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REPORT ON THE GEOLOGY AND WORKINGS OF THE RED HAWK GROUP OF CLAIMS

By

Everett J. Lees

PROPERTY FILE

September 3, 1933.

REPORT ON THE GEOLOGY AND WORKINGS OF THE RED HAWK GROUP OF CLAIMS

Location and general description of the property

The Red Hawk property includes 15 mining claims and fractions of claims located on the south side of Cadwallader valley between Red Hawk and Agnes creeks. It has a maximum extent of 1 mile in a southeast direction parallel to the valley and $1 \frac{1}{3}$ miles in a southwest direction from the river at an elevation of 4600 feet above sea-level to the top of the mountain peak at 7700 feet above sea-level. A trail $5 \frac{1}{2}$ miles long connects the property with Pioneer mines. The first 4 miles from Pioneer is suitable for travelling with a narrow track wagon, while the trail for the last $1 \frac{1}{2}$ miles while steep in part may be travelled by pack horses when loaded lightly. The present camp consists of 4 tents centrally located on the property.

A number of lenticular quartz veins up to 5 feet in width are exposed. Five tunnels aggregating 239 feet in length; a number of open cuts and pits and one small shaft 10 feet in depth open up the quartz veins. At the present time work is being carried on in three tunnels; one on a 2 to 3 foot quartz vein in albitite; one on a large irregular mass of quartz in diorite and a third is being run to intercept a strong shear zone, bearing lenticular quartz veins, at a depth of 270 feet below the surface.

Physiography

The lower half of the Red Hawk group of claims is located on the relatively uniform valley side with an average slope of 30° . The valley bottom at 4600 feet above sea-level contains a deep deposit of glacio-fluvial and fluvial silt, sand and gravel upon which Cadwallader river flows in broad meanders. These deposits cover the lower portion of the property for a width of 200 yards from the river southward. Rock outcrops on small bluffs above this for 200 to 300 feet and then but rarely over the rest of the lower half of the property.

Across the central part of the property between 5500 and 6100 feet above sea-level a number of nivation niches 20 feet deep with small ridges on their lower side run parallel to the valley side with an average trend about 132° . They are mostly located along shattered belts of andesite, but diorite and serpentine are occasionally the rocks on which they are formed. They commonly contain lenticular quartz veins. They owe their origin to banks of snow collecting on weaker rocks above belts of slightly harder rocks such as those strengthened by quartz veins or albitite dikes. The rock on the hillside above them is also generally harder, in some cases diorite.

Above 5900 feet above sea-level the terrane has been dissected by small mountain glaciers, resulting in one cirque on the upper central part of the property, one to the east of the property and one on the west lying partly on Red Hawk property and partly on Dan Tucker property. The formation of these cirques has left the mountain at their head in the form of a rugged peak rising to 7700 feet above sea-level.

Structure

The rock members of the Red Hawk property have a prevailing dip to the south. A wide belt of argillaceous sedimentary rocks passing across the lower portions of Red Hawk No' 2 and 4 claims strikes 130° (S 50° E) and dips from 25° to 60° to the south. The foliation of an andesite belt below it and andesites above it are in general parallel to it in dip and strike. The andesites above the sedimentary belt have been intruded by a basic igneous stock and associated sills all now altered to serpentine. The serpentine and the andesite have been in turn intruded by diorite stocks and dikes. The diorite works intimately through the andesite near the contact to such an extent that the rock may be as much diorite as andesite. Large dikes of diorite penetrate the serpentine parallel to its foliation. Long narrow tongues of serpentine are in consequence left projecting into the diorite. There are several albitite (or rhyolitic?) dikes in the terrane. These have been intruded into small masses of argillites isolated in the serpentine mass.

Stratigraphy and Petrography

Table of formations

Glacio-fluvial and fluvial deposits (silt, sand and gravel)

Albitite (or rhyolite? or aplite?)

Diorite (diorite, diorite porphyry, gabbro and pyroxenite)

Serpentine

(Andesite

(Argillite

Argillites. The argillites and andesites form a thick series of interbedded rocks.

An argillite member 1200 feet in thickness runs across Red Hawk No. 2 and 4 claims overlying an andesite member of an unknown but at least 200 feet thickness. Four small masses of argillite about 20 or 30 feet in thickness and of unknown extent are included in the serpentine masses or between them and diorite. The sedimentary rocks are predominantly argillites. The upper part of the thick member exposed on Red Hawk creek contains some sandy argillites and argillaceous sandstone. Along the lower portion of Agnes creek the sedimentary rocks are more calcareous and are limy argillites and thin bedded argillaceous limestone. The most complete section of the sedimentary rocks is exposed on Red Hawk creek.

