METAL MINING AND PROSPECT REPORT

PE-058-03

A. General Features

1. Mine *Ryan Lode* Mining District *Fairbanks*
2. Investigator *Henry R. Joesting* Date *Sept., 1940*
3. Location *S.E. slope of Ester Dome, 14 mi. W. of Fairbanks by graded road.*
4. Owners *Bartholemew Oil Corp. (hold options)* Address *1033 Brea Road, Fullerton, Calif.*
5. Supt. or Manager *B. W. Vallat* " " " " "
6. Chief Ores Mined *Gold*
7. Associated Minerals *Arsenopyrite, Jamesonite, Stibnite, Pyrite, Chalcopyrite, Scorodite and Cervantite*
8. Gangue Minerals *Quartz, and calcite, very rarely*
9. Rock Formations *Quartz mica schist, chlorite schist, quartzite schist*
10. Nature of Deposit (Fissure vein, fissured zones, disseminated, etc.) *Fissured zones. Ore occurs in shoots and zones in a wide shear zone.*
11. Thickness of vein or deposit *Up to 60 ± feet*
12. Strike of vein or deposit *N 25°-35° E*
13. Dip of vein or deposit *60°-65° SE*
14. Ore in (shoots, chimneys, etc.) *Shoots*
15. Character and pitch of ore shoots *Probably pitch slightly to N — insufficient development work done to determine position*
16. Depth of barren zone *3' to 12'* Depth of enrichment *Probably slight enrichment at the considerable depth at S end of deposit.*
17. Genesis of ore *Apparently assoc. with underlying granitic magma — hydrothermal solutions invaded shear zone. Faulting contemporaneous, as well as both pre- and post-mineral*
18. Nature of associated dikes or veins *Are parallel shear zones to NW & to SE of Ryan Lode which may be mineralized. Sericitized quartz porphyries are found about 1000' S.E.*
19. Entrance to mine *Shaft on N. end of property*
20. Amount of Drifts *500' approx.* Raises *——* X-cuts *150'*
21. Size of shafts *7' x 7'* No. of Levels *2*
22. Mine Machinery *I-R 2-stage compressor, Denver hoist powered by Ford V-8, D2 Diesel Cat tractor with LeTourneau dozer, drills and miscellaneous equipment.*
23. Mill Machinery *No mill on property. Test runs made on mill owned by company on Ready Bullion property and on ore shipped to States.*
24. Men employed *6* Dates of operation *Continuous*
25. Available timber and water power *Sparse spruce growths nearby; no water power.*
26. Transportation *Graded road to railroad siding, and to Fairbanks.*
27. Reported assays *Trace to several hundred dollars. Main ore zone is near hanging wall side of a shear zone; consists of 1½' to 17' of plus 15.00 ore. Lower grade ore is found on both sides of this zone*
28. Amount of ore milled or shipped *None*
29. Returns

References: See "Progress Report on the Ryan Lode Geological and Geophysical Survey" by Henry R. Joesting, Dec. 6, 1940

(over)

COPY

TERRITORY OF ALASKA
Department of Mines
~~Juneau~~ ...ge, ALASKA

Dec. 6, 1940.

Fbnks Prec " Dist

(14.9, 15.3)
148°00'
64°52'

58-5

PE 58-3

Kt 58-154

PE-058-03

Mr. B. W. Vallat,
1033 Brea Road,
Fullerton, Calif.

Dear Mr. Vallat:

Enclosed is a brief report, based on the work done this fall by the Department of Mines. Its organization is unusual, or rather non-existent, since it is merely a progress report, containing a few conclusions. You are welcome to use any of it in preparing your own report; the only stipulation is that the Department of Mines receives due acknowledgment. As indicated, some of the conclusions are based on rather scant evidence and may therefore be entirely haywire. I did not have time to work in very much of the data that you so kindly furnished me, however, it will be of considerable use when and if I am able to write a complete report on the area.

The small-scale map included in the report shows relations only in a very general way. There was no time this fall to prepare a tracing and copies of the 1" to 50' scale map, which shows the results of the geological and geophysical work in considerable detail, but on my return in the spring I hope to have time to prepare a copy for you.

Two samples were sent in for assay marked B 3, when they should have been marked A 3, but this error was corrected when the sample slips were checked against the notebook records. The reason for the incorrect marking is that Trench A 3 was originally marked B 3 by mistake. Later when the error was discovered I made the correction in my notebook, but the samples had already been sent in for assaying, and their numbers were not straightened out until recently, when I checked all the assay returns against my notebook records.

