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GEOCHEMICAL REPORT NO. 6

Geochemical Investigations of Selected Areas in Southeastern Alaska, 1964 and 1965

By

C.F. Herbert and W.H. Race

Juneau, Alaska

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GEOCHEMICAL INVESTIGATIONS OF SELECTED AREAS IN SOUTHEASTERN ALASKA, 1964 & 1965

By

C. F. Herbert and W. H. Race

SUMMARY

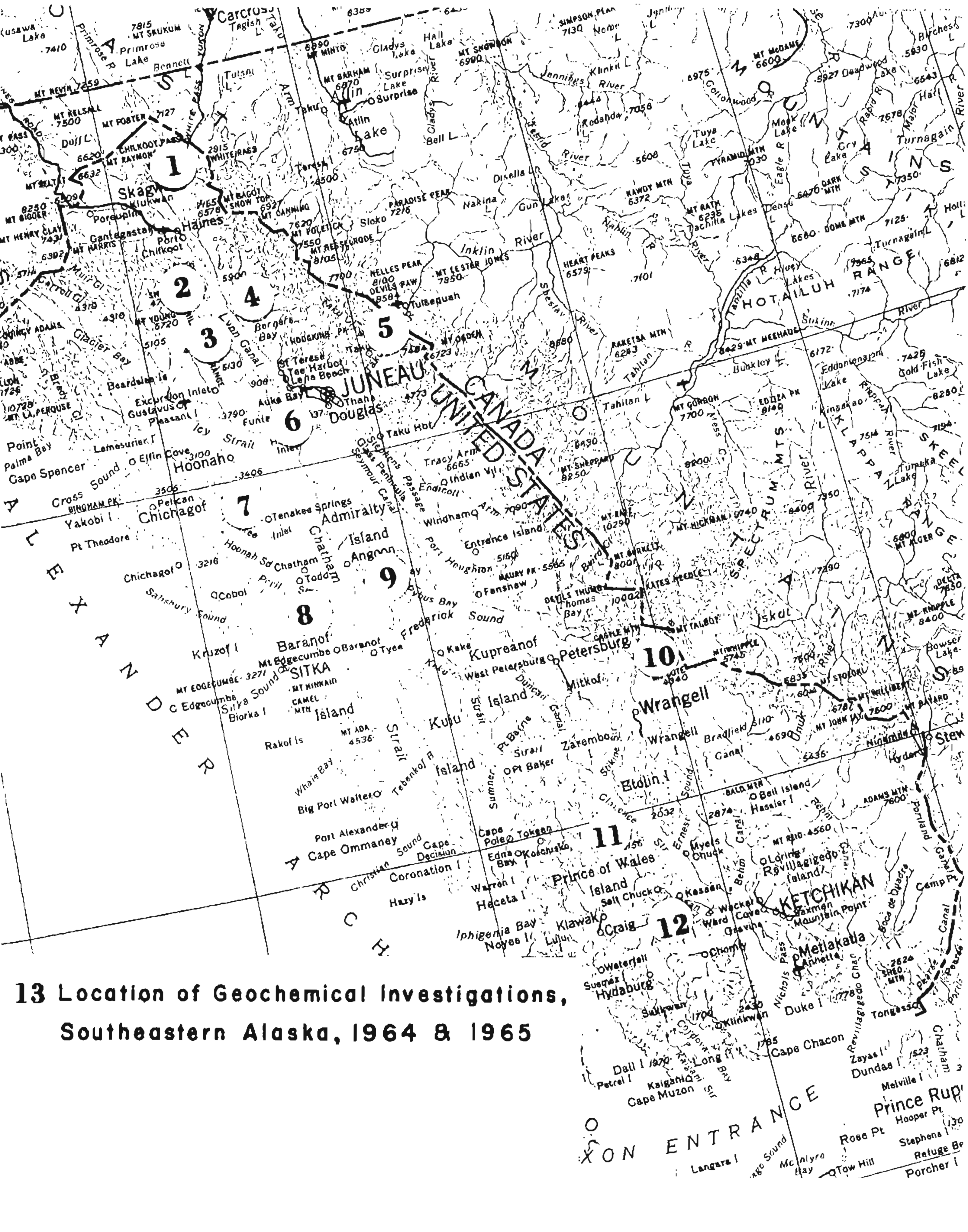
Southeastern Alaska, comprising some 40,000 square miles, contains about 7 per cent of the total area of the State, but its past total mine production of metals is equal to 17 per cent of the total production from the entire State. In percentages of Alaskan production, Southeastern Alaska has produced 22 per cent of the gold, 15 per cent of the silver, 100 per cent of the palladium, 3 per cent of the copper, 95 per cent of the lead and 100 per cent of the uranium. Total value of Southeastern Alaska's metal production, at present prices, is about $250 million.

Although the area is widely mineralized, very many parts of it have had little or no prospecting. Exposures along the beaches and stream-beds, and on cliffs and ridges have been examined, but the major portion of the land area, which is usually covered with dense forest growth, has received only scanty attention. It is believed that geochemical testing of stream sediments in the covered areas will serve, along with geological information in available publications, to direct prospectors to specific localities that have better-than-average chances of containing valuable ore bodies.

In this report we recommend five areas for detailed prospecting and several others that deserve additional reconnaissance.

The locations of areas investigated are shown on the Location Map as follows:

1. Skagway
2. Glacier Point
3. St. James and William Henry Bays
4. Berners Bay
5. Taku River
6. Mansfield Peninsula
7. Tenakee Inlet
8. Kelp Bay
9. Pybus and Gambier Bays
10. Stikine River
11. Ratz Harbor and Coffman Cove
12. Kina Cove



13 Location of Geochemical Investigations, Southeastern Alaska, 1964 & 1965

INTRODUCTION

General

This report, first published in November of 1964, covered the 1964 geochemical investigations of stream sediments in portions of Alaska. The 1964 report is exhausted, so it has been rewritten here and includes work done in 1965. The larger number of analyses now available has caused some changes in interpretation.

Field work was done by W.H. Race, State Mining Engineer for Southeastern Alaska, assisted at times by C.F. Herbert and Steven M. Lowell.

The 1964 work in the Hollis and Twelvemile areas is not included here. Since that work disclosed a rather large number of anomalies, additional work and geological mapping was done in 1965. The work for both years in these areas will be reported in a forthcoming geologic report.

Sampling and Analyses

Stream sediment samples were collected from gravel or silt under running water at points in streams above tidal influence. The character of the stream (swift or sluggish), the width, gradient, type of bedrock, if exposed, and principal constituents of the gravel were noted at each sample site. Also, the stream sediments were tested at the sample site for cold extractable total heavy metals by the use of dithizone, salt, and unleaded gasoline. Toluene was used as a substitute for unleaded gasoline but results did not differ significantly.

Samples were dried, screened through 80 mesh, and sent to a laboratory for analysis. Frequent checks confirmed the accuracy of laboratory reports within acceptable limits. Most of the analytical work was performed by the Rocky Mountain Geochemical Laboratory. Considerable assistance was given by the U.S. Bureau of Mines at Juneau, which also did some petrographic and spectrographic work. In 1964, the U.S. Geological Survey gave valuable assistance in the field of geochemistry. Some assaying but no geochemical work was done by the Division of Mines and Minerals laboratory in 1965.

Generally, the field tests and laboratory tests do not check satisfactorily. However, it does appear that field testing in a stream with markedly anomalous quantities of metal, especially copper, can be a valuable, rapid guide.

Interpretation of Results

There is no set rule for determining that quantity of metal in stream sediments that marks the upper limit of normal distribution beyond which all quantities may be considered anomalous. A metal source, such as a near-surface ore body, feeds metallic ions into surface waters collected by streams, and the ions are, to a varying degree, adsorbed by particles of clay in the stream sediments. Some clays have higher adsorbent qualities than others; other ions or solids may cause precipitation, or, conversely, prevent precipitation. Little is known of the effect on stream sediments of diluting high metal content waters with barren waters.

Consequently, the "anomalous" values used in this report may be questioned. A moderately high but less-than-anomalous quantity of metal in a large stream or in a group of adjacent streams may be more significant than a supposedly anomalous value in a single, smaller stream.

On the following pages the distribution of copper, lead, zinc and molybdenum in stream sediments from those portions of Southeastern Alaska sampled to date is shown. The vertical scale shows the percentage of all samples that have the quantity of metal shown on the horizontal scale. In order to more accurately portray the actual distribution of metal the curves are smoothed by calculating a moving average of three quantities.

Even the moving average does not smooth the curve for the distribution of zinc, and the Hollis area, which is abnormally high in zinc, is omitted. Obviously, some types of sediments (the more carbonaceous shales and their equivalents)normally carry more zinc than other sediments.

The metal content beyond which the distribution of a metal becomes erratic is taken as the anomalous value. For example , the distribution of copper decreases gradually to about 150 parts per million and then becomes erratic at the higher values.

Although the great majority of samples showed less than 30 parts per million of lead there is a gradual, rather than an erratic, reduction in the number of samples with values in excess of 30 parts per million. However, 60 parts per million, rather than 80, is taken as the threshold of anomalous values for lead because the downstream distribution of lead decays more rapidly than for copper or zinc, and lead values in the range of 60 ppm are likely to be significant.

Insufficient samples were run for nickel to permit a graphic determination of an anomalous value. For the purpose of this report, the anomalous value of nickel is taken to be 150 ppm.

Therefore, in this report, metal contents of stream sediments in excess of the following are considered to be anomalous:

Copper	150 ppm
Lead	60 ppm
Zinc	300 ppm
Molybdenum	14 ppm
Nickel	150 ppm

Prospecting Suggestions

Five areas in which anomalies warrant further prospecting are as follows:

Skagway: possible molybdenum orebody in a sheared portion of coarsely crystalline quartz-feldspar rocks within a complex granitic batholith.

William Henry Bay, Lynn Canal: lead-zinc, silver(?) in a zone of strong cross-folding and faulting of Paleozoic limestones, phyllites, and volcanics.

Mansfield Peninsula, Admiralty Island: lead-zinc-silver, nickel, possibly gold (Hawk Inlet). The anomalies are closely south of an idle gold mine and five miles south of a known nickel orebody. Rocks are schists with flows, dikes, sills and pipes of basic to intermediate igneous composition.

Gambier Bay, Admiralty Island: two locations with possible lead-zinc, silver(?) in Triassic limestones and chert-dolomite breccia; one possible molybdenum deposit in fissile, micaceous schists.

Pybus Bay, Admiralty Island: copper-zinc in carbonaceous, thin-bedded chert and argillite (Devonian).

Hollis, Prince of Wales Island: copper-zinc and lead-zinc anomalies in this former gold mining area will be covered in a separate geologic report.

Anomalous values have been found in places other than those mentioned above but the authors believe that first priority in prospecting should be given to the areas listed.

None of the areas suggested for prospecting has been sufficiently delineated by geochemical prospecting to warrant trenching or drilling or even surface geophysical methods. Consequently, the areas with known anomalies should be delineated by additional geochemical testing of stream sediments, rock chip samples, and soils.

Testing of samples at the sampling site is by far the most rapid method of tracing an anomaly to its source, but the cold extraction methods employed in on-site testing are not sufficiently reliable to permit complete reliance on this method. Furthermore, there is no known cold extraction method that will indicate molybdenum. It is suggested that a cold extraction method be used, but that samples also be sent to a laboratory for analysis.

In many of the swiftly-flowing streams in Southeastern Alaska, it is difficult to obtain suitable stream sediment samples. In order to get reliable results, it is often necessary to search for small sand pockets near boulders or logs. For uniformity, all samples should be taken under running water. Very sluggish streams and ponds often give a high reaction in the cold extraction tests because of the presence of humic acid from decaying vegetation.

If a drainage survey outlines an area of interest, further delineation of the possible metal occurrence should be done by soil sampling. On most of the hillsides in Southeastern Alaska there is a thin mantle of soil underneath a mat of decayed vegetation, or clay may be found in hillside rubble. The vegetation should be avoided as much as possible.

For those who are not familiar with geochemical prospecting methods, the following books are recommended:

Geochemistry in Mineral Exploration by H.E. Hawkes and J.S. Webb, Harper & Row, Publishers, Inc., 49 East 33rd Street, New York 16, New York. Price $12.50.

U.S. Geological Survey Bulletin 1152, Analytical Methods Used in Geophysical Exploration by the U.S. Geological Survey. Superintendent of Documents, Washington 25, D.C.

Bulletin No. 3, Geochemical Prospecting, University of Alaska, School of Mines, College, Alaska, 99735.

Handbook for the Alaskan Prospector by Ernest Wolff, Mining Research, University of Alaska, College, Alaska. Price $5.00 at most bookstores.

A field kit for cold extraction testing can be assembled from information in U.S. Geological Survey Bulletin 1152, or, more simply, from Bulletin No. 3 of the School of Mines of the University of Alaska. Complete field kits may be purchased from Exploration Laboratories, Inc., Box 396, Sausalito, California, 94965. The cost of these kits ranges from $16.75 to $58.00.

Reliable laboratory analyses may be obtained from the laboratories listed below. These laboratories charge for sample preparation (usually $0.50 a sample) if screening is not done before hand. Analytical charges are based on reasonably large lots; for only a few samples the charges may be higher than shown.

Rocky Mountain Geochemical Laboratories, Box 2217, Salt Lake City, Utah, 84110. Charges are $1.00 for a single metal in a sample ; $1.50 for two metals in the same sample; $1.80 for three metals; $2.00 for four metals.

Exploration Laboratories, Inc., Box 396, Sausalito, California, 94965. Charges are $0.80 for one metal in a sample and $0.40 for each additional metal.

Aerial photographs, which are almost a necessity for a prospector, are available for all Southeastern Alaska.

For most purposes, an area may be marked on a U.S. Geological Survey map and sent to the Survey with the request that photo coverage be provided. However, it is better to have an index map of the photographs available. These indexes may be purchased from the Survey and be used to pick out by number the exact photograph or photographs required. The small index map is difficult to read, so it is advisable to get the enlargement. Orders should be sent to:

J.O. Kilmartin, Chief
Map Information Service
U.S. Geological Survey
Washington, D.C. 20242

Each small index map, which is a reduction from a standard one-inch-to-four miles quadrangle map, costs $1.30; an enlargement costs $2.20. Individual 9" x 9" photographs cost $0.85 each.

The U.S. Forest Service expects to have available at Juneau complete indexes and files of negatives of aerial photography covering all of Southeastern Alaska. Prints will probably be made for the public, but the charge has not been established. The Forest Service photos show considerably more detail than do those presently available from the U.S. Geological Survey.

ABBREVIATIONS

In the sections on the individual areas which follow, the tables show the map number, which refers to the location of a sample site on the map of the area. The sample number is the field number given to the sample when taken.

Metal content is expressed in parts per million as determined by laboratory analyses.

The number of milliliters of dithizone solution used in the field test required to remove a color caused by heavy metals in one-half gram of sample is abbreviated as ml dye Cx.

Other abbreviations:

Elements:

Cu	copper
Pb	lead
Zn	zinc
Mo	molybdenum
Ni	nickel
Au	gold
Ag	silver

Colors:

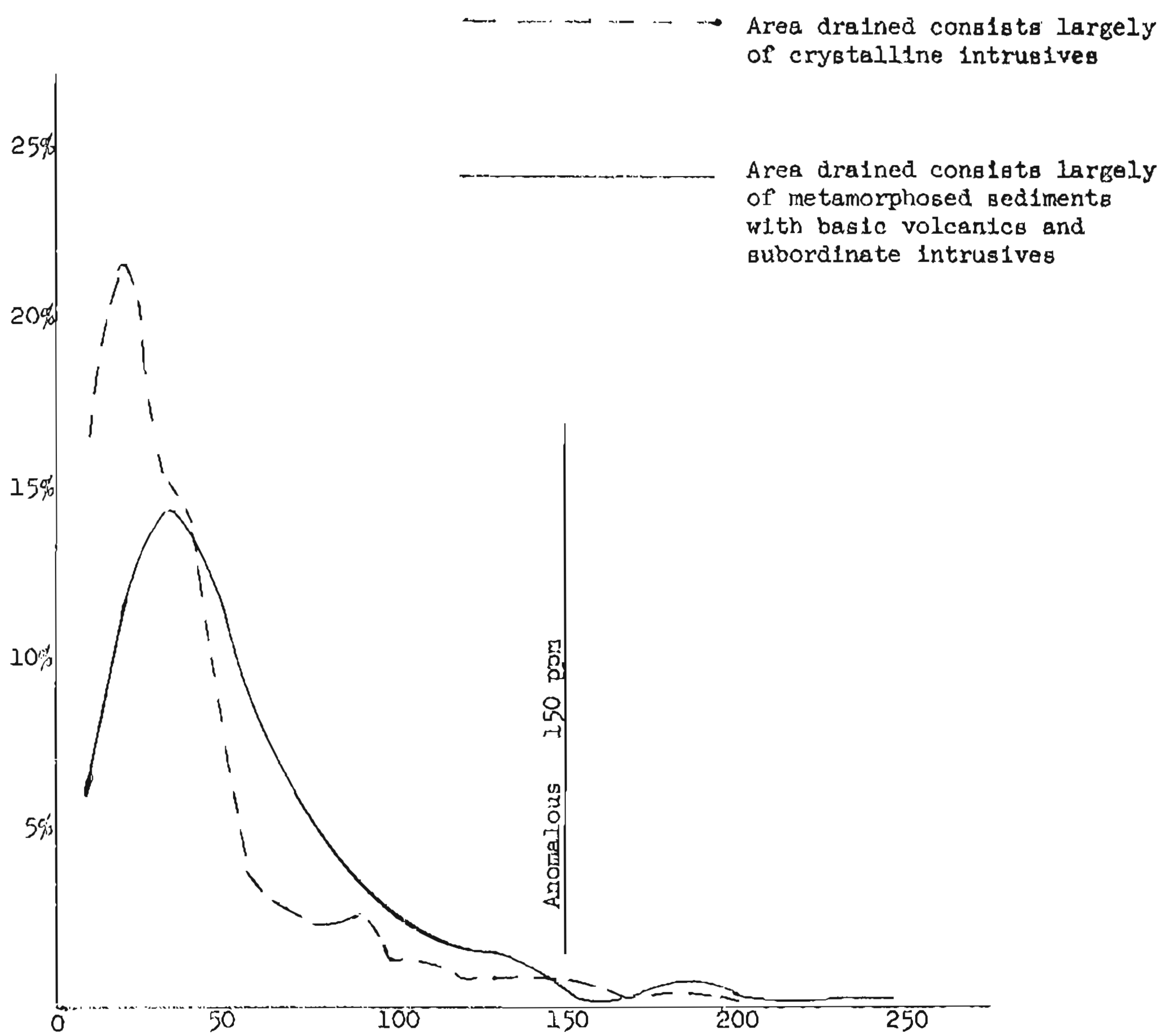
cls	colorless
or	orange
vio	violet
lav	lavender
brn	brown
blk	black
grn	green
lite	light in color
int	intermediate in color
dark	dark in color

