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FINAL REPORT

DECKER CREEK PROJECT

(1962)

NORTHERN

BRITISH COLUMBIA

VANCOUVER OFFICE
FEBRUARY, 1963

D.A. SILVERSIDES

TABLE OF CONTENTS

REFERENCES

(1) Loudon and Silversides (1961) Report on the Decker Creek Molybdenite Prospect

(2) Loudon, J.R. (1963) Final Report Bar-Dec Reconnaissance Project (1962)

ILLUSTRATIONS

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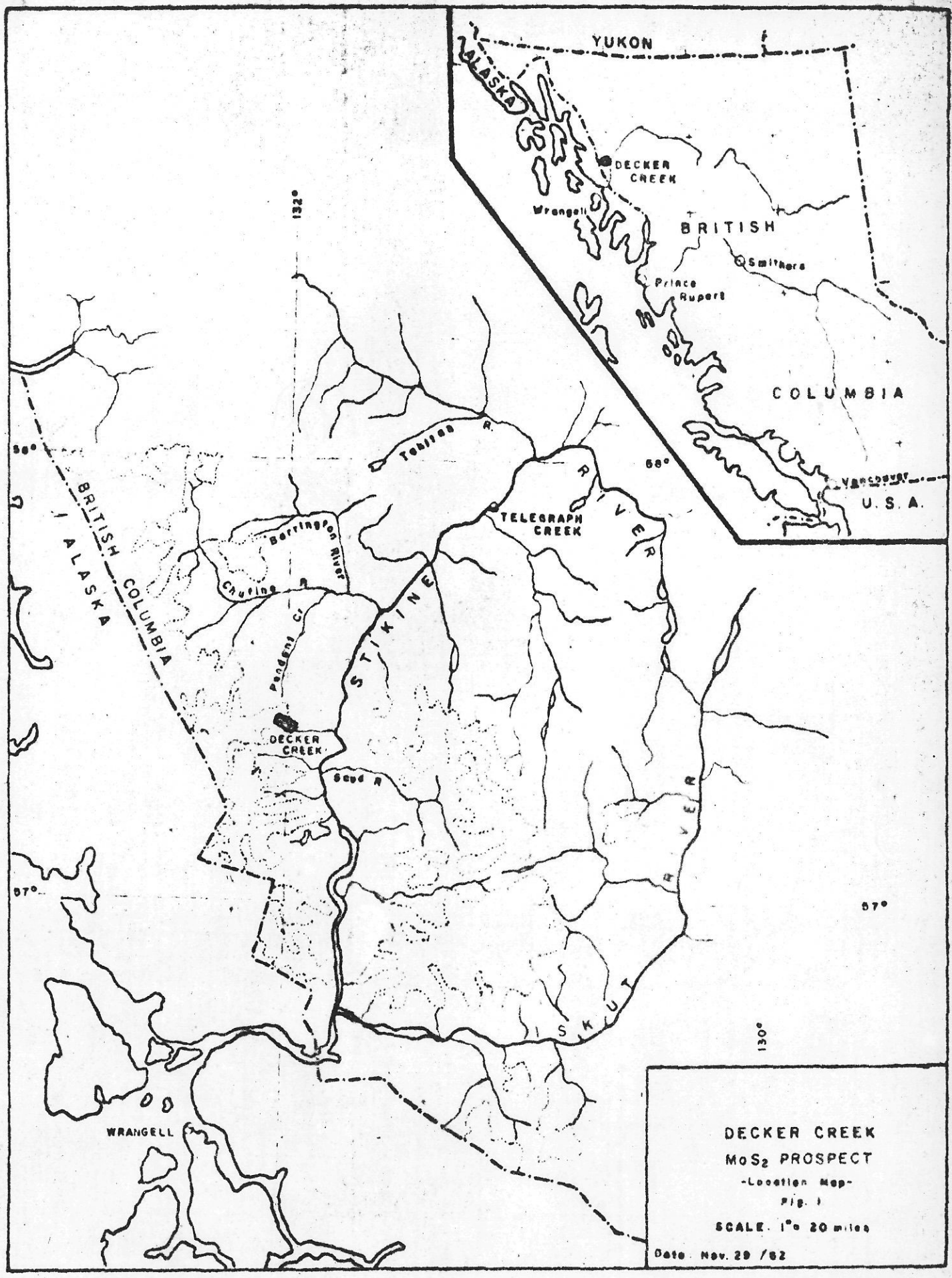
I SUMMARY

The Decker Creek Prospect was discovered in June, 1961, during exploration operations of the Stewart-Stikine Project. A block of seventy-nine claims was staked to cover a widespread occurrence of molybdenite between Pendant Glacier and the headwaters of Decker Creek and a recommendation was put forth to mount a program in 1962 to evaluate the property.

In the summer of 1962, the area felt to contain the highest frequency of molybdenite mineralization was mapped by plane table at a scale of 1" = 100 ft. A total length of 680 feet of trenching was completed and sampled, primarily for assessment purposes.

Molybdenite occurs in quartz veinlets, fairly large quartz lenses, fractures, and minor disseminations adjacent to quartz veining near the margin of the Chutine Quartz Monzonite Batholith. The batholith, believed to be of Tertiary age, intrudes Triassic(?) diorite and Permian(?) limestones and phyllites in the Decker Creek area.


