks are sharp and serrated. Above 5,000 feet, snow or ice covers all large areas where slopes permit, and in places glaciers extend to much lower heights.

Dense forests and vegetation cover the lower flanks of the mountains up to 3,000 to 3,500 feet, where the topography is not too steep for normal growth; valley bottoms not occupied by glaciers or recent flood plains of the rivers are well wooded. Ample mine timber is available, mostly western and black hemlock and Sitka spruce. Thick underbrush constitutes a hindrance to exploration in places.

Climatological data are not available for Hyder. A summary of observations taken at Stewart, 2 miles east of Hyder, for the years 1911 to 1921 3/ is given below:

| Month | Temperature, °F. | Rainfall, inches | Snowfall, inches |
|---|---|---|---|
| January .......... | 19.3 | 7.23 | 58.20 |
| February ......... | 25.9 | 5.87 | 37.17 |
| March ............ | 30.5 | 4.59 | 17.05 |
| April ............ | 39.2 | 3.69 | 5.10 |
| May .............. | 48.2 | 2.07 | - |
| June ............. | 54.4 | 1.99 | - |
| July ............. | 57.4 | 3.24 | - |
| August ........... | 55.8 | 7.88 | - |
| September ........ | 50.0 | 7.72 | - |
| October .......... | 41.9 | 11.35 | - |
| November ......... | 31.7 | 8.42 | 25.90 |
| December ......... | 26.0 | 9.68 | 60.68 |
| | 40.0 | 73.73 | 219.56 |

As the Mountain View property is at a higher altitude and is farther removed from tidewater than Stewart, snowfall there is somewhat heavier than is shown in the table.

## LABOR AND LIVING CONDITIONS

Some labor is available at Hyder (population 30) and Stewart (population 250), both of which depend on mining as their chief source of employment. Such labor as could not be supplied from these town could be brought from Ketchikan.

Some pertinent wage rates, as established for the area by the War Labor Board in 1945, follow:

3/ Schofield, S. J., and Hanson, George, Geology and Ore Deposits of Salmon River District, B. C.: Canada Geol. Surv. Mem. 132, 1922, pp. 6-7.

| Designation | Rate per hour |
|---|---|
| Blacksmith ........................ | $1.05 |
| Carpenter, journeyman ............ | 1.11 |
| Carpenter helper ................. | .99 |
| Machine man ...................... | 1.05 |
| Motorman ......................... | .99 |
| Mucker ........................... | .92 |
| Nipper ........................... | .99 |
| Timberman ........................ | 1.11 |
| Ball mill operator ............... | .92 |
| Flotation operator ............... | .99 |

Time and a half must be paid for work in excess of 8 hours a day and in excess of 40 hours a week. Double time must be paid for the seventh consecutive working day.

A camp built on the property in 1924 was sufficiently rehabilitated during the summer of 1944 to house a Bureau of Mines exploratory crew. The buildings, which are of log construction, are deteriorated by dry rot and settling, and it is doubtful that they could be made to serve satisfactorily for quarters for exploitation of the deposits. The camp, however, is ample for further exploratory work.

Limited amounts of supplies and small tools can be purchased in Hyder and Stewart at reasonable prices. Ketchikan is a convenient source of lumber, explosives, oil, gasoline, and large quantities of meats and groceries. Mining and milling equipment can be shipped in bond by water transportation from the United States directly to Stewart.

## HISTORY AND PRODUCTION

Gold- and silver-bearing lodes were discovered in the Salmon River district in 1898. Little attention was given to the area until 1909, when a small boom was started on the Canadian side of the line and the town of Stewart was started. Activity subsided shortly thereafter but was again revived in 1917 with the discovery of rich silver ores on the Canadian side and by the opening, in 1918, of what is now the Silbak-Premier mine, British Columbia's largest lode-gold producer. From 1918 until 1928, prospecting and development were at a peak, the town of Hyder sprang up, and nearly 4,000 people lived in the district. The Riverside property, upon which the Bureau of Mines conducted a tungsten project in 1942, was discovered in 1923. A mill was erected in 1925, and the mine became a producer of gold, silver, and lead. Other properties on which mills were erected during this period were the Silbak-Premier, Big Missouri, and Dunwell, all of which are in British Columbia.

With the drop in the price of silver in 1928, activity began to decline, and by 1932 the camp had almost reached its present status - a nearly abandoned mining community. The only operations to persist have been those of the Silbak-Premier and the Riverside, the latter operating intermittently on a small scale.

The Mountain View property was discovered in 1917 by John Hovland. In March 1924, a group of Ketchikan businessmen obtained an option on the Hovland group of five claims and paid $1,000 on the purchase price of $30,000. On July 15 of that year, the Mountain View Gold Mining Co. was incorporated under the laws of Alaska for the purpose of exploring and developing the property. Capitalization was set at 500,000 nonassessable shares at no par value. License fees have been maintained, and the corporation, although almost dormant, is still intact.

