STATE OF ALASKA

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GEOCHEMICAL REPORT NO. 8

Geochemical and Geological Investigations of Admiralty Island, Alaska

By
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GEOCHEMICAL AND GEOLOGICAL INVESTIGATIONS OF ADMIRALTY ISLAND, ALASKA

by W. H. Race and A. W. Rose

INTRODUCTION

The geochemical investigation of Admiralty Island was initiated in 1964 when Gambier Bay was sampled and the results reported by Herbert and Race (1964). In 1965 Pybus Bay was sampled and a chapter incorporating the results of both of these investigations was published during 1966 as part of Division of Mines and Minerals Geochemical Report No. 6. Most of the 1966 field season was spent in completing a reconnaissance sampling of Admiralty Island by William H. Race, State Mining Engineer, assisted at times by Charles F. Herbert and Steven M. Lowell. The results of a detailed geologic mapping and stream sediment sampling project in the Hasselborg Lake area during 1966 by Arthur W. Rose, State Mining Geologist, assisted by Leo Kerin is included. Also included is a copy of U. S. Geological Survey Map I-323, which portrays the geology of the island.

The geological and geochemical information of Admiralty Island presented in this report, while largely reconnaissance in nature, is in sufficient detail to bring attention to more than 12 areas in which further prospecting is warranted.

Admiralty Island is approximately 100 miles long and up to 30 miles wide. It is approximately 20 miles southeast of Juneau at its closest point. The village of Angoon on the west coast is the only community on the Island, although a few people live at fishing centers, logging camps, and at the Hawk Inlet Cannery during the salmon fishing season.

The earliest reported mineral discovery was during 1868 when a sample of coal from Mitchell Bay was given to the U.S. Navy Department at Sitka (U.S. Geological Survey Annual Report No. 17, 1896). The first reported gold discovery was at Funter Bay during 1887 (U.S.G.S. Bulletin 287, 1906). The gold at Hawk Inlet was apparently not found until 1919 (U.S.G.S. Bulletin 783, 1926).

The coal beds at Mitchell Bay and Murder Cove were developed on a small scale, but found unsuitable for use by the Navy. Gold mining continued sporadically until 1951. In more recent years the copper-nickel deposit at Funter Bay has been explored under a Federal DMEA loan, and mapped by various individuals and the U.S. Geological Survey. The U.S. Bureau of Mines has sampled the deposit (USBM Report of Investigation 3950). Assays indicate values of 0.5 - 1.0% copper and similar values in nickel.

Prospecting has been carried on intermittently through the years at various other locations, the most recent being in the Seymour Canal area by Mr. Stan Price. Mining claims are being held at Funter Bay, Hawk Inlet, and Seymour Canal.

GENERAL GEOLOGY AND MINERAL DEPOSITS OF ADMIRALTY ISLAND

The information summarized below and shown on figures 2-5 is based mainly on recent U.S. Geological Survey reports resulting from a reconnaissance mapping program (Bulletin 1181-R, Bulletin 1178, and Map I-323). New data from detailed field studies in the Hasselborg Lake area is shown in figure 3. Because of minor differences in terminology between the various reports, table 1 was prepared to show the correlations between units on the various maps.

The Paleozoic and Mesozoic rocks are principally marine sediments and volcanics that were deposited in a eugeosynclinal environment. The oldest rocks, of Silurian(?), Devonian, and Devonian(?) age, are graywacke, volcanics, limestone, chert, and argillite, that in many areas have been metamorphosed to schist and marble. Permian graywacke, slate, phyllite, and dolomite are overlain by Triassic volcanics, slate, limestone, chert, and conglomerate, and these in turn by Jurassic-Cretaceous slate, graywacke, conglomerate, and volcanics. Folding, faulting, and metamorphism in Cretaceous time were accompanied by intrusions of stocks and batholiths of ultramafic, mafic, intermediate, and felsic plutonic rocks. Wide zones of metamorphism border the largest pluton in the Thayer Lake area and are also found elsewhere on the island. During Tertiary time, nonmarine sediments were deposited locally, and a thick sequence of middle Tertiary basalts occupies the southern end of the island.

The gross structure of Admiralty Island parallels the northwesterly regional trend of the Coast Range. A northwest-trending anticlinorium is present along the west side of the island, and a synclinorium occurs along the east side (Bulletin 1181-R, p. 37-38). The Devonian and older rocks are exposed along the anticlinorium and the Jurassic-Cretaceous rocks occupy the synclinorium. Numerous northwest-trending faults parallel the folds and are probably related in age and genesis to the folding.

Several zones of the northeast-trending folds and faults cut across the regional structure. At the south end of the island, Jurassic-Cretaceous rocks extend westward along the coast, apparently along a large cross-fold or cross-warp. In the Gambier Bay area, east to northeast-trending folds are associated with the Gambier fault of similar trend. Northeast-trending faults are common as far north as Thayer Lake. A small northeast fault cuts across the Mansfield Peninsula at the north end of the island.

The geochemical data draw particular attention to the Triassic Hyd formation (unit 5 on map I-323) and the Devonian(?) Hood Bay formation (unit 4). The Hyd formation, in the Pybus Bay area, consists of chert breccia, limestone, and argillite, but north of Gambier Bay, the lower chert breccia and limestone units are not present. In the northern two thirds of the island, the Hyd formation consists of a thin discontinuous bed of slate overlain by increasing thicknesses of volcanics, which in part are spilitic pillow lavas.

A small chalcopyrite-pyrite-quartz vein is reported in the Hyd formation a few miles north of Windfall Harbor, and several copper occurrences occur in or near the Hyd formation in the Windfall Harbor area (Lathram et al, 1960, samples 10 and 11). Copper-nickel minerals are reported in the Hyd formation on the north shore of Gambier Bay (Herbert and Race, 1964).

The Hood Bay formation is characterized by black argillite, thin-bedded chert, and minor limestone. Much carbonaceous material and fine pyrite are present. Loney (1964) suggests that the Hood Bay formation interfingers northward and eastward with metavolcanic rocks of the Gambier Bay formation. Both formations with which geochemical anomalies are associated thus seem to be contemporaneous with nearby volcanism.

It seems possible that there is a relation between mineralization and volcanism, partly analogous to that suggested by Goodwin (1965) for parts of the Canadian Shield.

Table 1

Summary of Stratigraphy, Admiralty Island
(After U.S.G.S. Bulletin 1181-R and Map I-323)

Map I-323 Unit No.	Age	Formation	Lithology
8	Eocene and Oligocene	Admiralty Island volcanics	Basalt
7	Paleocene to Miocene	Kootznahoo formation	Sandstone, siltstone, shale, conglomerate and coal
6a	U. Jurassic to L. Cretaceous	Douglas Island volcanics	Augite porphyry flow breccia
6	U. Jurassic to L. Cretaceous	Seymour Canal formation	Slate and graywacke
6b	U. Jurassic to L. Cretaceous	Seymour Canal formation	Conglomerate
5	U. Triassic	Hyd formation	Mafic and intermediate volcanics, limestone, chert, slate, conglomerate
4 (N of Gambier Bay)	Permian and Triassic(?)	Undifferentiated sediments and volcanics	Andesite, argillite, chert, graywacke
3	Permian	Pybus dolomite	Dolomite, chert
3a 3b	L. Permian	Cannery formation	Calcareous graywacke, slate, phyllite, conglomerate
2	L. Permian	Cannery formation	Phyllite, schist, marble, chert
4 (Hood Bay)	Devonian(?)	Hood Bay formation	Argillite, chert
1a 1b	Devonian, Devonian(?) & Silurian(?)	Gambier Bay fm. and Retreat group	Marble and serpentinized dolomite
1	Devonian, Devonian(?) & Silurian(?)	Gambier Bay fm. and Retreat group	Schist
10	Paleozoic and Mesozoic	?	Migmatite and gneiss
9	Paleozoic and Mesozoic	?	Undifferentiated metamorphic rocks

At Funter Bay, copper-nickel mineralization is associated with a gabbro plug. Mafic and ultramafic intrusives are scattered along the length of the island, and the anomalous nickel content of stream sediments in the Hawk Inlet area suggests that a mafic intrusive may be present in this vicinity. A copper-nickel occurrence in a gabbro dike on the south shore of Hasselborg Lake probably belongs to this group (see the following section of this report).

A number of small mines and prospects have been opened along a belt of gold-quartz veins in schists of the Retreat group between Funter Bay and Hawk Inlet, with a possible extension to a prospect several miles south of Young Bay. These veins are associated with soda-rich dikes similar to intrusives accompanying gold veins on Douglas Island opposite Juneau. Minor amounts of base metal sulfides are also present in these veins. A similar occurrence is reported near the west end of Lake Florence.

Two copper prospects are mentioned in old U.S. Geological Survey reports (Bulletin 287, p. 151) west and north of Gambier Bay in the marble unit of the Gambier Bay formation. At the Brown prospect, between the two arms of Gambier Bay, pyrite and chalcopyrite occur in brecciated limestone. North of the Bay, the copper and gold are reported to occur in ledges.

REFERENCE

Goodwin, A.M., 1965, Mineralized volcanic complexes in the Porcupine-Kirkland Lake-Noranda region, Canada: Econ. Geol. v. 60, p. 955-971.

GEOLOGY OF THE HASSELBORG LAKE AREA

ABSTRACT

The Hasselborg Lake area consists of about 65 square miles between Hasselborg and Thayer Lakes in the central part of Admiralty Island. The Thayer Lake pluton, composed largely of foliated granodiorite, underlies the western part of the map area. The pluton has a mafic border zone and is surrounded by a zone several miles wide of highly sheared amphibolite, schist, and marble. These strongly metamorphosed rocks are in a fault contact on the east with a north-trending belt of lower-grade meta-sedimentary and metavolcanic rocks, at least some of which belong to the Permian Cannery formation. A system of northeast-trending faults offsets the contact of the pluton by distances up to a mile.

Two copper prospects at the south end of Hasselborg Lake and an area of gossans northwest of the Lake are suggested for further prospecting.

INTRODUCTION

As a result of reconnaissance mapping of Admiralty Island by the U.S. Geological Survey, Berg (1960) and Lathram et al (1965) pointed out that the area of metamorphic rocks west and northwest of Hasselborg Lake contains "numerous outcrops of orange, dark red, and dark brown gossan" with local concentrations of oxide and sulfide minerals. The present project was undertaken to further evaluate the mineral potential of the area, and consisted of geologic mapping and stream sediment geochemistry. The geochemistry of the stream sediments is discussed in another part of this report. Field work by boat and foot traverse was done during the period June 2 to June 20, 1966. The larger lakes are readily accessible by float plane from Juneau. Thayer Lake Lodge is open during the summer months, and cabins are maintained by the Forest Service for public use on Hasselborg and Distin Lakes.

On the bare slopes above about 2,500 feet, outcrops are excellent but were partly covered by snow at the time of the field work. Talus slopes below cliff and the lower flat areas are covered by thick brush and have few outcrops except along streams. Heavily-timbered areas are not difficult to traverse, but outcrops are sparse.

REGIONAL GEOLOGY

See the earlier part of this report for a discussion of the regional geology of Admiralty Island.

According to the reconnaissance map of Lathram et al (1965), the Hasselborg Lake map area includes the eastern portion of the Thayer Lake granitic pluton, a central belt of undifferentiated metamorphic rocks, and an eastern belt of Permian Cannery Formation. No major differences from this general picture have been found in the more detailed mapping of this project.

GEOLOGIC MAP UNITS

Although distinctive lithologies, such as marble, chert, and calcareous phyllite, are present in the map area, attempts to trace these units from one outcrop to another were generally unsuccessful. The degree of deformation also varied widely from one outcrop to the next. This lack of continuity indicates that the rocks are probably folded and faulted in a much more complex manner than is shown on the map. Hence, the units discussed below have been selected to group rocks that seem associated; they cannot be considered a stratigraphic succession, and most of the contacts are inferred.