YUKON
ALASKA
DECKER CREEK
Wrangell
BRITISH
Smithers
Prince Rupert
COLUMBIA
Vancouver
U.S.A.
132°
56°
58°
Tahltan R.
BRITISH COLUMBIA
ALASKA
Barrington River
Chutine R.
Pendent Cr.
TELEGRAPH CREEK
RIVER
STIKINE
DECKER CREEK
Sood R.
57°
ISKUT
RIVER
130°
WRANGELL
DECKER CREEK
MoS2 PROSPECT
-Location Map-
Fig. 1
SCALE. 1" = 20 miles
Date. Nov. 29 /62

IV INTRODUCTION

(1) Location and Access (see Fig. 1)

The Decker Creek Molybdenite Prospect lies 8 miles due west of the Stikine River, between Pandant Glacier and the headwaters of Decker Creek (latitude 57°23' N., longitude 131°58' W.).

Supplies are landed at the mouth of Decker Creek via Ritchie Transportation river-boat, which runs a weekly service on the Stikine between Wrangell, Alaska and Telegraph Creek, B.C. during the summer months (May 1 - Sept. 15). From the landing point, they must be flown to the prospect by helicopter. Float-equipped aircraft from either Coast Range Airways in Atlin or Alaska Coastal-Ellis Airlines in Wrangell will land in the river on charter.

The camp is situated at an altitude of 3,425 feet on a small gravel flat slightly southwest of center of the claim group.

(2) Reason for and Purpose of the Project

During the course of the Stewart-Stikine (1961) Project a large stain zone (9,000 feet X 1,200 feet) was noted between the headwaters of Decker Creek and the Pendant Glacier. Ground examination of this zone showed it to be an area of highly altered and sheared quartz monzonite cut by irregular dykes and lenses of aplite, quartz-feldspar porphyry, and molybdenite bearing quartz veinlets. Minor molybdenite occurrences were noted outside the zone.

These factors (widespread and favorable type of mineralization, alteration, and the apparent ground disturbance) suggested the possibility of a large, as yet unexposed, molybdenite deposit.

It was recommended that a program involving detailed plane table mapping, trenching, and sampling be undertaken. It was felt that such a program would provide sufficient data on mineralization, structural trends, and petrology, to outline favorable areas for diamond drilling.

(3) Work Done at Decker Creek

Seventy-nine claims were staked by Southwest Potash Corporation in August, 1961. A little detailed work was done during staking operations, this work consisted of mapping along claim base lines, geochemical sampling, and chip samples across several zones of mineralization. Results of this work are described in the 1961 Report on the Decker Creek Showing (Loudon and Silversides).

By July 12, 1962, snow cover had decreased sufficiently to allow commencement of work on the Decker Creek Project. Four, 14 x 17 ft. wood tent frames were constructed for the camp. Geologic work began on July 18.

An area 4,800 ft. x 3,000 ft., felt to contain the most favorable mineralization and significant geologic features,

was mapped by plane table at 1 inch = 100 feet. Definition of rock types encountered in mapping was aided in some instances by a cursory examination of thin-sections from specimens collected during 1961's examination.

Trenching was done through use of a Copco rock drill and 60% forcite. Total length of trenching completed was 680 feet, average width and depth 4 ft. x 4 ft. A total of 79 samples were taken, chipped off the walls of the trenches.

This report covers the work completed in 1962.

V REGIONAL GEOLOGY (see Fig. 2)

Regional geology has been described in detail by J.R. Loudon in the Bar-Dec (1962) and Stewart-Stikine (1961) reports. The dominant geologic feature brought to light by his work is the presence of an embayment in the eastern margin of the Coast Range Batholithic complex. This area is also marked by a deviation in strike (northwest to northeast) of volcanic and sedimentary strata.

Major intrusive masses which make up the "rim" of the embayment, in order of oldest to youngest, are diorite, granodiorite and quartz monzonite. Diorite has been postulated as Triassic, granodiorite as Triassic or later. Quartz monzonite may be of Tertiary age as similar quartz monzonite in the Sutlahine River area, covered in the Whiting-Iskut Project (1962), has been dated

absolutely as 69 m.y. by the Geological Survey of Canada.

Of significance is the presence of a number of small leucocratic stocks, ranging in composition from syenite, granodiorite, monzonite, porphyritic quartz monzonite to granite, which occur in and around the embayment. All of these have associated molybdenite mineralization. One, Conwest Balsam, has been dated absolutely at 48 m.y. Some (e.g., Canyon and Glacier intrusions) have been found to cut major quartz monzonite intrusives and are therefore younger.

In summation, the apparent importance of this embayment is that it outlines an area of extended intrusive activity probably beginning in the Triassic and extending well into the Tertiary. The youngest intrusives invariably have associated quartz-molybdenite mineralization.

Decker Creek can be considered as the most southerly of the molybdenite occurrences around the embayment. Here, molybdenite mineralization occurs near the margin of the Chutine Quartz Monzonite Batholith which is in contact with Triassic diorite and Permian limestones and phyllites. This batholith is characterized by the homogeneity and lack of alteration in its marginal portions. Thus, in comparison with other border areas, the area between the headwaters of Decker Creek and the Pendant Glacier is unique in that it contains highly sheared, altered rock in which molybdenite mineralization is present. This area is discussed in detail in the following section.

VI GEOLOGY OF THE DECKER CREEK MOLYBDENITE PROSPECT

(1) Geologic Setting

At the Decker Creek Prospect, molybdenite occurs within, but is not totally confined to a highly sheared, yellow iron-oxide stained zone extending from the western side of Decker Glacier to the eastern side of Pendant Glacier. This zone is located near the southwest margin of the Chutine Quartz Monzonite Batholith which intrudes diorite and interbedded limestones and phyllites in the Decker Creek Area. Rock types in the zone include altered and unaltered equivalents of the batholith, felsite, quartz-K-feldspar porphyry, and aplite. A fine-grained variety of quartz monzonite outcrops to the northeast of the zone.

