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Report on

THE UR SILVER-LEAD PROPERTY

Mayo Mining District

Yukon Territory

SUMMARY

The UR property and vicinity contain the same rock types as Keno and Galena Hills and are underlain by about the same thickness of 2500 ft. of Central Quartzite, the formation from which most of the more than $130 million worth of silver-lead-zinc and cadmium have been produced in this district.

Whereas the productive south limb of the east-west McQuesten anticline at Keno Hill swings southeast along a major fold, the corresponding north limb on the UR property swings northwest along this fold, forming a similar synclinal crumple at the fold intersection. The favorable quartzites here are cut by one or more northeast vein faults similar to the ore-bearing vein-faults on the south limb. This north limb has always been thought to be barren or low in silver but very limited trenching on one inferred vein-fault in August 1960, showed abundant vein siderite and traces of galena which assayed over 200 oz./ton silver.

Since this virgin area appears to contain all the favorable characteristics of the productive area short of actual known occurrence of ore, and much preliminary exploration can be done at modest cost, the owners plan to do further work before considering any other course of action for a more extensive exploration program.

THE UR SILVER-LEAD PROPERTY

Mayo Mining District, Yukon Territory

A.E. Aho
Consulting Geological Engineer

December 15, 1960

(Report written for own files as owner of property)

INTRODUCTION:

The Mayo Mining District has produced over $130 million worth of high grade silver-lead-zinc-cadmium ore from Keno and Galena Hills, mostly from Galena Hill, since 1947.

The writer has studied the district from time to time for a few years. It now appears that the fracturing which localized the mineralization may be related to a N 70° E - trending anticline up McQuesten valley, and since the known mineable deposits occur in vein-faults on the south limb of this anticline similar mineralized vein-faults recognized in 1960 on the Shanghai and UR properties on the north limb of the anticline may prove to contain similar ore deposits.

GENERAL CONDITIONS:

Location and Access.

The UR silver-lead property is situated at lat. 63° 58' N and long. 135° 34' W. on the north side of McQuesten valley across from the operations of United Keno Hill Mines, about 35 miles NNW of Mayo in the Mayo Mining district of Yukon. It lies 4½ miles NW of Elsa directly across McQuesten valley and can be reached best by hiking about 5 miles from the Silver King or from across the Hanson Lake road. For foot travel McQuesten River presents difficulties only in high water and only a small stretch of muskeg has to be crossed on the north side of the river. A very low cost road could be built from the Hanson Lakes road to McQuesten river, then a small ferry ford or bridge and an additional mile and a quarter of fairly easy road construction would be involved. This would place the property about 290 miles by all weather road from Whitehorse, capital of Yukon and rail head for concentrates to outside smelters.

Topography and Overburden:

The UR property angles up the moderate south-facing slope from the flat McQuesten valley bottom at 2100 feet elevation to about 3000 feet elevation where the slope levels off into several miles of undulating upland. The main slope which averages about 15°, is broken by a N 25° E trending lineament or topographic break which marks the location of a vein-fault along which the UR property was first staked. The known showings occur in this lineament at about 100 feet above the level of the valley bottom.

Bedrock is exposed extensively on a burned part of the slope west of this break and in many places along the sides of it. Overburden consisting of glacial silt with scattered cobbles and perhaps some boulder clay masks this area to shallow depths. This cover of silt appears to be fairly common on this side of McQuesten valley. Depth of till, outwash and silt in the valley bottom is entirely unknown. Up the next creek valley to the east, however, the depth

Topography and Overburden (cont'd)

of glacial drift exceeds 100 feet and little or no bedrock is exposed over an extensive area of the lower uplands. Up to 30 to 40 feet of silt were seen up the second creek valley to the east.

Timber, Water:

The hillside on the west side of the property has been burned off but the slopes and creek for over a mile to the east are cloaked with timber up to 18 inches diameter in places, suitable for exploration purposes and for a limited supply for mining. Cut mine timber can be obtained from Proctor's Sawmill some 10 miles away, about 4 miles west of Elsa.