Calcareous phyllite and volcanics (cp)

A belt along the west side of Hasselborg Lake is characterized by calcareous phyllite or argillite, accompanied by relatively unfoliated basalt, andesite, diabase, and dacite, and some green and gray schist. Much of the phyllite weathers an orange-brown color, apparently from decomposition of iron-bearing carbonates, although considerable pyrite is also present in many specimens. Thin sections disclose a finely laminated texture in much of the phyllite, and a suggestion of small nodules or oolites of carbonate in a siliceous matrix, now considerably smeared out by metamorphism. The rock thus has some aspects of chert or iron formation, but does not reach these extremes in composition. Most of the phyllites and volcanics are strongly fractured.

Rocks of the calcareous phyllite unit are shown extending north of Sikady Lake, but it is not certain that these are part of the same unit. Descriptions by Lathram et al (1965) suggest that the calcareous phyllite units may correlate with either the Devonian Gambier Bay formation or the Permian Cannery formation.

Amphibolite, banded schist, and marble (a)

The high mountains north of McKinney Lake are composed of amphibolite, marble, gneissic banded schist, and other schists. In addition to the higher grade of metamorphism and deformation, this group is distinguished from the calcareous phyllite unit by the presence of discrete marble beds up to about 50 feet thick, and by a lack of impure marbles corresponding to the calcareous phyllites. The mineral assemblage hornblende-plagioclase-magnetite is the most common association, but biotite, muscovite, and epidote also occur in the schists, and tremolite and diopside in some marbles. The banded schist is most common near the intrusive contact, and appears to have originated by strong deformation, perhaps almost to mylonite, followed by recrystallization. The amphibolites show less banding but may have originated similarly.

The boundary between the amphibolite unit (a) and the "contact zone" unit (cz) is not sharp, but is drawn where appreciable amounts of igneous-appearing rocks were noted.

The composition of the amphibolite unit suggests a correlation with the Gambier Bay formation.

Chert, siliceous schist, and dark phyllite (c)

An area near the south end of Hasselborg Lake is characterized by the presence of chert along with siliceous schist, dark gray phyllite, and gray-green schist, plus minor amounts of marble and volcanic rock. The chert is typically white to light gray and composed of relatively pure silica. It occurs in beds up to 20 feet thick. The dark phyllite is very similar to parts of the Cannery formation, and the two units seem gradational. The contact is drawn on the basis of the chert.

Light gray to white chert in thick beds does not appear to be common in the Cannery formation, although Lathram et al (1960) indicate it is present in the Windfall Harbor area (unit 3a). The characteristics of the unit thus suggest a correlation with the Cannery formation.

Cannery formation (Pc)

Thin-bedded to banded slate, siltstone, graywacke, and phyllite along the east shore of Hasselborg Lake have been assigned to the Cannery formation by Lathram et al (1965). The finest grained material is generally dark gray to black, with lighter colors in the graywacke. The beds are from a half inch to a foot in thickness and in some cases are clearly graded in grain size. The Cannery formation appears distinctly less metamorphosed than the rocks discussed above.

Quartz monzonite (qm)

A lens of leucocratic quartz monzonite occurs in schist west of the northern end of Hasselborg Lake. The lens generally conforms to the foliation of the enclosing schists. Weak iron-staining and alteration are characteristic of the quartz monzonite. A thin section shows a composition of about 40% albite, 30% microcline, 30% quartz, and a few percent biotite and its alteration products. The grain size averages about 5 mm, but in thin section considerable granulation and recrystallization is evident, giving the rock a weakly foliated appearance.

Thayer Lake pluton

Contact zone (cz)

A zone 1/4 to 3/4 mile wide along the contact of the Thayer Lake pluton is composed of coarse-grained to pegmatitic hornblende gabbro, hornblende-augite gabbro, hornblendite, mafic gneiss, and hornblende diorite, plus variable amounts of amphibolite. Some rocks in the contact zone are well-foliated, but most of the gabbro and much of the hornblendite is unfoliated. Abundant inclusions and schlieren of amphibolite are present in the foliated rocks. The gneisses may have been generated by contamination of relatively felsic magma. The coarse unfoliated gabbro and hornblendite appear to be late magmatic or metasomatic products and in at least a few cases occur as dikes cutting across the foliation.

Up to 5% pyrite and magnetite occur as disseminated grains in some gabbro and hornblendite.

Foliated quartz diorite and granodiorite (fg)

Well-foliated hornblende-biotite quartz diorite and granodiorite form a zone about a mile wide north of McKinney Lake and are also exposed adjacent to the west and south arms of Thayer Lake. The composition of these rocks is typically 5-15% hornblende plus biotite, 7-20% quartz, 60-75% andesine, and 0-15% orthoclase. Accessories include magnetite, apatite, sphene, zircon, and allanite. The granodiorite north of Thayer Lake Lodge is more leucocratic and contains oligoclase rather than andesine.

In thin section, some specimens show evidence of cataclasis with subsequent recrystallization.

Unfoliated granodiorite (ug)

The high area north of Distin Lake is formed of unfoliated hornblende-biotite granodiorite, more leucocratic than the rocks nearer the contact. The granitic pluton thus becomes more mafic-rich, foliated, and finer-grained as the contact is approached. Near the border of the pluton, contacts between rock types differing in composition were noted, but the foliation seems to disappear gradually.

Gabbro

Medium-grained gabbro dikes cut the Cannery formation and the chert unit at the south end of Hasselborg Lake. The best exposures of this rock type are on the northernmost of the two islands at the south end of the lake. Abundant float of gabbro also occurs in the stream draining Beaver Lake. A thin section of this material shows about 40% sodic plagioclase and nearly 60% actinolite pseudomorphous after pyroxene. The gabbro is probably related to the mafic stocks mapped by Lathram et al (1965) at Mole Harbor and south of Lake Alexander. A few outcrops of "diabase" in the calcareous phyllite unit may belong with the gabbro.

STRUCTURAL GEOLOGY

West of Hasselborg Lake, the prevailing strike of foliation is about N20W with a dip of 20 to 40 degrees southwestward. The contact of the Thayer Lake pluton is conformable with the foliation and dips inward at a rather shallow angle. The concordance of the contact with foliation in the pluton and in the country rock, in combination with the higher grade of metamorphism near the pluton, indicates that the intrusion was synkinematic. However, the unfoliated gabbro and hornblendite in the contact zone indicates that the intrusion must have occurred near the end of the period of metamorphism and deformation.

Two main fault systems were observed in the area, and correspond to those recognized by Lathram et al (1965). The north-northwest trending group includes a fault along Hasselborg Lake separating east-striking Cannery formation from the calcareous phyllite, and a subparallel fault through Coo Lake separating rocks of distinctly different lithology and metamorphic grade.

The northeast-trending group of faults is drawn on the basis of offsets of the contact of the Thayer Lake pluton and prominent topographic lineaments. Movement along the faults through Guerin Lake, McKinney Lake, and Thayer Lake was all south-side-down. One fault of this group, in the scarp west of Coo Lake, was seen in outcrop. According to Lathram et al (1965), the northeast-trending faults are Tertiary in age and should offset the northwesterly faults, but no evidence for this could be seen in the map area, and it seems possible that a recent period of movement on both offsets has been partly responsible for the present topography.

ECONOMIC GEOLOGY

Locality 1

(Ebba prospect, south end of Hasselborg Lake)

Float on the shore of Hasselborg Lake at this point consists of highly chloritized gabbro partially replaced by pyrrhotite, chalcopyrite, and possibly other sulfides. The discovery of the Ebba #4 claim, staked in 1959 by Dean Goodwin, is at this spot. The gabbro float may have been dug from a small pit at the discovery, but no exposure was visible when the prospect was visited. An assay of the mineralized gabbro showed 0.03% copper, 0.16% nickel, 0.02 ounces per ton gold, and 1.18 oz/T silver. Unmineralized gabbro was found a few hundred feet northeast along the beach, and unmineralized schist a shorter distance northeast. To the east, the closest outcrops are gently-dipping chert and black phyllite a few hundred feet away. Elsewhere the bedrock is covered by soil and glacial deposits, probably only a few feet thick. Soil sampling or geophysical methods might be used to obtain more information on the size and character of the mineralization.

Locality 2

(south end of Hasselborg Lake)

A vein of massive pyrite and chalcopyrite with a small amount of quartz is exposed on the shore of Hasselborg Lake at this point. The vein had been cleaned off but no claim location notice was found. The vein is about a foot wide and strikes N40W, dipping 23°NE. A chip sample across the vein assayed 2% copper, 0.04 oz/T gold, 0.66 oz/T silver, and no lead, zinc, or nickel. The country rock of the vein is sheared and fractured chert.

Occasional pieces of copper-bearing schist and igneous rock occur as float along the beach within several hundred feet southeast of the vein. The only exposures in the immediate vicinity are along the beach, so the extent of the vein and the other mineralization is completely unknown. Soil geochemical work might help define the extent and significance of the observed showings.

Locality 3

(east of Thayer Lake pluton on south side of Thayer Lake)

Traces of chalcopyrite were found as small veinlets in a few talus blocks in this vicinity.

Locality 4

(west of northern Hasselborg Lake)

A strongly iron-stained lens about two feet thick and 20 feet long occurs in schist at this point. Pyrite is the only sulfide that could be seen in the strongly oxidized material, but a geochemical analysis of the limonite-rich material showed 650 ppm copper and 9 ppm molybdenum along with small amounts of lead and zinc.

Several barren quartz veins up to six inches wide are also exposed nearby.

Locality 5

(1/3 mile north of 4)

A small cliff exposes a zone of strongly pyritized and iron-stained schist about 15 feet thick and several tens of feet long at this locality. About 10% pyrite is present in the zone, but no other sulfides could be found in the accessible parts of the zone. The lens is conformable with the enclosing highly foliated amphibolite and schist.

Locality 6

(1 1/4 miles east of 5)

Fine-grained schist at this location contains moderate amounts of disseminated pyrrhotite. Within the mineralized schist, several zones about one inch wide contain an estimated 0.1% copper as chalcopyrite.

Locality 7

(1 mile north of 5)

Some float below this strongly stained patch is strongly iron-stained and pyritized amphibolite with minor chalcopyrite. An assay of two selected pieces gave 0.48% copper. The source of the float appears to be near the top of the ridge and would probably be difficult to reach on foot. One stream from this vicinity shows a weak copper anomaly.

Locality 8

(shore, north Hasselborg Lake)

Strongly iron-stained boulders on the shore here contain abundant fine pyrite and traces of chalcopyrite. They are presumed to come from up the slope, but no mapping was done away from the shore here.

Gossans

(localities labeled G)

Iron-staining is common throughout the area, and as the reports of gossan were one of the reasons for mapping the area, the topic is mentioned further here. Several additional patches of readily-visible gossan in the northern part of the map area are indicated by G on the map. These are probably similar to localities 4, 5, and 7 in nature. The lack of strong stream sediment anomalies in samples 284, 285, 321, and 322 is not encouraging for large deposits at these localities, but small deposits might be present. These localities and similar ones farther north are believed to be the main one referred to by Lathram et al (1965) and Berg (1960).

Iron-staining and gossans are also well-developed in other parts of the area. From the field work, these occur in the following geologic environments:

1. Pyritic hornblendite and gabbro in the contact zone of the Thayer Lake pluton.

2. Pyritic schist is common in many parts of the area. Much of the pyrite is probably syngenetic, but some could be introduced.

3. Iron-bearing carbonates, especially in the calcareous phyllite unit, weather to a distinctive orange-brown color. Some pyrite also occurs in these rocks and undoubtedly contributes to the iron-staining.

Except as noted under localities, base metals were not noted in association with any of these occurrences.