Miscellaneous:

inter	interphase
ppt	precipitate
Tr	trace

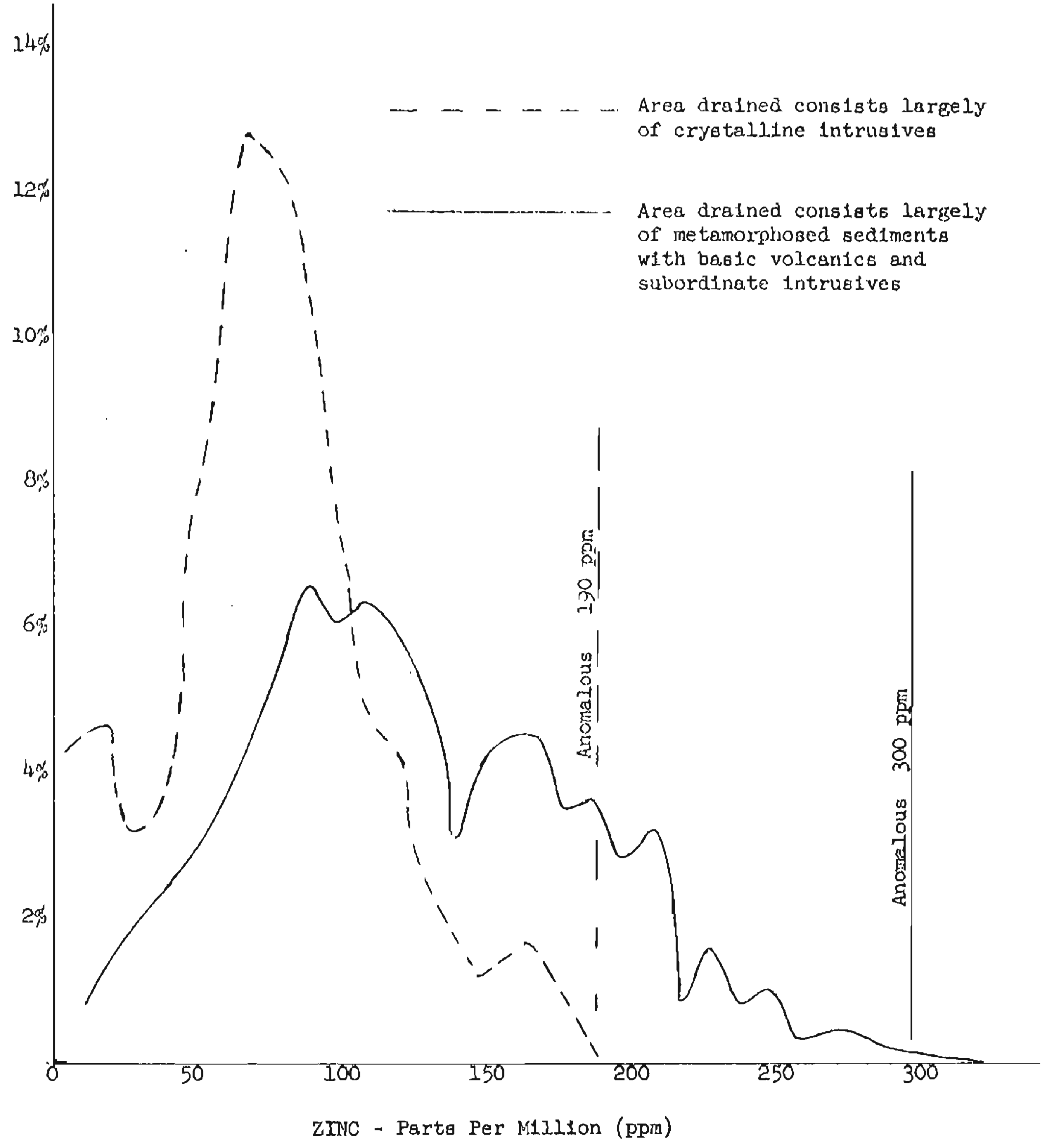
Rocks:

ap	aplite
d	diorite
g	granite
gd	granodiorite
mz	monzonite
gb	gabbro
ls	limestone
do	dolomite
ar	argillite
sh	shale
bs	black shale
sc	schist
gy	graywacke
ph	phyllite
cg	conglomerate
grs	greenstone
br	breccia
ch	chert
an	andesite
vol	volcanic rocks (unclassified)
metased	metasedimentary rocks
gn	gneiss
m	marble
intr	intrusive
qtz	quartz
silic	silicified
cal	calcareous
sed	sedimentary rocks (unclassified)



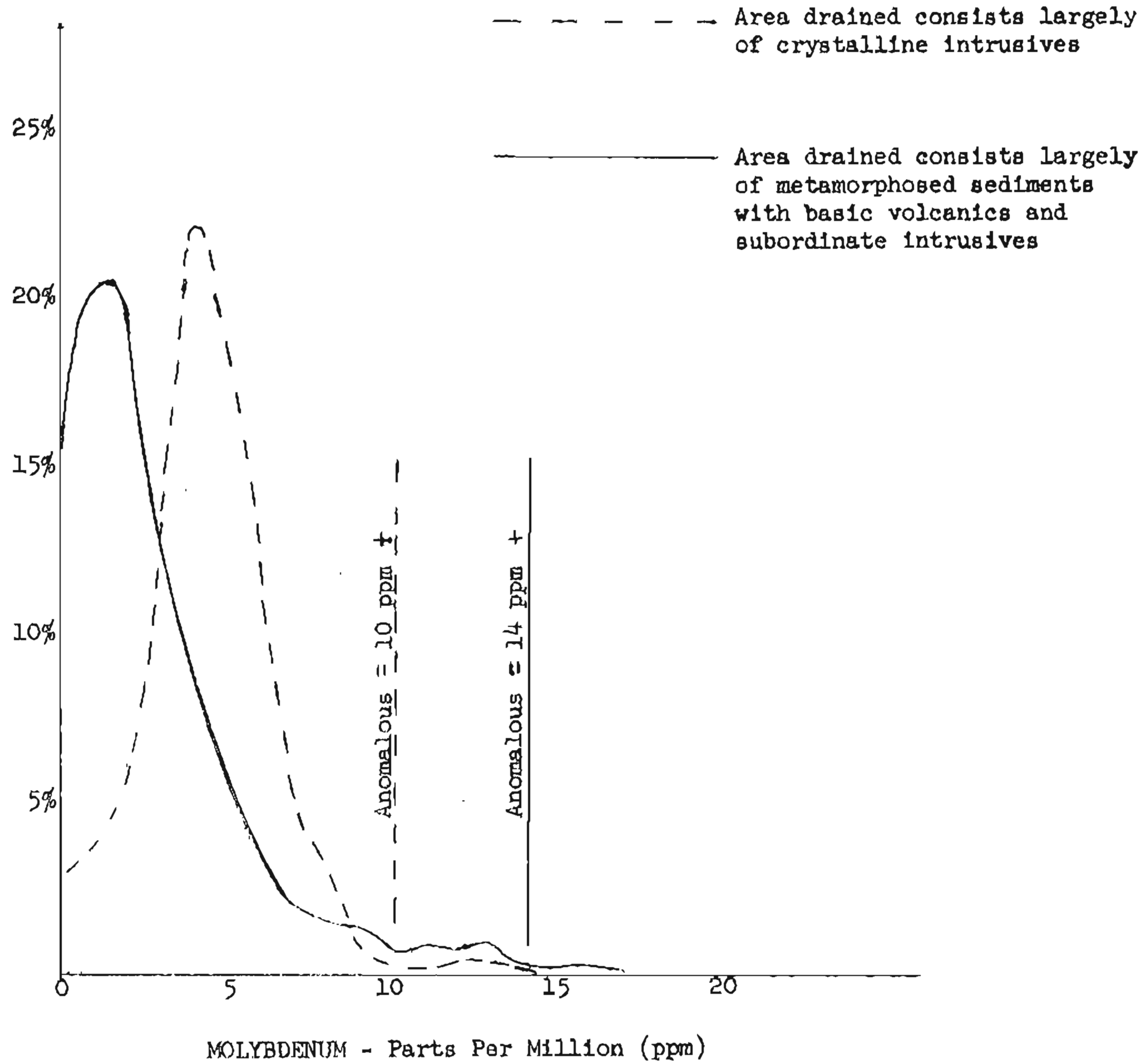
COPPER - Parts Per Million (ppm)

Copper Distribution in Stream Sediments
Portions of S. E. Alaska

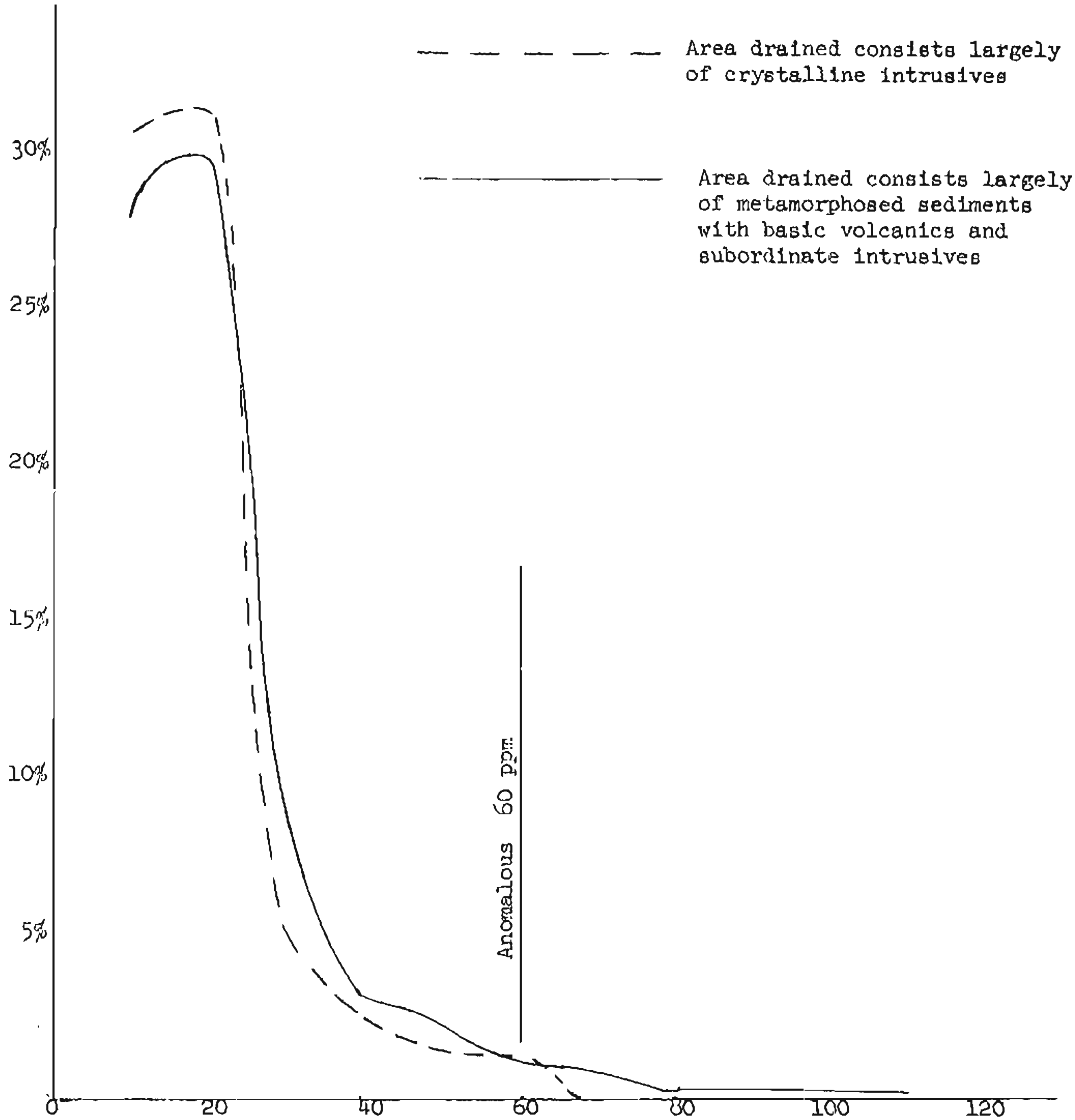


Zinc Distribution in Stream Sediments
Portions of S. E. Alaska

Note: Hollis area which has median value of 190 is excluded



Molybdenum Distribution in Stream Sediments
Portions of S. E. Alaska



LEAD - Parts Per Milliom (ppm)

Lead Distribution in Stream Sediments
Portions of S. E. Alaska

SKAGWAY

Skagway is located at the north end of Lynn Canal approximately 90 miles north of Juneau. It is the southern terminus of the White Pass and Yukon Railroad, which runs north to Whitehorse, Yukon Territory, Canada.

Mineral production from the immediate vicinity of Skagway has been very limited. The Inspiration Mine produced a few tons of ore which had values in silver, lead, zinc, and copper. Some prospecting was done on a molybdenum occurrence near Clifton, a station on the railroad about eight miles north of Skagway, and molybdenum has been found at other places near the railroad.

Geology

Skagway is located in an area of granitic rocks that form the Coast Range batholith. Metamorphosed sediments occur within the granitic rocks just west of town. The western limit of the batholith appears to lie between Skagway and Haines and its eastern edge is apparently near the Alaska-Canada border. Reconnaissance geology of the area is described in U.S. Geological Survey Bulletins 926-C, "Occurrences of Molybdenum Minerals in Alaska" and 800, "Geology and Mineral Deposits of Southeastern Alaska."

A copy of a thesis by Fred Barker, "Coast Range Batholith Between Haines and Lake Bennett, B.C.," was made available by Mr. Emil Maki of Skagway. The bedrock classifications shown on the attached map of the area are those of Mr. Barker.

Previous Work

Many years ago a shallow shaft was sunk on a molybdenite-bearing aplite dike northeast of Clifton and a short tunnel was driven on a molybdenite discovery west of map location 2 and below the railroad grade. There have been superficial searches for molybdenum on the steep, well-exposed slopes in the vicinity of Clifton, but there is no evidence of other underground work nor of surface trenching in the covered areas, although scattered grains of molybdenite may be found over a large area.

Over ten years ago a zone of high radioactivity close to Skagway caused considerable excitement, and there have been several discoveries of short, thin lenses of argentiferous galena in the tight batholithic rocks.

Geochemical Investigation

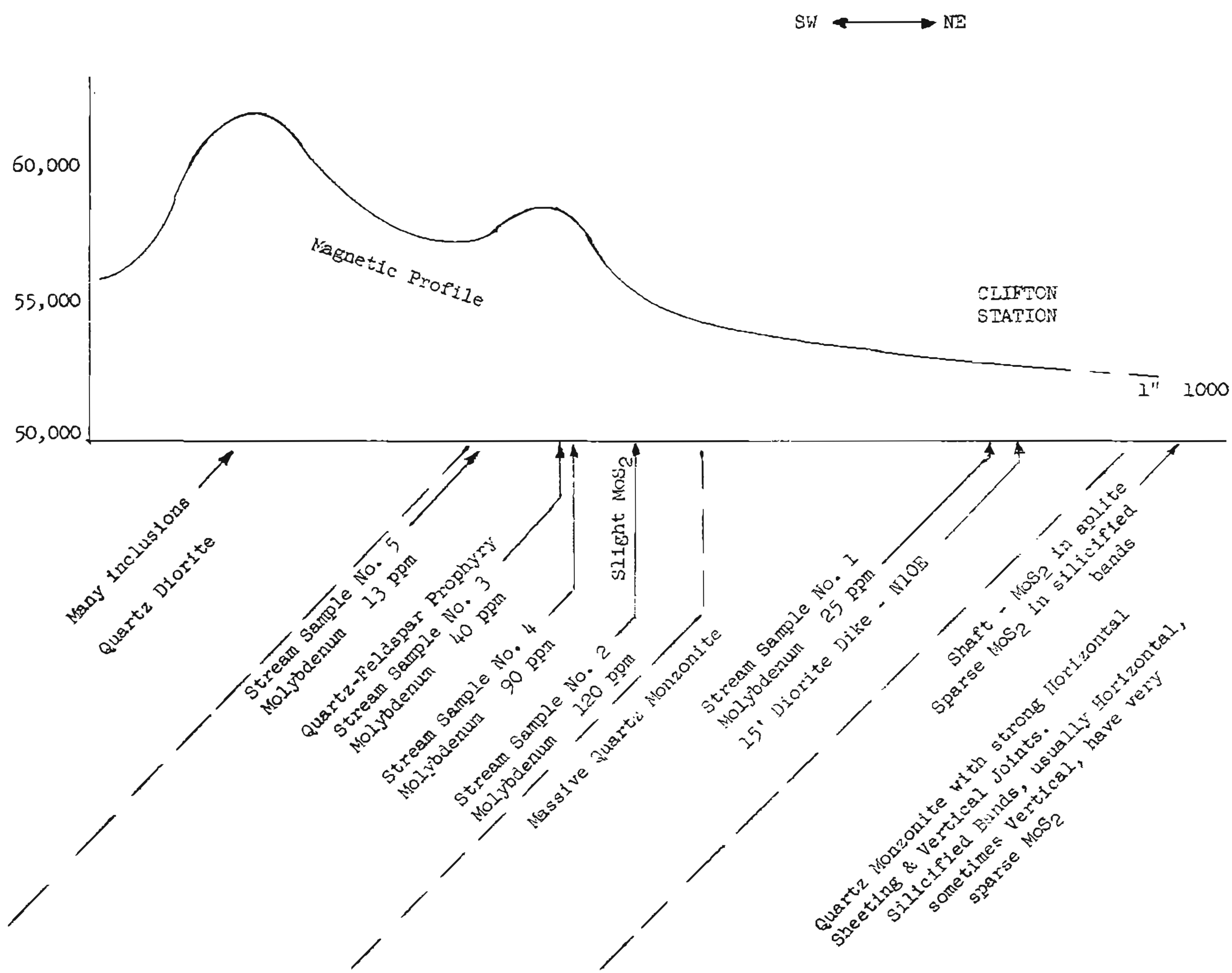
The Skagway area is much drier than the rest of Southeastern Alaska and the batholithic rocks have few watercourses. Consequently, there were few streams available for stream sampling.

Map locations 1 to 5 indicate a molybdenum anomaly associated with a north 60° east fracture zone that probably continues southwesterly through map locations 9 to 13.

In the Taiya River valley at map locations 15 to 17, a stream is flowing from a spring in glacial gravels and is depositing a large amount of iron oxide. Although stream sediment samples were not anomalous, the water tests show very high values with a thick red precipitate that is considered to indicate the presence of considerable lead. A similar Cx reaction with stream sediments was noted at map location 18 on the West Branch, but, at map location 19, also on the West Branch, no anomaly was apparent. Zircon was found in the gravel at map locations 18 to 22.

