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STATE OF ALASKA

DIVISION OF MINES AND MINERALS

REPORT ON

SPIRIT MOUNTAIN NICKEL-COPPER PROSPECT

CHITINA DISTRICT, COPPER CENTER PRECINCT

VALDEZ QUADRANGLE, ALASKA

By

M. W. JASPER

State Mining Engineer

March 1960

The old trails into the area - one (a double-ender sled trail) following the left limit (south) side of Canyon Creek from its junction with the Copper River, below Woods Canyon, and the other which leaves the Copper River at Taral at head of Woods Canyon - are heavily overgrown with willow and alder, making them virtually impassable.

Access to the property is now limited to "float" plane service from Chitina with landings made on Summit Lake, from which point the distance is about 2 miles by good trail. Landing on gravel bars in upper 3 miles of Canyon Creek's "U" shaped valley is not considered practical due to "tricky" shifting winds off the glaciers, the steep mountain ridges surrounding it on east-west sides and at south end, and a 400 foot high granite stock across 75% of lower end of this 3 mile section.

TOPOGRAPHY

The area is one of steep slopes and rugged relief. The elevation at mouth of Canyon Creek is 400 feet, at Summit Lake (10 miles to the southeast) is 3000 feet, and in the valley below the showings it is about 3100 feet above sea-level.

The mountain ridges along the valley average about 5000 feet, with Spirit Mountain, 6 miles west of the prospect, rising to 7200 feet above sea-level.*

CLIMATE

The area is one of fairly deep snowfall with the prospect generally free of snow during July, August, and September. During summer months fair weather is said to prevail, although wet summer seasons are not infrequent.*

* USGS Bul. 943-C. Page 50

WATER SUPPLY AND TIMBER

Glacier fed in the summer, Canyon Creek is a large stream during that season, carrying a sufficient volume of water to supply a large mining and milling operation during late spring, summer, and fall months. Stream flow during balance of the year is no doubt quite low. No stream gauging on Canyon Creek has been made, but at time of visit it was estimated to be within range of 3000 to 4000 cubic feet per minute.

From the air there appears to be an abundance of timber for mining purposes along the lower 4 miles of Canyon Creek, below the 2500 foot elevation.

HISTORY

"Discovery of nickel was first reported in the Canyon Creek area in 1907. Sixteen claims were staked and consolidated as the Spirit Mountain nickel prospect under ownership of B. O. Peterson, Charley Young, and Andrew Halvorsen, and a "double ender" road was constructed along Canyon Creek from the Copper River to the prospect. Several mineralized outcrops were explored by test-pits, and two short tunnels were driven at the base of the most promising outcrop, but no ore was shipped. The prospect was abandoned in 1917." *

The area was apparently neglected by prospectors until 1954 when 6 mineral claims - Spirit Mountain No.s 1 to 6 - were relocated by Andrew Halvorsen, Neil Finnisand, and Art Nelson. These claims are located on the west side of Canyon Creek, and cover the area in which the more interesting nickel-copper showings were originally found in 1907, and upon which the early day work was largely confined.

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GEOLOGY

"The prevailing country rock in the area represented in Fig. 1 is a bedded sequence of metamorphic rocks of Carboniferous age. These rocks, predominantly schist, greenstone, gneiss, and recrystalized limestone, are intruded by igneous rocks, which although largely diorite and diabase, include nickel-bearing peridotite and pyroxenite bodies that constitute the Spirit Mountain nickel-copper prospect....." *

"Several eastward-trending discontinuous peridotite and pyroxenite bodies crop out on both sides of Canyon Creek near its head. These bodies .....may represent discontinuous portions of the eastward-trending sill. Most of the sill-like bodies are sulfide bearing, but only two, which crop out on the west side of Canyon Creek, contain a significant quantity of nickel. These two bodies constitute the principal nickel deposit of this report. (See Fig. 4). The sill-like bodies intrude Carboniferous beds mapped as limestone on figure 3. This unit includes beds of fine-grained to coarse-grained recrystalized limestone, impure schistose limestone, and slightly calcareous hornblende, biotite, and diopside schists. These metamorphic rocks contain siliceous zones and stringers of quartz. Silicification is especially prominent along the upper contact of the intrusive bodies." *