SUGGESTIONS FOR PROSPECTORS

Additional stream sediment sampling and prospecting of the area northwest of Hasselborg Lake is needed to complete evaluation of the area of gossans pointed out by Berg (1960). Although no large ore bodies are indicated by the coverage so far, some of the gossans do contain copper, and the remaining area to the north and west therefore seems worth checking. A helicopter would be almost essential to field work in this area.

Soil sampling and possibly geophysical work are suggested to investigate the size and character of the mineralization at localities 1 and 2.

For other areas of interest, see the discussion on geochemical anomalies in the following part of this report.

REFERENCES

Berg, H. C., 1960, Three areas of possible mineral resource potential in southeastern Alaska: U.S. Geol. Survey Prof. Paper 400-B, p. 38-39.

Lathram, E. H., Loney, R. A., Berg, H. C., and Pomeroy, J. S., 1960, Progress map of the geology of Admiralty Island, Alaska: U.S. Geol. Survey, Misc. Geol. Inv. Map I-323, scale 1:250,000.

Lathram, E. H.,Pomeroy, J. S., Berg, H. C., and Loney, R. A., 1965 Reconnaissance geology of Admiralty Island, Alaska: U.S. Geol. Survey Bull. 1181-R, 48 pp.

GEOCHEMICAL INVESTIGATION

Introduction

A total of 563 stream sediment samples were collected from most of the large-sized drainages on the Island, and from some of their tributaries. The stream sediments, consisting of gravel, sand, and silt, were collected from stream beds beneath running water, screened to minus 1/16 inch at the sample site, and bagged for laboratory analyses. Field tests on most of the samples were made at the sample sites using one of the various cold extractable dithizone methods. The samples were then bagged for later drying and screening to minus 80 mesh. The screened samples were sent to Rocky Mountain Geochemical Laboratory at Salt Lake City and analyzed for copper, lead, zinc and molybdenum. Some samples from the vicinity of basic intrusives were also analyzed for nickel.

A small pocket Arvela AEM Magnetometer was used to detect variations in magnetism that might indicate the presence of magnetic anomalies. Bedrock observations were made whenever possible and rock samples taken for identification and assay if metallized or if in an anomalous area where the bedrock metal content could have an appreciable effect on the stream sediment analyses. The size and relative velocity of the stream was noted as well as the types of stones and gravel found. Some of the larger streams contained glacial till, but most of the streams contained only rocks of local origin.

Some sections of the coast were not sampled because inclement weather made landing with a small boat too hazardous.

Geochemical Results

Anomalous values in this report are based on frequency distribution graphs for each of five metals. "Normal" is considered that amount of concentration which most frequently occurs, and "threshold" is that amount of concentration above normal that may be anomalous or may be an erratic of normal. The sample is considered anomalous if the metal content is high enough to occur infrequently. Anomalous values used this year are based on the results of over 700 samples and are considered high enough to indicate the probable presence of a mineralized zone.

Too little is known of the effects of small high grade deposits, large low grade deposits, stream size and gradient, and low grade bedrock concentrations on stream sediment adsorption to positively select an anomalous value. However, the anomalies reported are thought to offer a prospector a better-than-average chance of finding a mineral deposit.

In areas draining primarily metasedimentary and volcanic rocks with subordinate intrusives, the anomalous values are considered to be at least 150 part per million copper, 60 parts per million lead, 300 parts per million zinc, 14 parts per million molybdenum, and 150 parts per million nickel. The only area that may be considered as primarily crystalline intrusive is that in the vicinity of Thayer Lake where 150 parts per million copper, 60 ppm lead, 190 ppm zinc, 10 ppm molybdenum, and 150 ppm nickel are considered anomalous.

The most outstanding anomaly is located on the north shore of Hawk Inlet west of the Alaska Empire Gold Mine (figure 4) where streams draining an area of 13 square miles are all anomalous in either zinc, nickel, copper, lead, molybdenum or combinations of these metals.

The anomalies found and reported in Geochemical Report No. 6, 1965 in Pybus and Gambier Bays (figure 2) are next in size and intensity and to this date have not been followed up with detailed prospecting.

Moderate anomalies were found in the Thayer-Hasselborg Lakes area and Pleasant Bay Lake (figure 3), Jims Lake (figure 1) and Hood Bay (figure 5).

Discussion of Results

Figure 1

A moderate anomaly was found to exist in a stream sediment sample taken from the stream entering Jim's Lake (southcentral Admiralty Island) from the northeast. The sample contained 75 ppm copper, 20 ppm lead, 3 ppm molybdenum, and 310 ppm zinc. Sample 189 on the north shore of the upper lake contained 100 ppm copper, 20 ppm lead, 6 ppm molybdenum, 95 ppm nickel, and 230 ppm zinc. The zinc value, while not considered anomalous, is well above normal as is the amount of copper. Both streams drain a small portion of Yellow Bear Mountain, which is shown on Map I-323 as a folded and faulted segment of the Gambier Bay formation. Both lakes are accessible by small plane, and a cabin located there may be used by permit obtainable from the U.S. Forest Service.

Figure 2

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 Bay 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 Bay 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 copper with quartz, pyrite, and fuchsite, a chrome-nickel mica. The speciman 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.

Figure 3

Sample 179 contained 90 ppm copper, 15 ppm lead, 235 ppm zinc, 3 ppm molybdenum, and 190 ppm nickel and is considered anomalous in nickel. The stream sediments are for the most part gabbro. Sample 178 is not considered anomalous but does contain greater than threshold amounts of nickel, and bedrock was pyritized diabase containing a trace of nickel. Stream sediment sampling at close intervals in the hills north of the lake seems justified.

Sample 302 contained 85 ppm copper, 10 ppm lead, 150 ppm zinc, 3 ppm molybdenum and 190 ppm nickel. However, the float is schist and since it is the only anomalous sample in the vicinity, further investigation doesn't seem warranted.

Sample 312 contained 100 ppm copper, 20 ppm lead, 305 ppm zinc, 6 ppm molybdenum, and 70 ppm nickel. It is anomalous in zinc and above threshold in copper content. Since samples taken at 309, 310, 311, and 312 all contain above threshold values of copper and are from the same vicinity, detailed prospecting is warranted.

Samples 317 and 318 are from the same stream at nearly the same location and are anomalous in copper. Minor chalcopyrite was observed in float here, and is probably derived from a gossan area near the top of the ridge (see earlier part of this report for discussion of gossans).

Sample 328 contained 45 ppm copper, 15 ppm lead, 400 ppm zinc and 70 ppm nickel. It is anomalous in zinc and warrants further investigation.

Figure 4

The streams draining an area of about 13 square miles north of Hawk Inlet were found to carry anomalous amounts of copper, lead, zinc, molybdenum and nickel either singularly or in various combinations. The northern most part of this anomalous area is the site of the Alaska Empire Gold Mine which produced over $200,000 in gold and silver.

Sample 419 contained 90 ppm copper, 25 ppm lead, 500 ppm zinc, 6 ppm molybdenum, and 130 ppm nickel. Sample 420 contained 75 ppm copper, 20 ppm lead, 235 ppm zinc, 4 ppm molybdenum, and 200 ppm nickel. One is anomalous in zinc and nearly so in nickel. The other is anomalous in nickel and nearly so in zinc. The heads of these two streams are opposite samples 432 and 433, which are both anomalous or nearly so in zinc and nickel. It is interesting to note that all four samples are quite low in molybdenum and copper content. This same proportion of metallic content is found to exist in samples 421 to 426, whereas samples 427 to 430 show a marked increase in copper and molybdenum content. The mobility of zinc and nickel ions is known to be greater than the mobility of copper, lead, and molybdenum ions, and may in this locality provide a useful guide to the source of the anomaly. Analyses of bedrock samples taken at sample sites and outcrops presented in table 2 indicate the schists and argillite do not contain sufficient metal to cause an anomaly. Vein quartz similar to that assayed from the Alaska Empire Mine, which is reported to contain nickel, could possibly account for an anomaly, in which case the base metals may provide a suitable guide to unexposed quartz veins and other gold deposits.

Mr. H. H. Townsend, a prominent mining engineer, examined the Alaska Empire Mine and reported on it in 1941. His map of the mine workings shows several "fine grained" dikes intersecting the tunnels and drifts. Float in several of the streams is largely intermediate intrusive rock, and a prospector has reported diorite float on the ridge, so there are probably crystalline intrusives at higher elevations which may be associated with the anomaly.

Samples taken during 1966 at approximately 500 feet greater elevation than 1965 samples from the same streams are still anomalous but lower in metallic ion accumulations. Sample 423 is higher in elevation than sample 422, yet is lower in copper, zinc, and nickel content while slightly higher in molybdenum content. Sample 427 is higher in elevation than sample 426, yet is lower in lead, zinc, molybdenum and nickel while higher in copper content. Sample 429 is also higher in elevation than sample 426 and lower in copper, lead, zinc, and nickel while higher in molybdenum content. This data cannot be explained without additional sampling at higher elevations. No magnetic anomalies were found.

Geochemical sampling at Funter Bay did not show appreciable nickel, yet some of the samples were from the hill on which the Admiralty Alaska Gold Mining Corporation's nickel deposit is located. This deposit has been described in several U.S. Geological Survey Bulletins and sampled by the U.S. Bureau of Mines while being explored under a DMEA contract. This deposit has been compared to the Giant Nickel Mine, Choate, British Columbia, which is producing 1300 tons of similar-grade nickel-copper ore per day. That operation has produced over a million tons of ore from a deposit originally thought to contain a few hundred thousand tons of ore.

Figure 5

One gold lode prospect is reported by J.C. Roehm, 1938, on the south shore of Hood Bay; however, assays discouraged development. The west end of the Gambier Bay fault projects into the North Arm of Hood Bay. The Devonian argillite and chert in which the anomaly in Pybus Bay was found, also outcrops in the North Arm. Samples in this area of Hood Bay were not anomalous. The sample at location 469 contained 50 ppm copper, 20 ppm lead, 300 ppm zinc, and 6 ppm molybdenum and is considered anomalous in zinc. Samples 466 to 468 contain moderately anomalous values of zinc and since the streams all drain a relatively small area of the same hillside could be indicative of a mineralized zone.

Sample 498 is anomalous in zinc. Since this stream drains the same country as sample 496 to 499, which are moderately anomalous in zinc, this indicates that prospecting in this area would have a better-than-average chance of success. The anomalous samples shown on the eastern portion of the map are described under figuere 1.

The andesitic basalts south of Chaik Bay contained only average values for copper, lead, zinc, and molybdenum.

