FRANKLIN PROJECT

GRAND FORKS AREA - 1969

FIELD WORK, GEOLOGICAL CONSIDERATIONS AND RESULTS

BY: G.W.H. NORMAN

GEOCHEMICAL SOIL & STREAM SEDIMENT SURVEY

BY; L. D. KORNZE

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ILLUSTRATIONS

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FIELD WORK, GEOLOGICAL CONSIDERATIONS, AND RESULTS

SUMMARY

Results of field work, 1969, on the Franklin Project at times appeared quite encouraging when assay returns gave high gold values or considerable widths of low copper values on the I.X.L. property. The overall results, however, do not justify expectation of large profitable ore bodies in the Franklin Camp and further work is not recommended.

FIELD WORK

Field work on the Franklin Project started in mid April with Charles McNeil--supervisor in charge of camp construction, supplies and personnel--and Larry Kornze--field supervisor of the technical phases of the field work. Deep snow and soft road conditions impeded field work until mid May. Geochemical and magnetic surveys of the grid lines laid out with tape and compass were completed by August (see Figs. 2 to 12). Geological work using the grid lines for control of outcrop mapping (see Fig. 1) was continued intermittently to November.

A D-8 bulldozer owned by Boundary Exploration Ltd. opened up one adit on the McKinley property (Fig. 13) and another adit on the Banner property (Fig. 14) by June for underground mapping and sampling. The bulldozer also prepared a two mile road from the McKinley property to the I.X.L. property on both sides of the stream where stream silt samples high in copper had been taken in the fall of 1968 (see Fig. 15). One trench was cut on the McKinley property south of the old adits where overlying Tertiary rhyolite conceals the southward extension of the mineralized rocks which gave high I.P. chargeability readings in the 1968 survey. Trenching and

broadening of the road exposed mineralized sharpstone conglomerate about one mile east of the McKinley claim where an I.P. anomaly was indicated by the 1968 work.

After uncovering the old adit on the Banner property, a series of trenches were made in an attempt to uncover the northern extensions of the Banner vein indicated by geochemical soil sampling in 1968. The extensions uncovered were narrow, irregular and low grade. A further northern extension of the Banner vein probably occurs on the Jimmy property and was stripped by the bulldozer with discouraging results.

The bulldozer returned to Franklin Camp on completion of the geochemical soil sampling and cut five additional trenches north of, and one south of, the two original trenches at the I.X.L. claims. Three additional trenches were out on the McKinley property to obtain better exposures of the mineralized rocks there. The rocks exposed in the trenches were mapped and channel samples were taken of mineralized sections. Assay results of the samples are given on Figs. 13, 14 & 15.

Three diamond drill holes--818, 560 and 606 feet long, respectively--were drilled by the Tralnberg Diamond Drilling Company during the period September 24 to November 17 (see Figs. 16 & 17).

The personnel employed, with lengths of employment, were as follows:

Name	Period of employment at Franklin Camp
Cliff Britch	Approximately 3-1/2 months
Ted Blaine	May 5 - November 22, 1969
Gordon Davis	May 28 - August 27, 1969
Eric Ewen	April 10 - July 10, 1969
Robin Hanvelt	June 1 - July 25, 1969

Larry Kornze	April 15 - Year end, 1969
Charles McNeil	April 14 - August 31, 1969
Jim Mullin	Approximately 1 month
Deryck Newton	May 1 - August 8, 1969
John Rea	May 13 - May 26, 1969
Gordon Sexton	June 15 - July 17, 1969
Stephen Shaw	June 15 - July 29, 1969
Larry Sheldon	4 days
Harold Snow	April 15 - August 28, 1969
Sid Visser	June 15 - July 10, 1969

TARGETS FOR MINERAL EXPLORATION

Similarity to the Phoenix Camp

The oldest rocks of Franklin Camp belong to groups of sedimentary and volcanic formations that range in age from late Paleozoic to Jurassic. The lithology, stratigraphical succession and structure of these Franklin rocks are comparable with those in the Phoenix Camp, 40 miles south, where production of copper and other metals has continued with interruptions since 1900. Granitic rocks belonging to the Nelson, Valhalla and Coryell intrusions of Mesozoic and Tertiary age separate the sedimentary and volcanic rocks of the Franklin Camp from those in the Phoenix area.

The productive copper deposits in the Phoenix Camp occur as pyrometasomatic skarn deposits in limestone interbedded with sharpstone conglomerate.

Limestone Belts in the Franklin Camp

Limestone occurs in the Franklin Camp, with sharpstone conglomerate (see Fig. 1), as two separate belts. The eastern belt can be traced north from the workings on the McKinley claim for nearly two miles. The western belt crosses the old Jumbo-I.X.L. property 1-1/4 miles west of the McKinley claim but is well exposed only on the sides of a small stream which gave

silt samples high in copper values.

The two limestone belts in the Franklin Camp are separated by the Tertiary conglomerate underlying McKinley Mountain. Extending north from beneath this conglomerate is a tongue of Nelson granodiorite, which was shown by a helicopter magnetic survey (Fig. 9) to contain a strongly magnetic phase. The presence of skarn type copper mineralization in limestone at the McKinley workings and on the old Jumbo-I.X.L. property and the extensions of these belts on either side of an intrusive with a strongly magnetic phase presented targets for exploration. Mineralized limestone at the McKinley property extends southward toward an unconformably overlying flat Tertiary cover, a few hundred feet south of the old caved workings. Copper enrichment if present in the southward extension of the limestone would be protected from Pleistocene glaciation by the Tertiary cover and could enhance the value of a discovery there.

Gold-Silver Veins - Union Type

The principal mineral production from the Franklin Camp has come from the Union Mine, which produced approximately 144,000 tons containing 48,158 ounces of gold, 1,407,975 ounces of silver and small amounts of lead, zinc and copper.

Assays and widths of the Banner vein, where sampled in 1968, together with soil sampling, suggested a silicified zone on the Banner claim similar to the Union vein that might be large enough to mine profitably. It was also known that other parallel veins or silicified zones existed on Crown Grants adjoining the Banner claims. Soil sampling clearly indicated the outcrop of the Banner vein and consequently soil sampling of

the surrounding properties appeared justifiable.

Part of the mineral production from the Phoenix-Greenwood Camps has come from small, high grade veins with silver and gold values. The presence of similar silver and gold bearing veins in the Franklin Camp added to the general similarity of the two camps.

RESULTS OF EXPLORATION - 1969

General Geology and Structure

The geology of Franklin Camp shown on Fig. 1 has been compiled from outcrop mapping of grid lines on 200 scale in 1969 and to a lesser extent from mapping on aerial photographs. This map gives a better definition of the two limestone belts than previous mapping, particularly the north part of the McKinley belt and the I.X.L. belt; and shows that the sequence of Strata from west to east across the I.X.L. and McKinley belts--respectively, cherty sediments and argillite, limestone, sharpstone conglomerate, and andesite flows and breccia--is the same. The relative positions of the McKinley and I.X.L. limestone belts can be explained by faulting, drag folding, or intrusion of granodiorite, but is most likely the result of a combination of these events. Tertiary conglomerate and lava, however, conceal the southern extensions of the McKinley belt and the northern extension of the I.X.L. belt and the evidence which would explain their relative position.