Andesites. A belt of andesites 200 or more feet in thickness is exposed along the lower portion of Red Hawk creek and on small bluffs along the lower portion of Cadwallader valley crossing Premier No. 2 claim. These rocks are overlain stratigraphically by the argillites. Irregular masses of andesite once part of a continuous mass lying stratigraphically above the argillites, outcrop at various places over the upper part of the property. They have been separated into these various masses by the intrusion of the serpentized basic igneous rock and by the diorite. They are exposed mainly on the high peak at the southwest corner of the property and down its northern side into the cirque above Red Hawk lake. They also underlie the adjoining portions of Red Hawk No. 1 and 2 claims. They are dense green rocks rarely showing their crystal structure megascopically. The andesites have undergone some propylitization with development of chlorite and in places pyrite. Biotite has been developed in places along schistosity in the belt of andesites lying below the argillites.

Serpentine. The serpentine forms a large irregular mass in the southern part of the area occupying portions of Red Hawk No. 1, 6, 8 and Joe fraction claims. It is intruded by diorite in such a way that long narrow tongues of serpentine are left projecting into the diorite. One of these connects across Red Hawk No. 3 claim with serpentine bodies on the Dan Tucker property. A sill or flow of serpentine rock comes in from the Dan Tucker property along the upper contact of the argillite belt on Red Hawk No. 4 claim.

The serpentine is a dense dark green to black rock. Examined under the hand lens it is seen to consist of fine scaly black serpentine with occasional spots made up of light green translucent material which are possibly either serpentine or mariposite. Both fibrous amphibole and fibrous serpentine in "slip-fibre" and "cross-fibre" veinlets are present in the serpentine rock. These form a poor grade of asbestos. Ankerite is abundant in places and sometimes talc and pyrite. Cliffs of the serpentine present a foliated appearance, resembling flow-structure. This may be due to flowage, to shearing or may be a relic structure of the original rock from which the serpentine was developed.

The weathered surface of the serpentine may take on a light greasy green color. Where more maturely weathered the serpentine becomes brown in color due to the development of iron oxide from the iron minerals contained in the serpentine.

Diorite. The diorite is an irregular stock outcropping largely in the cirque covered by Red Hawk No. 5, 6 and 10 claims. A part of the stock crosses the ridge northwestward into Dan Tucker property. Flow structure can be seen in the diorite even in the center of the outcropping mass. This indicates that the diorite came in in the form of steeply dipping dikes. The portion outcropping is the upper portion near the roof of the stock. A minor amount of diorite is intruded as lit-par-lit injections into limy argillite along the lower part of Agnes creek.

The most nearly normal facies of the stock is a greyish green, moderately fine grained diorite in which ferro-magnesian minerals do not appear to have well defined boundaries when viewed megascopically. They may be pyroxene or amphibole. They have been considerably altered to a light green mineral, probably in different cases, amphibole, chlorite and serpentine.

A fine grained facies of the diorite, is a uniform green color resembling the andesites. It outcrops in the western corner of Red Hawk No. 3 claim and elsewhere. Its granular texture and the minute feldspar and ferro-magnesian constituents recognizable under a hand lens distinguish it from the andesites.

A light colored facies exposed on Red Hawk No. 10 claim and the adjacent portion of Red Hawk No. 6 claim tends towards an aplite. It is of variable texture, irregularly crystallized and consists largely of feldspar with a little ferro-magnesian constituents.

Albitite. The rock tentatively considered as an albitite may be an aplite or rhyolitic rock. It is typically a light creamy grey to light green rock, consisting of feldspar and occasionally a minor amount of quartz. A dike of this rock about 30 feet wide is intruded into a small mass of argillite on the southeast side of Red Hawk No. 1 claim. It is found again under similar conditions 1400 feet to the south on Red Hawk No. 8 claim. A similar rock outcrops 700 feet to the northwest of the first mentioned occurrence on the opposite side of the cirque. At this point the rock contains phenocrysts of feldspar up to 3/16 inch in length in a fine light green groundmass. In all these cases there is a small patch of argillites either in contact with the albitite or nearby. Lenses of quartz are in or near the albitite in each of these occurrences.

Economic Geology and Workings

Lenticular quartz veins are abundant on the property. They are found in all the rocks except the serpentine, at the contacts of which they almost invariably die out. Veins outcrop best and most abundantly on the ridge separating the cirque on Red Hawk property from the one lying on partly on Dan Tucker property, where the ridge crosses Red Hawk No. 5 claim. These veins are in diorite. The larger veins are lenticular with a width up to 5 feet, strike southeast and dip 35° to 45° northeast. Erosion has exposed these veins well leaving them as a veneer of quartz on the mountainside. They are joined by veins from 2 inches to 1 foot in thickness that dip in the opposite direction at 35° to 45° to the southwest, into the mountain. The veins are so well exposed by erosion that they may be

extensively examined and sampled without opening them up further.