Two small streams cross the lower and upper ends of the topographic break and one stream follows the middle, so water is conveniently available for exploration purposes. A large creek just to the east would supply adequate good water for a main camp and nearby unfed lakes would provide adequate tailings disposal. McQuesten river nearby is a major uncontaminated supply.

Power and Facilities:

Limited power would be available from the Northern Canada Power Commission transmission line on the May-Elsa road, which services United Keno Hill Mines, Mayo and Keno. United Keno Hill have special power rates of 2.5/8¢ per KWH with a flat rate which in 1959 reduced their average cost to 1.41¢/KWH. A cost of 2.5¢ per KWH can be expected.

Mayo has twice-weekly plane service to Whitehorse and outside points, now has year-round telephone and road connections with the "outside", plus a number of other facilities.

Elsa has a Supermarket and post office but few other public facilities since it is otherwise entirely a company establishment.

Climate:

Climate, typical of Central Yukon, is cool in summer and cold in winter with moderate precipitation, but presents no unusual difficulty to year-around mining. Due to its southern exposure the UR property and adjoining slopes experience an earlier breakup and less frost than the United Keno Hill operations.

Parts of the south-facing slope are thawed; other parts have permafrost to undetermined depth, but probably less than 200 feet.

Costs:

Being relatively remote and about 1850 miles from smelters, this district faces higher than average costs of operation. A paper given at the Annual Western Meeting of the Canadian Institute of Mining and Metallurgy in October by the United Keno Hill staff details their present operations. Costs are cited as follows:

Costs (cont'd).

Mining	$21.85/ton
Milling	4.84/ton/ore treated
Trucking Elsa to Whitehorse	18.57/ton/concentrate (10¢/ton/mile)

Transportation costs to smelters total about $45/ton of concentrates. Cutoff grade is thus of the order of $47.50/ton. A paper given at the same CIM meeting by R. MacRae outlines the general cost picture for mining in Yukon. However, these costs are offset by the rich silver content of the ores which give a silver-lead concentrate valued at over $400/ton. Zinc concentrates, containing less silver, are barely profitable under certain conditions. For the last decade or more United Keno Hill have been producing nearly $10 million a year with profits up to $2 million a year (see Canadian Mines Handbook 1961, and Financial Post Survey of Mines 1960).

History:

From the first mining in 1913 to 1942 the district produced about $25 million in silver-lead ore and concentrates. Since 1947, mostly under United Keno Hill, the district has produced over $100 million in silver, lead, zinc and cadmium with net profits ranging from $500,000 to $2 million annually. Further exploration is proving up more and more ore in the district and it can be expected that production will continue for many years to come since much of the district is yet to be explored in detail.

From a study of aerial photographs in 1960 the writer, Aaro E. Aho, noted several northeast lineaments which could be vein faults on the north side of McQuesten valley. In June and July he and Cecil D. Poli prospected and checked several of these lineaments. On August 8th, Aho staked eight claims on the most prominent lineament or topographic break. Several trenches were dug on this break, some vein matter was found and at the end of September the main section of quartzites to the east was mapped roughly.

Although 16 claims, Crown 1-8 and Anker 1-8 were staked during the boom in December 1950 to cover the Quartzites to the east of the main lineament, no previous discoveries have ever been made within miles of this locality. No mineralization is visible here without digging, so this general area on the north side of McQuesten River has been thought to be either barren or low in silver.

The property was briefly examined by G.A. Dirom and R.L. Russell of American Smelting and Refining in September 1960.

Property (Figure 2)

The claims UR 1-8 inclusive, record Nos. 80519 - 80526 respectively, are owned outright by Aaro E. Aho of 4219 Lions Avenue, North Vancouver, B.C. and Cecil D. Poli of Mayo, Yukon, each holding undivided half interest. They are in good standing until August 15, 1961.

