92H-10
520627

The Rabbitt Mine is on 18 Mineral Claim units in the Princeton-Tulameen area.

Property is for sale, Option or whatever.

I can be contacted in the evening at 228-8644.

- David Tavorsky.

REPORT ON

THE RABBITT MINE

LAWLESS CREEK-TULAMEEN RIVER AREA

SIMILKAMEEN MINING DIVISION, B. C.

BY

ROBERT STEINER, B.A., P.GEOL.

March 21, 1979

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ROBERT STEINER, B.A., PROFESSIONAL GEOLOGIST

HEAD OFFICE:
371 - 56TH STREET
DELTA, B.C.
943-3987

FIELD OFFICE:
BOX 553
BLAIRMORE, ALBERTA

THE RABBITT MINE
LAWLESS CREEK-TULAMEEN RIVER AREA
SIMILKAMEEN MINING DIVISION, B. C.
MARCH 21, 1979

SUMMARY

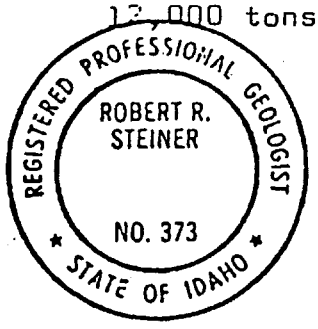
The Rabbitt Mine was examined in 1976. The adits were not entered. However, it is expected that the workings are probably in good condition.

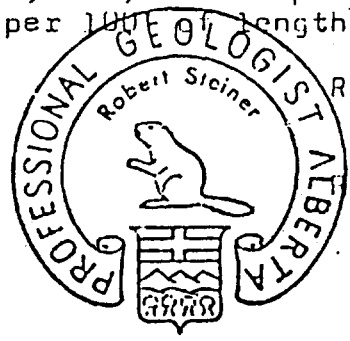
Recent geological work by D.C. Findlay and others suggests that the Rabbitt area is quite unique as a potential gold producer. It has been suggested that the mine is very close to one of the known surface expressions of the Pacific Plate. It is therefore probable that a very unique suite of minerals exists, particularly gold and silver. Platinum is also present in the area, and may become a significant component of future productions. It has been noted there is spherulite very near the mine.

The initial cost of re-opening the mine is estimated to be about $93,000. Some of this expense could be decreased by the shipment of surface mined siliceous ore, known to grade between 0.29 - 0.40 ounces gold per ton. At least 200 tons can be produced within a matter of 120 days.

Included in the estimated re-opening costs are stripping, trenching, surface and underground diamond drilling, and the establishment of a camp at the mine.

No estimate of ore reserves can yet be given because no recent work has been done. The writer has examined a number of properties in the area. Based on these examinations it can be assumed that a depth of at least 2,000' of auriferous quartz veins is present. The veins can be mined by open cut methods or horizontal adits, since they outcrop on a mountainside. If the depth of 2,000' by an average width of six feet be acceptable, now, then a potential reserve could be about 12,000 tons per 100' of length mined.





Respectfully submitted,

Robert Steiner, P. Geol.

THE RABBITT MINE
LAWLESS CREEK-TULAMEEN RIVER AREA
SIMILKAMEEN MINING DIVISION, B. C.
MARCH 21, 1979

ABSTRACT

The increasing value of gold has initiated a re-surgence in the re-examination of former "low-grade" gold mines. Some of these mines, at $35 per ounce gold, were marginal producers prior to 1940. Marginal connotes less than $15 per ton in gold. The Rabbitt Mine's average grade was reportedly about $11 per ton in gold. Hence it, as a number of other area mines, was quickly abandoned at the beginning of WW II, when government edicts decreed that marginal producers be shut down.

Present gold prices vary from six to eight times that of 1940, [$35 per ounce]. Industrial demand for gold competes with the traditional monetary demand. The discovery of new sources of gold has not kept up with the general demand for the yellow metal. Hence the reason for the re-examination and re-evaluation of old-time producers, whether they were marginal or not.

Geographic position, proximity to major transportation facilities and new recovery technologies all enhance the potential of these former "marginal" producers.

INTRODUCTION

The writer is familiar with the report area. It is a region where the writer has carried out evaluatory and assessment work, and exploration programs for various clients for some twenty years. The Rabbitt Mine was visited in 1976 and some preliminary exploration was done on the Rambler claim, immediately southwest of the Rabbitt.Laws Camp, northwesterly of the Rabbitt, was examined in 1977.

It is pertinent to this preliminary report on the Rabbitt Mine that some reference be made to both the Rambler and Laws Camp. The Rabbitt is about midway between the two properties. All three lie in a well mineralized zone which has been tectonically and orogenetically affected by the "Pacific Plate".

New knowledge about the orogeny of this part of the Coast Mountains-Interior Plateau transition zone indicates that the Lawless and Britton Creeks-Tulameen River junction is a very unique geological and metallogenic province.

RJ

GENERAL STATEMENT

The Rabbitt Mine was examined in 1976. The purpose of the examination was to determine the geological relationship between Law's Camp, the Rabbitt Mine, the Rambler Crown Grant [lot 1191], and the junction of Britton Creek and the Tulameen River.

This area is one of two known surface expressions of the Pacific Plate. The mineralization varies from microscopic diamonds [Camsell, 1914], to abundant magnetite on Lodestone Mountain. The writer includes copies of Minister of Mines reports about the area mainly to emphasize the uniqueness of the mineralization of the Rabbitt Mine and its immediate surroundings.

It is sufficient to indicate that the Mine is in a climatic, topographic and geographic location which would be conducive to an early start on re-examining the Mine and re-evaluating its potential.

At this juncture it would be redundant to report on climate, forestation, access and other pertinent details, generally outlined for a virgin territory. This is not the case for the Rabbitt Mine. Access is direct and simple. It is four hours by car from Vancouver, or 45 minutes from Princeton, B.C. The C.P.R. at Tulameen, four miles down the Tulameen River gives daily rail access to the area. Tulameen itself has been an established town since 1884.

GENERAL GEOLOGY

The general geology is outlined in the Xerox copies of various government bulletins since virtually no work has been done since 1929, no additional geological information applicable to the immediate vicinity of the Rabbitt Mine is available.

Proposed exploration outlined below may add to the present geological knowledge knowledge of the Rabbitt Mine area. However, recent investigations by D.C. Findlay, Geological Survey of Canada, 1969, and other workers indicate that the Rabbitt Mine, lying in direct contact with the "Tulameen ultramafic-gabbro complex" has a greater economic mineral potential than that realized by former operators.