Prospecting

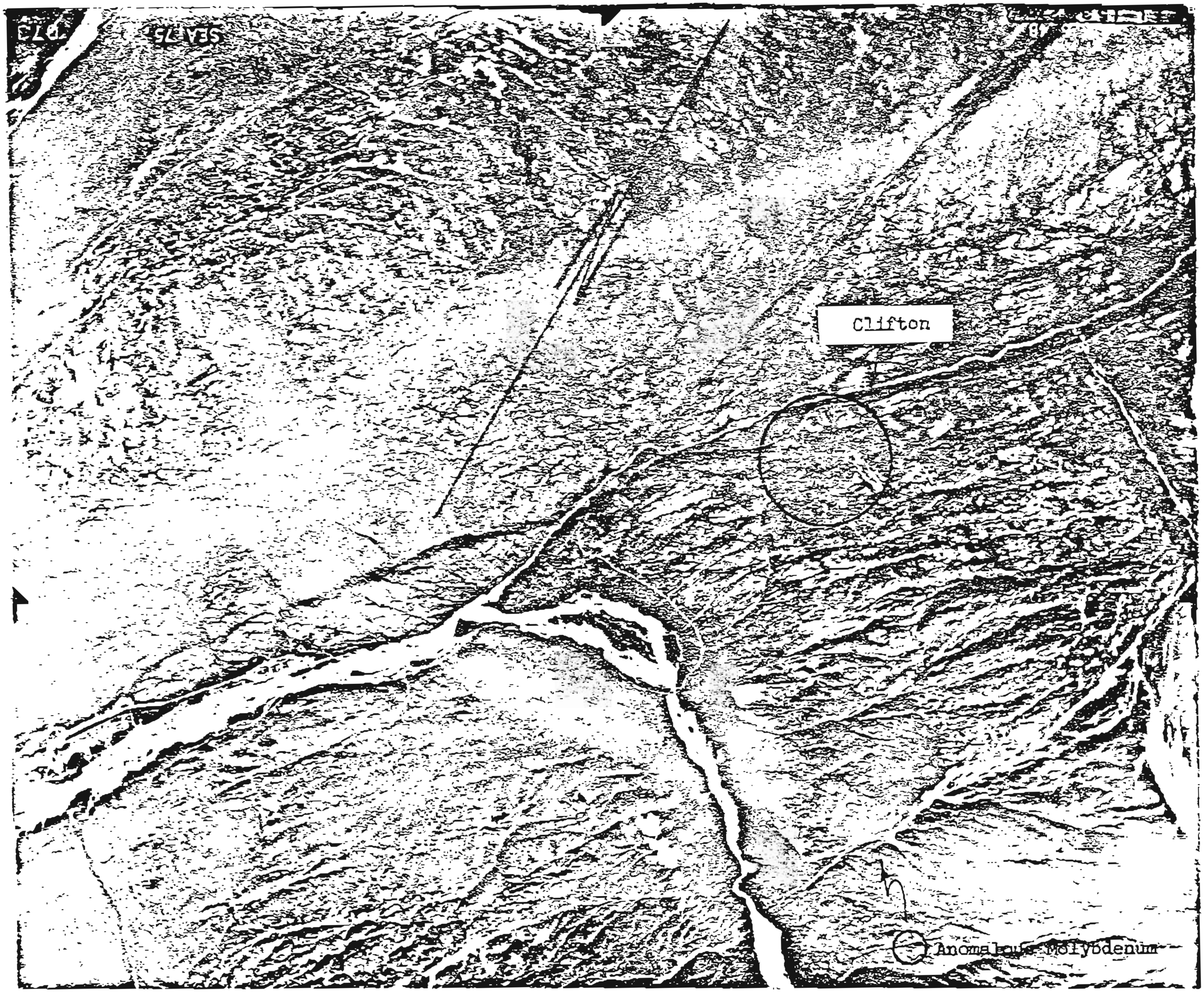
In view of the high molybdenum content of stream sediments from streams that drain the covered shear zone extending from the hill above Clifton down into the Skagway River, it would appear that an area about one mile long and five hundred feet wide should be prospected by soil sampling, followed by trenching of any anomalous areas indicated by such work. There is room in this shattered zone, indicated by high water content and vegetation, for a molybdenite ore body, most likely in or along the contact of the coarser grained quartz-feldspar rocks.

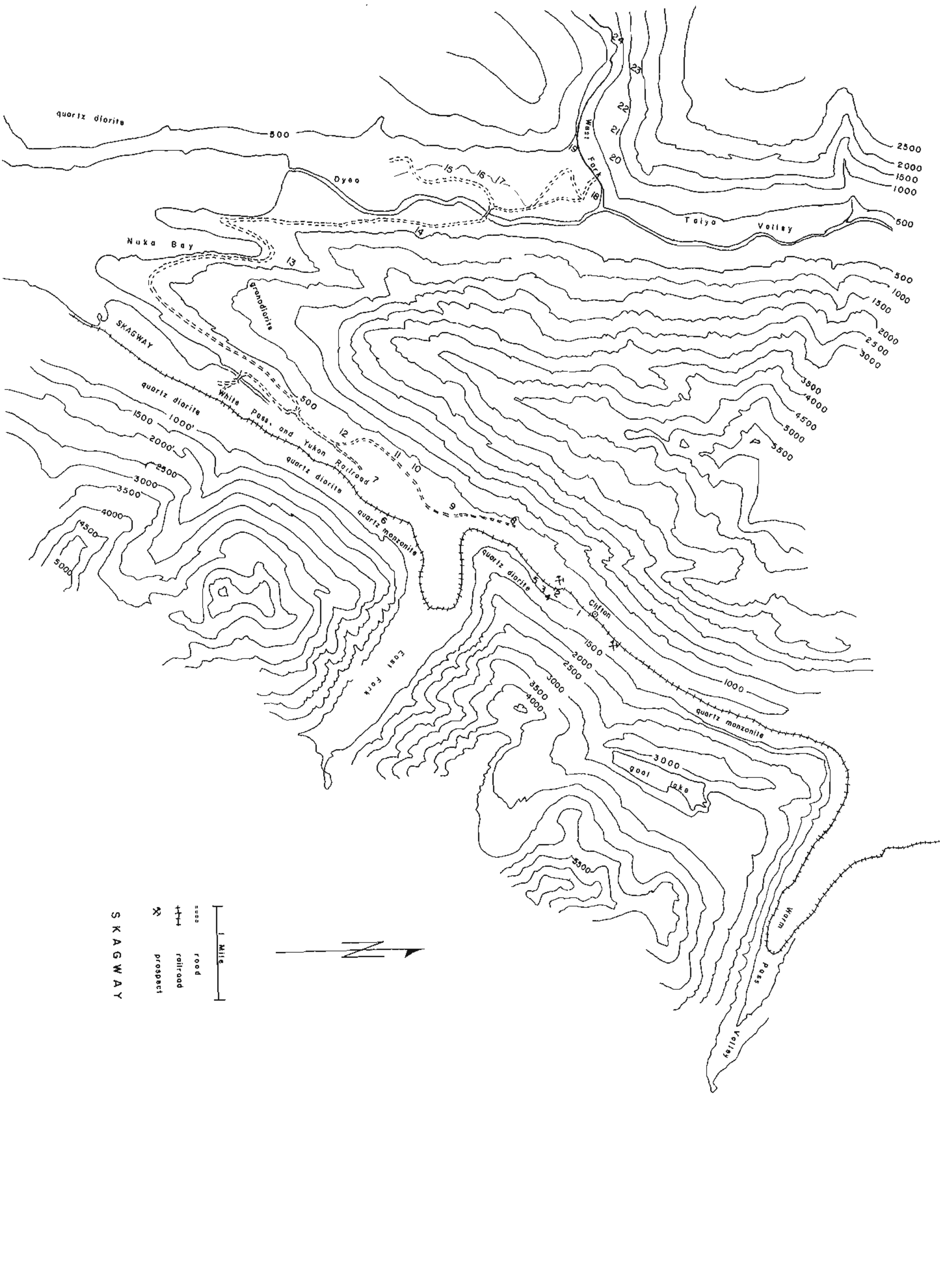

SW NE
60,000
55,000
50,000
Magnetic Profile
CLIFTON
STATION
1" 1000'
Many inclusions
Quartz Diorite
Stream Sample No. 5
Molybdenum 13 ppm
Quartz-Feldspar Prophyry
Stream Sample No. 3
Molybdenum 40 ppm
Stream Sample No. 4
Molybdenum 90 ppm
Slight MoS_2
Stream Sample No. 2
Molybdenum 120 ppm
Massive Quartz Monzonite
Stream Sample No. 1
Molybdenum 25 ppm
15' Diorite Dike - N10E
Shaft - MoS_2 in aplite
Sparse MoS_2 in silicified
bands
Quartz Monzonite with strong Horizontal
Sheeting & Vertical Joints.
Silicified Bands, usually Horizontal,
sometimes Vertical, have very
sparse MoS_2

SKAGWAY
August 1964

Map No.	Sample No.	Ppm Cu	Pb	Zn	Mo	ml dye Cx	Color Reaction	Mag reading x 1000	Bedrock	Stream Sediments
1	1	3	10	20	25	-	blank	52.9	qtz-biotite granite	qtz-biotite granite
2	2	5	30	25	120	10	pink-brn	55.5	covered	qtz monzonite
3	3	5	10	60	40	3	brn	58.5	covered	coarse grained qtz=feldspar
4	4	5	20	110	90	-	blank	58.5	covered	coarse grained qtz-feldspar
5	5	2	5	40	13	4	brn	57.5	covered	qtz-diorite
6	6	7	25	170	12	12	brn	54.5	covered	qtz-diorite
7	7 & 8	5	10	20	0	+ 20	pink-violet	56.4	pyritized qtzite	river wash
7	7R	0	tr	tr	0	tr	Ni.		qtzite	
7	7AR	0	tr	0	0	tr	Ni.		rusty qtzite	adjoining 7R
7	7BR	0	0	0	0	tr	Ni.		rusty granitic	adjoining 7AR
8	9	10	5	65	0	14	pink-gray	53.4	granite	granite
9	10	7	0	85	8	6	brn-gray	53.4	granite	granite
10	11	40	5	115	3	4	gray	53.6	granitic & schist	granite with some qtz
11	12	30	5	140	2	5	pink-gray	54.2	granitic & schist	granite with some qtz
12	13	45	0	160	2	4	gray	54.2	schist	schist
13	26	10	5	110	6			54.0	light igneous	light igneous

14	25	5	15	40	0	10		51.8	light igneous	light igneous
15	16	10	10	55	9	2	brn	56.5	no bedrock	rusty gravel water test+20 pink
16	17-18	no sample - water test +40 pink with red ppt.								
17	19	2	15	15	0		water 20 pink	55.6	no bedrock	rusty sand & gravel
18	14	5	20	20	0	+20	pink-gray	54.6	no bedrock	light & dark igneous
19	15	25	10	15	0	2	gray	54.6	no bedrock	light & dark igneous
20	20	3	10	75	0			56.0	no bedrock	light igneous
21	21	3	10	50	9			56.0	no bedrock	light igneous & some schist
22	22	5	10	85	5			55.6	no bedrock	light igneous & some schist
23	23	7	5	65	3			55.2	no bedrock	light igneous & some schist
24	24	2	15	10	0			55.2	no bedrock	light igneous & some schist


Clifton
Anomalous Molybdenum



quartz diorite
Dyea
West Fork
Taiya Valley
Nuka Bay
granodiorite
SKAGWAY
White Pass, and Yukon Railroad
quartz diorite
quartz monzonite
Clifton
East Fork
goat lake
Warm Pass Valley
1 Mile
road
railroad
prospect
SKAGWAY

GLACIER POINT

Glacier Point, located on the west side of Lynn Canal about sixty miles north of Juneau and fifteen miles south of Haines, is a delta built up by the outwash from Davidson Glacier, which, like other glaciers in the area, is now receding and providing new rock exposures along the valley walls. There are no old prospects or mines in the area other than a recent copper-iron discovery by Mr. Howard Hayes, a local logging operator, and a copper prospect located north of the Hayes prospect several years ago.

The Hayes discovery was made by Dale Henkins, a geology student in Mr. Hayes' employ.

Geology

The geology of the area has not been mapped but during the investigation it was noted that the general geology and structure shown on the north end of USGS Map I-303 continues through Glacier Point. The rocks are metasediments, including marbleized limestone and gneiss, with a northwesterly strike and some east-west faulting. The south end of the Chilkat Peninsula (opposite Glacier Point) is tuff and lava. The mainland and the Chilkat Peninsula are separated by the major fault zone that extends for 250 miles or more down Lynn Canal and Chatham Strait.

Geochemical Investigation

Twenty stream sediment samples were taken, including samples taken in the vicinity of the Howard Hayes prospect.

The variation between the Cx tests and the laboratory tests is remarkable. Note that the high Cx tests in no case were confirmed by laboratory work and that high laboratory results were not compatible with Cx testing. The discrepancy was especially notable at map locations 18 and 19 where the Cx tests gave a strong color that persisted at the end of the testing range; nevertheless, laboratory results were not anomalous.

Howard Hayes Prospect

This newly discovered prospect is located on a steep cliff at the head of a talus slope that contains float of magnetite in marble, and chalcopyrite with hematite, in an impure, schistose limestone partially altered to skarn. The magnetite outcrop was examined in some detail but the schistose limestone was largely inaccessible.

The deposit is interpreted as consisting of low grade mineralization in metamorphic rocks close to east-west faulting, which has formed slices of varying composition.

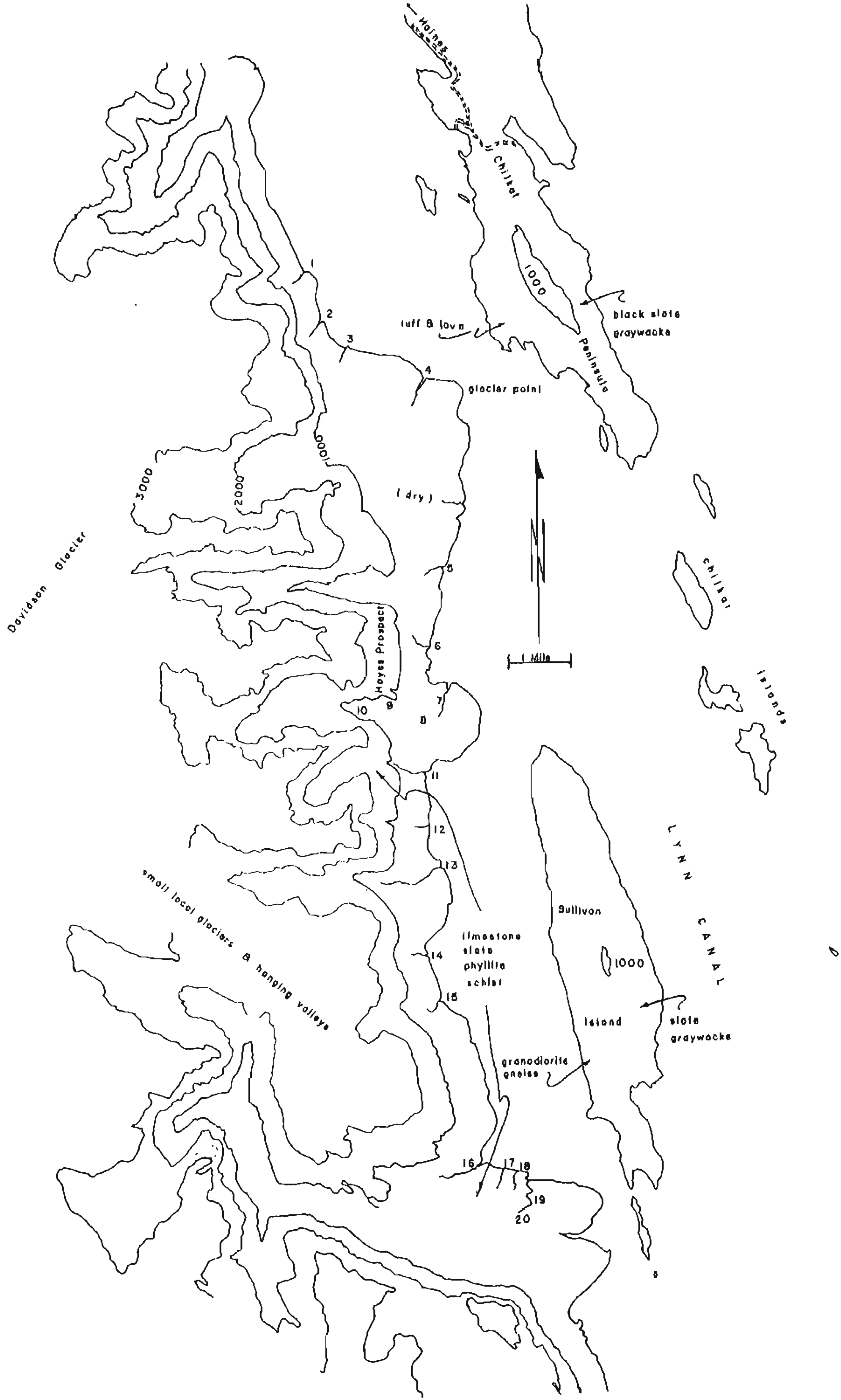
Prospecting

The higher copper content at map locations 11 to 13 may be derived from a northwesterly zone of structural weakness that is more or less in line with the Hayes prospect and the older prospect to the north of it. Since the creeks cut this zone on a steep mountain side it should be possible to locate the metal source by geochemical sampling of the streams and a search for float in the stream wash.

GLACIER POINT
August 1964

Map No.	Sample No.	Ppm Cu	Pb	Zn	Mo	ml dye Cx	Color Reaction	Mag reading x 1000	Bedrock	Stream Sediments
1	1	45	5	50	1	2	brn	54.8	no bedrock	gneiss & green schist
2	2	40	10	65	1	8	tan	55.0	schist	mainly schist with some quartz
3	3	15	10	45	2	10	brn	54.6	no bedrock	mixed gravel, brown coated
4	4	40	10	75	2	20	brn	54.6	no bedrock	schist, gneiss with some granite
5	5	35	10	35	1	-	blank	54.9	no bedrock	schist, gneiss with some granite
6	6	30	10	50	2	-	blank	53.6	schist & gneiss	schist, gneiss with some granite
7	7	25	5	35	2	7	tan	54.6	no bedrock	igneous & some marble
8	8	55	15	105	2	5	brn	54.4	limestone	mostly granitic
9	9	90	10	75	2	2	brn	54.5	schist & gneiss	schist, gneiss & some granite
10	10	30	5	30	2	10	brn	54.0	schist & gneiss	schist, gneiss & some granite
11	16	130	10	85	2	4	brn	53.7	no bedrock	schist with quartz
12	19	120	10	110	2	5	tan	53.6	schist	schist
13	18	125	10	60	2	-	blank	53.9	no bedrock	graywacke & rusty schist
14	20	65	15	60	1	-	blank	54.0	no bedrock	metasediments
15	21	60	10	60	2	-	blank	53.6	schist	mostly schist
16	11	35	25	60	1	-	blank	54.4	no bedrock	metasediments with some Ig.