GEOLOGY AND MINERALIZATION IN THE DISTRICT (Fig. 1):

Geology:

The Mayo district is underlain by late Precambrian or early Paleozoic

Metamorphosed sedimentary rocks of the lower greenschist facies which have been divided into three formations on Keno and Galena Hills - the Lower Schist, Central Quartzite and Upper Schist.

The Lower Schist consists mainly of graphitic schist and thin-bedded quartzite with several hundred feet of sericite-chlorite schist in its upper portion.

The Central Quartzite formation consists of several members of blue-grey to grey and white quartzite beds varying from a few inches to several feet in thickness, with minor interbeds of graphitic or sericitic schist. Between these quartzite members which may vary from 100 to 800 feet or more in thickness, are members composed of thin bedded quartzite and graphitic schist. On Galena Hill R.W. Boyle (G.S.C. paper 57-1) subdivided the Central Quartzite as follows:

Base of Upper Schist	Green sericite schist	100'
Silver King Member	Grey quartzites, beds up to 15' thick, white cherty quartzite near top	350' (appears to thin NE)
	Thin-bedded quartzites and graphitic schist	550'
Hector-Calumet member	Massive grey quartzite beds 5 to 25' thick, two or more beds pale grey to white cherty quartzite near center of sequence.	800'
	Grey to black thin-bedded quartzites and graphitic schist	350'
Mackeno member	Massive pale grey to black quartzites beds 5 - 10' thick, some interbedded graphitic schist	300'
Top of Lower Schist	Green sericite schist	350'

The white cherty quartzite beds, referred to by the writer as the Elsa-Calumet member, can be traced for at least 10 miles across Galena Hill until covered by overburden in McQuesten valley.

The upper schist is composed chiefly of thin-bedded quartzite, sericite-chlorite schist, and graphitic schist, with minor limestone in places.

Sill-like lenses of dioritic or gabbroic greenstone intrude the lower schist in abundance, and the Central Quartzite and Upper Schist to a lesser degree. These sills themselves have been metamorphosed in varying degrees ranging from massive greenstone to intensely sheared and altered chlorite schist.

Altered but unmetamorphosed sill-like aplitic porphyry occurs in a few places on Keno and Galena Hills.

The above formations are all conformable, strike about N 70° E and dip 20 - 30° S on the south limb of a west plunging, N 70° E anticline, the McQuesten anticline, which intersects a larger southeast plunging anticlimal fold, the Mayo Lake anticline, east of Keno Hill.

Mineralisation:

The productive mines of the district occur mainly in northeast-trending southeast-dipping tensional vein-fault systems in competent quartzites or greenstones of the south dipping Central Quartzite formation, overlain and underlain mainly by schists, on the south limb of the McQuesten anticline. The ore tends to be localized in the more massive members of this formation, particularly where vein-faults intersect or branch, where they pass upward into less competent schist or thin-bedded quartzites and often near N-NW cross-faults.

The pattern of veins and faults in the district may be caused by tensional fracturing related to rise of the N 70° E - trending McQuesten anticline. (For similar fracture patterns see "Relation of Ore Deposition to Doming" by E.H. Wisser, Geol. Soc. America Memoir 77, 1960).

GEOLOGY AND MINERALIZATION ON THE UR PROPERTY (fig. 2 and 3).

The UR property covers one or more northeast trending vein-fault systems which cut the Central Quartzite formation on the north limb of the McQuesten anticline.

Rock Formations (figs. 2 and 3).

Rock formations exposed in the vicinity of the UR property include the Lower Schist, Central Quartzite and Upper Schist formations, almost identical to those on the productive south limb of the McQuesten anticline as described below:

The top of the Lower Schist formation exposed two miles northeast of UR Nos. 1-8 claims consists mainly of sericite-chlorite schist with numerous lenses of slightly schistose greenstone up to 50 feet or more thick. Graphitic schist and thin quartzite members from several feet to several tens of feet thick exposed in a creek canyon may also belong to the upper part of this formation.

