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BUREAU OF MINES  
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REPORT OF INVESTIGATIONS

RECONNAISSANCE EXAMINATIONS OF PARTS OF  
THE ALASKA PENINSULA AND ALEUTIAN ISLANDS  
Southwestern Alaska

By

B. S. Webber, J. M. Moss, F. A. Rutledge, and R. S. Sanford

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By B. S. Webber <sup>2/</sup>, J. M. Moss <sup>3/</sup>,  
F. A. Rutledge <sup>4/</sup>, and R. S. Sanford <sup>5/</sup>

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- <sup>1/</sup> 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 \_\_\_\_\_".
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## INTRODUCTION

Very little attention has been given to the mineral potentialities of the Alaska Peninsula and the Aleutian Islands area during

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the past 40 years. In the Eighteen Nineties and early Nineteen Hundreds, parts of this area were covered by prospectors primarily interested in the coal deposits and gold. Reports on the area by the Federal Geological Survey at that time were mainly confined, in addition to the general geology, to the description of the coal deposits along the peninsula and the coal and gold mines and prospects in the Shumagin Islands.

Recent advances in metallurgical methods with accompanying increased recoveries of both gold and the base metals and the revaluation of gold in 1934 have improved prospects for successful mining operations in this area. To aid prospectors in their search for and development of deposits in the Alaska Peninsula and Aleutian Islands, the Bureau of Mines had a field party in the area during the spring and summer of 1945. Detailed data on individual deposits were obtained and the mineralized areas examined for other mineral occurrences.

Field work was started the first of May in the Shumagin Islands and two old mines, the Apollo mine and the workings of the Sitka Consolidated Mining Company, on Unga Island were mapped and sampled. In addition, five other deposits, Rising Sun, Clgen, Delarcff, Herron, and the Choumagin, were examined and sampled. Upon completion of the work on Unga Island, three deposits; Herman Lode, West Lodes, and the Brown Zinc Deposit; were examined on neighboring Popof Island during the first two weeks in June. The last half of June and first week in July were spent in a preliminary examination of the Sedanka Zinc Deposit. The description of this occurrence is given in a separate

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report <sup>6/</sup>, but an abstract is included with this report.

The last week in July 1945 was spent in the examination of three deposits, Hague, Hortense and the Copper Cliff, on Unalaska Island. All field work was terminated shortly after V-J day.

#### ACKNOWLEDGMENTS

In its program of exploration of mineral deposits, the Bureau of Mines has as its primary objective the most effective utilization of our mineral resources to the end that they make the greatest possible contribution to 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 P. Moon, chief, conducts preliminary examinations, performs the actual exploratory work, and prepares the final report. The Metallurgical Branch, R. C. Knickerbocker, chief, analyzes samples and performs beneficiation tests. Both these branches are under the supervision of Dr. R. S. Dean, assistant Director.

The exploratory program of the Alaskan Division, Mining Branch, is under the direction of R. S. Sanford, acting division chief, Juneau, Alaska. Samples were submitted to the Territorial Assay Office, Anchorage, Alaska and analyzed by Leo H. Saarela.

Special mention is made of the courtesies received from the Alaska Department, U. S. Army. Transportation facilities of the Army Transportation Service were extended to Bureau of Mines' personnel in

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<sup>6/</sup> Webber, B. S., and Others, Sedanka Zinc Deposit, Sedanka Island, Alaska: U. S. Bureau of Mines R.I. \_\_\_\_\_, 1946.

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*Seward*  
their travels from Kodiak, Alaska to the westward and return. Without this service, examinations, under war time conditions would have been impossible or seriously curtailed.

Acknowledgment is made to the Federal Geological Survey for geologic information and historic records secured from their bulletins on the area. Proper footnote reference is made to each where included.

The field examinations were conducted by B. S. Webber and J. M. Moss; and the report was prepared by R. S. Sanford and F. A. Rutledge.

#### LOCATION AND ACCESSIBILITY

The Alaska Peninsula and its geographic continuation the Aleutian Islands stretch nearly 1600 miles in a long arc from the mainland of Alaska at 154° west longitude, 59° north latitude to 173° east longitude, 53° north latitude (figure 1). Lying as it does between the Pacific Ocean and the Bering Sea, much of it is readily accessible to ocean shipping. However, a large part of the land along the coast on the north side of the peninsula is broad marshy plains with numerous lakes. This impedes travel to the interior but several bays cut almost through the peninsula and make access easier. However, harbors on the north side of the peninsula are not open for winter navigation. The rest of the peninsula and the Aleutian Islands are open throughout the year.

Ships of the Alaska Steamship Company now call at the Shumagin Islands, ports along the Alaska Peninsula, and Dutch Harbor on Unalaska Island on their way to the Bering Sea, Bristol Bay, and Northwestern Alaska. The freight rate of the Alaska Steamship Company on general





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cargo during 1945 from Seattle, Washington to Dutch Harbor on Unalaska Island was \$1.25 a hundred pounds or \$0.62½ a cubic foot whichever was greater. Passenger rates were as follows: Class 8, \$105 plus 16 percent surcharge plus 15 percent tax; Lower first class, \$90 plus 16 percent surcharge plus 15 percent tax; and Steerage, \$53 plus 16 percent surcharge plus the 15 percent tax.

Prior to World War II, the Alaska Steamship Company maintained a shuttle service from Seward, Alaska to Kodiak Island and Dutch Harbor. This service was abandoned during the war and has not yet been resumed (May 1946). At present there is no commercial air transportation to the Aleutian Islands.

Many of the out-of-the-way ports can only be reached by traveling on trading ships, cannery boats, and chartered fishing boats.

Small boats may be chartered in most of the ports in the area for reconnaissance trips along the nearby coast and hauling of men and supplies during exploration. Charter rates vary from \$30 to \$100 a day depending upon the size of the boat chartered. However, it is extremely difficult to find boats for charter during the fishing season.

The location of Unga and Popof Islands in the Shumagin group is shown in figures 1 and 2. Seven of the deposits examined are on Unga Island and three on Popof Island. The other three deposits examined are on Unalaska Island (figure 1). *Port 138 mallic*

PHYSICAL FEATURES AND CLIMATE

The Alaska Peninsula and the Aleutian Islands form a long arc separating the Bering Sea from the Pacific Ocean. Extremely mountainous,

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the land is cut by numerous inlets, bays, sounds, and fiords. The mountains lie along the southern face of the peninsula forming the Aleutian Range which stretches from Mount Redoubt on the east the entire length of the peninsula. Mount Redoubt is 10,200 feet in elevation and the mountains in the eastern part of the peninsula approach 7,000 feet. To the west the average height of the mountains is less though several volcanic peaks range up to 9,000 feet. The Aleutian Islands are largely of volcanic origin and evidence of volcanic action is found throughout the peninsula. Many of the volcanic peaks are still active.

Unmistakeable evidence of glaciation remains in the many cirques, broad U-shaped valleys, and striae found throughout the peninsula and the islands to the south. Several glaciers still remain among the higher peaks on the peninsula.

On the south side of the peninsula the Aleutian Range rises precipitously along the Pacific Ocean. The coast is rugged with many deep indentations and steep cliffs. The northwest coast however is very dissimilar. On this side the range is flanked by broad lowlands with numerous lakes dotting the tundra.

The Aleutian Islands and the peninsula west of Naknek Lake is devoid of trees but is covered with a luxuriant growth of grasses and moss. Scattered alders and a few willows are found along the streams and lower slopes of the mountains. A few small trees are found in the extreme eastern portion of the peninsula.

Lying as it does between the warm waters of the Pacific Ocean and the cold waters of the Bering Sea, the Alaska Peninsula and the Aleutian Islands have an abundance of rain and foggy weather. The Gulf of Alaska and the Aleutian Islands area has a permanent winter low pressure area and is the main source of the fall and winter storms of the Northern Hemisphere. However, this low pressure area disappears in the spring and though the area is still extremely cloudy, the period from April to September is usually free of high winds. Although the winters are very stormy, the temperature is mild with the temperature never far below freezing except in the higher portions.

Table I has been compiled from the records of the U. S. Weather Bureau. Periods covered by this table vary from two years for a recent station to Kodiak where the records date back to 1869.

TABLE I - Weather records

Location	Average mean temperature °F	Average annual precipitation inches	Average annual snowfall inches
Attu, Attu Island	38.7	71.17	49.5
Atka, Atka Island	40.3	69.04	49.0
Dutch Harbor, Unalaska I.	40.4	56.88	77.9
Scotch Cap, Unimak I.	40.7	57.27	41.5
Coal Harbor, Unga I.	39.1	48.51	57.2
Kodiak, Kodiak Island	40.6	61.03	49.4
Chignik, Alaska Penin.	35.9	139.21	53.5
Ugashik, Alaska Penin.	- -	24.62	- -
Naknek, Alaska Penin.	34.8	23.57	- -
Dillingham, Bristol Bay	34.4	26.06	- -

On the peninsula, snow covers the entire area during the winter months and remains until late in March. In the Aleutians the snow does not remain on the ground for protracted periods except at higher elevations.

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## LABOR AND LIVING CONDITIONS

The facilities for housing and a supply of skilled labor are almost negligible in this area. With the exception of Kodiak and Unalaska, the towns are small and a large majority of the inhabitants are natives. Before any extensive exploration or development can be carried out, some form of housing will be required. The United States will be the best source for the required labor though some natives may be secured for semi-skilled and common labor. During the fishing season this source of labor will be nil. The isolation and disagreeable weather of the area will affect the attitude of mining personnel toward remaining in the region at ordinary rates of pay.

The following hourly rates were effective in Alaska for a 40-hour week during 1945.

Air hammer operator	\$1.313
Air compressor operator	1.70
Blacksmith	1.565
Mechanic	1.565
Electrician	1.68
Laborer	1.015
Tractor operator	1.70

Convenient sources of supplies for any large mining operation are almost totally lacking in the area. Many of the supplies required for an exploratory program can be obtained in Kodiak on Kodiak Island and Unalaska on Unalaska Island and a small stock of staples is available at several of the smaller towns, but most of the supplies must be obtained from the United States.

## HISTORY AND PRODUCTION

A Russian expedition under the command of Vitus Bering first

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discovered Alaska in about 1741. Reports on the return of his ships to Russia brought an influx of traders and trappers to the new land and other Russian expeditions soon followed. However the first settlement was not established until 1784 at Three Saints Bay on Kodiak Island. The only recorded mineral production by the Russians during this period was some coal mined on Unga Island along the outcrops near Coal Harbor.

In 1867 the United States purchased Alaska from Russia for \$7,200,000. For several years little was done to officially examine the potential resources of Alaska, but miners, traders, and trappers were soon active in many parts of Alaska. When the United States Geological Survey began their investigations of Alaska in 1895, several gold mines and prospects were active in the Shumagin Islands and coal was being developed in the Unga Island, Herendeen Bay, and Chignik Bay coal fields. Practically all of the coal produced from these deposits has been used locally by the canneries.

The production of gold has come mainly from the Apollo mine on Unga Island. Between \$3,000,000 and \$4,000,000 is reported to have been produced. Approximately \$12,000 of gold was produced from the beach placers on Popof Island <sup>7/</sup>.

#### APOLLO MINE

##### Introduction

The Apollo mine was the main source of the gold produced in the Shumagin Islands. Located at latitude 55° 10' N. and longitude 160° 35' W., the mine is about three miles west of Unga and one mile west

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<sup>7/</sup> Atwood, Wallace W., Geology and Mineral Resources of Parts of the Alaska Peninsula: U. S. Geological Survey Bull. 467, 1911, p. 20

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of the head of Delarof Harbor near the southern end of Unga Island (figure 2). It is reported that the Apollo mine was operated by the Alaska Commercial Company and produced between \$3,000,000 and \$4,000,000 from 1891 through 1904. During part of 1903, the property was operated by a lessee but only 40 of the 60 stamps were used. The mine has been idle since 1908.

The property consists of two patented mining claims that are thought to be owned by the Alaska Commercial Company and are part of the Apollo group (figure 3). The two claims are the Apollo and the Prospect. The Alaska Commercial Company voluntarily withdrew from the corporation register in the Alaska Territorial Auditor's office in January 1943 and is, therefore, no longer licensed to conduct business in the Territory. The last recorded address of the company was 310 Sansome Street, San Francisco, California.

The examination of the Apollo mine by the Bureau of Mines was conducted by two engineers from May 4 to 10, 1945. See figures 3 and 4.

#### Ore deposit

The ore consists of free gold, pyrite, galena, sphalerite, chalcopyrite, and native copper in a country rock composed of andesite and dacite. The deposit is controlled by a zone of fracturing having an average strike of N. 30° E. and a nearly vertical dip. Erratic changes in both strike and dip of the network of individual quartz veinlets forming the deposit were noted within short intervals. The vein outcropped for about 1,200 feet from an elevation of 600 to 750 feet. Above the 200-foot level, the ore body has been stoped for an average