I have been quite busy getting various odds and ends cleaned up before Monday, Dec. 9, when Mrs. Joesting and I are supposed to take an Electra for Juneau. If proper connections can be made we will embark on the SS. Northsea on Dec. 12.

In the event that you need to communicate with me before next March, my address will be care of Geological Department, Johns Hopkins University, Baltimore, Md.

Thanks for your kind cooperation; I hope that our association will be resumed next spring.

Sincerely yours,

Henry R. Joesting,
Assoc. Mining Engineer.

PROGRESS REPORT ON THE RYAN LODE GEOLOGICAL AND GEOPHYSICAL SURVEY

This report is intended primarily to describe the status of the geological and geophysical studies of the Ryan Lode property, Ester Dome, made by the Department of Mines during September and October, 1940. The conclusions are in some cases based on insufficient data and consequently may be altered when additional work is done.

Fourteen days were spent on the property and on adjacent areas by the writer and two assistants, and an additional four days were spent by the writer and one assistant. About a week was spent by two men in plotting traverses and in making calculations based on geophysical measurements.

Most of the prospect trenches and shafts that were open were examined and surveyed in an attempt to obtain a conception of the general structural and mineralogical relations. Samples were taken partly to supplement those taken by the Bartholomae Oil Company and partly to enable the writer to familiarize himself with the vein material and with the various types of country rock. The results of assays and mineral determinations, most of which were made by A. E. Glover, Territorial Assayer, are shown in the accompanying tables.

Resistivity and magnetometric traverses were run first where the ore body and fault zone were exposed by transverse prospect trenches, and subsequently over adjacent areas where relations were obscured by overburden. The locations of the main traverses are shown on the accompanying geologic map.

Resistivity profiles over fault zones were found to be characterized by extremely sharp fluctuations in resistivity, while those over comparatively undisturbed schist were uniform. No data are available to indicate whether or not mineralized and non-mineralized fault zones can be differentiated by resistivity measurements; however, it is unlikely that such a distinction can be made unless mineralization is confined to certain types of fault zones, such as the larger and more persistent ones.

Resistivity measurements show that the faulting extends over a wider zone than anticipated. Along Line 1 (see map) the fault zone is almost continuous, and since it extends past both extremities of this line, it is here at least 750 feet wide. Along Line 2, fault zones, occasionally interspersed with undisturbed schist, were found over a width of 700 feet and other faults may occur past the northwest end of the line. The southeast half of Line 2 traverses comparatively undisturbed country rock. Line 3 crosses a number of relatively narrow fault zones separated by undisturbed country rock. Including the unfaulted portions, the total width of the fault zone along Line 3 is about 1500 feet and faulting may continue past both ends of the line. Faulting is considerably less intense near the northwest end of Line 3 than at other parts of the Ryan Lode. The fault zone which contains the Ryan Lode ore body may, therefore, either die out to the southwest or be displaced to the east.

Vertical magnetic anomalies did not exceed 30 gammas in the traverses run in the vicinity of the Ryan Lode. While they were larger over faults than over undisturbed schist, very precise and detailed measurements would be necessary to trace the faulting by magnetometric methods. In the Fairbanks District large faults are usually accompanied by larger anomalies than those associated with the Ryan Lode, therefore, these small anomalies are assumed to indicate that the displacement along any one shear zone is small, although the aggregate displacement may be large.

The strike of the main fault zone is about parallel to that of the undisturbed schist and to the Ryan Lode ore zone. Within the fault zone exposed by the prospect trenches are numerous minor slips with a more easterly strike, as shown in the map. The displacement along both the main fault zone and the minor slips appears to be essentially horizontal. It is probable that the minor slips are shear fractures formed when the major movement took place. Since the country rock, which consists mainly of quartz mica schist and mica schist, is unable to transmit horizontal shearing stresses for any considerable distance, it is necessary to postulate the existance of an underlying competent rock mass through which the main stresses were transmitted. This underlying rock would probably be the same granitic intrusion with which the nearby aplite and quartz porphyry dikes are associated.

As indicated previously, the Ryan Lode portion of the shear zone appears to die out to the southwest, while the remainder of the shear zone along Line S extends further to the southeast than along Line E. This may be caused by the lateral displacement of the shear zone either along an approximately east-west shear fracture, or along a separate and later shear zone. A possible factor in the development of a large amount of displacement at an angle to the main shearing movement is the position of the intrusive rock southeast of the Combination Shaft, which may have acted as a buttress against the main shearing stresses, forcing relief to take place along an east-west zone.