PROPOSED PROGRAM

The property was visited in 1976. At that time the adits were accessible, but the writer didn't enter them. Many of the surface cuts and trenches were sloughed in. In the past the writer directed several surface exploration programs between the Rambler claim, the Rabbitt Mine and Law's Camp. The most dominant feature found was a zone of auriferous quartz veins, emplaced in a northeasterly direction from the Rambler to the Rabbitt.

En echelon faulting, to the right [easterly], disrupted an otherwise continuous vein zone some 150' wide and a minimum of 8,000' long. The faulted veins trace an arcuate path paralleling the contacts between Nicola age rock types and the Eagle granodiorite west of Lawless Creek.

Law's Camp, northwesterly of the Rabbitt, also lies in this arcuate zone. The sulfides here are dominantly lead and zinc, with copper, silver and gold occurring as accessory elements. Were this arcuate zone, bellying easterly, as traced by a bend in Lawless Creek, a straight line, then Law's Camp would lie northeasterly of the Rabbitt Mine. It is probable that at depth the Law's Camp mineralization does occur northeasterly of the Rabbitt. Studies of Landsat I and II imagery indicate this northeasterly trend. It appears, therefore, that en echelon faulting, regressing <u>westerly</u>, has placed the surface expressions of valuable mineralization westerly of the Rabbitt Mine. But at depth this mineralization should extend towards the Rabbitt Mine [easterly] rather than away from it [westerly].

It is therefore proposed that any open ground between Law's Camp and the Rabbitt Mine be staked as soon as possible.

Some diamond drilling should be done on any veins outcropping between the Rabbitt and the Rambler. However, the writer suggests that more could be accomplished by cat work on surface, plus surface drilling as a follow-up; and as much underground drilling as practicable. Any subsurface drilling would follow veins directly, in order to determine both grade and location at once.

Some funds should be reserved for rehabilitation of the two adits.

COSTS

Catwork will cost $65 to $80 per hour. The access to the adits, from the Tulameen road to the portals, will require some rehabilitation and rerouting. This work would facilitate the movement of equipment, such as drills, loaders, trucks and trailers. Some surface mining could begin as soon as the snow goes. A considerable amount of direct shipping, siliceous base ore could be made available by stripping and ripping. Hence the need for a cat with rippers.

It is suggested that about thirty hours would rebuild all present access to the Rabbitt Mine. A further fifty hours would result in the stripping of about 200 tons of shipping grade siliceous base gold ore. This ore is contained in a number of veins outcropping near the lower portal of the Rabbitt Mine.

Any surface-mined ore, when shipped to a smelter such as Asarco's Tacoma facility, would provide a small cash flow, a reliable metallurgical flow sheet and most importantly, a dry run of a potential open pit or open cut operation. The cost of surface mining some 200 tons would involve cat time, the use of a small gas drill [Copco Cobra], powder, a front end loader and at least one truck. The operator would also have to bear rail shipping costs to the smelter, and minor smelter charges.

A direct-shipping ore would be far more acceptable to any smelter if it were crushed to minus $\frac{1}{4}$ inch. There would be no quota or other restriction on the amount of ore accepted by the smelter. Therefore a crusher would have to be used. A simple rock or gravel crusher, such as those used in local gravel pits would be sufficient. It is recommended that this equipment be leased. Estimated cost of crushing may be about $1.00 - $1.50 per ton.

Although rail transport is available, trucking may be more economical. It is a 350 mile haul either to Tacoma or Kellog. Rates for bulk loads range about 15 cents per ton mile.

The following costs can therefore be expected:

Catwork, at $80/hour, total time 80 hours	$ 6,400
Loader and back-hoe, at $25/hour, total time 60 hours	1,500
Trucking, at 15 cents per ton mile, [200 x 350 x 15]	10,500

Trucking, supplies, general duty, etc. at $10.50/hour, at least 200 hours	$ 2,100
Surface drill [gas]rental, $20/day, 60 days	1,200
Diamond drill, surface, BQ wireline at $23/ foot, at least 1,000 feet	23,000
Diamond drill, underground, $16/foot, at least 500 feet	8,000
Camp, [mobile home type, e.g.: ATCO camp] $500 per month, four months	2,000
General labour, at $100/day/man, all found, four men for 100 days	40,000
Supervision on a retainer basis	5,000
Assays, Metallurgical tests, etc.	5,000
Camp supplies, including fuel, estimated at $32/day for 100 days	3,200
Pickup truck, 4 wheel drive, for general duty, $80/day, 100 days [truck could be obtained on lease-purchase basis]	8,000
Insurance, W.C.B., permits, licenses and performance bonds	5,000
Total estimated costs	$107,990
Contingency reserve, at 10% of estimated costs	11,000

Some funds should be provided for further staking and/or property acquisition. The writer cannot give a cost estimate for these items, because additional ground may or may not be required. The Gold Mount and Gail Gold claims appear to cover the best ground. However, if Law's Camp is available it should be acquired.

An estimated total expenditure of some $118,000 should result in a preliminary shipment of 200 tons of siliceous ore containing about 0.29 - 0.40 ounces gold per ton. Since no work was done after 1940, the workings will need some rehabilitation. The possible sale of gold ore mined during this initial stage will certainly help defray expected costs.

DISCUSSION

The Rabbitt Mine appears to be the locus of intensely disturbed rock types that underwent great tectonic, orogenetic and metallogenetic transformations. It is a few thousand feet east of the "Tulameen ultra-mafic-gabbro complex", [D.C. Findlay, G.S.C., 1969]. The Complex is late Triassic. Its main composition is dunite.

To the west of the Complex lies the Eagle Granodiorite, a batholithic member of the Coast Intrusions. It is later than the Complex and probably intruded it. Between the western edge of the Complex and the eastern edge of the Eagle intrusions is a belt of Nicola rocks, of pre-Eagle intrusion age, but also having been intruded by the Complex. Findlay indicates that both the Complex and the Eagle granodiorite may have had a common magmatic origin.

The two intrusions raised the Nicola metavolcanics and metasediments from their regional greenstone facies to epidote-amphibolite schists and calcareous green-schists. It is also suggested that the Nicola volcanics, [host rocks for the Highland Valley copper deposits] may have a co-magmatic relationship with the Complex and the Eagle granodiorite. Findlay also suggests that the Copper Mountain intrusions, some 20 miles southerly, originated from the same ancestral magma. It is to be noted that all the rock types mentioned are alkalic.

If the three major rock types in the Rabbitt Mine area are almost contemporaneous with each other, and the Nicola series was the oldest, then it suffered the greatest "squeeze". The ancestral magma of the Eagle granodiorite was not entirely devoid of silica. Hence when the Eagle rocks intruded both the Nicola rocks which did have some inherent silica present and the Tulameen Complex, which was devoid of silica, the intrusion resulted in emanations of quartz veins from the Eagle rocks into the Nicola rocks. The intrusion of the siliceous apophyses from the Eagle granodiorite into the Nicola series caused a more "pure" siliceous veination of the dunite of the Tulameen Complex. The Complex was probably prepared for the acceptance of silica [quartz] veins from the Eagle through the Nicola rocks by the orogeny created by the Eagle granodiorite.