"The regional trend of the bedded metamorphic rocks is a little north of west. Local variations of as much as 40° from this trend are common. The regional dip is to the north, generally at an angle of 50° to 85°. Most of the intrusive bodies in the area are roughly conformable to the intruded beds. Part of the discontinuity of the sill-like bodies is due to segmentation by faulting, but no evidence of large displacement was found..... Numerous slickensided surfaces along contacts of the intrusive bodies represent adjustment involving only small displacement." *

USGS Bul. 943-C. Page 52, 53.

Mineralization

The presently known minerals of economic interest found in this deposit are apparently limited to pentlandite (FeNi)S - and chalcoprite - $CuFeS_2$. A second nickel-iron sulfide (identified as Bravoite by the USGS) is said to also be present in lesser amount. *

The most abundant sulfide present is pyrrhotite with lesser amounts of pyrite. Minor amounts of sphalerite and magnetite are also reported. * Of the secondary minerals limonite is the most common; occasional negligible amounts of malachite was noted.

Samples submitted for analysis show only traces of gold and silver. None of them to date show cobalt to be present.

Points examined along the strike of the mineralized zone on west side of Canyon Creek were limited to (a) the 50 foot tunnel at about 3360 elevation; (b) the 22 foot wide open-cut at about the 3500 elevation; and (c) a 9 foot test pit 350 feet west of the open-cut at about the 3660 foot elevation.

The tunnel does not show mineralization of special interest.

The wide open-cut shows a more or less solid 4 foot width of sulfides on the limestone footwall side, with an additional overlying 18 foot width of fairly heavy disseminated sulfides in an altered peridotite dike. This 22 foot wide showing was sampled in two sections, as described below. It is exposed a length of about 30 feet on the steep slope.

The nine foot depth of the test pit was sunk on a 24 inch wide peridotite sill, which is the same intrusive as exposed in the cut at the 3500 foot elevation. The mineralization was limited to disseminated sulfides

* USGS Bul. 943-C. Page 53.

and minor amounts of malachite 'stain'. The basic sill was followed for 300 to 400 feet westerly from the 9 foot test-pit, with only disseminated mineralization noted where it was fully exposed.

A reported solid sulfide exposure between the tunnel level and the valley floor was not found.

The wide mineralized areas on east side of the valley were not examined as little or no work had been done by Malverson and Finnisand on that side of Canyon Creek, and no samples had been taken by them to indicate presence of minerals of possible economic interest.

Sampling

Samples taken were limited to the wide open-cut at about the 3500 foot elevation. Analysis of these showed the following values:-

SAMPLE RESULTS

Sample No.	Width	Au oz	Ag oz	Cu %	Ni %	Description
7759	18 ft	tr	tr	0.56	0.56	NW side of open-cut @ 3500 Elev. Altered peridotite sill. Estimate 5 to 10% sulfides.
7760	4 ft	tr	tr	1.60	4.26	Solid sulfides on NW side. Adjoins the above sample.

CONCLUSIONS

The several showings examined on the west side of Canyon Creek are not in themselves of economic interest or importance. The one point having a 22 foot width exposed in open-cut at the 3500 foot elevation appears confined in strike length to 30 to 50 feet. Limited work done in the past has failed

to locate a zone of required width and lateral extent to indicate a "possible" nickel-copper deposit of the required magnitude to make it one of real interest.

The possibilities of finding a nickel-copper deposit of economic importance in this structure is presently considered limited to the finding of greater widths and far more continuous "segments" of the peridotite sill-like masses than have been located in the district to date.

RECOMMENDATION

It is recommended that a systematic effort be made to trace the peridotite westerly in search of wider and more continuous segments of this basic intrusive.

The highly mineralized areas on east side of Canyon Creek valley should be investigated, as the well defined oxidized zones and strong "gossan cappings" may be overlying zones of possible importance.

Anchorage, Alaska.