Evidence favouring an original connection is the variable trend of the McKinley limestone belt which swings from northeast to north to northwest and finally sharply northeast, north from the McKinley property. This trend conforms roughly to the east boundary of the granodiorite

tongue on its west side, and during the introduction of the granodiorite the McKinley limestone belt may have been displaced eastward in a dome like structure. If the change in trend present north of the McKinley persists under the cover of Tertiary rocks to the south it would swing the McKinley limestone belt toward the I.X.L. belt but insufficiently without additional sharp drag folding or faulting to make a connection.

Directly west of the Banner property is a mass of andesite porphyry 2500 feet long by 400 feet wide. The porphyry lacks the distinguishing characteristics of a flow and is believed to be intrusive. At both the I.X.L. and McKinley properties bodies of pyritic, silicified and bleached, feldspar porphyry occur which, where least altered, are green in colour and lithologically resemble the Banner andesite porphyry. The pyritic porphyry crosscuts limestone and is clearly intrusive. It disappears under the Tertiary capping south of the McKinley property and east of the I.X.L. It is conjectural whether it continues across the concealed interval. A concealed connection of the I.X.L. and McKinley porphyries might be expected if the granodiorite tongue west of the McKinley limestone belt is a small separate pluton and not a tongue extending north from the large granodiorite mass south of the Tertiary conglomerate.

Spatial relationships which may be purely coincidental are the location of the unaltered andesite porphyry and the Banner vein system of silicified zones at the north end of the dome like structure and the pyritic silicified porphyry and skarn mineralization at the south end. Besides the skarn mineralization at the south end there are narrow, high grade sulphide concentrations at some of the limestone porphyry contacts which are similar in mineral composition to massive sulphide locally

concentrated in the Banner vein.

Geophysical Work

Geophysical work in 1969 consisted of ground magnetometer readings with a Sharpe P.M.F.3 magnetometer along all grid lines where soil samples were taken; I.P. surveys along selected roads and grid lines, and an extension of the airborne magnetometer work to cover claims staked between Bluejoint and Burrell Creeks directly south of the Franklin Camp grid lines.

The ground magnetic work was plotted on 200 scale and is condensed to 800 scale on Fig. 5 with interpretation (Fig. 6). The airborne magnetic work and interpretation by William Dolan is shown on Fig. 9. Dolan's interpretation suggests a series of NE to NNE and NW trending structures. Franklin Camp lies west of the "Kootenay Arc" at the point where that structure swings from northeast to northwest. North of Franklin Camp regional structural features have the Cordilleran northwesterly trend: south, the dominant structural feature is the northeasterly trending Republic graben. Franklin Camp is located in an area where the direction of two dominant structural trends intersect and the location of the camp in an environment where intersecting trends are a reasonable expectation supports Dolan's interpretation.

The most striking feature of the ground magnetic map, which is also clearly indicated on the airborne magnetic map, is a zone of magnetic highs 1000 to 4000 + gammas extending northeast across the center of the camp. North of the I.X.L. claims the highs are clearly related to the zone of diorite and hornblendite with a high magnetite content that is shown on the west side of the granodiorite tongue that crosses the McKinley-I.X.L.

road.

Pyroxenite or pyroxene bearing hornblendite is associated with the hornblendite and is a distinct phase of the band of basic rocks 4000 feet south of the I.X.L. which produces a strong linear anomaly of 4000 - gammas, similar to that caused by the northern belt. Dolan shows this southern anomaly ending at a northeast fault. The magnetically inferred fault is indicated on the ground by a topographic scarp with granitic rocks to the southeast and unmetamorphosed andesite breccia to the northwest. The scarp lines up well with a fault inferred to lie along McKinley Creek northwest of the McKinley showings. The McKinley Creek fault appears to be one of the major faults of the camp and parallel strands of this fault may explain the apparent duplication of limestone bands between the McKinley showings and Franklin Creek.

Grid lines were not run across McKinley Mountain between the I.X.L. and McKinley properties and ground magnetic data do not clearly indicate the southern extension of the zone of 4000 gamma plus magnetic highs which cross the I.X.L.-McKinley road. A magnetic high does extend westward across the center of the I.X.L. trenches and 150 feet of magnetite rich amphibolite lithologically similar to the rocks mapped as diorite and hornblendite was cut at the bottom of the I.X.L. diamond drill hole No. 1.

The amphibolite in diamond drill hole No. 1 contains 1/2 to 1 percent chalcopyrite. The lithology and copper content of the rock at the bottom of diamond drill hole No. 1 is similar to that of the band of basic rocks 4000 feet south of the I.X.L. which produce the 4000 gamma linear anomaly.

Dolan interprets the linear belt of magnetic highs (4000 + gammas) as an old structure, which may predate the tongue of Nelson granodiorite and associated diorite and hornblendite. A series of mid Tertiary pulaskite dikes parallel the old structure. Pulaskite was cut in some of the I.X.L. holes and was slightly sheared and mineralized with pyrite. The old structure is probably an old pre Nelson intrusive fault that has been reactivated several times.

The location and results of I.P. surveys are indicated on Figs. 7 & 8. Chargeability of the Tertiary conglomerate and Nelson granodiorite is extremely low in contrast to the older sedimentary and volcanic rocks of the area. Graphitic and pyritiferous dark argillite bands are present at probably several stratigraphic horizons. These are not always well exposed, but certainly account for some of the chargeability highs, particularly along the main road west of the Banner property and some of the high readings along the road 400 to 1600 feet north of the McKinley. South of the McKinley workings and east of the I.X.L. pyritic porphyry accounts for some of the high readings. Pyritization at the I.X.L. claims is extensive and somewhat irregular, but correlation with the I.P. results is not always clear.

McKinley Property

The McKinley property is on the forested north slope of McKinley Mountain. Glacial drift up to 20 feet thick (plus) is present and, in places, prevented the bulldozer from reaching bedrock. The geology as exposed by road cuts and five trenches is shown on Fig. 13.

Early in 1969 the portal of the old No. 1 Adit on the east side of McKinley Creek was uncovered, and Trench No. 1 was cut 300 feet south

of the adit.

The adit had been driven 190 feet southwesterly into the mountain with a 40 foot tunnel driven southeast and a 130 foot tunnel driven due west, 85 feet in from the portal. Channel samples 10 feet long were cut from the ribs of the tunnel and the average assays for the various parts of the adit workings are given on Fig. 13.

The rocks exposed in the tunnel consist of highly silicified argillite and limestone with some epidote and locally much garnet. These rocks contain varying amounts of pyrite from place to place ranging from sparse disseminations to nearly massive pyrite locally. The copper content as shown by the assays is extremely low and a little chalcopyrite was noted only at the extreme south end of the adit.