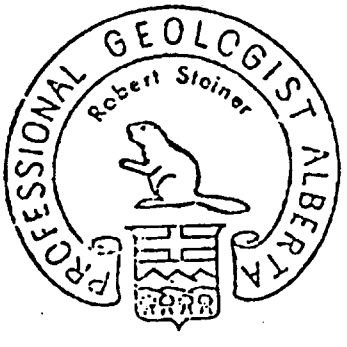
The gold mineralization in the Rabbitt mine is probably the direct result of major faulting resulting from the emplacement of the Eagle granodiorite. The faults were pathways for gold-bearing solutions emanating from the Eagle rocks. Most of the veins noted in the Rabbitt Mine are of the fissure filling variety.

Some 5,000' southwesterly of the Rabbitt, at the junction of Britton [Eagle] Creek and the Tulameen River is a large breccia pipe in the Tulameen Complex. This pipe carries abundant magnetite and chromite. Minor asbestos also occurs. Camsell also reported diamonds and platinum. The writer has seen both diamonds and platinum in placers derived from this pipe. The above noted minerals suggest high temperature mineralization, after the

emplacement of the Eagle granodiorite. Gold is a high temperature element. Findlay suggests that only the top of the zoned, non-stratiform Complex has been eroded. Thus, since much of the Complex is still present very close to the Rabbitt adits, then the known ore must extend to a considerable depth. The Rambler, some 2,000' below the Rabbitt, carries 0.25 - 0.40 ounces gold in 2' - 6' veins. However, the Rambler is closer to the Complex, and may not have the same "purified" and more gold-acceptable veins as the Rabbitt. In other words, the metamorphosed Nicola rocks and the dunite of the Complex may have acted as a filter and allowed only gold to pass into the Rabbitt veins. There is no arsenic and only minor copper and silver are present.

Research subsequent to Findlay's work suggests that the Complex is a surface expression of the "Pacific Plate". It is a member of a unique series of rocks found only in Alaska, the Central Urals, the Duluth area, South Africa and Rhodesia.

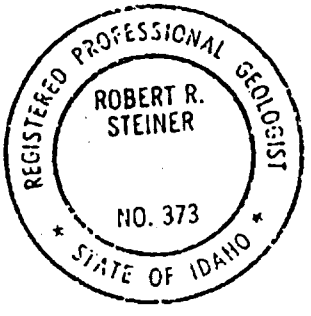
All these ultramafic complexes have a number of common features: gold, platinum, diamond and chromium minerals. The above noted world wide complexes also have significant amounts of uranium minerals, although South Africa is the only large scale shipper of this element. Some parts of the region surrounding the Rabbitt Mine are also radio-active.



Respectfully submitted,

Robert Steiner

Robert Steiner, P. Geol.



ROBERT STEINER, B.A., PROFESSIONAL GEOLOGIST

HEAD OFFICE:
371 - 56TH STREET
DELTA, B.C.
943-3987

FIELD OFFICE:
BOX 853
BLAIRMORE, ALBERTA

C E R T I F I C A T E

I, Robert R. Steiner, of 371 - 56th Street, Delta, B.C., Canada, do hereby certify that:

I am a 1950 graduate of the University of British Columbia, graduated with a B.A. degree in geology.

I am a member, in good standing, of the Association of Professional Engineers, Geologists and Geophysicists of Alberta, registered as a Professional Geologist; and further, that I am registered as a Professional Geologist, State of Idaho, U.S.A.

I have practised as a consulting geologist since 1957.

I have no interest in the property:

The Rabbit Mine, Lawless Creek-Tulameen River Area, Similkameen Mining Division, B.C.

I do not express any guarantee or warranty. The report is based on facts resulting from personal investigations, and that opinions expressed are my own, unless otherwise so noted.

DATED at the City of Vancouver in the Province of British Columbia this 21stday of March, 1979.

REGISTERED PROFESSIONAL GEOLOGIST
ROBERT R. STEINER
NO. 273
STATE OF IDAHO

PROFESSIONAL GEOLOGIST ALBERTA
Robert Steiner

Respectfully submitted,

Robert Steiner

Robert Steiner, P. Geol.
Alberta and Idaho.

A little downstream from the above the creek has cut through a small ultrabasic stock. In several places narrow but strong shear zones intersect this body, and these are locally mineralized with abundant pyrite and magnetite. The showing, however, seemed to have little economic significance.

Law's Mining Camp (23)

References: Ann. Repts., Minister of Mines, B.C.: 1908, p. 132; 1913, p. 236; 1916, p. 261; 1922, p. 107; 1926, p. 228; 1927, pp. 255-256; 1928, p. 269; 1929, p. 279. Camsell, 1913, pp. 162-166.

General Statement. Law's Mining Camp is situated on the west side of Lawless (Bear) Creek about 3 miles from Tulameen River. The principal claims on which most of the work has been done, fall into two groups, one including the St. Lawrence and St. George claims, and the other, the Liverpool. The first named claim was staked in 1900 by Charles L. Law and associates, and on it and the nearby St. George claim all the early work, consisting of two shafts, an adit, and open-cuts, was done. By 1916 Law had developed enough ore to ship a carload, which is reported to have returned him $600. Since that time, however, nothing further has been done. The second group of claims is owned by Louis Marcotte of Coalmont, who in 1922 sank a 60-foot shaft on the Liverpool claim. Encouraged by the results, he extended an adit, already started near the collar of the shaft, until, by 1926, it was 110 feet long. The following year a group of twelve claims, including the Liverpool, was taken over by Hope Range Copper Company, Limited, and exploration was continued on a small scale for the next 2 years. Since 1929 the claims have lain idle.

Geology. The rocks underlying both groups of claims are limestones interbedded with mica, dolomite, and talc schists, all sheared members of the Nicola group. A short distance to the west lies the Eagle granodiorite body, and it and apophyses and dykes from it have cut and metamorphosed the Nicola rocks. The ore, consisting of pyrrhotite, pyrite, chalcopyrite, small amounts of galena and sphalerite, and, in places, magnetite, replaces beds of limestone or their contact-metamorphosed parts consisting of garnet, epidote, and amphibole. In even those parts of the ore that consist of massive sulphides, however, the amount of chalcopyrite is not usually great, and the gold and silver values, although significant, are not high. The area is largely covered with drift, and exploratory work to date has not been sufficient to determine the size of the limestone bodies or the associated mineral deposits. It is, however, clear that the latter, though they may replace a limestone bed across its entire width, are more generally confined to a band along the hanging-wall side. Two samples were taken in 1929 by the Resident Engineer in a stub drift off the bottom of the shaft sunk on the Liverpool claim. One of these, across 6 feet, returned 0·06 ounce in gold and 0·50 ounce in silver a ton, and 1·26 per cent copper. The other, a general sample from the face of the drift, assayed: 0·14 ounce in gold and 0·60 ounce in silver a ton, and 1·31 per cent copper. This ore consists of massive pyrite containing streaks of chalcopyrite.