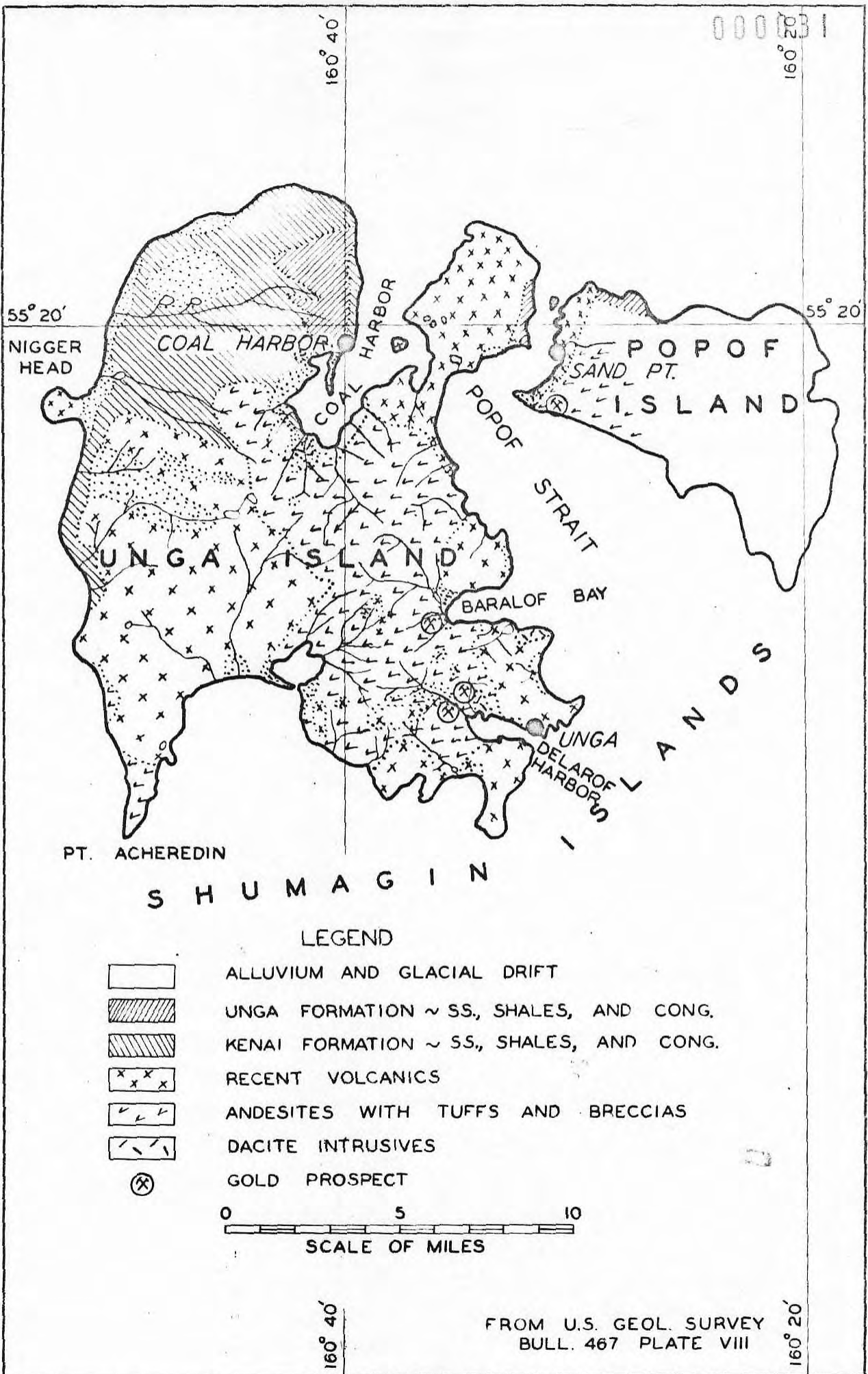


FIG. 2

UNGA AND POPOF ISLANDS



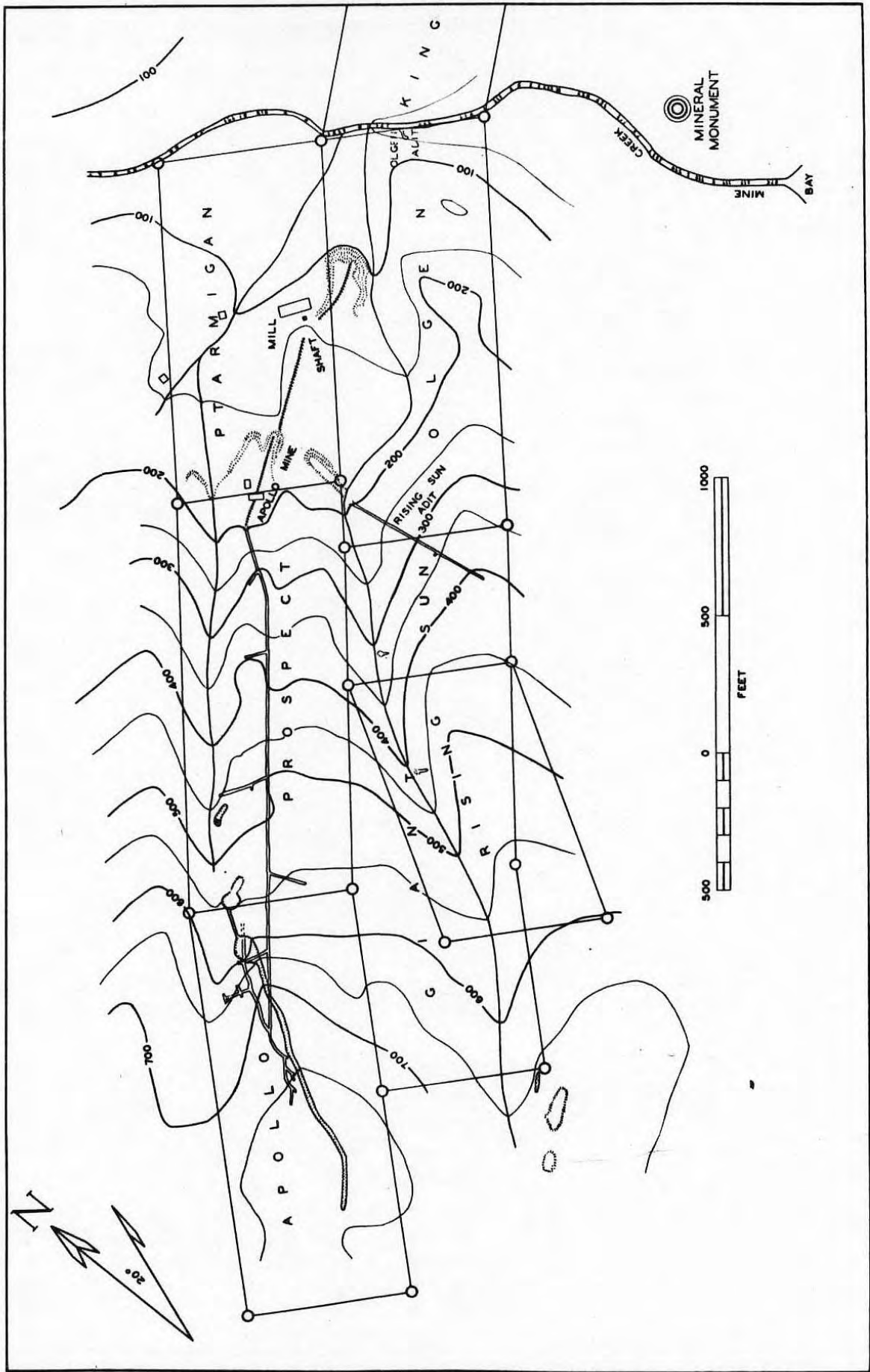


FIG. 3 APOLLO GROUP, UNGA ISLAND, ALASKA

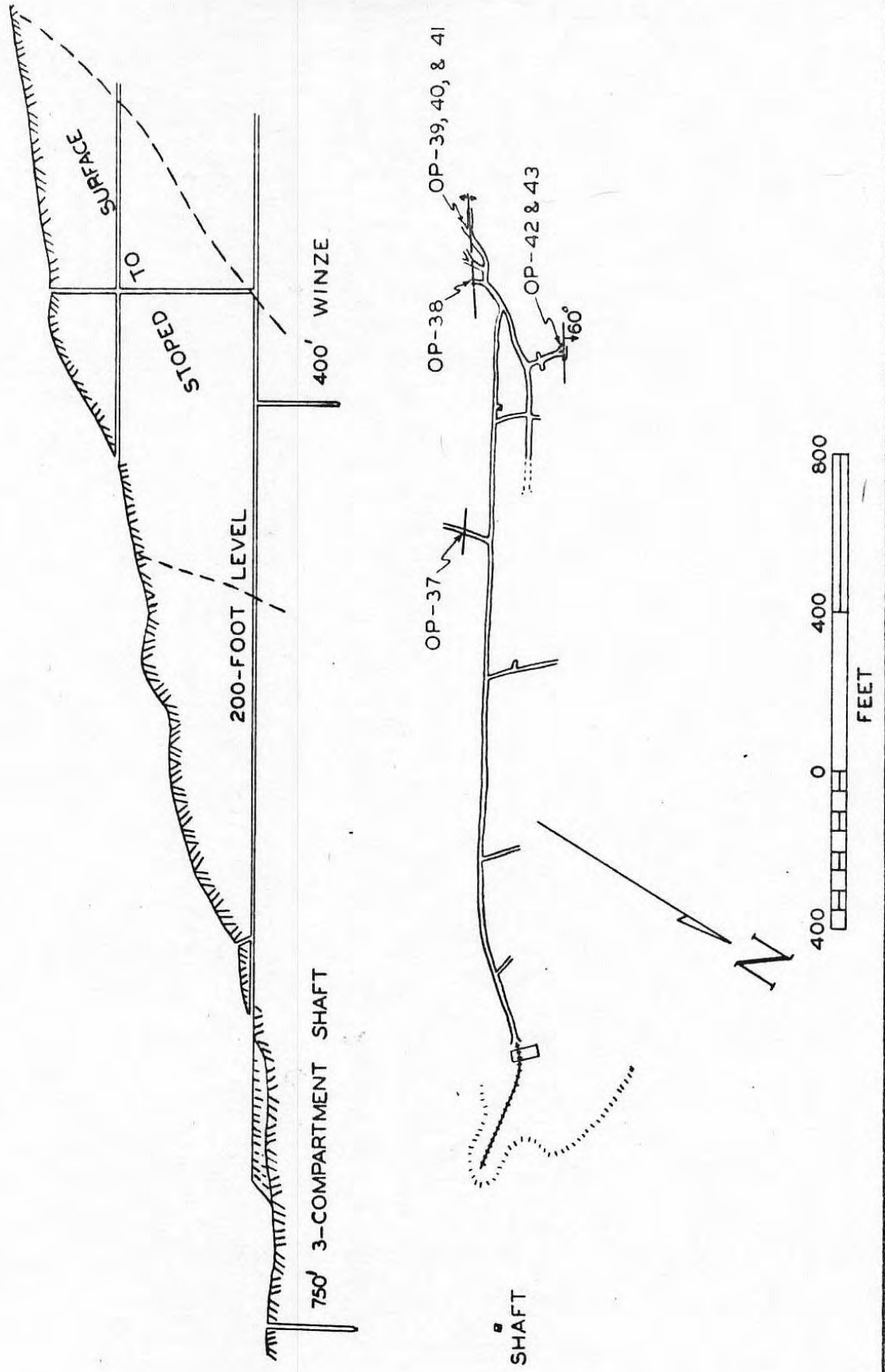


FIG. 4. PLAN AND SECTION - APOLLO MINE

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length of 1,000 feet from the 200-foot level to the surface (figure 4). The walls are highly siliceous, and though some sloughing has occurred, they roughly indicate the stoped widths to have reached 40 feet and to have averaged about 20 feet. Intense silicification extends well beyond the stope walls, but at the 200-foot level, it is much narrower and the stope widths appear to have also narrowed considerably. The relative positions and lengths of the open stopes at the surface and on the 200-foot level indicate a northeasterly rake and a shortening of the ore body with depth.

Exploratory crosscuts driven from the main adit on the 200-foot level show that the ore body lies within a wide northeasterly trending fracture zone bound by strong faults that are about 200 feet apart. Faulting within this zone is common but does not appear to have effected the ore body. A strong fault angles into the southeast boundary fault from the north, and appears to have terminated the ore shoot toward the southwest. This fault does not extend beyond the southeast boundary fault and is probably premineral and may be expected to extend to the northwest boundary fault.

A search for a second ore shoot toward the southwest was apparently made by driving along the southeast boundary fault. This drift is badly crushed and is now open for only 160 feet. <sup>Along this interval</sup> No ore was found and crosscuts were not driven into the favorable zone toward the northwest.

The southeast boundary fault was also intersected in a crosscut driven southerly from the main adit at a point about 650 feet from the

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southwest end of the ore shoot. This fault is clearly premineral, and the boundary fault on the opposite side of the fracture zone may reasonably be assumed to be also premineral. The well developed zones of silicification accompanying each of these major faults may therefore be expected to continue beyond the Apollo ore shoot. The silicified zone along the northwest boundary fault has been prospected at only one place on the 200-foot level. There it contains a moderate amount of sulphides, chiefly pyrite, and it appears that a small amount of stoping had been done.

The old stopes in the main ore body vary in width from 5 to 40 feet and average about 20 feet. It is reported that the main ore body is mined out  $\frac{8}{10}$ . Unfortunately a complete examination of the old stopes was not possible. The manways into the stopes above the 200-foot level are in thorough disrepair and the water level is coincident with the floor of the adit. Inspection of the accessible pillars shows that the ore contained considerable amounts of chalcopyrite, galena, and a lesser amount of sphalerite. Except for the concentrates shipped, none of the base metals were recovered. During the later part of the operation, a small chloridizing plant was installed to prepare the silver contained in the concentrates for amalgamation. The metal content of the silicified zones along the boundary faults is very small.

No data is available as to the extent of development or stoping below the 200-foot level. There is a 3-compartment shaft near the old mill site reported to be 750 feet deep and a winze on the 200-foot level

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$\frac{8}{10}$  Atwood, W.W., Mineral Resources of Southwestern Alaska; Mineral Resources of Alaska, Report on Progress on Investigations in 1908, U. S. Geological Survey Bull. 379, 1909, p. 150.

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is reported to be 400 feet deep.

From the reported total production of \$4,000,000 and an average value of \$8 at the old price of gold for the mill feed, it is assumed that about one-half million tons of ore was mined.

#### Sampling and analyses

Since the main ore body had been mined out, sampling was directed toward ascertaining the potential value of the walls of the old stopes and of the silicified zones accompanying the boundary faults. Only seven places were accessible for sampling. The locations of the seven samples taken in the silicified zones are shown on figure 4. The three remaining samples were taken in the walls of the stope; OP-44 in the hanging wall, OP-45 in the footwall, and OP-46 on the surface in the footwall. The results of the analyses are given in table II.

TABLE II - Analyses of Apollo Samples

Sample No.	Width Feet	Ounces a ton		Percent		
		Gold	Silver	Lead	Copper	Zinc
OP-37	4.8	Trace	Trace	0.4	-0.1	-0.1
OP-38	5.2	Trace	0.4	*	*	*
OP-39	3.8	Trace	0.2	*	*	*
OP-40	6.4	0.03	0.6	*	*	*
OP-41	6.4	Trace	Trace	0.2	-0.1	-0.1
OP-42	8.9	Trace	0.6	*	*	*
OP-43	6.0	Trace	Trace	*	*	*
OP-44	3.0	Trace	Trace	-0.1	0.1	-0.1
OP-45	5.0	Trace	0.2	-0.1	0.3	0.4
OP-46	15.0	Trace	Trace	*	*	*

NOTE: Determinations for lead, copper, and zinc were not made on samples marked (\*).

### RISING SUN CLAIM

#### History and ownership

The Rising Sun claim, one of the patented claims forming the

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Apollo group, was owned by the Alaska Commercial Company. Lying one mile west of Delarof Harbor, Unga Island, it adjoins the Prospect claim of the Apollo mine to the northwest. The portal of the Rising Sun crosscut adit is about 400 feet southeast of the portal of the Apollo adit (figure 3), and is located on the Olgen claim near its common endline with the Rising Sun claim.

Ore deposit and development

Development on the Rising Sun claim consists of the 580-foot crosscut adit and 37 feet of drifting shown on figure 5. The adit strikes S. 06° E. and the portal elevation is 200 feet. A silicified fracture zone outcropping about 360 feet to the south of the portal at an elevation of 350 feet is exposed at 345 feet in the adit. Where cut by the adit, the zone consisted of reticulated white quartz veins over a 14-foot width. The quartz is quite vuggy and occupies about 75 percent of the fracture zone. Sulphides were not observed in the vein material, but black to brown oxidation products occur in moderate amounts. The principal development of the quartz at the surface is west of the trace of the adit and the vein was drifted upon in that direction. The vein rapidly pinched to a width of 12 inches at the face of the short drift, where the quartz is terminated by a fault of moderate strength.

At the surface, the quartz vein cut in the adit can be followed over 100 feet easterly from the trace of the adit, and farther along the steep declivity in the same direction, quartz appears in the talus and as isolated small outcrops. About 300 feet S. 75° W. along the

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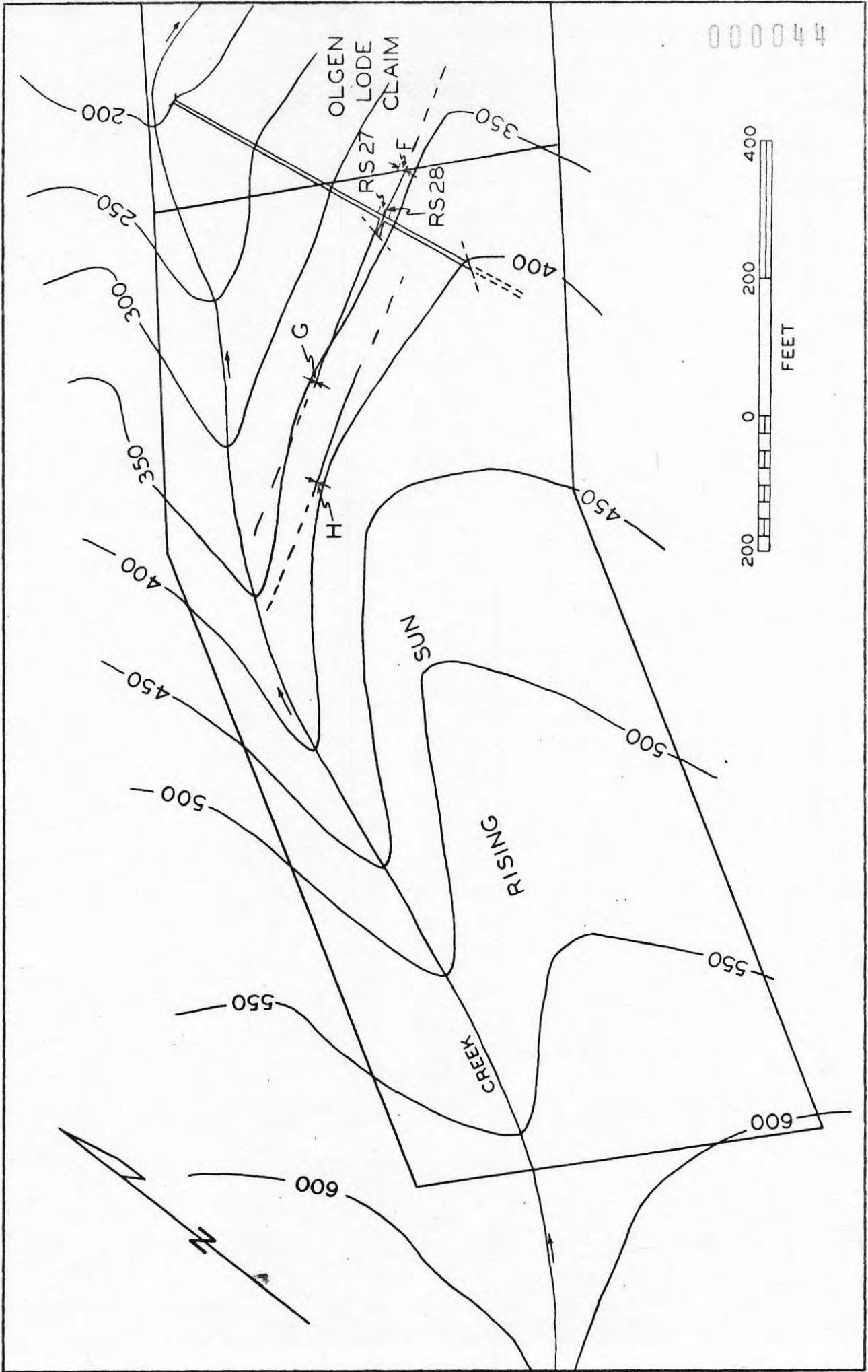


FIG. 5.

RISING SUN CLAIM

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strike of the vein, it enters a canyon wall at a low angle and the best developed section, 2.6 feet in width, was sampled. The vein can not be traced within the canyon and was not observed farther along the projected strike.