17	15	15	10	50	1	5	violet	53.6	schist	metasediments
18	14	30	10	75	2	+20	violet	54.8	schist	schist
19	12	35	20	75	2	+20	violet	53.6	no bedrock	schist & some granitic
20	13	50	10	75	1	12	violet	53.4	no bedrock	schist



Haines
Chilkat
1000
Peninsula
black slate
graywacke
tuff & lava
glacier point
3000
2000
1000
(dry)
Davidson Glacier
Hayes Prospect
1 Mile
Chilkat
Islands
LYNN CANAL
Sullivan
Island
slate
graywacke
limestone
slate
phyllite
schist
granodiorite
gneiss
small local glaciers & hanging valleys
1
2
3
4
5
6
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10
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13
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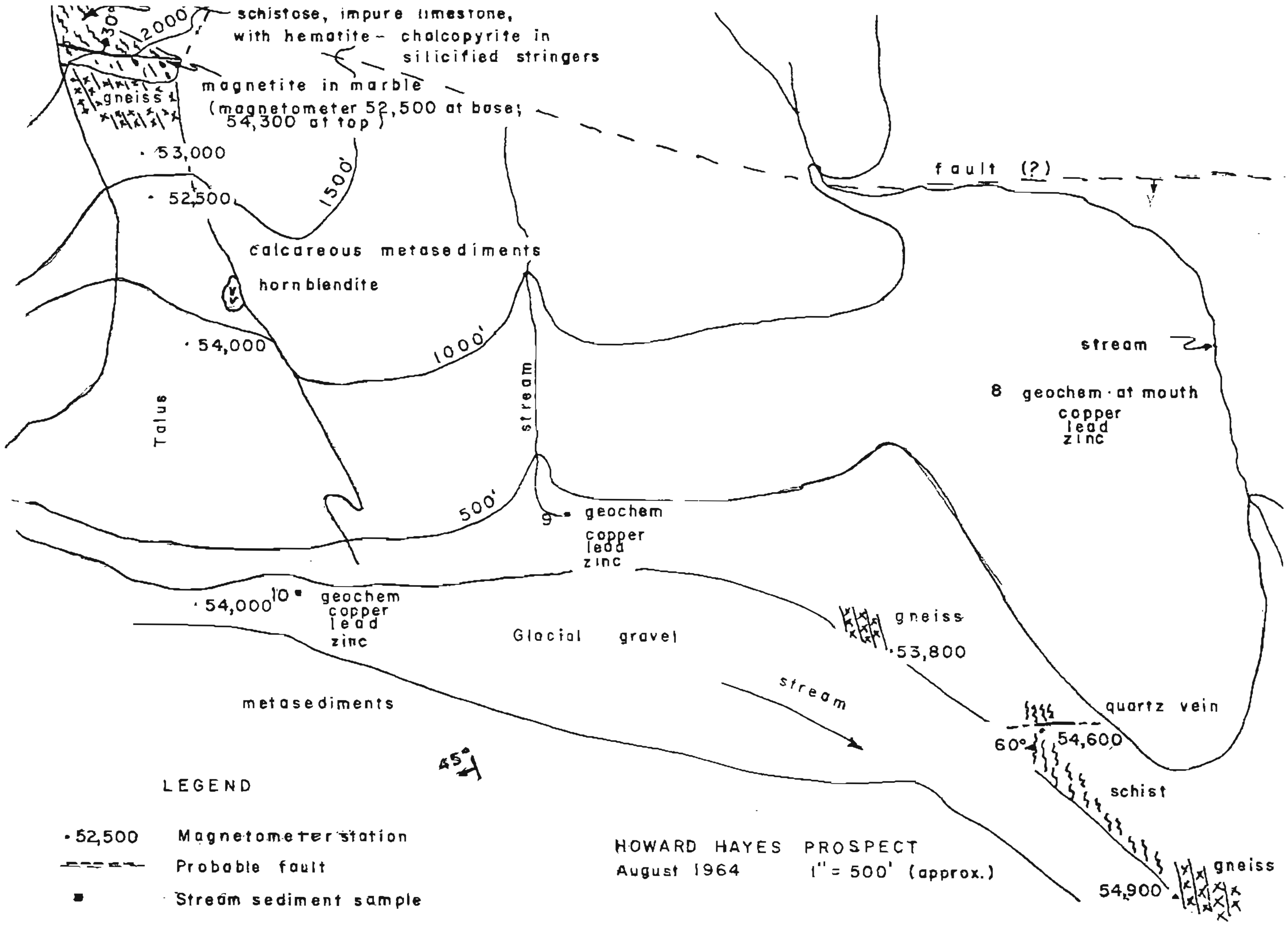
16
17
18
19
20


schistose, impure limestone,
with hematite - chalcopyrite in
silicified stringers
magnetite in marble
(magnetometer 52,500 at base;
54,300 at top)
gneiss
30°
2000'
1500'
1000'
500'
53,000
52,500
54,000
54,000
calcareous metasediments
hornblendite
Talus
stream
fault (?)
stream
8 geochem · at mouth
copper
lead
zinc
9 geochem
copper
lead
zinc
10 geochem
copper
lead
zinc
Glacial gravel
metasediments
gneiss
53,800
stream
quartz vein
60°
54,600
schist
54,900
gneiss
45°
LEGEND
52,500 Magnetometer station
Probable fault
Stream sediment sample
HOWARD HAYES PROSPECT
August 1964 1" = 500' (approx.)

ST. JAMES AND WILLIAM HENRY BAY

St. James Bay and William Henry Bay are on the west side of Lynn Canal thirty to forty miles northwest of Juneau. Prior to 1919 over a thousand feet of drifts and tunnel were driven in a copper mine south of the head of William Henry Bay. Shipments from the mine returned $1,020 in gold and silver, but there is no report on the value of the copper recovered.

Geology

The area considered lies north of a large mass of granodiorite (not shown on the accompanying map) and consists of Silurian and Devonian graywacke, argillite and andesitic flows, with some intercalated limestone. These rocks trend northwesterly and dip steeply to the northeast.

In the vicinity of William Henry Bay a major northwesterly thrust fault is warped sharply to the east by cross-faulting and folding, which involves a bed of Permian limestone. Intrusions of diabase and diorite occur northwest and southwest of the bay.

The geology of the area is described and illustrated in the following publications by the U.S. Geological Survey: Bulletin 714, "Mineral Resources of Alaska, 1919"; Bulletin 963-A, "Some Mineral Investigations in Southeastern Alaska"; Map I-303, "Progress Map of the Geology of the Juneau Quadrangle".

Geochemical Investigation

The geochemical investigation was made in conjunction with a State land appraisal during June of 1965. William Henry Bay was more thoroughly investigated this year b cause of an anomalous sample taken in 1964 during a stop forced by bad weather.

A total of 11 samples are reported of which three are anomalous. The stream found in 1964 to be anomalous, on the south side of William Henry Bay, was sampled at higher elevations and found to contain very high values of zinc.

Prospecting

A strong lead-zinc anomaly at map localities 8 to 9, accompanied by much iron staining of the gravel in the creek along which the samples were taken, suggests a local source of metal. However, lack of mineralized float in the creek makes it seem improbable that the small creek actually cuts a mineralized structure.

It is recommended that the creek be followed by geochemical testing of the stream sediments (possibly water sampling will work well at this locality). Iron staining itself may be a reliable guide. At a point where the anomaly drops or iron staining decreases, or beyond the head of the creek if anomalies persist that far, soil sampling should be done. The hill is covered with timber and brush, making outcrops scarce except in the creek beds. Consequently, soil sampling seems to be the easiest guide to possible mineralization. The soil cover is thin, so shallow pits can be used to check the results of soil sampling.

August 1964 & June 1965

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
1	5B23	5	5	25	2		none			none	lite & intermediate intr.
2	5B24	20	20	85	3		3	tan-green		schist	schist & marble
	5B24R	altered volcanic rock w/pyrite.						Assay - Au.-Tr., Ag.-Tr., 0.27% Pb.			
3	5B25	25	15	115	2		2	tan-green		schist	schist, sandstone & phyllite
4	5B26	45	15	105	2		2	tan-green		none	schist, sandstone & phyllite & some qtz.
5	5B27	50	20	165	3		1	tan-green		sc. & ls.	sc., phyllite & some granitic
6	5B28	30	15	130	4		1	tan-green		ls.	sc. & ls.
7	5B29	45	20	200	8		5	lav.	2.5	none	metased. & intr.
8	WHB2	55	125	2000	8		10	brown		ls. & gn.	small round rusty mix
9	5B30	54	95	+1000	4		20	pink-lav.		phyllite	phyllite & sc.-rusty gravel
10	5B31	45	50	+1000	3		20	pink-lav.		ls. & sc.	phyllite & sc.
11	WHB1	45	15	135	5			blank		ls.	small round mix

BERNERS BAY

Berners Bay is situated on the east side of Lynn Canal approximately forty-five miles northwest of Juneau. Gold lode deposits were first discovered in 1886 or 1887 on Sherman Creek. Between 1890 and 1900, five stamp mills were erected and production exceeded 68,000 ounces of gold before the mines closed a few years later. Copper has been reported in the area, but very little prospecting in recent years has taken place.

Geology

The geology of Berners Bay is described in the following U.S. Geological Survey Bulletins: Bulletin 446, "The Berners Bay Region, Alaska"; Bulletin 800, "Geology and Mineral Deposits of Southeastern Alaska".

These bulletins indicate that the coast range diorite commences at the mouth of the Antler River, but the eastern limit is not defined. The Canadian Department of Mines and Resources, Geological Survey Memoir 248, Taku River Map-Area, British Columbia, indicates that bedrock at the border is tuff, graywacke, argillite, conglomerate, breccia, limestone and andesites with minor intrusions. This leads to the conclusion that the Coast Range diorite does not occupy a large part of the area so it should be favorable for prospecting.

Geochemical Investigation

A total of 28 stream sediment samples were taken as well as two rock samples that contained sulfides. No strong anomalies were detected.

BERNERS BAY
August 1964

Map No.	Sample No.	Ppm Cu	Pb	Zn	Mo	ml dye Cx	Color Reaction	Mag reading x 1000	Bedrock	Stream sediments
1	19	15	5	55	2	8	violet-brn	54.0	graywacke	black slate & graywacke strike 310° - dip vert.
2	20	15	10	60	2	5	pink-brn	54.0	graywacke & B.S.	black slate & graywacke
3	21	15	5	45	2	-	blank	54.2	graywacke	graywacke & glacial fill
4	22	20	15	75	2	2	brn		graywacke	graywacke & glacial fill
5	23	10	10	25	2	6	brn		argillite w/pyrite	graywacke & glacial fill water test plus 15 brn/ redcap
6	24	55	15	135	4	6	pink-brn	54.5	no bedrock	graywacke & some igneous
7	25	5	5	10	2	3	brn	53.5	graywacke & B.S.	graywacke & some grando-diorite
8	26	20	10	75	2	17	pink-brn		graywacke & B.S.	graywacke & some grando-diorite
9	11	45	10	60	3	4	brn	54.5	gneiss & argillite	graywacke & some grando-diorite
9R	108	0	0	0	0	Assay	gneiss with pyrite & chalcopyrite?			
10	12	10	5	40	2	+20	brn	54.5	qtz diorite &granodio-rite	mostly granodiorite
11	13	35	15	90	2	6	brn	53	graywacke	micaseous schist
12	14	65	10	85	4	6	brn		no bedrock	graywacke with granodiorite
13	18	30	10	75	4	5	brn		black slate w/pyrite	black slate
14	17	65	15	245	8	4	violet-gray	54.5	black slate	black slate w/qtz

15	16	15	5	35	2	6	brn	54	graywacke	graywacke. b.r. to the east schistosegreenstone
16	10	20	10	110	3	10	pink-brn	53.5	graywacke	graywacke
17	8	30	5	50	3	6	pink-brn		no bedrock	graywacke
18	9	20	10	35	2	15	pink-brn	53.5	no bedrock	graywacke
19R	107R	0	0	0	0		Assay		chlorite schist & limestone outcrop 75'wide with pyrite & Cu?	
20	6	45	5	75	2	6	violet		black slate	metosediments & some igneous
21	5	55	15	85	3	-	no test		no bedrock	granite boulders & B.S.
22	4	70	15	75	3	6	brn		no bedrock	granite boulders & B.S.
23	3	30	10	80	3	4	gray		no bedrock	black slate
24	2	25	5	50	3	6	gray		no bedrock	black slate
25	1	30	15	65	3	+20	pink-violet		no bedrock	metoseds. & some igneous
26	15	35	10	40	2	6	pink-violet	55.0	no bedrock	metoseds. & some igneous
27	B.C.1	45	15	75	4	8	brn	55.2	no bedrock	glacial mix
28	B.C.2	50	5	40	3	10	pink-brn	55.0	graywacke	glacial mix water test +15 pink-brn

copper reported
quartz diorite
schistose greenstone
copper reported
graywacke
limestone
slate
greenstone volcanics
BERNERS BAY
Mud
Cove Point
Pt St Mary
Point Bridget
Mab Island
Sawmill
Cowee Creek
Davies Creek
1 Mile

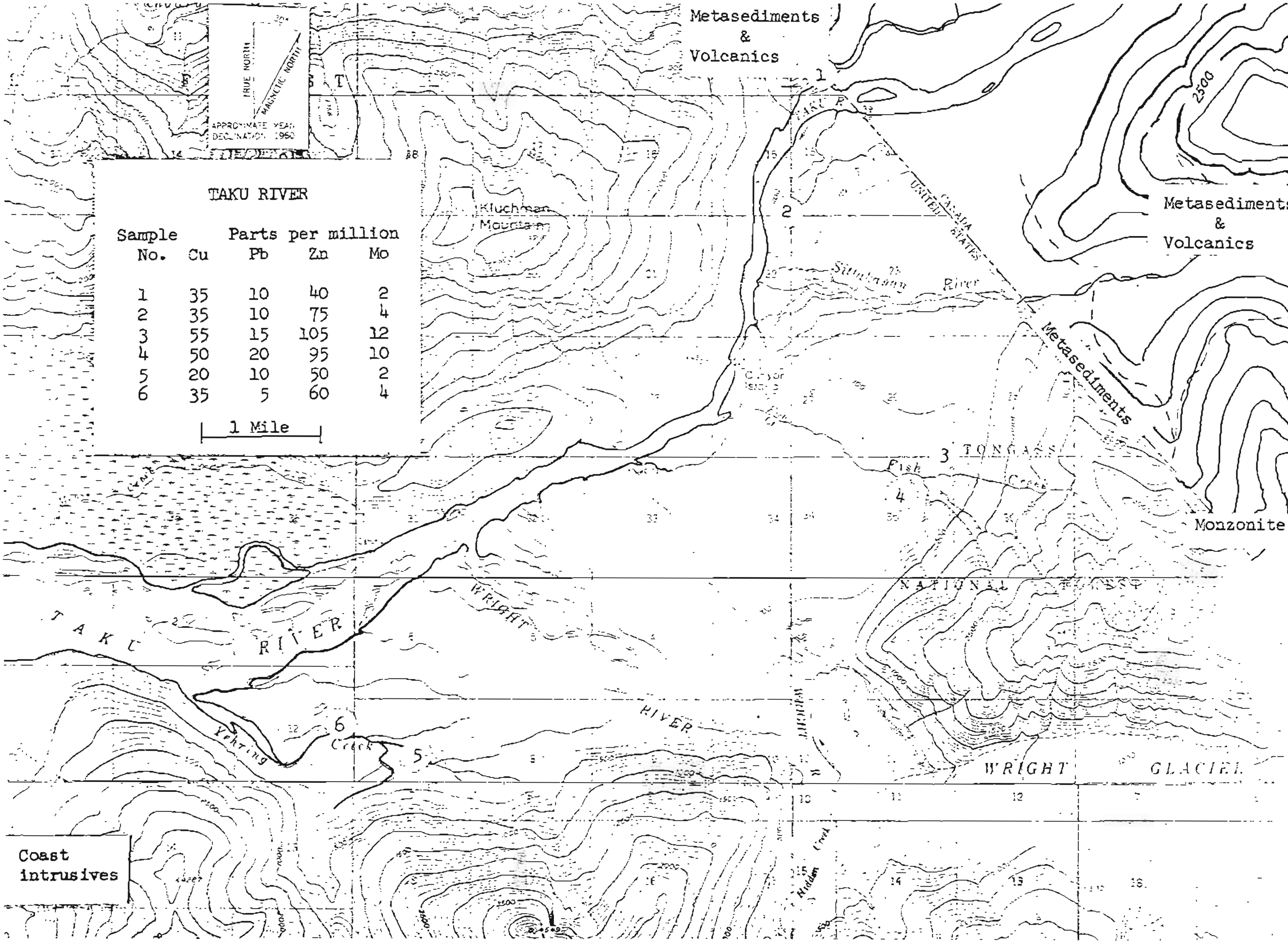
TAKU RIVER

Six stream sediment samples were taken in the vicinity of the Taku River, thirty miles northeast of Juneau.

Several lead, zinc, copper, silver and gold prospects occur a few miles east of the border on the Canadian side.

Early U.S. Geological Survey maps show this particular area as being part of the Coast Range batholith but detailed geologic mapping has not been done. The Canadian Department of Mines and Resources, Geological Survey Memoir 248 indicates that bedrock at the border in the vicinity of the Sittakanay River and Wright Glacier is Paleozoic schist, quartzite, argillite, and slate with minor intrusions. The intrusive in this area is quartz monzonite. The eastern limit of the Coast Range batholith is probably near the western part of the accompanying map.

Considerably more work must be done before the mineral potential of this geologically favorable area can be determined. The rather high molybdenum content of samples 3 and 4, in an area where metasediments are believed to be intruded by quartz monzonite, is interesting.



TAKU RIVER

Sample No.	Cu	Pb	Zn	Mo
	Parts per million			
1	35	10	40	2
2	35	10	75	4
3	55	15	105	12
4	50	20	95	10
5	20	10	50	2
6	35	5	60	4

1 Mile

MANSFIELD PENINSULA

The Mansfield Peninsula is the northernmost part of Admiralty Island and is approximately 20 miles west of Juneau. Gold was first discovered at Funter Bay in 1887; several small mines were active in the area for several years afterwards. Gold was discovered at Hawk Inlet in 1919 and there was some production from a large quartz vein.

More recently, activity has centered on the copper-nickel deposit of the Admiralty Alaska Gold Mining Corporation at Funter Bay. This deposit was drilled and tunneled under DMEA loan provisions from 1951 to 1956. It has been mapped by the U.S. Geological Survey and sampled by the U.S. Bureau of Mines. Assays indicated values of 0.5 - 1.0% copper and similar values of nickel.