The Central Quartzite formation, exposed intermittently over the intervening two miles distance, consists mainly of blue-grey and grey quartzite with lesser amounts of almost black quartzite, brownish quartzite and sandy quartzite. Beds vary from a few inches to several feet in thickness. Near the middle of the section several feet of light grey to white cherty quartzite is exposed but outcrops are not extensive enough to show total thickness. The lack of any other distinctive horizon markers that have been recognized so far make it very difficult to subdivide this part of the Central Quartzite formation yet or to correlate members within it, especially since outcrops are not abundant. The thickness of this Central Quartzite, as worked out in cross-section, appears to be of the order of 2500 feet similar to that on Galena Hill five miles away across the valley.

The following incompletely exposed section of Central Quartzite was mapped around the UR property.

		Description
UR No. 1-8	500' + (?)	Massive grey quartzite beds up to several feet thick. Thickness of members varies from few feet to tens of feet or more. Interbedded with grey quartz sericite-graphite schist, graphitic schist and probably considerable blue-grey quartzite. Contains sheared greenstone (chlorite schist) in several lenses up to at least several feet thick.
Slope E to Creek	500' (?)	Unexposed except for two small outcrops of massive grey quartzite. May be underlain in large part by above section.
Slope between two creeks	1200'	Slabby to massive blue-grey to black quartzite, beds few inches to several feet thick. 100', perhaps more, of massive slightly schistose greenstone. 200' massive grey quartzite, some cherty white quartzite up to a few feet thick, also blue-grey and brownish grey quartzite. Blue-grey and grey quartzite. 300-400' blue-grey to black quartzite, some grey quartzite, minor sandy crumbly quartzite, minor schistose greenstone. 500-600' incompletely exposed brownish grey to blue-grey quartzite, grey quartzite and minor (?) quartz mica schist and graphitic schist. Underlain or perhaps intercalated by graphitic quartz mica chlorite schist and quartz chlorite schist of Lower Schist formation.

The massive, slightly schistose greenstone occurs at the point of the spur which forms the edge of the upland between the two creeks, and similar greenstone is exposed 11,000 feet due north on the otherwise drift-covered uplands, presumably also within the Central Quartzite.

The upper schist formation is exposed along the northwest side of claims UR Nos. 1-8, being in faulted contact with the Central Quartzite along the break referred to under "Topography and Overburden." Along the burned ridge to the west this formation consists of a monotonous section of brown-weathering quartz-mica schist with some beds of blue-grey quartzite up to a few feet thick in its lower part, exposed near the base of the slope, and some graphitic and sericite-chlorite schists to the west, farther up in the section. Three miles west of the UR claims, and perhaps 2000 to 3000 feet higher stratigraphically, three or

more slightly limey grey quartzite members 200 to 400 feet thick, separated by 200 to 400 feet of schists, occur on the Shanghai property. These quartzites, carrying schist interbeds, are apparently much higher in the stratigraphic section than the Central Quartzite described on the UR claims and do not resemble it.

Along the baseline of UR Nos. 4-8 claims numerous outcrops of altered porphyry similar to that on Galena Hill indicate a moderate-sized body of this rock on the southwest side of the break. This porphyry appears to lie at about the same stratigraphic horizon, near the top of the Central Quartzite, as it does on Galena Hill.

Fresh fine-grained dioritic to andesitic dike rock was seen in several localities within the Central Quartzite to the east and in the Lower Schist formation. The presence of this rock type is the only major difference in geology that exists between this area and Keno and Galena Hills, otherwise the same rock formations of similar thickness exist on the UR property.

Structure (figs. 2 and 3)

The three formations, and to some degree the greenstones, have been strongly sheared with pervasive bedding-plane movement, resulting in development of schistosity, flat isoclinal east-west drag folds overturned to the north, and east-west lineation parallel to the axes of the drag folds. This structural fabric is also characteristic of the productive south limb of the district and was formed under considerable depth of cover with accompanying low grade regional metamorphism of the lower green schist facies.