Surface trenching indicates that the south end of the adit is 100 feet south of the silicified pyritic feldspar porphyry exposed in Trench No. 2, about 40 feet above, which implies a south dip of the porphyry skarn contact at this point. The contact was exposed by Trench No. 2 and the end of an old short tunnel 40 feet directly above the main adit was found. Copper stain and chalcopyrite were visible in the skarn along the contact. Copper bearing skarn was also noted where McKinley Creek cuts the porphyry-skarn contact and also at the contact of porphyry and limestone at the east end of Trench No. 2.

The zone mineralized with copper at the contact varies from zero to a maximum width of about two feet. It is the source of chalcopyrite-rich samples that had been hand sorted near the portal of the workings 40 feet directly above the main adit and near an old open cut at the creek near the

western end of Trench No. 2.

Trench No. 1 exposes the mineralized rocks directly below the overlying Tertiary rhyolite where anomalous high I.P. chargeability readings had been recorded in 1968. Rocks exposed in this trench are chiefly pyritic silicified feldspar porphyry similar to that in Trench No. 2, with included remnants of siltstone and one small section of highly silicified sharpstone conglomerate.

The lack of limestone and presence of sharpstone conglomerate in Trench No. 1 suggest that the porphyry may have been intruded along a fault with a right hand shift.

At the western end of Trench No. 3 a narrow zone of skarn is exposed on the east side of a massive limestone outcrop. The southern section of this skarn zone, north of Trench No. 2, was open cut by W. E. MacArthur in 1948-9 and yielded 145 tons assaying approximately: gold 0.0138 oz/ton; silver 6.3 oz/ton; lead 11.2 percent; zinc 17.1 percent. Copper content was estimated to be 3 percent, but was not saved by Cominco. Trench No. 3 was extended east from the productive skarn zone to another limestone outcrop 250 feet to the east, but failed to reach bedrock because of deep overburden. Porphyry was exposed by Trench No. 3A on the east side of limestone. The skarn directly north of the porphyry in Trench No. 3A contains a massive pod (?) of magnetite, with some chalcopyrite, six feet or more thick.

Trench No. 4 was cut across McKinley Creek about 300 feet north of the road at Trench No. 3A to test anomalously high copper in soil samples at station 1+00E (615 ppm) and 1+00W (965 ppm) on line 10+00N. The trench exposed skarn with a little visible chalcopyrite a short distance south of 1+00E and skarn and limestone near 1+00W, but elsewhere the rocks exposed

were unmineralized argillite, feldspar porphyry, sharpstone conglomerate, and a little limestone. The limestone and skarn in the trench at 1+00W line 10+00 lies directly north and on strike of the limestone near Trench No. 3A.

The rock exposed by trenching at the McKinley property shows an east-west striking silicified pyritic porphyry 300 to 350 feet wide cutting across north-south striking limestone and skarn with probably some interbedded argillite and succeeded eastward by sharpstone conglomerate. Two massive limestone beds appear to be present--a western one 180 feet wide and an eastern bed 100 feet wide.

The copper bearing pyritic mineralization above the adit at the west end of Trench No. 2, the silver-lead-zinc-copper ore zone between Trenches Nos. 2 & 3 from which a 145 ton shipment was made, and the magnetite in Trench No. 3A all lie directly north of the pyritic silicified feldspar porphyry. The association seems to imply a genetic association. The showings opened up by trenching are small and expectations of large concentrations of ore along the porphyry contact do not seem to be justified. The mineralized limestone segments north of the porphyry are cut off at the porphyry contact but do not show up on the porphyry's south side. A shift of the limestone probably to the west is indicated by the presence of sharpstone conglomerate in Trench No. 1 and also by the numerous right hand shifts of limestone segments in passing south from the Banner property to the McKinley.

It would be reasonable to expect that a limestone extension if found on the south side of the porphyry would be mineralized along and near its contact with porphyry. The faulted extension might be found by drilling but from results of trenching at the I.X.L. and McKinley, expectations for

large profitable ore bodies are scarcely justified.

I.X.L. Property

The six I.X.L. claims shown on the Claim Map (Fig. 21) were optioned in 1968 after silt samples high in copper (1340 to 2875 ppm) were taken from a tributary of Bluejoint Creek which crosses the claims. Trenches, assays and geology are shown on Fig. 15.

Trenches Nos. 1 & 2 were made early in June on either side of the Bluejoint tributary to locate the source of the silt samples high in copper. Both trenches expesed skarn on the east side of limestone outcrops. Assay returns from John O. Dolphin, Osoyoos, B.C., gave: gold 1.30 oz/ton; silver 4.5 oz/ton and 0.52 percent copper for a 10 foot chip sample of skarn in Trench No. 1; and gold 0.15 oz/ton, silver 0.6 oz/ton and 1.25 percent copper from a grab sample of poorly exposed banded mineralization on the south side of Trench No. 2 and 0.95 percent copper from 12 feet of much oxidized skarn east of the limestone on the north side. Check assays by Coast Eldridge and by Crest, made later in 1969, showed that the high grade gold assay was high by a factor of 10 and some of the copper assays were high.

Trenches Nos. 1A, 2A, 3, 4, 5, 6 and 7 were cut to explore an area defined by soil sampling as high in copper which had a roughly coincident magnetic high, and some supporting I.P. highs. The only rock outcropping within the area trenched was limestone near Trenches Nos. 1A, 1, 2 and 6; pulaskite near Trench No. 6; and skarn in an old pit near the north end of Trench No. 7. One of the grid lines used for soil sampling crossed some old pits dug prior to 1906 which contained fragments of good grade

vuggy skarn, well mineralized with copper. Trench No. 4 was cut close to these old pits but did not disclose the source. Similar mineralized skarn was later found in Trench No. 6 at a limestone prophyry contact.

Outcrop mapping of the grid lines in the I.X.L. area (see Fig. 1) was completed before the second period of trenching. This work showed that the limestone petered out about 300 feet south of Trench No. 1A. Along the projection of the limestone southward, limestone fragments were noted in the sharpstone conglomerate, which is well exposed in hills southeast from the limestone. The conglomerate in these hills is not mineralized or silicified and the change to silicified and mineralized conglomerate at the east end of Trench No. 2 is concealed by overburden near the stream which flows north directly west of Trench No. 2. The grid line mapping showed that a large area of Nelson granodiorite outcropped to the northwest of the limestone, and that a few pits had been dug in silicified pyritic rocks about sixty years ago, 400 to 500 feet southeast.

The trenching showed that the limestone occurred as remnants in a silicified feldspar porphyry irregularly mineralized with pyrite which had been almost completely oxidized to limonite. Zones of skarn with epidote, magnetite, garnet, and some chalcopyrite separate the porphyry from contact with unaltered limestone, with rare exceptions. Crosscutting intrusive relationships of porphyry to limestone are exposed in Trench No. 6.

The high grade zone of sulphides five feet wide in this trench is similar in occurrence to the 145 ton shipment by McArthur from the McKinley property.