Near by iron-stained andesite outcrops, with broken quartz strewn over the surface. A small pit has been sunk on this under a perpetual snow bank exposing a small stringer of quartz striking 160° (S 20° E) dip 60° W, joining a 1 foot quartz lens dipping about 40° S. A tunnel has been driven in the ridge at an elevation of 6640 feet above sea-level along the trend of the line of broken quartz strewn on the surface. It runs for 63 feet at 250° (S 70° W) exposing a small 2 inch quartz vein near the face of the tunnel that strikes 130° (S 50° E) dip 20° S.W. A branch of the tunnel starts 5 feet back from the face and runs 28 feet at 200° (S 20° W) to intercept a quartz lens 1 foot thick almost directly under the pit below the snow bank. Lower down in the cirque to the east on Red Hawk No. 6 claim at an elevation of about 6300 feet above sea-level a tunnel (Gopher tunnel) runs 30 feet at 311° (N 49° W), then 5 feet at 235° (S 55° W) then a further 10 feet at 290° (N 90° W). It passes through a large mass of quartz for the first 20 feet and is in diorite in which quartz and calcite lenses make up from 25% to 50% of the rock for the rest of its length. The mass is not exposed well enough to determine its strike and dip. The mass is probably similar to the large lenticular veins so well exposed that are described previously. The tunnel is being continued.

An old tunnel has been driven at an elevation of 6050 feet above sea-level on the southeast side of Red Hawk No. 1 claim on an albitite dike. The dike cuts a mass of argillite caught between serpentine and sheared diorite. The tunnel runs 33 feet at 98° (S 82° E) and a further 15 feet at 117° (S 63° E). The albitite is about 25 feet wide and of unknown extent. The argillite next to it strikes 145° (S 35° E)

dip 45° S.W. The shearing of the adjacent diorite parallels it in strike and dip. A number of quartz lenses are cut in the tunnel for the first 10 feet and then only a few throughout the rest of its length. A lens of quartz 6 inches wide is exposed in a pit dug in the albitite 20 feet northeast of the entrance of the tunnel. Another outcrop and a pit 30 feet east above the tunnel exposes some quartz stringers, one of which swells from 1 inch to 1 foot in width, strikes 150° (S 30° E) dip 85° S.W.

A somewhat similar mass of albitite (or aplite or rhyolite) is situated 700 feet northwest on the opposite side of the cirque. Outcrops of argillite, andesite and diorite porphyry of limited extent outcrop near or adjacent to it. All these rocks are included between more extensive masses of serpentine on the southwest and diorite on the northeast. A number of small pits near this albitite expose broken quartz.

1300 feet to the south on Red Hawk No. 8 claim a 2 to 3 foot quartz vein striking 135° (S 45° E) dip 50° N.E. cuts albitite. The albitite is exposed in two open cuts one of which reveals the vein. A tunnel starts on the northeast or hanging-wall of the vein and runs diagonally across it into the albitite on the foot-wall. The tunnel is now in 13 feet, running 10 feet at 85° (N 85° E), and then bending towards the south for the last 3 feet. The tunnel is being continued. The vein has an unknown extent to the northwest but on the southeast it terminates 2 feet from a shear which brings serpentine into contact with the albitite and with the argillite lying 10 to 20 feet south of the vein. The strike of the shear is 26° (N. 26° E) dip 55° S.E. The strike of the argillites is 108° (S 72° E) dip 77° S. 20 feet beyond the vein along the prolongation of its strike to the

southeast a pit has been dug exposing serpentine. The albitite with some small quartz stringers is again exposed in a pit 250 feet to the southeast.

A fracture zone in andesite and diorite runs along the boundary between Red Hawk No. 3 and No. 4 claims and along the boundary between No. 1 and 2 claims. This follows a small ridge below a nivation notch. The trend of this ridge is 135° (S 45° E). A number of lenticular stringers of quartz from 1 inch to 1 foot in width run along it. They have been extensively explored by open cuts, pits and one small shaft 10 feet deep. At the present time a tunnel has been started on Red Hawk No. 4 claim about 350 feet northeast down the hill with the intention of intersecting this zone at a depth of 270 feet. The tunnel is now in 45 feet at a bearing of 220° (S 40° W) and is passing through a serpentine rock.

A small pit has been dug on a similar ridge of andesite on Red Hawk No. 2 claim about at the elevation of the tunnel. It exposes 2 feet of broken quartz.

