



**HARRISON LAKE PROJECT
(92H/5, 12; 92G/9)**

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INTRODUCTION

The northwest-trending Harrison Lake fracture system, approximately 100 kilometres east-northeast of Vancouver, is associated with regional hot spring activity and sporadic gold mineralization. Most of this gold was found before the turn of the century; it includes numerous occurrences and several small producers such as the Providence (Mineral Inventory 92H/NW-30) and RN (Mineral Inventory 92H/SW-92) mines. Since the 1930's, extensive parts of the Harrison Lake area have not experienced much exploration activity or regional geological mapping.

In 1981-1982 Rhyolite Resources Inc. started drilling some gold-bearing quartz-sulphide veins at Doctors Point, on the western shore of Harrison Lake. The results of this work led to a large staking rush, as some companies realized that areas adjacent to the Harrison Lake fracture system had favourable potential for both epithermal and mesothermal gold mineralization. Part of this activity involved the re-evaluation of some former mines and occurrences in the area; this included work by Abo Oil Corporation on the disused RN gold mine (also known as the 'Geo' occurrence, Mineral Inventory 92H/SW-92), situated approximately 4 kilometres northeast of Harrison Hot Springs.

The current British Columbia Ministry of Energy, Mines and Petroleum Resources' project was initiated in response to the widespread exploration interest in the area. The project involved the following:

- (1) Geological mapping at a scale of 1:5 000 of a 3-square-kilometre area in the Doctors Point vicinity (Fig. 13). This mapped area includes all the surface mineralized gold showings discovered and drilled to date by Rhyolite Resources Inc.
- (2) Sampling the mineralized veins and unmineralized host rocks for precious metal assaying, whole rock and trace element analyses, and thin-section studies.
- (3) Geologically mapping the immediate vicinity of the disused Providence mine (Mineral Inventory 92H/NW-30) at a scale of 1:1 000 (Fig. 16). This included detailed mapping of the main (No. 3) adit on the property (Fig. 17) and collecting mineralized and host rock samples for analyses and thin-section examination.
- (4) Reconnaissance geological mapping at a scale of 1:25 000 of the area between the Providence mine and Doctors Point.
- (5) A brief examination and sampling of the disused RN gold mine (Mineral Inventory 92H/SW-92) which is currently being re-evaluated by Abo Oil Corporation.

REGIONAL GEOLOGY

The Harrison Lake fracture system forms a major, southeasterly trending dislocation over 100 kilometres in length, which in parts passes along, and parallel to, Harrison Lake. The system separates highly contrasting geological regimes (Roddick, 1965; Monger, 1970). To the northeast, the rocks include well-deformed

supracrustals of the Pennsylvanian to Permian Chilliwack Group (Monger, 1966), as well as highly foliated gneissic rocks and some younger granites. By contrast, the rocks on the southwestern side of the fracture are generally younger, are less deformed, and have suffered lower metamorphic grade; they include a variety of volcanic, volcanoclastic, and sedimentary rocks, as well as intrusive granitic rocks and migmatites. These supracrustals are separable into a number of different groups of Jurassic/Cretaceous age. The most important regarding gold mineralization are the Fire Lake and Harrison Lake Groups which are well developed respectively northwest and southwest of Harrison Lake. The Fire Lake Group (Roddick, 1965) comprises a variety of coarse to fine-grained sedimentary rocks with lesser greenstone volcanic rocks, while the Harrison Lake Group (Crickmay, 1925; Roddick, 1965) is predominantly a volcanic sequence of andesitic to dacitic composition, with lesser amounts of volcanoclastic and sedimentary rocks. Both groups are intruded by younger plutonic rocks ranging from granite to diorite.