Detailed mapping (see Fig. 3) was conducted in an area some 4,800 ft. x 3,000 ft. on the Decker Creek side of the Prospect. The following sections describe the results of this work.

(2) Rock Types

(a) Limestone and Phyllite

Interbedded limestones and phyllites occur as a fairly large block within diorite in the southwest corner of the mapped area (Fig. 3). They were not observed in contact with quartz monzonite. Limestone occurs in coarse-grained bands, two to three feet thick, separated by crenulated $\frac{1}{2}$-inch bands of phyllite that have been transformed locally into chloritic schists.

No metallic mineralization is evident in the assemblage.

The limestone-diorite contact, where observed, strikes northeast and dips 75° southeast. Bedding has been intensely deformed into a complex of isoclinal folds.

(b) Diorite

Diorite is well exposed in the steep cliff on the western edge of the property but its contact with altered quartz monzonite is almost completely covered by ice and snow. Where observed, the contact strikes northwest and dips 60° to 80° to the southwest.

The diorite has a very heterogeneous texture and composition, ranging from fine to coarse granitic, from schistose to gneissic. On the average, the rock is medium-grained, having 30 per cent calcic plagioclase, 20 to 30 per cent biotite, 30 to 40 per cent hornblende, and 5 per cent quartz. Accessories are minor apatite and magnetite.

Thin-sections show no pervasive hydrothermal alteration in the central portions of the diorite. Epidote stringers and chloritic alteration of biotite and hornblende occur along the contact with quartz monzonite.

(c) Quartz Monzonite (coarse-grained, pink)

Unaltered, coarse-grained quartz monzonite outcrops in the northwest corner of the map area and extends northward to form the major batholith. What appear to be isolated patches also

occur northwest of camp at an elevation of 3,800 feet. The rock is typically medium to coarse-grained and porphyritic, with large (up to 1 inch) K-feldspar phenocrysts. It is a light pink flecked with dark green in color and contains glassy quartz (* 26 per cent), white sodic plagioclase (31.5 per cent), pink K-feldspar (36 per cent), and dark green biotite (6.5 per cent). Accessory minerals (2-3 per cent) are magnetite, apatite, and sphene. Under the microscope, K-feldspar is seen to be perthitic and biotite generally has associated chlorite around its margins. Sericitization of the feldspars is minor, being most noticeable in the centres of normally zoned plagioclase (An 25 in centers, An 5 in rims).

Three sets of joints, striking N.65°E., dipping 25°S.E., striking N.65°E., dipping vertically, and striking N.00N., dipping 70° to vertically east, traverse the quartz monzonite in the northwest corner of the mapped area. In the central portions of the batholith a very strong north strike and vertical dip to joints and faults is present.

Quartz veinlets and lenses are common in the unaltered quartz monzonite, but are spaced up to 100 feet apart. Molybdenite occurs in these quartz veins as medium to coarse-grained rosettes. Pervasive alteration of the quartz monzonite, in the form of

*mineral percentages established by point counts of thin-sections

silicification and sericitization, occurs where quartz veining is closely spaced. Two mappable rock units, sericitized quartz monzonite and silicified breccia, are recognized in the mapped area and are discussed under the heading of Alteration.

(d) Quartz Monzonite (fine-grained, white)

Fine-grained quartz monzonite outcrops east of the camp and is exposed between an elevation of 1,900 feet and 4,500 feet. Within the mapped area, it is in gradational contact with altered quartz monzonite and further to the north it grades into unaltered, coarse-grained quartz monzonite typical of the major batholith.

The rock is white to light grey in color and is composed of glassy quartz (35 per cent), white sodic plagioclase (33 per co flesh-colored K-feldspar (30 per cent), and black biotite (2 per cent). Accessories include magnetite, sphene, and apatite. On the average, the texture is fine-grained, somewhat sugary. Porphyritic textures (quartz and K-feldspar phenocrysts) appear in higher sections (3,500 feet to 4,500 feet elevation). Thin-sections show no alteration of biotite or feldspars, except adjac to quartz veining, where minor and local sericitization occurs. K-feldspar crystals are perthitic and plagioclase is zoned normal with An 25 in the centers, An 5 on the rims. Bulk plagioclase composition is estimated to be An 15.

Between an elevation of 3,000 feet to 4,500 feet, the rock is cut by randomly orientated vuggy quartz veinlets and pegmatite lenses. Quartz veinlets average ½ inch in thickness and are spaced 10 to 20 feet apart. Pegmatite lenses, composed of quartz, K-feldspar, plagioclase, and biotite are generally 20 to 50 feet in length and up to 3 feet in thickness.

The only metallic mineralization observed, associated with the lenses and veinlets is specular hematite and pyrite. Specular hematite was found in one locality, approximately 7,500 feet east of camp. Elsewhere, only pyrite appears to be present.

Three sets of joints, striking north, dipping 80° to vertically east, striking northeast, dipping 70° to vertically northwest, and striking northeast and dipping 30° to 40° southeast, traverse the inner regions of the quartz monzonite. In the mapped area, adjacent to altered quartz monzonite, one set, striking northwest, dipping 60° to 70° northeast, predominates, and its joint faces are coated with pyrite and flakes of sericite.