GRASSHOPPER MOUNTAIN GOLD DEPOSITS

Grasshopper Mountain, which lies in the angle between Lawless Creek and Tulameen River, is traversed by the broad zone of sheared Nicola rocks that follows along the northeast side of the Eagle granodiorite body. The southwest half of the mountain is, however, composed of rocks of the Olivine Mountain ultrabasic body. Mineral deposits occur within the sheared Nicola rocks as quartz veins or as breccia zones in which quartz veinlets constitute up to 75 per cent of the vein matter. The wall-rocks of most of these are carbonatized lavas, but in the Sunrise group they are argillite and limestone. The principal

metallic mineral is pyrite, but chalcopyrite occurs in small amounts and, more rarely, galena, sphalerite, and hematite. Gold is present, but does not appear to be associated particularly with these minerals, and much of the vein is barren of precious metals. Much of the gold occurs in pockets in which native gold and a telluride mineral, probably petzite, can be seen. It seems probable that the gold-bearing solutions were introduced separately from those that deposited the quartz and sulphides. On the Sunrise claim gold seems to be associated with banded, comb quartz, which is apparently younger than the high-temperature, glassy quartz forming most of the veins. It is, therefore, probable that the gold in all the deposits is of somewhat later origin than the veins themselves and the sulphides they carry.

Rabbitt Property (25)

References: Ann. Repts., Minister of Mines, B.C.: 1938, special report; 1940, p. 60.

Location and History. The Rabbitt property, owned by P. and T. Rabbitt of Tulameen, is at an elevation of about 4,000 feet on the northeast slope of Grasshopper Mountain overlooking Lawless Creek at a point a mile from its junction with Tulameen River. It was located in 1938 by the Rabbitt brothers, who the same year shipped 5 tons that returned $72 in gold. In the following year Grasshopper Mines, Limited, was incorporated to work the property, and in 1940, 1,361 tons of ore was mined from which 924 ounces of gold and 514 ounces of silver were recovered.

Geology. The mineral deposits occur in volcanic rocks of the Nicola group, which are traversed by a wide, intensely sheared zone that follows the east margin of the Eagle granodiorite. The situation is further complicated on the Rabbitt property by the intrusion of the Olivine Mountain ultrabasic body, the contact of which lies about a mile southwest of the workings. On the property are several quartz veins with a general northerly strike and a steep dip. The veins are composed of glassy quartz, and vary in width from a few inches to 6 feet, averaging 3 or 4 feet. They are not composed entirely of quartz, the wider sections becoming lodes rather than veins and consisting rather of highly brecciated wall-rock cemented with quartz, which constitutes around 75 per cent of the vein material. The volcanic rock forming the fragments has been largely carbonatized, and a similar carbonatization extends into the walls of the veins for distances up to 10 feet. The quartz carries free gold, an undetermined telluride mineral, chalcopyrite, pyrite, galena, and sphalerite, but all in very small amounts, and much of the veins is quite barren.

Adits and a deep surface cutting have developed a section 85 feet long of the vein on which most work has been done. It was from this section that most of the ore had been shipped. At the northern end of this section the vein swings from north 45 degrees east to about north 25 degrees west for about 275 feet. It varies from 1 foot to 6 feet in width, but is reported to be low grade where it is widest. Several other veins have been exposed by open-cuts, but the average values in them are low.

Old Glory Group (25)

The Old Glory group, owned by R. J. Marks of Tulameen, lies just to the southeast of the Rabbitt property and at about the same elevation.

At the time of the writer's visit in 1939 the showing had only recently been discovered, and the only exposure was in a single small open-cut. This was made in a zone of crushed quartz and carbonatized volcanic rock about 10 feet wide. Apparently a vein or breccia zone, similar to those on the properties described above, has been crushed as a result of more recent fault movements. No mineralization of importance was seen.

reason for this study was that these rocks are believed to be the source of the platinum in the Tulameen placers; a comparison was made of these rocks and similar formations in the great platinum placer-fields of Russia. Dr. Poitevin's report appears in 1923 Summary Report, Part A, of the Geological Survey, Canada, from which the following excerpts are taken:—

"*Chemical Composition of Platinum.*

"Native platinum found in dunite, pyroxenite, and placer deposits is not pure metal. It is essentially a solid solution of platinum and iron or of platinum and palladium, to which iridium, rhodium, osmium, copper, gold, silver, nickel, cobalt, and manganese are commonly added.

"*Primary Platinum Deposits.*

"After studying the Uralian and other platiniferous areas for more than twenty years Professor Dupare concluded that three typical primary deposits may be distinguished:—

"(1.) A dunite type in which the mother-rock of platinum is dunite surrounded by successive zones of koswite, pyroxenite, and gabbro. This is the classic type, and wherever dunite is observed with its marginal zones of pyroxenite and gabbro it is always more or less platiniferous. The great placer deposits of Taguil, Iss, Koswinsky, etc., were derived from such type of rocks and so were the Tulameen placers.

"(2.) A pyroxenite type in which the mother-rock of platinum is practically a koswite. This pyroxenite may be associated with gabbro but never with dunite. Even in the Urals such occurrence is rare. Placer deposits derived from this type or primary ground are always poorer than the dunite type and their occurrence does not necessarily mean the presence of platinum.

"(3.) A peridotite type in which the rock is in all places a peridotite carrying more or less large quantities of rhombic pyroxenes and some accessory monoclinic pyroxenes. These peridotites pass laterally to dunite, but rarely to true pyroxenites. They mostly contain brownish spinels and chromite grains. Moreover, these peridotites may be serpentinized to such an extent that none of the primary minerals can be recognized. Rocks of this type occur at Khrebet-Salatim, northern Ural mountains, Russia; and at La sierra de Ronda, Andalusia, Spain. According to Professor Dupare, placer deposits derived from such rocks are not sufficiently known to allow any conclusions to be drawn as to their commercial value.