March, 1960

By- Martin W. Jasper

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U.S.B.M. I.C. 7279 pp 70-71

U.S.G.S. Cir. 252 pg 7

STATE OF ALASKA

DIVISION OF MINES AND MINERALS

SUPPLEMENTAL REPORT

SPIRIT MT. NICKEL-COPPER PROSPECT

CANYON CREEK, CHITINA DISTRICT

COPPER CENTER PRECINCT, ALASKA
(Valdez Quadrangle)

By

M. W. JASPER

State Mining Engineer

April 1960

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SUPPLEMENTAL REPORT
ON
SPIRIT MOUNTAIN NICKEL-COPPER PROSPECT
CANYON CREEK, CHITINA DISTRICT
COPPER CENTER PRECINCT, VALDEZ QUADRANGLE

INTRODUCTION

This area was revisited August 12 to 14, 1959, at request of Andrew Halvorson, Neil Finnisand, and Arthur Nelson, owners.

The examination was confined to the peridotite areas on east side of upper Canyon Creek valley, between approximate 3150 to 5000 foot elevations, where they had largely limited their 1959 prospecting season. This section lies ½ to 1 mile upstream from the old Adit, from which point the mineralized zone is said to extend about four miles southeasterly, having been reportedly traced by frequent outcrops into the Tebay River valley.

The investigation was limited to the 1½ mile section east of Canyon Creek, extending from the valley floor over the ridge crest to point near head of the next parallel "hanging valley." *

GEOLOGY

(The general geology of the area is discussed on page 4 of the attached report covering the west side examination made in 1954.)

The mineralized and strongly altered zone on the east side of the valley is presently considered a continuation of the structure on the west side of Canyon Creek, upon which the adit was driven and a number of open cuts made during the 1907-1917 period.

Here the structure has natural exposures of greater widths and lengths of the highly altered peridotite dikes or sill like masses with pyritization

* Refer to Map 3, attached.

being more extensive and continuous. Fault "drag folds" in the limestone adjacent to - and in some cases including the intruded peridotite (and/or diorite "tongues") - suggest greater fault displacements than was noted on the west side structure. On south side of this zone - an estimated 700 feet from Sta. 5 and 200 to 300 feet from sample No. 286 area (as shown on Sketch Map 4, attached) - the deeply incised gulch occupies a major fault zone of easterly-westerly strike which cuts across the ridge. More or less paralleling the peridotite-limestone mineralized zone, this fault was probably responsible for the fracturing and "drag folds" along the peridotite-limestone belt in this area.

On south side of the gulch fault zone the formation appears to be entirely diorite. Its areal extent was not determined, and time was not available to map the area in detail.

The peridotite-limestone zone is largely obscured across the ridge crest, but is plainly evident in both the precipitous east and west walls near head of the "hanging-valley." Standing nearly vertical their limonite coated outcrops were estimated to be 50 to 100 feet across.

Mineralization

The sulfide minerals noted in this area are limited in order of their abundance to pyrite, marcasite and pyrrhotite with occasional chalcopyrite. No nickel minerals were noted.

Thirty feet west of Sta. 3 (refer to sketch, Map 4) and open-cut in a 12 to 15 foot bluff, a few feet above the valley floor, has exposed a silicious, banded (granitic) gneiss carrying numerous parallel veinlets of galena and sphalerite. Its exposed width is 15 inches; it is considered that additional work will show the

total width to be greater. This is the only point to date where the galena-sphalerite mineralization has been found. Ullmanite (a nickel, antimony sulfide) was reported present associated with this galena-sphalerite occurrence, but it could not be identified in study of the sample taken for assay here plus hand specimen from the same point. No gold or silver values were found in sample assayed.

From a distance the mineralized zone on east side of the valley appears to have a heavy "gossan" capping. However, close examination shows the limonite to be a thin coating, which is derived from oxidation of the pyroxene, hornblende, pyrite, pyrrhotite, and marcasite.

The iron sulfides occurring are small solid lenses, veinlets, and disseminated grains. These minerals are more abundant on the lower slopes where they are found in a peridotite gneiss (or schist) which is somewhat calcareous in some sections and silicous in others.

