STATE OF ALASKA

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GEOCHEMICAL REPORT NO. 16

# A GEOCHEMICAL INVESTIGATION OF A PORTION OF THE FORTYMILE DISTRICT, EAST-CENTRAL ALASKA

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# A GEOCHEMICAL INVESTIGATION OF A PORTION OF THE FORTYMILE DISTRICT EAST-CENTRAL ALASKA

## INTRODUCTION AND SUMMARY

A Geochemical investigation of the southwest portion of the Fortymile district in east-central Alaska was conducted during June 2 to July 5 and August 17 to September 5 of 1967.

This study was undertaken as a follow-up of A Geochemical Investigation Along the Taylor Highway, East-Central Alaska by R. H. Saunders. The purpose of the present investigation was to do detailed geochemical stream sediment sampling in and near the Chicken mining camp, an area only partly covered in the previous report.

The area covered includes the drainage of Chicken, Lost Chicken, Franklin, Ingle, Wall Street, Fortyfive Pup, and Buckskin Creeks; portions of Mosquito and South Forks of the Fortymile River; and eight other unnamed adjacent creeks. A total of 176 stream sediment samples were taken, of which 25 had probable or possible anomalous concentrations of copper, zinc, lead, molybdenum, or nickel. Limited bedrock sampling, including possibly mineralized veins, was undertaken, and 26 samples were selected for assay or analysis (see tables 2 and 3). A computation of results from both sources reveal three areas worthy or more detailed investigation.

## PHYSICAL FEATURES

Topographic relief ranges from altitudes of 1600 feet in the Mosquito Fork floodplain to 5500 feet on the ridge crest above the headwaters of Fortyfive Pup. The hills are rounded and wooded with brush and small trees to an altitude of 3500 feet. Spruce up to 20 inches in diameter is found in stream and river valleys where not logged. The area is well drained, and despite the presence of continuous permafrost, only a few swamps and bogs occur. Lakes are rare and restricted to oxbow lakes in the floodplain of the South Fork with the exception of two small pingo lakes on tributaries of Fortyfive Pup.

## GEOLOGY

The geology of the area has been described by J. B. Mertie, Jr. (1937).

The Precambrian Birch Creek schist is the oldest rock unit in the area. It is best exposed in the valley of Franklin Creek where it is composed of marble, hornblende schist, and biotite schist, and is intruded by several small granitic plutons. The contact between the Birch Creek schist and metamorphic rocks of Paleozoic age is poorly defined, but is thought to lie on the north side of the ridge between the Franklin and Chicken Creek drainages.

Metamorphosed Paleozoic greenstone, phyllite, marble, hornblende schist, and biotite schist have been intruded by small Mesozoic plutons ranging in composition from diorite to granite.

Basalts and gabbros of Tertiary age crop out conspicuously along the road from Mosquito Fork bridge to the lower end of Switch Fork. Tertiary sediments, sandstones, shales, and conglomerate with some lignite occur on the ridge nose at 2000 feet between Myers Fork and a small creek to the south. Late Tertiary high level stream terraces border most of the present drainage, though in some cases, such as at Lost Chicken Creek, they are now isolated from the principal drainage. Some of these terrace deposits are auriferous.

Pleistocene and recent alluvial deposits occur in the present stream valleys and on lower Chicken Creek. These deposits are mostly a frozen dark gray to black silt or "muck" with ice lenses containing bones of Pleistocene vertebrates. Periglacial features include fossil and active ice wedges, active solifluction lobes, inactive rock glaciers, stabilized talus, and possibly small abandoned cirques.

## MINERAL DEPOSITS

Placer gold was discovered on Franklin Creek in 1886, and has been mined in the district since that time. Gold placers in the area have been worked on Franklin Creek, Stonehouse Creek, Chicken Creek, Lost Chicken Creek, Fortyfive Pup, Ingle Creek, and parts of Mosquito Fork and South Fork. Some prospecting for lode gold and base metals has been done, but no hardrock production has resulted. One occurrence of lode mineralization is exposed on the ridge between Stonehouse Creek and Myers Fork where free gold in calcite and quartz veins is present on the claims of local miner Art Purdy. A deposit yielding flour gold is located approximately 200 feet above the river upstream from Mosquito Fork bridge. An occurrence associated with a porphyry lies on the bench between Chicken and Lost Chicken Creeks. A second occurrence of free gold in quartz and calcite veins was reported in the headwaters of Ingle Creek. The writer examined a sample reputed to have come from this location. Much free gold in thin flakes was observed distributed in the calcite portion of the vein.

On Lilliwig Creek, a tributary to Ingle, a lode consists of small parallel stringers of quartz and calcite with gold bearing sulfides which assayed 1.87 ounces of gold and 2.05 ounces of silver to the ton. A lead-silver prospect is being investigated near the Taylor Highway on the next creek east of Lost Chicken Creek.

Scheelite is common in concentrates from all creeks in the area. Claims for scheelite have been staked in the past in the headwaters of Fortyfive Pup and Buckskin Creeks. Cinnabar was identified in the concentrates from Stonehouse Creek. From the concentrates of the Chicken dredge,magnetite, ilmenite, marcasite, pyrite, and barite were identified. A spectrographic analysis also showed approximately one ounce of silver per ton in a selected sample of the heavy nonmagnetic fraction. A serpentine float sample showing short fiber asbestos was found on a bench at the Hepeman property on Fortyfive Pup. It is possible that this sample has a distant source, but other asbestos-free serpentinite float indicates that it may be locally derived.

## GEOCHEMICAL INVESTIGATION

One hundred seventy-six samples of stream sediments were taken during this investigation. They were tested in the field for cold extractable heavy metals following the procedure given by Hawkes (1963, p. 579). Xylene was used as solvent for the dithizone. Samples of the finest sediment available were selected from beneath stream water level. These usually consisted of silt and clay-size particles. Where only sand could be found, a large two-pound sample was taken in order that the fines could be mechanically concentrated. Contamination and dilution in old placer workings are always possible, and for this reason not much can be learned from one anomalous sample from a placered area. Samples were sent to Rocky Mountain Geochemical Laboratories in Salt Lake City to be analyzed for trace amounts of copper, zinc, lead, molybdenum, and nickel. This approach was based on the probability that a metallic deposit would contain enough of one or more of these metals to form a traceable dispersion pattern, regardless of what metal constituted the chief value in the deposit.