The boundaries of the silicified feldspar porphyry with limestone

or with the granodiorite to the northwest can be clearly distinguished. It is difficult and perhaps impossible to distinguish the more silicified phases of porphyry from silicified siliceous sediments (siltstone and sharpstone conglomerate) and the boundaries shown between these rocks on the surface plan (Fig. 15) and the sections of the drill holes (Figs. 16 & 17) are not reliable.

The porphyry wedges out southward a short distance south of Trench No. 1A where it is separated from limestone by unmineralized black argillite which appears to have insulated the limestone from the porphyry and inhibited development of skarn. Northward from Trench No. 1A the porphyry is bounded to the east by silicified sediments in Trenches Nos. 2 & 3 and north of Trench No. 3 passes under the overlying Tertiary conglomerate.

Fig. 15 presents the assay results of channel samples taken across 10 or 20 foot intervals depending on intensity of mineralization. The highest and most continuous assays were obtained in Trench No. 3, but were separated by a 150 foot wide gap in which rock was too deeply buried by overburden to reach with a bulldozer.

Three diamond drill holes were put down to test the concealed area in the center of Trench No. 3 and the skarn area of Trenches Nos. 1 & 2 which had furnished assays with some good gold assays. The locations of the three holes are shown on Fig. 15. Graphic sections of the holes are given on Figs. 16 & 17 with which are attached detailed logs.

The copper content of the rocks encountered in the drill holes was negligible, with sparse amounts of chalcopyrite barely detectable even when it was recognized as present. This is indicated by assays of the best looking mineralization in diamond drill hole No. 3. In drill hole No. 1 a basic

green amphibolite was intersected from footage 656 to the bottom of the hole at 818 feet. Chalcopyrite was visible in this rock from 765 - 785 feet, and it has a very similar composition to phases of the bands of basic diorite and hornblendite mapped 4000 feet south of the I.X.L. and 2000 feet northeast. It was not cut by diamond drill hole No. 2 and therefore is unlikely to outcrop.

A fault zone, footage 647 to 656.6, in diamond drill hole No. 1 separates the amphibolite from granodiorite to the west. The fault in diamond drill hole No. 1 lies a short distance west of Dolan's "old" linear structure (Fig. 6), but may be part of this structure and extend, as Dolan indicates, in a general way along the west side of the zone of diorite and hornblendite at least as far as the syenite in the northeast corner of the map area (Fig. 1).

The drilling indicated that the formations dip about 55 degrees east. The pulaskite dikes also dip east, but both strike and dip of the dikes are variable.

The rock associations, silicified feldspar porphyry, limestone and skarn present at the I.X.L. property are similar to those at the McKinley, as is also the general erratic nature of the mineralization. The difference between the two mineral occurrences is structural. At the I.X.L. the limestone and porphyry have roughly parallel strikes and dips. At the McKinley the strikes are approximately at right angles. The similarity and erratic nature of the mineralization when porphyry crosscuts or parallels limestone does not encourage the idea that some special type of structure or folding in the concealed area between the I.X.L. and McKinley might be a favourable

target for exploration. The regional geology of the Franklin Camp, however, is more easily explained by a series of faults and folding though present seems less important. It is probable that if limestone is concealed between the McKinley and I.X.L. properties, it would occur in isolated segments that would be difficult to locate by wildcat drilling.

Banner Property

An assay plan of the Banner vein is shown on Fig. 14. The old adit driven 190 feet across the vein in 1900 was reopened and sampled. A silicified zone extends across the north rib of the tunnel from 145 feet to 175 feet in from the portal. The central 20 feet of the silicified section averaged: gold 0.005 oz/ton; silver 0.6 oz/ton; copper 0.37 percent; lead 0.04 percent; zinc 2.91 percent. An assay of 25 feet of the south rib in the adit was: gold 0.01 oz/ton, silver 0.42 oz/ton; copper 0.76 percent; lead 0.25 percent, and zinc 3.96 percent. This showed a slight improvement and suggested that values increased southward toward the Banner shaft which assayed 0.59 oz/ton in gold and the surface trench 25 feet north, which gave good average assay across a 30 foot width (see Fig. 14).

Boundary Exploration drilled three holes under the 30 foot ore section exposed in the trench. The holes verified that the silicified zone sampled in the adit is the downward extension of the Banner vein and showed that the dip is 45 degrees east. Assays and widths intersected by the holes showed little change from the tunnel intersection, and expectations of a potential pod of mineable ore between the tunnel and the shaft were not realized.

Surface trenching of the extension of the Banner vein northward

from the shaft and check sampling of extensions south indicate that the high grade segments of the Banner vein are small and discontinuous.

Work in 1968-1969 has shown that the Banner vein is one of a series of parallel structures. This series is separated from the Union vein, which was mined intermittently 1914-1942, by a down faulted segment of Tertiary conglomerate and lava.

The veins of the Banner series are lithologically similar to the Union vein, which is about one mile east and probably a member of the eastward faulted extension of the Banner group.

An attempt was made during the thirties to develop and mine the Homestake Mine from an incline shaft. This was not successful because of the erratic distribution of values although sections of the vein assayed more than one ounce gold.

An 8 foot chip sample was taken in June from the vein exposed in a pit 600 feet northwest of the Homestake shaft which assayed 3.815 oz/ton gold. Two check samples, each four feet long, taken later, gave 0.14 oz/ton and 0.025 oz/ton gold. These results confirm the erratic distribution of values.

The Banner group of veins strike northwest at right angles to the northeast trending limestone which forms the most northern section of the McKinley limestone belt. This part of the McKinley limestone belt is in direct alignment with the I.X.L. limestone belt and lies close to Dolan's old linear structure. The intersections of the veins with the old linear structure, particularly in limestone, offer a highly speculative long shot target for exploration.

The decrease of the magnetic high along the old linear structure northward suggests that the granodiorite tongue, margined westward by basic rocks, plunges north and may underlie the area in which the Banner vein system intersects the limestone.

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GEOCHEMICAL SOIL

AND

STREAM SEDIMENT SURVEY

By: L. D. Kornze

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GEOCHEMICAL SOIL SURVEY

INTRODUCTION

Preliminary work in the Franklin Camp area was done in the fall of 1968. During September, October and November of that year reconnaissance geochemical and geological surveys revealed three areas of interesting mineralication, notably in the vicinity of the old McKinley Mine and on the Banner and I.X.L. claims. An experimental induced polarization survey conducted over the old McKinley workings indicated anomalous conditions which were possibly related to more widespread mineralization. Encouraging assays were obtained from selected rock samples collected from mineral showings in these three anomalous areas. Based on this reconnaissance information a comprehensive exploration program was planned for the 1969 season.

The 1969 program consisted of:--

1. Collection of 4100 soil samples over 75 line miles.
2. Ground magnetometer survey over the same 75 line miles.
3. Geological mapping of the sampled areas.
4. Induced polarization survey over the selected areas of interest, totalling 22 line miles.
5. Collection of 670 stream sediment samples covering a drainage area of approximately 200 square miles stretching from 15 miles north to 25 miles south of the Franklin campsite.
6. Airborne magnetometer survey of the 45 square miles surrounding Franklin Camp.
7. Building of a two mile access road.