After much of the cover was eroded away, perhaps in early Tertiary time, gentle folding resulted in arching of the N 70° E McQuesten anticline along this former east-west structural grain, and rise of the major southeast plunging Mayo lake anticline east of Keno Hill. The formations on the south limb of the McQuesten anticline at Keno Hill swing from N 70° E to NE into the Mayo lake anticline and similarly the same formations on the north limb at the UR property swing from E-W to NW, forming a moderately gentle WNW-plunging syncline at the major fold intersection (fig. 2). Dips are gentle, averaging about 15° and rarely steeper than 30° except at minor crumples or at dragged zones near vein-faults.

This north limb of the McQuesten anticline is cut by the same pattern of longitudinal and northeast vein-faults and W to NW cross faults that characterize Keno and Galena Hills. The Shanghai property on the north limb shows similar northeast breaks with the same type of left hand offset, cross faults, and silver-lead mineralization in an associated longitudinal break. On the UR property and to the west three N 25° E lineaments were noted on air photos and upon checking two were definitely found to be fault or vein-fault zones.

The westernmost lineament, occupied by a small creek, occurs entirely in the Upper Schist and brief examination showed no definite evidence for either presence or absence of faulting.

The next lineament, about 2400 feet to the southeast, is a branching topographic break or swale extending through the Upper Schist southwest into the quartzite beds previously mentioned at the base of the slope, presumably near the base of this formation. Some disturbed attitudes and an outcrop of quartzite breccia in the lowest part of this break confirm the presence of strong faulting.

The main lineament, 1800 feet farther southeast, consists of a swale or break in slope 50 to 100 feet wide, up to 15 feet deep, about 5700 feet long, slightly concave to the northwest and striking N 25° E oblique to the hillside. The northwest side consists of moderately-to-gently-dipping Upper Schist formation, while the southeast side consists of gently-to-moderately-dipping Central Quartzite formation, perhaps dragged into steeply dipping attitudes next to the lineament, indicating a major fault zone with the southeast side moved up as in northeast faults on Galena Hill. This conclusion is corroborated by presence of quartzite breccia on the southeast side near chainage 26 + 50 and in a trench near chainage 20 + 50 on the baseline of UR Nos. 3 and 4 claims, and of 2½ feet of gouge striking about N 30° E about 50 feet within the Central Quartzite formation near chainage 26 + 00. Moreover presence of manganiferous siderite with traces of galena in trenches on the southwest side near chainages 20 + 65 and 27+00 shows that this is a major mineralised vein-fault zone. Irregularities in the lineament and presence of the gouge zone in the southeast wall of this break suggest that it is not a simple fault but probably a ramifying zone with branches extending into the Central Quartzite formation.

Since this N 25° E vein-fault zone cuts across the WNW-plunging synclinal fold in the Central Quartzites, it should extend entirely into these quartzites both to the northeast and southwest; perhaps the quartzites near the base of the slope to the west lie along the Upper Schist-Central Quartzite Contact on the northwest side of the vein-fault zone. Such localities "where vein-faults pass upward from quartzite into overlying schist "are recognised as favored loci for ore deposition on Keno and Galena Hills.

The apparent WNW syncline may have its axis at about chainage 42 + 00 on the southeast side and perhaps at chainage 25 + 00 on the northwest side which, if substantiated by subsequent mapping, would indicate a typical left lateral offset of about 1700 feet (see fig. 2). The stratigraphic displacement or dip slip may be of similar or greater magnitude.

East of the UR fault zone the Central Quartzite section is not exposed extensively enough to determine yet whether other vein-faults exist in this direction, but if their spacing remains the same as to the west and on Galena Hill, there should be at least one or two in this section as well. Fractured, rusty quartzite float and reported altered (carbonatised) greenstone suggest that at least one break may extend up the slope between the two larger creeks to the east.

No cross-faulting has yet been recognised in the limited amount of work that has been done around the UR property.