"Although native platinum is not commonly observed in massive dunite, several localities in the Urals are known where it was found in-place. In some cases it was observed either as minute, isolated octahedra 1 to 3½ millimetres in diameter that are associated with more recent olivine crystals, or as minute segregations. Native platinum may also occur in dunite as large, compact masses older than the associated olivine. It has also been recognized as inclusions in chromite. In many cases when the chromite is removed by a bisulphate of carbonate fusion the remaining platinum forms a spongy mass. Platinum is a product of magmatic crystallization formed later than chromite.

"Dr. Wyssotaky gathered a large number of dunite and chromite specimens from the primary outcrops of Taguil, Weressowy, Kamenouchky, etc., from which twenty-five samples of all descriptions were prepared and submitted for assay. Twenty-two of them gave negative results and the remaining three revealed very small quantities of platinum. Similar results were obtained in assaying the Tulameen dunites.

"When searching for native platinum in dunite or serpentinized areas, it should be remembered that this alloy has an erratic distribution and that negative assay results may be the rule in either rich or poor primary platiniferous ground.

"About twenty primary platinum deposits are known in Ural mountains. Most of them are located in chromite schlieren; a few are in dunite. Although small bonanzas were found at times, experience showed that systematic mining of primary ground was impracticable.

"No primary platinum deposits have yet been recorded from Tulameen map-area. This is probably due to the removal in Pleistocene time of preglacial dunitic debris from the gulches.

"*Placer Deposits.*

"The richness of platiniferous placers derived from dunite and its associated rocks is governed by several factors, such as the area of primary rocks exposed (especially the dunite), the length of time during which the rocks were submitted to destructive agencies, and, to a certain degree, to the abundance and volume of chromite segregations (since platinum is associated with chromite). The preservation of accumulated gravels, sand, and pay-dirt from

subsequent disturbances such as glacial action is a factor among others that may influence the economic value of placer-grounds.

"During post-Tertiary time special climate conditions favoured the erosion of the Ural rugged mountain system; hence the rapid disintegration of ultrabasic rocks and the formation of huge platinum placers. Continental ice which invaded European Russia never developed in the Urals and the placers already formed were not disturbed.

"In the Urals, to each primary dunite-outcrop corresponds a large volume of platiniferous river-gravels.

"From the primary dunite-outcrop of Taguil 65 miles of workable platiniferous gravels are distributed along the valleys of the Martian, Wyssim, and Tschauch rivers, Taguil area, Russia.

"From the primary outcrops of Weressowy and Swelti-Bor were derived 125 miles of platiniferous gravels distributed along Iss river and its tributaries; from the primary outcrops of Kamenouchky, 30 miles of river-gravels; from the Sosnowsky, 28 miles of river-gravels; from Koswinsky-Kamen, 28 miles of river-gravels.

"The above list does not include all the smaller placers, and yet more than 276 miles of platiniferous gravels along the rivers in the Urals have been actually exploited or are being worked.

"The topography of Tulameen map-area is distinctly of the plateau type. With the exception of Tulameen river, which divides the main dunite-exposure into two parts, the drainage is limited to a few creeks. The disintegration of basic rocks was accordingly not so extensive as in the Urals. Tulameen valley was overrun by local glaciers, and thus certain parts of the valley, which probably at one time contained the richest platiniferous deposits of the district, were severely glaciated and the platiniferous gravels left behind greatly impoverished.

"Before glaciation Tulameen river and its tributaries probably had more than 30 miles of platiniferous gravels, but whereas the gravels of the Urals were spread in broad valleys, these of Tulameen were deposited in narrow, almost canyon-like channels.

"From 1821 to 1915 (ninety-two years) the total platinum production of the Urals is officially given at 14,479 poods, corresponding to 231,664 kilos of approximately 8,120,000 troy ounces. According to Professor Duparc, these figures are low because they do not include the large amount of platinum stolen by the labourers or the professional thieves. At Taguil alone it has been proved that only half the output of the placers reached the owners.

"The total platinum production of Tulameen map-area is officially given as 10,000 oz., but it is generally conceded that the output of the placers was more likely to have been 20,000 oz.

"The above notes will explain why the placers of Tulameen are smaller, poorer, and cannot be compared with the Uralian placers, although the primary dunite-outcrop of Tulameen was as rich in platinum as any of the Uralian dunite exposures of the same size.

"*Conclusions.*

"The following detailed study of Olivine and Grasshopper mountains, Tulameen map-area, shows that the primary platiniferous rocks of Tulameen are of the Uralian type. The area of dunite and pyroxenite exposed is smaller than at Taguil, but is quite comparable in size and otherwise with several other Uralian occurrences. This petrographic comparison adds strength to Duparc's statement that placer deposits derived from rocks of the Uralian type are always platiniferous. The present investigation does not change any conclusions arrived at by Camsell as to the economic future of Tulameen. The placers of that district were fairly prospected and up to date probably 20,000 oz. of platinum has been recovered from them, but unfortunately the greater part of this output was disposed of when platinum was at its lowest price.

"The basic rocks from which the platinum placers of Russia are derived were proved by Professor Duparc to constitute thick sills. These sills were in many places sufficiently truncated by erosion to expose the dunite and its consanguine associates. Thus, for 300 miles along the east flank of the Urals, dunite is to be found outcropping at intervals. If, as there is every reason to believe, the Tulameen irruptives are similar in form, it is to be expected that they are distributed along a line somewhat parallel to the Coast range. Olivine and Lodestone mountains are the only two separate dunite-outcrops of the same age known to exist in the part of British Columbia, but it is most probable that other exposures are likely to be found, especially south of Tulameen map-area, where the country is not so heavily covered by younger volcanics as it is north of Olivine mountain.

"Although southern British Columbia is in no way an ideal territory to look for placer deposits, prospecting for primary platiniferous dunite in that direction may nevertheless lead to a possible discovery similar to that of Tulameen, which when at its best would have been a good business proposition had native platinum then been worth $122 an ounce instead of $2 or $3.

"Briefly summarized, the following suggestions may be of value and assistance to those interested in prospecting for native platinum.

"Prospecting should first be carried on preferably in an unglaciated area, to locate basic irruptives having the petrographic characters outlined in the following pages. When such an area is located, the gravels of those parts of old or recent streams traversing it should be very carefullly examined. Native platinum in many cases is extremely fine and it may be overlooked by expert panners. This will occur especially if the platinum is magnetic, as the metal will then adhere and be carried by magnetite, which generally forms a good percentage of the heavy concentrates. No dunite or serpentinized area should be abandoned as being non-platiniferous because any assay of some specimens failed to give positive results."

Dr. Poitevin's interesting report shows a distinct similarity between the Russian platinum-bearing rocks and those of the Tulameen River area, so that those intending to search for platinum might do well to familiarize themselves with the Tulameen variety before starting on a prospecting expedition.