8. 19,600 feet of bulldozer trenching.

9. 1,984 feet of diamond drilling.

The following report is in two sections. The first portion describes the results of the soil sampling, the second section deals with the results of the stream sediment survey.

DESCRIPTION OF AREA

The Franklin Camp area is mountainous with peaks rising to 4700 feet from a valley bottom of 2700 feet. The main creeks run to the south with Franklin, Gloucester and McFarlane Creeks draining to the southeast.

Glaciation during Pleistocene times broadened valley bottoms and steepened mountain slopes. Approximately 30 percent of the area is covered by glacial deposits, mostly lying in the valley bottoms and on northern mountain sides. On the steeper slopes glacial deposits are preserved only locally and the bedrock, if not completely exposed or talus covered, is blanketed by a thin layer of near-residual soil.

Precipitation averages 25 to 30 inches annually with a large part of it falling as snow in the winter months. The summers are warm and dry with temperatures often above 90 degrees, while winters are relatively severe with the mercury dropping at times to 20 degrees below zero.

The region is thickly wooded with the following species of trees: tamarack, douglas fir, spruce, white birch, yellow pine and the less common white pine. White cedar, hemlock, poplar, cottonwood and alder flourish in the low lying swampy areas. South-facing hillsides are often bare of trees, but are covered by thick patches of mountain laurel and Saskatoon bushes. Black raspberries, huckleberries and innumerable species of wild flowers

thrive in the thinly forested areas.

The countryside supports a wide variety of wildlife. Animals commonly seen are mule deer, white-tail deer, beaver, black bear, coyote, brown squirrel, chipmunk, gopher and pack rat. Cougars and mountain goats are rare. The birds include Franklin grouse, ruffled grouse, blue grouse and migrating waterfowl.

SOIL SAMPLING

General Discussion

Glacial deposits of clay and gravel on the north side of McKinley Mountain are irregularly distributed. This distribution may have resulted from uneven erosion since Pleistocene times. Bulldozer work immediately adjacent to the old McKinley adit revealed glacial material in excess of 30 feet. This irregularity in the distribution and thickness of the glacial till is reflected in the broken pattern of geochemical anomalies. Trenching of the copper anomaly on the I.X.L. Grid showed that the overburden consisted of glacial till covered by a layer of talus and colluvium from the higher slope. The upper slope is well mineralized with pyrite and minor disseminated chalcopyrite occurring locally. Development of soil on this metal-rich talus and colluvium gave rise to a very widespread copper anomaly. Glacial deposits are virtually absent on Franklin Mountain. Outcrops constitute approximately 30 percent of the upper mountain slopes. The West Grid is covered by glacial till except for the ridge-backs which parallel the south side of the West Fork and west side of Franklin Creek.

Where soil has had the opportunity to develop, podzol profiles with well defined A_1, A_2, B and C horizons are present. The soil may best

be described as podzolic. The low rainfall and good drainage is responsible for a very thin A_1 and a well leached, light coloured, A_2 horizon. The combined A horizons vary in thickness from 2 to 12 inches. Four to ten inches of red-brown B horizon grades into the eroded bedrock rubble or weathered glacial till of the C horizon.

Grids (Figs. 2, 3 & 4)

The Franklin Grid extends from the Tertiary capping on McKinley Mountain north to the grid established by Franklin Mines Ltd. in 1964. The North I.X.L. Grid covers the area surrounding the copper anomalous stream located in 1968 (Fig. 10). Chalcopyrite occurring in hornblendite was discovered by prospecting to the south of the North I.X.L. Grid. The South I.X.L. Grid was laid out to cover these showings. The West Grid was established to cover a number of old prospects and to fill in the gap between the Franklin and North I.X.L. Grids. The combined grids cover approximately six square miles. A total of six miles of baseline was cut, from which 75 miles of crosslines were run at 400 and 800 foot intervals.

Soil Sampling Procedure

Each soil sampling crew consisted of two men who chained and sampled the lines as they proceeded. Sample stations were located every 100 feet along the crosslines and co-ordinates marked with flagging for future reference. Samples of the B horizon were collected with trowels and placed in numbered, moisture-repellent soil sample envelopes. Field notes were taken pertaining to the sample and its environment. A total of 4100 soil samples were taken.