From 1924 to November 1, 1928, the property underwent active development. Under the supervision of Arthur O. Moa, general manager, a camp was constructed, a hydraulically operated power plant and compressor were installed, a 4,000-foot aerial tramway to the Salmon River Highway was built, the surface was trenched and mapped, and over 4,000 feet of crosscuts and drifts were driven. In addition, the original five claims plus two additional claims were patented, and payments on the property were completed. The Gray Copper vein, on which the Bureau of Mines later undertook exploration, was explored by driving the adit in December 1927, but little drifting was done on the vein at that time as the presence of scheelite was unknown. Operations were suspended November 1, 1928, and, aside from limited repair work, no further development has been carried on by the Mountain View Gold Mining Co.

No ore has been shipped from the property, nor has any appreciable amount of ore been stock-piled on the dump, as most of the development work consisted of crosscuts.

## PROPERTY AND OWNERSHIP

Seven patented claims and two unpatented claims comprise the property. The patented claims are Fish Creek Nos. 1, 2, 3, 4, and 5, Silver Falls, and Silver Falls Fraction. Those unpatented are Fish Creek No. 6 and Fish Creek Fraction.

The Mountain View Gold Mining Co. has title to the patented ground and, as far as can be ascertained, its locations of the unpatented claims have not been contested or invalidated. The company also held a preliminary permit from the Federal Power Commission covering the water-power rights of Fish Creek. Present status of this permit is not known.

## ORE DEPOSITS

### General Geology[4]

Portland Canal (fig. 2), at the head of which lies the Salmon River mining district, cuts obliquely across the Coast Range batholith, trending northwest, extends 1,100 miles from southern British Columbia into Yukon Territory and ranges in width from 20 to 100 miles. The deposit examined lies near the northeast flank and within the intrusive, which at this point is about 50 miles wide. Outlying dikes, sills, and stocks genetically related to the main batholith further increase the width affected by intrusives to over 100 miles.

4/ Buddington, A. F., Geology of Hyder and Vicinity, Southeastern Alaska: Geol. Surv. Bull. 807, 1929, p. 13.

Four main groups of rock are present in the district: (1) The Texas Creek granodiorite, a great central intrusive mass; (2) the Hazelton group, of probable Jurassic age, comprised of greenstone, tuff, volcanic breccia, graywacke, slate, argillite, quartzite, and rare limestone: (3) the Hyder quartz monzonite, a pinkish intrusive composing the Hyder batholith; and (4) the boundary granodiorite, a pink intrusive composing the boundary stock. Only the Texas Creek granodiorite and the Hazelton group, the Bear River series of which is in contact with the batholith on its northeast flank, are known to carry mineral deposits of economic importance. The contact, which trends northwest, is locally irregular in strike.

## Occurrence of the Deposits

The deposit occurs as a steeply dipping fissure vein having a general strike of about north 48° west and a dip of 50° to 55° northeast, as shown in figure 4. The vein has been exposed by open cuts for a distance of 460 feet along the strike as well as by a crosscut, a drift, and a shaft. Underground drifting, including that done by the Bureau of Mines, exposes the vein for a distance of 315 feet. The distance along the dip between this drift and the outcrop is 360 feet. The exposed part of the vein lies entirely within the Texas Creek granodiorite.

A tentative interpretation of the geological structure of the deposit is shown on figure 5, prepared from observations made during Bureau of Mines exploration. It will be noted that the vein, though continuous, pinches and swells in corresponding lengths both on the surface and underground. Pinched lengths show shattering, thin traces of gouge, and poor mineralization. The wider portions of the vein show slight shattering, no gouge, and generally good mineralization. It will also be noted that the strike of the better portions of the vein is always 5 to 15 degrees nearer north than the pinched segments. From the above, it is believed that contemporaneous with or following the establishment of the fissure, slight movement, as indicated by the arrows in figure 5, caused both the formation of openings favorable for deposition and lengths of sheared tight rock unfavorable for deposition. Movement having a horizontal component of 2 to 3 feet would have been ample for the establishment of this structural control.

Four shoots of mineralization raking approximately north 60° east are shown on figure 5. Shoot 2 has been established from underground and surface exploration, No. 3 is not well-defined underground, No. 4 is exposed on the surface but not underground, and No. 1 is exposed partly on the surface and for a few feet underground.

## Character of the Ore

Segregation of galena, sphalerite, and silver indicates that mineralization took place in two or more stages. Pyrrhotite and scheelite appear to have been deposited contemporaneously or nearly so, followed by chalcopyrite and pyrite, and finally by sphalerite, galena, and quartz. Gold and silver in native form are present in small but appreciable amounts.