In general, it may be said that the most distinguishing characteristics of the fine-grained quartz monzonite in relation to coarse-grained quartz monzonite is its lesser biotite content (2 per cent versus 6.5 per cent) and its fine-grained sugary texture. Pegmatitic activity appears to have been concentrated

in the upper regions of the rock between an elevation of 3,500 feet to 4,500 feet. In mineralogy, both types of quartz monzonite are similar, thus a common genetic origin is logical. Intrusive relations between the two types appear to be lacking and thus both probably crystallized under similar temperature conditions and at the same time.

(c) Aplite

Aplite is intruded throughout altered rock in lenses generally 6 inches to 1 foot in thickness and 10 to 60 feet long. Fairly large (up to 500 feet long, and 80 feet thick), highly sheared masses occur in the marginal portions of the fine-grained variety of quartz monzonite. The dominant attitude is strike northwest and dip steep to the northeast.

The rock is light pink in color, fine-grained, sugary, and composed of quartz (30 per cent), K-feldspar (40 per cent), and albite (30 per cent).

Quartz veinlets, from 1/8 to 1/2 inch thick and bearing fine-grained molybdenite, occur within and follow the same strike and dip as the aplite masses. These are best displayed in the area northeast of camp at an elevation of 3,500 feet to 4,200 feet, where numerous veinlets, spaced 3 inches to 6 inches apart, traverse the rock.

(f) Felsite Dykes

Fine-grained, felsitic dykes were observed in the area northeast of camp at an elevation of 3,450 feet to 3,500 feet and to the northwest at an elevation of 3,550 feet to 3,650 feet. They are difficult to detect and trace because of their small size and tendency to blend with altered rock. Those observed are between 6 inches to 1 foot thick and traceable up to 100 feet along strike. Attitudes, striking north to northwest and dipping 10 degrees to 15 degrees to the east, appear to be consistent. Molybdenite mineralization was observed cutting these dykes, therefore they are pre-mineralization.

The dyke rock is a light grey in color, with a general aphanitic texture. In some dykes, rare phenocrysts of quartz, biotite, and K-feldspar were observed. Thin-sections show them to consist of fine-grained quartz, K-feldspar, plagioclase, and biotite.

(g) Quartz - K-feldspar Porphyry Dykes

A number of quartz-K-feldspar porphyry dykes are concentrated in the eastern portion of the mapped area. They vary in width considerably and appear to be lenticular at least in plan view. The longest traceable dyke has a strike length in excess of 2,100 feet, the shortest 600 feet. A predominant attitude, striking due north and dipping 60° east is characteristic

of the dykes in this area. One similar dyke was observed at an elevation of 3,950 feet to 4,050 feet, 2,800 feet northwest of camp. Its attitude differs from those in the eastern portion of the mapped area, being N.30°W./55° S.W.

The dyke rock is light grey in color, with a porphyritic texture. It is made up of quartz and K-feldspar phenocrysts set in an aphanitic groundmass of plagioclase, biotite, K-feldspar, and quartz. Pyrite occurs as an accessory.

These dykes cut all exposed rock types and quartz molybdenite mineralisation and therefore appear to be the youngest rock on the property.

(3) Alteration

Alteration consists of silicification, and sericitization of what was once believed to be quartz monzonite. Altered rock was divided into two mappable units.

(a) Sericitized Quartz Monzonite

Sericitized quartz monzonite lies adjacent to and is gradational into coarse-grained quartz monzonite and fine-grained quartz monzonite. The rock is highly sheared and has a light brown stain of iron-oxide. Pyrite is common, occurring as fine-grained cubes, and appears most abundant in the area northwest of camp at an elevation of 3,600 feet to 3,000 feet. The rock is characterized by a general lack of biotite. Biotite does occur

however, but is confined locally to areas where quartz veining is sparse. By far the majority of the rock contains white mica (sericite?) as its only mica.

Thin-sections show sericitization to range from very sparse to very pervasive. Thin-sections of rock from the more northerly portions of the mapped area contain minor amounts of "sericite" in the form of seamlets and sprinklings within plagioclase. Rocks in the area immediately north of camp show the most pervasive alteration. Here, thin-sections show all the feldspars to be heavily sericitized. Relatively large flakes of "sericite" (up to 1/8 inch in diameter) are present and contain within their boundaries fine cubes of pyrite. These are believed to be due to hydrothermal alteration of biotite, accompanied by an addition of sulphur.

In general, it appears that the degree of sericitization is a function of quartz veining such that pervasively altered areas contain a high frequency of veinlets.

(b) Silicified Breccia

Silicified breccia is exposed at an elevation of 3,300 feet to 3,350 feet on what is commonly called the "Nunatak", and on the ridge some 2,300 feet to the northwest at an elevation of 3,700 to 4,050 feet. It probably underlies the ice between these two areas.

This rock lies adjacent to the diorite contact and appears to be in gradational contact with the sericitized quartz monzonite type. Outcrops are very hard and siliceous appearing. Fresh broken rock displays a random orientation of quartz seamlets having diffuse margins and spacings of 3 to 4 inches.

Thin-sections show a granulation of grains has occurred. Sericitization is moderate to heavily pervasive. Silicification is in the form of thin seamlets of granular quartz traversing the sections in random distribution.

A fine-grained, dark grey mineral aggregate is associated with the random quartz seamlets of the breccia. This aggregate has been identified in polished section * as a granular mixture of pyrite, magnetite, sphalerite, and chalcopyrite in emulsion texture with the sphalerite. Molybdenite does <u>not</u> occur with this aggregate. It does occur in quartz veinlets, lenses, and fractures associated with quartz veins which <u>cut</u> the breccia. Furthermore, these quartz-molybdenite veins have a definite northwest trend. In conclusion, molybdenite mineralization is later than the random brecciation, silicification, and pyrite-magnetite-sphalerite-chalcopyrite mineralisation.