A 2 foot quartz vein or lens of unknown extent is exposed in argillites on the west line of Red Hawk No. 4 claim 70 feet south of the northern post. Where it is exposed it strikes 125° (S 55° E) dip 45° S.W. parallel in strike and dip with the bedding of the argillites.

In summary it may be said that there are a considerable number of quartz veins exposed on the property. They are all of lenticular character. Twenty-three samples were taken for assaying. Where Mr. Rice sampled the veins extensively during his examination of the property few samples were taken but on those veins on which he took fewest samples, a number were taken. The results of the assays show that while most of the veins carry a trace of gold none of them assay over 0.01 ounce per ton.

List of Samples Assayed for Gold

Samples from Albitite

R.1, Gold, Trace: 3 foot vein in albitite at tunnel south side of Red Hawk No. 8, M.C.

R.2, Gold, Trace: Two 3 inch veins in albitite exposed in pit 250 feet east of tunnel, Red Hawk No. 8 M.C.

R.11, Gold, Nil.: Combined sample of several lenticular quartz veins up to 6 inches wide in two pits and an outcrop near the tunnel on the east side of Red Hawk No. 1, M.C.

R.12, Gold, Nil.: Several little quartz lenses in tunnel, east side of Red Hawk No. 1, M.C.

Samples from Diorite

R.6, Gold, Trace: Sample taken over first 30 feet of Gopher tunnel, large mass of quartz making up 75% of rock, in tunnel N.W. corner Red Hawk No. 6 M.C.

R.7, Gold, Trace: Sample taken over last 15 feet of Gopher tunnel; quartz making up 30% to 50% rock, N.W. corner of Red Hawk No. 6, M.C.

R.23, Gold, Trace: 2 foot quartz-calcite lens joined by a 3 inch vein. 200 feet west of Gopher tunnel, N.W. corner of Red Hawk No. 6, M.C.

R. 8, Gold, Trace: 2 to 3 foot quartz vein, ridge western corner Red Hawk No. 5, M.C.

R.10, Gold, Nil.: 2 foot quartz vein, near western end of S.W. line of Red Hawk No. 5, M.C.

R.13, Gold, Trace: 2 foot quartz lens at serpentine contact in cirque on S.E. side of Red Hawk No. 6, M.C.

R.15, Gold, O.Ol.: 5 foot vein and 1 foot vein at their intersection on ridge Red Hawk No. 5, M.C.

R.16, Gold, Trace: 1 to 4 foot lenticular quartz vein on ridge below R.15, on Red Hawk No. 5, M.C.

R.19, Gold, Trace: 1 foot to 2 feet of broken quartz, east corner Red Hawk No. 10, M.C.

R.20, Gold, Nil.: 5 inch quartz vein on ridge, east side of Red Hawk No. 10, M.C.

Samples from Andesite

R.3, Gold, (No Specimen?): 2 foot to 3 foot lenticular vein of silicified carbonate in sheared andesite on ridge along the south boundary of Red Hawk No. 4 M.C. near the east end.

R.4, Gold, trace: Combined sample of 1 inch to 12 inch lenticular quartz veins exposed in a number of test pits on ridge along southern boundary of Red Hawk No.4, M.C. between 800 and 900 feet from the east end, in both sheared andesite and diorite.

R.5, Gold, trace: 6 inches to 12 inches of rusty quartz in 10 foot shaft on south line of Red Hawk No. 2 M.C. 400 feet east of S.W. corner.

R.18, Gold, nil. : 2 feet of broken quartz in pit on small ridge 500 feet east of S.W. corner post of Red Hawk No. 2, M.C.

R.22, Gold, trace: 4 inch quartz lens in andesite on Red Hawk No. 2, M.C. 400 feet north of S.E. corner.

R.9, Gold, trace: 1 foot quartz in a small pit above tunnel on ridge, Red Hawk No. 5 M.C.

R.14, Gold, nil. : Combined sample of 2 inch vein and 12 inch lens of quartz in tunnel on ridge, Red Hawk No. 5, M.C.

R.21, Gold, trace: Broken quartz in pits in altered andesite next to the albitite or aplite dike, east side Red Hawk No. 1, M.C.

Samples from Argillite

R.17, Gold, nil. : 2 feet quartz vein on west line of Red Hawk No. 4, M.C. about 75 feet S. of N.W. corner post.

H.H. Yuill
475 Howe St.,
Vancouver,
Canada.

August 7th, 1933.

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The Secretary,
Red Hawk Gold Mines Limited,
Stock Exchange Building,
VANCOUVER, B. C.