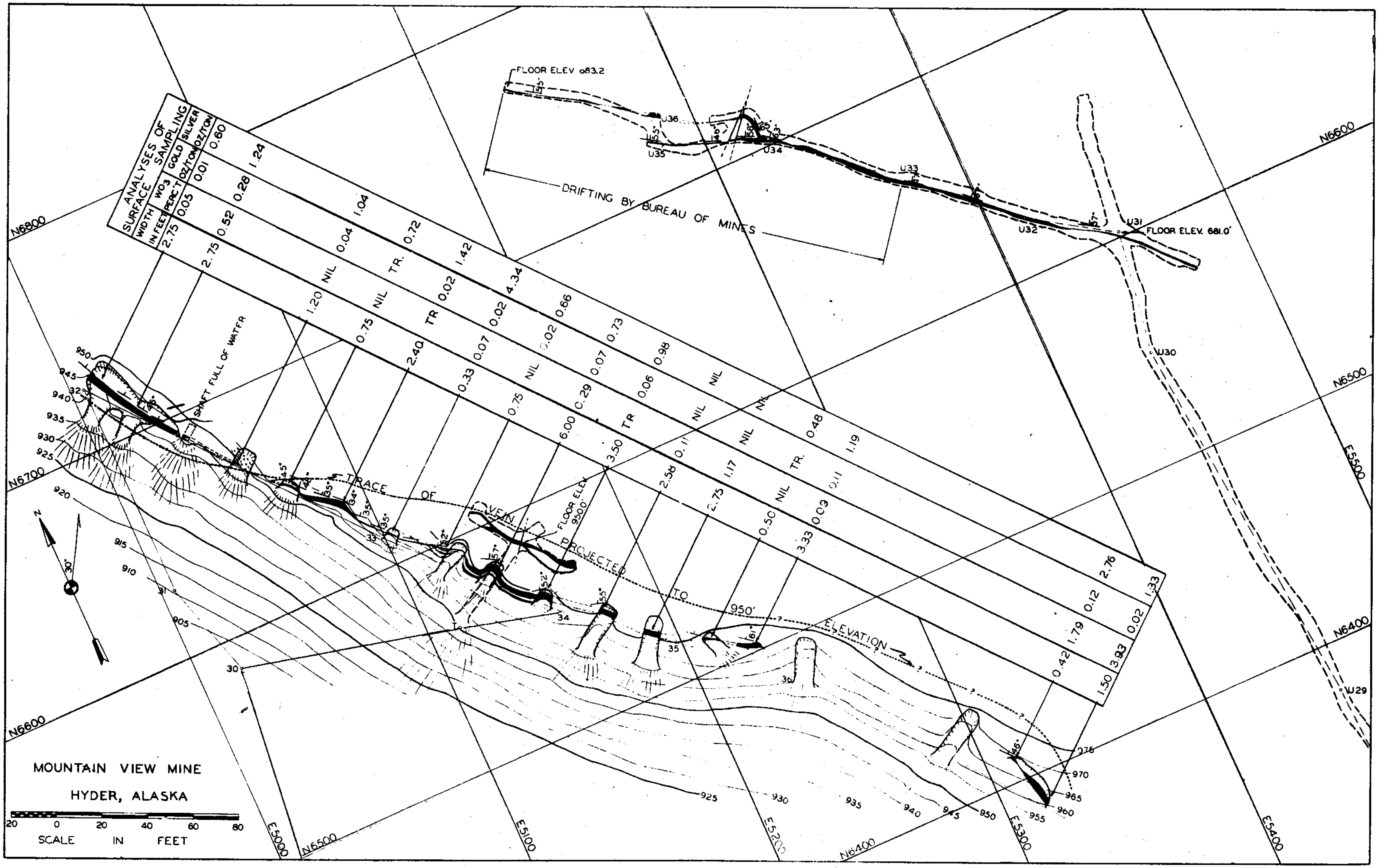



FIG. 4 WORKINGS TOPOGRAPHY AND ASSAY MAP OF SURFACE SAMPLING

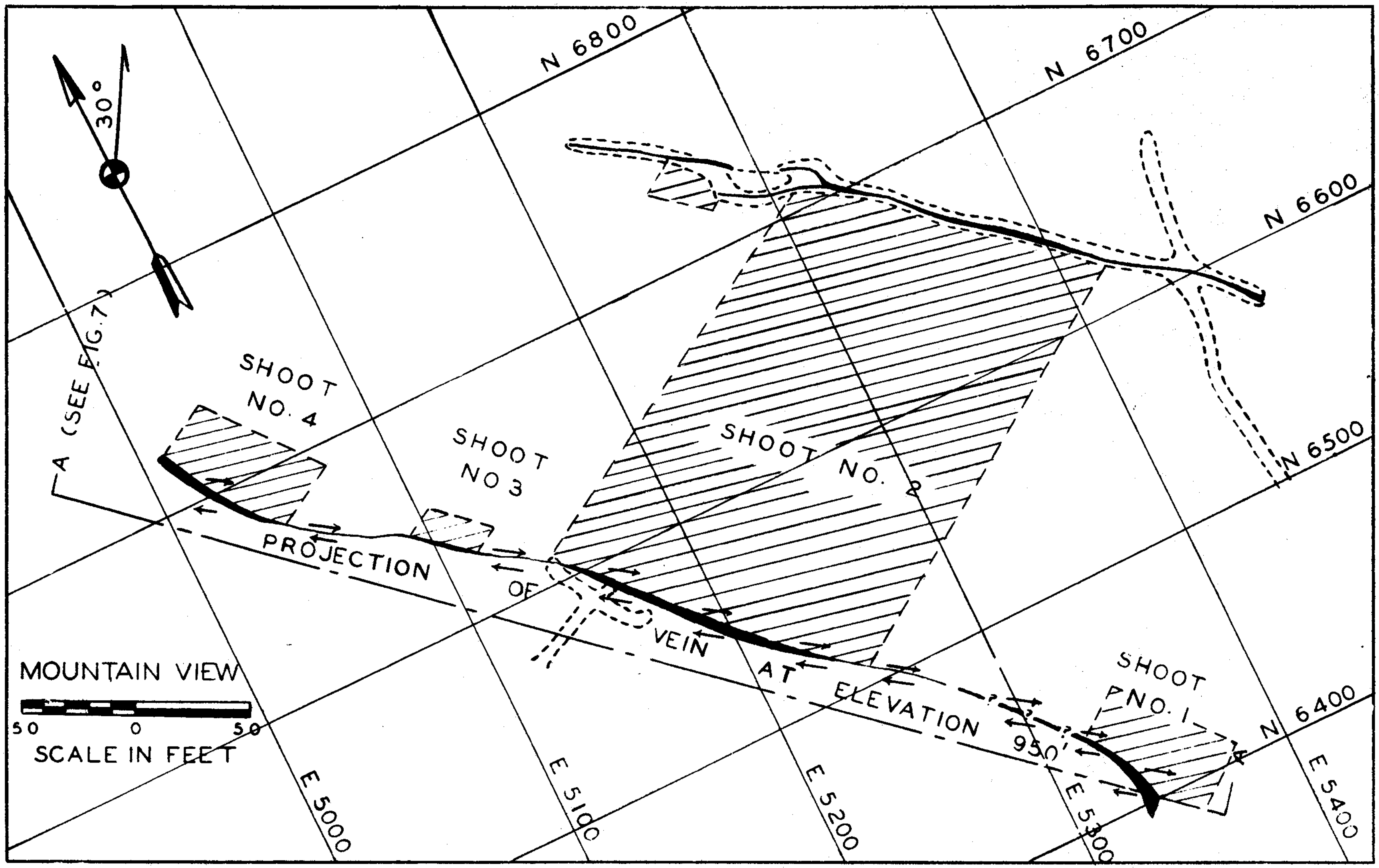



FIG. 5 PLAN SHOWING STRUCTURAL CONTROL OF ORE SHOOTS

Vein gangue consists of barite, quartz, sericite, chlorite, and small, altered inclusions of granodiorite.

## DEVELOPMENT

### Mine Workings

Underground development is confined entirely to drifting and crosscutting, of which there is a total of over 4,200 linear feet, including that done by the Bureau of Mines (fig. 3). The Gray Copper vein is intercepted 1,823 feet from the portal.

At a point 1,428 feet from the portal, a branch crosscut was driven by the Mountain View Gold Mining Co. in a northeasterly direction to cut at depth outcrops of other veins which apparently are not related to the Gray Copper vein. No positive results were obtained from this work. Several veins were intercepted, but they were of low grade, lacked any apparent continuity, and could not be correlated with surface showings. The Gray Copper vein was not intercepted on or near its projected strike in this crosscut, and it is believed that the deposit extends only a short distance into the Bear River series, if at all.

All underground exploration by the owners took cognizance of the possibility of future full-scale operations. Cross sections of the drifts and crosscuts range from 5 by 7 feet to 9 by 9 feet. Average tunnel grade is 1.9 percent. The degree of curvature is satisfactory for haulage in most places, though one section near coordinates 5400 N. and 5100 E. (fig. 3) needs straightening. Mine track from the portal to the present face on the Gray Copper vein is 12-pound rail.

Roofs and walls throughout the mine stand well without timbers. Water seepage into underground workings presents no problem, as total flow from all rock openings amounts to less than 10 gallons a minute. A drainage ditch has been excavated along the entire length of the tunnel.