One of the characteristic features of the Decker Creek Property is the presence of a pyrolusite stain on outcrops of

* Identified by Dr. R.M. Thompson, mineralogist, University of British Columbia

both altered rock types. One thin-section from the area north of camp where the stain appears to be heaviest, showed a fine-grained, prismatic and isotropic aggregate of crystals which may possibly be manganite.

4. Structural Geology

(a) Structural Features

Structural data pertaining to the Docker Creek Prospect is summarized in Fig. 4.

(1) Quartz Veining

Molybdenite-bearing quartz veinlets and lenses have very predominant northwest strikes and varied, but systematic changes in dips. The locus of change in dip is represented by an "axis" shown in Fig. 3. Veins southwest of the "axis" tend to have increasing southwest dips. Those in the vicinity of the axis tend to have flat dips, and those northeast of the axis tend to have increasing northeast dips.

Vein attitudes are summarized in Fig. 4b. Those of set (i), striking N.15° to 20°W., and dipping 20° to 30° N.E. appear to be most numerous. Those of set (ii), striking N.30° to 35° W., and dipping 20° to 30° S.W., tend to be less numerous, but in all probability occur in as great a number as set (ii) since the area generally having southwest-dipping veins is largely covered by ice and snow.

(2) Shears and Faults

Widespread, numerous faults and shear zones are characteristic of the Decker Creek Prospect. There is a well-defined pattern in orientations (see Fig. 4a), consisting of two predominant directions.

(i) Striking due North to N.5°E., and dipping 85° E. to 85°W.

(ii) Striking N.15° to 20°W., and dipping 50° to 60° N.E.

A third set (iii) strikes N.25° to 30°W., and dips 60° S.W., and appears most prevalent in the rock forming the ridge projecting through the ice some 2,500 feet northwest of camp.

Set (i) cuts set (ii) and is therefore later. Its walls tend to be open (up to 1 foot gaps observed) and have paralleling, barren, vuggy quartz veinlets. Displacements appear to be minor and gouge rare. This set follows regional faulting and jointing within the quartz monzonite batholith.

Sets (ii) and (iii) have similar strikes but opposite dips and appear to have developed at the same time. Displacements are minor, the largest observed was a 10-foot dip-slip displacement of a flat-lying quartz lens northwest of camp at an elevation of 3,875 feet. All observed slickenside directions are aligned downdip and this, together with the observed displacements indicate

the two sets to be normal faulting.

Sets (ii) and (iii) closely follow attitudes of steeper dipping quartz veining. In fact, a number of veinlets to the north of camp have their margins slickensided by late movement.

(3) Jointing

Joint data from the mapped area is summarized in Fig. 4(c). Apparent sets present, in decreasing order of abundance, are:

(i) Striking N.15°E., and dipping 20° to 30°E.

(ii) Striking N.05°E. to N.25°W., and dipping vertically.

(iii) Striking N.45°-50°E., and dipping vertically.

The poles of the three sets of regional jointing (occurring outside the MoS_2 mineralized area) are shown by the red circles and correspond to sets (i), (iii), and the more northerly striking joints of set (ii). Thus, set (ii) might actually contain a set striking northwest, which in turn would correspond to lineations particular to the mineralized area, namely set (ii) faults and shears, and set (i) quartz veining.

(4) Fractures

Fractures having open walls with gaps up to 1/4 inch wide occur within altered rock. They have coatings of white mica, pyrite, and pyrolusite on their faces and can be traced up to 300 feet along strike. Two sets are present.

(i) Striking N.30° to 75°E., and dipping vertically.

(ii) Striking N.30° to 25° E., and dipping 35°S.E.

Set (i) is the most prevalent. Set (ii) appears mainly in silicified breccia and frequently has curved strikes, such that they appear to plunge 10° to 20° southeast.

Other structural features of the property include:

(i) The northwest strike and southwest dip of the diorite contact which is in effect the apparent boundary of molybdenite mineralization to the southwest.

(ii) A poorly developed foliation present in parts of moderately altered to unaltered rock. This appears to be primary (i.e., developed during initial crystallization of the batholith) and follows the attitude of the diorite contact, thus it most likely represents flowage of the crystallizing quartz monzonite magma.