Results of the field and laboratory tests are shown in table I. The locations where the samples were taken are shown on figure 3. Frequency distribution graphs illustrating relative numbers of samples containing various concentrations of the metals are shown in figures 1 and 2.

The definition of what is and what is not an anomalous sample is somewhat arbitrary. This is because of the diversity of rock types with each having its own range of heavy metal content. Two classes of anomalous samples are distinguished. Possibly-anomalous samples which are generally greater than the second standard deviation, and probably-anomalous samples which are greater than the third standard deviation. Listed below are the ranges for possibly-and probably-anomalous samples in the map area:

| Element | Possibly-anomalous | Probably-anomalous |
|---|---|---|
| Copper | 35 ppm to 45 ppm | 45 ppm or greater |
| Zinc | 140 ppm to 165 ppm | 165 ppm or greater |
| Lead | 25 ppm to 30 ppm | 30 ppm or greater |
| Molybdenum | 3 ppm to 4 ppm | 4 ppm or greater |
| Nickel | 60 ppm to 70 ppm | 70 ppm or greater |

The prospector using geochemical methods should carefully define his own background values in the area where he is working. The above data, while useful as an average in this areal study should be applied with caution to any particular part of the area.

## Anomalous areas

A weakly anomalous molybdenum area is indicated by samples taken at locations 5 and 8 in figure 3. These are in an area of small granitic Mesozoic plutons intruded into amphibolites and marbles. Molybdenum is usually less mobile than copper, but one or more of the intrusives along the ridge may have mineralized the country rock in a contact deposit which might carry molybdenum, copper, or scheelite. Because of the sparsity of streams, a system of soil and bedrock sampling would probably be most productive. Particular attention should be paid to contact areas around the plutons.

A second anomalous area is on the hill bounded on the west by Chicken Creek and on the south and east by the South Fork (figure 3). Several samples with anomalous amounts of lead, copper, zinc, and nickel were found there. The geology of this area consists of granitic intrusives which intrude greenstones and acid lavas. The nickel anomalies may indicate an ultrabasic body in that part of the hill or they may be derived from the greenstones. A prospect near sample 58 occurs in a contact zone between a small intrusive and greenstone. It shows lead, zinc, and copper mineralization. Similar deposits might be found in the next creek to the east and higher on the hill. Additional stream sediment samples collected at closer spacing in the area of the highest anomaly, along with soil and bedrock samples, should more closely define the extent of mineralization.

The presence of chromite in the stream sediments would indicate that the probable source of the nickel anomaly is an ultrabasic body.

The third anomalous area is the hill bounded by Wall Street Creek and Walker Fork (figure 3). Several samples show possibly-anomalous values of copper, and one in the creek above Lassen Strip shows a probably-anomalous value of copper. Several small granitic plutons in the area are intruded into schist, amphibolite, and marble. More stream sediment samples should be taken in the streams south of Lassen Strip. An anomaly suppressed by the presence of marble may exist on Wall Street Creek. Additional soil and bedrock sampling should be done, particularly in areas around the contact between the granitic intrusives and the host rock.

## Recommendations to prospectors

Three anomalous areas are indicated in this study, but none are of striking proportion. Several conditions tend to suppress anomalous values in stream sediment sampling. One of the most important of these is the presence of large amounts of limestone or marble in an area. In such an environment, the metals tend not to migrate as far as they might in a noncarbonate area. Extensive areas of marble outcrop in Wall Street Creek, Franklin Creek, and parts of the Chicken Creek and Buckskin Creek Drainage.

The prospector should first take more stream sediment samples in the anomalous areas indicated by this investigation and have them analyzed for trace metal content. As can be seen in the tabulated geochemical data, the field tests failed to indicate some anomalous areas. Soil samples might then be taken in the area of highest geochemical anomalies. The prospector should penetrate the organic cover and take all samples from the same soil horizon.

## REFERENCES CITED

Hawkes, H. E., 1963, Dithizone field test: Economic Geology, v. 58, p. 579-586

Mertie, J. B., 1937, The Yukon-Tanana Region, Alaska: U. S. Geol. Survey Bull 872, 276 p.

Saunders, R. H., 1966, A geochemical investigation along the Taylor Highway, east-central Alaska: Alaska Div. Mines and Minerals, Geochemical Report No. 9, 17 p.

Table I

Copper, zinc, lead, molybdenum, and nickel content of stream sediments in the Fortymile District

| Map No. | Sample No. | Concentration (ppm)* Cu | Zn | Pb | Mo | Ni | Field** Test | Stream Width | Float at sample site | Bedrock | Mineral-ization | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7N 45 | 5 | 40 | 10 | 1 | 10 | 0 | 2 | basalt | | | |
| 2 | 7E 33 | 15 | 50 | 10 | 1 | 30 | 1 | 50 | 80-basalt, 20-granitic | basalt | | |
| 3 | 7N 48 | 20 | 85 | 20 | 1 | 40 | 1 | 3 | granitic, schists, basalt | | | |
| 4 | 7N 47 | 5 | 45 | 10 | 1 | 10 | 1 | 3 | granitic | | | |
| 5 | 7E 35 | 15 | 55 | 10 | <u>3</u> | 20 | 0 | 2 | 50-granitic, 50-amphibolite | | | |
| 6 | 7E 34 | 5 | 35 | 10 | -1 | 10 | 1 | 2 | granitic | | | |
| 7 | 7N 68 | 15 | 105 | 10 | 1 | 20 | 3 | 2 | granitic | granite | | |
| 8 | 7N 67 | 15 | 65 | 10 | <u>4</u> | 20 | 3 | 2 | marble | | | |
| 9 | 7N 9 | 10 | 110 | 20 | 2 | 10 | 2 | 3 | granitic, greenstone | | | |
| 10 | 7N 31 | 15 | 125 | <u>30</u> | 1 | 30 | 1 | 3 | tuffaceous sediment | | | *** |
| 11 | 7N 30 | 15 | 70 | 10 | 1 | 30 | 2 | seep | n/ob | | | |
| 12 | 7N 29 | 20 | 75 | 10 | 1 | 10 | 9 | 1 | n/ob | | | *** |
| 13 | 7N 81s | 10 | 65 | 10 | -1 | 30 | 0 | | | basalt | | soil samples on basalt |
| 13 | 7N 82s | 25 | 105 | 10 | 1 | 40 | 1 | | | basalt | | soil samples on basalt |
| 13 | 7N 83s | 30 | 125 | 10 | 1 | 40 | 0 | | | basalt | | soil samples on basalt |
| 14 | 7E 18 | 10 | 60 | 10 | -1 | 30 | 2 | 50 | basalt, minor granitic | | | |
| 15 | 7N 11 | 15 | 45 | 10 | 1 | 10 | 2 | 4 | 75-granitic, 20-basalt, 5-greenstone | | | |
| 16 | 7N 17 | 20 | 75 | 10 | -1 | 30 | 6 | seep | n/ob | | | *** |