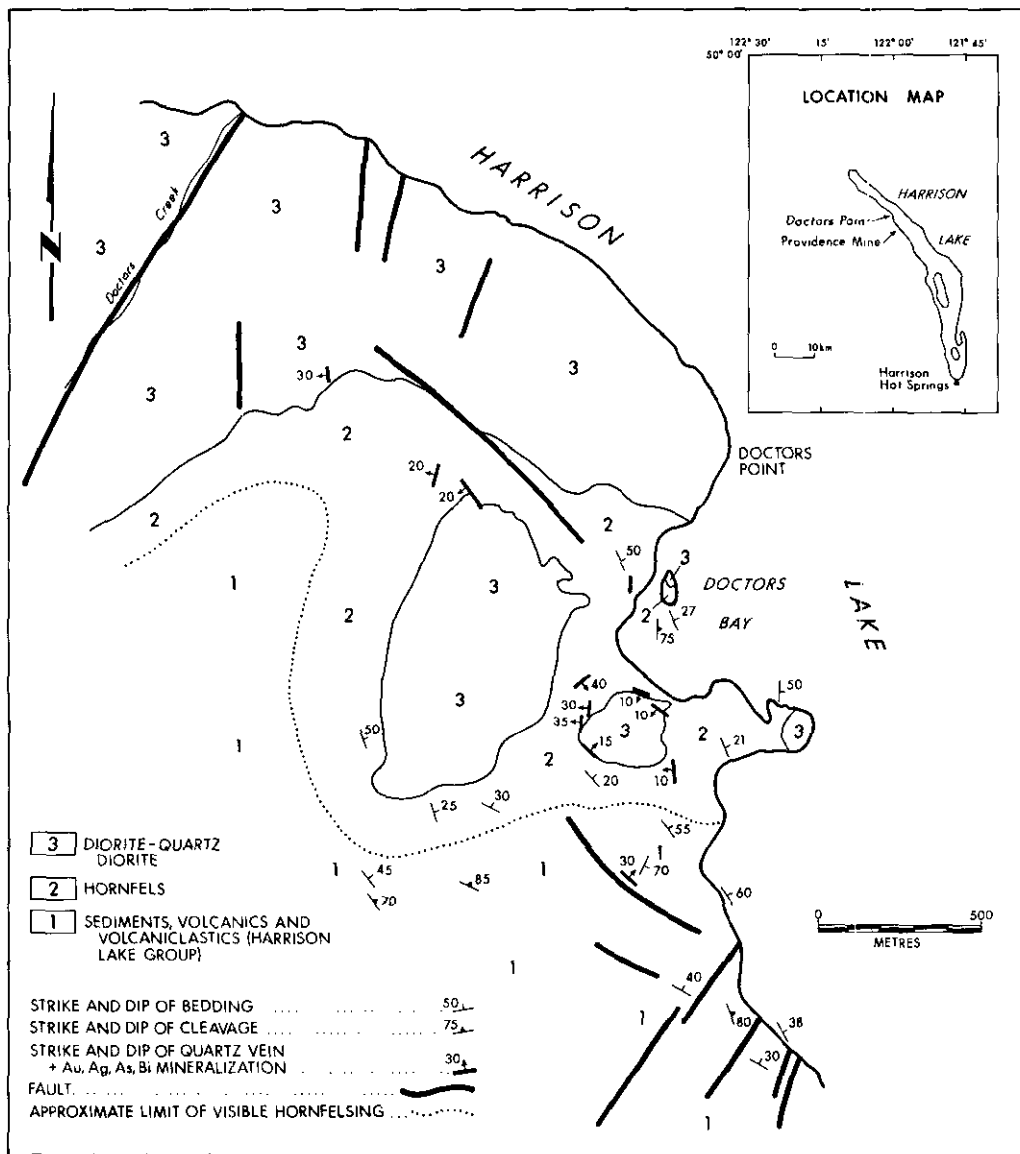


Figure 13. Geology of the Doctors Point area, Harrison Lake.

The Harrison Lake fracture system is associated with regional hot spring activity; this includes two hot springs along the Lillooet River valley, northwest of the lake, as well as one situated at Harrison Hot Springs on the southeastern extremity of the lake. The gold mineralization along the system is hosted in rocks of various ages and lithologies. The Fire Lake gold camp, situated approximately 20 kilometres northwest of Harrison Lake, includes six mineralized occurrences, all of which are found in quartz-rich veins that cut the Fire Lake Group. Five of these veins are hosted in greenstones and carry chalcopyrite and native gold. These quartz veins are not continuous but form lenses and gash fillings. The sixth mineral occurrence in the camp, the Dandy (Mineral Inventory 92G/NE-10), is hosted in brecciated sedimentary rocks and carries lead-zinc mineralization in a quartz-calcite vein.

At the RN mine (Geo), situated close to Harrison Hot Springs, the gold is hosted in sulphide-bearing quartz veins that cut both highly deformed metasedimentary rocks of the Chilliwack Group and intrusive diorite plutons.

The Providence mine, situated 5 kilometres southeast of Doctors Point, represents a fracture-filled vein deposit hosted in andesitic rocks of the Harrison Lake Group. The rocks in the Doctors Point area, where Rhyolite Resources Inc.'s mineralization was discovered, were originally assigned to the Fire Lake Group (Roddick, 1965) and the Mysterious Creek Formation (Monger, 1970). However, the prevalence of acidic to intermediate volcanic rocks in the area suggests they probably belong to the Harrison Lake Group. In the Providence mine vicinity, andesites and andesitic breccias predominate, but northward toward Doctors Point they become less abundant and are replaced by volcanic rocks of more acidic composition, together with coarse volcanic breccias, tuffs, and a variety of sedimentary rocks. At Doctors Point this supracrustal assemblage is intruded by several diorite-quartz diorite plutons which are surrounded by wide and prominent thermal metamorphic aureoles. The gold-bearing veins at Doctors Point exhibit a pronounced spatial relationship to the diorite pluton margins, but current geological data suggest the intrusions were not necessarily genetically related to the gold mineralization.