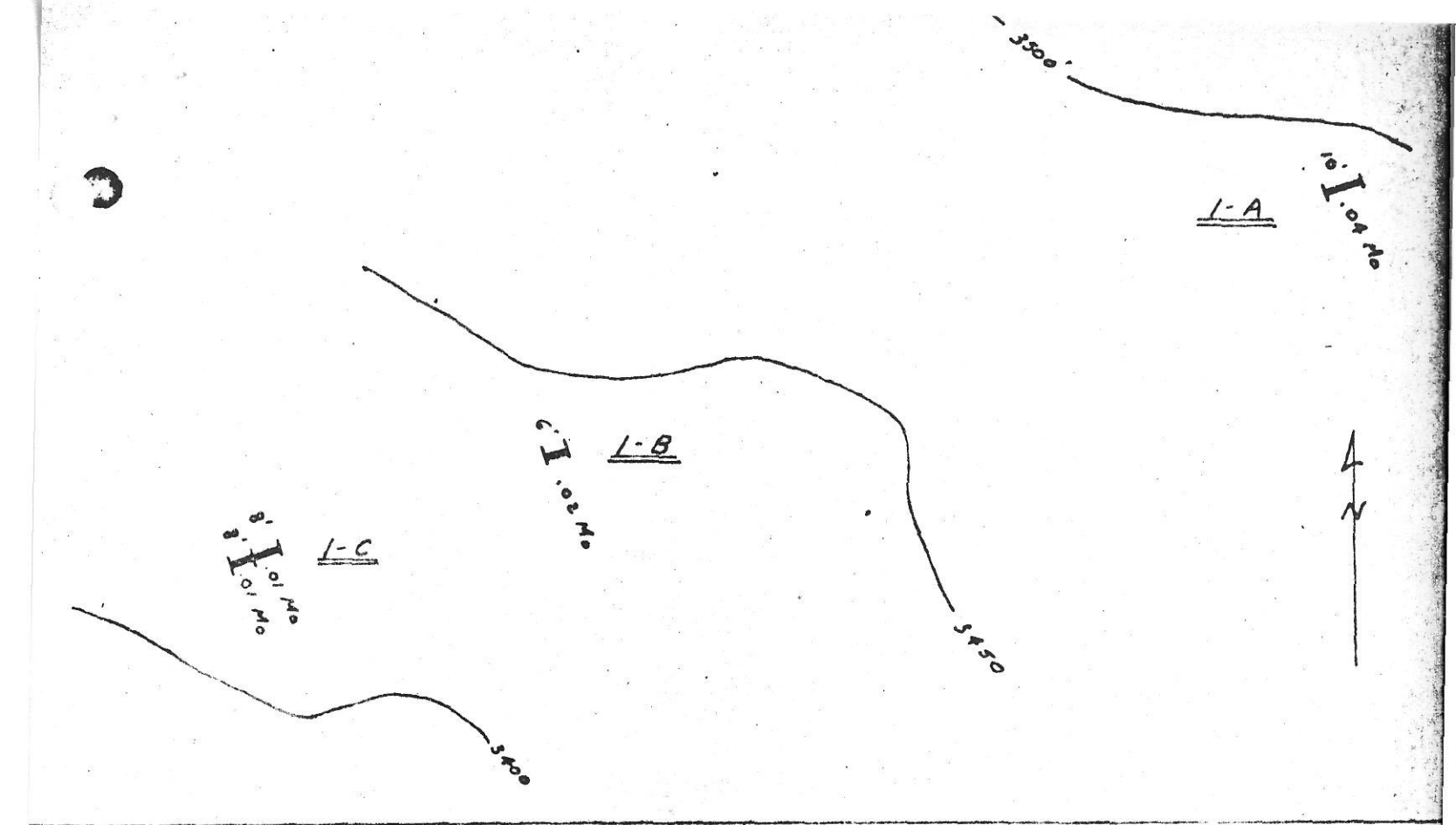
(iii) The granulated nature of rock in the silicified breccia appearing adjacent to and up to 800 feet from the diorite contact. Such a feature is common in contact margins of igneous bodies and is generally interpreted as being due to movement of a nearly crystallized shell.

(iv) The predominant northwest strike and shallow northeast dip of felsite dykes. These are cut by molybdenite mineralization, thus appear to be earlier.