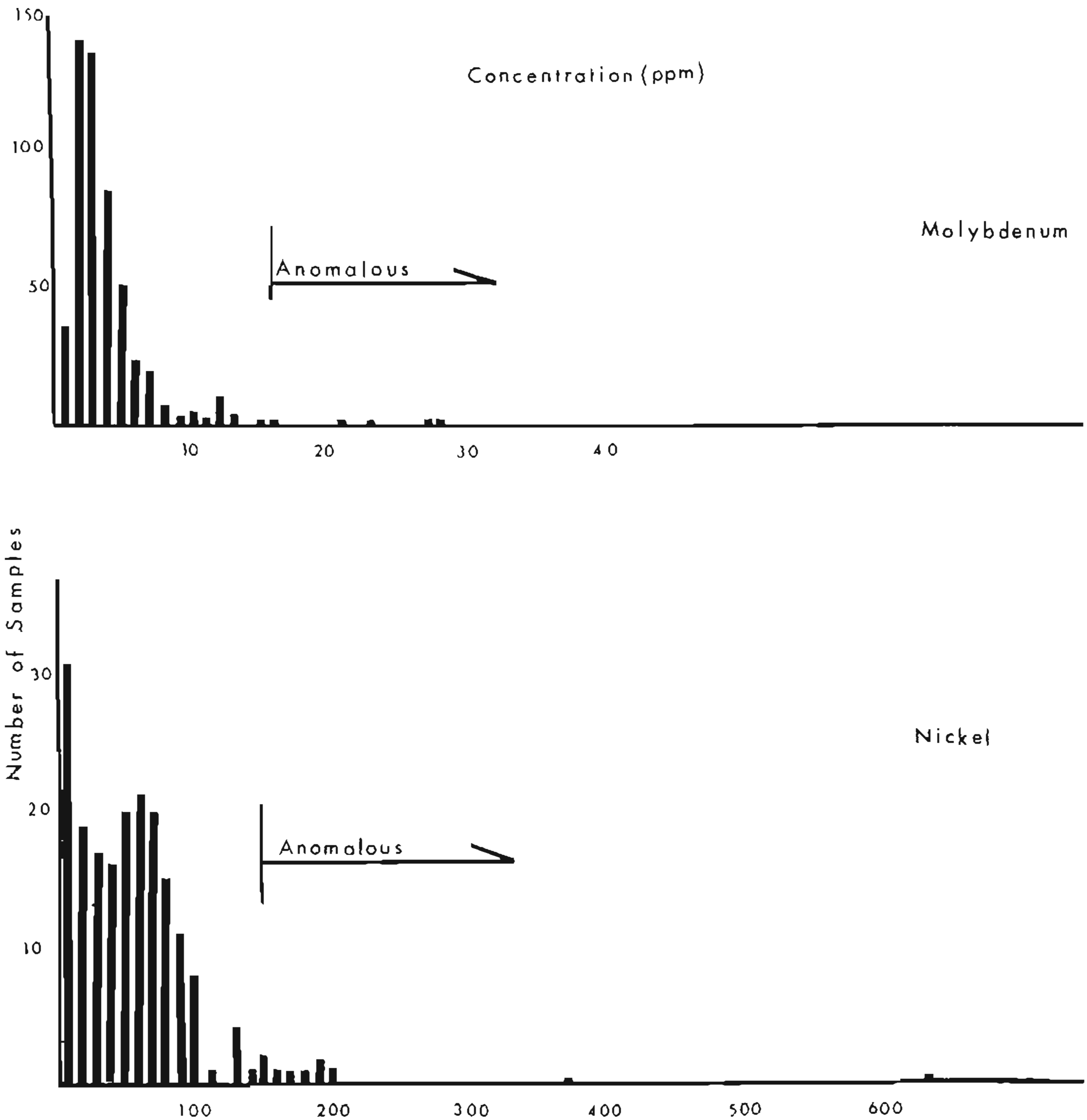
Magnetic variations noted were: 3200 gammas at sample site 174, 2000 gammas at site 407, and 2500 gammas at site 410. The variations at sample sites 407 and 410 may reflect the contact of the intrusive with the schist. The variation at 174 was probably caused by the ultramafic contact with the shale.

Table 2

HAWK INLET ROCK ANALYSES

Map No.	Sample No.	Cu	Pb	Zn	Mo	Ni	Au	Ag	Identification
		Parts per Million							
419	6B131R								Micaceous schist w/trace of pyrrhotite
422	6B158R	Tr		Tr					Basalt w/ sulphides
425	6B276R	10	5	450	3	95	-0.25*	-1*	Argillite w/qtz.
427	6B275R								Argillite w/sulphides
429	6B274R	25	5	40	2	45	-0.35	-1	Argillite w/qtz.
429	6B274R	45	10	140	2	170	-0.25	-1	Schist
430	6B270R								Black slate w/sulphides
432	Mine	675	750	+1000	5		4.8	5.5	Quartz w/sulphides from Alaska Empire dump

* one Troy oz./ton = 34.27 ppm


Concentration (ppm)
Molybdenum
Anomalous
150
100
50
10
20
30
40
Number of Samples
Nickel
Anomalous
30
20
10
100
200
300
400
500
600

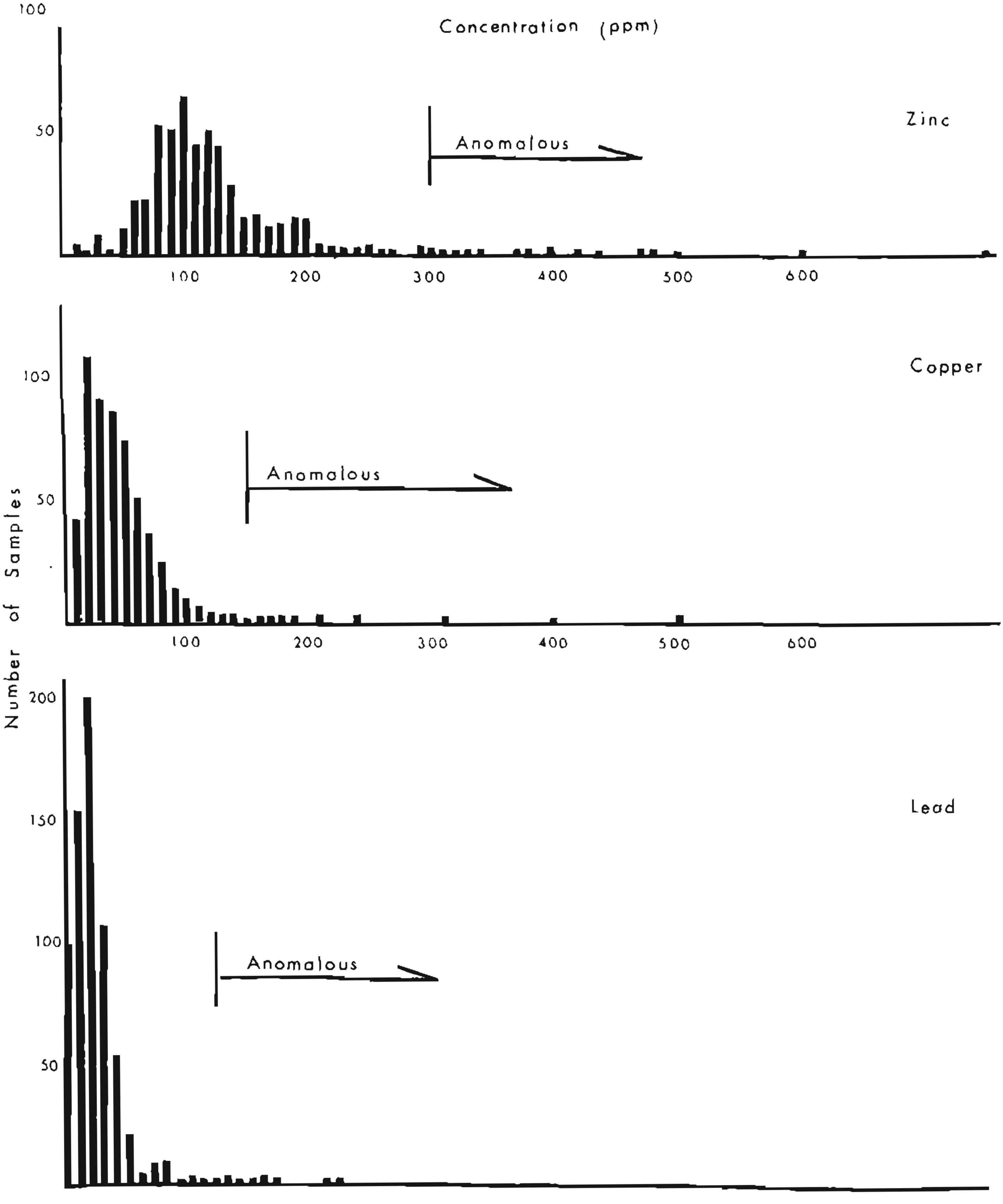

Concentration (ppm)
Zinc
Anomalous
100
50
100
200
300
400
500
600
Copper
Anomalous
100
50
100
200
300
400
500
600
Number of Samples
Lead
Anomalous
200
150
100
50
50
100
150
200

Table 3

List of Prospects and Mines

Name	Location	Minerals	Deposit Description	Country Rock	Development	Production
Brown	Cave Mtn. Gambier Bay	Pyrite & Chalcopyrite	Brecciated limestone w/ sulphides	Calcareous schist	Some trenching	None reported
Cook	Gambier Mtn. N. side Gambier Bay	Copper w/ gold	None	None	Unknown	None reported
Copper Chief	4 miles N. Windfall Harbor	Pyrite Chalcopyrite	Veinlets of qtz. in schist 20' wide x 200' long 1 to 1.7% Cu.	Qtz. mica schist	60' shaft & 25' drift	None reported
Mammoth	4 miles S. of head of Youngs Bay	Free gold, pyrite,galena & sphalerite	Mineralized schist	Schist	165' tunnel, pits & trenches	None reported
Bear Creek	3 miles E.of head of Funter Bay	Asbestos	Tremolite 1½' wide exposed for 14'	Schist	Some trenching	None reported
Portage Group	2 miles N.E. of Funter Bay	Pyrite, galena, chalcopyrite	Qtz. masses & mineralized schist 30' wide	Slate, schist & greenstone	Small shaft & open cuts	None reported
Tellurium & lower group	E.Shore Funter Bay	Free gold pyrite & pyrrhotite w/gold	Qtz. filled fissure & qtz. veins	Amphibole-schist	Two 100' shafts & connecting X-cuts	Total Funter Bay $100,000

Name	Location	Minerals	Deposit Description	Country Rock	Development	Production
Heckler & upper group	1 mile E.of lower group E. shore of Funter Bay	Gold	Qtz.ledges & thin seams	Schist & slate	70' shaft, several tunnels	Part of total Funter Bay
Alaska-Dano	S.E. shore Funter Bay	Free gold	2' qtz.ledge	Qtz.,schist	2 shafts & 300' of drift	Part of total Funter Bay
Admiralty -Alaska Gold Mining Corp.	At upper group	Pentlandite & chalcopy-rite	Pluglike mafic intrusive body	Schist	3 tunnels with drifts and X-cuts over 3000' total	Part of Funter Bay production
Williams or Alaska Empire Gold Mining Co.	N. side Hawk Inlet	Gold, pyrite, chalcopyrite, galena & sphalerite	Several large qtz. veins	Qtz. schist	Shaft,several hundred feet of drift & X-cuts. Other veins trenched	Total Hawk Inlet over $200,000
Fishery Point	West side Admiralty Island	Pyrrhotite, pyrite, galena & chalcopyrite	Qtz.& mineral-ized schist 30' wide	Schist	X-cuts & short shaft	None reported
Kanalku Coal	Mitchell Bay	Bituminous coal	12' thick w/5' of partings	Shale	Several 100' of slopes & tunnels	Some local sales
Murder Cove Coal	S. end Admiralty Island	Bituminous coal	5' thick w/3 partings 1' thick. Coal fractured & faulted	Basaltic tuff	Several 100' of slopes & tunnels	None reported

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Abbreviations

The following 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
pyr	pyrite
pyrr	pyrrhotite
fs	feldspar

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
gry	graywacke
ph	phyllite
cg	conglomerate
grs	greenstone
br	breccia
c	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)
ub	ultrabasic

