803514 R. V. Kirkham

THE GRANDUC SULPHURETS PROPERTY

UNUK RIVER REGION

NORTHERN B.C.

Jan 2 1962

Location and History

The Sulphurets property is a 69 claim group of 34 Ray and 35 Ted claims on Sulphurets Creek, 8 miles east of the junction of this Creek and Unuk River, and 20 miles north of the Granduc Mine. The property was staked for Granduc Mines Ltd. in 1960, to include a series of 200 to 600 gamma magnetic anomalies located during an airborne magnetic survey by helicopter of Unuk River drainage basin. The original staking in 1960 consisted of 37 Ted claims and 24 Ray claims. Two Ted claims were dropped and 10 additional Ray claims were staked in 1961.

A group of approximately 50 Arbee claims were staked early in 1960 by Don Ross and Stan Bishop of Ketchikan, Alaska, to include mineral showings on Mitchell Glacier. This staking was done when local inhabitants of the region learned that Granduc was doing airborne magnetic surveys and exploration in Unuk River area. Granduc's Ted-Ray Claim group was staked first and have priority over the partly overlapping Arbee claims. $800 was paid by Ross in lieu of assessment work for 8 Arbee claims adjoining the east side of Ray claims on the ridge between Sulphurets and Mitchell Glaciers in June 1961; the remaining Arbee claims were allowed to lapse and were restaked as the John Bull group by Wendell Dawson for Ross and associates. No work has been done yet on the claims adjoining the Ted-Ray group and they will lapse during the period June 14th - 18th 1962, unless the required assessment is completed.

Work Performed

The airborne magnetic survey of the Unuk River drainage area was carried out in April 1960. Areas in which magnetic anomalies occurred were staked in late May and recorded in early June. Ground inspection of the anomalies was carried out June to October 1960.

The work in the Sulphurets Property in 1960 consisted of reconnaissance geology on ½ mile to one inch and a few ground reconnaissance magnetic surveys on 200 scale. 5000 feet of magnetic lines were run across the claims along the two sides of the Mitchell Glacier, and a 5000 foot base line and 14,000 feet of side lines were run on the southeast end of the property, east of Sulphurets Glacier.

Sufficient geological and geophysical work was carried out in 1960 :-

1) to indicate that the anomalies were due to small concentrations of magnetite, disseminated in the rock or in small clusters, associated with chalcopyrite and pyrite;

2) to indicate that chalcopyrite also occurred in syenite porphyry, which underlies extensive areas on the claims where there are no anomalies;

3) to show that further work would be required to determine the grade and extend of the copper mineralization;

4) to fulfill assessment work requirements for the first year.

During 1961 a more detailed type of mapping was carried out for the company by R. V. Kirkham, a graduate student at University of British Columbia, to determine the structure of the rocks and the sequence and significance of the extensive rock alteration as a guide to the best exploration procedures. Thirty-two Packsack holes, totalling 738 feet, were drilled to obtain samples for assay, in four separate areas. Two of the areas were selected to get samples of the better type of mineralization and two of the areas were selected to fulfill assessment requirements for claim groups without moving the drill camp, because of insufficient time available.

Geology

Lithology

The accompanying 1000 scale map by R. V. Kirkham gives the general distribution of rock units in and near the claims and their attitudes. The oldest rocks are believed to be volcanic. They underlie the greater part of the claims and consist of massive andesite breccias and tuffs. Argillite and sandstone occur in small amounts with the volcanic rocks and are either interbedded or infolded. The sedimentary rocks, consisting of argillite, greywacke and conglomerate, underlie the extreme western and northern edges of the claims and a large area directly northwest of the claims. The volcanic rocks are cut by syenite and syenite porphyry sills or sheets nearly parallel to bedding, and the sedimentary group are cut by trachyte porphyry, which may be a finer-grained variety of the syenite. The syenite intrusives trend north-northwest and are cut by a series of fine-grained diorite dikes, a few of which are shown on the map. These dikes strike east and dip north.

Local Structure

The relationship of volcanic rock groups to sedimentary rock groups in the general region north of the claims indicates that the volcanic rocks probably lie along an anticlinal structure. This structure extends northwest across the south half of the claims, but is cut off by northeast faults (Sulphurets Fault) along the west side of the property. Topography shows that the faults dip west. The rocks on the west side of the faults strike northeast at right angles to those east of the fault and dip northwest. They consist of greywacke argillite and conglomerate, except for a small area in the central part of the claims underlain by syenite and volcanics. This area of syenite and volcanics may lie between strands of the northeast fault zone.

Regional Structure

The more important structural features of the region are shown on the attached 2 mile scale plan. The relative position of the northeast fault across the Sulphurets claims to the northeast faults across the Granduc property suggests that these faults are part of one continuous major fault zone that extends north-northeast across the district. The Sulphurets and Granduc fault zones not only have a common alignment and a similar dip; but the movement in both places has produced right-handed drag offsets and is accompanied by overturned folding toward the southeast.