Summary of Structure:

The structure on the UR property apparently consists of (a) a gentle, crumpled WNW plunging syncline caused by intersection of the McQuesten and Mayo lake anticlines, cut by (b) several northeast striking vein-faults zones. A major vein-fault zone on UR Nos. 1-8 claims has apparently moved the

Summary of Structure(cont'd.)

southeast side up and perhaps to the northeast so that the underlying Central Quartzite is brought into faulted contact with the Upper Schist around the axis of this syncline. This vein-fault zone may thus extend into the Central Quartzite both to the northeast and southwest which, with its probable branching nature, could favour the deposition of ore. Other vein-fault zones probably exist in the incompletely exposed section of favorable Central Quartzite to the east.

Not only rock formations but vein-fault structures on the UR property are very similar to those of Keno and Galena Hills, perhaps even to details of apparent displacement.

Mineralisation (fig. 3)

Except for rust along fractures and rare pyrite in a few localities, no mineralisation has ever been found on the surface anywhere near the UR property. However, the presence of quarzite breccia and a few dark manganese-stained fractures on the southeast side of the main lineament prompted Foli and Aho to dig a trench near this wall a hundred feet southeast of chainage 27 + 00 on the baseline.

This trench (No. 1) hit frost at about 4 feet, was deepened by thawing down to 7½ feet, passed through schistose greenstone rubble with pieces of whitish gouge, and was finally stopped by flows of water as abundant manganiferous siderite float was found in its lower (SW) end. Minor fragments of anglesite and galena panned from this trench assayed 217 oz./ton silver, suggesting that pure unleached galena may contain up to 250 to 300 ounces. This silver content is comparable to that of the better ore on Keno and Galena Hills. Manganiferous rust scraped from the nearby manganese stained quartzite outcrop assayed 0.34 oz./ton silver; a fine hairline stringer of galena was also found in this outcrop. Fine placer scheelite (?) also seen in the panningsfrom the trench may originate around the altered porphyry exposed farther up the lineament.

A second trench (No. 2), dug about 125 ft. to the southwest along a small branch swale within schistose greenstone, sericite-chlorite schist and graphitic schist of the Central Quartzite formation, showed minor manganiferous siderite float then 2½ ft. of whitish gouge at a depth of 7 ft. indicating a steeply-dipping branch fault as previously mentioned. No sulfides or anglesite could be panned from this trench.

A third trench (No. 3) at chainage 20 + 65 on the baseline, went through two feet of abundant weathered manganiferous siderite float and fragments of grey quartz-sericite graphite schist, between 2 ft. and 4 ft. depth, then through glacial silt to a depth of 7 ft. where altered and brecciated schist-quartzite bedrock veined with quartz was exposed. Galena was panned from the layer of siderite float but none was found on bedrock. An assay of the siderite itself gave only a trace of silver.