| Map No. | Sample No. | Concentration (ppm)* Cu | Zn | Pb | Mo | Ni | Field** Test | Stream Width | Float at sample site | Bedrock | Mineral-ization | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | 7N 18 | 25 | 90 | 20 | -1 | 30 | 11 | 3 | n/ob | | | *** |
| 18 | 7N 10 | 15 | 80 | 20 | 2 | 20 | 6 | 5 | 75-granitic, 20-basalt 5-chert | | | ** |
| 19 | 7N 15 | 10 | 40 | 10 | -1 | 10 | 0 | 1 | granitic | | | |
| 20 | 7N 16 | 20 | 90 | 10 | -1 | 30 | 2 | 1 | n/ob | basalt | | |
| 21 | 7E 3 | 20 | 95 | 20 | 1 | 30 | 2 | 2 | n/ob | | | |
| 22 | 7N 14 | 10 | 45 | 10 | 1 | 20 | 3 | 3 | granitic | | | |
| 23 | 7E 2 | 10 | 75 | 10 | 2 | 20 | 1 | 1 | granitic | granite | | |
| 24 | 7N 13 | 5 | 40 | 10 | -1 | 10 | 2 | 3 | granitic | | | |
| 25 | 7E 1 | 10 | 35 | 10 | 1 | 20 | 0 | 1 | granitic | granite | | |
| 26 | 7N 12 | 10 | 65 | 10 | 1 | 10 | 2 | 3 | granitic | | | |
| 27 | 7E 7 | 10 | 100 | 20 | 1 | 50 | 0 | 8 | 33-basalt, 33-granitic 33-schists | | | in placer cut |
| 28 | 7E 6 | 15 | 90 | 30 | 1 | 40 | 2 | 6 | 80-schists + quartzites | | | placered |
| 29 | 7E 5 | 10 | 60 | 20 | -1 | 30 | 2 | 3 | 75-quartzite, 25-granitic | | | |
| 30 | 7N 22 | 5 | 15 | -10 | -1 | 10 | 1 | 2 | granitic | | | |
| 31 | 7E 4 | 5 | 65 | 20 | 1 | 20 | 2 | 1 | 20-granitic, 80-quartzite | | | |
| 32 | 7N 21 | 5 | 40 | -10 | -1 | 20 | 0 | 2 | granitic | | | |
| 33 | 7N 20 | 5 | 25 | -10 | -1 | 20 | 0 | 1 | granitic | | | |
| 34 | 7N 19 | 20 | 75 | 10 | -1 | 30 | 4 | 3 | granitic | granite | | |
| 35 | 7E 8 | 10 | 65 | 20 | 1 | 20 | 1 | 2 | 45-granite, 45-basalt 10-schists | | | |
| 36 | 7E 17 | 15 | 125 | 20 | 1 | 40 | 0 | 2 | basalt | | | |
| 37 | 7E 9 | 5 | 40 | 10 | -1 | 10 | 2 | 2 | 30-quartzites, 70-granitic | | | |

| Map No. | Sample No. | Concentration (ppm)* Cu | Zn | Pb | Mo | Ni | Field** Test | Stream Width | Float at sample site | Bedrock | Mineral-ization | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38 | 7E 10 | 5 | 60 | 10 | -1 | 30 | 0 | 1 | schists | | | |
| 39 | 7E 11 | 5 | 35 | 10 | 1 | 10 | 0 | 1 | granitic | granite | | |
| 40 | 7E 16 | 20 | 90 | 10 | 1 | 60 | 2 | 3 | 60-basalt, 30-schists | | | |
| 41 | 7E 15 | 30 | 85 | 10 | 1 | 50 | 2 | 2 | schists, talc schists greenstone | | | |
| 42 | 7N 24 | 30 | 110 | 20 | 1 | <u>60</u> | 0 | 2 | phyllite-quartz, schist | | | |
| 43 | 7E 14 | 20 | 85 | 10 | 1 | 30 | 2 | 2 | n/ob | | | |
| 44 | 7E 13 | 15 | 95 | 10 | 1 | 30 | 0 | 1 | n/ob | | | |
| 45 | 7E 12 | 20 | 70 | 20 | 1 | 40 | 2 | 1 | n/ob | | | |
| 46 | 7N 4 | 5 | 65 | 10 | -1 | 40 | 2 | 2 | granitic | granite | | |
| 47 | 7N 5 | 15 | 60 | 10 | -1 | 40 | 1 | 2 | granitic | granite | | |
| 48 | 7N 6 | <u>35</u> | <u>155</u> | 20 | 1 | <u>80</u> | 1 | 2 | greenstone | | | |
| 49 | 7N 7 | <u>45</u> | <u>150</u> | 20 | 1 | <u>90</u> | 1 | 2 | greenstone | | sparse sulfides quartz flood | |
| 50 | 7N 3 | 15 | 65 | 10 | 1 | 30 | 2 | 2 | granitic-basalt | granite, basalt | | old ditch |
| 51 | 7N 1 | 10 | 55 | 10 | 1 | 20 | 0 | 1 | n/ob | | | |
| 52 | 7N 2 | 10 | 50 | -10 | 2 | 20 | 0 | 2 | granitic | granite | | |
| 53 | 7E 21e | 10 | 55 | 10 | 1 | 40 | 0 | 3 | 50-granitic, 40-greenstone, 10-basalt | | | hydraulic cut |
| 54 | 7E 22 | 10 | 90 | 10 | 1 | 30 | 0 | 50 | 60-granitic, 40-basalt | | | |
| 55 | 7E 23 | 10 | 35 | 10 | 2 | 30 | 0 | 50 | 60-granitic, 40-basalt | | | |
| 56 | 7E 26 | 30 | 130 | <u>30</u> | 1 | 50 | 10 | 2 | 40-granitic, 50-greenstone | | | *** |
| 57 | 7E 27 | 25 | 125 | 20 | 2 | 30 | 20+ | 2 | 20-granitic, 50-intermediate volcanic, 30-greenstone | | | *** |
| 58 | 7E 28 | <u>40</u> | <u>160</u> | <u>40</u> | 1 | <u>60</u> | 20+ | 2 | 40-granitic, 60-greenstone | | | Ag, Pb, prospect |