Dear Sir:

Preliminary Report on Property of

RED HAWK GOLD MINES LIMITED

by H.H. Yuill.

The property consists of fifteen mineral claims and fractions located about seven miles South East of the Pioneer Mines, in the Bridge River District of the Lillooet Mining Division, British Columbia.

Apart from some surface trenches and cuts there has been no work done on this property. My examination has included a complete mapping of all rock exposures and prospecting the surface of the property by experienced geologists.

A description of the details is contained in the notes attached to this report, and the following maps are included:-

- Map No. 1. Claim Plan 1"-300', showing geology and workings and assays
- Map No. 2. Detail of workings and assays on Rhyolite Dyke
- Map No. 3. Plan and section of workings along trail, showing location of suggested tunnel site

The prospecting work done to date has not yet disclosed fissuring in the diorite similar to that of the productive veins in the district. Our sampling of the quartz showings in the various workings described in the notes has failed to indicate more than a trace of gold. Therefore, it would not

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appear advisable to make further expenditure in extending these workings.

There is, however, a zone of mineralization running through your ground (see Map 3) and into Dan Tucker ground that perhaps should be prospected further.

This zone has a North-West South-East direction and consists of a series of irregular quartz veins with varying dips. The zone is apparently continuous for a length of at least 2000' on Red Hawk ground, and has been followed for an equal distance on the Dan Tucker.

This zone runs along the contact between the diorite and greenstone and there is a possibility that it may enter the diorite at depth. Our assays of the quartz stringers on surface showed only traces but it is possible that at this horizon the vein may have split and fingered out, and that in depth there may be a single channel and that it may carry some values. I consider that this possibility is rather remote, but as you have a crew of men on the property I would suggest that you should consider the advisability of testing this possibility by driving a prospecting tunnel to cut this zone at about 270' depth. A tentative site has been marked for starting the tunnel which would be driven in a direction South 40° East. The tunnel may cut the zone at 450 feet, but may require to be driven 550 feet if the zone dips at 60°. This tunnel should be driven by hand and progress should be about 100 feet per month.

The information to be gained by driving this tunnel will be equally valuable to the Dan Tucker, and it is possible you may be able to obtain their co-operation in making this test.

I shall be available on Friday the 11th to discuss the situation with the Directors if they so wish.

I am sending Dr. Lees to make an independent geological study of the property to see if he can find any indications of interest that should be further investigated, in case we have missed them in our study of the property.

Yours faithfully,

Vancouver, B. C.,

August 7th, 1933.

C
O
P
Y
H.H. Yuill
475 Howe Street,
Vancouver,
Canada.

RED HAWK NOTES

To Accompany Preliminary Report dated Aug. 7, 1933.

LOCATION

The Red Hawk Property is situated on the Southwest side of Cadwallader Creek between 6 and 7 miles from the Pioneer Mine. It covers a range in elevation from 4500' to 7500'.

A good pack horse trail leads in from the end of the road about a mile above the Pioneer Mine.

TOPOGRAPHY

The lower claims, including the Premier 1 to 3 and the Red Hawk 2, 4 & 9, are all on a relatively smooth side hill with an average slope of about 35°. Outcrops in this section are very scanty and the presence of big blocks of float from the bluffs above makes their determination often uncertain.

The Claims Red Hawk 1 & 6 occupy, for the greater part, a large cirque basin while Red Hawk 5, 10, the Southern part of 6, 8, and the Joe Fraction are on the steep ridges surrounding it. Red Hawk 7 is staked on the steep ridge at the head of the cirque in which Red Hawk Lake lies. Rock exposures are excellent in all this section.

The present camp site is near the lip of the cirque basin on Red Hawk No. 1 claim and the trail leading to it runs closely along the boundary between Red Hawk No. 3 and No. 4, and a part of No. 1 and No. 2 before it turns up to the camp.

Timber is generally rather scanty on the upper parts of the group but there is enough for preliminary mining purposes and a good deal of fair timber is available on the flats at the foot of the hill.

Several small springs supply water throughout the summer but the main source of water must be Red Hawk Creek which runs throughout the year.

ECONOMIC GEOLOGY

Showings along the trail.

A zone of mineralization with an average strike N 45 W has been exposed by a number of open cuts. For the greater part it is in greenstones most of which are probably flow but which are cut by a number of large diorite dykes. To the Northwest, down the hill, a few scattered outcrops suggest that the whole area is underlain by greenstone with occasional interbedded bediments. To the Southeast the outcrops indicate a band of mixed diorite and greenstones 300 or 400 feet wide striking approximately parallel to the direction of the mineralized zone. It is evident that, while the diorite is elongated in the direction of the strike of the bedded rocks, its actual contact is irregular and crosscutting so that the same may hold true of the dip. There is a reasonable expectation therefore that the dip may be steeper than that of the beds, possibly vertical or even dipping outwards steeply.