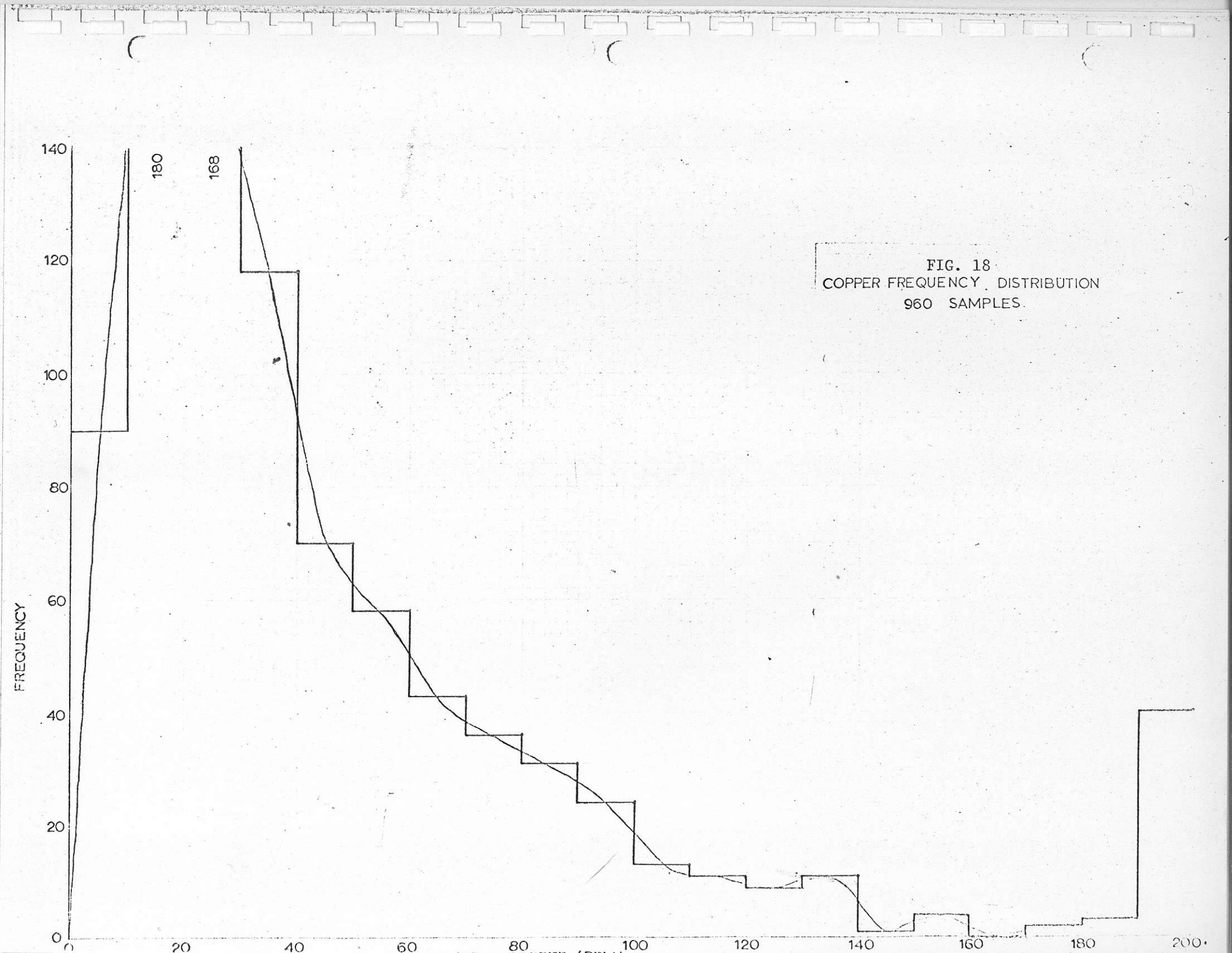


FIG. 18
COPPER FREQUENCY DISTRIBUTION
960 SAMPLES.

Chemical Analysis

The soil samples were analyzed in Newmont's mobile geochemical laboratory situated at Princeton, B. C. Analyst was T. A. McGinn. All samples were dried and sieved and the minus 80 mesh material retained. For copper, lead and zinc analysis a weighed amount of sample was treated with hot perchloric acid for 3-4 hours until all the material had reacted. The solution was then diluted and the copper, lead and zinc content determined by atomic absorption on the Techtron AA-4. Some of the samples were also analyzed for silver, using a similar analytical technique.

Geochemical Results

Copper Anomalies (Fig. 2)

A total of 1560 soil samples were collected from the Franklin Grid. A histogram plot of 960 of the samples indicated an upper background value of 100 ppm (Fig. 18). In addition to the 100 ppm contour, a 60 ppm contour interval was drawn to establish geochemical trends which would possibly reflect the geology as well as topographic features. It was observed in the field that in an area where geochemical results exceeded 300 ppm, chalcopyrite mineralization usually occurred in the immediate area.

Franklin Grid

Patchy copper anomalies surrounding the McKinley workings reflect the irregular distribution of the deep glacial overburden. Most of the chalcopyrite mineralization in the area is confined to the contact between the pyritic, silicified feldspar porphyry and the limestone-skarn zone.

Trench samples of the silicified feldspar porphyry assayed from 0.04 to 0.12 percent copper. The northwest trend in the Banner area is associated with the parallel system of quartz veins which contain minor pods of high grade mineralization. To the south of the Banner the north-south trend closely follows the sharpstone and argillite belts. The northwest trending anomaly at the north end of the grid closely follows the contact zone of the syenite intrusive (see Fig. 1). Disseminated chalcopyrite does occur in places in the intrusive, but an induced polarization survey over this anomaly indicated that this mineralization is not extensive. The geochemical survey and bulldozer trenching to the north of the contact by Franklin Mines Ltd. in 1964 did not uncover any persistence to the mineralization.

West Grid

A portion of the large anomaly in the mid-eastern section of the grid overlies a small, but very strong, magnetic high. This rock type is known to carry chalcopyrite and magnetite on the South I.X.L. Grid. This would possibly account for the copper anomaly. The surrounding altered siltstone contains up to 2% pyrite and 3% magnetite. No chalcopyrite was detected. Copper values to the north are relatively low while some spot highs to the south can be attributed to minor amounts of chalcopyrite in the syenite intrusive.

North I.X.L. Grid

The anomalies on the most northerly crossline of the grid are due to a concentration of mineral in the swampy head waters of Blue Joint Creek. The large copper anomaly surrounding the old I.X.L. workings covers an area of widespread mineralization, but does not reflect immediate bedrock conditions, for reasons previously discussed on page 3. Sampling of seven bulldozer trenches revealed three areas of concentrated copper mineralization; the best being a 70 foot average of 0.78% copper which did occur in the centre of the geochemical anomaly. The rock sample results also indicated that the pyritic silicified feldspar porphyry contained minor copper from 0.03 to 0.17 percent. The presence of this low grade mineralization was reflected in the widespread geochemical patterns.

South I.X.L. Grid

The elongated copper anomaly coincides with a strong magnetic anomaly. Geological mapping revealed a long, narrow band of hornblendite containing minor chalcopyrite and magnetite mineralization. The magnetic and copper anomaly in the northwest corner of the grid is also associated with the hornblendite intrusive. The spotty values in the northeast section are extensions of the North I.X.L. anomalies.

Zinc Anomalies (Fig. 4)

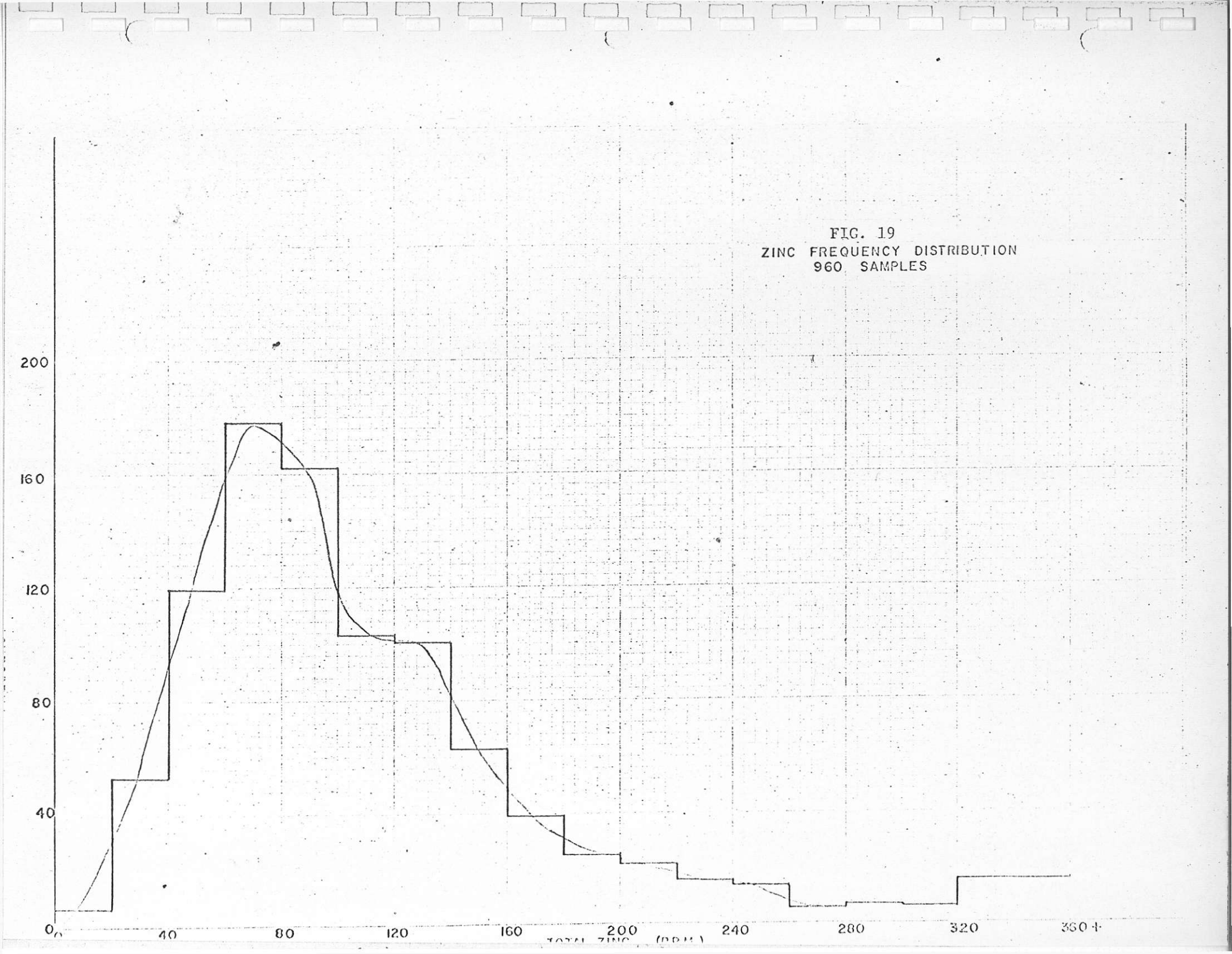
Statistical analysis of 960 samples indicated an upper background value of 280 ppm (see Fig. 19). As in the copper interpretation, a lower value, 200 ppm, was used to reflect any geochemical trends that may be associated with the geology.