A well developed vein of quartz parallels the above vein about 50 feet to the south, and enters the canyon wall 125 feet farther toward the southwest. See figure 5. This vein can be traced in the large rubble boulders a distance of 150 feet N. 75° E. from the canyon rim. If this vein maintained in depth the relative position to the white quartz veins in the fracture zone as it does at the surface, it would be expected in the Rising Sun adit about 50 feet beyond the latter. However, it does not appear in the adit.

Exploration by the Bureau of Mines

The two veins outcropping on the Rising Sun claim were mapped and sampled by the Bureau of Mines. Two samples were taken in the adit across the strike of the reticulated quartz veins in the fracture zone and one on each side of the trace of the adit on the outcrop. One sample was taken across the other vein. The results of analyses are given in table III.

TABLE III - Analyses of Rising Sun Samples

Sample No.	Width Feet	Ounces a ton			Percent		
		Gold	Silver	Lead	Copper	Zinc	
RS-27	7.0	Trace	Trace	*	*	*	
RS-28	7.0	0.01	Trace	*	*	*	
F	10.5	Trace	0.2	*	*	*	
G	2.6	Trace	0.2	*	*	*	
H	8.0	0.01	2.0	0.2	Trace	-0.1	

NOTE: Determinations for lead, copper, and zinc were not made on samples marked ( \* ).



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## OLGEN LODE CLAIM

Introduction

Olgen lode claim is another of the patented claims belonging to the Apollo group (figure 3). Development consists of a short adit on the right limit of Mine Creek about 1,600 feet northwest of Delarof Harbor, Unga Island, and approximately 1,500 feet easterly of the Apollo adit portal. The adit is near the eastern end line of the Olgen claim and there has been no production.

Description of deposit

The mineralized vein on the Olgen claim occurs within the southwesterly continuation of the Sitka fracture zone in the andesite and the split vein from the Sitka claim appears to be joined at the eastern end of the Olgen claim. Both branches of the split vein maintain a constant strike of S. 45° W. through the southwestern portion of the King claim on the opposite side of Mine Creek, but at the left limit of the creek, the southern-most split swings S. 70° W. joining the northern branch at the Olgen adit.

The adit is very short and the vein material exposed in it has been thoroughly oxidized. It is cellular and vuggy, and it is probable that it has contained the same sulphides observed at the Sitka mine, i.e., pyrite, and lesser amounts of chalcopyrite, galena, and sphalerite.

Figure 6 shows the Olgen adit and vein outcrop. The vein is traceable along its projected strike S. 33° W. partially through natural exposures and by float in the talus a distance of 500 feet. At the latter point the north wall is obscured under a heavy accumulation of

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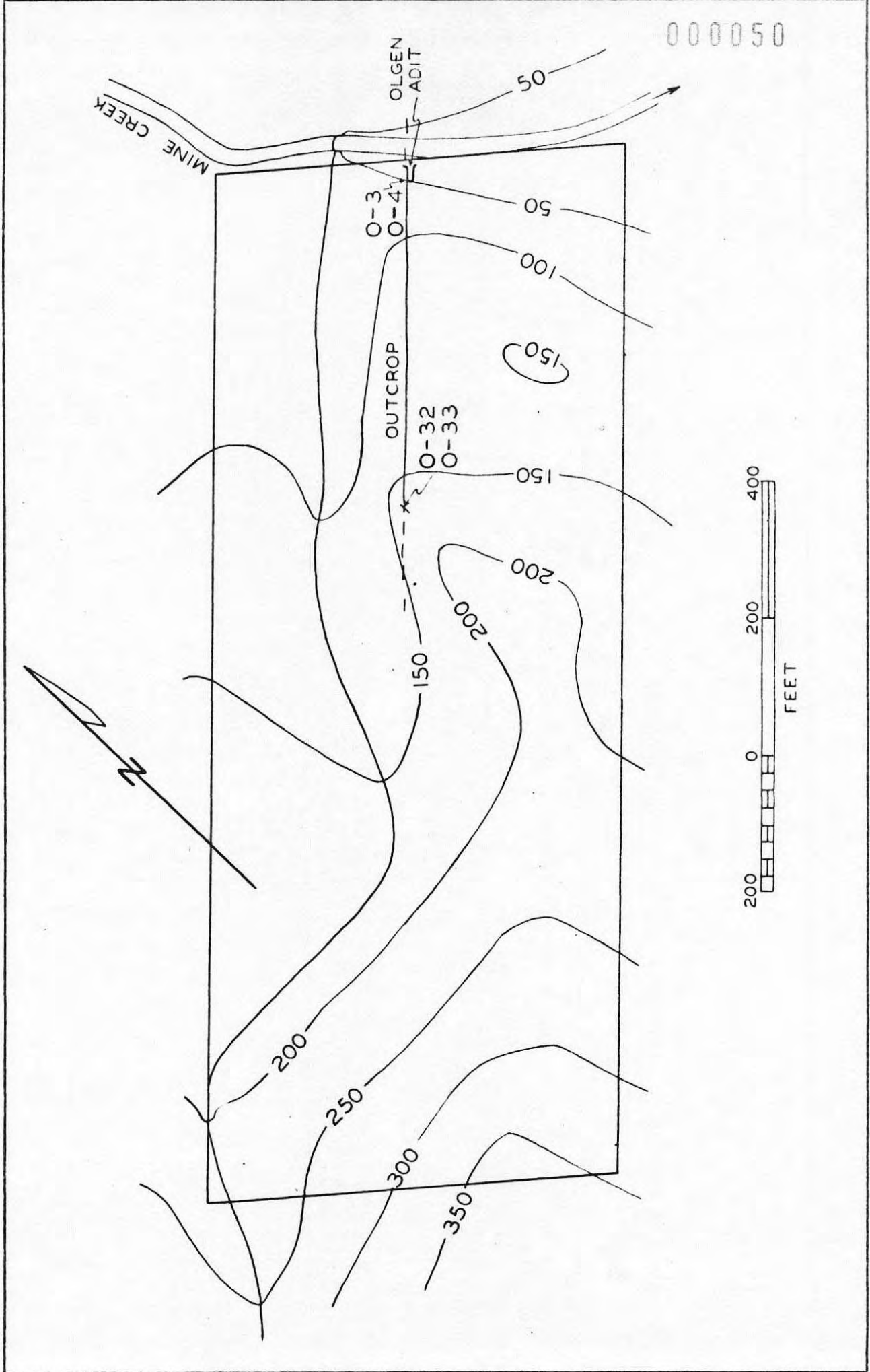


FIG. 6.

OLGEN LODGE CLAIM

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talus, but the adjacent true width of 4.3 feet of vuggy and cellular quartz was sampled. The vein material grades off to the southeast through a decreasing quartz content into normal andesite. The next 200-foot interval is heavily overburdened and the vein was not observed in the next outcrops. The vein has a strike length of 500 feet.

#### Sampling and analyses

Four samples were taken by the Bureau of Mines from the vein on the Olgen claim. The position of the samples and results of their analyses are shown on figure 7. Two of the samples, O-3 and O-4, were taken across the vein in the Olgen adit, and the other two were taken across that portion of the vein exposed 500 feet southwesterly of the Olgen adit. One of these, O-33, was taken normal to the vein of the parallel zone of mineralization with graduation from the quartz to the normal andesite of the country rock.

### SITKA MINE

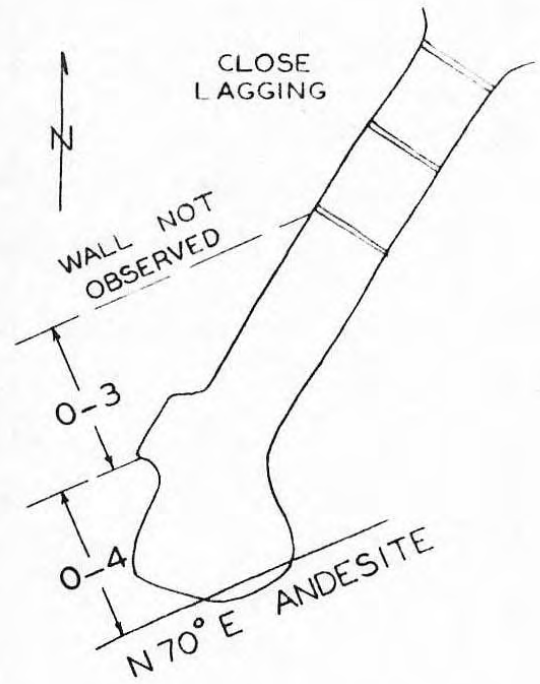
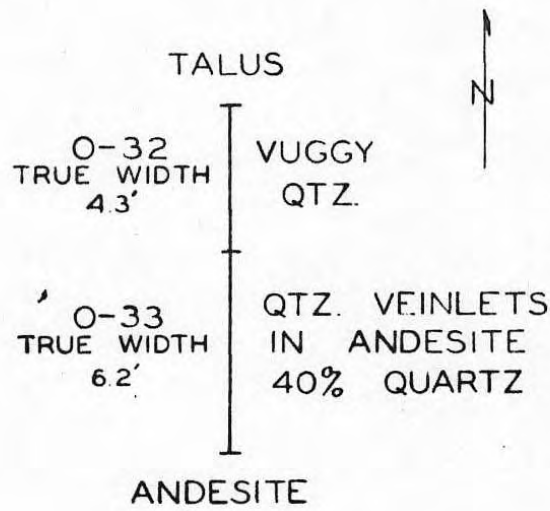
#### Introduction

The Sitka mine is on the patented King claim of the Sitka Consolidated Mining Company. See figure 8. Beside the King claim, the property consisted of the patented North Extension of King and a mill site. This company, like the adjoining Apollo group of claims west of Mine Creek, belonged to the Alaska Commercial Company. The Sitka mine is located across the valley about one half mile northeast of the Apollo mine and one mile north of the head of Delarof Harbor, Unga Island.

The Sitka mine was examined by two engineers of the Bureau of Mines from May 10 to 14, 1945.

OUTCROP  
500 FEET S 46° W  
OLGEN ADIT

OLGEN ADIT



SAMPLE NO.	TRUE WIDTH	GOLD OZ.	SILVER OZ.	LEAD %	COPPER %	ZINC %
O-3	7.1	0.05	2.4	0.7	1.7	1.2
O-4	7.8	0.01	0.4	-	-	-
O-32	7.0	TR.	TR.	-	-	-
O-33	10.0	TR.	0.2	-	-	-

FIG. 7. ASSAY MAP

OLGEN LODE CLAIM

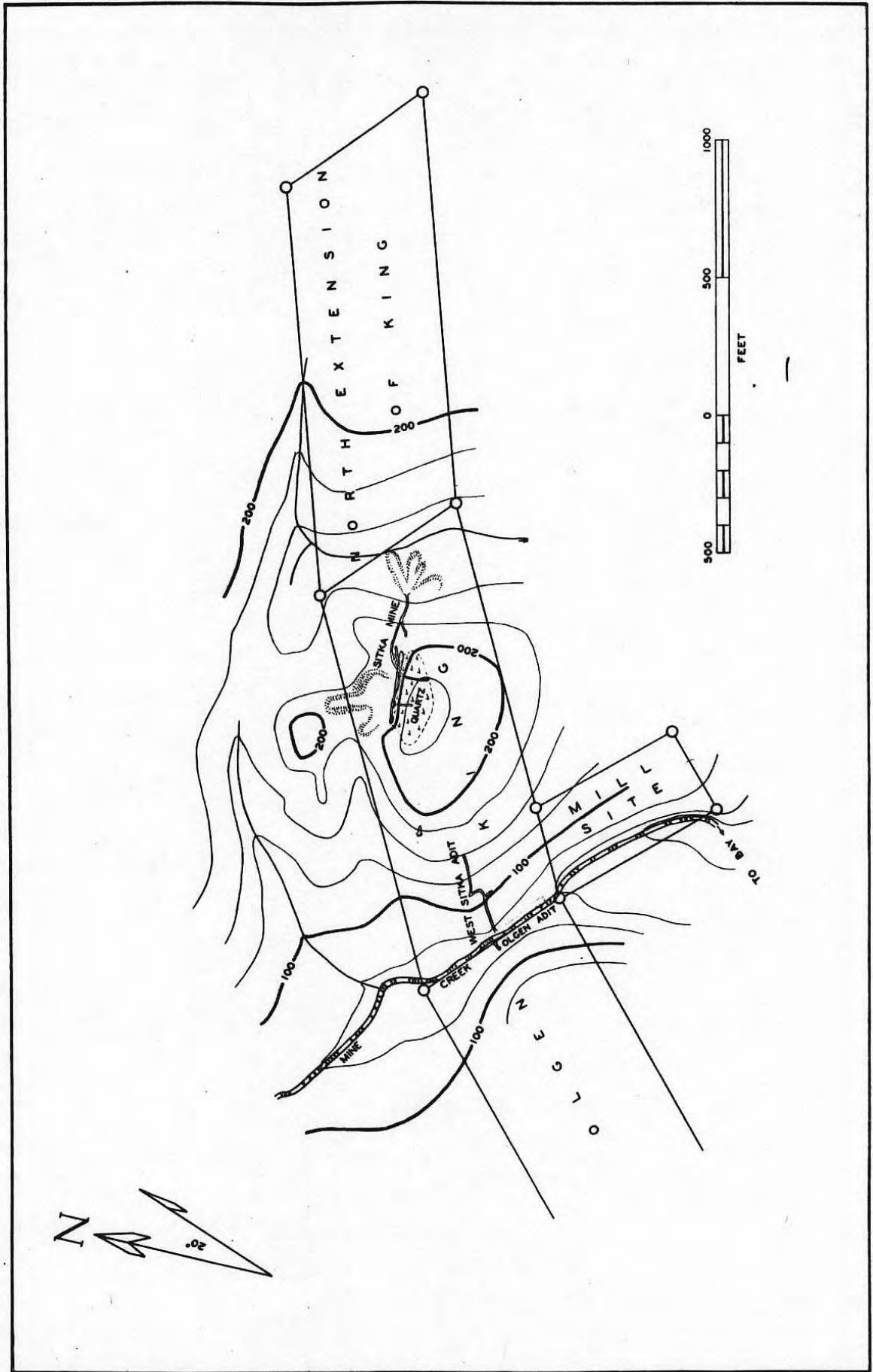


FIG. 8

SITKA CONSOLIDATED MINING CO., UNGA ISLAND, ALASKA

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History and production

The Sitka mine was developed contemporaneously with the Apollo. Since it was planned to treat the ore from the Sitka mine in the Apollo mill, two batteries of stamps were added for that purpose. The Sitka ore, however, contained a relatively high percentage of base-metal sulphides and losses were high. Milling of the Sitka ore was discontinued therefore, after only a portion of the estimated 15,000 ton produced was milled.

Ore deposits and development

The ore in the Sitka mine is associated with a silicified shear zone in the andesite, and the strike of the shear zone is approximately at right angles to that of the Apollo mine across the valley. Near the surface, just west of the shaft, there are relatively few open fractures within the ore zone and the reticulated quartz veins contain an estimated 5 percent of combined chalcopyrite, galena, and sphalerite over a width of 10 feet. Chalcopyrite and galena predominate, with a decidedly lesser amount of sphalerite. The strike and dip of the reticulated quartz veins in this enriched zone have a wide range, but average about east-west with a high dip. Individual streaks of quartz, often very vuggy, trend away from the east-west strike into the wide adjacent silicified zone to the south. Prospecting has not been carried along their projected individual strikes.