APPENDIX

TRENCHES

Scales: 1" = 50'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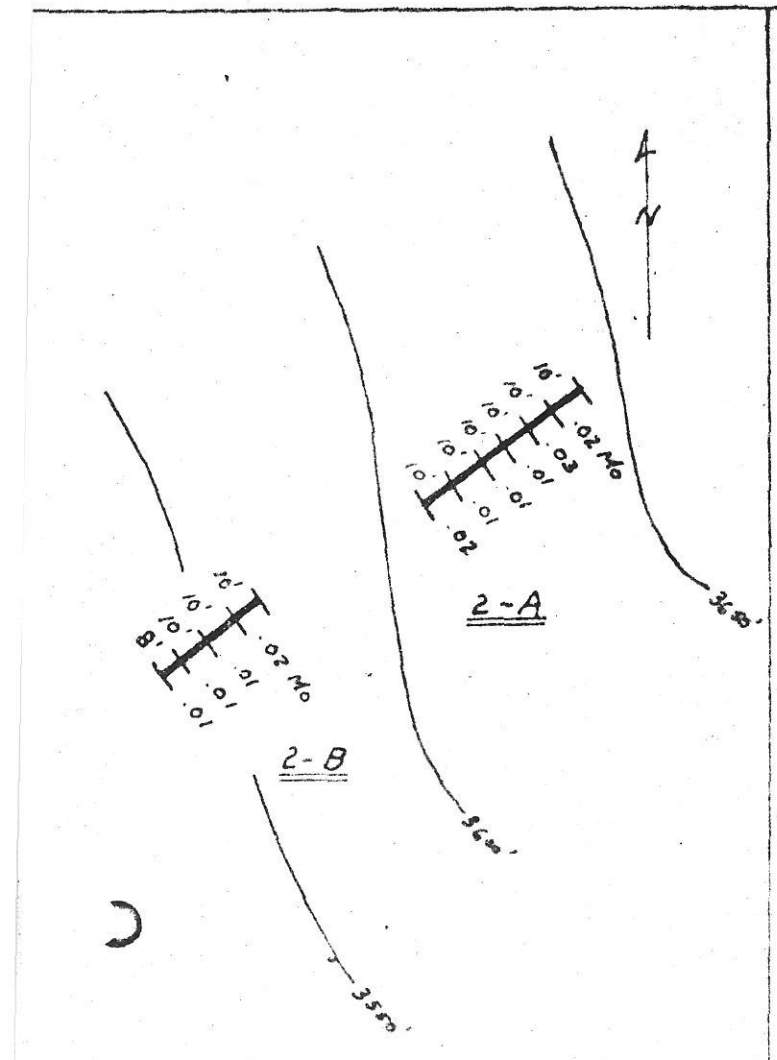
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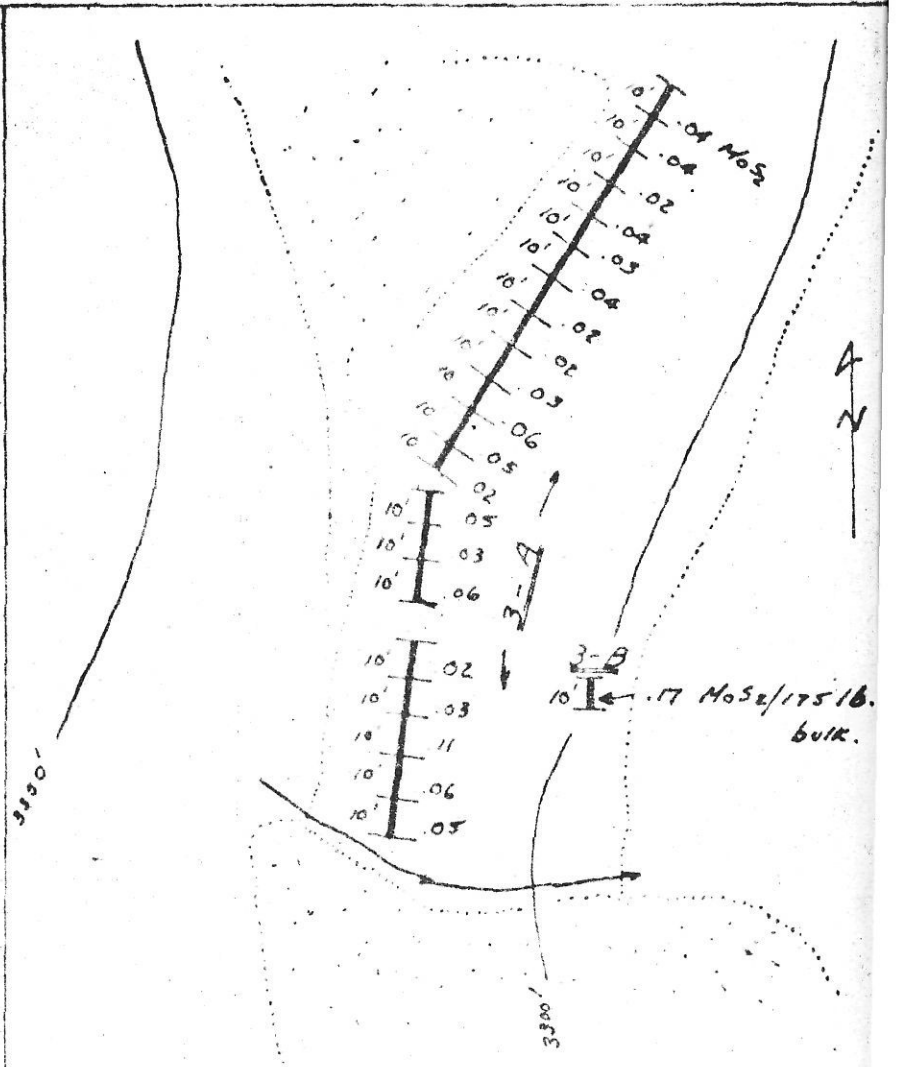