Granite Creek.

Swan Lease. This old placer-ground, situated about 2 miles up Granite creek from its mouth, has been operated by the Hematite Iron and Gold Mines Development Company, with offices in Seattle, Wash. A tunnel was driven 350 feet from Granite creek north-west and a 60-foot shaft sunk from the tunnel in an endeavour to strike bed-rock near the old workings, but without success. The vertical walls, 66 feet wide and striking in a north-east direction, encountered in the tunnel point to an old river-channel and possibly a canyon, where there seems to be little likelihood of finding pay-gravel. A new tunnel was commenced in September from the Tulameen river near Coalmont and distant about 4,000 feet from the old *Swan* property workings. This tunnel has possibilities of success as far as the pay-gravels of the Tulameen river are concerned, but it is probably too low and too far distant to be of any service for extracting the old *Swan* claim gravels. It is estimated that this 4,000-foot tunnel, if excavated, would reach a point 100 feet below the bottom of the shaft in the *Swan* lease tunnel.

If the outlet of this buried channel could be discovered on the Tulameen river there would be a better chance of finding pay-gravel. It seems advisable, therefore, to continue the new tunnel until bed-rock is reached and then swing it along the south bank of the Tulameen river with the idea of picking up the gravels deposited near the outlet of the *Swan* channel.

Bush Lease. A syndicate of four men financed this lease, which is situated about 4 miles up Granite creek. During the low water a pipe-line was constructed from Holmes creek, so that hydraulic operations could be carried on as soon as the spring run-off commenced. This lease is situated on the east side of Granite creek and Holmes creek is on the west, so that the pipe-line had to be slung across Granite creek.

Princeton Mining and Development Co. This company's property, situated 4 miles east of Princeton and mentioned in the 1923 Annual Report, was developed on the upper and lower levels during 1924. The lower tunnel, driven through the quartz-porphyry dyke for about 150 feet, encountered andesite, or the same formation that is ore-bearing in the upper levels. The fractures in the andesite are slightly mineralized close to its contact with the porphyry, but no regular vein had been discovered at the time of examination. The upper tunnel was also driven and the same class of ore encountered.

The new 250-ton ore-bin was finished and a spur 400 feet long completed from the Great Northern Railway, so that the property, with compressor, boiler, and all necessary mining equipment, is ready to commence operations. The higher price of copper will help this mine and no doubt shipments will be made shortly.

Princeton B.C. Colliery Co., Ltd. A new shaft was sunk on this company's property on the west side of the Similkameen river, adjoining the town of Princeton, and a good seam of coal developed. The new shaft was found necessary because the No. 1 on the east side of the river caught fire some years ago and was considered dangerous. No. 2 shaft, still farther east, was not considered satisfactory owing to severe

Mogul	Greenwood	C. Sherdahl and O. Sherdahl, Westbridge						Gold, silver.
North Star	Jewel Lake	Greenbridge Gold Mines, Ltd., Calgary, Alta.						Gold, silver.
Number Seven	Boundary Falls	W. E. McArthur, Greenwood						Gold, silver, lead.
Providence	Greenwood	W. E. McArthur, Greenwood						Gold, silver, lead, zinc.
Rambler	Beaverdell	J. J. Kennedy, Sec., R.S.K. Mining Syndicate, Beaverdell						Silver, lead, zinc.
Roadside	Westbridge	R. Gaustin, Westbridge						Silver, gold.
Sally	Beaverdell	Sally Mines, Ltd., Penticton						Gold, silver, lead, zinc.
Tiger	Beaverdell	J. S. Nordman, Beaverdell						Silver, lead, zinc.
Waterloo	Edgewood	J. N. McLeod, Edgewood						Silver, lead, zinc.
Wellington	Beaverdell	Beaverdell-Wellington Syndicate, Greenwood						Gold, silver, lead, zinc.
W.S. Group	Westbridge	S. G. Peterson, Westbridge						Gold, silver.
Bathfield Silver Lode	Summerland	G. F. Shaw and F. Semenoff, Penticton						Gold, silver, lead, zinc.
Canty	Hedley	Canty Gold Mines, Ltd., Hedley						Gold, silver.
Empire	Oliver	Mowat and Kerr, Victoria						Gold, silver.
Fairview Amalgamated	Osoyoos	Fairview Amalgamated Gold Mines, Ltd., Vancouver	150	150	*150	Aug., 1935	Amalgamation, blanket tables, flotation	Gold, silver, copper, lead.
Gold Standard	Oro Fino Mountain	Gold Standard (Fairview) Mining Co., Ltd., Penticton						Gold, silver.
Grandoro	Oliver	J. P. Wukelick, leaser, Penticton	20	20	†20	Jan., 1935	Amalgamation; cyanidation	Gold, silver.
Hedley Mascot	Hedley	Hedley Mascot Mines, Ltd., Vancouver	175	175	175	May, 1936	Flotation	Gold, silver, copper.
Kelowna Exploration	Hedley	Kelowna Exploration Co., Ltd., Hedley	250	250	250	Sept., 1934	Cyanidation; flotation	Gold, silver, copper.
Lucky Strike	Salmo	Stuart Howard, Oliver						Gold, silver.
Monashee	Lumby	Monashee Development Co., Ltd., Vancouver		50	*50	Oct., 1939	Flotation	Gold, silver.
Mak Siccar	Osoyoos	A. Whitehead and P. Davedoff, Penticton						Gold, silver.
Osoyoos	Osoyoos	Osoyoos Mines of Canada, Ltd., Calgary, Alta.	75	150	150	Mar., 1936	Table concentration; flotation; cyanidation	Gold, silver, copper.
Silver King	Oliver	J. Pearson *et al.*, Oliver						Gold, silver.
Smuggler	Oliver	H. C. Boumstead, Oliver						Gold, silver.
Yellow Valley	Oliver	R. F. C. Stewart, Penticton						Gold, silver.
B.C. Gold	Tulameen	Rabbit Bros., Tulameen						Gold, silver.
Carusa	Princeton	Frank Carusa, Princeton						Copper, gold, silver.
Copper Mountain	Allenby	Granby Con. M.S. and Power Co., Vancouver	3,000	4,000	4,000	1920	Flotation	Copper, silver, gold.
Red Buck	Princeton	Red Buck Mines, Ltd., Princeton		100	†100	Dec., 1938	Flotation	Copper, silver, gold.
Silver King	Tulameen	P. Y. Porter, Murrayville						Silver, lead, zinc.
Silver Moon	Princeton	E. Michel *et al.*, Princeton, and C. Nelson, Princeton						Gold, silver.
Amazon	Woodbury Creek	J. R. Tuikess, Kaslo						Silver, lead, zinc.
Caledonia	Blaylock	Geo. E. McCready, Kaslo						Silver, gold, lead, zinc.
Highland Surprise	Retallack	Highland Surprise Gold Mines, Ltd., Vancouver						Gold, silver.
Charleston	Retallack	A. J. Harris, Kaslo						Silver, lead, zinc.
Krao	Ainsworth	Krao Mines, Ltd., Kaslo						Silver, lead, zinc.