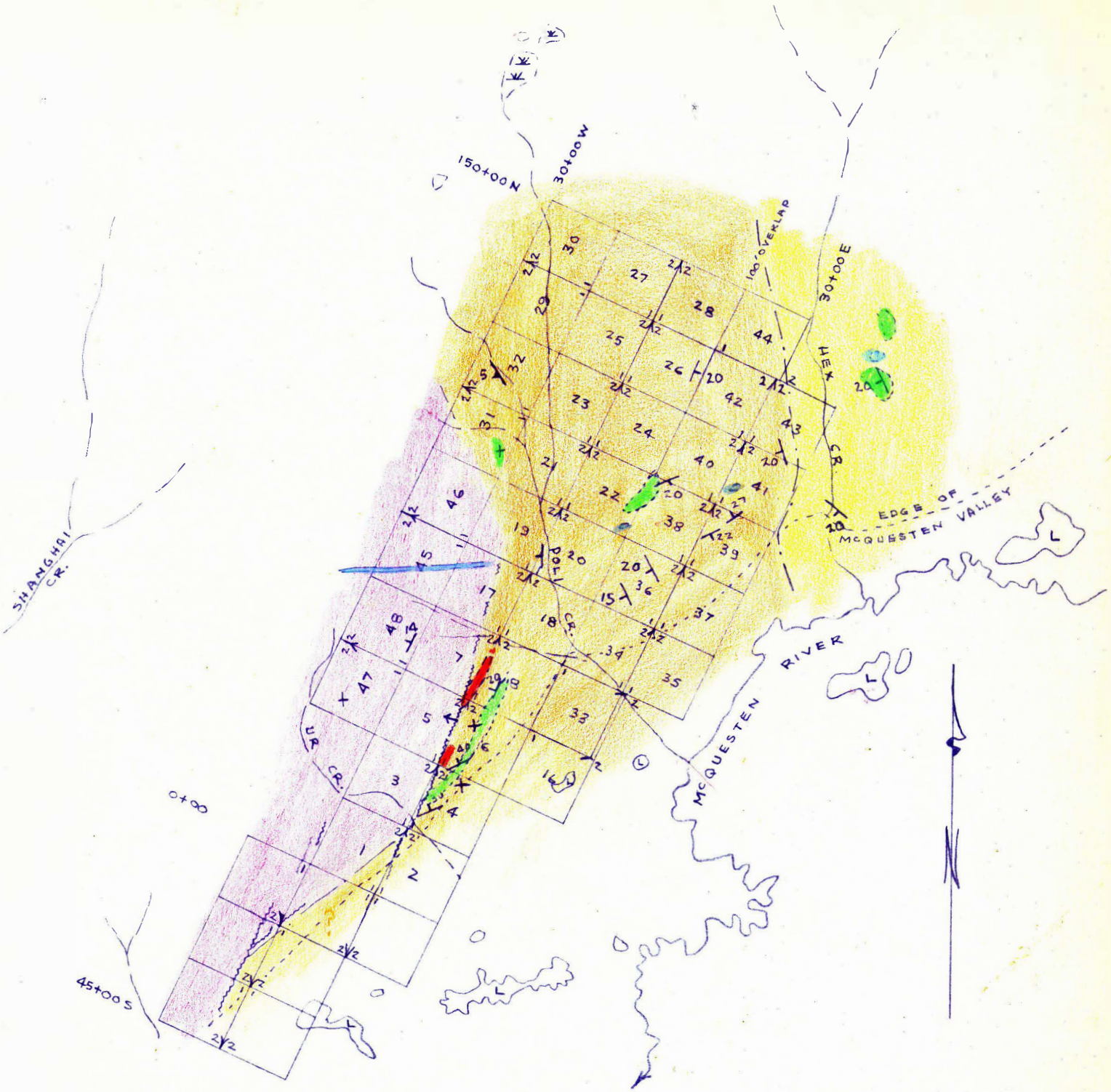
A fourth trench (No. 4) some 20 to 30 feet south of No. 3, also encountered some weathered manganiferous siderite float, then boulders 2 to 3 ft. across of quartzite breccia resting against a wall of quartzite at a depth of 8 ft.

Short of actual discovery of ore, the siderite mineralisation and silver content in the traces of galena found so far, completes the picture of similarity to Keno and Galena Hill in all apparently significant respects. Considering the amount of vein material that was uncovered by this limited work when little or no surface mineralization was evident, it seems probable that much more mineralizatkon could be found by trenching, test pits or ground sluices in the most likely places on this and other possible vein-faults, aided by geophysic, geologic mapping and perhaps geochemistry.

CONCLUSIONS:

Since this entirely virgin area appears to contain all the characteristically favorable rock types, structures, vein-faults, signs of mineralisation with high silver content and a sizeable area of favorable ground in this productive district, further exploration on the UR property and adjoining area is well justified.

Much of the preliminary exploration can be done at modest cost with reasonable chances of improving the picture, therefore mapping, prospecting, electromagnetic work, geochemistry, trenching, test-pitting and ground-sluicing should be done by the owners before considering any other course of action for a more extensive exploration program.



PLAN OF
UR GROUP OF CLAIMS
MAYO MINING DISTRICT
YUKON

1 IN = 3000'

A.E. AHO MARCH 27, 1961