With owners reporting that numerous pieces of the peridotite in this area had shown "positive" nickel present through use of the dimethylgloxime test, fifteen to twenty freshly broken pieces, showing no visible sulfides, were checked. Of these only three (from points where samples 276,279, and 281 were cut) responded to the test - and then only after a 30 to 45 minute interval.

Mineralization at the higher elevations (above the 3400 level) in area examined is limited to disseminated pyrite and pyrrhotite with only occasional fine, short veinlets and "pods" of these minerals noted.

Sampling

With field tests showing only traces of nickel and occasional chalcopyrite at a few widely separated points, only a limited number of samples were taken. Results of their analysis are as follows:-

SAMPLING RESULTS

Sample No	Width in.s	Au oz	Ag oz	Ni %	Cu %	Description
271	10	Nil	Nil	Tr	0.16	4530 El. Near HW of 100' peridotite dike (or sill) at Ls contact. Diorite contact 200' south. Fine veinlets & dissem. pyrite & pyrrhotite 40' from base of 300' Ls cliff.
272						4500 El. Rock type. Identification-peridotite.
273	18	Tr	Nil	Tr	0.15	3160 El. 40' S55E of Spirit Mt. #4 Disc. Post. 60-70% pyrite, pyrrhotite, marcasite in banded peridotite gneiss or schist.
274	26	Tr	Nil	Tr	Tr	El. 3160. Overlies & adjoins #273. Est. -5% sulfides in banded,peridotite gneiss.
275	26	Tr	Nil	Tr		El. 3160. Overlies & adjoins #274. Est. -1% sulfides in banded peridotite gneiss.
276	32	Tr	Nil	Nil		El. 3160. Overlies & adjoins #275. Few grains pyrite. Banded peridotite gneiss. Dimethyl test showed tr of Ni in 1 hr.
*277	15	Nil	Nil		0.12	El. 3150. Open-cut showing galena & sphalerite veinlets in silicious, banded, granitic gneiss.
279	60	Tr	Nil	Tr		El. 3410. Little pyrite in highly sheared & altered peridotite. Dimethyl test showed trace of Ni in half hour.
280	28	Nil	Nil	Tr		El. 3410. Underlies #279. Material similar to #279.
281	Grab	Tr	Nil	Tr		El. 3450. Grab across 3' highly altered peridotite dike, with little dissem.sulfides. Dike 20' wide, Ls FW & HW. Dimethyl test showed trace Ni.
285	Grab	Tr	Nil	Tr		El. 3600. Grab of dissem.sulfides in 100' peridotite dike by NF. Diorite contact 75 to 100 ft. south.
286	Grab	Tr	Nil	Tr		El. 3600. Grab by NF from point near small open cut of peridotite dike, with few small "pods" of sulfides & dissem. grains.

* 2.68% Pb 4.08% Zn

Two samples taken by Messrs. Finnisand and Nelson earlier in August 1959 from the west side zone were submitted for assay. Obtained from open-cut and test pit completed by original discoverers previously sampled by undersigned in 1954, plus one from a new showing between those two, results of their analysis are as follows:-

Sample No.	Width in.s	Au oz	Ag oz	Ni %	Co %	Cu %	Description
282	36	Tr	Nil	10.4	Nil	0.97	El. 3700. Across one end of 9' test pit. Solid pyrrhotite, pentlandite, and some chalcopyrite.*
283	18	Tr	Nil	7.84	Nil	2.05	El. 3525. Solid pyrrhotite, pentlandite, and some chalcopyrite, on FW side of 22 ft wide open-cut.
284	12	Tr	Nil	1.58	Nil	Tr	Reported taken from shallow trench dug in 1958. Full width of mineralized peridotite not exposed. Pyrrhotite, pentlandite, little chalcopyrite.

* Note:- The high nickel values in No. 282 and type of material in that sample suggests its source to be from another exposure, as this 8 foot test-pit was examined in 1954 and total of sulfides present was estimated at less than 5%. It seems likely that the owner inadvertently got sample No. 282 and No. 284 "switched."