Franklin Grid

The most southerly zinc anomaly extends from Last Chance Creek along the road to the old McKinley workings. Disseminated sphalerite, galena and pyrite in the silicified sharpstone and limestone would account for this anomaly. The northwest trending anomalies in the Banner area overlie and parallel the mineralized quartz veins. To the west of the baseline, the larger anomalies are related to the pyritic argillite belt. Selected samples of argillite containing approximately 5 percent pyrite assayed 0.37 and 0.35 percent zinc.

Northwest of the Homestake a topographic anomaly is evident in the headwaters of a small creek immediately below the old mine dump. The long, narrow anomaly east of the Homestake lies along the basal portion of the Tertiary conglomerate. At two places along this contact, groundwater seepage was observed, and it is likely the zinc content of the water has been precipitated by the organic content of the soil. These two anomalies are insignificant.

FIG. 19
ZINC FREQUENCY DISTRIBUTION
960 SAMPLES



West Grid

No zinc anomalies of any significance were found on the West Grid. The few spot highs in the northwest corner are related to drainage courses.

North I.X.L. Grid

The four anomalies along the most northerly crossline are due to the metal concentration in the swamps. Two streams draining the metal-rich I.X.L. area run into these swamps. The anomalies over the I.X.L. showings follow the limestone-sharpstone belt direction. Small amounts of sphalerite and galena were observed in the sharpstone and along the contact of the limestone and feldspar porphyry.

South I.X.L. Grid

The anomalies in the northeast portion of the grid are extensions of the North I.X.L. trend. The remaining few to the south are relatively weak and are of no apparent geological importance.

Lead Anomalies (Fig. 3)

Total lead values ranged from six to greater than 2000 ppm. Statistical analysis of 960 samples resulted in upper background value of 50 ppm (see Fig. 20). A 35 ppm contour interval was also drawn to indicate geochemical trends.

Franklin Grid

Most of the lead anomalies are coincident with, but not nearly as widespread as, the zinc anomalies. Along

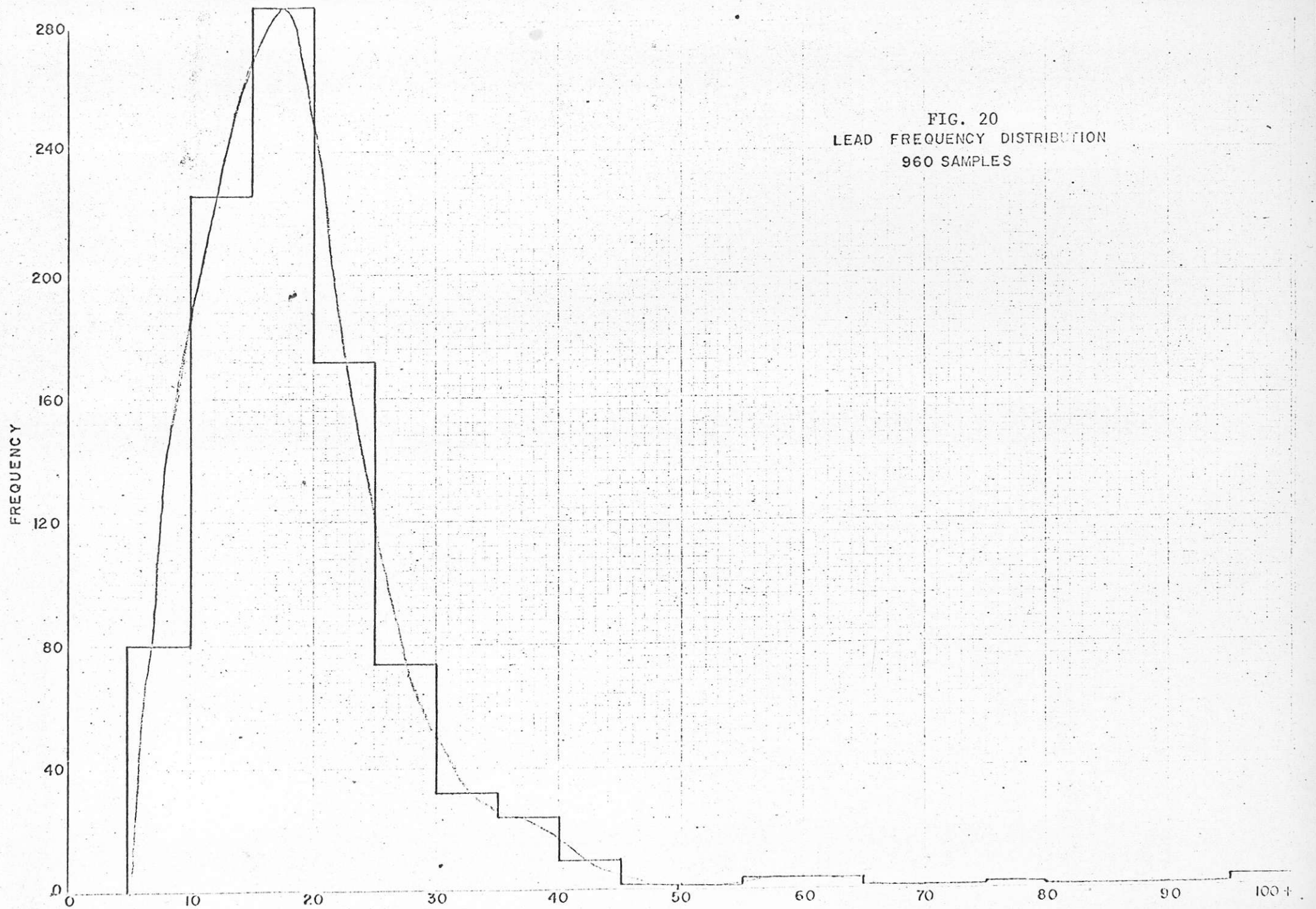


FIG. 20
LEAD FREQUENCY DISTRIBUTION
960 SAMPLES

the syenite contact the lead is more coincident with the copper than with zinc, although no galena mineralization was observed. Galena was identified in all anomalous locations except in the pyritic argillite belt.