| Map No. | Sample No. | Concentration (ppm)* Cu | Zn | Pb | Mo | Ni | Field* Test | Stream Width | Float at sample site | Bedrock | Mineral-ization | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 59 | 7E 21d | 30 | 125 | 20 | 1 | 60 | 3 | 2 | schists, greenstone | | | |
| 60 | 7E 20 | 25 | 105 | 20 | 1 | 60 | 0 | 2 | schists, greenstone | | | |
| 61 | 7E 19 | 50 | 105 | 20 | 1 | 90 | 2 | 2 | altered intermediate volcanic greenstone | | | |
| 62 | 7N 35 | 10 | 60 | 10 | 1 | 40 | 1 | 75 | greenstone | basalt | | |
| 63 | 7N 33 | 30 | 120 | 20 | 1 | 50 | 14 | 3 | greenstone | greenstone | | *** |
| 64 | 7N 26 | 40 | 170 | 40 | -1 | 40 | 7 | 1 | basalt | | | *** |
| 65 | 7N 25 | 35 | 155 | 30 | 1 | 40 | 1 | 1 | basalt | | | |
| 66 | 7N 28 | 40 | 145 | 30 | 1 | 40 | 0 | 1 | n/ob | | | |
| 67 | 7E 24 | 10 | 40 | 10 | 1 | 20 | 0 | 50 | 80-granitic, 20-basalt | greenstone | | |
| 68 | 7N 23 | 15 | 85 | 20 | 1 | 30 | 0 | 50 | n/ob | | | |
| 69 | 7N 75 | 10 | 50 | -10 | 1 | 30 | 2 | 2 | marble, granitic, greenstone | | | |
| 70 | 7N 76 | 15 | 60 | -10 | 1 | 20 | 2 | 1 | granitic greenstone | | | |
| 71 | 7N 78 | 10 | 55 | -10 | 1 | 10 | 1 | 4 | granitic, marble | | | |
| 72 | 7N 77 | 5 | 35 | -10 | -1 | 10 | 2 | 1 | granitic | | | |
| 73 | 7N 79 | 10 | 40 | -10 | -1 | 10 | 2 | 1 | granitic | | | heavy iron stain |
| 74 | 7N 81 | 5 | 45 | -10 | 1 | 10 | 6 | 4 | granitic, schists, marble, greenstone | | | *** |
| 75 | 7N 80 | 5 | 55 | 10 | 1 | 10 | 2 | 1 | granitic | granite | | |
| 76 | 7N 82 | 5 | 40 | -10 | 1 | 10 | 1 | 4 | granitic, greenstone, marble | granite | | |
| 77 | 7N 83 | 5 | 40 | 10 | 1 | 20 | 1 | 4 | schists, greenstone | schist | | |
| 78 | 7E 73 | 15 | 70 | 10 | -1 | 20 | 0 | 2 | 50-granite, 50-marble | | | |
| 79 | 7E 75 | 15 | 85 | 10 | 1 | 30 | 0 | 5 | hornblende schist | hornblende schist | | placered |

| Map No. | Sample No. | Concentration (ppm)* Cu | Zn | Pb | Mo | Ni | Field** Test | Stream Width | Float at sample site | Bedrock | Mineral-ization | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80 | 7E 74 | 25 | 85 | 10 | 1 | 50 | 0 | 2 | 30-marble, 70-schists | | | |
| 81 | 7E 76 | 20 | 75 | 20 | 1 | 40 | 0 | 5 | 15-marble, 25-granitic 60-schists | hornblende schist | | placered |
| 82 | 7E 77 | 20 | 90 | 20 | 1 | 50 | 1 | 50 | 60-granitic, 40-schists | | | |
| 83 | 7N 37 | 10 | 70 | 10 | 1 | 40 | 1 | 100 | greenstone | greenstone | | |
| 84 | 7E 32 | 20 | 105 | 20 | -1 | 30 | 0 | 3 | 35-gneiss, 45-amphibolite 20-marble | | | |
| 85 | 7E 31 | 20 | 100 | 20 | 1 | 40 | 1 | 3 | 50-marble, 10-schists 40-amphibolite | marble | | |
| 86 | 7E 30 | 35 | 120 | 10 | 1 | 60 | 0 | 2 | 20-quartzite, 80-am-phibolite | | | |
| 87 | 7E 29 | 20 | 100 | 20 | 1 | 40 | 2 | 2 | 60-fine grained gneiss 40-quartzite | | | |
| 88 | 7E 28b | 25 | 95 | 20 | 1 | 30 | 3 | 2 | 20-garnet schist, 70-quartzite, 10-gneiss | | | |
| 89 | 7N 43 | 20 | 105 | 10 | 1 | 20 | 0 | 2 | schists | | | |
| 90 | 7N 42 | 10 | 85 | 10 | 1 | 20 | 0 | 1 | schists | | | |
| 91 | 7N 41 | 15 | 85 | 10 | 1 | 30 | 0 | 2 | schistose | | | |
| 92 | 7N 40 | 5 | 50 | 10 | 1 | 50 | 0 | 100 | 75-quartzite, phyllite, and schist, 25-granitic | | | |
| 93 | 7E 72 | 35 | 110 | 20 | 1 | 30 | 0 | 2 | 25-marble, 25-quartzite, 50-schists | | | |
| 94 | 7E 71 | 30 | 85 | 10 | 2 | 40 | 3 | 2 | schists | | | |
| 95 | 7N 39 | 5 | 55 | 10 | -1 | 30 | 0 | 100 | 75-quartzite, phyllite, and schist, 25-granitic | | | |
| 96 | 7E 25 | 35 | 90 | 10 | 1 | 50 | 0 | 2 | 20-quartzose schist 30-marble, 40-hornblende schist | | | |