Both the granodiorite and the vein material are moderately hard. Properly tempered drill steel generally drills 14 to 20 inches for each sharpening. Breaking qualities of both country rock and vein material are such that holes generally break to the bottom. Overbreak, while drifting, varied from 2 to 6 inches.

### Surface Plant

All of the surface plant, necessary for conducting exploratory operations was rehabilitated by the Bureau of Mines during the summer of 1944 and should be in good condition for at least two more years. This plant is adequate for additional exploration but not for exploitation of the ore bodies. Listed below are buildings, mechanical installations, and other units constituting the surface improvements:

Cookhouse and bunkhouse, combined (contains dry room, wash room, and showers).

Manager's cabin.
Assay office (needs crusher, pulverizer, and considerable rehabilitation of equipment).
Warehouse.
Powerhouse and blacksmith shop, combined.
Dam (dimensions are 30 feet across top, 14 feet deep at middle).
Hydraulic line (700 feet of 14-inch-diameter cedar-stave pipe).
Pelton wheel (4/1/2-foot wheel, undershot; delivers 50 horsepower at 100-foot head).
Jack-shaft (designed to transmit safely 100 horsepower; 3-inch diameter, 30 feet long).
Compressor (Ingersoll-Rand Class ER-1, size 9" x 8", single-stage; displacement is 173 cubic feet at 300 r.p.m.; coupled directly to Pelton wheel by jack shaft).
Receiver (30 cubic-foot capacity).
Drill sharpener (Ingersoll-Rand Type 33).
Miscellaneous blacksmith-shop equipment (complete for small operation).
Generator (for camp lights, 1-k.w., 100-volt, D. C.).
Large tram (reaches 4,000 feet from Salmon Creek road to warehouse, 1-inch traction cable and 5/8-inch power cable; not in repair).
Small tram (reaches 400 feet from powerhouse to mine dump; used for moving steel between mine and blacksmith shop; 5/8-inch traction cable, 1/4-inch power cable).
Air line (3,000 feet, 2-inch).

If mining and milling operations were undertaken it would be necessary to build an entirely new surface plant. A good site for such construction is available on and near the old mine dump (see fig. 3). A flat area of approximately 40,000 square feet at that place provides ample space for most of the necessary buildings; immediately adjacent topography is satisfactory as construction sites for the remainder. Also, by utilizing the present dam and by extending the 14-inch hydraulic line an additional 450 feet, an effective head of 200 feet can be obtained for power at this site.

## SAMPLING AND ANALYSIS

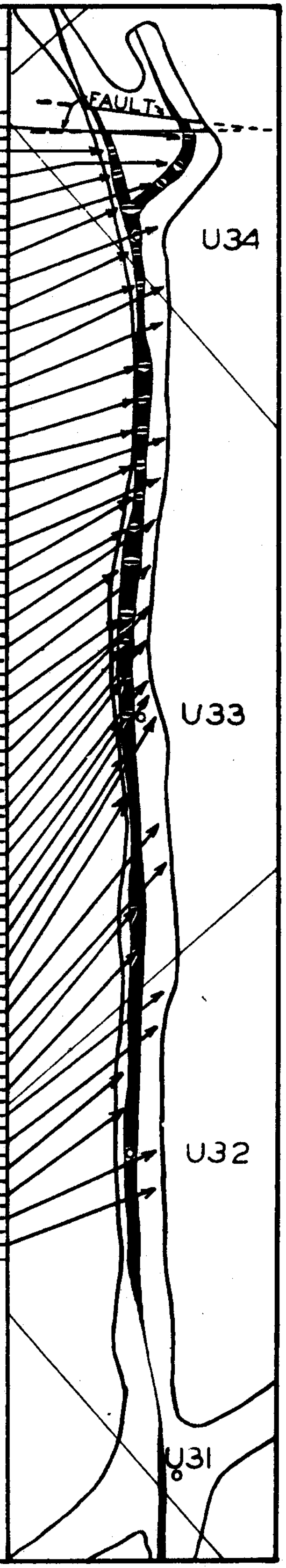
Eighty channel samples 12 inches wide and 6 inches deep were cut from the vein. These were reduced in accordance with standard procedure[5/] at the project site, using a Chipmunk crusher with shims of various sizes and a nest of screens.

A part of the analyses was made by Frank Richenbach, local assayer in Hyder, and a part by Smith-Emery, assayers, Los Angeles. Samples were tested for tungstic oxide, gold, and silver. Lead, zinc, and copper were present in such small amounts that they were of no economic importance.