Table 4

Analyses of Stream Sediments, Admiralty Island

		Metal Content (ppm)					Field Test					
Map No.	Samp.No.	Cu	Pb	Zn	Mo	Ni	ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
Figure 2												
1	5B57	10	10	75	4		2	tan	53.	ar.	ar.	2-8' slow
2	5B56	20	10	125	4		3	tan			gry.,ar.,d.	2-8' slow
3	5B55	15	10	105	5		3	pink			ar., gry.	2-8' slow
4	5B54	15	10	85	12					ar.	ar.	2-8' rapid
5	5B53	35	15	115	12		6	pink		ar.	ar.	2-8' rapid
6	5B35	25	15	135	5		2	tan	54.		cg.,c., gry.	8' rapid
7	5B32	25	5	150	3		3	tan w/tan ppt	52.5		everything but sc.	8-20' rapid
8	5B33	40	5	125	3		2	tan	53.5	volcanics	volcanics	2' slow
9	5B34	20	5	165	4		4	tan-pink		metased.	c.,gry.& metased.	2-8' rapid
10	5B36	25	5	125	5		7	pink-lav		basalt	volcanics	2-8' w/falls
11	5B37	30	5	165	5		6	tan			vol.& rusty meta-sed.	20-60' rapid
12	5B58	35	15	220	7		2	tan	50.0		gry. & ar.	2' slow
13	5B59	135	20	380	15		4	tan		ar. & gry	chert,gry.,do.,vol.	2-8' w/falls
14	5B60	180	20	330	15		10	tan-cls.			do.,gry.& do.br.	8-20' rapid
15	5B61	55	15	330	12		1	tan		ar. & intr.	gry.,ar.& do.	8-28' w/falls
16	5B62	310	25	200	10		20	pink		carb. ar.	ar.	2-8' rapid
17	5B63	130	20	300	13		3	tan			do.,do.br.& gry.	8-20' slow
18	5B52	105	15	260	12		6	pink		ls.	ls.,chert,gry.	8-20' slow
18A	GB299	75	15	180	5				53.	ar. & chert	chert & jasper ar.	2-8' w/falls
19	5B51	65	10	170	7		2	pink	52.5	ls	ls	2-8' rapid
20	5B50	30	5	125	4		2	tan	52.5	do	do	2-8' rapid
21	5B49	20	10	90	4		25	pink	49.0		ar	2' slow
22	5B48	70	10	120	5		5	pink	52.5		gry.,chert.,do.	2-8' rapid
23	5B47	60	10	200	5		2	tan			gry. & chert	2-8' rapid
24	5B46	60	10	200	4		2	tan	52.	chert	gry. & chert	2-8' rapid
25	5B45	30	5	70	3		4	tan	55.		gry. & chert	2' slow
26	5B44	50	10	135	5		2	tan	52.5		gry. & chert	2-8' rapid
27	5B43	40	10	130	4		4	tan	50.	chert	chert & ar	2' rapid
28	5B42	35	5	190	3		6	pink		do -br	everything	2' rapid
29	5B41	35	5	185	4		6	lav.			everything	2' rapid
30	5B40	15	5	115	5		8	pink-cls	50.0	do	ar & some g	2-8' rapid

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
31	5B39	15	5	115	4		2	brn	54.	ar	ar	2' rapid
32	5B38	20	10	130	5		7	brn	53.5	ar	ar	2-8' rapid
33	5B69	60	15	150	4		5	pink		red c	ch.,do.br & int.intr	2' slow
34	5B71	50	10	200	4		3	tan			ch.,gry.,br & vo	2-8' slow
35	5B72	40	10	165	5		2	tan	55.	ar	gry.,ar. chert	2-8' slow
36	5B73	55	10	165	4		1	tan			gry.,ar chert do.	8-20' fast
37	5B74	55	10	190	4		4	tan		gry	gry	8-20' slow
38	5B75	45	15	160	4		4	tan			gry & do	2-8' slow
39	5B70	35	10	145	5		8	pink		metased	metased & vol	2-8' slow
40	5B65	15	5	105	5		7	pink			ar.,gry.,gneiss	2' slow
41	5B64	45	10	200	5		16	pink-lav	55.		ar, gry, gneiss	2-8' slow
42	5B66	25	35	95	21		9	pink-lav		gry & slate	ar., gry	2-8' slow
43	5B67	40	10	190	5		8	pink-lav			chert,gry-rust gravel	8-20' slow
44	5B68	40	10	185	5		1	green			gry	2-8' slow
45	5B76	35	10	145	3		1	green		do	do & chert	2' slow
46	5B77	30	10	100	4		1	green	55.		d.,ch.,vo.& cg.	2-8' slow
47	5B78	20	10	115	8		5	tan	56.	do	all angular do	2' slow
48	5B79	15	5	110	7		1	green			chert & some d.	2' slow
49	38	25	25	180	0		7	brn.		no bedrock	qtz.fs.intr.,vo.br.	med. creek
50	37	25	20	95	1		2	tan	54.2	no bedrock	qtz.fs.intr.,vo.br.	small creek
51	36	50	20	130	0		3	tan	54.0	no bedrock	chert, ar.	med. creek
52	35	75	10	125	0		0			ar	chert,ar.,vol.	med. creek
53	34	30	25	140	1		5	brn	53.0	no bedrock	ch.,sc.,biotite gr	small creek
54	33	35	10	105	1		2	pale grn	54.3	ar	ar.,chert,sc	small creek
55	32	30	25	165	0		3	yellow	54.4	no bedrock	ch.,ar.,little ls.	
56	31	30	80	125	1		7	lite brn	54.2	greenstone	ar.,greenstone	large creek
57	30	45	25	120	2		0		54.8	blk chert	ar, chert	large creek
58	29	15	25	55	0		4	cls	54.8	no bedrock	ar.,chert,acid intr.	med. creek
59	28	5	25	40	2		5	vio-brn	54.2	no bedrock	ar.,chert,acid intr.	med. creek
60	27	5	20	30	0		0		54.0	no bedrock	ar	med. creek
61	26	25	15	100	0		0		54.3	ar	ar.,cg.,acid intr.	med. creek
62	67	10	10	5	0		0			no bedrock	glacial	
63	66	15	10	10	2		4	vio		no bedrock	vol	
64	39	5	10	25	1		0		54.6	no bedrock	vol.,acid intr.	small creek
65	40	5	20	30	0		0		55.0	no bedrock	glacial	small creek
66	41	5	10	?	0		4	brn	54.2	no bedrock	vol cg qtz.	small creek
67	42	50	10	?	8		0		54.2	no bedrock	ar	small creek

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
68	43	55	10	?	0		2	brn	54.6	no bedrock	ar	med. creek
69	44	5	10	?	5		6	vio	54.1	vol, cg		med. creek
70	45	10	15	25	0		4	brn	53.9			med. creek
71	46	35	30	85	4		6	brn	53.8			large creek
72	47	25	10	90	2		15	vio-brn	53.9		gray vol	small creek
73							0					very short creek
74	48	40	10	290	11		8	brn	54.9	vol	vol	med. creek
75	49	25	10	90	4		7	brn		chert	vol,chert	med. creek
76	50	40	10	100	4		11	brn	53.5	chert	vol,chert	med. creek
77	51	30	10	60	3		4	brn	53.1	vol br	vol, chert	med. creek
78	52	35	10	135	3		18	vio-brn	54.1	schistose	on fault zone(?)	large creek
79	53	50	15	?	4		5	vio	54.5	ls.w/epi-dote	glacial	large creek
80	54	20	20	95	1		18	yellow	53.6	blk marble	glacial	med. creek
81	54R	35	20	?	0					altered basic dike	N6E; 33E	
82	55	50	10	95	4		14	brn	53.6	schist	qtz.sc,marble	
83	56	60	10	210	7		21	vio-gray	53.8	schist	sc,marble,d (?)	large creek
84	56R	20	10	25	12					graphite sc	specimen	
85	57	55	10	190	10		18	vio-brn	54.0	qtz mica sc	sc,m,d	large creek
86	58	55	10	195	9		4	brn	53.5	blk marble	sc, marble	larger creek
87	59	20	15	80	2		10	brn		blk marble	sc, marble	small creek
88	60	15	40	75	7		2	tan	53.3	sc	sc,qtz,igneous	small creek
89	61	25	10	200	6		22	vio-brn	53.7	sc	glacial	large creek
90	62	30	10	170	3		11	vio-brn		no bedrock	glacial	small creek
91	63	15	10	100	1		5	brn	53.4	no bedrock	very short creek	very small creek
92	64	45	10	240	8		7	vio	53.8	no bedrock	sc	med. creek
			Water only				15	vio	53.8	no bedrock	sc	
93	65	40	10	80	1		0		53.6	no bedrock	river wash	river
94	5B100	50	15	225	28		6	tan-cls		sc	sc	3' slow
95	5B99	60	5	380	13		10	pink-tan			sc,ls qtz & int. intr.	2' rapid
96	5B98	65	10	245	10		3	tan			vol,ls,& some sc	15' slow
97	5B97	55	10	340	12		5	tan		sc	vol,ls,& sc	3' fast
98	5B96	15	10	135	8		4	tan		sc	sc	2' fast
99	5B95	30	10	175	8		4	tan		ls	sc & ls	4' fast

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
100	5B94	55	15	210	8		5	tan		green sc	sc	10' w/falls
101	1			Missing								
102	2	30	25	135	1		0			greenstone	ls,greenstone	med. creek
103	3	45	35	185	3		0			ls	ls	med. creek
104	4	50	40	100	2		3	brn	54.1	schistose ls	ls	small creek
105	5	45	40	185	3		0			impure ls	ls	large creek
106	6	45	30	125	0		0			impure ls	ls	med. creek
107	7	45	55	400	1		2	brn	53.0	cal.sc & an sill w/pyr		med. creek
108	8	55	80	475	2		0	brn	53.8	ls	ls	med. creek
109	9	55	60	370	1		1	brn	53.8	ls	ls	very small creek
110	10	50	65	200	0		0		54.0	ls	ls	very small creek
111	11	50	65	160	0		10	brn	53.4	faultzone?	ls	large creek
112	15	55	35	150	0		10	brn	53.6	sandy ls	ls	
113	14	70	70	125	0		7	brn	53.9	sandy ls	ls w/pyr	med. creek
114	13	35	35	85	0		6	brn	53.8	sandy ls	ls	med. creek
115	12	45	50	180	0		11	brn	52.0	sandy ls	ls	med. creek
116	68	45	10	135	2					grn chert	various	large stream
117	69	35	15	100	2					no bedrock	sc	med. creek
118	70	45	15	125	1					no bedrock	sc	med. creek
119	71	70	15	80	1					no bedrock	sc	med. creek
120	72	80	35	100	1					sc	sericite sc	med. creek
121	73	85	10	100	2					sc	sc,qtz,grs	small creek
122	74	55	25	70	1					sc	sc, ls	med. creek
123	75	50	110	90	0					sc	sc, ls	med. creek
124	76	40	15	110	2					sc	sc, ls	small creek
125	77	40	10	25	1					sc	sc, ls, qtz, d	very small creek
126	78	50	10	220	3					sc	sc, ls, qtz, d	med. creek
127	79	40	10	330	2					ls	ls, sc, acid intr.	small creek
	79R	20	10	10	0					ls with pyr		
128	80	40	20	95	0					ls	ls,sc,acid intr.	small creek
129	25	50	10	90	3		20	vio-brn	54.4	no bedrock	ls breccia	small creek/falls
130	24	10	20	110	2		0		54.7	no bedrock	ls breccia	small creek
131	23	400	20	100	3		17	vio-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	vio-brn	53.5	no bedrock		intermittent stream
134	20	135	20	70	1		18	violet	55.2	schist	schist	med. creek