The zone consists of a series of irregular quartz

veins dipping at all angles and in both directions. It is apparently continuous for a length of at least 2000 feet on the Red Hawk and has been followed for an equal distance on the Dan Tucker. The dip is uncertain but in the only places where a definite fracture could be observed, seemed to be to the Southwest from 70 to 80°.

It is clear that this zone runs along the contact between the diorites and the greenstone and there is a possibility that it may run into the diorite downwards. It is possible, therefore, that the vein might be stronger, more continuous, and carry values if confined to a single channel and that on reaching the incompetent rocks at the contact split and fingered out and lost its values. On the other hand, there is quite a likelihood that the diorite dips back under itself and that the vein continues to parallel the contact to an unknown depth. In any event it is uncertain that the diorite, which is of the mixed up type described, may prove to be a sufficiently homogeneous type or sufficiently competent to provide a single channel, nor if it do so that there should be available solutions which deposited gold.

The zone has been exposed by a number of workings.

On Red Hawk No. 2 about 500 feet Southeast of the West corner a small shaft has been sunk through the overburden to a depth of about 10 feet. It exposes a vein of quartz about a foot wide with a considerable width of gouge on both walls,

striking at N 55° W and dipping at 75° W. The wall rock is badly crushed and altered greenstone. Sample K 8 was taken of the quartz in this shaft. Width 12". Au. Trace; Sample K 9 was taken from the gouge on the footwall of the vein, width 12", Au. Nil. Panning both the quartz and the gouge showed no colors.

A little to the Southeast of the shaft an open cut exposes a vein of quartz 10" wide with greenstone on the footwall. The showing is right on the surface and is all broken so that the attitude is unreliable. Strike N 50 W, dip 65° SW.

Sample K 15 was taken of the quartz in this vein. Width 10". Au. Trace. It is uncertain if this is the same vein exposed in the shaft or not.

A little to the West of the Northwest part of Red Hawk No. 1 and the Northeast post of Red Hawk No. 3 an open cut has exposed badly foliated and altered greenstones. No quartz is exposed.

About 500 feet to the Northwest of this point outcrops of altered and albitized rock show a considerable amount of quartz. This is in greenstones and interbedded sediments. A wide diorite dyke cuts across the zone just beyond this and although there are a number of quartz stringers there is no evidence of the zone going through it. Beyond this three small open cuts have exposed both greenstone and diorite and a few

quartz stringers but are all very shallow.

Just beyond them, however, a deep cut has exposed greenstones and sediments all pretty well altered and several quartz veins one of which has a maximum width of 10". These have a fairly regular strike parallel to the general direction of the zone but dip in both directions. The rocks are all regularly foliated with a Westerly dip but the veins cut across the foliation.

Sample K 7 was taken across one of these quartz veins. Width 5". Au. Trace.

About 60 feet beyond this cut is a long one that has been driven right through the ridge on which the showings occur. The rock is all highly albitized and altered but is probably not an intrusive. Several quartz veins are exposed dipping in both directions but having an average strike of N 50 W. The main vein dips at 50° E but none of them show any suggestion of persistence.

Sample K 5 was taken from the quartz of one of these veins. Width 8". Au. Trace.

Sample K 6 was taken from a quartz vein. Width 4". Au. Trace.

To the Northwest of this cut three shallow cuts expose very similar conditions except that the last one is in the edge of a tongue of diorite that cuts across the zone.

The last cut on this belt lies beside the Southwest

post of Red Hawk No. 4 and the Northwest post of Red Hawk 3. It lies in diorite throughout and shows a good deal of crushed quartz and a strong fracture running N 50° W, dip 80° W. This fracture is a foot or so wide but does not appear to carry quartz. The whole cut is scarcely deep enough to give a good idea of the situation.

Sample K 4 was taken from the gouge and crushed quartz. The width was indeterminate and the sample was taken as an indication only. Au. Nil. Panning from this cut gave no indication of values.

About 200 feet down the hill from the shaft an open cut has exposed a lens of quartz which is 3½ feet wide on one side and 1½ feet wide on the other. It appears to be entirely in greenstone which is, however, so badly sheared and weathered that it is hard to determine. From the look of the cut it seems probable that the vein would lack persistence and there is no diorite known anywhere in the vicinity. No extension of this vein has been exposed.

Sample K 2 was taken from this vein on the Northwest side of the cut. Width 3' 5". Au. Trace.