Apparently the lack of homogeneity, as well as the incompetent nature of the schist, is a contributing cause to the complex structure of the shear zone. Although part of the complexity of the near-surface portions is the result of frost action and soil creep, it is not considered likely that the structure will become much narrower or much less complex at greater depths, as long as the shear zone is confined to schist. Because of the large dimensions of the shear zone, the depth to which faulting can be expected to continue can probably be reckoned in terms of thousands, rather than hundreds of feet, although it may not continue to as great depths as where analogous strike-slip faulting occurs in harder rock.

As in other parts of the Fairbanks District, mineralization apparently took place in existing faults, along which additional displacement occurred both during and after the vein filling. Although there is no direct evidence in the immediate area, some of the faulting, as well as the mineralization, is probably related to intrusive rocks. The position and shape of the intrusives were to some extent controlled by already existing structure, thus the intrusives shown on the sketch map are more or less parallel to the Ryan Lode.

No data are available concerning the possibility of changes in character or tenor of ore at increased depth, or the probable depth to which mineralization reaches. However, merely from a consideration of the lateral dimensions of the orebody, it appears extremely unlikely that any change attributable to increased depth will take place within several hundred feet of the surface.

Arsenopyrite, jamesonite and stibnite, and their alteration products, are found associated with the gold in the Ryan Lode. Pyrrhotite has been reported, but has not been found by the writer. It is unlikely that pyrrhotite would remain unaltered near the surface. The probable temperature of mineralization is intermediate, although a detailed study might alter this opinion. High temperature minerals, probably derived from pegmatites and contact metamorphic zones, were found in placer concentrates at the mouth of nearby Eva Creek.

SUMMARY AND CONCLUSIONS.

Shear zones on the Ryan Lode and adjacent properties can be traced by means of earth-resistivity measurements. Magnetometric measurements are of less value in tracing these shear zones because of the small magnetic anomalies associated with them.

Geologic and resistivity studies indicate that the Ryan Lode is part of a much broader shear zone that varies in width from at least 700 feet to at least 1500 feet. In some places the faulting is almost continuous across the shear zone; in others shear zones are separated by comparatively undisturbed schist. The shearing is assumed to have been caused by essentially horizontal stresses, transmitted through a comparatively rigid underlying granitic body, and it is likely that both are related to underlying granitic rocks. Mineralization and part of the faulting were apparently contemporaneous. Because of the incompetent and heterogeneous nature of the schist, the shear zone is complex. The increased width of the shear zone at Line 3 may be caused by the dike-like intrusive or by the buttressing effect of the intrusion near the Combination Shaft, which caused relief from the horizontally applied stresses to take place along an east-west fault zone instead of parallel to the Ryan Lode.

In the last prospect trench to the southwest there is no evidence of mineralization and the faulting is much less intense than that associated with the Ryan Lode ore body. In view of the possibility that the fault zone here has been displaced to the east, it is considered unlikely that the Ryan Lode ore body continues further to the southwest.

Mineralization and part of the faulting were apparently contemporaneous and it is likely that both are related to underlying granitic rocks. Both faulting and mineralization probably extend to considerable depths. On the basis of somewhat meager information the main mineralization is considered to be of the intermediate temperature type.

RECOMMENDATIONS FOR FUTURE WORK.

Since the work described here was of a preliminary nature, additional information is needed to determine the structural relations in more detail and over a greater area. Existing resistivity lines should be extended and new lines should be run northeast and southwest of the area covered last fall. Short, intermediate transverse lines should be run to trace individual shear zones, and several longitudinal lines should be run between lines 2 and 3 to determine if the shear zone has been displaced by transverse faulting.

Because only two and a half days were spent in running magnetometer traverses, some additional magnetometer work should be done before discarding this rapid and inexpensive geophysical method.

Geological study of all existing bedrock exposures should of course precede the geophysical work.

ACKNOWLEDGMENTS.

Thanks are due to Mr. B. W. Vallat, manager, and to Mr. Richard Stewart, assistant manager, of the Ryan Lode operations of the Bartholomae Oil Corporation for furnishing much information that could not otherwise have been obtained and for their cooperation in every possible way.