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
	20R	1.7%	60	270	0					do brec.		
135	18	35	40	45	0		6	brn		cal sed	impure ls	med. creek
136	17	30	30	150	0		+20	brn	53.8	cal sed	impure ls	med. creek
137	19	35	35	120	0					schist	schist	med. creek
	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 sc	sc,alt.diabase(?)	med. creek
	16R	35	10	100	0					alt basic dike		
139	85	70	10	195	1					no bedrock	sc, ls	large creek
140	84	35	10	330	4					cal.sc	sc,ls,acid porphyry	small creek
141	83	30	10	195	1					cal.sc	sc,ls,acid porphyry	small creek
142	82	35	10	120	1					cal.sc	sc,ls,acid porphyry	small creek
143	81	30	10	105	3					schist	sc,ls,acid porphyry	large creek
144	5B86	70	15	245	7		1	green	55.		ch,ls,sc & lite intr.	30' rapid
145	5B87	35	10	160	5		8	tan		glacial clay	ch,br,ls,sc	25' rapid
146	5B88	45	10	220	7		4	tan		glacial clay	ch,gry,ls,sc	5' rapid
147	5B89	30	5	115	7		2	tan		glacial clay	complete mix	2' slow
148	5B90	30	10	205	8		1	green		chert	ch,ls,vol.sc	20' slow
149	5B91	90	25	320	10		18	pink			do,br,ls,lite intr.	30' fast
150	5B93	110	+5	800	16		1	tan			schist & qtz.	2' rapid
151	5B92	90	20	365	8		1	green		sc/pyr	gray sc,ls,g, & qtz intr.	2' fast
152	5B85	65	80	1000	7		5	tan	55.	breccia	breccia	3' rapid
	54R1											
153	5B84	80	85	750	7		15	or-lav	55.	breccia	breccia	2' rapid
154	5B83	240	105	1000	7		10	pink/brn	54.	vol & ls	vol, ls & d	2' rapid
155	5B82	50	15	245	5		1	grn ppt.			volcanics	2' rapid
156	5B81	20	10	120	5		5	tan	55.	ar & gry	ar & gry	6' slow
157	5B80	10	5	95	5		3	tan	53.	ar & gry	ar & gry	2' slow
Figure 1												
158	6B147	55	15	150	3				0	gry	gry & hyd vol	8-20' w/falls
159	6B297	95	20	185	4		90		53.	ar	grn vol br, ar	2-8' rapid

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
160	6B298	60	10	145	3		155		53.		int.intr.,ch,vol ar	2-8' slow
161	6B148	40	10	100	3				53.	gry	gry,vol,int.intr.	8-20' w/falls
162	6B149	70	15	115	3				53.	gry	vol,gry,lite int. intr.	8' rapid
Figure 3												
163	6B146	55	20	155	4				53.		gry,sh,vol,int.intr.	2-8' slow
164	6B145	100	25	130	3				53.		" " " " "	2' med.
165	6B144	150	25	440	6				53.	gry & shale	gry,vol,sh,int. intr.,some mag.	8-20' w/falls
166	295	95	20	160	6		100		53.		rusty vol,c,ar,cg	8-20' rapid
167	294	60	15	210	2		100		54.		ar,c,metased.	20' rapid
	6B294R	0					tr	metamorphosed conglomerate				
168	156	80	10	100	5				54.		dark intr,ub.do	8-20' slow
	6B154R	at diorite w/sulphides										
169	154	35	15	70	2				54.		" " " " w/pyr	2-8' rapid
170	155	20	15	70	3				54.		dark intr,ub.do w/pyr	2-8' medium
171	150	50	5	180	4				53.	glacial fill	gry,dark intr.w/pyrr	2-8' rapid
172	151	50	10	100	3				53.	chert	glacial mix	20-60' rapid
173	6B152R	50	5	70	4	Black slate 0.02 oz. Au						
	152	40	10	100	3				53.	shale w/c	rusty c w/bs	2-8' rapid
174	153	85	15	110	3				56.2	ultra mafic	ub,int intr,gry	8-20' rapid
175	157	35	10	80	3				53.5		ub,int intr, gry	2-8' rapid
176	292	75	10	125	3	95			54.	dark intr	metaseds & dark intr.	2-8' rapid
177	293	60	15	140	3	90			54.		ar,grs,int.intr. & some magnetite	2-8' rapid
178	6B291R	0				tr.	diabase w/pyr.					
	291	70	15	180	5	125			53.		ar,grs,int.intr. chert	2-8' rapid
179	6N19	90	15	235	3	190	17				gabbro	8-20' slow
180	6N20	30	5	110	4	80	4			slate	sc.gabbro,qtz	2-8'
181	6E129	10	5	55	4	20	2				gabbro,slate	2'
182	6N21	40	10	95	4	50	3				slate	2'
183	6N22	90	15	135	3	100	1				schist,slate	2'
184	6E158	30	5	125	3	70	1				schist,gry	8-20' med.

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Characteristics
185	6B115	45	5	105	2				53.	schist & ls	schist & ls	60-80' slow w/falls
186	6B114	55	5	135	2				53.	schist	m,sc,ar,lite intr	20-60' slow
Figure 1												
187	6B278	75	20	310	3						vol. argillite	8-20' slow
188	6B290	40	10	150	3	75			54.		vol. argillite	8-20' slow
189	6B302	100	20	230	6	95			53.		metased	2-8'rapid
190	301	50	15	175	2	75			53.		ar, ls,do,int.intr.	8-20' slow
191	300	70	20	185	3	85			53.		" " "	2-8' slow
Figure 3												
192	6N40	30	10	95	4	50	3				granite	2'
193	6N41	15	10	135	3	30	2				granite	2-8'
194	6E164	30	10	160	3	30	2			schist	schist	2' slow
195	6E167	40	10	140	3	70	1				schist	2' slow
196	6N6	40	5	140	2	40	2				schist	8-20' med.
197	6N4	25	5	110	2	10	1				slate,gry	2-8' med.
198	6E90	70	15	150	5	60	5			phyllite	schist,ph,vol.	8-20' rapid
199	6N5	65	5	105	3	80	3				schist	8-20' slow
200	6E300	40	15	130	5	90	1				schist	2-8' med.
201	6E301	45	5	95	5	70	7				schist	2-8' med.
202	6N34	45	10	120	3	80	1				schist	2-8'
203	6N33	40	5	100	3	50	1				schist,qtz.	2-8'
204	6N32	55	5	100	3	90	1				sc,granite,qtz.	8-20' rapid
205	6N31	45	5	120	3	40	1				granite,schist	2-8'
206	6E207	25	5	140	4	40	1				schist,granite	2'
207	6N30	110	25	75	4	20	1				granite,schist	2-8'
208	6N29	80	5	75	2	60	1				granite	2-8'
209	6N28	55	5	90	3	50	1					2-8'
210	6N27	20	5	80	6	30	1				granite	8-20' slow
211	6N35	35	5	90	4	40	2				granite	2-8'
212	6N36	25	10	80	6	10	1				granite	2-8'
213	6E215	25	5	70	2	10	1			gd	granitic rock	2-8'
214	6N39	15	5	75	2	10	1				granite	2-8'
215	6E201	10	5	60	3	30	1				granite	2'
216	6E200	5	5	25	1	20	1				granite,schist	2'
217	6N38	25	5	75	2	10	1				granite	2-8'
218	6N37	20	5	80	3	10	1				granite	8-20'
219	6E218	20	5	75	2	30	1			gd	gd,basalt,sc	2-8'
220	6E219	20	5	85	3	30	1			gd	gd,sc	2-8'
221	6N23	25	5	80	2	40	2				granite	2-8'

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
222	no sample											
223	6N26	20	10	110	5	30	1				granite	2-8'
224	6N25	25	10	130	2	10	2				granite	2-8'
225	6N24	20	5	110	4	40	2				granite,gabbro	2-8'
226	6N49	25	5	175	7	50	3				schist	2-8'
227	6N48	110	5	115	5	60	15				sc, g, m.	2'
228	6N47	20	10	125	2	20	2				granite,schist	8-20'
229	6N50	45	5	120	6	20	1				granite	2-8'
230	6E232	15	5	85	2	30	1				granite,schist	2-8'
231	6N46	15	15	135	4	10	3				granite	2-8'
232	6N45	30	5	100	4	40	2				granite	2-8'
233	6N44	20	5	105	3	10	2				granite	2-8'
234	6N43	10	5	95	3	40	4				granite	2-8'
235	6N57	10	10	85	4	40	1				granite	2-8'
236	6E236	5	5	100	1	10	1				granite	2'
237	6N58	15	5	80	1	10	1				granite	2-8'
238	6N59	15	5	95	1	10	1				granite	2-8'
239	6E237	15	5	80	3	10	1				granite	2'
240	6E224	15	5	85	2	30	1				granite,schist	2'
241	6N47	30	5	85	3	40	2				granite, schist	8-20'
242	6E243	25	10	80	2	50	1				qtz,diorite	2-8' rapid
243	6E242	25	5	100	5	50	1				granite,schist	2-8'
244	6N89	30	5	60	2	10	1				granite, schist	8-20'
245	6N88	10	5	60	4	10	2				granite	2'
246	6E251	20	5	65	3	60	1				granite, schist	8-20' med.
247	6E252	5	5	60	2	10	1				granite, gabbro	20-60'
248	6E249	5	5	55	1	20	2			gd	gd	2-8' rapid
249	6N51	5	5	65	5	10	4				granite	2-8'
250	6N52	20	5	80	3	20	2				granite	20-60' med.
251	6N66	5	5	75	4	10	1				granite	2'
252	6N75	15	5	85	3	10	2				granite	2-8'
253	6N67	5	10	60	2	20	1				granite	2'
254	6N68	5	5	75	2	20	1				granite	2'
255	6N74	25	5	75	3	10	1				granite	2'
256	6N69	10	5	65	1	20	1				granite	2'
257	6N70	10	5	75	2	10	1				granite	2'
258	6N71	15	5	75	1	10	1				granite	2-8'

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
259	6N72	15	5	80	1	40	1				granite	2-8'
260	6N73	15	5	60	2	10	1				granite	2-8'
261	6N53	35	5	75	3	20	1			granite	granite	2'
262	6N54	15	5	85	2	20	1				granite	2'
263	6N55	30	5	80	3	20	3				granite	2'
264	6N56	20	5	80	5	30	3				granite	2-8'
265	6N60	35	5	90	2	20	1				granite	2-8'
266	6N61	20	5	85	2	10	1				granite	2-8'
267	6N62	25	5	80	3	10	1				granite	8-20'
268	6N63	15	5	75	5	20	1				granite	8-20'
269	6N65	40	5	80	2	10	1				granite,gabbro	2-8'
270	6N64	35	5	60	4	20	1				gabbro, granite	2'
271	6N78	55	5	100	2	10	1				granite, diorite	2-8'
272	6N77	50	5	75	2	60	1				" "	2-8'
273	6N76	60	5	90	3	50	3				" "	2-8'
274	6N79	30	5	55	1	40	1				gr, dio, gabbro	8-20'
275	6E276	55	5	105	3	70	1				schist,gabbro	2-8'
276	6N80	50	5	100	4	60	1				granite	8-20'
277	6N83	60	5	115	1	60	1			schist	schist, qtz	8-20'
278	6N82	55	5	70	1	10	2				schist, granite	8-20'
279	6N87	55	10	95	5	50	3				schist,	2-8'
280	6N84	75	5	95	3	70	1			schist	schist	2-8'
281	6E281	85	5	95	5	50	1				schist	2-8'
282	6N85	70	10	75	3	30	2				schist, marble	8-20'
283	6E282	35	5	55	2	40	2				schist, granite	2-8'
284	6E284	40	5	70	4	70	2				schist, diorite	2'
285	6N86	45	5	75	4	50	2				schist	8-20'
286	6N81	85	5	75	1	50	2				granite, diorite	8-20'
287	6N96	20	10	55	1	10	3				marble	2-8'
288	6N97	65	10	70	2	70	1				schist, diorite	8-20'
289	6N95	70	15	195	3	20	2				schist	2-8'
290	6N94	45	10	125	2	30	1				schist	2'
291	6N93	60	10	140	3	70	2				schist	2'
292	6E319	60	5	90	5	60	2				schist	2'
293	6N92	45	10	115	2	40	1				schist	2'
294	6N91	65	10	105	5	60	1				schist	2-8'
295	6N18	95	10	135	3	100	7				schist, marble	8-20'
296	6N17	75	5	110	7	70	3				schist, marble	2-8'