The total right-handed drag on the Sulphurets fault may be as much as five miles, if the syenite sheets on the Sulphurets property were originally part of the group of syenite sheets north of Treaty Creek glacier. A series of diorite and foliated granodiorite intrusions older than the main coast batholith, extend southeast from Unuk River to Granduc. The only similar foliated granodiorite and diorite intrusives older than the batholith southeast of the Granduc fault zone occur about five miles southwest on Texas Creek, Alaska, and indicate a right-handed shift comparable to that present north of Sulphurets Glacier.

The large right-handed offset that is indicated for Sulphuret - Granduc fault zone suggests that the northwest striking syenite sheets in the southern part of the Sulphurets property are dragged in the fault zone to a northeast strike in the north half of the property. A drag of northwest striking folds into a northeast trend clearly occurs at Granduc. Excessive rock alteration has made it difficult to map the detail features of the structure and it seems highly probable that the syenite sheets and associated rocks in the south half of the property are cross-folded and more intricately deformed than is indicated on the map.

Rock Alteration

The 2 mile structural map gives the distribution of the silicified and altered zones in the district. A study of the alteration in the Sulphuret section of the district is now being made at the University of B.C. by R. V. Kirkham, as a thesis for a master's degree. The alteration consists of silicification, carbonatization, sericitization and pyritization, and any of the first three types listed may predominate. The alteration resembles that which takes place along some gold veins or along complex gold and silver bearing base metal veins. In the Unuk River region the alteration appears to be definitely associated with fault and deformed zones, and is confined to the northern part of the area northwest and east of Unuk River, north of its junction with the South Unuk fork. Between Granduc and Unuk River, along the South Unuk the alteration is of a higher temperature type characterized by biotite, and amphibole.

Some of the different types of alteration are shown with very approximate accuracy on the accompanying 1000 scale geological map. In general, the altered rocks stain brown on weathering by oxidation of the contained pyrite and contain very minor amounts of copper, lead, and zinc. On the Sulphurets property, particularly along the Sulphurets fault zone, chloritization occurs and chalcopyrite is present in place of pyrite.

Mineralization and Assays

Chalcopyrite mineralization was found in the syenite rocks on the claims in 1960, particularly on the ridge between Mitchell and Sulphurets Glaciers and north of Mitchell Glacier. The copper content of many of the exposures was estimated to be approximately one percent and the chances of finding a porphyry copper type of deposit appeared to be favourable.

Field work in 1961 indicated that the copper mineralization was probably associated with chloritization and with northeast faulting. A Packsack drill was moved to a camp near the centre of the property on August 8th and sites were selected for testing the rocks on either side of the northeast fault. Site 1 was selected on the footwall side of the main fault, where a stream cuts down through overburden to silicified chloritized rocks mineralized with chalcopyrite. Site 2 was selected on the hanging wall side where slightly chloritized unsheared syenite, well mineralized with chalcopyrite, was exposed in a series of outcrops on the south side of a large area of snow. Sites 3 and 4 were random selections to fulfill assessment requirements.

The general pattern of the drill-holes is indicated on the accompanying maps. At Site 1 nine holes were drilled at 50-foot intervals along a line trending southwest, then west-southwest for 450 feet. Total footage drilled was 185 feet, or about 20½ feet per hole. The 185 feet averaged 0.5 percent copper, which ranged from 0.2 to 1.63 percent. The molybdenum content ranged from ~~0.1~~ 0.01 to ~~0.4~~ 0.04 percent.

At Site 2 ten holes totalling 251 feet were drilled, which averaged 0.63 percent copper and ranged from 0.05 to 1.14 percent copper. At this site the central 140-foot width averaged 0.86 percent copper.

Four holes, totalling 102 feet, were drilled at the 3rd site. They averaged 0.295 percent copper and ranged from 0.13 to 0.42 percent.

Nine holes, totalling 200 feet, were drilled at Site 4. They averaged 0.144 percent and ranged from 0.08 to 0.21 percent copper.

Attempts were made at the turn of the century to work the gravels along Sulphurets Creek, three miles below the glacier, for gold. Nuggets nearly ½ ounce in size are reported, in the 1903 Minister of Mines report, to have been found but high water in the creek during summer is stated to have hampered work. Fine gold was found at the junction of Sulphurets Creek and Unuk and dredging leases for these gravels are reported in 1929.

Gold and silver bearing vein material has been collected at three widely-separated localities on and near the company's Ted-Ray Claim group and the earlier discoveries of gold along Sulphurets Creek suggests that there may be an adequate source for the gold that would be worth the effort of a more thorough prospecting next season. The first

discovery of gold silver vein material was made by prospectors Barclay and Wright in 1959, for Granduc, 8000 feet southeast of the southeast corner of the Ted-Ray claims, on the east side of Bruce Jack fault. A sample taken across 4.3 feet assayed Au 0.32 Ag 45.7, but the values were concentrated probably in a narrow stringer.