Sample K 3 was taken from the quartz of this vein on the Southeast side of the cut. Width 1' 6". Au. \$0.20.

LOWER TUNNEL

About 600 feet Southeast of the camp a rhyolite dyke outcrops in the side hill. This dyke is about 20 feet wide at this point and intrudes argillaceous sediments. It has been

considerably shattered, being a competent member in incompetent rocks, and the fractures have been filled with quartz. The total percentage of quartz is, however, quite small - probably not over 5 or 10%. The attitude of the dyke is about N 50° W and it appears to dip vertically.

A little below the outcrop a tunnel has been driven for about 42 feet in the dyke. There is no real change in the condition observed in the outcrop. There is a certain amount of quartz near the portal occupying cracks in the dyke but there is very little showing in the face. The nature of this occurrence and the small percentage of quartz together with irregular nature of the stringers and their lack of persistence makes this showing of no economic importance. No samples were taken.

On the opposite side of the basin, about 300 feet Northwest of the camp the same dyke is exposed again. At this point the dyke is about 25 feet wide and has the same attitude as that at the tunnel. Here, however, the conditions are somewhat different. The myolite is cutting a large dacite porphyry dyke and, as a consequence of intruding competent rocks is preserved from fracturing and subsequent mineralization. There is, however, a strong fracture bearing N 55° W and dipping steeply which is a little distance from the contact of the dyke on the Southeast end of the exposures but appears to be running along the contact at the Northwest end. This fracture zone was opened

up by two cuts during the writer's visit which show it to have a minimum width of 6 feet. It is partly in the dacite porphyry and partly in diorite but the rock within the fracture zone is altered and sheared beyond recognition. There is a considerable development of talc and some of the gouge is largely composed of this mineral. The whole zone contains a considerable number of quartz stringers some 4 or 5 inches wide. Neither extension of this zone is exposed. Panning of both the quartz and gouge gave negative results. Neither of the cuts were deep enough to give a very accurate idea of the nature of this showing but it is very doubtful if there is sufficient quartz to make it of any importance.

Sample K 16 was taken from gouge, crushed rock and quartz. Width 6 feet. Au. Trace.

South of the camp near the southern boundary of the Red Hawk No. 8 is another exposure of phylite. This dyke is very irregular and at least 50 feet wide. This may be the same dyke as in the previous showings but it is not on line and cannot be definitely connected. It is exactly similar in nature and is cutting sediments and serpentine. It is shattered and mineralized similarly to the one in the tunnel. A number of cuts expose it well so that a reliable conclusion can be reached.

At the extreme North end outcrops show the dyke to

be cutting serpentine and, while exposures are not good, there appears to be little quartz mineralization. North of this point the dyke cannot be traced on account of the overburden but it does not show in outcrops on line occurring about 500 feet beyond. It is possible that it may swing to the East and be continuous with the one in the tunnel.

About 150 feet due South from this point a small open cut exposes the dyke again. Here it is cutting argillites although the argillite-serpentine is only a few tens of feet away. It is clear that between these two showings the Southwest contact of the dyke has taken a sharp bend. In neither case is the Northeast contact exposed. In this cut the rhyolite has been shattered and the fractures headed with small gash veins and lenses of quartz. The total percentage of quartz is under 10%, and the occurrence appears to have no economic value.

About 150 feet Southeast of the above cut a large cut has exposed about 20 feet of this dyke on its western contact with argillites. Just above this cut exposures show this dyke to take a sharp swing to the East for about 35 feet. At the angle of this swing shattering appears to have been concentrated so that there is a considerable width of quartz. The contact of the dyke in the cut has an attitude of N 65 W and dips at 80° Southwest, and the main fracture system is parallel to this. On passing out of the dyke at the turn the fractures and mineralization die out promptly.

Sample K 10 was taken from the outcrop close to the turn of the dyke and is composed of quartz and altered dyke but with a relatively high percentage of quartz - say 75%. Width $3\frac{1}{2}$ feet. Au. trace.

Much the same condition is exposed in the cut just below except that here the shattering has been less intense and there is consequently less quartz. Not only that but it can be seen that the main mass of the quartz has no real extension downward but appears to be more or less of an isolated mass. Away from the main mass of quartz the dyke has suffered some shattering and there are small veinlets of quartz but the total amount is very small. Panning from this cut gave negative results.

Sample K 11 was taken from the main mass of quartz and crushed rhyolite in the center of this cut. About 50% of the sample was quartz, or possibly a little more. Width $3\frac{1}{2}$ feet. Au. Trace.

Sample K 12 was taken on the Southwest side of K 11 to the edge of the dyke and consisted of rhyolite dyke somewhat crushed and altered with a number of small quartz stringers, probably totalling between 15 and 20% of the sample. Width $4\frac{1}{2}$ feet. Au. Trace.