HENRY R. JOESTING,
Assoc. Mining Engineer,
Department of Mines.
College, Alaska
Dec. 6, 1940

Table 1--Results of Assays ~~and Mineral Determinations~~.

Location of Sample	Gold Value	Remarks
Trench A 2, 17' NW. of 0 point	$ 5.95	Dark grey gouge, with a trace of sulfides. From hanging wall of faulted vein.
" A 3, 19' NW. of 0 point	34.55	Scoroditized quartz from middle of 2' vein.
" B 1, at 0 point	41.30	From main vein. Contains small amounts of arsenopyrite and scorodite.
" B 1, at 0 point	1.40	Black gouge from hanging wall. A trace of sulfides present.
" B 3, 30' SE. of 0 point	2.42	Iron-stained gouge, schist and brecciated vein material from minor fault zone, near hanging wall.
" B 3, 35' SE. of 0 point	1.72	Similar to above, from minor fault zone.
" B 3, 60' SE. of 0 point	2.80	Similar to above, from minor fault zone.
Strike Trench, 105' S. of 0 point of Trench C 1	12.40	From white crushed qtz., just above massive scoroditized part of vein.
Trench C 1-3, 22' SE. of Sta. 7, or 80' NW. of 0 point	2.10	Black gouge, iron-stained quartz and schist from large shear zone.
Trench C 1-3, 37' SE. of Sta. 7, or 75' NW. of 0 point	10.50	Crushed iron-stained qtz. from minor shear zone.
Trench below C 1-3, or (last trench to SW.), 30' NW. of east edge of trench	nil	From Limonitized minor shear zone.
Same as above, 48' NW. of east edge of trench	nil	Iron-stained crushed qtz., gouge and schist, from 6' shear zone.

Table 1--Continued.

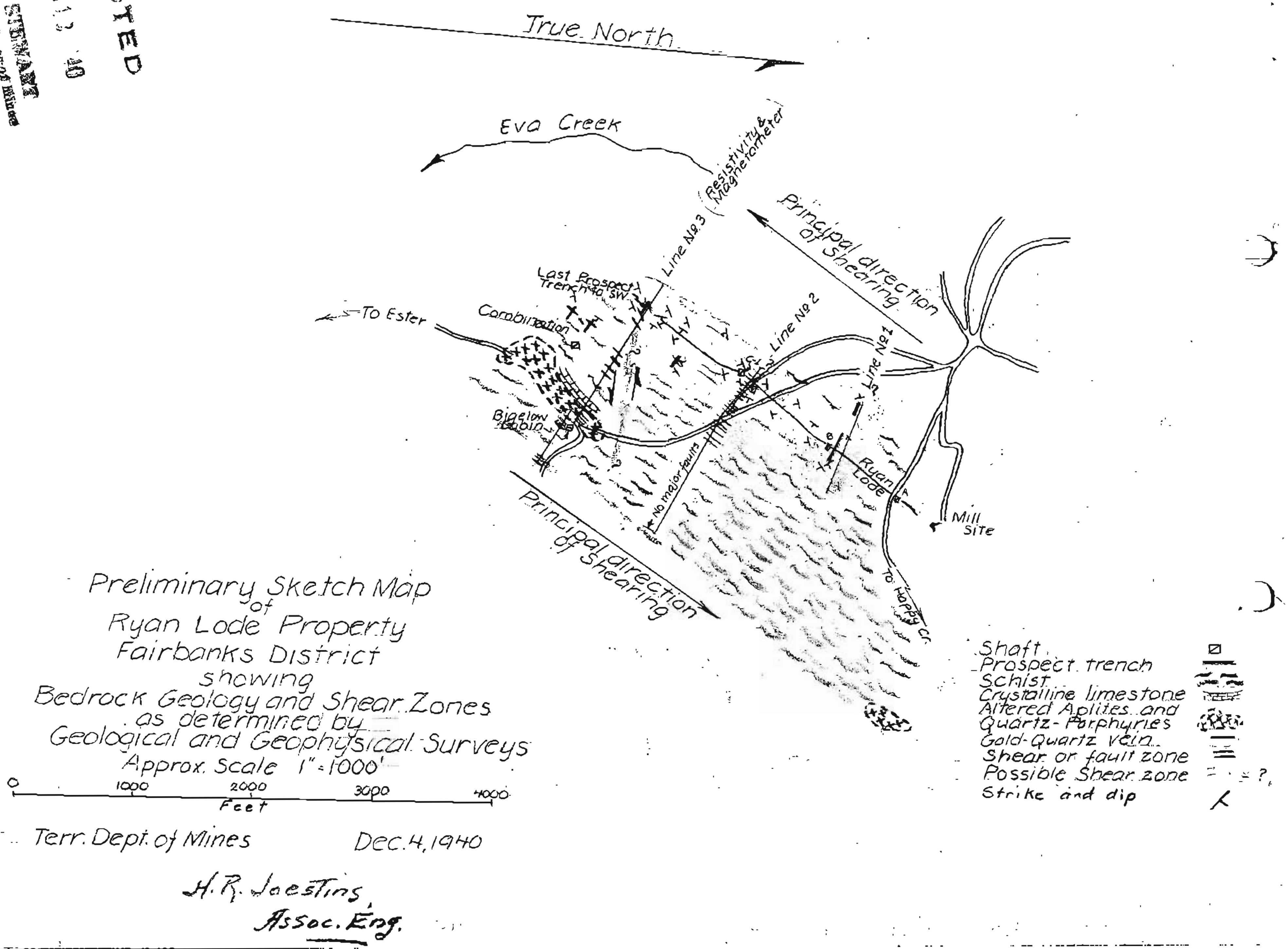
Location of Sample	Gold Value	Remarks
Trench 120' NNW. of Combination Shaft, in middle of trench	$ 0.70	Vein qtz. from mineralized zone.
Trench 200' west of Combination Shaft, in middle of trench, near north wall	2.80	Mineralized crushed qtz.
Same as above, in middle of trench, near south wall	1.05	Mineralized crushed qtz. and gouge.