* Idle at present. † Intermittent.

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B. C. Minister of Mines.

SIMILKAMEEN RIVER AREA.

HEDLEY.

Kelowna Exploration Co., Ltd. Company office, Room 2402, 19 Rector Street, New York, N.Y.; mine office, Hedley, B.C.; W. Adams Kissam, Chairman; Sewell T. Tyng, President; John W. Mercer, Treasurer; O. P. Ebeling, Secretary; W. C. Douglass, Mine Manager. This is a private company, operating the *Nickel Plate* mine at Hedley. The underground haulage, storage, and loading facilities at the top of the main haulage winze were considerably improved during the year. Development consisted of 4,602 feet of crosscutting and drifting, 60 feet of winzing, and 380 feet of raising. A total of 82,660 tons of ore was milled, yielding 5,591 tons of concentrates. A crew of 179 men was employed at the mine.

Hedley Mascot Gold Mines, Ltd. Company office, 1132 Marine Building, Vancouver, B.C.; mine office, Hedley, B.C.; Wendell B. Farris, President; V. J. Creeden, Secretary; W. S. Charlton, Treasurer; C. W. S. Tremaine, General Superintendent. Capital: 3,000,000 shares, $1 par; issued, 2,264,130. The property of this company is located 1 mile north of Hedley. A raise has been driven to connect the 4,300 level with the 4,800 level. From the raise exploratory development-work has been done at intermediate levels. Ore from the 4,300 level is raised by surface aerial tram from the portal of this level to one portal of the 4,800 level. On the 4,800 level the ore is transported to the main portal. At this main portal is located the top terminal of the main surface aerial tramway to the mill.

During the past year a cyanide plant has been installed to operate in conjunction with the flotation-mill. Several buildings have been constructed for use as offices, shops, and storage-room.

Development during the year consisted of 423 feet of crosscutting, 1,330 feet of drifting, 1,788 feet of raising, and 17,070 feet of diamond-drilling. A total of 6,115 tons of concentrates yielded 22,819 oz. of gold and 2,829 oz. of silver. An average crew of 133 men was employed.

Canty Gold Mines (Hedley), Ltd. Company office, 1132 Marine Building, Vancouver, B.C.; mine office, Hedley, B.C.; Wendell B. Farris, President; V. J. Creeden, Secretary; W. S. Charlton, Treasurer; R. H. Stewart, Managing Director; Charles Bishop, Mine Superintendent. Capital: 3,000,000 shares, $1 par; issued, 2,172,788. The property of this company is about 2 miles east of the *Nickel Plate* mine. During the past season the mine was dewatered. Work of exploratory nature was confined largely to the No. 1 drift level.

Ore from the *Canty* was treated in the *Mascot* mill. To permit haulage by truck it was necessary to improve the road from the *Canty* to a point above the *Mascot* mine. From this point the ore was transferred by a short aerial tram to the top terminal of the *Mascot* tramway.

TULAMEEN.

Grasshopper Mine. Lloyd Kissick, Superintendent. This company operates the property known generally as the "Rabbitt Group," located 8 miles from the town of Tulameen, on the west bank of the Tulameen River. The property is accessible by good road from Tulameen. The property was located by the Rabbitt Bros. in 1938. Several truck-loads of selected ore were mined from the surface and shipped during that year. The property was optioned and mining machinery was installed. During 1939 and 1940 two adits were driven on the vein for distances of 110 and 336 feet respectively. A stope was carried from the upper, No. 1, level to the surface. A raise was driven from No. 2 level. Operations were suspended in November, 1940.

Development consisted of 110 feet of crosscutting, 1,150 feet of drifting, and 350 feet of raising. A total of 1,361 tons of ore was mined, yielding 924 oz. of gold and 514 oz. of silver.

An average crew of eight men was employed.

Goldfinch	Greenwood	Greenwood	E. Larsen *et al.*, Greenwood		Gold, silver, lead, zinc.
Golden Crown	Phoenix	Greenwood	W. E. McArthur & Son, Greenwood		Gold, silver, copper.
Golden Eagle	Greenwood	Greenwood	A. F. Crowe, Grand Forks		Silver, gold, copper.
Granby	Phoenix	Greenwood	W. E. McArthur, Greenwood	Concentration	Gold, silver, copper.
Highland Bell	Greenwood	Greenwood	Highland Bell, Ltd., Creston		Silver, gold, lead, zinc.
Highland Chief	Beaverdell	Greenwood	Highland Chief, Ltd., Kelowna		Silver, lead, zinc.
Homestake	Beaverdell	Greenwood	Homestake Syndicate, Grand Forks		Gold, silver, lead, zinc.
Humming Bird	Greenwood	Greenwood	C. A. Anderson, Grand Forks		Gold, silver, zinc.
Jewel	Jewel Lake	Greenwood	Jewel Leasing Syndicate, Greenwood		Gold, silver.
Klondyke	Bridesville	Greenwood	S. Berglund, Rossland		Silver, gold.
Lakeside	Greenwood	Greenwood	N. Boris, West Grand Forks		Silver, gold.
Lakeside	Greenwood	Greenwood	J. S. and S. J. Kleman, West Grand Forks		Gold, silver.
Number Seven	Boundary Falls	Greenwood	W. E. McArthur *et al.*, Greenwood		Gold, silver, lead, zinc.
Providence	Greenwood	Greenwood	Providence Mine Syndicate, Greenwood		Silver, gold, lead, zinc.
Rosemont	Beaverdell	Greenwood	Highland Bell, Ltd., Creston		Gold, silver.
Sally	Beaverdell	Greenwood	Leasers from Sally Mines, Ltd., Penticton		Silver, gold, lead, zinc.
Union	Granby River	Greenwood	W. E. McArthur, Greenwood		Gold, silver.
Wellington	Beaverdell	Greenwood	A. J. Morrison, Greenwood		Silver, gold, lead, zinc.
Wiarton	Camp McKinney	Greenwood	Highland Bell, Ltd., Creston		Gold, silver, lead, zinc.
Yankee Boy	Grand Forks	Greenwood	W. Schwarz, J. S. and S. J. Kleman, *et al.*, Grand Forks		Gold, silver.
Divine	Oliver	Osoyoos	W. Bousfield, Oliver		Silver, gold.
Empire	Oliver	Osoyoos	Cluff, Ewers & Smither, Oliver		Gold, silver.
Gold Standard	Oro Fino Mountain	Osoyoos	A. Whitehead and D. Dollemore, Princeton		Gold, silver.
Grandoro	Oliver	Osoyoos	J. P. Wukelick, Penticton		Gold, silver.
Grandview	Oliver	Osoyoos	W. R. Trombley, Greenwood		Gold, silver, copper.
Gypo	Oliver	Osoyoos	R. C. McKay, Oliver		Gold, silver.
Hedley Mascot	Hedley	Osoyoos	Hedley Mascot Mines, Ltd., Vancouver	Flotation	Gold, silver, copper.
K.C.M.	Penticton	Osoyoos	Kleman Bros. and A. Kabatoff, Penticton		Gold, silver.
Morning Star	Osoyoos	Osoyoos	O. Carlson and R. McKay, Oliver		Gold, silver.
Nickel Plate	Hedley	Osoyoos	Kelowna Exploration Co., Ltd., Hedley	Cyanidation; flotation	Gold, silver, copper.
Osoyoos	Osoyoos	Osoyoos	J. W. Boothe and D. Dollemore, Oliver		Gold, silver.
Silver King	Oliver	Osoyoos	L. T. Levasseur and Richard Rowe, Nelson		Gold, silver.
Sunnyside	Penticton	Osoyoos	E. C. Rice and T. J. Kohlman, Penticton		Gold, silver.
B.C. Gold Group	Tulameen	[illegible]	Rabbitt Bros., Tulameen		Gold, silver.
Copper Mountain	Allenby	Similkameen	Granby Cons. M.S. and Power Co., Vancouver	Flotation	Copper, gold, silver.
Caledonia	Blaylock	Ainsworth	G. E. McCready, Kaslo		Silver, lead, zinc.
Highland Surprise	Retallack	Ainsworth	Highland Surprise Gold Mines, Ltd., Vancouver		Gold, silver, lead, zinc.
Revenue	Zwicky	Ainsworth	O. Kahle and E. Garrett, Kaslo		Silver, lead, zinc.
Whitewater	Whitewater	Ainsworth	C. J. Garrett, Retallack		Silver, gold, zinc, lead.
Sullivan	Kimberley	Fort Steele	Consolidated Mining and Smelting Co. of Canada, Ltd., Trail	Flotation	Silver, lead, zinc.
Monarch and Kicking Horse	Field	Golden	Base Metal Mining Corporation, Ltd., Toronto	Table concentration; flotation	Silver, lead, zinc.