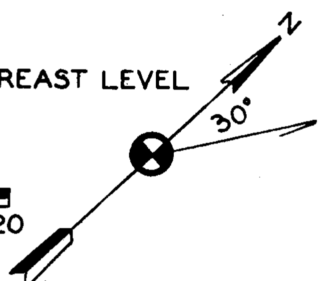
The position, width, and grade of all surface samples are shown on figure 4. Similar information for samples from the upper drift and lower drift are shown on figures 7 and 6, respectively.

5/ U. S. Bureau of Mines, Instructions to Samplers: pp. 3-4.

| ANALYSES OF SAMPLING - LOWER DRIFT | | | | |
|---|---|---|---|---|
| NUMBER OF SAMPLE | WIDTH (FT) | $WO_3$ PERCT | GOLD OZ/TON | SILVER OZ/TON |
| 145B | 167 | 1.76 | 0.45 | 1.75 |
| 72.5 | 1.08 | 0.22 | 0.04 | 3.20 |
| 105B | 1.50 | 0.18 | 0.01 | 3.16 |
| 69.5 | 1.25 | 0.22 | TRACE | 0.72 |
| 73B | 1.17 | <0.05 | 0.72 | 14.24 |
| 65.4 | 2.92 | 0.85 | 0.24 | 5.26 |
| SILL 60 | 0.67 | <0.05 | 0.015 | 0.81 |
| 59.3 | 1.00 | NIL | TRACE | 1.20 |
| 54.7 | 0.75 | 0.47 | TRACE | 2.66 |
| SILL 55.0 | 1.17 | <0.05 | 0.27 | 3.15 |
| SILL 50.0 | 0.83 | <0.05 | 0.02 | 1.56 |
| 44.8 | 1.75 | <0.05 | 0.03 | 0.37 |
| 40.6 | 1.25 | NIL | 0.01 | 0.80 |
| 36.3 | 1.25 | NIL | TRACE | 0.80 |
| SILL 35.0 | 3.00 | NO SAMPLE TAKEN | | |
| 32.4 | 1.00 | NILL | 0.01 | 1.70 |
| SILL 30.0 | 1.43 | 0.19 | 0.11 | 6.59 |
| 28.5 | 1.67 | NIL | 00.1 | 1.20 |
| 24.6 | 1.67 | 4.11 | 0.27 | 2.39 |
| SILL 25.0 | 2.67 | 4.52 | 0.045 | 19.16 |
| 20.0 | 2.16 | 0.80 | 0.02 | 4.60 |
| SILL 20.0 | 283 | 4.17 | 0.21 | 48.75 |
| 13.5 | 2.16 | 0.77 | TRACE | 3.56 |
| SILL 15.0C | 0.83 | 0.06 | 0.29 | 42.14 |
| SILL 15.0 A | 0.50 | 4.80 | 0.02 | 2.28 |
| 10.0 | 1.42 | 0.06 | TRACE | 0.40 |
| SILL 10.0 | 0.92 | <0.05 | 0.02 | 2.49 |
| 5.5 | 1.17 | <0.05 | 0.03 | 0.77 |
| SILL 5 | 1.00 | <0.05 | 0.055 | 0.67 |
| 0.0 | 1.33 | 0.16 | TRACE | 0.36 |
| SILL 3 | 1.00 | 1.56 | ·0.03 | 6.54 |
| 205 | 0.75 | 1.94 | 0.015 | 4.09 |
| SILL 0.0 | 0.83 | 0.67 | — TRACE — | |
| 210 | 0.66 | 0.96 | 0.02 | 1.65 |
| 215 | 0.83 | 1.55 | 0.04 | 1.94 |
| 220 | 1.33 | 2.27 | 0.04 | 1.57 |
| 225 | 2.16 | 1.36 | 0.02 | 1.56 |
| 230 | 1.75 | 3.06 | 0.04 | 1.16 |
| 235 | 1.83 | 1.35 | 0.01 | 1.01 |
| 240 | 225 | 1.06 | 0.10 | 2.29 |
| 245 | 1.25 | 0.31 | 0.07 | 2.81 |
| 250 | 1.00 | 0.30 | 0.035 | 1.22 |
| 255 | 1.58 | 1.33 | 0.21 | 3.09 |
| 260 | 1.58 | 3.37 | 0.31 | 2.31 |