| Map No. | Sample No. | Concentration (ppm)* Cu | Zn | Pb | Mo | Ni | Field** Test | Stream Width | Float at sample site | Bedrock | Mineral-ization | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97 | 7N 74 | 30 | 80 | -10 | 1 | <u>60</u> | 1 | 3 | schists | | | |
| 98 | 7N 73 | <u>40</u> | 90 | 10 | 1 | 30 | 2 | 2 | greenstone, schist | | | |
| 99 | 7N 85 | 10 | 65 | 10 | -1 | -10 | 5 | 2 | granitic | | | *** |
| 100 | 7N 84 | 15 | 60 | 10 | 1 | 10 | 2 | 50 | granitic | | | |
| 101 | 7E 81 | <u>40</u> | 70 | 10 | 1 | 40 | 0 | 2 | schists | | | |
| 102 | 7E 80 | 35* | 80 | 10 | 1 | 50 | 0 | 2 | schists | | | |
| 103 | 7E 79 | <u>45</u> | 75 | 20 | 2 | 40 | 0 | 2 | schists | biotite schist | | |
| 104 | 7E 78 | 30 | 105 | 20 | 2 | 50 | 5 | 2 | n/ob | | | *** |
| 105 | 7E 91 | <u>35</u> | 115 | 20 | 1 | <u>70</u> | | 1 | n/ob | | | in bog |
| 106 | 7E 90 | 25 | 95 | 10 | -1 | 50 | | 1 | granitic, schists, amphibolite | | | |
| 107 | 7E 89 | 15 | 85 | 10 | 2 | 40 | | 1 | granitic, schists, amphibolite | | | |
| 108 | 7E 87 | 15 | 80 | 10 | 1 | 40 | | 1 | granitic,schists | | | |
| 109 | 7E 88 | 15 | 80 | 10 | 1 | 30 | | 1 | granitic,schists | | | |
| 110 | 7E 92 | 15 | 75 | 10 | 1 | 40 | | 1 | schist amphibolite | | | |
| 111 | 7E 86 | 30 | 95 | 10 | 1 | 30 | | 3 | amphibolite, schist | | | |
| 112 | 7E 85 | 25 | 110 | 20 | 1 | 30 | | 2 | granitic,schists | | | |
| 113 | 7E 84 | 25 | 100 | 20 | 1 | 40 | | 2 | granitic,schists | | | |
| 114 | 7E 82 | <u>35</u> | 95 | 20 | 2 | 30 | | 1 | granitic, schists | | | |
| 115 | 7E 83 | 25 | 95 | 20 | -1 | 50 | | 1 | granitic, schists | | | |
| 116 | 7E 93 | 15 | 85 | 10 | 1 | 30 | | 1 | n/ob | | | |
| 117 | 7E 95 | 15 | 70 | -10 | 1 | 40 | | 3 | n/ob | | | |

| Map No. | Sample No. | Concentration (ppm)* Cu | Zn | Pb | Mo | Ni | Field** Test | Stream Width | Float at sample site | Bedrock | Mineral-ization | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 118 | 7E 94 | 25 | 85 | 20 | 1 | 40 | | 1 | schists | | | |
| 119 | 7E 96 | 20 | 95 | 10 | 1 | 30 | | 5 | n/ob | | | |
| 120 | 7N 70 | 20 | 90 | 10 | 1 | 40 | 2 | 6 | schists, granite, marble | | | |
| 121 | 7N 69 | 10 | 70 | -10 | 2 | 10 | 2 | 4 | granitic marble | | | |
| 122 | 7N 72 | 25 | 105 | 10 | 1 | 40 | 3 | 15 | marble, granitic, schist | | | |
| 123 | 7N 71 | 25 | 85 | 10 | -1 | 40 | 6 | 1 | granitic | | | |
| 124 | 7N 51 | 15 | 90 | 20 | -1 | 40 | 0 | 10' | schists, marble, granitic | | | |
| 125 | 7E 51 | 10 | 65 | 10 | -1 | 20 | 0 | 2 | granitic | | | |
| 126 | 7E 52 | 20 | 90 | 10 | -1 | 20 | 1 | 2 | granitic | | | |
| 127 | 7E 53 | 20 | 100 | 10 | -1 | 40 | 2 | 2 | 90-granitic, 10-schist | | | |
| 128 | 7E 50 | 20 | 105 | 20 | 1 | 30 | 2 | 2 | granitic | | | |
| 129 | 7E 45 | 20 | 100 | 10 | -1 | 30 | 0 | 2 | hornblende schist | | | |
| 130 | 7E 44 | 25 | 105 | 20 | 1 | 40 | 0 | 2 | 50-granitic, 50-hornblende schist | | | |
| 131 | 7E 54 | 15 | 70 | 10 | -1 | 30 | 0 | 2 | 10-vein quartz, 90-schists | | | |
| 132 | 7E 43 | 25 | 100 | 10 | 1 | 20 | 0 | 1 | 80-schists, 20-granitic | | | |
| 133 | 7E 42 | 20 | 90 | 10 | 1 | 30 | 0 | 2 | 80-granitic, 20-schist | | | |
| 134 | 7E 41 | 15 | 75 | 10 | 1 | 20 | 0 | 2 | n/ob | | | |
| 135 | 7E 49 | 20 | 65 | 10 | 1 | 20 | 2 | 2 | 10-granitic, 20amphibolite, 10-schists, 60-quartzite | | | |
| 136 | 7E 46 | 30 | 105 | 10 | 1 | 20 | 0 | 2 | n/ob | | | |
| 137 | 7E 40 | 30 | 105 | 20 | -1 | 20 | 1 | 2 | 90-schists, 10-granitic | | | |
| 138 | 7E 39 | 20 | 90 | 10 | -1 | 30 | 3 | 1 | n/ob | | | |
| 139 | 7E 38 | 25 | 100 | 10 | 1 | 30 | 0 | 4 | 30-granitic, 10-marble 60-schist | hornblende schist | | |