The second discovery was made by J. H. Montgomery in 1960, while doing reconnaissance geological mapping. A small character sample from the location, which is 1 mile south of the toe of Mitchell Glacier, assayed Au 0.32 oz Ag 28.4 oz.

The third discovery was made in 1961 by R. V. Kirkham, late in the evening while finishing a traverse on the Ted Ray claims. The location is 7000 feet north of the southeast corner of the claims, near the toe of a hanging glacier. His description in his notes states that veinlets of calcite and barite form one to three percent of the rock for four hundred feet. The sample taken from a sulphide clot in one of these veins showed free gold and electrum plates. Assay of material selected from the sample by discarding all pieces containing visible gold or electrum gave Au 12.62 oz Ag 333.3 oz.

Molybdenite occurs in small amounts associated with chalcopyrite in the silicified rocks along the footwall of the Sulphurets fault, in the vicinity of Packsack drillsite 1. A molybdenite bearing zone without copper occurs along the south side of Mitchell Glacier, west of the Bruce Jack fault. This zone is highly sericitic and in places contains closely-spaced small quartz veinlets. Intense shearing has smeared out part of the molybdenite into fine streaks. One sample of better than average grade assayed 0.685 percent of molybdenite. The area in which good grade samples of molybdenite can be obtained locally is more than 1 mile square and lies entirely on the claims of Ross and associates. The problem of evaluating the deposit lies in the relatively small proportion of good-grade molybdenite rock that can be recognized and its scattered occurrence in rock without visible molybdenite. Further systematic investigation of the molybdenite occurrence is recommended, provided the claims of Ross and associates can be obtained on reasonable terms, or restaked if dropped next year.

Recommendations

5000 feet of diamond drilling, if justified by results, is recommended to test the extent and grade of copper mineralization along and near the fault between Packsack drillsites 1 and 2.

A complete layout of holes cannot be attempted with the present information regarding the dip of the fault and the extent and dip of the copper-bearing chloritic zone at Packsack site 2. The dip of the zone is probably west and the first hole should be drilled vertically on the western side of Site 2 to the fault, if possible. If the fault cannot be reached, a series of holes (some angle holes east) should then be drilled eastward at intervals until the fault is cut. Additional holes will have to be laid out pending results obtained. At least one hole should be drilled at a location on the fault directly north of Packsack Site 1, to probe the footwall side of the fault.

A prospecting team of two men should be employed to trace the gold found in gravels along Sulphurets Creek to its source. They should also prospect the Sulphurets fault south and west of the claims for copper, to track down samples of massive chalcopyrite that were found near the toe of the Sulphurets Glacier in 1961. They should also prospect the south half of the property for copper and high-grade silver gold vein matter.

The cost of exploration in 1962, to get a better valuation of Granduc's Unuk River (magnetite) and Sulphurets properties, is estimated to be $72,000. Drilling should start as soon as snow conditions permit on the Unuk River in April and begin on the Sulphurets Property by mid-July to be completed by September 30th. Prospecting can commence on Sulphurets Creek by mid-May, and continue until October.

G.W.H. Norman
2nd January 1962

STRUCTURES AND IGNEOUS ROCKS, UNUK RIVER REGION

GRANDUC MINES LTD.
JANUARY, 1962

R.V. Kirkham

SCALE: 1 inch = 2 mile

(Tertiary?) Iskut Fault

Paleozoic

Low grade Cu

Fault

TOM MACKAY LAKE

Lower Cretaceous

STORIE CREEK

TREATY CREEK GLACIER

Triassic

HARRYMEL CREEK

Harrymel

Lower Jurassic Conglomerate

MITCHELL CREEK

Sulphurets Fault

SULPHURETS CREEK

KING CREEK

Jurassic

3% Pyrite Chalcopyrite 2% Cu

Magnetite

RIVER

No 3

No 2

No 1

10,000,000 Tons Magnetite & 0.3% Cu

Magnetite & Cu

UNUK RIVER

West Shaft

South Granduc Fault

Granduc - Sulphurets Fault ??

Mineralized Syenite Max. 0.5% Cu

(Tertiary?) South Unuk Fault

Silicified Rock = Syenite ?

Jurassic Conglomerate

GRACIE

Granduc Fault

Centre Fault

LEDUC

Granduc Mine

Gold Structures

Scotty Dog Fault

EXPLANATION

INTRUSIVE ROCKS

- Coast Range Granodiorite
- Unuk River Granodiorite - Diorite
- Syenite
- Diabase

- Pillowed Andesite
- Silicified Zones

H.F.K Fault.

- Faults
- Folds
- Overturned Folds
- Bedding and/or Schistosity
- Granduc Properties
- Granduc
- Max-Har
- Ted-Ray

1" = 2 miles.