A three-compartment shaft has been carried to a reported depth of 400 feet plus a 50-foot sump but it is now filled with debris to the 55-foot level. See figures 9 and 10. The mine is drained down

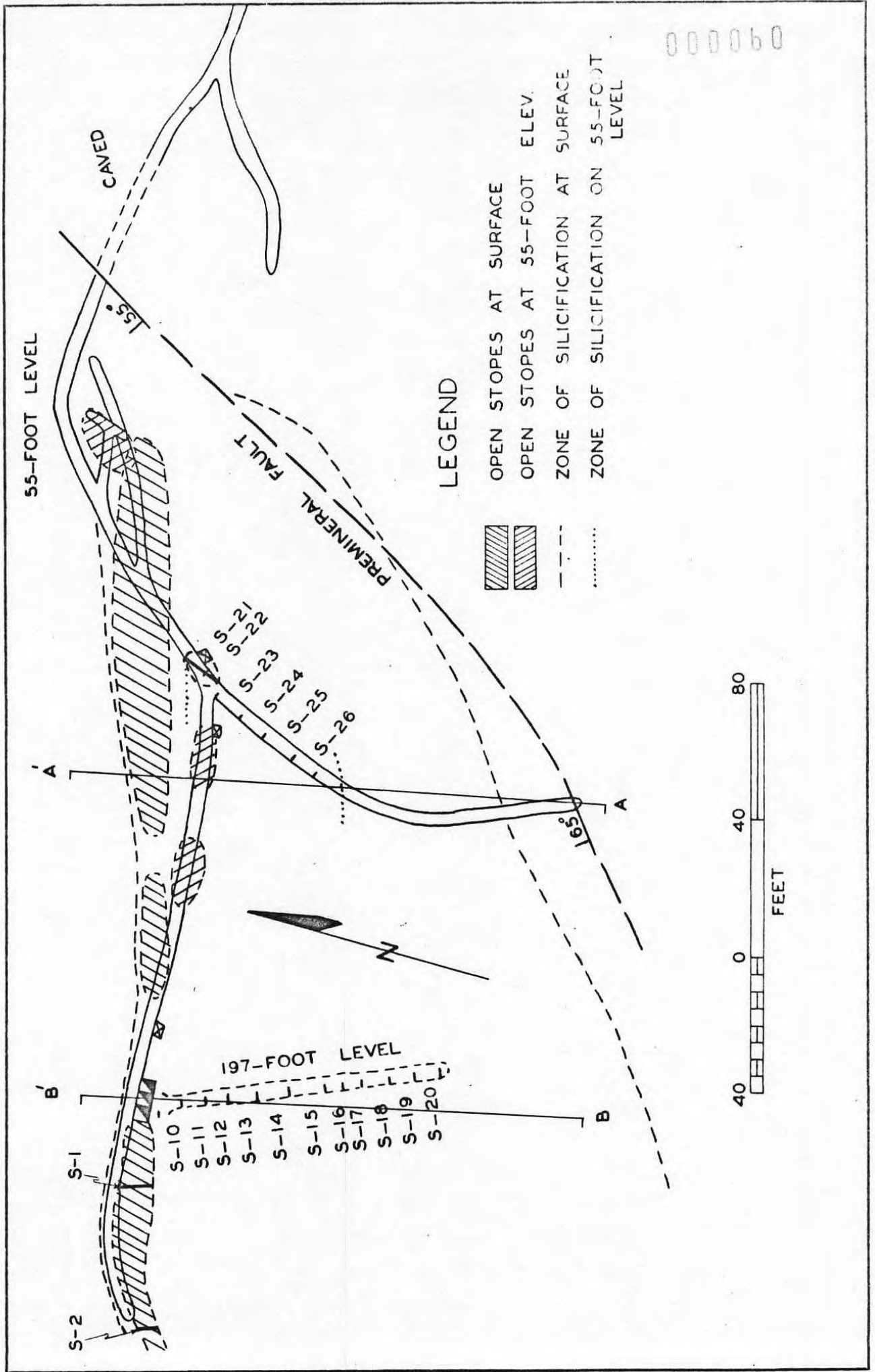
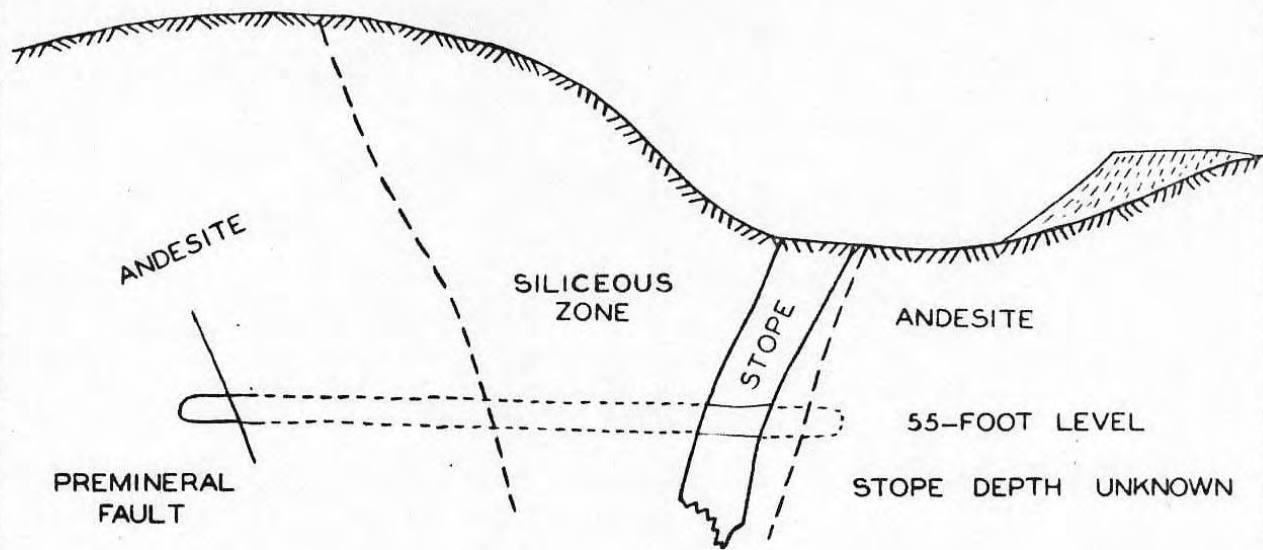


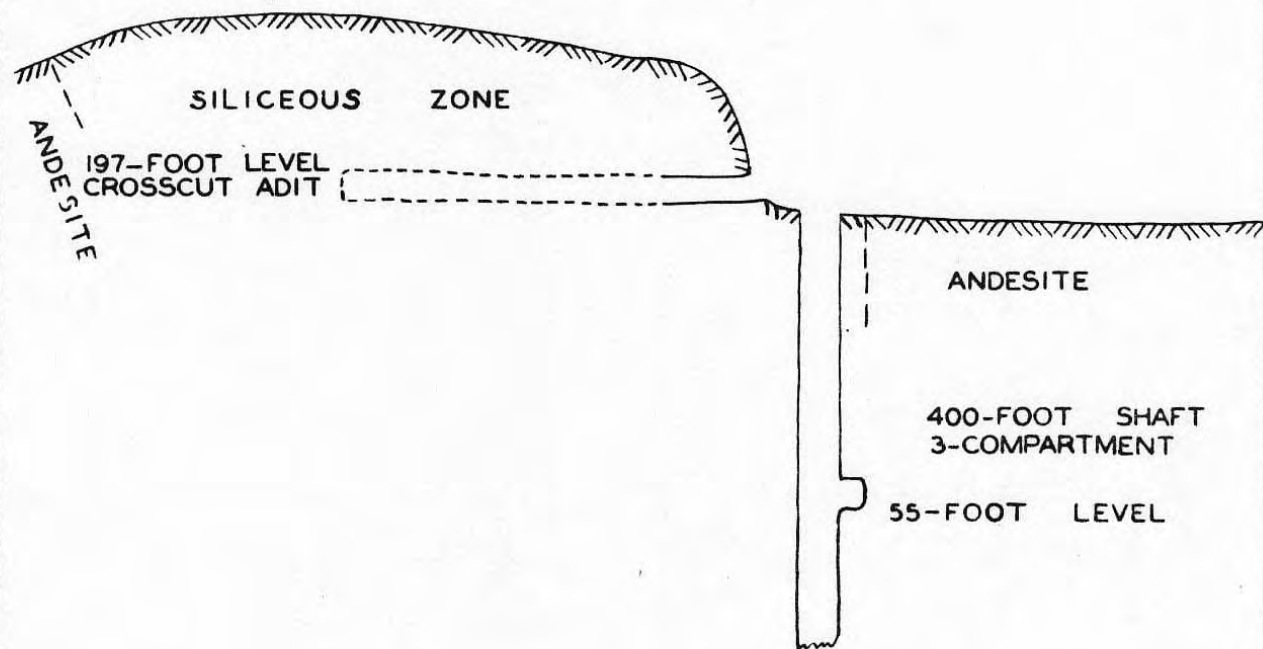
FIG. 9

SECTION A-A'

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SECTION B-B'



--- ZONE OF SILICIFICATION



FIG. 10.

SECTIONS THROUGH SITKA WORKINGS



R.I. \_\_\_\_\_

to the 55-foot level by an adit driven from the east. The stopes above this level are open and have an average width of about 15 feet along the strike length of about 150 feet. There is no reliable data on the depth to which stoping was carried, but it has been reported by a miner who worked there at the close of the Apollo-Sitka operation that the stopes do not extend much below the 55-foot level.

A crosscut adit has been driven southerly into the wide siliceous zone behind the shaft, and a crosscut on the 55-foot level traversed the siliceous zone. On the 55-foot level, the silicified zone has narrowed considerably conforming to the condition observed at the Apollo mine.

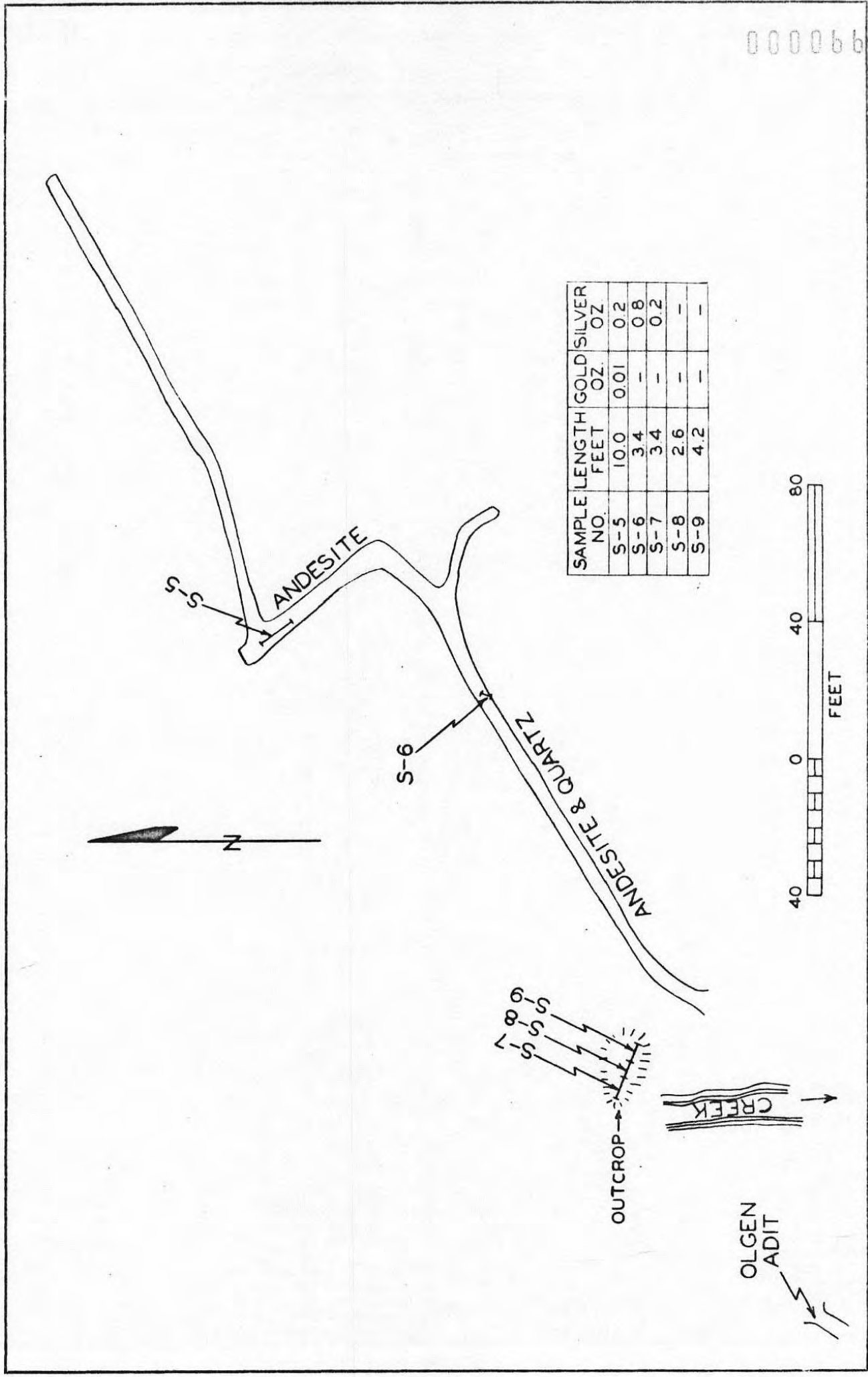
Exploration along the strike of the Sitka vein has extended easterly from the shaft to a northeast trending fault at which the deposit is terminated. Stoping has been continuous from the shaft to this fault. Fresh sulphides of copper, lead, and zinc are found on the 55-foot level west of the shaft and little stoping or exploration has been done in this direction. Surface exposures are absent however, in this direction along the strike of the vein.

A considerable development of barren quartz south from the shaft has a strike length of about 600 feet and is about 100 feet wide (figure 8). Beyond its western extremity, based upon intermittent outcrops, it continues as two roughly parallel zones of reticulated quartz veins, both having a strike of S. 45° W. The two veins show a strong development of vuggy quartz and near the western end line of the King claim appear to join and continue onto the Olgen claim.

The west Sitka adit (figure 11) is located near the western end line of the King claim where the above veins join. The adit is 360-foot

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WEST SITKA ADIT

FIG. 11.

R.I. \_\_\_\_\_

long and with a 30-foot crosscut appear to have been driven to explore the two veins.

Sampling and analyses

Twenty-two samples were taken in the Sitka workings on the King claim. Four of these, S-1, S-2, S-21, and S-22 were taken across the main vein and are indicative of the material mined. Samples S-10 to S-20, inclusive, and S-23 to S-26, inclusive, were taken in the crosscuts in the adjoining silicified zone. Three samples were taken on the outcrop of the wide development of quartz south from the shaft. Sample locations are shown on figure 9 and the analyses in the following table:

TABLE IV - Analyses of Sitka mine samples

Sample No.	Width Feet	Ounces a ton		Percent		
		Gold	Silver	Lead	Copper	Zinc
S-1	10.0	0.02	1.4	*	*	*
S-2	4.9	0.10	2.2	0.6	1.4	2.7
S-10	8.5	0.04	1.6	0.5	0.9	0.4
S-11	6.8	*	*	*	*	*
S-12	6.2	Trace	0.6	0.15	Trace	0.2
S-13	8.2	0.01	Trace	*	*	*
S-14	9.8	0.01	0.2	*	*	*
S-15	9.8	0.01	0.3	*	*	*
S-16	5.0	Trace	Trace	*	*	*
S-17	5.8	Trace	Trace	*	*	*
S-18	7.5	Trace	0.2	*	*	*
S-19	6.8	Trace	Trace	*	*	*
S-20	7.8	Trace	Trace	*	*	*
S-21	8.7	4.14	2.2	0.2	0.15	0.1
S-22	4.9	0.08	0.8	*	*	*
S-23	9.0	0.02	0.2	-0.1	Trace	Trace
S-24	9.0	Trace	Trace	*	*	*
S-25	10.0	Trace	Trace	*	*	*
S-26	8.3	0.01	Trace	0.2	Trace	-0.1
S-29	11.0	Trace	Trace	*	*	*
S-30	7.5	Trace	Trace	*	*	*
S-31	8.0	Trace	Trace	*	*	*

NOTE: Samples marked with asterisk ( \* ) were not analyzed.

Five samples were taken at the west Sitka adit. Two of these were underground and the remaining three samples were across an outcrop near the adit portal. Location of samples and analyses are shown on figure 11. Samples S-6 and S-7 apparently correspond.