Geology

The Mansfield Peninsula has been described in part in several U.S. Geological Survey publications. The most comprehensive of these are Bulletins 287, "The Juneau Gold Belt"; 714, " Mineral Resources of Alaska, 1919 and 1924"; 897-D, "Nickel Content of an Alaskan Basic Rock"; 936-O, "Nickel-Copper Deposit at Funter Bay, Admiralty Island, Alaska"; 1155, "Contributions to Economic Geology of Alaska"; and 1181-R "Reconnaissance Geology of Admiralty Island, Alaska". U.S. Bureau of Mines publication RI 3950 contains sample information on the copper-nickel deposit. The copper-nickel deposit is described (Barker, Bulletin 1155) as being a gabbro pipe underlain by black graphitic phyllite with interlayered quartz-sericite-biotite schist and green schist. The Peninsula is predominantly Devonian schists with interbeds of marble. The schist varies from calcareous to graphitic, which is frequently pyritized. Volcanic rocks, argillite, chert, slate, and graywacke occur on the east shore, while a foliated quartz diorite pluton forms the west coast of the peninsula.

Geochemical Investigation

A total of 27 stream sediment samples were taken from streams draining into Funter Bay, Hawk Inlet, and along the east shore of Mansfield Peninsula. The streams sampled headed generally in the vicinity of Mt. Robert Barron. Analyses of these samples indicate that streams draining the part of Funter Bay in which the existing copper-nickel deposit is located contain from 20 to 55 ppm copper, from 75 to 135 ppm zinc, and from 45 to 70 ppm nickel, none of which are considered to be anomalous.

Surprisingly, the only nickel anomalies were found south of Funter Bay in Hawk Inlet at map locations 9 to 13, where no nickel mineralization has been reported. This group of samples is also highly anomalous in zinc and probably in silver. Samples at sites 11 and 12 contained 3.0 and 2.5 ppm silver respectively.

Prospecting

Sample 12, which was taken from a small stream, is very high in zinc and nickel and carries lead in anomalous quantity. The topography suggests that sample site 12 lies on a southwesterly trending geologic structure (cross fold or shear zone) that could contain the source of the anomalies found in samples 10 and 11.

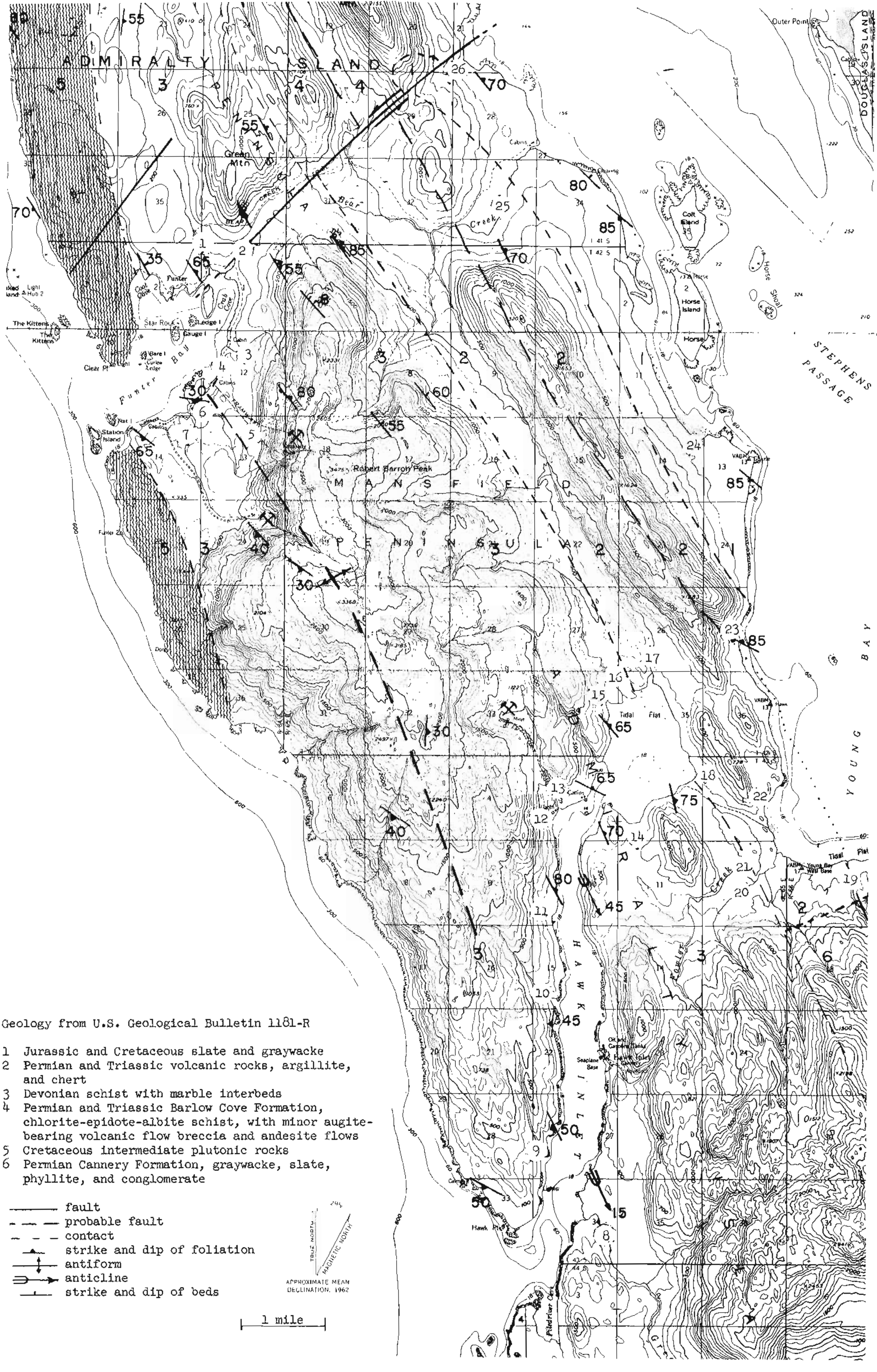
The steep stream at site 12 should be followed up the hill, with careful attention paid to the possibility of float in the stream bed. Soil samples should be taken northerly along the hill, and soil and gravel should be panned to detect the presence of sulphides or gold.

The headwaters of the streams sampled at sites 10 and 11 cut the hypothetical southwesterly geologic structure and should be followed by sampling of stream sediments and soils, and by panning.

MANSFIELD PENINSULA

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
1	5B247	20	10	80	2	55	6	pink-tan		phyllite	ph., lite & int. intr.
2	5B246	35	10	125	3	60	19	tan-or. w/red ppt.		phyllite	ph., int. & dark intr.
3	5B244	35	15	135	7	70	7	pink	3.5	schist	schist & lite intr.
4	5B241	35	10	90	4	65	16	pink-tan		schist	schist
5	5B242	50	10	75	3	55	20	pink-lav.			metaseds.
6	5B243	55	10	85	3	45	20	pink-lav.	3.0	schist	sc., ls., & lite intr.
7	5B245	20	20	90	3	50	10	pink w/brn ppt.	3.0	schist	metaseds. & lite int. intr.
8	5B160	65	15	290	5	100	13	pink-vio.	2.7		grs. int. & dark intr.
9	5B159	45	20	485	5	150	10	pink w/or. ppt.	3	sc. w/qtz.	sc., ar. 10% int. intr.
10	5B158	25	15	465	4	150	5	tan	2.2	argillite	sc., ar. & 40% int. intr.
11	5B157	40	10	2200	6	370	10	pink-lav.	3.2	ar. w/qtz.	sc., ar. & 10% int. intr.
12	5B156	65	65	9500	7	1000	20	pink w/or. ppt.	3.3	argillite	metaseds. & 50% int. intr.
13	5B150	100	20	600	12	165	20	" " "	3		ar., qtz., int. intr.
14	5B155	15	10	80	1	75	9	tan	3		glacial till mostly intr.
15	5B151	10	5	85	1	55	11	pink-tan	3	phyllite	ar., dark intr., qtz. (rusty)
16	5B152	35	5	130	2	75	4	brn.-brey			metaseds., lite to dark intr
17	5B153	30	10	170	3	95	20	pink w/tan intr.		argillite	metaseds., lite to dark intr
18	5B154	30	10	165	2	90	5	tan w/tan intr.			metaseds., lite to dark intr
19	5B169	50	5	175	2	75					metaseds., lite to dark intr
20	5B168	20	10	160	3	55					metaseds., lite to dark intr
21	5B167	20	5	110	2	55					metaseds., lite to dark intr.

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
22	5B161	55	40	115	2	65					sc., ar. & int. intr.
23	5B165	40	5	105	2	50					sc., ar. & lite intr.
24	5B164	90	10	245	4	70					sc., ar. & lite int. intr.
25	5B163	45	10	95	1	55				sc. & ar.	lite int. intr., gn., & ar.
26	5B162	20	10	85	1	55					lite int. intr., cg. & ar.
27	5B161	80	5	145	2	80					grn. sc. & lite intr.



ADMIRALTY ISLAND
DOUGLAS ISLAND
Outer Point
Green Mtn
Bear Creek
Funter
Funter Bay
The Kittens
Station Island
Colt Island
Horse Island
Horse Shoal
STEPHENS PASSAGE
Robert Barron Peak
MANSFIELD PENINSULA
Tidal Flat
YOUNG BAY
HAWK INLET
Hawk Pt
Fowler Creek
Seaplane Base
APPROXIMATE MEAN DECLINATION, 1962
TRUE NORTH
MAGNETIC NORTH
Geology from U.S. Geological Bulletin 1181-R
1 Jurassic and Cretaceous slate and graywacke
2 Permian and Triassic volcanic rocks, argillite, and chert
3 Devonian schist with marble interbeds
4 Permian and Triassic Barlow Cove Formation, chlorite-epidote-albite schist, with minor augite-bearing volcanic flow breccia and andesite flows
5 Cretaceous intermediate plutonic rocks
6 Permian Cannery Formation, graywacke, slate, phyllite, and conglomerate
fault
probable fault
contact
strike and dip of foliation
antiform
anticline
strike and dip of beds
1 mile

TENAKEE INLET

Tenakee Inlet, on the east side of Chichagof Island 50 miles southwest of Juneau, is about 40 miles long. At the town of Tenakee, a hot spring has been in use since the late 1800's. Early U.S. Geological Survey bulletins mention two nickel prospects east of the town. Norite is reported on the west side of the Inlet near its head. The norite is mentioned as being similar to that found on the west coast of Chichagof Island where it is known to contain copper and nickel. These reports led to the present investigation.

Geology

The accompanying copy of a portion of U.S. Geological Survey Map I-388 shows that Tenakee Inlet is an area where Devonian argillite, graywacke, and limestone have been intruded by a wide variety of igneous rocks. The age of the intrusives varies and for the most part is unknown. The prospects east of the town consist of mineralized dikes of mafic rocks near a granodiorite intrusive. The norite body reported in the old bulletins is shown on the west side near the head of the Inlet. Petrographic analyses of samples taken in and adjacent to the norite indicate the norite has in places been metamorphosed to a hornblend gneiss and contains less than 0.1% copper and zinc. Sample 5B205 contained 2 to 10 percent pyrrhotite but no nickel.

Geochemical Investigation

Sixty-six stream sediment samples were taken. Nine of these were from the watershed containing the prospects east of the village and thirteen from the watershed containing the norite body. Analyses did not show anomalous amounts of copper, zinc, or nickel.

A single high lead analysis was reported from sample site 22 at the head of the Inlet. A re-assay of this sample revealed that it not only contained high lead but also high silver (3 ppm). The analysis also showed much iron and either bismuth or thallium.

The stream is 8 to 20 feet wide, and about 1½ miles long and heads on a steep mountain slope. It apparently heads along the contact between Devonian marble and hornfels where these sediments form a roof pendant in a diorite and tonalite intrusion.

The target area could be narrowed by geochemical sampling up the stream from its confluence with the main river.

Samples 55 to 58 in Crab Bay indicate, in cold extractable tests, the presence of metals other than those tested for in the laboratory.

The rock and stream sediment samples taken in the vicinity of the norite body did not suggest the presence of appreciable amounts of nickel or copper.

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
1	5B173	15	10	100	2	40	2	tan		vol. & qtz.	50% intr., vol. & ls.
2	5B171	20	5	85	4	65	1	tan	3		ls., vol., ar.
3	5B172	5	5	50	4	30	8	tan		vol.	vo.canics
4	5B174	35	20	160	7	75	4	tan			lite-intr. & vol. br.
5	5B175	20	15	120	6	65	1	tan			lite-intr. & vol. br.
6	5B176	50	10	80	5	65					cg. (dry stream)
7	5B177	15	5	60	6	55	5	pink		lite intr.	lite intr.
8	5B178	10	10	50	6	40				lite intr.	lite intr.
9	5B179	25	15	90	5	55	3	cls.			lite intr.
10	5B180	35	10	75	6	90					intr., silic. metased.
11	5B181	30	5	60	3	65					intr., silic. metased w/sulf.
12	5B182	35	20	95	4	90	1	tan		limestone	ls., metased. & intr.
13	5B183	40	10	90	5	65	1	tan			ls., metased., no intr.
14	5B184	40	10	70	4	60	1	tan			ls., metased., no intr.
15	5B185	50	15	70	5	65					ls., metased. & intr.
16	5B186	50	10	80	5	55	1	tan			ls., metased. & intr.
17	5B187	35	10	85	5	55	1	tan		lite intr.	lite-intr., gn. & metased.
18	5B188	25	15	80	8	55				lite intr.	lite-intr., & metased.
19	5B189	20	15	80	3	40	3	pink-tan		lite intr.	lite intr.
20	5B190	25	10	90	4	40					lite intr. & ls.
21	5B194	50	10	80	6	65				lite intr.	lite intr. & ls.

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	MI dye	color			
22	5B193	35	200	130	6	90	4	vio.-grey	(Note: High in Fe	w/3ppm Ag)	90%lite intr.,10% intr.
23	5B192	65	15	95	4	55	10	pink-lav.		lite intr.	lite intr.
24	5B191	40	15	80	6	40	2	tan			lite intr.
25	5B195	30	10	75	4	40				lite intr.	lite intr.
26	5B196	85	10	75	4	40	2	tan			lite intr.
27	5B197	50	5	75	4	60					lite-int. & dark Intr.
28	5B198	70	10	80	4	75				dark intr.	int.-dark intr.
29	5B203	50	10	95	5	75				int. intr.	lite-int. intr.
30	5B204	35	10	115	3	65	2	tan		dark intr.	dark intr.
31	5B205	50	10	135	4	65				lite itn.intr., gn.	-same w/some ls.
32	5B201	40	10	90	5	40	1	tan			lite-dark intr. & ls.
33	5B199	40	15	80	4	55	4	tan-cls.			lite int. intr.,some metased.
34	5B200	35	15	85	3	50					metaseds. & lite int. intr.
35	5B202	35	10	75	5	65					lite-dark intr. ls., metased.
36	5B206	35	5	80	5	65					lite-int. intr.
37	5B207	20	10	135	5	40					int., intr.
38	5B208	15	30	100	5	50	1	tan		int. intr.	int. intr.
39	5B209	25	15	65	5	65	6	tan-cls.			lite int. intr. & metased.
40	5B210	30	15	75	5	70					lite int. intr. & metased.
41	5B211	35	10	60	3	75					lite-dark intr.
42	5B212	25	10	60	3	55				lite intr.	lite intr.
43	5B213	25	10	90	4	54					lite int. intr. & metased.

TENAKEE (cont.)

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	Hl dye	color			
44	5B214	15	15	75	5	40					lite int. intr.
45	5B215	5	20	75	5	40				lite int. intr.	lite int. intr.
46	5B216	15	15	65	4	40				lite intr.	lite intr.
47	5B217	5	15	90	5	40	3	tan		lite intr.	lite intr.
48	5B218	25	10	75	5	55	4	tan			lite intr. & some ls.
49	5B219	15	10	50	4	30	5	tan		lite intr.	lite intr.
50	5B220	20	15	60	4	40	3	cls.		lite intr.	lite intr.,chert (rusty gravel
51	5B221	20	10	55	4	55	5	tan-pink			lite int. intr.
52	5B223	20	10	85	4	40	5	pink-cls.			int. dark intr.
53	5B222	20	10	60	3	55	4	cls.			lite int. intr.,metased.& qtz.
54	5B224	15	10	75	4	40					int. intr.
55	5B225	15	10	60	4	40	12	pink to tan w/or. ppt.	3.5		lite int. intr. & qtz.(rusty gravel)
56	5B226	20	10	65	5	45	5	" "	3.4		lite int. intr. & qtz.
57	5B227	10	15	80	4	55	5	tan			lite int. intr.
58	5B228	20	10	65	3	65	+20	pink w/red ppt.			lite int. intr.
59	5B229	20	15	75	3	60	3	tan	2.9	lite int. intr.	lite int. intr. & vol. br.
60	5B236	5	15	50	5	55					metased. & lite intr.
61	5B235	15	15	65	4	50	5	pink-cls.			lite int. intr. & metaseds.
62	5B237	15	15	80	6	40					pink intr. & some dark intr.
63	5B234	30	20	110	4	60	5	pink-cls.		dolomite	metased. & some pink intr.

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
64	5B232	30	15	125	5	40	7	tan			ls. & some lite intr.
65	5B231	50	10	120	5	40	2	tan			metased. & lite intr.
66	5B230	25	15	95	4	55					lite intr. & metased.

Kelp Bay is on the northeast portion of Baranof Island, 75 miles southwest of Juneau. There are no reported prospects in the area. This investigation was made because of the interesting geology mapped by the U.S. Geological Survey and published in Map I-411, "Reconnaissance Geologic Map of Baranof and Kruzof Islands, Alaska"; Map I-388, "Reconnaissance Geologic Map of Chichagof Island and Northwestern Baranof Island, Alaska"; and Bulletin 1141-0, "Reconnaissance Geology of Northern Baranof Island, Alaska".

It was noted on Map I-388 that several samples of bedrock taken in the vicinity of Kelp Bay indicated the presence of sulphides on the southeast shore of The Basin, the southwest shore of Catherine Island, and near Cosmos Cove. An intrusive granodiorite is shown at Catherine Island and south of Kasnyku Bay. Sedimentary, volcanic, and intrusive rocks are metamorphosed and highly silicified. Intense shearing has occurred along the fault between Baranof and Catherine Islands.

Geochemical Investigation

A total of 49 stream sediment samples were taken during the course of this investigation. Samples 46 to 48, taken along a four-mile distance on the northeastern shore of Portage Arm and Kelp Bay, are anomalous in nickel. The rocks drained by the streams sampled are amphibolite, hornblende gneiss, gabbro, tonalite, and diorite. Unfortunately, most of the streams in this area were dry at the time of examination. This resulted in an insufficient number of samples taken.