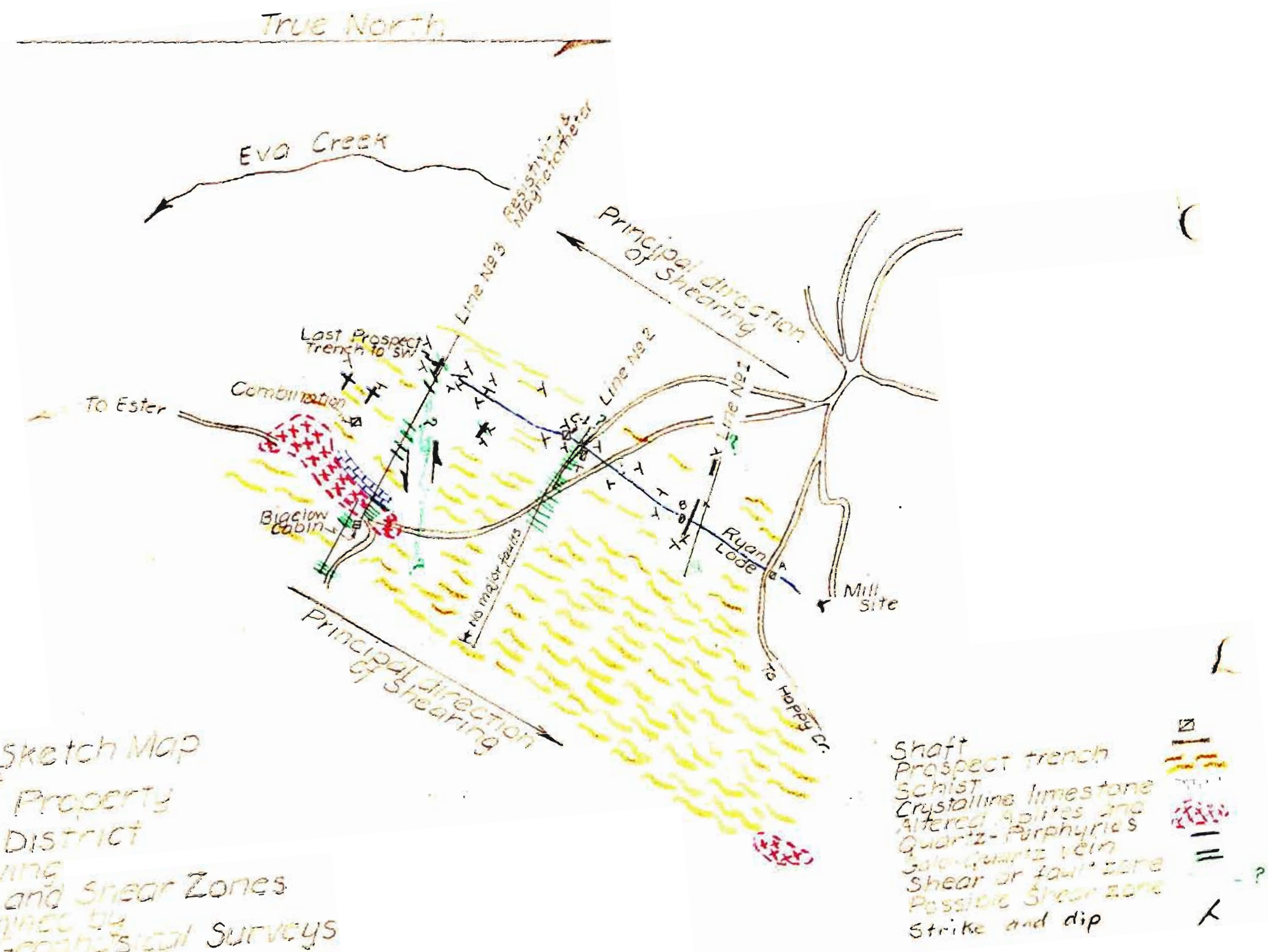
Table 2--Mineralogical Determinations and Notes.