Origin of the Tulameen ultramafic-gabbro complex, southern British Columbia[1]

D. C. FINDLAY
Geological Survey of Canada, Box 969, Whitehorse, Yukon Territory

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The Tulameen Complex is a composite ultramafic-gabbroic intrusion that outcrops over 22 sq. mi. (57 km²) in the Southern Cordillera of British Columbia. The complex intruded Upper Triassic metavolcanic and metasedimentary rocks of the Nicola Group, and on the basis of geologic relations and a K–Ar age determination (186 m.y.) is tentatively dated as Late Triassic.

The principal ultramafic units — dunite, olivine clinopyroxenite, and hornblende clinopyroxenite — form an elongate, non-stratiform body whose irregular internal structure is best explained by deformation contemporaneous with crystallization of the rocks. The derivation of the ultramafic rocks is attributed to fractional crystallization of an ultrabasic magma. The gabbroic mass, which consists of syenogabbro and syenodiorite, partly borders and partly overlies the ultramafic body and was apparently intruded by it.

The ultramafic and gabbroic parts of the complex probably formed from separate intrusions of different magmas, but the two suites have sufficient mineralogical and chemical features in common to indicate an ultimate petrogenic affinity of the magmas. Comparison of the Tulameen rocks with nearby intrusions of the same general age, in particular the Copper Mountain stock, suggests that they are members of a regional suite of alkalic intrusions. The possibility is also raised that these intrusions may be comagmatic with the Nicola volcanic rocks.

Introduction

An intrusive complex of ultramafic and gabbroic rocks exposed near Tulameen in south-central British Columbia (Fig. 1) has features differing from most ultramafic-mafic intrusions in the Canadian Cordillera. As far as known, most of the latter are alpine-type peridotites (e.g. Armstrong 1949; Aitken 1959; Leech 1953; Little 1949, 1960; Lord 1948; Tipper 1960; Gabrielse 1963), whereas the Tulameen Complex is similar to a group of distinctive ultramafic intrusions occurring in the panhandle region of Alaska (Taylor and Noble 1960; Ruckmick and Noble 1959; Irvine 1959, 1963; Walton 1951) and in the Ural Mountains of U.S.S.R. (Vorobeva *et al.* 1962; Zavaritsky and Betehktin 1937; Noble and Taylor 1960). The latter intrusions are characterized by a concentric or zonal arrangement of rock units, the absence of orthopyroxene and plagioclase, and a pronounced defficiency in silica. Largely because of the first characteristic they have been termed "zoned intrusions" (Nobel and Taylor 1960).

In Canada, the Tulameen Complex appears to be one of the few known representatives of the zoned intrusion family, although more will probably be recognized as detailed studies of Canadian ultramafic rocks progress.[2,3] The ultramafic rocks of the Tulameen Complex are nearly identical to those of the Alaskan intrusions noted above, but the associated gabbroic rocks are significantly different. In the Alaskan bodies, the gabbroic rocks have tholeiitic characteristics and include olivine gabbro, norite, and diorite. At Tulameen, the gabbroic suite is potassium-rich and, like the ultramafic suite, silica-undersaturated. These features, apparently unique amongst known North American zoned intrusions, have prompted the hypothesis advanced in this paper that the Tulameen gabbroic and ultramafic rocks are genetically linked as the products of the same intrusive cycle. This interpretation is contrary to that advanced by other workers for certain of the Alaskan occurrences, and is apparently similar to interpretations proposed by Russian authors for some of the Uralian intrusions.

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[1]Canadian contribution to the International Upper Mantle Project No. 156.

[2]An ultramafic body in the Aiken Lake area, B.C., described by Roots (1954) and presently being investigated in detail by T. N. Irvine has similar characteristics to the Alaskan and Tulameen intrusions (T. N. Irvine, personal communication).

[3]The Pacific Nickel body near Hope, B.C., described by Aho (1956) and notable for its associated nickel-copper deposits has been likened to zoned intrusions by some authors (e.g. Ruckmick and Noble 1959). However, the presence of orthopyroxene as a major constituent in the ultramafic and dioritic rocks of this body, as well as other features, suggests that it is more probably a variant of the 'normal' Cordilleran alpine-type intrusion.