## DELAROFF CLAIMS

### Introduction

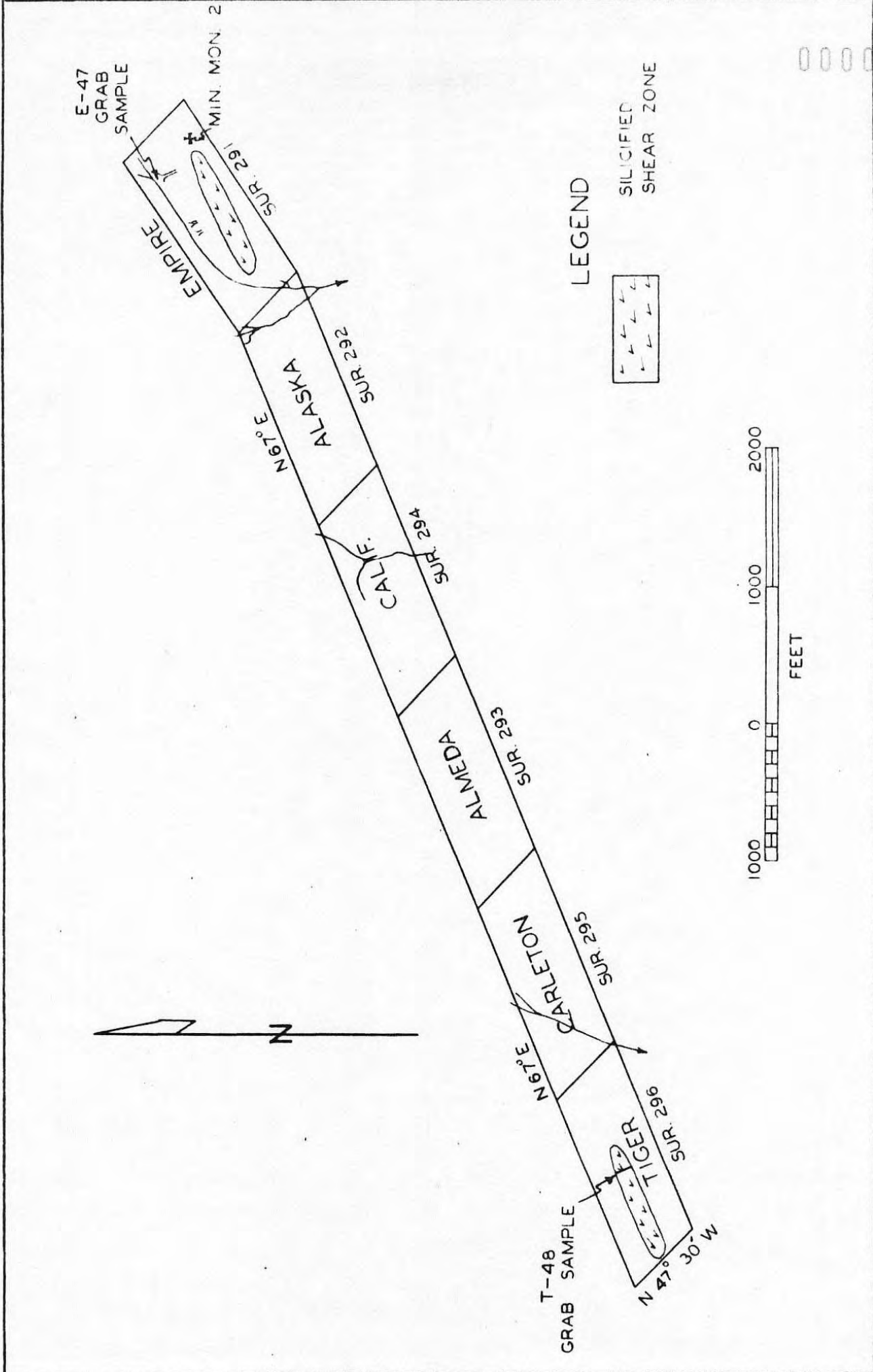
The Delaroff group of patented claims were owned by the Delaroff Mining Company. Located about one mile north of the south end of Unga Island and west of the head of Delaroff Harbor, the claims cover two large silicified shear zones (figure 12). The shear zones appear to be in alignment with the Apollo fracture zone to the northeast. The group consists of the six following claims: Tiger, Carleton, Alameda, California, Alaska, and Empire.

### Description of deposits

The silicified zones occur at the ends of the line of claims and stand out in bold relief. Both zones are enclosed by normal andesite except the zone on the Empire claim which is bordered toward the northeast by bleached andesite. The Empire silicified zone is about 900 feet in length and 100 feet in width. The silicified zone on the Tiger claim has the same width and is about 1000 feet long. There is some evidence through intermittent outcrops that the shear zone continues for several hundred feet northeast of the silicified portion.

Very little vein quartz was observed in either outcrop, and the only exploration work found had been done on the Empire claim. See

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FIG. 12.

R.I. \_\_\_\_\_

figure 13. The development consisted of a few open cuts now largely filled with slide rock, and a crosscut adit that is now inaccessible. Judging from the size of the adit dump, the adit could not have penetrated the silicified zone. No development work was found on the Tiger claim.

The amount of pyrite present seemed no greater than that normally occurring in the andesites of this area. Particular attention was paid to the possible occurrence of copper or lead sulphides, as these minerals customarily are found in the gold-bearing veins of the district. Except the pyrite mentioned above, no sulphides or their oxidation products were found.

#### Sampling

Two grab samples were taken; one, E-47, from the dump of the adit on the Empire claim, and the other, T-48, across the outcrop on the Tiger claim. Location of samples is shown on figure 12, and the results of analyses in the following tables:

TABLE V - Analyses of Delaroff samples

Sample No.	Ounces a ton	
	Gold	Silver
E-47	Trace	Trace
T-48	0.01	Trace

#### HERRON PROSPECT

#### Introduction

The Herron prospect on Unga Island is  $1\frac{1}{2}$  miles north of the village of Unga near the trail between Unga and Baralof Bay. The group

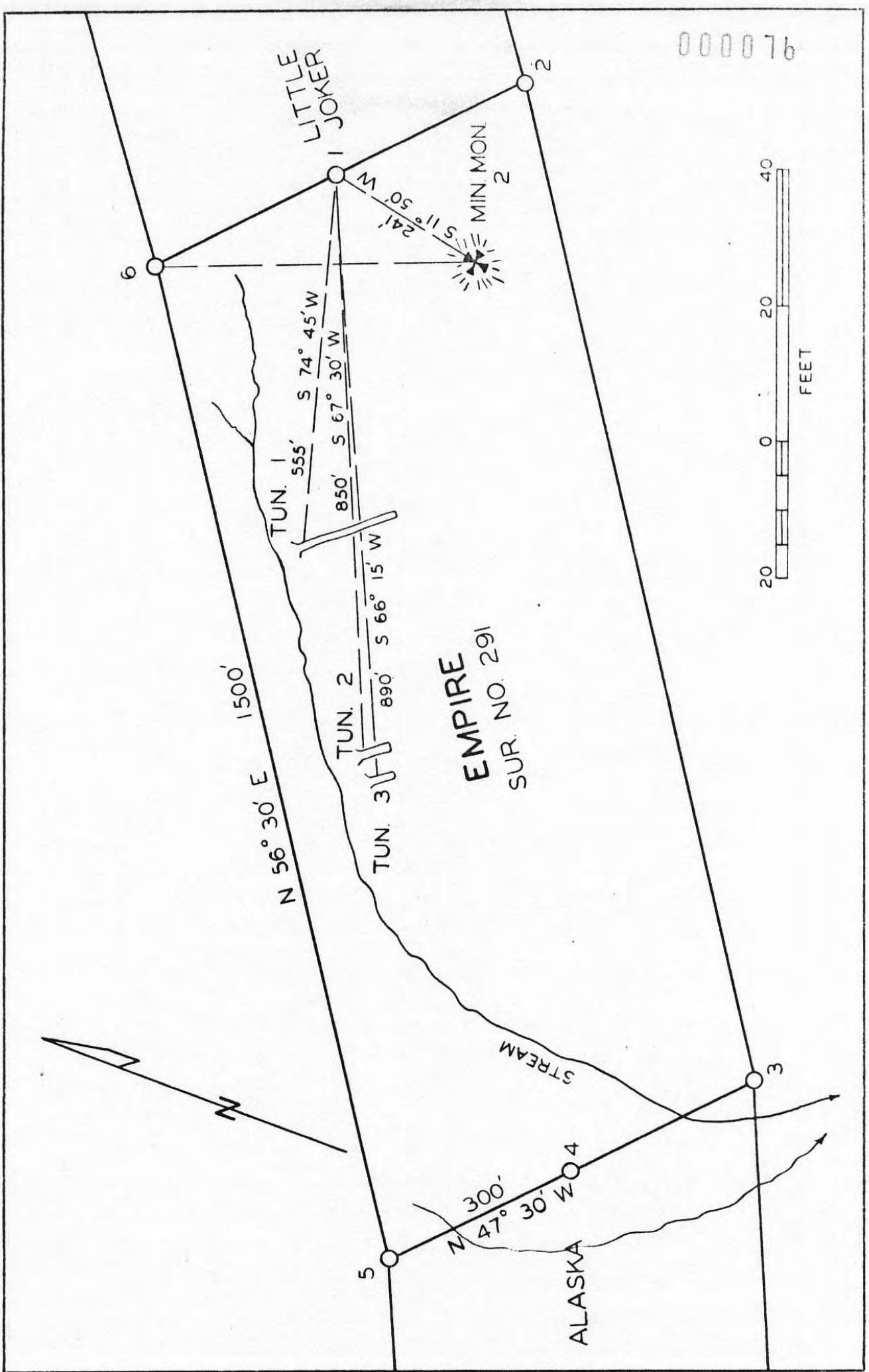


FIG. 13.

EMPIRE CLAIM

R.I. \_\_\_\_\_

consists of two unpatented claims that were staked during the period of maximum mining activity in this area. Though the claims have been held for 40 years, they are little developed and have been held principally by restaking.

#### Description of deposit

The deposit consists of a single silicified shear zone in the andesite. Figure 14 is a sketch of the silicified zone showing development. The outcrop is readily accessible and the very low pyrite content of the silicified zone is unusual in this district where pyritization is very common. No other sulphides or their oxidation products were identified.

The results of analyses and location of the samples taken by the Bureau of Mines is given on figure 14.

### CHOUMAGIN CLAIMS

#### Introduction

The Choumagin group of five patented claims stretch southwest from Squaw Harbor at the head of Baralof Bay on the east side of Unga Island. See figures 2 and 15. Belonging to the Choumagin Mining Company, San Francisco, California, the property consists of the following claims: Bertha, Kodiak, Union, Liberty, and Columbia. The deposits occur on the Union and adjacent Liberty claim, but all development has been confined to the Union claim.

The mineralized zones outcrop about one-half mile from the head of Baralof Bay well up the northwest side of a wide northeast trending valley (figure 2). They were examined by two engineers of the Bureau



R.I. \_\_\_\_\_

of Mines May 26, 1945.

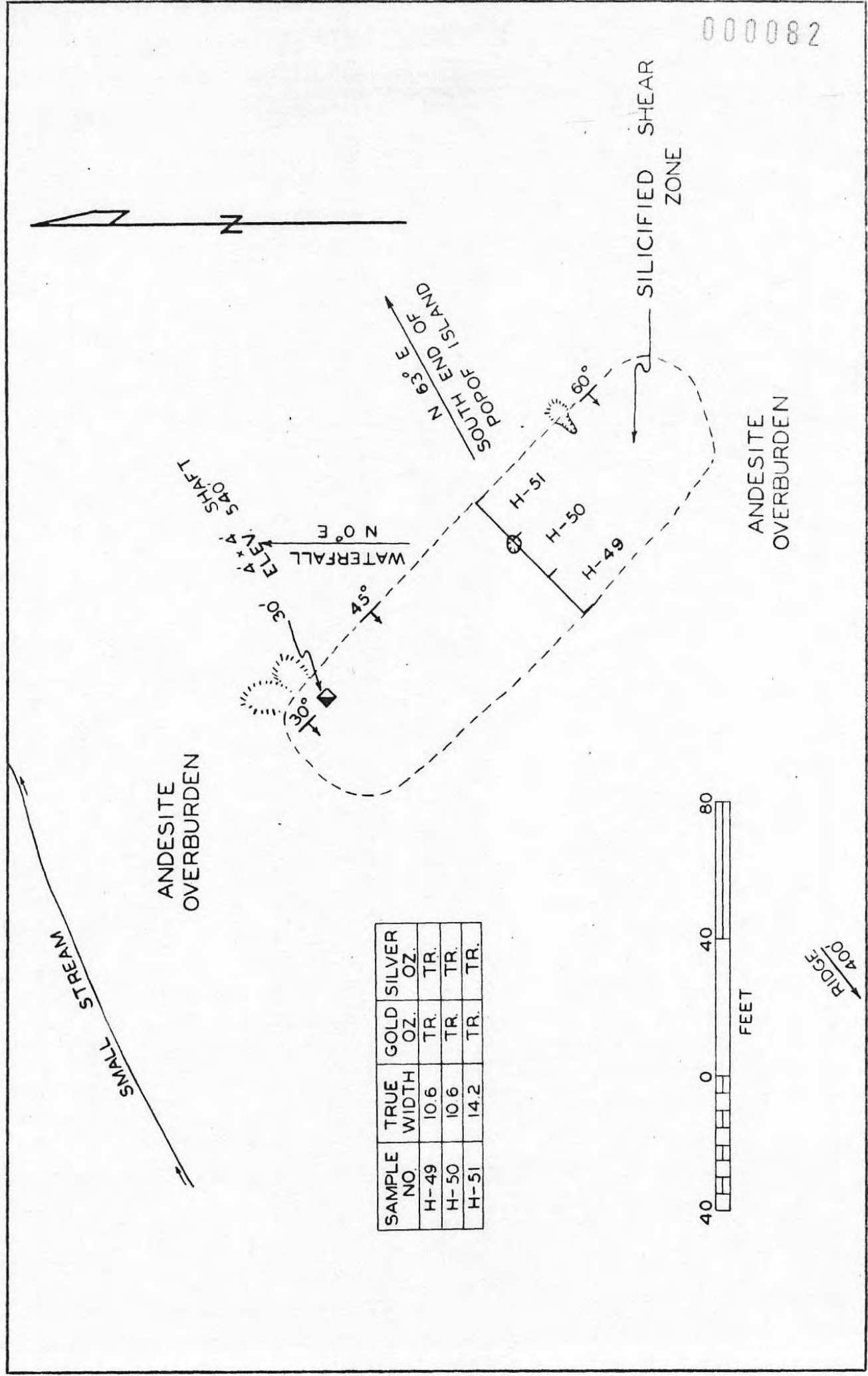
Description of deposits

Two parallel quartz veins outcrop on the Union and Liberty claims. The southern vein is a 50-foot silicified shear zone containing numerous masses of andesite. It also contains considerable vein quartz particularly in the partial outcrops on the Liberty claim. Where this zone is cut in the lower adit on the Union claim, the zone also encloses many masses of andesite, minor amounts of vein quartz, and moderate amounts of rust from oxidized pyrite. The outcrop of this zone is very conspicuous over a strike interval of about 1,200 feet.

A quite uniform fissure vein of quartz containing pyrite parallels the above 50-foot silicified zone approximately 150 feet to the northwest. The fissure vein averages 3 feet in width and consists of about 60 percent quartz with numerous small masses of country rock. From the lower crosscut adit, this vein has been followed easterly a distance of 327 feet and is present in good strength in both faces. It was reported in 1903 <sup>2/</sup> that this vein had been drifted upon a distance of 169 feet from the upper adit. At that time the vein had not been reached in the lower adit. The portal of the upper adit is northwest of the 50-foot silicified zone, and therefore does not cut it. Strike of both the veins is N. 60° E. and the dip is 85 degrees northwest. Exploration and development apparently were directed toward the 3-foot vein.

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<sup>2/</sup> Atwood, W. W., Mineral Resources of Southwestern Alaska: Mineral Resources of Alaska, Report of Progress of Investigations in 1908, U. S. Geological Survey Bull. 379, 1909, p. 150.



HERRON PROSPECT

FIG. 14.

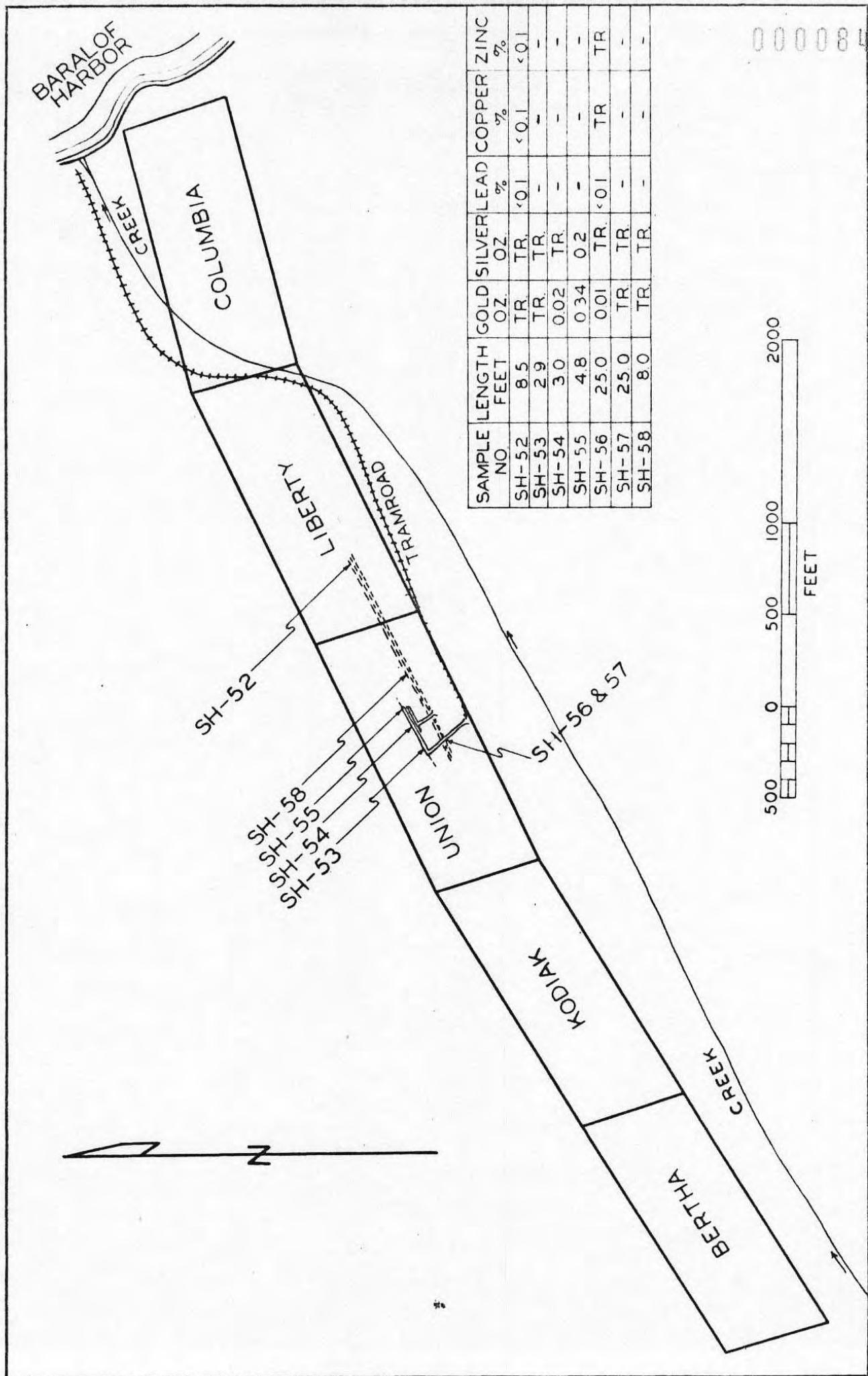


FIG. 15.