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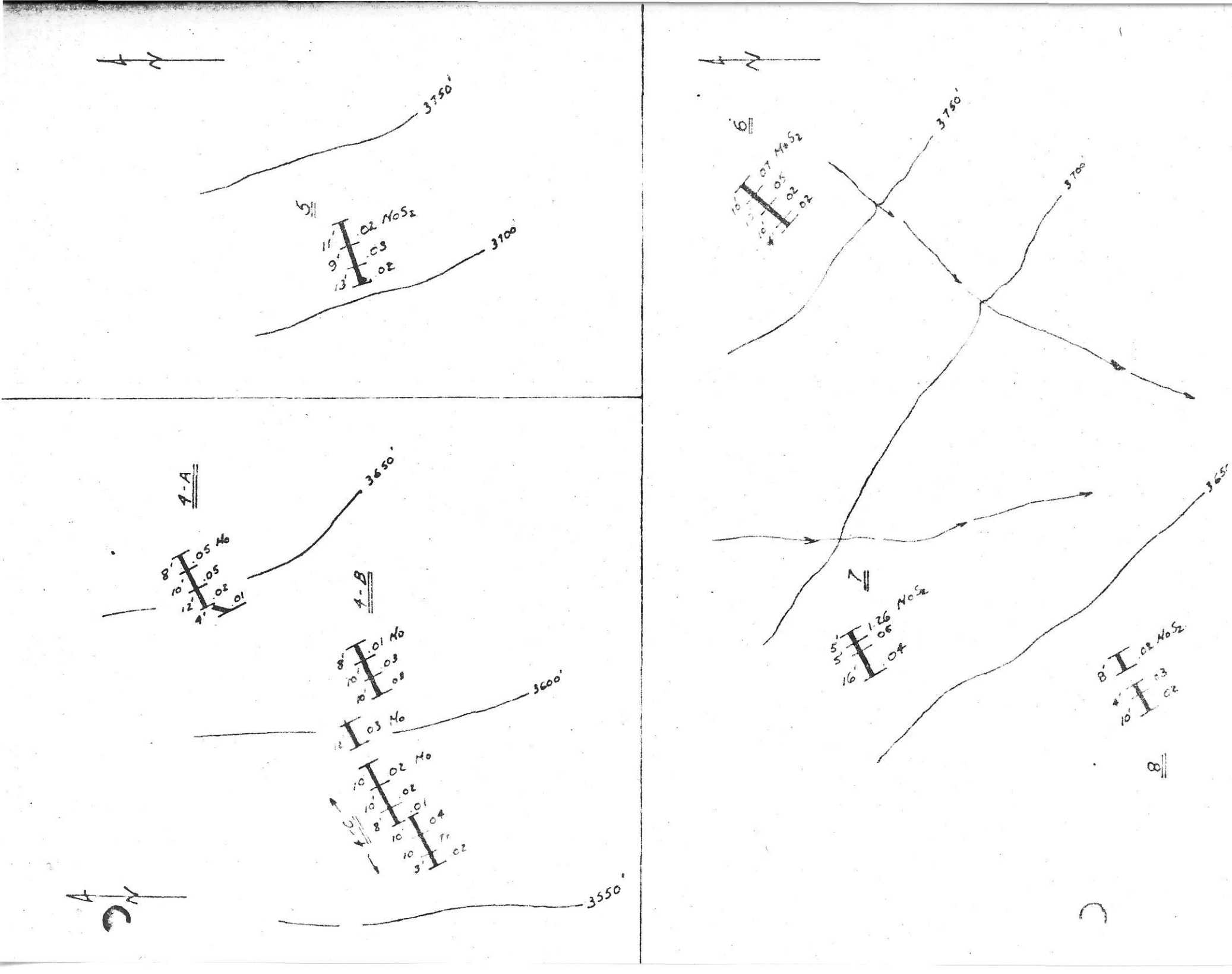
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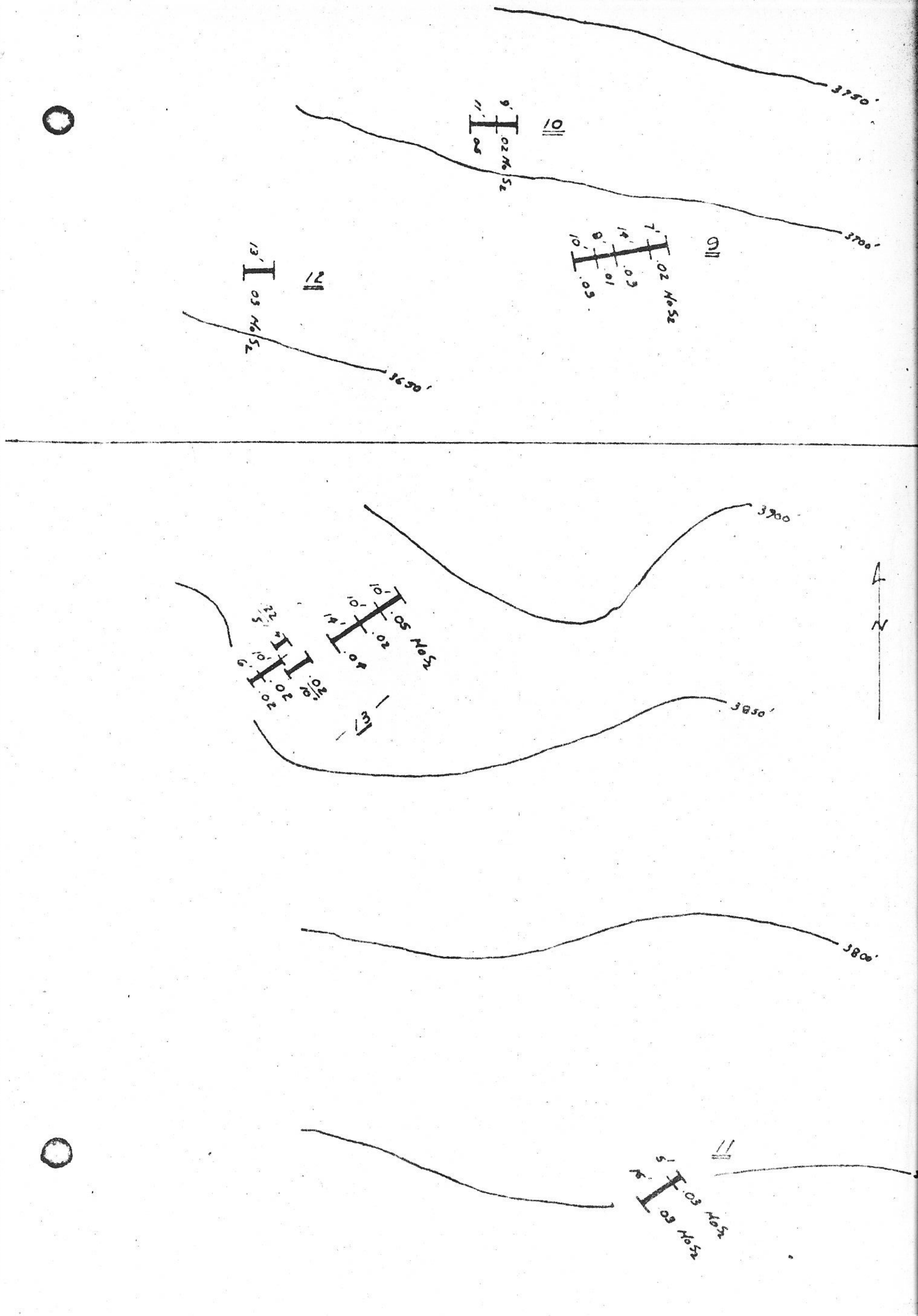
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