Location of Sample	Remarks
Trench B 1, 80' SE. of 0 point	From 2-3' bed of hard, massive appearing, black quartzite. Contains considerable sericite and graphite, and small amounts of magnetite and garnet.
Trench B 2, 80' from SE. end. (no 0 point)	Soft clay-like schist, black when wet and gray when dry. The color is caused by finely disseminated graphite and sericite. Garnet, chlorite, and magnetite were observed. The specimen was not examined under a petrographic microscope. Black gouge, grey when dry. Contains sericite, graphite, chlorite and possibly talc. The light color when dry is caused by the mixture of these minerals.
Mouth of Eva Creek	A sample of placer concentrates obtained from the mouth of nearby Eva Creek contained the following minerals, some of which are indicative of high temperatures, while the others are derived from the regionally metamorphosed schist: Garnet, magnetite, apatite, pyrite, zoisite, zircon, muscovite, chlorite, tourmaline, epidote, calcite, dolomite and scheelite. The minerals are listed approximately in their order of abundance.
Igneous rocks near Bigelow Cabin	The rocks are considerably altered, but probably were originally quartz porphyries, syenite-aplites and related species. It is doubtful if sufficiently unaltered specimens could be found to permit definite identification. From the appearance of the specimens, they occur in dikes associated with an underlying granitic mass. All are considerably oxidized and contain limonite, and all exhibit the same type of hydrothermal alteration; that is, sericitization.
General	It is significant that sericitization is one of the dominant characteristics of the mineralized veins and wall rocks of the Ryan Lode, as well as of the nearby dike rocks. This may be indicative of the relation of the mineralization to the same plutonic mass with which the dikes are probably associated.

Table 8--Continued.

Location of Sample	Remarks
General (cont.)	The significance of the association of graphitic schist with the Ryan Lode ore body is not known. However, graphitic schist is not uncommon in the Fairbanks District, and it is possible that where present, it merely offers a convenient locus for faulting.


True North
Eva Creek
Resistivity & Magnetometer
Principal direction of Shearing
Line No 3
Line No 2
Line No 1
Last Prospect Trench 40 SW
To Ester
Combination
Bigelow Cabin
Ryan Lode
Mill Site
No major faults
Principal direction of Shearing
To Happy Cr.
Shaft
Prospect trench
Schist
Crystalline limestone
Altered Aplites and Quartz-Porphyries
Gold-Quartz vein
Shear or fault zone
Possible Shear zone
Strike and dip
Preliminary Sketch Map of Ryan Lode Property Fairbanks District showing Bedrock Geology and Shear Zones as determined by Geological and Geophysical Surveys
Approx. Scale 1" = 1000'
0
1000
2000
3000
4000
Feet
Terr. Dept. of Mines
Dec. 4, 1940
H. R. Joesting, Assoc. Eng.



Preliminary Sketch Map
of
Ryan Lode Property
Fairbanks District
showing
Bedrock Geology and Shear Zones
as determined by
Geological and Geophysical Surveys

Approx. Scale 1" = 1000'

0 — 1000 — 2000 — 3000 — 4000
Feet

Terr. Dept. of Mines — Dec. 4, 1940

H. R. Joesting,
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