CHOUMAGIN GROUP

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Development is confined to the Union claim, figure 16, and consists of two crosscut adits separated by a vertical interval of 150 feet. The lower adit is 260 feet long and from the end which vein has been followed northwesterly by 340 feet of drift, penetrated the 3-foot vein a drift was driven 340 feet northeast along the vein. The upper adit was not accessible at the time of the examination but was reported to be 79 feet long with a 116-foot drift to the northeast along the vein and a 53-foot drift to the southwest. Drifting from the lower and upper crosscut adits falls within the same strike interval.

#### Sampling and analyses

Two samples, SH-56 and SH-57, were taken in the lower adit across the 50-foot silicified zone. In sampling the 3-foot vein, three samples, SH-53, SH-54, and SH-55, were taken in the drift from the lower adit and two samples, SH-52 and SH-58, were taken across the outcrop. Analyses and location of the samples is shown on figure 15.

### HERMAN LODE

#### Introduction

The Herman lode is located on the southwest side of Popof Island  $1\frac{1}{2}$  miles south of Sand Point (figure 2). It is between the Sand Point spit and Red Cove. The Herman lode outcrops at the base of precipitous sea cliffs immediately above the beach placers of Popof Island. The gold placers were discovered by Louis Herman in the summer of 1904, were of small extent, and have not been worked

L 1565 Bull No.?

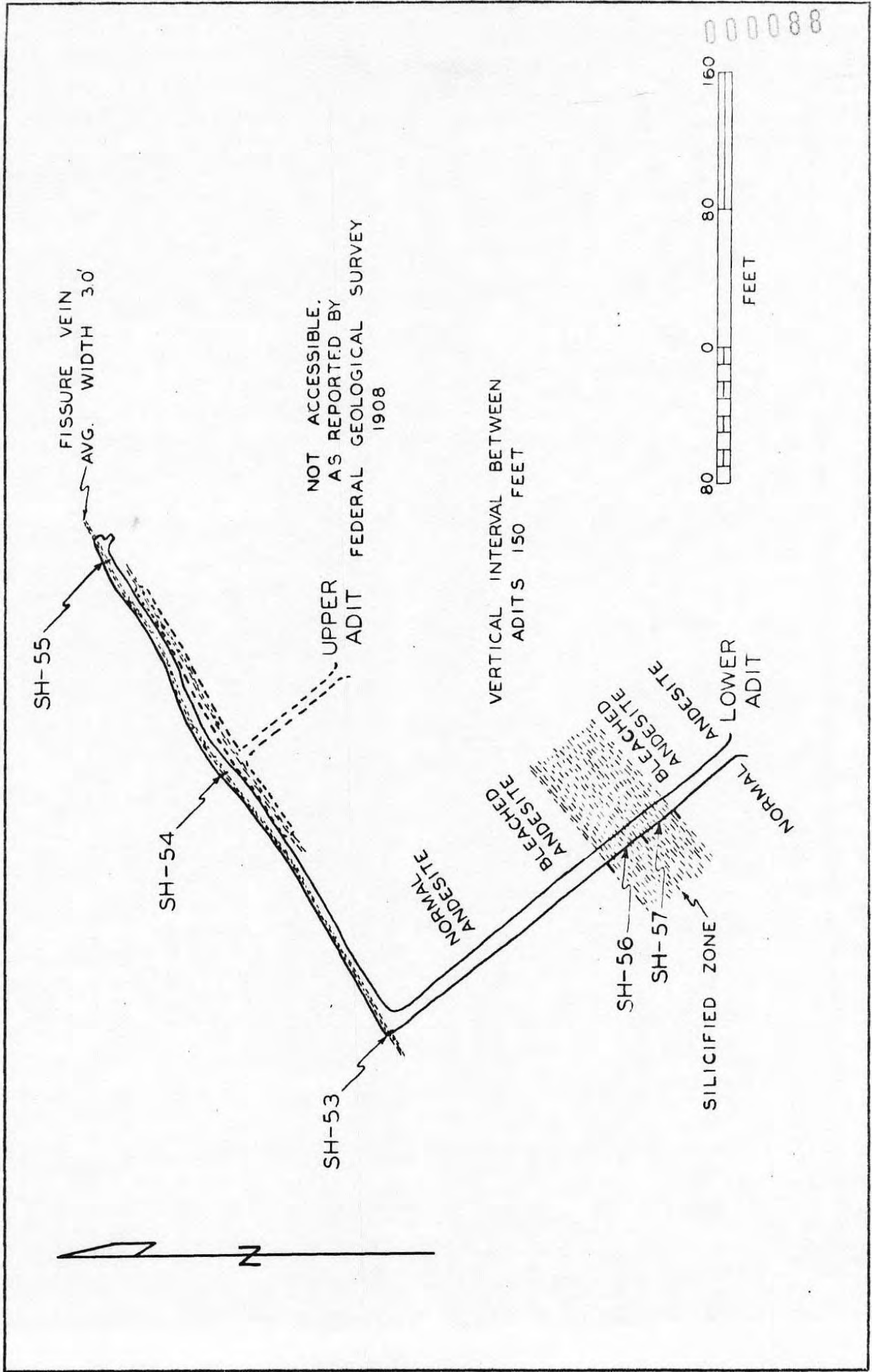


FIG. 16. UNDERGROUND DEVELOPMENT, UNION CLAIM

R.I. \_\_\_\_\_

for many years. They are reported to have yielded between 3,000 and 4,000 ounces of gold.

The deposit is covered by a portion of the B.B. group of unpatented claims held by F. Brown and Wm. West.

Description of deposit

A system of quartz veins and veinlets, mineralized with pyrite, chalcopyrite, galena, and sphalerite outcrop at the beach line in volcanic tuffs and massive andesite flows. The tuffs outcrop along the base of the sea cliffs as a section across a low dome about 50 feet in height. The tuffs extend seaward at least to low tide line, and are overlain by several hundred feet of massive andesite flows. See figures 17 and 18.

Within the very limited strike and dip slope intervals exposed, the quartz veins are best developed and are more highly mineralized within the tuffs section. In the overlying andesite flows, the veins rapidly broom out and fail with decreasing sulphide content. At the beach line and within the tuffs, a 10.5-foot section contains 5 veins with a combined width of 2.0 feet. The section 175 feet northerly along the strike and at an elevation of about 175 feet is 50 feet wide and contains at least a dozen small poorly mineralized veins. Few of the veins extend far beyond this section.

The vein cut in the crosscut adit is in massive andesite and is 320 feet northerly along the strike from the outcrops at the beach line. The persistence of this vein is believed due to its having been cut low in the section and therefor closer to the tuffs. This is further

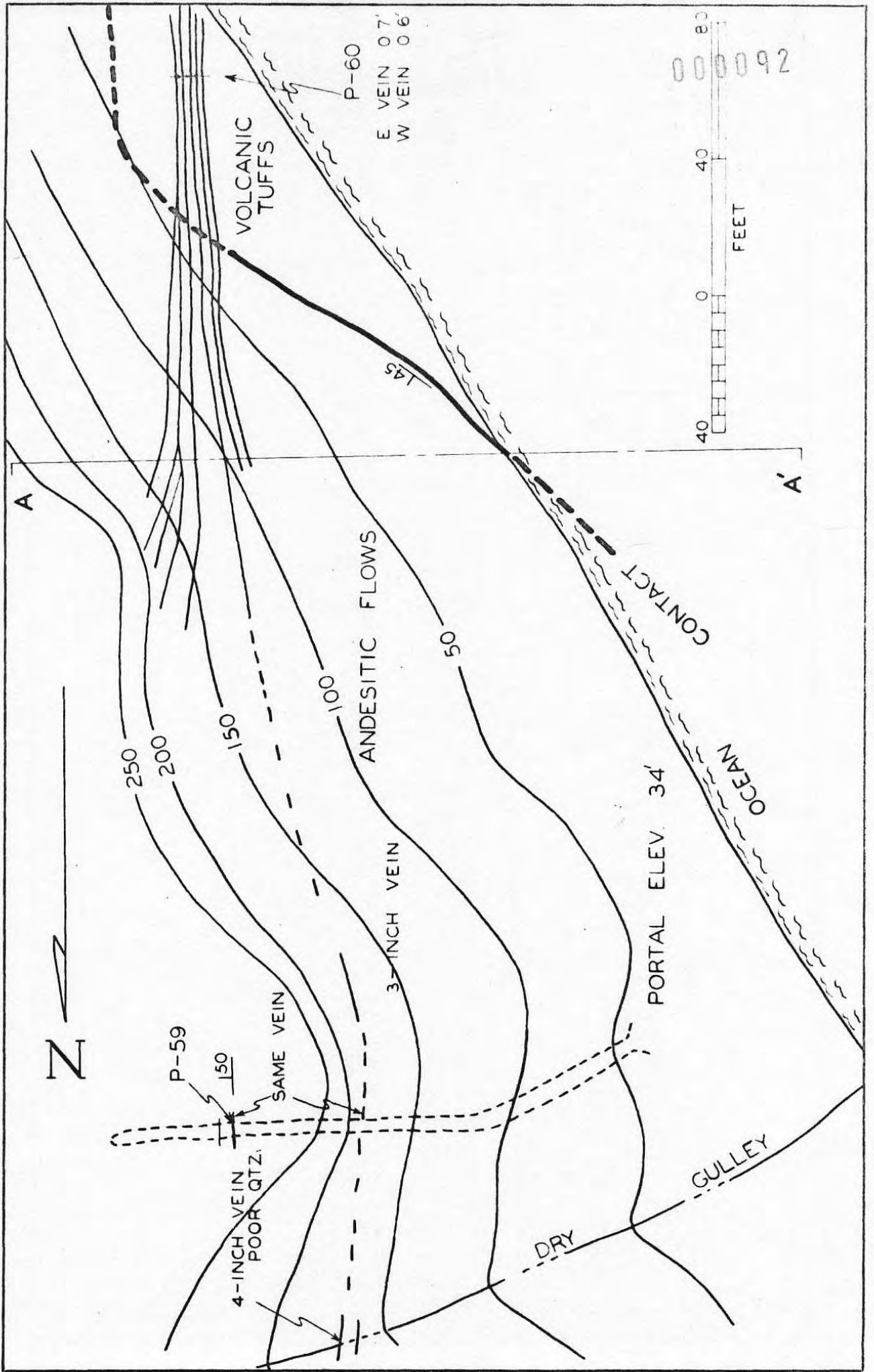


FIG. 17.

HERMAN LODE, POOPF, ALASKA

R.I. \_\_\_\_\_

indicated by the increase in width of the vein where cut in the adit at an elevation of 35 feet over its outcrop width at an elevation of about 200 feet. In the adit the vein is 1.1 feet thick and at the outcrop only 0.25 foot. Sulphide mineralization is weak at the adit level and is less at the outcrop.

The attitude of the contact between the andesite flows and the tuffs is not accurately determinable from existing exposures, but it is probably very irregular with a general southeasterly strike and a dip toward the northeast of about 45 degrees.

#### Sampling

Two samples were taken by the Bureau of Mines at the Herman lode. The first, P-59, was taken across the most persistent vein where it is exposed in the crosscut adit. The other sample, P-60, was taken across the above vein and a parallel vein in the section of tuffs exposed along the sea cliffs. The two veins were 0.7 and 0.6 feet, respectively. Total length of the sample was 1.3 feet.

Location of samples is shown on figure 17. The results of analyses of the samples are given in the following table:

TABLE VI - Analyses of Herman lode samples

Sample No.	Width Feet	Ounces a ton		Percent		
		Gold	Silver	Lead	Copper	Zinc
P-59	1.1	0.14	Trace	0.15	Trace	Trace
P-60	1.3	0.01	0.8	0.3	0.2	0.6

#### WEST LODES

#### Introduction

The West lodes I and II are located about 4 miles southeast



R.I. \_\_\_\_\_

of the Sand Point spit on the north shore of Red Cove (figure 2). Red Cove is on the southwest coast of Popof Island. The veins are in the sea cliffs at the northern entrance to the cove and face upon a very narrow bouldery beach. Access to the outcrops is very difficult.

The property consists of two unpatented claims, B. B. Nos. 5 and 6, held by F. Brown and Wm. West.

#### Description

The two veins, No. I and No. II, occur in fractures in a major northeasterly trending fracture zone obliquely exposed in cross section along the southwest shore of Popof Island. Though the fractures are quite persistent, the veins pinch out along part of the exposed strike interval. The veins are sparsely mineralized and the sulphides are mainly pyrite with a small amount of chalcopyrite, galena, and sphalerite.

The No. I vein outcrops at the beach where it is 1.3 feet in width. It can be reached in the lower part of the cliff some 200 feet northeasterly along its strike where it is less than a foot in thickness and contains but few sulphides. Toward the southwest from this section, it has pinched out along a strike interval of about 75 feet. The vein is again accessible 525 feet northeasterly from the outcrop at the beach in a short, steep gulch. Here it is 2.1 feet wide and sparsely mineralized. From this section the outcrop can be seen toward the southwest along an interval of about 100 feet where it is considerably wider, probably about 4 feet. Several hundred feet farther northeasterly the vein can be seen from the top of the cliff

R.I. \_\_\_\_\_

to have thinned to about 1 foot.

The No. II vein is accessible in the gulch only but can be seen intermittently in the cliff face for about 800 feet toward the southwest. At its outcrop in the gulch the vein is 4.6 feet in width and is considerably altered through oxidation. Sulphide mineralization appears to be confined to pyrite. The vein was not observed northeast of the gulch but might perhaps have been seen from the beach along this section had it been accessible.

Sampling

Two samples were taken across the No. I vein and one from the No. II vein. Location of the samples is shown on figure 19. The results of analyses of the samples are given in table VII.

TABLE VII - Analyses of West lode samples

Sample No.	Width Feet	Ounces a ton		Percent		
		Gold	Silver	Lead	Copper	Zinc
P-65	1.3	0.01	0.4	-0.1	Trace	-0.1
P-66	2.1	Trace	Trace	0.7	0.05	0.4
P-67	4.6	0.01	Trace	*	*	*

NOTE: Samples marked with asterisk ( \* ) were not analyzed.