Since a nickel anomaly exists, and the known rock types may be favorable for the occurrence of nickel ore bodies, the area merits further attention. In particular, the better developed drainage system that flows easterly and northeasterly from the intrusive mass on Catherine Island should be tested.

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
1	5B149	5	-5	10	2	30	0			light intr.	lite intr. & metased. w/pyr.
1R	49R	Basalt w/trace Cu & Zn.									
2	5B147	20	5	105	2	45	3	tan	2.6	int. intr.	int. intr. & gneiss
3	5B148	10	-5	60	1	35	0				int. intr. & metased.
4	5B146	20	5	110	3	55	1	tan			dark intr. & argillite
5	5B145	30	5	170	1	75	1	tan			dark intr. & some gn.
6	5B144	60	10	225	3	90	1	tan			ar. & inter. igneous
7	5B107	90	10	175	1	155	1	green	2.7	argillite	green schist & gry.
8	5B106	110	5	175	1	100	2		2.6		green schist & gry.
9	5B105	80	5	170	1	95	3	lav.		schist	grn. sc., ar. silic. sc.
9R	5R	gneiss w/trace Cu.									
10	5B104	60	5	150	1	95	2	tan			gry. & schist
11	5B103	35	10	150	1	75					sc. & silic. metased.
12	5B102	65	10	200	1	150	1	tan		schist	schist & gry.
13	5B101	80	10	185	1	120	4	pink	2.8	schist	sc., gry., chert w/sulphides
14	5B108	60	5	205		105	4	tan		silic. metased.	sc., gry., 1% light intr.
15	5B109	20	20	185	5	75	5	tan	3	schist & gry.	schist
16	5B110	30	5	165	1	55	1	tan		argillite	argillite
17	5B111	55	5	185	2	110	2	tan			bs., ar., grn. schist
18	5B113	35	-5	50	1	50	10	pink-grey	2.8	metased.	qtz. di., gry., schist
19	5B114	20	-5	120	1	85	7	pink-lav.			bs. & grn. schist

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
20	5B115	35	5	105	1	65	13	pink-lav.			gry., b.s.., ar. & lite intru.
21	5B118	105	10	185	1	95	10	tan-vio.		argillite	argillite
22	5B119	110	10	200	1	95	4	tan		argillite	argillite
22R	19R	gneiss w/trace Cu.									
23	5B117	40	5	190	1	75	4	tan		grn.sc. & chert	grn. sc., bs. & chert
24	5B116	50	10	200	1	90	7	tan		chert	argillite & chert
25	5B112	90	5	165	1	115	4	pink-tan	3		grs., ar. & gry.
26	5B126	40	10	200	1	70	2	tan	3	grn. schist	green schist
27	5B124	65	10	190	1	50	3	pale tan		argillite	argillite
28	5B125	45	5	170	1	90	5	lav.		argillite	argillite
29	5B123	25	10	245	1	75	10	pink-tan	2.6	sh. & sc.	shale & schist
30	5B122	35	5	190	1	65	14	pink-tan	2.8	ar. w/qtz.	argillite, greenstone
31	5B121	50	10	200	1	75	2	pink	2.6	gry.	gry. & argillite
32	5B120	60	5	170	1	120	4	pink-lav.			grs. & some jasper, gry.
33	5B129	49	5	165	1	95	4	tan			sc. & qtz. d. w/sulphides
34	5B128	25	5	165	1	95	3	tan		schist	schist & gry.
35	5B127	55	5	190	1	75	2	tan		phyllite	ar., grs. sc., purple sc.
36	5B139	30	10	240	2	100	0			grn. schist	schist, argillite
37	5B138	25	5	175	2	90	2	tan			grn/ scjost & some jasper
38	5B135	30	5	160	5	115	10	pink-tan			schist, ar., gry.
39	5B136	30	5	160	3	135	3	tan			schist & metased.

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	Ml dye	color			
40	5B133	45	5	220	2	90	3	tan		grn. schist	grn. sc. & volcanics
41	5B132	25	10	165	5	90	2	tan		metased.	metaseds., 10% intr.
42	5B131	25	5	130	3	65	3	tan		schist	intr., vol.,sc.w/pyrite
43	5B130	35	5	125	2	70	1	tan	2.7		intr. & dark intr.,some do.
44	5B134	35	10	165	4	65	1	tan		metased.	silic. metased., intr.
45	5B137	35	-5	110	2	100	1	tan			90% intr.
46	5B140	65	5	150	2	160	0			qtz. diorite	qtz. d. & some aplite
46R	40R	gneiss w/Cu. & Zn.									
47	5B141	115	5	165	2	315	0			qtz. diorite	qtz. d. & argillite
48	5B142	150	5	165	2	405	1	tan		lite intr.	lite intr.
48R	42R	amphibolite w/trace Cu. & Zn.									
49	5B143	40	10	260	5	110	0				lite & inter. intr.

PYBUS BAY AND GAMBIER BAY, ADMIRALTY ISLAND

During 1964 and 1965, stream sediment samples were collected from most of the reasonably accessible streams which flow into Pybus Bay and Gambier Bay. A total of 157 samples have been analyzed for copper, lead, zinc and molybdenum. The analyses point to four areas in which prospecting is warranted.

Previous Work

In 1904 the U.S. Geological Survey reported on the Brown copper prospect on Cave Mountain (south of location 143 on the accompanying map) and on Gambier Mountain (north of location 146). Mention of these prospects is made in U.S.G.S. Bulletins 259 and 287. Prospectors have reported copper at a few other locations, especially in the area bounded by map locations 150 and 155.

Geology

U.S. Geological Survey Bulletin 1178, Stratigraphy and Petrography of the Pybus-Gambier Area by Robert A. Loney (1964) covers the geology of the area, the general features of which are shown on the accompanying map.

Geochemical work has drawn particular attention to the Hood Bay formation (shown as No. 7 on the accompanying map) and the Hyd formation (shown as No. 8 for the sedimentary section and No. 11 for the volcanic section).

The Hood Bay formation, which Loney considers to be Devonian in age, consists of radiolarian chert and siliceous argillite with local limestone, calcareous argillite, and fine-grained graywacke. Finely divided carbonaceous material and pyrite are common. Loney believes that ancient volcanics were the source of the sediments, which were deposited in a restricted basin. No large intrusive masses are known to exist but dikes of intermediate composition have been found. There are a few basic lava flows.

The Hyd formation consists of a basal chert breccia with a dolomite or limestone matrix, a limestone member, and an argillite member. Basic volcanic flows are interfingered with the sediments and are, at places, the dominant rocks in the formation. Loney assigns the Hyd formation to the Triassic system.

Geochemical Results

Seven stream sediment samples (map locations 12 to 18) were taken from streams which drain an area apparently underlain entirely by rocks of the Hood formation. These seven samples average 136 ppm copper, 19 ppm lead, 289 ppm zinc, and 12 ppm molybdenum. Contiguous streams from map location 13 to 16 average 162 ppm copper, 20 ppm lead, 302 ppm zinc, and 13 ppm molybdenum. Apparently the Hood formation, or parts of it, have an anomalously high content of copper, zinc, and possibly molybdenum.

In Gambier Bay, map locations 107 and 111 average 52 ppm copper, 65 ppm lead, 321 ppm zinc, and 1 ppm molybdenum. The streams at these locations drain the Hyd formation below its contact with the Hood formation, which is folded sharply. The area also lies just south of the projected position of the Gambier Bay fault. Zinc and lead are present in anomalous quantities.

Where the Hyd formation is exposed on the north shore of Gambier Bay, the streams at map locations 150 to 154 average 117 ppm copper, 67 ppm lead, 783 ppm zinc, and 13 ppm molybdenum. Within the area covered there has been some prospecting for copper and nickel, but the stream sediments indicate that lead, zinc, and possibly molybdenum should be sought, as well as copper, which is present in anomalous quantity only at location 154. A specimen of dolomite breccia at location 152 carried only 10 ppm in copper with quartz, pyrite, and fuchsite, a chrome-nickel mica. The specimen assayed 0.10% nickel and a trace of gold.

At map locations 94 to 97 the stream sediments average 55 ppm copper, 10 ppm lead, 298 ppm zinc, and 16 ppm molybdenum (sample 94 carried 28 ppm molybdenum). These streams drain an area underlain by schists and phyllites of the Gambier Bay formation, which, at the sample locality, contained considerably more mica than was observed elsewhere.

Prospecting

The Hood Bay formation of carbonaceous chert and argillite, in the northwestern part of Pybus Bay, appears to carry anomalous amounts of copper, zinc, and possibly molybdenum. These metals may be widely distributed in the rocks, but concentration in one or more favorable beds or structures is possible.

At map location 16 a small stream with anomalous copper flows over carbonaceous argillite. This stream appears to have its origin along an east-west fault that offsets a 30 foot wide andesite dike. Near the fault, the argillite is badly sheared and carries considerable pyrite. The chert is recrystallized. It is suggested that the stream be followed from location 16 southwesterly for a half mile or less by taking stream sediment samples for geochemical tests in the field, with laboratory tests at a later date, and that chip samples of bedrock be taken frequently for laboratory analysis. Bedrock should be examined carefully for the presence of finely divided sulphides, and assays should be made of samples that appear to contain sulfides or that show copper stains. It is possible that field testing of water for heavy metals may be a useful and rapid method of tracing the anomaly to its source.

At location 17 a large stream, about two miles long drains a basin underlain by rocks of the Hood formation. At its mouth this stream has a copper content of 130 ppm and a zinc content of 300 ppm. These quantities seem to be fairly high in relation to the size of the stream, indicating that investigation of this stream and its tributaries is warranted.

At locations 13 and 14, the stream sediments have anomalous amounts of copper, zinc, and molybdenum. The streams are fairly short and should be followed.

In the southwestern portion of Gambier Bay, map locations 107 to 111 are on small, steep streams that cross the Hyd formation, which, at this place, consists almost entirely of limestone with some andesite intrusions (possibly flows). The streams have anomalous contents of lead and zinc.

The contact between the Hyd formation and the Gambier Bay formation apparently lies a short distance south of the shoreline but at an elevation between 300 feet and 600 feet. It is folded, probably faulted, and may be adjacent to the basal breccia member of the Hyd. The setting may be favorable for the existence of lead and zinc replacement bodies.

Since the hillside is very steep, the best access is up the stream along the fault at location 111. This should be followed to the contact between the limestone (or breccia) and the schist. This contact should then be followed easterly and southeasterly for about one-half mile.

The Hyd formation is well exposed on the north shore of Gambier Bay at locations 150 to 154. Copper and nickel prospects have been found in this area but little work has been done on them. Since geochemical tests show only one copper anomaly (at location 154) and all are high in lead and zinc, it seems that lead-zinc orebodies are more likely to be found. It should be noted that the cold extractable test of sample 154 gave a precipitate that often indicates the presence of silver.

The best access is up the nose of the ridge from location 154. The stream at this place lies in a long northwesterly trending depression that probably marks the contact between the sedimentary and volcanic members of the Hyd formation. Apparently the contact is faulted and diorite in the creek may be derived from one or more small intrusions.

The molybdenum and zinc anomaly at map location 94 to 97 on the west shore of Snug Cove in Gambier Bay may or may not have importance. Sample 94, which carried 28 ppm of molybdenum, was taken from a stream that drains from a probable northeasterly trending fault zone in soft, micaceous schists. There are no known intrusive masses nearby, but at location 95 acidic igneous rocks and quartz are present in the stream bed. The stream at location 94 may be followed westerly for 500 to 600 feet to a point where the stream lies in the assumed fault. If there is evidence of acidic intrusives (such as granite), considerable quartz or silicified schist, the search for molybdenum should be continued by stream sediment and soil analyses. Similarly, the stream from location 95 should be followed westerly.

On the ridge between the north and south arms of Gambier Bay, samples 131 an 133 show anomalous copper, apparently derived from a fairly narrow band of dolomite breccia that extends westerly from the beach at location 133 for two or three miles along the northern face of the ridge. The old Brown copper prospect was on this band and chalcopyrite may be found at the beach. Exposures are rare but the bed can be followed by intermittent patches of rusty soil. A lack of important copper anomalies from 135 to 143 discourages a belief that the breccia bed contains a large copper orebody.

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 1000 gauss	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
1	5B57	10	10	75	4						
2	5B56	20	10	125	4						
3	5B55	15	10	105	5						
4	5B54	15	10	85	12						
5	5B53	35	15	115	12						
6	5B35	25	15	135	5		2	tan	54.		cg., chert, gry.
7	5B32	25	5	150	3		3	tan w/tan ppt	52.5		everything but schist
8	5B33	40	5	125	3		2	tan	53.5	volcanics	volcanics
9	5B34	20	5	165	4		4	tan-pink		metasediment	chert, gry. & metased.
10	5B36	25	5	125	5		7	pink-lav.		basalt	volcanics
11	5B37	30	5	165	5		6	tan			volcanics & rusty metased.
12	5B58	35	15	220	7		2	tan	20.0		gry. & argillite
13	5B59	135	20	380	15		4	tan		ar. & gry.	chert,gry,dolomite & volcs.
14	5B60	180	20	330	15		10	tan-cls.			dolomite,gry.& do. breccia
15	5B61	55	15	330	12		1	tan		ar. & intr.	gry.,ar. & dolomite
16	5B62	310	25	200	10		20	pink		carb. ar.	argillite
17	5B63	130	20	300	13		3	tan			do.,do. breccia & gry.
18	5B52	105	15	260	12		6	pink		limestone	ls., chert, gry.
19	5B51	65	10	170	7		2	pink	52.5	limestone	limestone
20	5B50	30	5	125	4		2	tan	52.5	dolomite	dolomite
21	5B49	20	10	90	4		25	pink	49.0		argillite

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 1000 gauss	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
22	5B48	70	10	120	5		5	pink	52.5		gry. chert, do.
23	5B47	60	10	200	5		2	tan			gry. & chert
24	5B46	60	10	200	4		2	tan	52.	chert	gry. & chert
25	5B45	30	5	70	3		4	tan	55.		gry. & chert
26	5B44	50	10	135	5		2	tan	52.5		gry. & chert
27	5B43	40	10	130	4		4	tan	50.	chert	chert & argillite
28	5B42	35	5	190	3		6	pink		do.-br.	everything
29	5B41	35	5	185	4		6	lav.			
30	5B40	15	5	115	5		8	pink-cls.	50.0	dolomite	ar. & some granitic
31	5B39	15	5	115	4		2	brn.	54.	argillite	argillite
32	5B38	20	10	130	5		7	brn.	53.5	argillite	argillite
33	5B69	60	15	150	4		5	pink		red chert	ch., do. br. & int. intr.
34	5B71	50	10	200	4		3	tan			ch., gry., br. & vo.
35	5B72	40	10	165	5		2	tan	55.	argillite	gry., ar. chert
36	5B73	55	10	165	4		1	tan			gry., ar. chert do.
37	5B74	55	10	190	4		4	tan		gry.	gry.
38	5B75	45	15	160	4		4	tan			gry. & dolomite
39	5B70	35	10	145	5		8	pink		metased.	metased. & volcanics
40	5B65	15	5	105	5		7	pink			ar., gry., gneiss
41	5B64	45	10	200	5		16	pink-lav.	55.		ar., gry., gneiss
42	5B66	25	35	95	21		9	pink-lav.		gry. & slate	ar., gry.

Map No.	Sample No.	Ppm Cu	Pb	Zn	Mo	Ni	Cx ml dye	color	Mag. Intensity x 1000 gauss	Bedrock	Stream Sediments
43	5B67	40	10	190	5		8	pink-lav.			chert, gry-rusty gravel
44	5B68	40	10	185	5		1	green			gry.
45	5B76	35	10	145	3		1	green		dolomite	dolomite & chert
46	5N77	30	10	100	4		1	green	55.		d.,ch., vo. & cg.
47	5B78	20	10	115	8		5	tan	56.	dolomite	all angular dolomite
48	5B79	15	5	110	7		1	green			chert & some diorite
49	38	25	25	180	0		7	brn.		no bedrock	qtz. feldspar intr.,vo. br.
50	37	25	20	95	1		2	tan	54.2	no bedrock	qtz. feldspar intr.,vo. br.
51	36	50	20	130	0		3	tan	54.0	no bedrock	chert, argillite
52	35	75	10	125	0		0			argillite	chert, argillite, volcanics
53	34	30	25	140	1		5	brn.	53.0	no bedrock	ch., sc., biotite granite
54	33	35	10	105	1		2	pale grn.	54.3	argillite	argillite, chert, schist
55	32	30	25	165	0		3	yellow	54.4	no bedrock	ch., ar., little ls.
56	31	30	80	125	1		7	light brn.	54.2	greenstone	argillite, greenstone
57	30	45	25	120	2		0		54.8	black chert	argillite, chert
58	29	15	25	55	0		4	colorless	54.8	no bedrock	ar., chert, acid intr.
59	28	5	25	40	2		5	vio.-brn.	54.2	no bedrock	ar., chert, acid intr.
60	27	5	20	30	0		0		54.0	no bedrock	argillite
61	26	25	15	100	0		0		54.3	argillite	ar.,cg., acid intr.
62	67	10	10	5	0		0			no bedrock	glacial
63	66	15	10	10	2		4	violet		no bedrock	volcanics

PYBUS AND GAMBIER BAYS (cont.)