CONCLUSION

Although the east side zone examined contains altered peridotite exposures of greater areal extent, and more widespread pyritization, than west side of valley, to date no ore-shoots of possible economic importance or showings that would encourage or justify an exploration program be undertaken have been found.

Nickel occurs only in trace amounts as is the case with gold. Cobalt and silver are entirely absent.

The absence of gold or silver values in the galena-sphalerite vein, presently exposed across a 15 inch width, indicates this occurrence is not of economic interest. However, should additional stripping on this showing expose a much greater width of the galena-sphalerite mineralization, it would be desirable to make effort to trace or project its northeasterly strike into the overlying limestone to determine whether there are indications of possible large replacement orebodies of these minerals in that formation.

In samples from the area as a whole no traces of cobalt have been found to date.

One sample submitted by Mr. Nelson (marked No. 1) in 1959 carried 0.18 oz in gold, but description of its location was not given. Mr. Finnisand reports that a sample taken by him in 1958 from the wide showing on west side of valley at the 3525 elevation sampled by undersigned in 1954 was reported to carry $20.00 to $24.00 in gold by a commercial assayer.

RECOMMENDATION

With the nickel-copper showings to date being confined to the peridotite zone on west side of Canyon Creek, it is recommended that future exploration work be largely limited to search for ore bodies in that area. Prospecting of the peridotite zone should be continued westerly in effort to find more encouraging surface exposures. To date the outcrops have been widely spaced with relation to each other, and individually have short, irregular, lenticular surface expression along strike of the zone.

With these occurrences located near or at peridotite-limestone contacts a diamond drilling program would be the best method to employ to determine whether replacement deposits exist of economic importance below the surface outcrops. A

drilling program should be preceded by a geophysical survey, as use of this medium would isolate the stronger and larger mineral concentrations.

Until such time as a geophysical and/or diamond drilling program can be undertaken, trenching along and across surface exposures (for sampling purposes) reported found in 1959 should be done. For this work it is suggested a light weight gasoline engine powered jackhammer should be available.

Although no nickel-copper occurrences have been found in the east side area examined, it will be worth-while for owners to follow the peridotite zone easterly, and sample surface exposures wherever strong pyrrhotite showings are found.

By- Martin W. Jasper

Anchorage, Alaska
April 1960

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SUMMARY

The showings examined on the Spirit Mt. Nickel--Copper Prospect do not suggest or indicate an occurrence of economic importance.

However, with district structural conditions of this area reported as being persistent for 5 to 6 miles westerly toward Spirit Mountain and an as yet undetermined distance easterly, and the presence of a favored peridotite "host" rock for nickel deposition reported frequently reoccurring (out-cropping) for varying distances along this structure, it is "possible" that more intensive prospecting and trenching along this zone may locate ore-bodies of real interest.

Use of geophysical equipment by experienced operators along this peridotite structure would be the quickest method to locate subsurface mineralized zones. A survey of this nature should isolate the areas of most intensive mineral concentrations. Their width and lateral extent would suggest the most promising (large tonnage potential) aections to drill.

INTRODUCTION

A preliminary examination of the Spirit Mountain nickel-copper occurrence was made at request of Andrew Halvorson, of Seattle, Wn., and Neil Finnisand, long-time resident of Chitina, Alaska. Accompanied by Mr. Finnisand, one day, - July 23, 1954 - was spent on the property.

LOCATION AND ACCESSIBILITY

The six mineral claims - Spirit Mountain No.s 1 to 6, inclusive - held by Messrs. Halvorson and Finnisand, are located at approximate co-ordinates Longitude 144° 16' West and Latitude 61° 18' North. They are situated on the fairly steep west side slopes of Canyon Creek valley.

The old trails into the area - one (a double-ender sled trail) following the south side of Canyon Creek from its junction with the Copper River below Woods Canyon, and the other which leaves the Copper River at Taral at head of Woods Canyon - are heavily overgrown with willow and alder, making them virtually impassable.

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