BROWN ZINC DEPOSIT

Introduction

The Brown zinc deposit is located on the unpatented B.B. claim No. 14, held by F. Brown and Wm. West. The deposit outcrops conspicuously close to the base of the sea cliffs near the northern side of Red Cove, on the southwestern side of Popof Island. It is enclosed by andesite which in the vicinity of the vein is colored a

SECTION A-A'

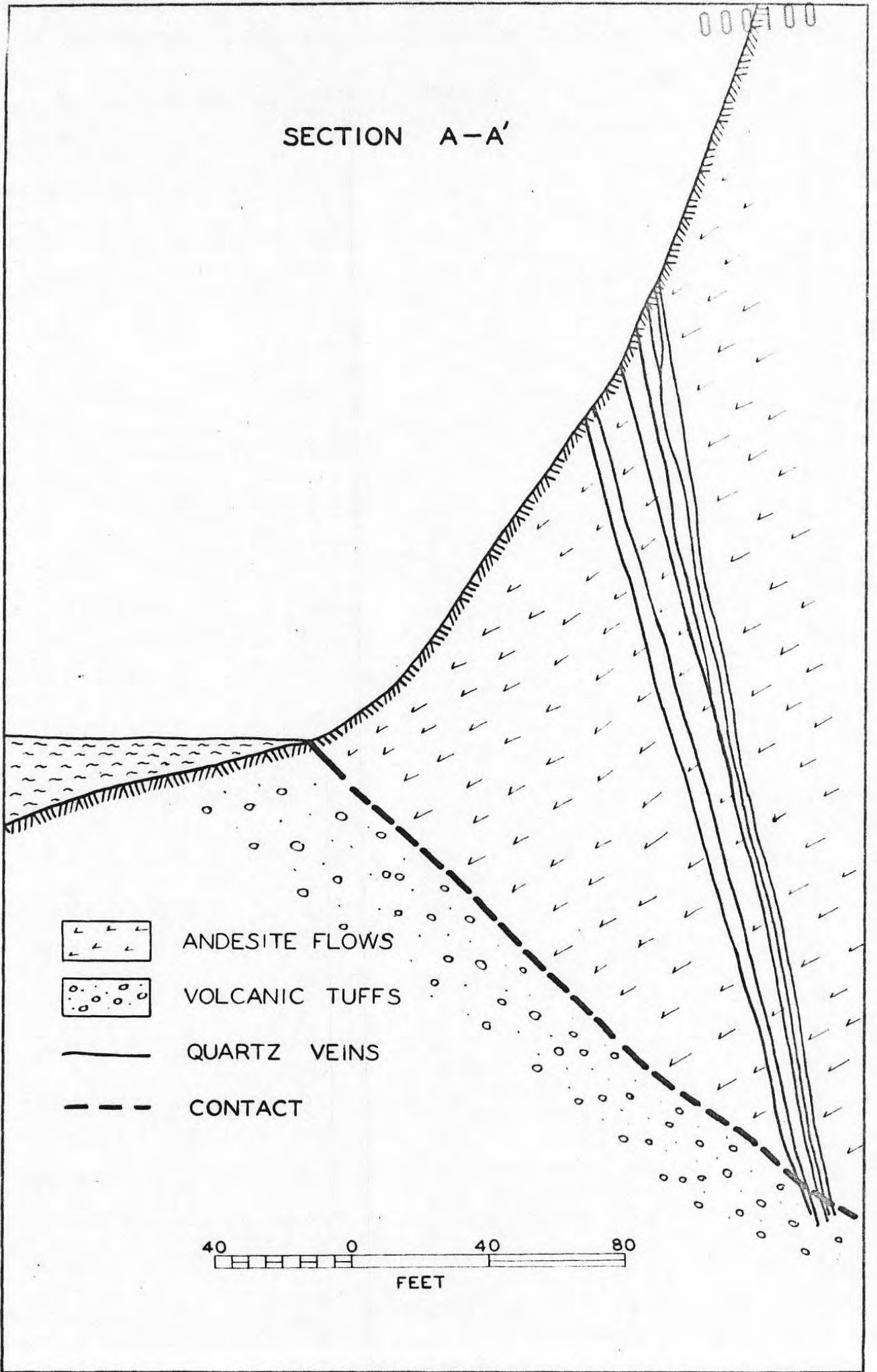


FIG. 18. VERTICAL SECTION ~ HERMAN LODGE

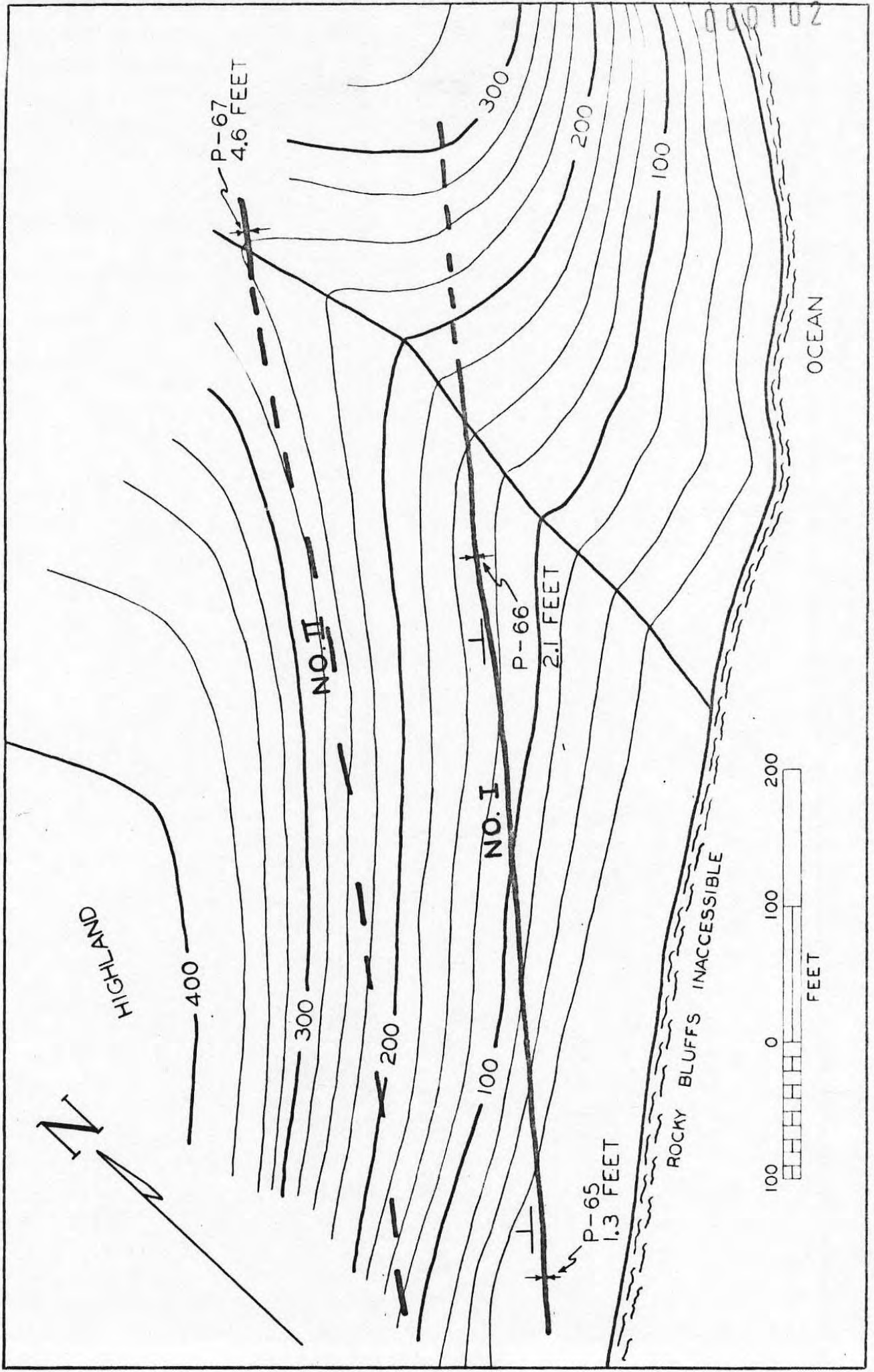


FIG. 19.

WEST LODES ~ POPOF, ALASKA

R.I. \_\_\_\_\_

bright yellow from the oxidation of the pyrite.

The cliffs are steep and ragged, and the beach along this section is narrow and strewn with boulders.

#### Description

The deposit consists of a system of more or less parallel quartz veins, only the principal one of which was sampled. The system appears to thin and fray out at elevations above 200 feet. A single, thin vein was observed in the face of the cliff at an elevation of about 450 feet, and about 300 feet along the strike from the face of the adit. There are several small veins in the hanging wall section, which are mineralized. The principal vein pinches and swells rapidly along the limited strike interval exposed, averaging about seven feet in width.

A very small amount of chalcopyrite, galena, and sphalerite occur with the pyrite.

Development at the Brown zinc deposit consists of a single adit, portal elevation 20 feet, driven along the principal quartz vein (figure 20), and the samples were taken across the vein thus exposed. The adit is 135 feet in length and two short crosscuts were driven at about 80 feet to explore the adjacent sections.

Analyses of the samples are given in table VIII.

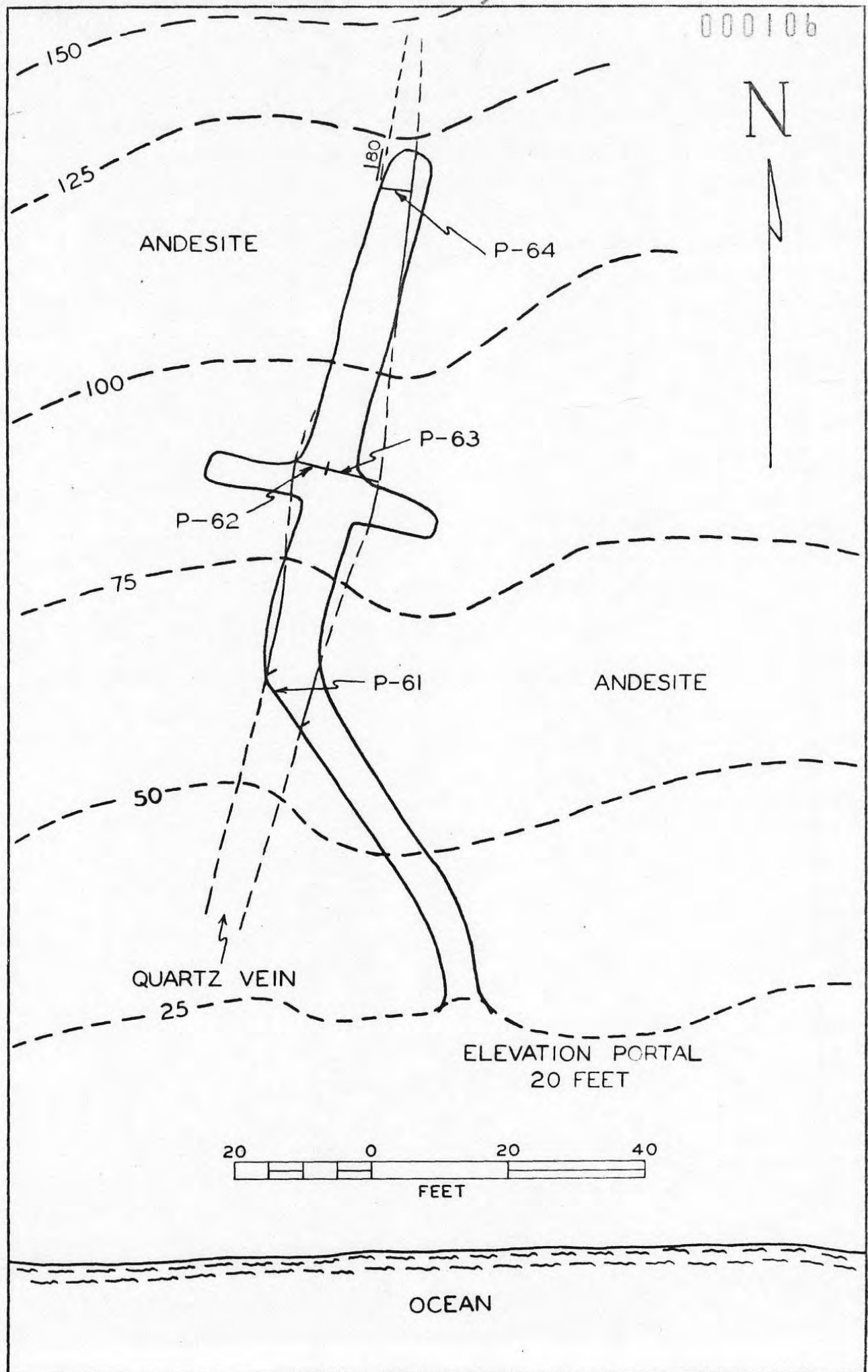


FIG. 20. BROWN ZINC DEPOSIT

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TABLE VIII - Analyses of Brown zinc deposit samples

Sample No.	Width Feet	Ounces a ton		Percent		
		Gold	Silver	Lead	Copper	Zinc
P-61	6.0	0.06	0.2	*	*	*
P-62	4.5	0.01	Trace	*	*	*
P-63	7.5	0.12	Trace	*	*	*
P-64	4.0	Trace	Trace	0.5	-0.1	0.8

NOTE: Samples marked with asterisk ( \* ) were not analyzed.

## HAGUE MINE

Introduction

The Hague mine is located on Unalaska Island  $1\frac{1}{2}$  miles south of the town of Unalaska. The property consisted of two unpatented claims and has reverted to the public domain. The deposit outcrops at an elevation of about 525 feet and is near the head of a ravine trending N.  $30^{\circ}$  W. and emptying into Captains Bay  $1/4$  mile distant.

The property was visited in 1904 by a member of the U. S. Geological Survey 10/, at which time the property was inactive, and development work was confined to the adit level. A 3-stamp mill had been installed at the beach on Captains Bay and was connected by a tramroad to the mine. The operation was unsuccessful.

At some later date, a two-compartment winze was sunk on the vein in the short strike interval of its best development, which is immediately beneath its short outcrop.

Description of deposit

The quartz vein occurs along the footwall of an east-west fault in compact gray andesite. The vein, strike S.  $80^{\circ}$  E., dip  $60^{\circ}$  N., is very weak and is generally only a few thin ribs of silicified andesite

10/ Collier, A. J., Auriferous quartz veins on Unalaska Island: Report on Progress of Investigations of Mineral Resources of Alaska in 1904, U. S. Geological Survey Bull. 259, p. 102-103.

R.I. \_\_\_\_\_

in the footwall of the fault. Mineralization is mainly pyrite with a small amount of chalcopyrite.

Development consists of the main adit, elevation 1495 feet, crosscutting the main fault and continuing on to a second fault. Here the adit was turned to the east to follow the fault for 70 feet before it was again turned to the north to crosscut the same fracture zone.

The two-compartment winze is open for about 100 feet and may have continued to a greater depth. The only accessible level is 60 feet below the collar of the winze. Here drifting was carried 50 feet easterly and 15 feet westerly from the winze. A plan and section of the workings are shown on figure 21.

Only one sample was taken on the main level across the best exposure of the vein. This sample, HA-97, was three feet in width and contained 0.02 ounce a ton gold and a trace of silver.

#### HORTENSE CLAIMS

The Hortense group of claims was first located in 1905 and they have been relocated twice. Though no stakes or rock monuments were found it is readily identified through the description in the recorded location notices. Outcrops are comparatively abundant and an extensive reconnaissance of the area was made July 29 and 30, 1945. The claims are held by J. Reinkin of Unalaska, Alaska.

The mineralized area is located on Unalaska Island just east of the portage between Portage Bay and the village of Unalaska (figure 22). The deposit is about one mile from the beach of Portage Bay.