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 1000 gauss	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
64	39	5	10	25	1		0		54.6	no bedrock	volcanics, acid intr.
65	40	5	20	30	0		0		55.0	no bedrock	glacial
66	41	5	10	?	0		4	brn.	54.2	no bedrock	vol. cg. qtz.
67	42	50	10	?	8		0		54.2	no bedrock	argillite
68	43	55	10	?	0		2	brn.	54.6	no bedrock	argillite
69	44	25	10	?	5		6	violet	54.1	vol. cg.	
70	45	10	15	25	0		4	brn.	53.9		
71	46	35	30	85	4		6	brn.	53.8		
72	47	25	10	90	2		15	vio.-brn.	53.9		gray volcanic
73							0				very short creek
74	48	40	10	290	11		8	brn.	54.9	volcanics	volcanic
75	49	25	10	90	4		7	brn.		chert	volcanics, chert
76	50	40	10	100	4		11	brn	53.5	chert	volcanics, chert
77	51	30	10	60	3		4	brn.	53.1	vol. breccia	volcanics, chert
78	52	35	10	135	3		18	vio.-brn.	54.1	schistose	on fault zone (?)
79	53	50	15	?	4		5	violet	54.5	ls. w/epidote	glacial
80	54	20	20	95	1		18	yellow	53.6	blk. marble	glacial
81	54R	35	20	?	0					altered basic dike	N6E; 33E
82	55	50	10	95	4		14	brn.	53.6	schist	qtz. schist, marble
83	56	60	10	210	7		21	vio.-gray	53.8	schist	schist, marble, diorite (?)
84	56R	20	10	25	12					graphite sc.	specimen

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 1000 gauss	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
85	57	55	10	190	10		18	vio.-brn.	54.0	qtz. mica sc.	
86	58	55	10	195	9		4	brn.	53.5	black marble	schist, marble
87	59	20	15	80	2		10	brn.		black marble	schist, marble
88	60	15	40	75	7		2	tan	53.3	schist	schist, qtz., igneous
89	61	25	10	200	6		22	vio.-brn.	53.7	schist	glacial
90	62	30	10	170	3		11	vio.-brn.		no bedrock	glacial
91	63	15	10	100	1		5	brn.	53.4	no bedrock	very short creek
92	64	45	10	240	8		7	violet	53.8	no bedrock	schist
			Water only				15	violet	53.8	no bedrock	schist
93	65	40	10	80	1		0		53.6	no bedrock	river wash
94	5B100	50	15	225	28		6	tan-cls		schist	schist
95	5B99	60	5	380	13		10	pink-tan			sc., ls. qtz. & int. intr.
96	5B98	65	10	245	10		3	tan			vol., ls. & some schist
97	5B97	55	10	340	12		5	tan		schist	vol., ls. & schist
98	5B96	15	10	135	8		4	tan		schist	schist
99	5B95	30	10	175	8		4	tan		limestone	schist & limestone
100	5B94	55	15	210	8		5	tan		green schist	schist
101	1			Missing							
102	2	30	25	135	1		0			greenstone	ls., greenstone
103	3	45	35	185	3		0			limestone	limestone
104	4	50	40	100	2		3	brn.	54.1	schistose ls.	limestone

PYBUS AND GAMBIER BAYS (cont.)

Map No.	Sample No.	Ppm Cu	Ppm Pb	Ppm Zn	Ppm Mo	Ppm Ni	Cx ml dye	Cx color	Mag. Intensity x 1000 gauss	Bedrock	Stream Sediments
105	5	45	40	185	3		0			impure ls.	limestone
106	6	45	30	125	0		0			impure ls.	limestone
107	7	45	55	400	1		2	brn.	53.0	cal. sc. & an. sill w/pyrite	
108	8	55	80	475	2		0	brn.	53.6	limestone	limestone
109	9	55	60	370	1		1	brn.	53.8	limestone	limestone
110	10	50	65	200	0		0		54.0	limestone	limestone
111	11	50	65	160	0		10	brn.	53.4	faultzone?	limestone
112	15	55	35	150	0		10	brn.	53.6	sandy ls.	limestone
113	14	70	70	125	0		7	brn.	53.9	sandy ls.	ls. w/pyrite
114	13	35	35	85	0		6	brn.	53.8	sandy ls.	limestone
115	12	45	50	180	0		11	brn.	52.0	sandy ls.	limestone
116	68	45	10	135	2					green chert	various - large stream
117	69	35	15	100	2					no bedrock	schist
118	70	45	15	125	1					no bedrock	schist
119	71	70	15	80	1					no bedrock	schist
120	72	80	35	100	1					schist	sericite schist
121	73	85	10	100	2					schist	schist, qtz., greenstone
122	74	55	25	70	1					schist	schist, limestone
123	75	50	110	90	0					schist	schist, limestone
124	76	40	15	110	2					schist	schist, limestone
125	77	40	10	25	1					schist	sc., ls., qtz. diorite

Map No.	Sample No.	Ppm Cu	Pb	Zn	Mo	Ni	Cx ml dye	color	Mag. Intensity x 1000 gauss	Bedrock	Stream Sediments
126	78	50	10	220	3					schist	sc., ls., qtz. diorite
127	79	40	10	330	2					limestone	ls.,sc., acid intr.
	79R	20	10	10	0					ls. with pyrite	
128	80	40	20	95	0					limestone	ls.,sc., acid intr.
129	25	50	10	90	3		20	violet-brn.	54.4	no bedrock	ls. breccia
130	24	10	20	110	2		0		54.7	no bedrock	ls. breccia
131	23	400	20	100	3		17	violet-brn.	54.6	do. br.	intermittent stream
132	22	320	15	105	1		17	drk. brn.	53.5	do. br.	intermittent stream
133	21	500	20	285	1		17	violet-brn.	53.5	no bedrock	intermittent stream
134	20	135	20	70	1		16	violet	55.2	schist	schist
	20R	1.7%	60	270	0					do. brec.	
135	18	35	40	45	0		6	brn.		cal. sed.	cmpure limestone
136	17	30	30	150	0		20	brn.	53.8	cal. sed.	impure limestone
137	19	35	35	120	0					schist	schist
	19AR	140	40	100	0					100' alt.dike	
	19BR	80	40	55	0					hornfels	next to dike
138	16	35	20	50	0		10	brn.	54.0	garnet schist	schist, alt. diabase (?)
	16R	35	10	100	0					alt.basic dike	
139	85	70	10	195	1					no bedrock	sc., limestone
140	84	35	10	330	4					cal. sc.	sc., ls., acid porphyry
141	83	30	10	195	1					cal. sc.	sc., ls., acid porphyry

PYBUS AND GAMBIER BAYS (cont.)

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 1000 gauss	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
142	82	35	10	120	1					cal. sc.	sc., ls., acid porphyry
143	81	30	10	105	3					schist	sc., ls., acid prophyry
144	5B86	70	15	245	7		1	green	55.		ch., ls., sc. & lite intr.
145	5B87	35	10	160	5		8	tan		glacial clay	ch., br., ls. sc.
146	5B88	45	10	220	7		4	tan		glacial clay	ch.,gry., ls. sc.
147	5B89	30	5	115	7		2	tan		glacial clay	complete mix
148	5B90	30	10	205	8		1	green		chert	ch., ls., vol. sc.
149	5B91	90	25	320	10		18	pink			do., br., ls., lite intr.
150	5B93	110	+5	800	16		1	tan			schist & qtz.
151	5B92	90	20	365	8		1	green		sc./pyrite	gray sc., ls., g. & qtz.intr.
152	5B85	65	80	1000	7		5	tan	55.	breccia	breccia
	54R1										
153	5B84	80	85	750	7		15	orange-lav.	55.	breccia	breccia
154	5B83	240	105	1000	7		10	pink w/brn. ppt	54.	vol. & ls.	vol., ls. & d.
155	5B82	50	15	245	5		1	green			volcanics
156	5B81	20	10	120	5		5	tan	55.	argil.& gry.	argillite & gry.
157	5B80	10	5	95	5		3	tan		argil.& gry.	argillite & gry.

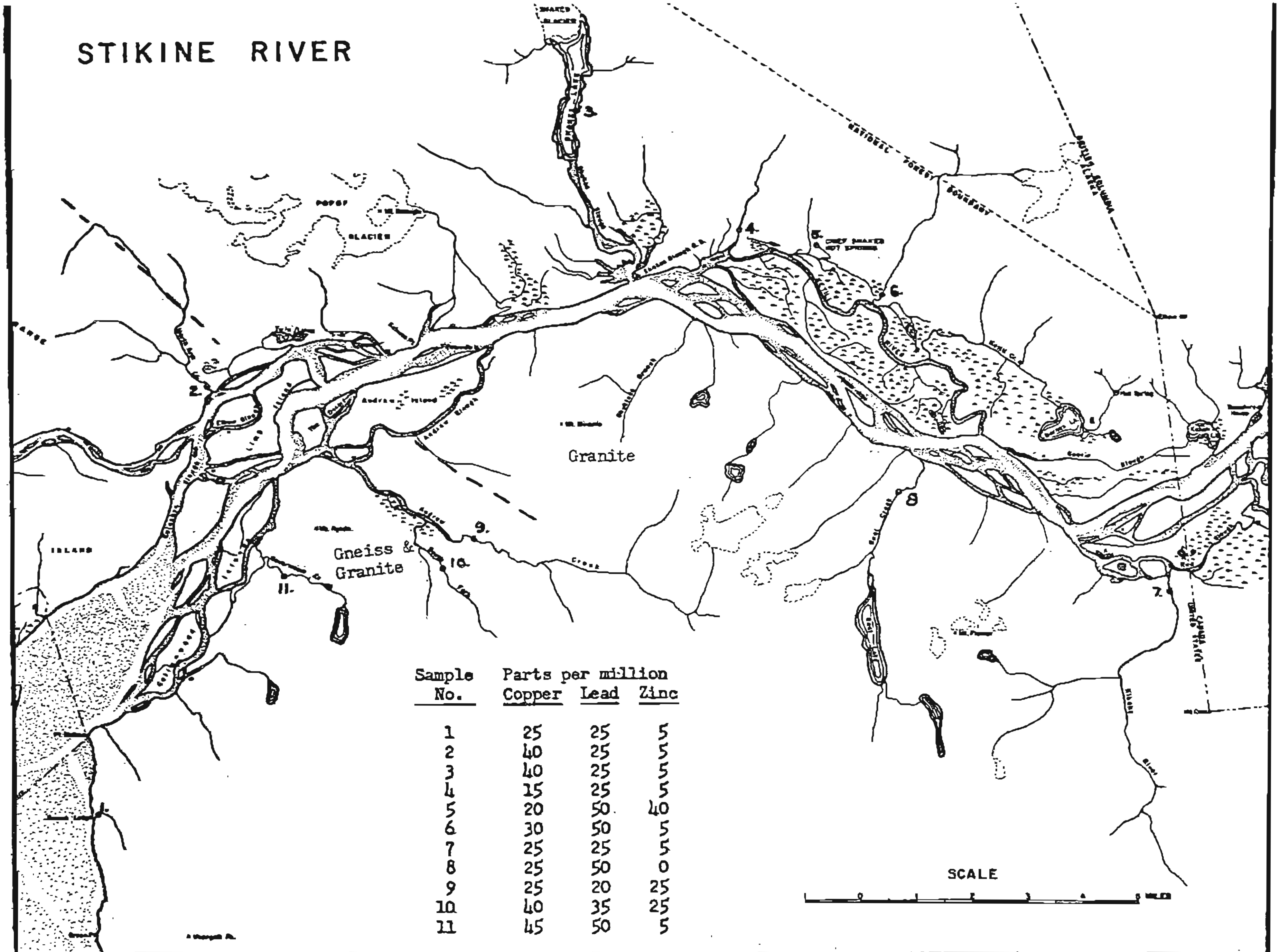
STIKINE RIVER

Eleven stream sediment samples were taken on June 18 and 19, 1964 between the Canadian border and the mouth of the Stikine River, northeast of Wrangell. The area covered includes part of the Coast Range batholith and the bordering metamorphic rocks on its west side.

There are no known prospects in this area although the garnetiferous schist near Garnet Ledge has been investigated as a possible source of industrial garnets.

None of the stream sediment samples showed what is considered an anomalously high metal content.

STIKINE RIVER



Sample No.	Parts per million Copper	Lead	Zinc
1	25	25	5
2	40	25	5
3	40	25	5
4	15	25	5
5	20	50	40
6	30	50	5
7	25	25	5
8	25	50	0
9	25	20	25
10	40	35	25
11	45	50	5

RATZ HARBOR - COFFMAN COVE

Ratz Harbor and Coffman Cove are located on the east side of Prince of Wales Island. Ratz Harbor is approximately 50 miles northwest of Ketchikan, and Coffman Cove is north of Ratz Harbor.

Keil and Peterman Corporation have constructed about thirty miles of logging road in the area for the Ketchikan Pulp Company. The logging road in that area has exposed bedrock in many places at Ratz Harbor, but in only a few places at Coffman Cove. Snow above the 500 foot level limited the sampling program at Ratz Harbor. Field work there was done in 1964 and at Coffman Cove in 1965.

Geology

The geology of Prince of Wales Island, and in particular the Kasaan Peninsula, has been described in the following U.S. Geological Survey Bulletins: Bulletin 347, "The Ketchikan and Wrangell Mining Districts, Alaska"; Bulletin 800, "Geology and Mineral Deposits of Southeastern Alaska"; Bulletin 1058-H, "Geology of Part of the Craig C-2 Quadrangle and Adjoining Areas, Prince of Wales Island, Southeast Alaska"; Bulletin 1090, "Iron and Copper Deposits of Kasaan Peninsula, Prince of Wales Island, Southeastern Alaska"; and Bulletin 1108-B, "Geology of the Craig Quadrangle, Alaska".

Bulletin 1108-B shows the inland area of Ratz Harbor to be diorite, while the points on either side of the Harbor entrance are mapped as graywacke, slate, and andesitic volcanic rocks. The area to the west of the diorite is mapped as undifferentiated intrusive rocks, determined by photo interpretation. The undifferentiated intrusive rocks may include complexes of the metamorphic rocks. The diorite was found to continue northward to Coffman Cove. The graywacke, andesites, and volcanics border the intrusives along the east shore.

Mineralization in the area is predominantly pyrite. However, magnetite was found in a gabbro between Little Ratz and Ratz Harbors, and in andesite north of Luck Lake which is south of Coffman Cove. A sample of granodiorite east of Big Lake assayed 0.03 percent copper.

Magnetometer readings taken at sample points were uniformly between 10,000 and 15,000 gammas except for the reading taken below the outlet of Luck Lake, where a reading of 5,000 gammas was noted, and near site 21 where 11,000 gammas was noted. These may reflect the boundary of the intrusive.

Mineral Deposits

The only reported deposit in the area is the old McCullough prospect which is at an altitude of about 100' and about a mile west of Gold and Gallion Lagoon, a salt chuck connecting Barnes and Sweetwater Lakes. This prospect is described in U.S. Geological Survey Bulletins 642-B and 963-A. A report by J.C. Rhoehm, former Territorial Mining Engineer of the Territorial Department of Mines is available for copy from the Division of Mines and Minerals Office, Box 1391, Juneau, Alaska, 99801.

The deposit is a quartz-breccia vein containing pyrite and chalcopyrite. The vein is approximately vertical and has been explored by a shaft 61 feet deep and by several open cuts. The vein is about 10 feet wide, and outcrops over a distance of 350 feet.

Samples taken by Roehm and the Survey indicate 0.7 to 3.3 percent copper. The property at the time this report was written was unclaimed.

Geochemical Investigation

Twenty-two stream sediment samples were taken adjacent to logging roads at Coffman Cove in the vicinity of Luck Lake and at the head of Sweetwater Lake. At Ratz Harber, 35 field tests were made, ten of which were bagged for laboratory analysis.

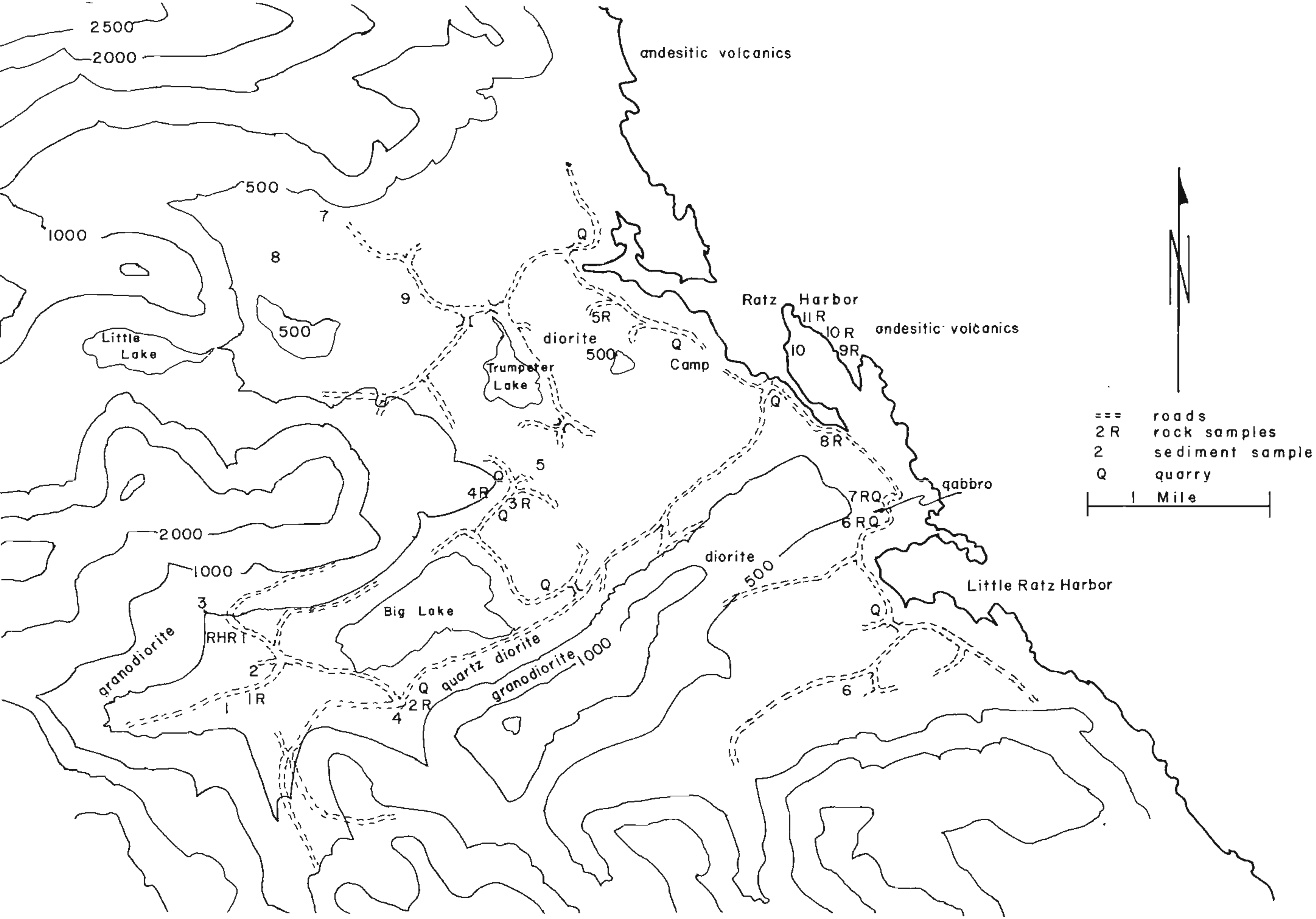
In the Coffman Cove area, there are copper anomalies at map locations 4, 11, and 14. The most interesting of these is sample 14 (190 ppm of copper), which is included in a mile-long portion of a dioritic intrusion that carries higher than average amounts of copper from map location 13 to map location 14. The somewhat higher than average amounts of zinc and molybdenum at map location 22 are worth mention because the sample was taken from a 50 foot wide stream that drains a large area on the western margin of an intrusive mass.