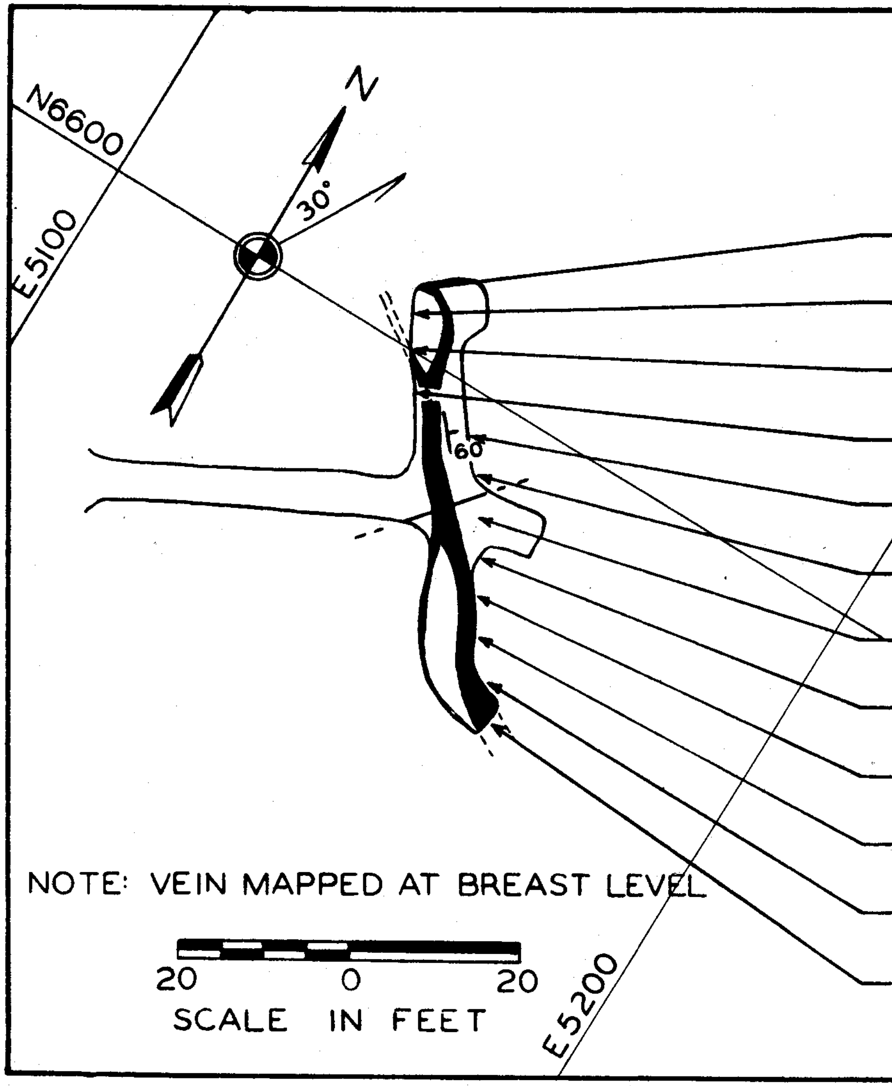

NOTE: VEIN MAPPED AT BREAST LEVEL





MOUNTAIN VIEW - TUNGSTEN

FIG. 6 ASSAY MAP - LOWER DRIFT




## ANALYSES OF SAMPLING - UPPER DRIFT

| LOCATION OF SAMPLE | WIDTH IN FEET | $WO_3$ PERC'T | GOLD OZ/TON | SILVER OZ/TON |
|---|---|---|---|---|
| WEST WALL, 1 FOOT ABOVE FLOOR | 1.75 | <0.05 | 0.01 | 1.92 |
| WEST WALL, 2 FEET ABOVE FLOOR | 1.42 | 0.67 | 0.08 | 1.21 |
| WEST WALL, 4 FEET ABOVE FLOOR | 1.33 | <0.05 | 0.04 | 0.36 |
| WEST WALL, 5 FEET ABOVE FLOOR | 1.75 | <0.0.5 | 0.10 | 1.05 |
| EAST WALL, 1 FOOT ABOVE FLOOR | 0.75 | 0.15 | 0.14 | 1.77 |
| EAST WALL, 1 FOOT ABOVE FLOOR | 0.90 | 0.32 | 0.02 | 0.61 |
| CENTER OF CROSSCUT, IN FLOOR | 1.33 | 0.80 | 0.14 | 1.10 |
| EAST WALL, 1 FOOT ABOVE FLOOR | 1.50 | T.R. | 0.09 | 0.62 |
| EAST WALL, 2 FEET ABOVE FLOOR | 1.75 | <0.05 | 0.06 | 1.39 |
| EAST WALL, 2 FEET ABOVE FLOOR | 1.92 | <0.05 | 0.01 | 0.47 |
| EAST WALL, 3 FEET ABOVE FLOOR | 1.42 | <0.05 | 0.01 | 0.25 |
| FACE, 4 FEET ABOVE FLOOR | 4.00 | 0.18 | 0.04 | 1.72 |
| | | | | |

FIG. 7 ASSAY MAP - UPPER DRIFT MOUNTAIN VIEW MINE

BENEFICIATION OF MOUNTAIN VIEW TUNGSTEN ORE[6/]

During the exploration program at the Mountain View mine, a metallurgical sample was taken from the lower level, which at the time was thought to be representative of the mineralized material. The sample was essentially quartz with some pyrrhotite and pyrite and minor amounts of barite, scheelite, sericite, chalcopyrite, and chlorite. Small amounts of galena and calcite also were present. The sample contained 2.64 percent tungstic oxide, 11.95 percent iron, and had 0.18 ounce of gold and 14.09 ounces of silver to the ton. The silver was present as native silver in wire form. A qualitative spectrographic analysis of the free silver shows a high gold content, which indicates that the gold is alloyed with silver. The bulk of the scheelite and sulfides was free of gangue at minus 20-mesh, but a small amount of these minerals remained locked to minus 65-mesh.