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
297	6N16	70	5	130	5	70	3				schist	8-20'
298	6N1	80	5	140	2	80	8				schist, basalt	8-20'
299	6N3	80	15	160	3	20	1				slate	2-8'
300	6E100	35	15	155	2	60	3				slate	2-8'
301	6N2	85	10	150	3	190	2				schist	2-8'
302	6N7	60	10	200	3	50	3				schist, slate	2-8'
303	6N8	70	10	85	3	110	0				schist	8-20'
304	6N15	60	10	190	6	30	3				slate, sc,an	8-20'
305	6E115	55	5	80	4	20	7			andesite	an, diabase, sc	2' med.
306	6N9	40	5	95	5	10	5				schist, an	2-8'
307	6N14	30	10	105	4	50	2			gry	gry, schist	2-8'
308	6N10	80	10	120	3	80	3				schist	8-20'
308A	6N114	70	10	60	5	60	4				schist	2-8'
309	6N99	110	5	40	4	80	2				dolomite	2'
309A	6N115	55	-5	80	4	20	2				schist	2-8'
310	6N105	110	5	55	2	130	2			dolomite	schist	2-8'
311	6E340	125	5	60	3	100	15			granite, sc	g,gabbro,sc	2-8' rapid
312	6N106	100	20	305	6	70	18				schist	2'
313	6N104	80	5	60	4	70	3			schist	schist,diorite(?)	8-20'
314	6N107	45	10	185	2	50	3			schist	schist,diorite	2-8'
315	6N108	55	5	150	3	100	1			schist	schist,granite	8-20'
316	6N100	80	5	45	3	30	3				schist,dolomite	2'
317	6N103	155	5	85	3	80	1				schist,(pyritic)	2-8'
318	6E346	115	10	70	6	90	5				schist, gabbro	2-8' rapid
319	6N101	80	5	80	3	70	1				schist,(pyritic)	2-8'
320	6N102	80	5	45	5	80	1				schist "	2-8'
321	6N113	120	5	90	4	90	3				schist	2-8'
322	6N112	65	5	70	4	50	2				schist	2-8'
323	6N109	35	10	175	4	80	5			schist	schist	2'
324	6N110	55	10	200	3	90	4				schist	2-8'
325	6N111	55	10	70	5	20	2				schist, granite	2-8'
326	6N11	70	10	155	6	140	5				schist,	2-8'
327	6N12	125	10	115	3	80	5				basalt,schist	
328	6N116	45	15	400	2	70	5			schist	schist	
329	6N117	80	10	185	3	60	4				schist	

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
330	6N118	40	5	85	3	40	5				schist	
331	6N119	30	5	65	2	10	5				schist	
332	6N13	35	5	70	4	60	6				schist,basalt	
333	6B286	40	10	170	8	70			54.		ar,silic.sc,qtz, dark intr.	8-20' slow
Figure 1												
334	6B287	30	10	135	6	65			54.		ar,silic.sc,qtz	2-8' slow
335	6B288R	500					foliated gabbro w/mafic inclusions w/sulphide					
	6B288	50	10	120	4	85			1		ar,ls,ub, some magnetite	8' rapid
336	6B289R	0				tr	gabbro w/mafic inclusions w/pyr.					
	6B289	30	15	130	6	85					all find sand	2-8' slow
Figure 3												
337	6B158	35	15	90	3				53.5	blk shale	bs, int.intr., ub	20-60' slow
338	159	30	10	100	2				53.	gry,blk shale	gry,sh,vol,int.intr	8-20' w/falls
339	160	55	10	180	3				53.	gry & shale	gry,sh,vol,int.intr	20' rapid
340	161	50	5	135	2				53.	sh & slate	" " " " & do	20' rapid
341	162	missing							53.	gry	gry,c,vol,do, int. intr.	8-20' rapid
342	168	50	10	115	3				53.	ch & ch.br	chert	2-8' w/falls
343	169	50	10	110	2				53.	ch	chert & grs.	2' w/falls
344	170	65	10	150	6				53.	ch,bs,do	c,do,bs,cg	2-8' w/falls
345	171	70	10	40	3				53.	ch,do	c,do,bs,grn vol	2-8' w/falls
346	172	205	10	130	3				53.		grn vol,c w/pyr	2-8' rapid
347	173	60	5	220	6						ls,vol,chert	2-8' w/falls
348	163	40	5	125	3				53.	gry	gry, vol,sed.	8-20' slow
349	164	50	15	75	6				53.		gry,vol,chert	2-8' rapid
350	165	50	10	90	2				53.		gry,ch,dark intr.	8-20' slow
351	166	70	25	225	3					bs, chert	bs,ch,gry,all with pyrite	2' w/falls
352	167	75	20	240	2						gry grs,vol,ch	20-60' rapid
Figure 1												
353	190	85	10	140	3					grn vol	grn vol,vol,int intr	5' w/falls
354	189	75	10	125	3					brn slate	sh,ch,dark int, jade	15' rapid
355	188	40	5	75	4						ar,gry,dark intr.	50' rapid

Table 4 (cont)

Map No.	Samp.No.	Cu	Pb	Zn	Mo	Ni	Field Test: ml dye Cx	Field Test: Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
		Metal Content (ppm)										
356	187	45	10	100	2						slate,gry,cg,qtz, some magnetite	75' rapid
357	6B303	55	10	90	5	85			53.		metased,int intr	8-20' slow
358	186	45	10	90	2						sh,gry,cg,qtz	75' rapid
359	185	45	10	115	3						sh,gry,dark intr.	10' rapid
360	184	45	10	115	2						sh,gry,cg,vol	10' rapid
361	183	50	10	100	4						vol,cg,lite intr.	2' rapid
362	182	110	10	90	2					slate	do,sh,grn vol	3' rapid
363	181	40	10	120	5						gry,sh,vol.cg, lite intr.	6' rapid
364	180	40	15	160	4				53.	black sh	gry,bs,vol.cg	3' rapid
365	179	35	10	100	2				53.		gry,bs	8-20' slow
366	178	40	10	110	2				53.		gry,cg	60' slow
367	177	35	5	110	3				53.		gry,cg	20-60' slow
368	176	25	10	75	2				53.		glacial clay & gravel	2' slow
369	175	30	10	130	4				53.	congl	gry,cg	8-20' w/falls
370	174	35	10	105	3				53.	gry	gry,vol,sed.	8-20' slow
371	191	20	5	85	2				53.	slate	sh,lite intr,vol	2-8' slow
372	192	60	5	110	3						sh,grn.vol	20' rapid
373	193	70	10	105	3				53.		sh,grn.vol	20' rapid
374	202	15	5	45	3				53.	grn vol w/ pyr	grn.vol,cg,lite intr.	2-8' rapid
375	201	15	5	55	2						grn.vol,cg,lite intr.	8-20' w/falls
376	203	25	10	70	2				53.	sh & slate	int.intr,sh,qtz	2-8' rapid
377	204	20	5	45	2				53.	grn vol	grn vol,lite int.	2' rapid
378	205	10	5	45	2					lite intr. & grn vol	grn vol,lite int. intr.	8-20' rapid
379	6B206R	0	0	0	0	silicified from contact zone w/pyr						
	206	15	5	65	2				53.	glacial clay	rusty vol,lite int. intr.	8-20' slow
380	6B207R	0	0	0	0	50	silicified igneous rock w/pyr					
	207	35	5	85	1				53.	lite int.intr.	lite intr.grn.sc, do w/pyr	2-8' w/falls

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
381	6B208R	0	0	0	0	0	silicified volcanic w/pyr					
	208	20	5	55	6				53.		lite int.intr.,grn vol.ub.	8-20' slow
382	209	10	5	50	2						lite-drk intr. w/ sulfide	2-8' flow
	6B209R	0	0	0	0	0	granodiorite w/pyr.					
383	210	15	10	50	5				53.		lite-int.intr.,gn	2-8' rapid
384	200	15	5	60	3				53.		int.intr.vol,ar	2-8' slow
385	6B199R	0	0	0	0		siltstone-sandstone w/pyrite					
	199	35	10	90	2				53.	sh w/intr. w/ar.	ar,int.intr,cg	8-20' w/falls
386	198	50	5	95	3						seds.& metaseds.	2-8' slow
387	197	85	5	80	4				53.		gry,sh,vol,intr.	2-8' rapid
388	196	25	5	100	1				53.		sh,grn.sc,int.intr.	20-60' slow
389	143	60	35	140	2						shale & slate	2' rapid
390	142	65	20	115	2						seds & metaseds	2-8' rapid
391	141	70	15	120	2						seds & metaseds	2' rapid
392	140	70	15	190	2						lite intr,metaseds	2' rapid
393	139	50	25	115	2						vol,ar,int.intr,ch	2-8' rapid
394	138	50	35	160	4						vol,ar,int.intr,ch	8-20' slow
395	195	35	10	210	2				53.		ar,dark intr,cg	8-20' slow
396	194	50	20	195	2						ar,grn.sc,qtz	2-8' rapid
Figure 4												
397	5B169	50	5	175	2	75					metaseds,lite-drk int.	20-60' rapid
398	5B168	20	10	160	2	55					metaseds,lite-drk int.	2-8' slow
399	167	20	5	110	2	55					metaseds,lite-drk int.	8-20' slow
400	166	55	40	115	2	65					sc,ar,int.intr.	2-8' slow
401	165	40	5	105	2	50					sc,ar,int.intr.	2' slow
402	164	90	10	245	4	70					sc,ar,int.intr.	2-8' slow
403	5B163	45	10	95	1	55				sc,& gr	lite-int.intr.,cg & ar	20-60' rapid
404	162	20	10	85	1	55					lite-int intr & cg & ar	2-8' slow
405	161	80	5	145	2	80					grn.sc & lite intr.	2-8' rapid

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
Figure 1												
406	6B137R			pyroxenite & amphibolite w/pyrrhotite - float								
	6B137	40	10	45	2				53.		sc & int.ig.gneiss w/pyrr.	2-8' slow
407	136	15	5	45	4	30			55.		lite-dark intr.sc, ph,gneiss w/pyr	2-8' slow
408	135	20	15	70	2	40			53.	sc & ph	lite-int.intr,ph,sc	2-8' rapid
409	134	25	20	65	2	30			53.		int.intr,schist	2-8' rapid
Figure 4												
410	133	10	5	45	2	40			55.5		lite-ultra basic intr.	2-8' rapid
411	5B247	20	10	80	2	55				phyllite	ph,lite-int.intr.	2-8' slow
412	246	35	10	125	3	60				"	" " " "	2-8' slow
413	244	35	15	135	7	70			54.5	schist	sc,lite intr.	8-20' rapid
414	241	35	10	90	4	65				"	sc	2-8' w/falls
415	242	50	10	75	3	55					meta seds	2' slow
416	243	55	10	85	3	45			53.	schist	sc-lite ig	2-8' slow
417	245	20	20	90	3	50			53.	"	metased lite-int. intr.	8-20' rapid
418	6B132	35	30	170	3	70			53.	"	metased lite-int. intr.	8-20' rapid
419	6B131R						schist w/pyr. & Pyrr.					
	131	90	25	500	6	130			53.		metased lite-int. intr.	2-8' w/falls
420	130	75	20	235	4	200			53.	schist	metased lite-int. intr.	2-8' rapid
421	5B159	45	20	485	5	150		pink w/or ppt	53.	sc w/qtz	sc,ar,10%int.intr.	
422	158R	tr		tr			basalt w/sulphides				basalt	
	158	25	15	465	4	150			52.2	ar	sc,ar,40%int.intr.	8-20' rapid
423	157	40	10	2200	6	370			53.2	ar w/qtz	sc,ar,10%int.intr.	8-20' rapid
424	6B277	65	10	420	7	175			53.	argillite	ar,sc	8-20' rapid
425	6B276R	10	5	450	3	95	-0.25	ppm Au,-1		ar/qtz		
	276	20	675	13000	13	1500				ar/qtz	ar,w/qtz (very rusty)	2' w/falls
426	5B156	65	65	9500	7	1000			53.3	argillite	metased & 50% int. intr.	2-8' rapid
427	6B275R						argillite w/sulph.					