| Map No. | Sample No. | Concentration (ppm)* Cu | Zn | Pb | Mo | Ni | Field** Test | Stream Width | Float at sample site | Bedrock | Mineral-ization | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 140 | 7E 36 | 20 | 90 | 10 | 1 | 30 | 0 | seep | n/ob | | | |
| 141 | 7E 37 | 25 | 95 | 10 | 2 | 30 | 0 | 2 | 25-granitic, 75-hornblende schist | | | |
| 142 | 7E 47 | 25 | 80 | 10 | 1 | 30 | 1 | 2 | schists | | | |
| 143 | 7E 48 | 20 | 60 | 10 | 1 | 30 | 3 | 2 | schists | | | |
| 144 | 7N 50 | 10 | 55 | 10 | 1 | 20 | 2 | 2 | schists | | | |
| 145 | 7N 49 | 20 | 80 | 20 | 1 | 20 | 2 | 1 | schists | | | |
| 146 | 7N 54 | 20 | 90 | 10 | -1 | 30 | 2 | 3 | schists | | | |
| 147 | 7N 53 | 15 | 70 | 10 | 1 | 30 | 1 | 1 | quartz schist | | | |
| 148 | 7E 68 | 15 | 90 | 10 | 1 | 30 | 0 | 2 | 20-quartzite, 80-schists | | | |
| 149 | 7N 52 | 30 | 110 | 20 | 1 | 40 | 4 | 10' | granitic schists | | | |
| 150 | 7E 69 | 20 | 75 | 10 | 1 | 30 | 0 | 2 | 25-quartzite, 25-marble 50-schists | quartzite | | |
| 151 | 7E 70 | 25 | 105 | 10 | -1 | 40 | 3 | 2 | n/ob | | | |
| 152 | 7E 67 | 15 | 80 | 10 | 2 | 30 | 0 | 2 | n/ob | | | |
| 153 | 7E 66 | 25 | 95 | 10 | 1 | 40 | 1 | 6 | 80-anphibolite, 20-granitic | | | |
| 154 | 7N 66 | 10 | 55 | -10 | 1 | 20 | 2 | 2 | schist | | | |
| 155 | 7E 65 | 20 | 80 | 10 | 1 | 30 | 0 | 1 | 80-quartzite, 20-schists | | | |
| 156 | 7N 65 | 30 | 125 | 10 | 1 | 30 | 1 | 2 | marble & schist | schist | | |
| 157 | 7N 64 | 30 | 105 | 10 | 2 | 30 | 2 | 1 | ultra basic, marble schist | | | |
| 158 | 7N 63 | 20 | 65 | 10 | 1 | 20 | 0 | 15 | schists, marble | | | |
| 159 | 7N 62 | 10 | 95 | 10 | 1 | 30 | 2 | 15 | schists, marble | | | |
| 160 | 7E 64 | 15 | 110 | 10 | -1 | 40 | 4 | 1 | n/ob | | | |

| Map No. | Sample No. | Concentration (ppm)* Cu | Zn | Pb | Mo | Ni | Field** Test | Stream Width | Float at sample site | Bedrock | Mineral- ization | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 161 | 7E 62 | 15 | 85 | 10 | 1 | 40 | 0 | 6 | 25-marble, 15-granitic 60-amphibolite | amphib- olite | | |
| 162 | 7E 63 | 20 | 135 | 10 | -1 | 40 | 1 | 2 | 80-granitic, 20-amphib- olite | amphib- olite | | |
| 163 | 7E 55 | 20 | 100 | 10 | 1 | 30 | 0 | 2 | 60-quartzite, 25-gneiss 15-amphibolite | | | |
| 164 | 7E 56 | 25 | 135 | 20 | 1 | 40 | 1 | 2 | gneiss | gneiss | | |
| 165 | 7E 57 | 15 | 65 | 10 | 1 | 30 | 3 | 1 | n/ob | | | |
| 166 | 7E 61 | 15 | 90 | 10 | -1 | 40 | 1 | 6 | granitic | | | |
| 167 | 7E 59 | 10 | 80 | 10 | 1 | 30 | 0 | 2 | granitic | granitic | | |
| 168 | 7E 60 | 15 | 85 | 10 | -1 | 30 | 3 | 2 | 80-quartzite, 20- schists | | | |
| 169 | 7E 58 | 15 | 90 | 10 | -1 | 30 | 4 | 2 | quartzite | | | |
| 170 | 7N 61 | 15 | 70 | 10 | 1 | 30 | 2 | 12 | schists, marble | | | |
| 171 | 7N 60 | 20 | 90 | 10 | 1 | 30 | 2 | 2 | schists, greenstone | greenstone | | |
| 172 | 7N 59 | 15 | 75 | 10 | 1 | 30 | 6 | 2 | schists, greenstone | | | *** |
| 173 | 7N 58 | 20 | 75 | 10 | 1 | 30 | 3 | 2 | schist | schist | | |
| 174 | 7N 57 | 15 | 105 | 10 | 1 | 40 | 3 | 15 | granitic, schists | schist | | |
| 175 | 7N 55 | 15 | 80 | 10 | 1 | 40 | 2 | 15 | schists, gneiss, marble | gneiss | | |
| 176 | 7N 56 | 15 | 75 | 10 | 1 | 40 | 3 | 150' | schists, gneiss, marble | gneiss | | |

* Total metal contents analyzed by Rocky Mountain Geochemical Laboratories, Salt Lake City, Utah. Reported in parts per million

** Milliliters dithizone, cold extractable heavy metals test (Hawkes, 1963)

*** See table II for spectroscopic analysis

n/ob not observed

## Table II

Semiquantitative spectrographic analyses of representative stream sediment samples[a]