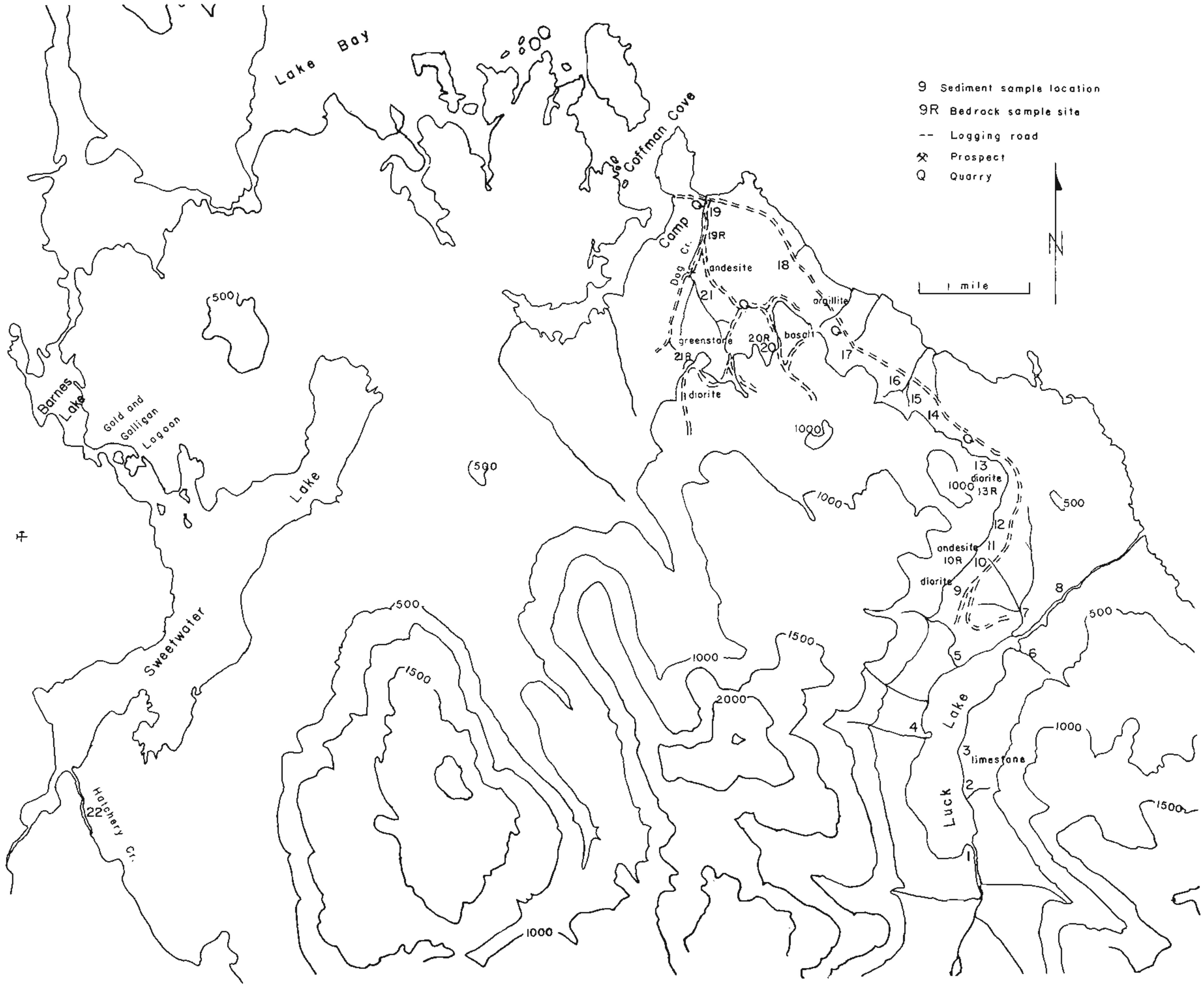
In Ratz Harbor, sample 4 is anomalous in copper and possibly in zinc, since 180 ppm of zinc is rather high for a stream that drains an area underlain by igneous rocks. The stream at map location 4 drains a fairly large area.

Map No.	Sample No.	Ppm					Cx		Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
		Cu	Pb	Zn	Mo	Ni	ml dye	color			
1	18	80	15	200	3		none			none	glacial mix
2	17	110	10	100	4		none			limestone	ls. & metased.
3	16	100	10	105	3		none			limestone	ls. & intr.
4	21	155	10	105	4		2	tan-grn.	2.0	none	metased.
5	22	125	20	125	3		2	" "	2.2	none	volcanics
6	15	100	10	95	4		none			none	metased. & intr.
7	14	20	5	30	2		4	pale violet		none	metased. & intr.
8	20	80	15	35	4		2	tan-grn.	1.0	none	metased. & intr.
9	1	65	5	80	3		1	colorless	2.6	diorite	90% intr.
10	2	80	5	105	3		1	"	2.5	an./sulf.	60% intr.
11	3	165	10	100	3		2	tan-grn.	2.5	none	gry. & intr.
12	4	80	10	90	4		2	" "	2.4	none	" " "
13	5	135	5	110	4		2	colorless	2.5	diorite	" cg. & intr.
14	6	190	10	115	5		4	tan	2.7	diorite	90% diorite
15	7	110	10	115	4		2	tan	2.3	basalt & d.	basalt & diorite
16	8	105	10	135	4		2	tan	2.3	" " "	basalt & diorite
17	9	90	15	135	4		2	tan	2.3	" " "	basalt & diorite
18	10	45	10	170	4		5	tan	2.5	argillite	argillite
19	11	65	5	95	3		4	tan	2.5	an.w/sulfide	argillite & an.
20	12	30	15	140	4		2	tan-pink	2.8	basalt	basalt
21	13	95	15	95	3		4	ten	2.3	d. w/sulf.	d. & ls. (mag. 1.0 nearby)
22	19	85	10	150	7		none			none	argillite & volcanics

RATZ HARBOR

Map No.	Sample No.	Ppm Cu	Ppm Pb	Ppm Zn	Ppm Mo	Ppm Ni	Cx ml dye	Cx color	Mag. Intensity x 5000 gammas	Bedrock	Stream Sediments
1	RHS1	40	10	40						lite intr.	mostly intr.
2	RHS2	70	5	160						lite intr.	mostly intr., some metased.
3	RHS3	40	20	40						sheared intr.	lite intr.w/qtz.& pyrite (rusty)
4	RHS4	180	5	180						lite ig.w/dykes	mostly lite-int. intr.
5	RHS5	30	25	55							grnstn., lite-int. intr.
7	RHS7	20	<2	90							metased. & lite intr.
8	RHS8	140	55	65							metased. & lite intr.
9	RHS9	50	2	60							mostly intr. (rusty)
10	RHS10	10	30	85						volcanics	volcanics


andesitic volcanics
Ratz Harbor
andesitic volcanics
Little Lake
Trumpeter Lake
diorite
Camp
Big Lake
granodiorite
RHR1
quartz diorite
granodiorite
diorite
gabbro
Little Ratz Harbor
=== roads
2R rock samples
2 sediment samples
Q quarry
1 Mile


Lake Bay
Coffman Cove
Camp
Dog Cr.
Barnes Lake
Gold and Galligan Lagoon
Sweetwater Lake
Hatchery Cr.
Luck Lake
andesite
greenstone
diorite
basalt
argillite
limestone
9 Sediment sample location
9R Bedrock sample site
-- Logging road
Prospect
Q Quarry
1 mile
N

KINA COVE

Kina Cove is located approximately 5 miles ENE of Hollis. There are about six miles of logging roads south of the head of the bay. The area was logged about four years ago and has since grown to brush and young trees.

No reported prospects or mines exist in the vicinity of the road system.

Geology

The geology of Kina Cove is indicated by U.S. Geological Survey Bulletin 1108-B to have been compiled from Bulletin 800 and "by photo-geologic methods only". Bulletin 800, Plate I, shows the geology as consisting of Devonian sediments and lavas.

Bulletin 1058, "Geology of Part of the Craig C-2 Quadrangle and Adjoining Areas, Prince of Wales Island, Southeastern Alaska, Plate 33", shows part of Kina Cove as Silurian volcanic graywacke, conglomeratic volcanic graywacke, tuff, agglomerate, limy-matrix conglomerate, and lava flows too small to show on the map. This bulletin also shows the creek flowing through a unit of slate, slaty argillite, and minor fine conglomerate and graywacke, also of Silurian age.

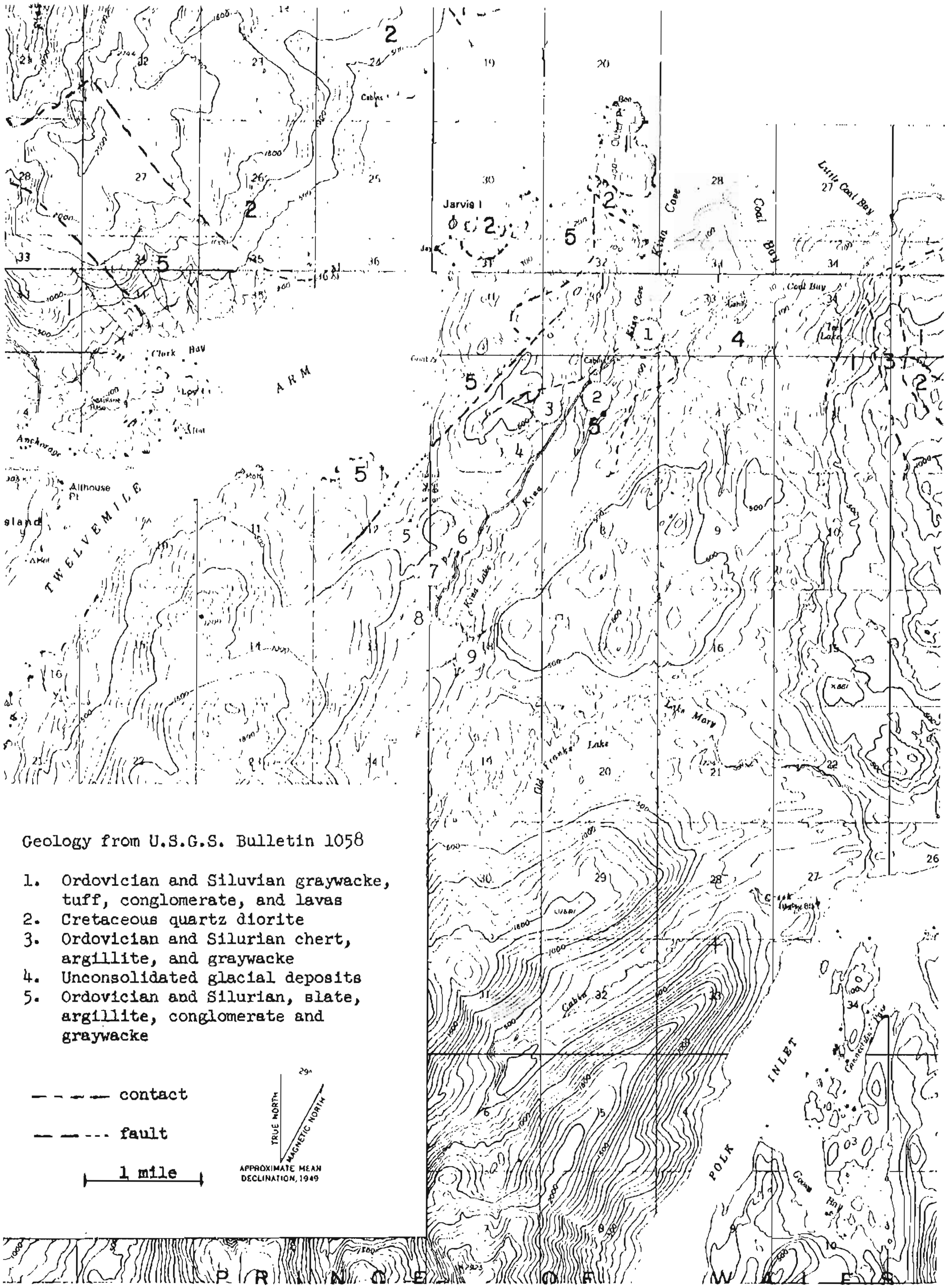
The field work confirmed that the slaty argillite includes graywacke and limestone near the beach and extends to the south end of the lake where it becomes quite schistose and contains a higher percentage of sulphides. The slaty argillite on the hill to the west of the lake shows evidence of crumbling and appears to be more graphitic than similar slaty argillite near the mouth of Kina Creek.

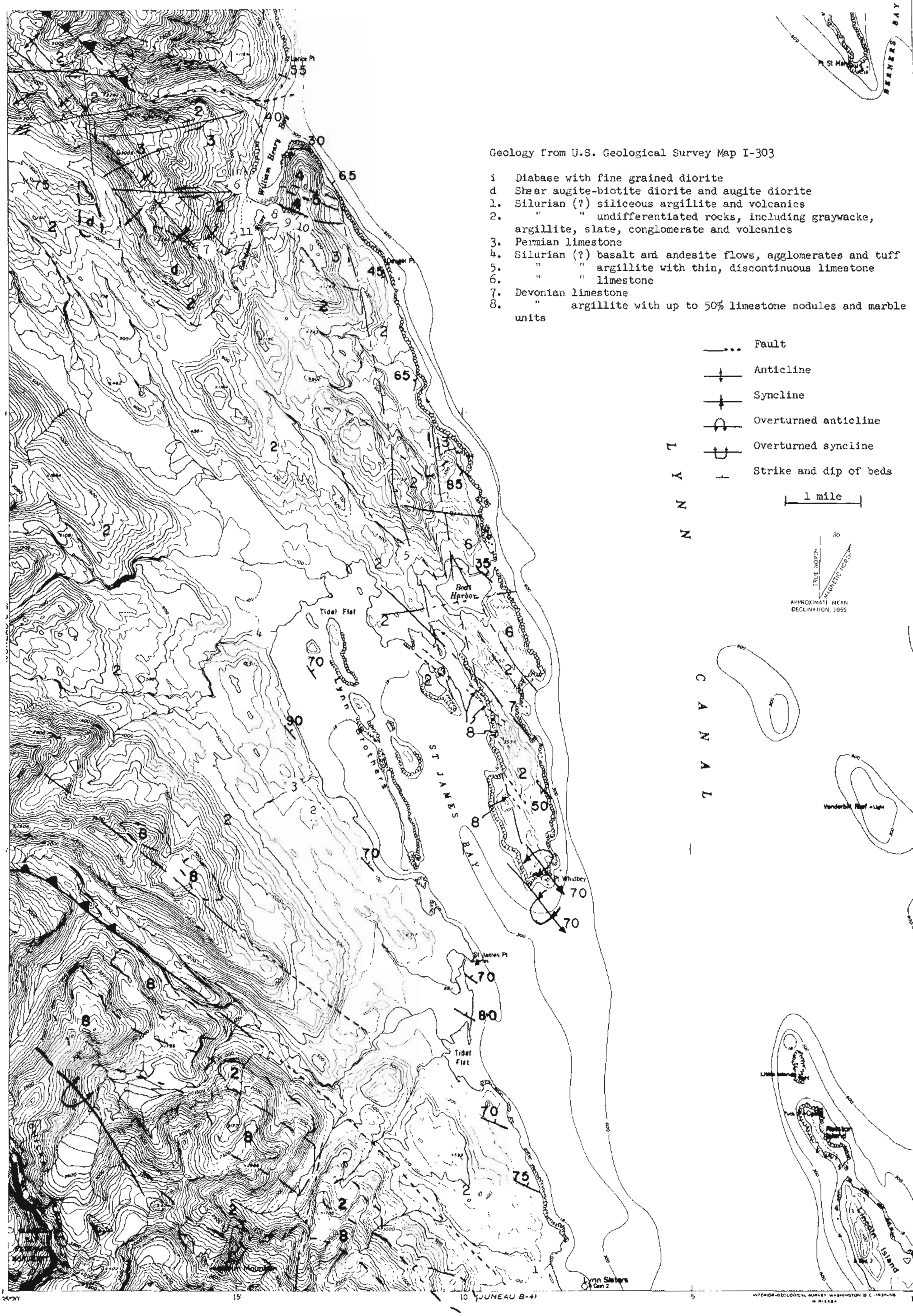
Geochemical Investigation

Nine stream sediment samples were taken along the logging roads. These showed that the high zinc content in the Hollis area to the west persists into Kina Cove. The high copper-zinc anomaly found at map location 4 is interesting as is the molybdenum anomaly at map location 8, which is apparently near an area with an unusually large amount of quartz.

KINA COVE
July 1964

Map No.	Sample No.	Ppm Cu	Pb	Zn	Mo	Ml dye Cx	Color Reaction	Mag reading x 1000	Bedrock	Stream Sediments
1	6	5	5	125	4	+20	brn		No bedrock	glacial mix
2	7	50	5	110	4	15	brn		argillite & limestone	glacial mix
3	8	65	5	175	1	15	brn		graywacke & schist	schist
4	9	225	25	400	4	+20	brn		argillite	argillite
5	5	25	5	40	4	10	purple-brn		argillite	beach gravel
6	4	35	5	120	0	+20	brn		argillite	argillite w/much qtz.
6R		tr	tr	tr	0		tr Ni, No Ag		argillite	argillite w/much qtz & pyrite
7	3	45	10	115	5	15	brn		graywacke schist & limestone	graywacke with much quartz
8	2	20	5	140	20	15	brn		schistose graywacke	mostly schist
9	1	35	5	90	1	+20	brn		no bedrock	graywacke, schist & diorite
9R		tr	0	tr	0		tr Ni		schistose metasediment w/pyrite	


Jarvis I
Kina Cove
Coal Bay
Little Coal Bay
Clark Bay
ARM
Allhouse Pt
TWELVEMILE
Kina Lake
Lake Mary
Old Franks Lake
POLK INLET
Coon Bay
P R I N C E O F W A L E S
Geology from U.S.G.S. Bulletin 1058
1. Ordovician and Siluvian graywacke, tuff, conglomerate, and lavas
2. Cretaceous quartz diorite
3. Ordovician and Silurian chert, argillite, and graywacke
4. Unconsolidated glacial deposits
5. Ordovician and Silurian, slate, argillite, conglomerate and graywacke
contact
fault
1 mile
TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1949


Geology from U.S. Geological Survey Map I-303
i Diabase with fine grained diorite
d Shear augite-biotite diorite and augite diorite
1. Silurian (?) siliceous argillite and volcanics
2. " " undifferentiated rocks, including graywacke, argillite, slate, conglomerate and volcanics
3. Permian limestone
4. Silurian (?) basalt and andesite flows, agglomerates and tuff
5. " " argillite with thin, discontinuous limestone
6. " " limestone
7. Devonian limestone
8. " argillite with up to 50% limestone nodules and marble units
Fault
Anticline
Syncline
Overturned anticline
Overturned syncline
Strike and dip of beds
1 mile
TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1955
LYNN CANAL
ST JAMES BAY
BERNERS BAY
Lynn Brothers
Tidal Flat
Boat Harbor
Pt Whidbey
St James Pt
Lynn Sisters
Lincoln Island
Vanderbilt Reef
William Henry Bay
Lance Pt
(JUNEAU B-4)
(JUNEAU C-3)
135°00'