DOCTORS POINT AREA

INTRODUCTION

In the late 1970's, Mr. G. Nagy discovered gold-silver mineralization at Doctors Point, on the southwest shore of Harrison Lake, approximately 45 kilometres north-northeast of Harrison Hot Springs (Fig. 13). In 1981 Rhyolite Resources Inc. purchased the Nagy claims and subsequently conducted an exploration program involving geological mapping, soil sampling, trenching, and drilling. During August and September 1981, Rhyolite Resources Inc. put down 13 NQ drill holes totalling 890 metres. This program intersected gold-silver-bismuth mineralization in sulphide-bearing quartz veins; the best intersections were in holes 81R-8 and 81R-11 which respectively intersected 3.2 metres of 7.1 grams gold per tonne (0.21 ounce gold per ton) and 3.9 metres of 4.2 grams gold per tonne (0.125 ounce gold per ton). In July 1983 Rhyolite Resources Inc. announced they had completed 60 diamond-drill holes totalling 4 570 metres and had drill indicated and probable mineralized reserves of 450 000 tonnes grading 3.1 grams gold per tonne (0.1 ounce gold per ton) and 31 grams silver per tonne (1 ounce silver per ton).

GEOLOGY

The simplified geology of the area is shown on Figure 13. The southern part is underlain by a variety of generally moderately dipping volcanic, volcanoclastic, and sedimentary rocks that probably belong to the Middle Jurassic Harrison Lake Group. To the north these supracrustals are intruded by five diorite-quartz diorite bodies that vary in size from only 25 metres in diameter to over 1 kilometre across. The volcanic

rocks are fine to medium grained, are generally highly altered, and range from andesite to dacite in composition. Both porphyritic and non-porphyritic varieties are seen, and abundant disseminated pyrite is a widespread feature; the dacitic varieties are commonly devitrified and silicic. Most of the volcanic rocks are massive; flow banding is rarely seen.

The sedimentary rocks range from massive, black argillites, some of which contain rounded concretionary structures, through to finely bedded siltstones that in places display excellent graded bedding. Most of the sedimentary rocks indicate deposition in a low-energy environment but some siltstones contain argillitic rip-up clasts and others show signs of soft sediment deformation and chaotic slumping. The volcanoclastic rocks vary from finely bedded, often siliceous tuffs through to massive, chaotic volcanic breccias having angular to subangular clasts exceeding 0.3 metre in diameter. Most breccias are oligomictic, but some of the coarser varieties contain clasts of both dacitic and andesitic volcanic rocks, as well as fragments of bedded sedimentary material and broken quartz and feldspar crystals. The more mafic breccias are marked by rounded clots of calcite rimmed by epidote. In places the bedded tuffs and breccias are interlayered with volcanic flows that also sporadically contain angular, lithic clasts. Consequently, it is often difficult to distinguish between these tuffaceous lavas and the volcanoclastic rocks, particularly where devitrification is widespread.

The plutons intruding the supracrustals (Fig. 13) range from diorite to quartz diorite in composition. When fresh they form grey-coloured, generally massive, and coarse-grained rocks. Biotite is the most widespread mafic mineral but hornblende is sporadically developed and can exceed 20 per cent by volume in parts. These rocks contain up to 10 per cent disseminated pyrite in places, but this sulphide does not contain gold.

Five individual plutons are seen. They range in size from the small body underlying the northern portion of the island in Doctors Bay through to the incompletely mapped large mass situated between Doctors Creek and Doctors Point (Fig. 13). The three remaining bodies form rounded to oval-shaped masses whose contacts with the country rocks are highly irregular in parts. Rounded, mafic xenoliths are seen in the largest pluton near Doctors Creek (Fig. 13) but are rare in the other four bodies. The largest pluton is also notable for its higher quartz content. The diorites are generally massive textured but the small body underlying the western extremity of the peninsula, south of Doctors Bay (Fig. 13), exhibits vertically inclined flow layering. This consists of subtle, diffuse concentrations of light and dark minerals with no signs of any sharp boundaries between individual layers which are mostly very regular and generally 1 to 2 centimetres wide. The plutons are surrounded by a 100 to 250-metre-wide hornfelsic zone marked by intense recrystallization of the country rock; in places identification of the original rock type is impossible. Close to the pluton margins the hornfels contains fine biotite and magnetite and is characterized by weak silicification with some disseminated fine-grained pyrite and pyrrhotite. The pyrite-pyrrhotite can exceed 15 per cent by volume immediately adjacent to the plutons but these intrusion-related sulphides do not carry gold. Two exposures of hornfelsic rocks containing coarse garnet crystals were also noted.