West Grid

Several spot highs are scattered over the western portion of the grid. Two of these highs are associated with the syenite intrusive although no mineralization was observed in the field.

North I.X.L. Grid

Practically all anomalies are confined to the belt of altered sedimentary rocks between the Tertiary conglomerate and the Nelson granodiorite. Galena occurs with sphalerite and chalcopyrite in narrow, high grade veins in the limestone-skarn zones. The sharpstone conglomerate carries small and scattered occurences of galena in the southeast area of the grid. The amount of observed mineralization is barely enough to give rise to the geochemical anomalies that did occur.

South I.X.L. Grid

Lead shows some vague coincidence with the zinc on extensions of the North I.X.L. anomalies. The remainder of the anomalies are individual spot highs which are not related to any geological feature and are of doubtful significance.

SUMMARY AND CONCLUSIONS

Most of the geochemical soil survey anomalies can be confined to six geological environments.

1. Copper, lead and zinc mineralization in the McKinley Mine and I.X.L. areas is associated with the silicified, pyritic, feldspar porphyry and the limestone-skarn contact.
2. Northwest trending Banner type quartz veins carrying pods of chalcopyrite, galena, sphalerite and pyrite.
3. The high trace metal content of the sedimentary rock series, particularly the dark, pyritic argillite, which gives rise to large zinc, copper and lead anomalies.
4. A strong copper anomaly occurs over disseminated chalcopyrite along the margin of the northwest trending syenite intrusive.
5. The sharpstone conglomerate on the I.X.L. Grids and east of the McKinley workings contains sphalerite and galena. North of Franklin Creek copper anomalies are more closely associated with the sharpstone, but no actual copper mineralization was identified. Silicification of the sharpstone conglomerate south of the creek may account for the change in anomaly characteristics. It is very likely that the deposition of lead-zinc mineralization and the silicification are closely related.
6. The hornblendite intrusive on the South I.X.L. Grid is anomalous in copper and also gave rise to a magnetic anomaly. This intrusive locally contains magnetite and chalcopyrite.

GEOCHEMICAL STREAM SEDIMENT SURVEY

INTRODUCTION

The object of the stream sediment survey was to geochemically prospect for other areas of mineralization in proximity to the Franklin Camp. A total of 670 samples were collected from 25 streams.

GENERAL DISCUSSION

Streams draining an area approximately 40 miles by 5 miles and centered on the Franklin Camp were sampled (Figs. 10, 11 & 12). Sample intervals were approximately 1000 feet and closed down to 500 feet in areas of interest. At each sample point two samples of active sediments were collected within 30 feet of each other and the values presented the average value of the determination on the two samples.

Stream sediments derived from metasediments of the Anarchist Group returned above background results because of the higher trace metal content of these rock types. Where metal concentrations do occur in these rocks, values usually exceed 200 ppm for Cu, 400 ppm for Zn or 100 ppm for Pb. Lower background values characterize areas of igneous rocks and values in excess of 50 ppm for Cu, 100 ppm for Zn or 40 ppm for Pb are significant.

CHEMICAL ANALYSIS

Stream sediment samples were analyzed at the Newmont mobile geochemical laboratory in Princeton. The analytical procedures previously described for soil samples were used for stream sediment samples. All samples were analyzed for copper, lead and zinc. Additional determinations for molybdenum and silver were made on selected samples.

RESULTS

Streams G and H are anomalous for lead and zinc. Copper is also weakly anomalous. Geologic investigation shows these areas to be underlain by the Coryell granite. Although good rock exposures exist, no mineral concentrations were located.

A soil sample traverse to further explore this area indicates an anomalous area roughly 2000' by 5000'. It is noted, geochemically high values occur in well developed soil horizons.

Streams J, K, L and M are anomalous for lead, zinc and copper and drain metasediments of the Anarchist Group. Detailed work on the Franklin Grid has shown a pyritic argillite in this same rock sequence to carry above background values in lead, zinc and copper. The same rock type was found as the source for these anomalies.

The tributaries of Gloucester Creek returned several anomalous values--of special interest were the high results on the western side. Subsequent investigation of the area above the highest values revealed that considerable bulldozer trenching had been done by Franklin Mines Ltd. in 1964. This trenching exposed a contact between syenite and granodiorite. Pyrite and minor chalcopyrite occur along the contact as discontinuous and narrow zones.

The areas drained by the tributary streams of Franklin Creek, sampled in 1968, were all covered by the soil sample grids in 1969.

All of the Blue Joint Creek tributaries, except for eastern tributary P, drain the metal-rich Anarchist Group. The area around tributary P was prospected on a reconnaissance basis. No geological explanation was found for the anomaly. It is of note that anomaly P is coincident with an

airborne magnetic high. Magnetic interpretation suggests an intrusive similar to the hornblendite which occurs on the northeast corner of the South I.X.L. Grid and underlies the trenched area of the North I.X.L. Grid. D.D.H.#1 intersected 162 feet of this intrusive carrying magnetite and minor chalcopyrite.

The stream immediately northwest of the Franklin Campsite cuts the granodiorite intrusive which contains minor disseminated chalcopyrite and molybdenite. This granodiorite is also drained by anomalous stream N. Immediately north of Miller Creek a small quartz plug carries pyrite and minor chalcopyrite, causing the anomalous values in the two northern tributaries.

A minor number of sporadic copper, lead and zinc anomalies were defined in the remaining areas. These anomalies are of limited areal extent, occur in isolated locations, and no follow-up prospecting has been completed.

SUMMARY AND CONCLUSIONS

Metasediments of the Anarchist Group in the Franklin Camp area carry above background values in copper, lead and zinc. Geological investigation suggests these values are caused, at least in part, by the pyritic argillite horizon.

Two anomalous areas are defined by the stream sediment survey:

1. High lead and zinc values outline an area 2000' by 5000' at the head waters of streams G and H. Although good exposures of the Coryell granite were apparent, no source for the anomaly was found. Further prospecting and soil sampling are recommended to fully define this anomalous area to the east.

2. Stream P is geochemically anomalous for copper and zinc and is coincident with a magnetic feature interpreted as a hornblendite intrusive. Further investigation of the area surrounding stream P is warranted, especially if the magnetic high outlines a hornblendite intrusive similar to those explored on the I.X.L. Grid.

Report By:

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L. D. Kornze