Weight percent[b]

| Map No. | Sample No. | Co | Cu | Cr | Pb | Ni | Ag | Sm | V | Zn |
|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 7N 29 | 0.0003 | 0.0003 | 0.014 | 0.001 | 0.0005 | 0.0001 | nd | 0.0011 | nd |
| 16 | 7N 17 | nd | 0.0003 | 0.011 | 0.0020 | 0.0003 | 0.0001 | nd | nd | nd |
| 17 | 7N 18 | 0.0004 | 0.0003 | 0.013 | nd | 0.0003 | 0.0001 | nd | nd | nd |
| 18 | 7N 10 | nd | 0.0002 | 0.014 | nd | 0.0003 | 0.0001 | nd | nd | nd |
| 56 | 7E 26 | 0.0003 | 0.0005 | 0.016 | 0.0005 | 0.0003 | 0.00008 | nd | nd | 0.010 |
| 57 | 7E 27 | 0.0003 | 0.0005 | 0.015 | 0.0005 | 0.0004 | 0.00008 | nd | nd | nd |
| 58 | 7E 28 | 0.0003 | 0.0006 | 0.015 | 0.0043 | 0.0004 | 0.00008 | 0.0005 | nd | 0.015 |
| 63 | 7N 33 | 0.0005 | 0.0003 | 0.021 | 0.001 | 0.0006 | 0.0001 | nd | 0.0013 | nd |
| 64 | 7N 26 | 0.0008 | 0.0004 | 0.027 | 0.0025 | 0.0007 | 0.0002 | nd | 0.0014 | 0.015 |
| 74 | 7N 81 | nd | 0.0001 | 0.015 | 0.0015 | 0.0005 | 0.0001 | 0.001 | 0.001 | nd |
| 99 | 7N 85 | nd | 0.0001 | 0.019 | nd | 0.0006 | 0.0001 | 0.001 | 0.001 | nd |
| 104 | 7E 78 | 0.0003 | 0.0005 | 0.015 | nd | 0.004 | 0.00008 | 0.001 | nd | nd |
| 123 | 7N 71 | 0.0004 | 0.0002 | 0.014 | 0.002 | 0.0006 | 0.0001 | nd | 0.0011 | nd |
| 172 | 7N 59 | 0.0004 | 0.0002 | 0.019 | 0.0005-0.001 | 0.0004 | 0.0001 | nd | 0.0011 | nd |

a. Sample locations are shown on figure 3

b. All samples were also analyzed for As, Bi, Hg, Mo, Nb, and Ta, but these elements were not detected. Not detected (nd) means the sample contains either none of the elements or amounts less than the following:

| | |
|---|---|
| As (arsenic) | 0.1% |
| Bi (bismuth) | 0.003% |
| Co (cobalt) | 0.0004% |
| Hg (mercury) | 0.03% |
| Mo (molybdenum) | 0.0002% |
| Nb (niobium) | 0.006% |
| Pb (lead) | 0.001% |
| Sn (tin) | 0.001% |
| Ta (tantalum) | 0.01% |
| V (vanadium) | 0.0002% |
| Zn (zinc) | 0.015% |

Ag - silver
Cr - chromium
Cu - copper
Ni - nickel

Analyses by Donald R. Stein, Division of Mines and Minerals

Table III

Assay results

| | | Ounces per ton | | Weight percent | | | |
|---|---|---|---|---|---|---|---|
| Map No. | Sample No. | Gold | Silver | Copper | Lead | Zinc | Remarks |
| A | 7E 23a | Nil | Nil | | | | Quartz vein in basalt with pyrite. |
| B | 7N 10r | Trace | Nil | | | | Siderite nodule in float |
| $B^1$ | 7N 10r | Trace | 0.10 | | | | Breccia |
| C | 7E 32a | Trace | 0.24 | | | | Quartz calcite vein |
| D | 7N 7 | Trace | Trace | | | | Quartz float with pyrite |
| E | 7E 16a | Trace | 0.14 | nd | nd | nd | Mineralized quartz breccia |
| F | 7E 27a | Trace | Trace | nd | nd | nd | Hydrothermaly altered area |
| G | 7E 19a | 0.02 | 0.68 | 0.1 | 0.2 | 0.3 | Mineralized float near silver prospect |
| H | 7N 27 | Trace | Nil | nd | nd | nd | Pyrite rich bedrock sample altered volcanic |
| I | 7E 17a | 0.02 | 0.82 | nd | nd | nd | Iron stained quartz float |
| J | 7N 44 | Trace | 0.24 | | | | Pyrite bearing quartz mica schist |
| K | 7E 22a | Nil | Nil | | | | Iron stained quartz float with pyrite pseudo morphs |
| L | 7E 24a | Nil | 0.28 | | | | Iron stained quartz float |