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
427	275	165	40	2600	27	630			54.	argillite	ar	2' rapid
428	5B150	100	20	600	12	165			53.		ar,qtz,int.intr.	8-20' rapid
429	6B274R	25	5	40	2	45	-0.25 ppm Au,-1 ppm Ag					
	274	60	15	840	23	160			54.	argillite	argillite	2' rapid
	6B274 1/2 R	45	10	140	2	170	-0.25 ppm Au, -1 ppm Ag			schist		
430	6B270	240	40	2300	11	850			54.	ar w/qtz & pyr.		2' w/ falls
	6B270R						black slate w/sulphides					
431	271	15	20	180	9	30			54.	ar w/qtz & pyr	Argillite	2' w/falls
432	6B272	70	10	380	7	150				" " " "	ar,sc, & qtz	2-8' rapid
433	273	70	15	320	5	125			54.	" " " "	" " " "	2-8' rapid
434	5B151	10	5	85	1	55				phyllite	ar,dark intr,qtz (rusty)	2' slow
435	152	35	5	130	2	75					metaseds,lite-drk intr.	8' slow
436	153	30	10	170	3	95				argillite	" " " "	20-60' slow
437	154	30	10	165	2	90					" " " "	2' slow
438	155	15	10	80	1	75					glacial fill	2' slow
439	160	65	15	290	5	100					grs,lite-drk intr.	20-60' slow
Figure 1												
440	6B129	45	10	85	2	50			53.	schist	fine sand	20-60' slow
441	128	40	15	105	2	60			53.	"	sc,m,int.intr.	8' rapid
442	127	25	10	95	2				53.	sc & m	" " " "	20-60' rapid
443	126	25	10	95	2				53.	" " "	sc, m	20-60' rapid
444	6B125R						hornblende gneiss w/pyrr					
	125	25	10	70	2				53.	gn w/pyrr.	sc,m,gr,lite-drk intr.	20-60' rapid
445	6B124	30	10	60	2				53.	marble	sc,m,gr,lite-drk intr,some gn	20-60' rapid
446	123	35	10	70	2					marble	m,lite-drk intr.w/ pyr	8-20' rapid
447	6B122R						diorite w/diorite & 2-5% pyrrhotite - float					
	122	20	10	55	3				53.	sc,m	sc,m,d.w/pyr.pyrr.	60' rapid
448	121	20	15	85	4					m	m,10% lite intr.	8' w/falls
449	6B110R						silicified breccia w/minor pyrrhotite					
	110	20	10	90	4				53.	seds,ch	seds w/few intr. boulders	8-20' rapid

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
450	6B109R						quartzite w/pyr					
	109	40	10	75	3				53.	quartzite	quartzite,siltstone	2-8' slow
451	108	40	15	80	3				53.	int.intr.	int.intr.	2' rapid
452	6B107R						qtz diorite in contact with biotite schist, diorite w/pyr & pyrr - float					
	107	30	10	115	2				53.		qtz,d,w/pyr & pyrr c, sc	2' slow
453	105	60	15	105	2				53.	schist	sc,m,int.intr.	8' rapid
454	106	45	10	115	2				53.	mica sc	sc,int.intr.,m	2-8' rapid
455	113	50	5	110	2				53.		ls,sc,lite intr.	2-8' rapid
456	6B112						quartzite w/2-5% pyrrhotite					
	112	35	10	90	4				53.	qtzite w/ pyrr.	qtz, w/pyrr,ls	2-8' rapid
457	111	35	5	80	3				53.	granite	granite	2-8' rapid
458	116	50	10	110	3					coal shale	shale,10% lite intr	2-8' slow
459	120	20	10	80	3				53.		lite intr.,sh,w/pyr	8-20' slow
460	119	25	10	80	4				53.		" " ",qtz	20-60' slow
461	118	25	20	130	3				53.		shale,lite intr.	2-8' slow
462	117	30	15	110	3				53.	sedimentary	sedimentary	2-8' slow
463	104	40	10	90	2				53.	schist	sc,m,int.intr.	8' rapid
464	103	55	15	125	4				53.	"	sc,m,ar	8' rapid
465	6B102	30	15	95	3						sc,m	8' rapid
466	101	70	25	245	4				53.	ar,w/qtz	ar	2-8' rapid
467	100	50	15	155	4						metased.,lite intr	2' rapid
468	99	50	15	250	4				53.		ls,shale " "	8' rapid
469	6B98R						schist & vein qtz w/pyr					
	98	50	20	300	6					sc.w/qtz &	pyr;ar,m, " "	2-8' w/falls
470	96	50	20	100	3						metased,lite intr.	20' rapid
471	95	65	20	130	2						metased,vol,lite intr	20-60' rapid
472	94	30	20	105	2				53.		ar,do	2-8' slow
473	93	100	20	200	3						metaseds	60' slow
474	88	60	15	115	3				53.		do,ls,vol,ar	60' slow
475	87	50	15	85	2				53.		" " " "	8-20' rapid
476	85	50	10	100	2				53.	argillite	vol,ls,ar,do	2-8' rapid
477	86	50	15	95	2						" " " "	20-60' rapid
478	84	40	10	95	2				53.		" " ,do	8-20' w/falls
479	85	70	10	130	2				53.		" ,ch,ar,do	20-60' rapid

Figure 5

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
480	6B92R						contorted gneiss & black schist w/pyr.					
	92	35	15	130	2				53.5	sc,gn,w/pyr	sc & marble	8-20' w/falls
481	89	20	10	95	4				53.		ls,ar,do,vol	2-8' rapid
482	82	30	10	105	2				53.	cg	ls & vol	2-8' rapid
483	81	30	10	145	2				53.		vol	8-20' w/falls
484	80	30	10	75	2				53.		"	2-8' rapid
485	79	30	10	85	4						"	2-8' rapid
486	90	25	15	120	2				53.	schist	sc,vol,ls	20-60' rapid
487	78	35	15	105	4				53.	vol	vol	20-60' w/falls
488	6B91	20	15	90	2				53.8	vol	vol & ls	20-60' slow
489	77	30	10	75	2				53.		vol	8-20' rapid
490	76	40	5	75	2				53.	vol	vol	2-8' rapid
491	75	40	20	95	2				53.	vol	vol	2-8' rapid
492	74	30	20	115	4				53.	ar & sc	ar,vol	2-8' slow
493	73	35	5	90	2						vol, metaseds	8-20' slow
494	72	50	15	285	5					argillite	ar,silic sc,vol	2-8' rapid
495	71	60	15	155	4				53.	ar w/qtz	ar,sc,qtz,ls	2' slow
496	70	55	20	225	7				53.		" " " " ,do	2' slow
497	69	65	20	190	4				53.	schist	ar,sc,do,ls	2' slow
498	68	90	20	600	7				53.		ar,sc,ls	2-8' slow
499	67	75	25	290	5				53.	sc,& ar	ar,sc,do	2-8' rapid
500	66	30	50	145	6				53.		ar,qtz chert	2' slow
501	58	20	20	290	3				53.	vol	vol	8-20' rapid
502	65	25	10	120	3				53.		vol	2-20' rapid
503	62	25	15	95	2					vol	vol	8-20' rapid
504	61	10	10	100	4					"	"	2-8' slow
505	60	15	15	100	3						"	60' slow
506	59	10	10	105	3				53.		" & ar	20-60' slow
507	63	10	15	115	2						"	8-20' slow
508	64	10	15	140	6					vol	"	2-8' rapid
509	57	20	15	115	2				53.		vol w/pyr	20-60' slow
510	56	25	15	130	2				53.		vol w/qtz & pyr	2-8' w/falls
Figure 1												
511	6B55R					tactite w/pyr						
	6B55	30	10	95	2					tactite w/ pyr	ar,chert,vol	8-20' rapid

Table 4 (cont)

		Metal Content (ppm)					Field Test		Mag			
Map No.	Samp.No.	Cu	Pb	Zn	Mo	Ni	ml dye Cx	Color Reaction	intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
512	54	20	10	115	2					ar	ar,ch,lite intr,do	8-20' rapid
513	53	20	15	125	2				53.	vol	vol	2-8' slow
514	52	15	15	125	2				53.	vol	an,some gb	2-8' rapid
515	51	20	15	100	2				53.		vol,some gb	2-8' rapid
516	49	25	15	115	2					vol	an,basalt,ar,qtz	2-8' w/falls
517	48	10	15	105	3				53.	vol	vol	60' rapid
518	50	15	15	95	2				53.		vol,chert,ar	20-60' slow
519	47	10	15	170	4				53.	vol	vol	8-20' slow
520	46	15	5	120	2				53.		vol	8-20' slow
521	45	10	20	175	3						andesite	2-8' slow
522	44	20	15	135	2				53.		vol	2-8' rapid
523	43	25	15	135	3				53.		andesite	2-8' w/falls
524	42	10	40	155	2				53.	vol	vol	2-8' w/falls
525	41R					felsite w/pyrite						
526	41	15	20	155	3				53.	felsite w/ pyr.	vol,qtz,ls	2-8' w/falls
527	40	15	15	110	10				53.		vol,lite intr,ls	20-60' slow
528	39									ls & vol	vol,lite intr,do, qtz	8-20' slow
529	38	30	15	115	2					ls & cg	ls,cg,qtz	2-8' slow
530	37									ls	ls,cg,vol	20-60' rapid
531	36	25	15	115	3				53.	ls,do	ls,cg,vol	2-8' rapid
532	35	25	10	105	2				53.	ls	ls,cg,vol	2-8' w/falls
533	6B34	20	10	110	4				53.	ls,cg	ls,cg,vol rusty	2-8' slow
534	33	15	15	115	3				53.	ls,mudstone	metaseds	2-8' rapid
535	31T	15	15	125	3						metaseds	20-60' slow
536	32T	20	10	120	3						"	60' slow
537	32	20	15	130	3							
538	31	15	15	130	4					vol	vol,metaseds	2-8' w/falls
539	30	10	5	90	3						" "	6' rapid
540	29	20	20	155	4						do,ar,vol	8' rapid
541	28	15	15	105	2					do,ar	do,ar,vol	50' slow
542	27	15	15	160	3					cg	seds,metaseds.	8-20' slow
543	26	10	15	115	3					cg	metaseds	8-20' slow
544	25	20	20	115	4					cg	metaseds	2-8' slow

Table 4 (cont)

Map No.	Samp.No.	Metal Content (ppm) Cu	Pb	Zn	Mo	Ni	Field Test ml dye Cx	Color Reaction	Mag intensity x 1000 Gammas	Bedrock	Stream Sediments	Stream Characteristics
545	24	25	15	135	3					do,ar	do,ar	2-8' rapid
546	23	20	15	95	4					do,ar	do,ar	2' slow
547	22	15	15	115	4					do,ar	do,ar	2-8' slow
548	20	20	15	115	4						vol	8-20' rapid
549	21	15	10	95	3						vol	2-8' rapid
550	8	15	20	105	4				52.	vol	vol	2-8' w/falls
551	9	10	20	115	4				53.	vol	vol breccia	2' w/falls
552	10	15	10	85	3				53.		vol	2-8' rapid
553	11	10	15	110	3				53.	vol breccia	vol breccia	20' w/falls
554	12	20	20	115	4				53.	vol	vol	20-60' rapid
555	19	15	10	95	2						vol	20' slow
556	18	20	10	80	3					vol	vol	2-8' w/falls
557	17	20	15	105	3					vol	vol	2-8' w/falls
558	16	15	10	100	4					vol	vol	20-60' slow
559	15	20	15	90	4						vol,some do	20-60' slow
560	6B14R					felsite w/pyrite & andesite w/pyrrhotite float						
	14	25	35	95	2				53.		an,w/pyr,some do	8-20' rapid
561	13	30	15	90	3				53.	vol	vol,lite intr,do	8' w/falls
562	7	25	10	120	3				53.	vol	vol	2-8' slow
563	6	15	10	75	3				53.	vol	vol,some lite intr.	8-20' rapid