Detailed sampling of the deposit indicated that the metallurgical sample was of much higher grade than the average mineralized material. However, it was thought that the results obtained would be indicative of the recoveries that could be expected from the lower-grade material.

Results of tabling tests indicated that the sample was not amenable to gravity concentration. The scheelite concentrate contained 34.53 percent tungstic oxide representing a recovery of 64.1 percent. Gold and silver recoveries were 55.1 and 25.8 percent, respectively. The sulfide middlings contained 17.9 percent of the gold and 46.3 percent of the silver and assayed 0.136 ounce of gold and 26.96 ounces of silver per ton.

The flotation tests evidence further the refractory nature of the sample. The procedure used in the flotation tests were basically as follows:

The sample was crushed to minus 20-mesh and was wet-ground in stages to minus 65-mesh. A sulfide rougher concentrate was floated with Xanthate Z-6, Reagent 208, and Frother 52. The sulfide rougher concentrate was not cleaned. A scheelite rougher concentrate was then floated with oleic acid, quebrachio, and Frother 52 and cleaned.

The metallurgical sample consisted of five sacks. For test purposes, various combinations of the five sacks were made. Table 1 summarizes the results obtained, giving concentrate grades and percentage recoveries of metals.

The results of the tests illustrated in table 1 indicate that the sample is not amenable to concentration by flotation. Recovery of the scheelite varied from 43.0 to 79.3 percent, whereas the scheelite concentrates contained from 39.85 to 57.52 percent tungstic oxide. The test giving the highest recovery, 79.3 percent, produced the lowest-grade concentrate, 39.85 percent tungstic oxide. In producing a concentrate containing 57.52 percent tungstic oxide, 54.9 percent of the scheelite was recovered.

6/ Extracts from weekly reports by the Rolla Division, Metallurgical Branch, Bureau of Mines, Rolla, Mo.

TABLE 1. - Results of flotation tests, Mountain View mine, Hyder, Alaska

| Product | Test A | | | Test B | | |
|---|---|---|---|---|---|---|
| | Weight, percent | Analysis, $WO_3$ | Percent of total | Weight, percent | Analysis, $WO_3$ | Percent of total |
| Scheelite concentrate | 5.87 | 39.85 | 79.3 | 2.75 | 53.40 | 51.0 |
| Sulfide concentrate | 26.30 | 1.63 | 14.5 | 24.88 | 2.19 | 18.9 |
| Scheelite middlings | 5.99 | 1.85 | 3.7 | 10.23 | 5.75 | 20.4 |
| Rougher tailing | 61.84 | .12 | 2.5 | 62.14 | .45 | 9.7 |
| Composite | 100.0 | 2.95 | 100.0 | 100.0 | 2.88 | 100.0 |

| Product | Test C | | | Test D | | |
|---|---|---|---|---|---|---|
| | Weight, percent | Analysis, $WO_3$ | Percent of total | Weight, percent | Analysis, $WO_3$ | Percent of total |
| Scheelite concentrate | 1.79 | 57.42 | 54.9 | 2.03 | 55.88 | 43.0 |
| Sulfide concentrate | 23.62 | 1.43 | 18.0 | 27.97 | 1.81 | 19.2 |
| Scheelite middlings | 4.47 | 7.44 | 17.8 | 5.18 | 5.96 | 11.7 |
| Rougher tailing | 70.12 | .25 | 9.3 | 64.82 | 1.06 | 26.1 |
| Composite | 100.0 | 1.87 | 100.0 | 100.0 | 2.64 | 100.0 |

## BIBLIOGRAPHY

Buddington, A. F., Geology of Hyder and Vicinity, Southeastern Alaska: Geol. Surv. Bull. 807, 1929.

Buddington, A. F., and Chapin, Theodore, Geology and Mineral Deposits of Southeastern Alaska: Geol. Surv. Bull. 800, 1929.

Westgate, L. G., Ore Deposits of the Salmon River District, Portland Canal Region: Geol. Surv. Bull. 722, 1920.

Schofield, S. J., and Hanson, George, Geology and Ore Deposits of Salmon River District, B. C.: Canada Geol. Sur. Mem. 132, 1922.