nd - analyzed, but not detected

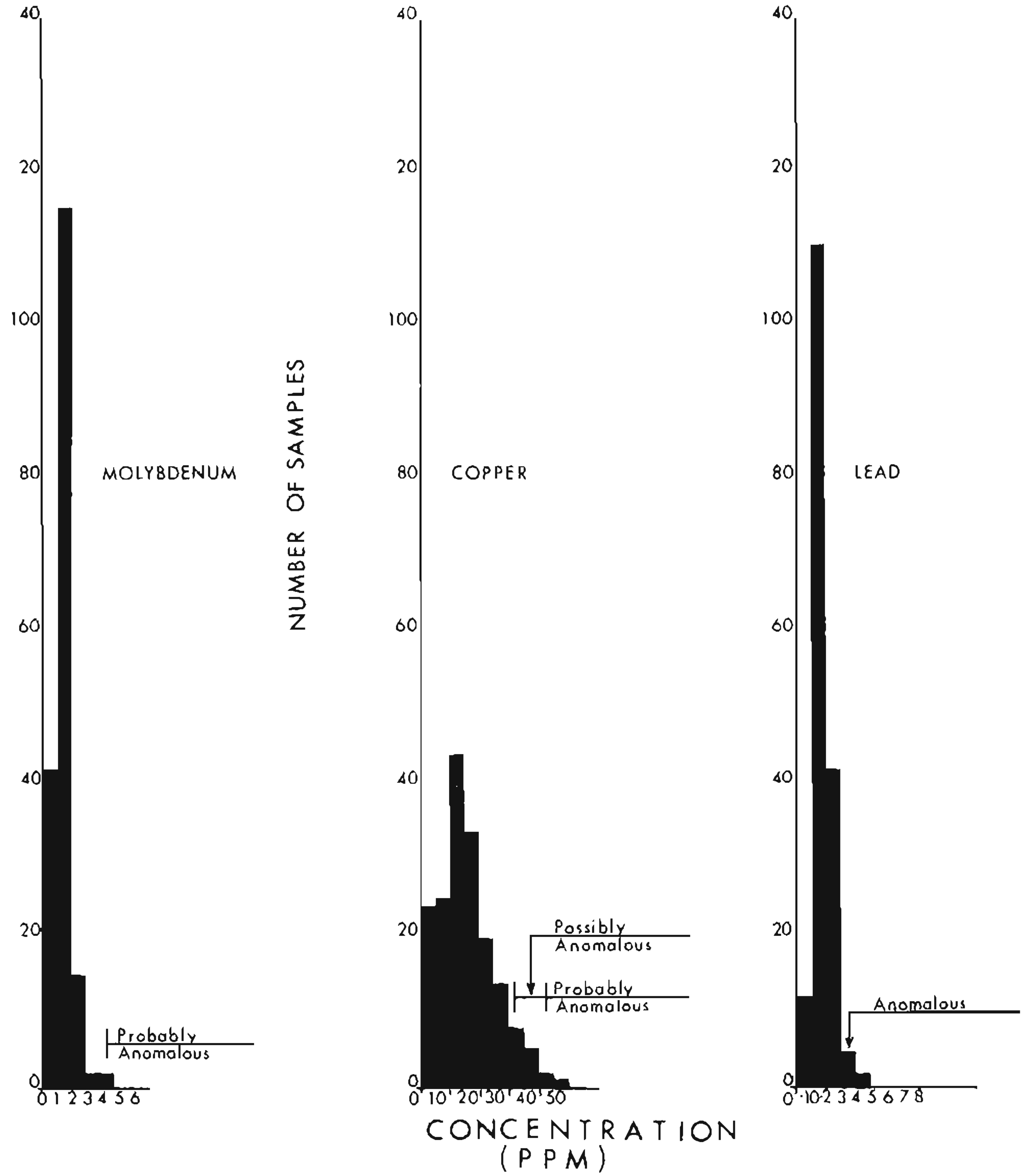


Figure 1 Frequency concentration graphs of molybdenum, copper and lead in stream sediment of the Fortymile District area

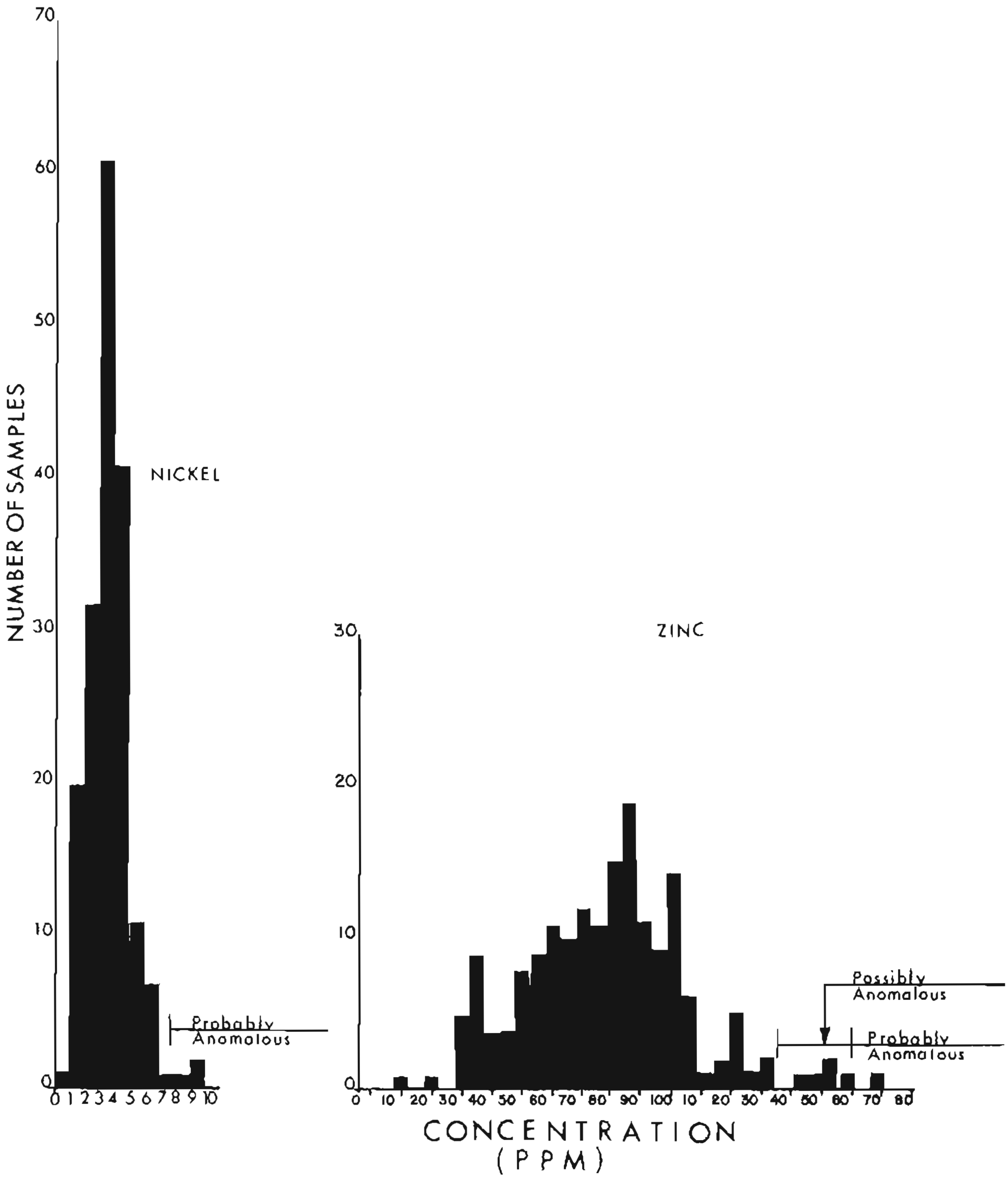


Figure 2 Frequency concentration graphs of nickel and zinc in stream sediment of the Fortymile District area