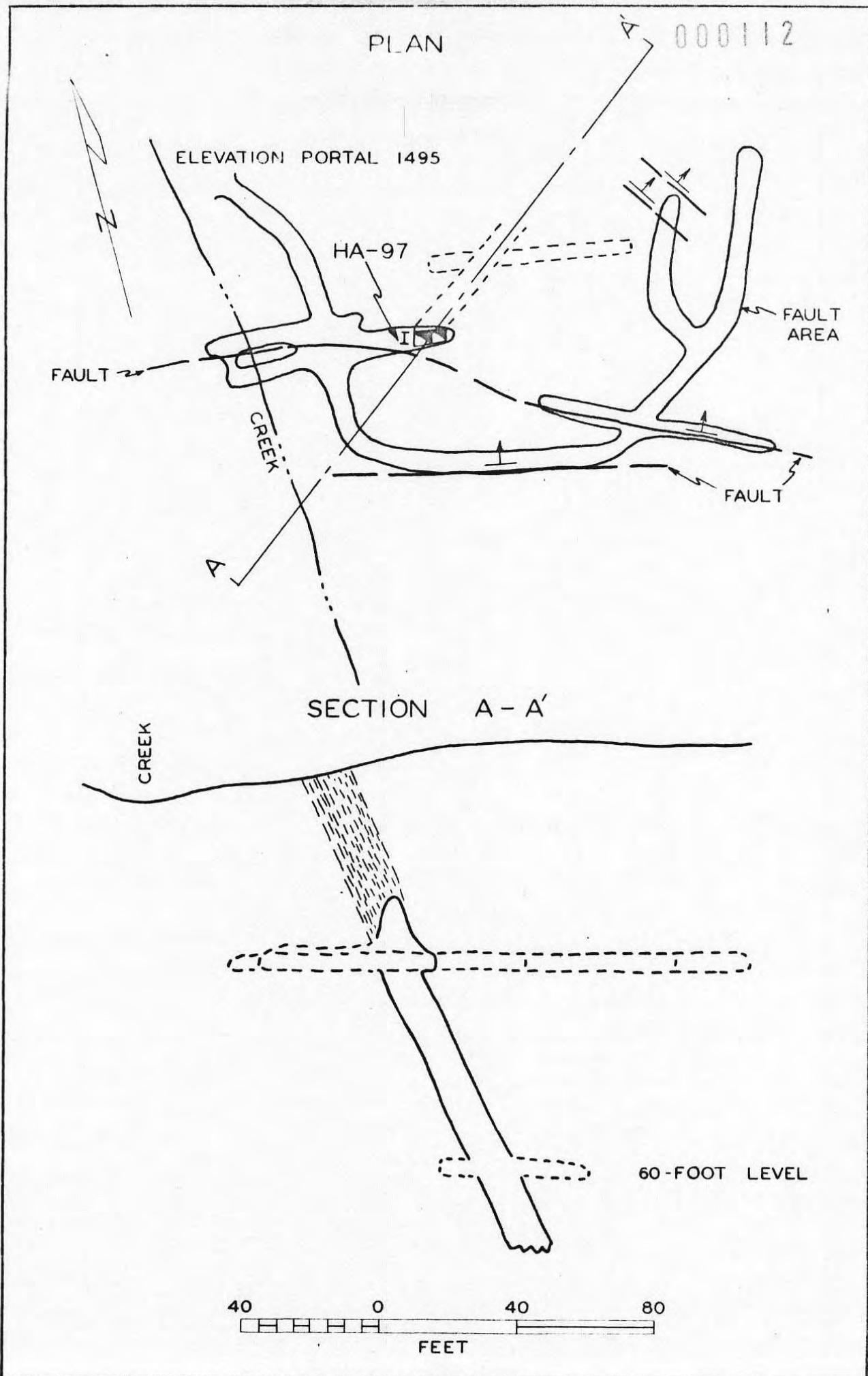
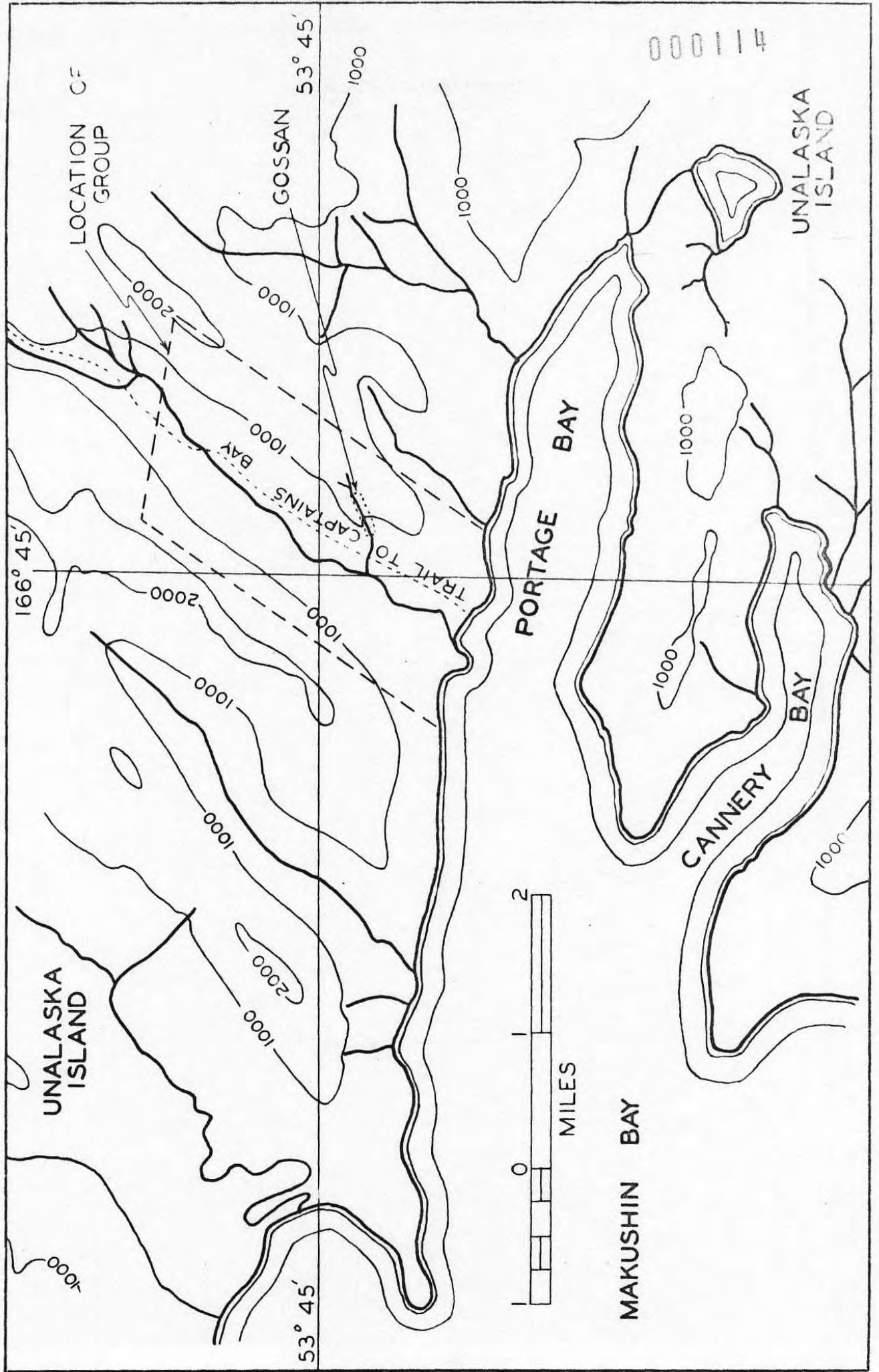


FIG. 21. PLAN & SECTION ~ HAGUE MINE



HORTENSE GROUP

FIG. 22.

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The only evidence of mineralization other than minor concentrations of pyrite in the prevailing flows and tuffs is a well developed gossan zone, about 600 feet in length. The zone strikes N. 60° E. and is exposed over widths ranging from 10 to 45 feet. The exposure is terminated by a swampy meadow just above high-tide level, and can be followed northeasterly to an elevation of 300 feet. At this point it is covered by tundra but outcrops about 100 feet farther along the strike are only slightly iron stained.

The gossan area occurs within a wide northeasterly trending band of volcanic breccia, a large part of which consists of olivine-rich basic fragments. This band of volcanic breccia was traced by means of its intermittent outcrops along a strike interval of several miles from Portage Bay. There are two exposures of a granitic intrusive in the general vicinity, but it was not observed close to the gossan area.

If any attempt had been made to explore the deposit, the openings have since been obliterated. An open cut at an elevation of 185 feet did not penetrate the limonite, though the material in the floor is fresher than the overlying 5 feet. Small fragments of basic rock were encountered 2 feet below the surface, and a block  $1\frac{1}{2}$  feet in length was taken from the floor of the cut. The outer shell of this was limonitic, but the interior was fresh and contained no sulphides.

Two types of limonite boxworks occur in the upper 4 feet of the gossan zone. An ochreous to brown, usually fine cellular type with thin rigid walls predominates. It contains very little silica. The

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second type has extremely thin and fragile walls and an overall foliated appearance. It is darker in color than the first type and may be goethite. Copper carbonate stain was not observed in any part of the outcrop.

It is believed that the limonite content of the capping is no greater than could be expected from the oxidation of the pyrite and the basic fragments occurring in the volcanic breccia.

### COPPER CLIFF CLAIMS

The Copper Cliff group consisting of 12 unpatented claims is held by John Reinkin of Unalaska, Alaska. Situated on Unalaska Island between Kuliluak and Pumicestone Bays, the claims have been held for many years through relocation and no exploration has been done.

The country rocks are moderately basic igneous rocks of fine to medium texture. Feldspar porphyries are common. Pyritization, and the occurrence of small unmineralized quartz veins increases as the divide between Pumicestone Bay and Kuliluak Bay is approached from the head of Kuliluak Bay. It is probable that the widespread occurrence of pyrite has been mistaken for chalcoppyrite.

Two parallel quartz veins constitute the best mineralized zone observed. The veins are located about 2 miles N. 30° E. from the head of Kuliluak Bay at an elevation of about 400 feet. The area is easily accessible. The quartz veins are enclosed by pyritic andesite, are sparsely mineralized by pyrite and chalcoppyrite, and

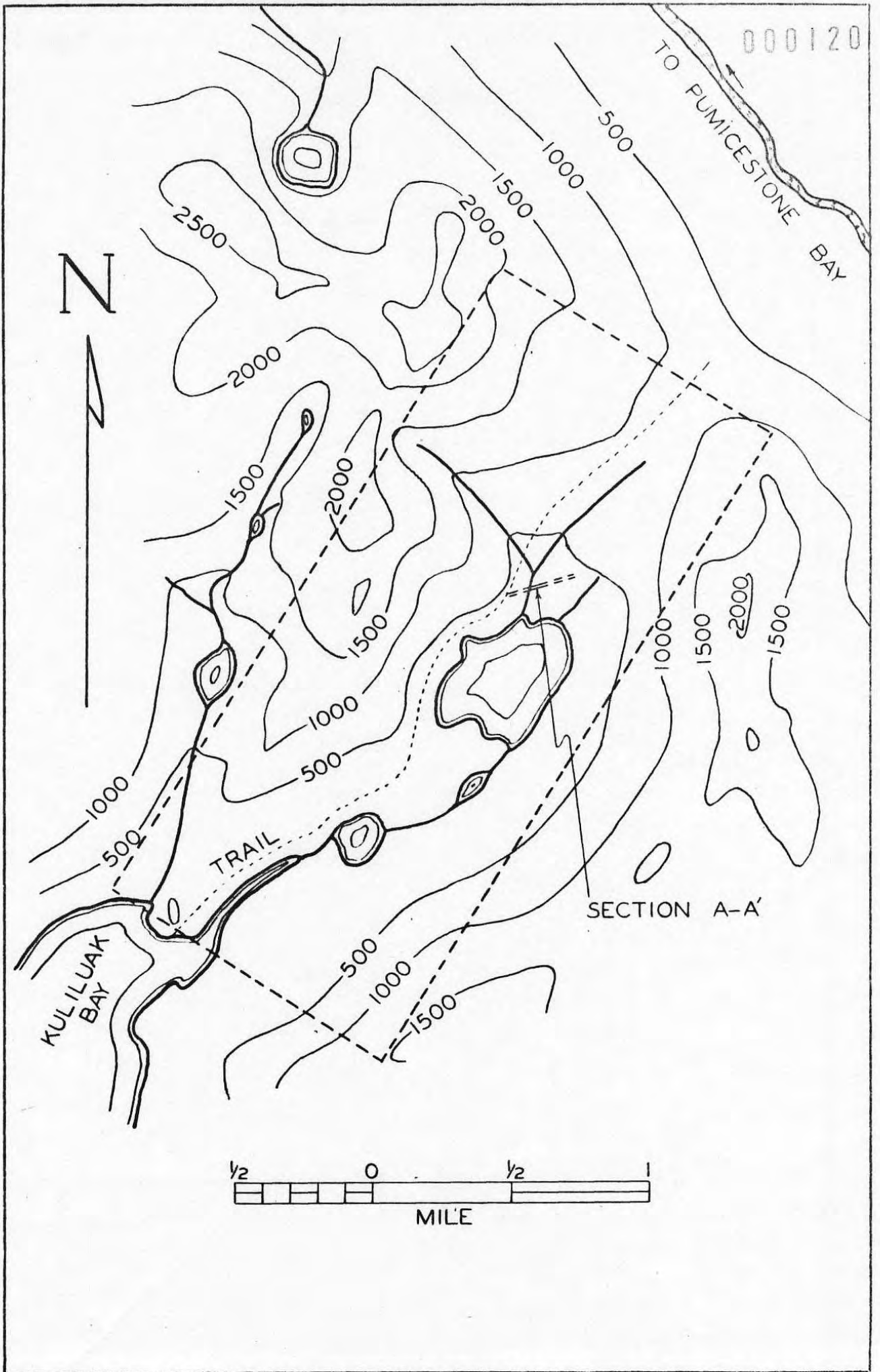
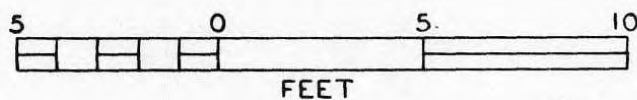
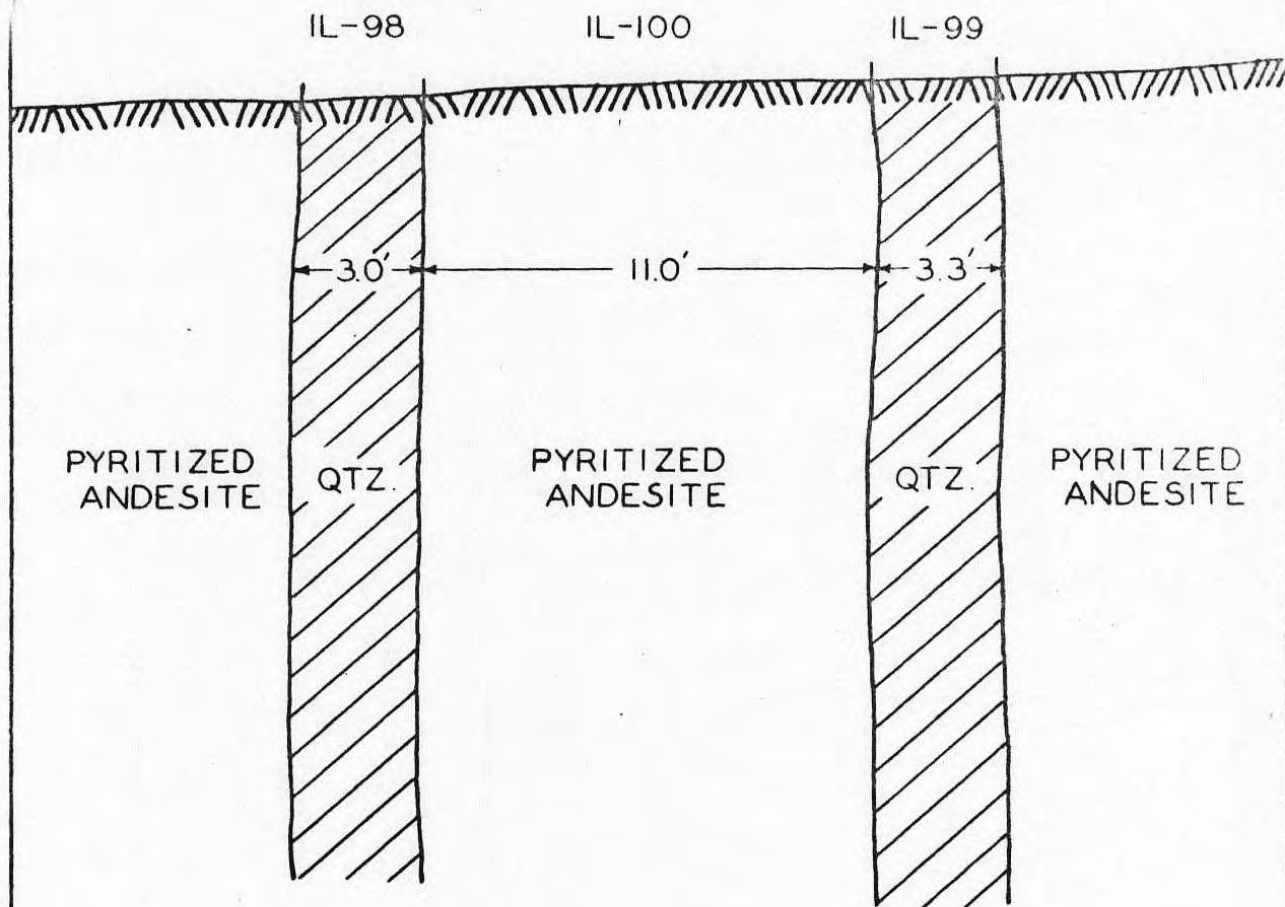


FIG. 23.

COPPER CLIFF GROUP

SECTION A-A'

000122



SAMPLE NO.	LENGTH FEET	GOLD OZ.	SILVER OZ.	COPPER %
IL-98	3.0	TR.	TR.	0.03
IL-99	3.3	NIL.	TR.	-
IL-100	11.0	NIL.	TR.	-

FIG. 24. SECTION A-A' ~ COPPER CLIFF GROUP

are not sharply defined. At the outcrop they are 3.0 and 3.3 feet in width, respectively, and are separated by 11.0 feet of pyritic and silicified andesite.

Figure 23 shows the location of the Copper Cliff group of claims and the outcrop of the two quartz veins. The samples and results of analyses are given in figure 24.

#### SEDANKA ZINC DEPOSIT (ABSTRACT)

The zinc deposit is located approximately 3,000 feet southeast along Lode Creek from Biorka Harbor on the north side of Sedanka Island. See figure 1. The deposit is readily accessible to ocean-going ships.

Zinc mineralization at this deposit is confined to the hanging wall section of a fault striking N. 83° E. across Sedanka Island and dipping approximately 55° to the south. Mineralization has been structurally controlled by a series of nearly vertical fractures (80° to 90° SW.) in the diorite forming the hanging wall of the fault.

The Sedanka or Biorka zinc deposit was examined, overburden stripped, and sampled by Bureau of Mines engineers from June 19 through July 10, 1945. The average analysis of the 29 samples cut over a strike length of 240 feet is 6.8 percent zinc, 0.18 percent lead, 0.33 percent copper, 0.02 ounce a ton gold and 0.82 ounce a ton silver. Eliminating the 7 lower grade samples on the west and the last three on the east, the 19 remaining consecutive samples over a length of 158.8 feet average 9.1 percent zinc, 0.24 percent lead and 0.45 percent

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copper. Exploration has been confined to the area near Lode Creek. The fault to the east or west has not been prospected.

Complete data on this investigation will be found in Bureau of Mines Report of Investigations No. \_\_\_\_\_, "Sedanka Zinc Deposit, Sedanka Island, Alaska by B. S. Webber and others.



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