Sample K 13 was taken on the opposite side of K 11 from K 12 and is similar to K 12 except that here the quartz is probably not over 5%. Width 6 ft. Au. Trace.

Sixty feet to the South of this cut on the line of the apparent strike a small cut has been driven which is in serpentine throughout. It is therefore evident that the dyke has swung again, and also that the serpentine is cutting across the sediments.

One hundred and sixty feet to the Southeast of this cut is another big cut which is in rhyolite throughout. This has been somewhat fractured and there are a number of quartz stringers but the total amount of quartz is probably not more than 5%.

Sample K 14 was taken from the quartz and altered rhyolite in the best looking part of this cut. Width 6 feet. Au. Nil.

A hundred feet beyond this cut the dyke outcrops again over a width of not less than 50 feet. There are a number of irregular quartz veinlets as before, but no sign of any continuous vein. A small cut in the Northeast edge of the dyke has revealed nothing.

It is evident as a result of the sampling and panning that the quartz stringers in this showing carry very little values and that fact, combined with the irregular nature of the shattering and the general paucity of quartz, renders this showing of no economic value. There is no geological evidence for any reason to expect different conditions at depth since erosion has already exposed a vertical section of over 300 feet on this showing alone.

GOPHER TUNNEL

On the northern corner of Red Hawk No. 6 material dug out by a gopher showed a considerable quantity of quartz. During the writer's visit a short tunnel was being driven through the overburden to explore this. Up to the present the exact nature of the occurrence is still in doubt but the face of the adit is almost entirely in crushed quartz and rock. It is impossible to get any idea of the extent and direction of this vein except that it does not appear in the bluffs immediately above and to the right of the tunnel. Specimens of this quartz were panned and gave a negative result. Two samples were taken across the face composed of crushed quartz, altered crushed rock, and talc, chlorite gouge.

Sample K 17 Width 5'. Au. Trace.

Sample K 18 " 5'. Au. Trace.

It is probable that this showing represents one of the barren lenses of quartz that are not uncommon throughout the district and is probably of no economic importance. Work is being continued at the present time in order to determine definitely the exact nature of the deposit.

About 200 feet to the Southwest of this tunnel a number of irregular flat quartz veins are showing in a bluff. They are apparently in sediments right on the contact with a large diorite dyke. They are composed of quartz and calcite

and show some pyrite, magnetite and chalcopyrite. They are very irregular and small but a sample was taken to see if they carried any values although panning gave no results.

Sample K 1 Width 4' Au. Trace.

This showing is evidently of no commercial value.

UPPER TUNNEL

Near the center of Red Hawk No. 5 a short tunnel has been driven. Unfortunately up to the present time it is covered with snow and cannot be seen. There is some quartz exposed on the dump which was panned with negative results. There appears to be a strong fractured zone running about N 75 W but the exposures are too vague to be certain.

Near the upper end of the Southeast boundary line of the Premier No. 1 a cut has exposed a diorite dyke about 6 feet wide cutting through sediments. This dyke is slightly shattered and shows a little quartz mineralization along the fractures. This appears to line up with McQuires workings and is probably on the same zone.

The chances of proving up on economic quantity of ore even supposing it to carry values do not justify further work at the present time.

On the cliffs at the Southwest edge of Red Hawk No. 5 several large lenses of quartz appear. They are extremely difficult of access but are so well exposed that they can be seen to be irregular blowouts in the shape of discontinuant

short lenses. Panning of float from here has given negative results and they are of no economic value.

RECOMMENDATIONS

It is evident that there is no showing of any economic value at the present time.

The zone along the trail is in the greenstones close to the diorite contact and may strike down into it at a moderate depth. While these showings are of no economic importance there is a possibility that geologic conditions may change at reasonable depth although this does not appear to be true of any of the other showings. That such a change would lead to the development of economic ore is very improbable and the chances scarcely seem to justify the expense of testing them. If, however, work is to be continued on the property this would appear to be the only place where with our present knowledge it can be attempted with the slightest chance of success.

A tunnel site has therefore been located a distance of 450' down the slope of the hill. A tunnel driven from this point on a bearing of S 40 E should pass directly under the cuts at a distance of about 360 feet giving a vertical depth of 270 feet if the vein dips to the Southwest at 80° , 430 feet should cut the whole zone and if at 60° SW 540 feet should do so. Provided the diorite does not dip under itself and the veins dip to the Southwest neither of which facts can be definitely determined, the tunnel should cut the fracture zone well within the body of the diorite provided it persists into it.