GEOLOGICAL HISTORY OF THE DOCTORS POINT AREA

Middle Jurassic sedimentation and volcanism were followed by a period of uplift and folding which resulted in the consistent easterly dip of the bedding and the imposition of a subvertically inclined fracture and slaty cleavage. Bedding-cleavage intersections indicate that the entire area occupies the eastern limb of a major, northwest-trending anticline. There is no evidence of structural repetition in the sequence, and the graded bedding shows tectonic inversion did not occur. The temporal relationship between the diorite plutonism and the folding is unknown; however, no fracture cleavage is seen in the diorites. The plutons, subsequent to their intrusion were cut by narrow, mafic dykes. This event was followed by easterly directed thrust

movements along thin, gently dipping thrust planes. Overall movement across individual thrust surfaces, however, was very small. Subsequently, gold-silver-bearing quartz-sulphide veins were injected along some thrust planes. This was followed by two sets of subvertically inclined faulting that trend northeast and southeast respectively. Slickensiding indicates the southeast-striking fault set suffered both vertical and subhorizontal movements.

MINERALIZATION

The gold-silver mineralization at Doctors Point is hosted in long, narrow, generally gently dipping (10 to 30 degrees) quartz-sulphide veins that cut both the diorites and the adjacent hornfelsic rocks. On surface these veins vary from a few centimetres to 0.75 metre wide, but drilling has reportedly intersected veins over 2 metres in width. The veins include both clear and white vuggy quartz, the vug cavities being lined with small quartz crystals. Pyrite and arsenopyrite are the commonest sulphides; in part the veins comprise coarse, massive sulphide material in which quartz is subordinate. Surface leaching results in abundant boxwork textures in the quartz veins, and many mineralized outcrops are coated with green scorodite ($\text{FeAsO}_4 \cdot \text{H}_2\text{O}$), an alteration product of the arsenopyrite. In some instances the veins contain small amounts of chalcopyrite, while rare examples of molybdenum and galena are also reported. Analyses (Ray, 1983; Table 1) show that the gold-silver mineralization at Doctors Point is generally associated with anomalous amounts of bismuth, antimony, mercury, copper, and lead, and occasionally associated with anomalous values of zinc and tungsten.

TABLE 1
TRACE ELEMENT ANALYTICAL RESULTS,
DOCTORS POINT, HARRISON LAKE*

	27852 ¹	27853 ²	27854 ³	27856 ⁴
Cu	51	345	680	0.36%
Pb	207	18	40	48
Zn	13	72	23	44
Co	<2	146	2	5
Mo	8	2	<2	7
Hg (ppb)	38	<15	290	710
Sb	206	<10	250	580
As	6.8%	<25	0.6%	5.7 %
Ba	240	400	770	370
Bi	4	<2	17	55

All values in ppm except where recorded in per cent; Hg in ppb.

¹⁻⁴ Grab samples of sulphide-rich quartz veins on the Rhyolite Resources Inc.'s property, Doctors Point, Harrison Lake. Analysis by AA (Hg by cold vapour AA).

*For Au-Ag analyses on mineralized grab samples from the Doctors Point area see Ray (1983), Tables 1 and 2.

To date 13 mineralized veins are outlined on surface and the majority of these are located within 100 metres of the diorite-hornfels contact (Fig. 15). Surface veins are traceable over a 30-metre distance, but drilling indicates some exceed 200 metres in length. One surface vein is traceable from the diorite into the adjacent hornfels without any apparent dislocation or change in either mineralogy, vein dimension, or gold content.

The mineralized veins are usually bounded by a 'bleached zone' in which the nature and texture of the original rock type is unrecognizable. These bleached zones comprise a very fine mixture of quartz, sericite, and kaolin, with some disseminated pyrite; in places it carries trace amounts of gold. The bleached zone varies from a few centimetres to 3 metres in width; generally the wider zones are associated with the thicker veins, and commonly the hangingwalls contain the widest zones of alteration. The bleached

alteration passes gradually out to a wider 'rotted zone' which is characterized by its friable, weathered, and rusty appearance. In this zone the feldspars are extensively kaolinized, but the textures of the original rocks are clearly visible. This alteration zone can exceed a total of 8 metres in width and generally carries weakly disseminated pyrite but no gold.

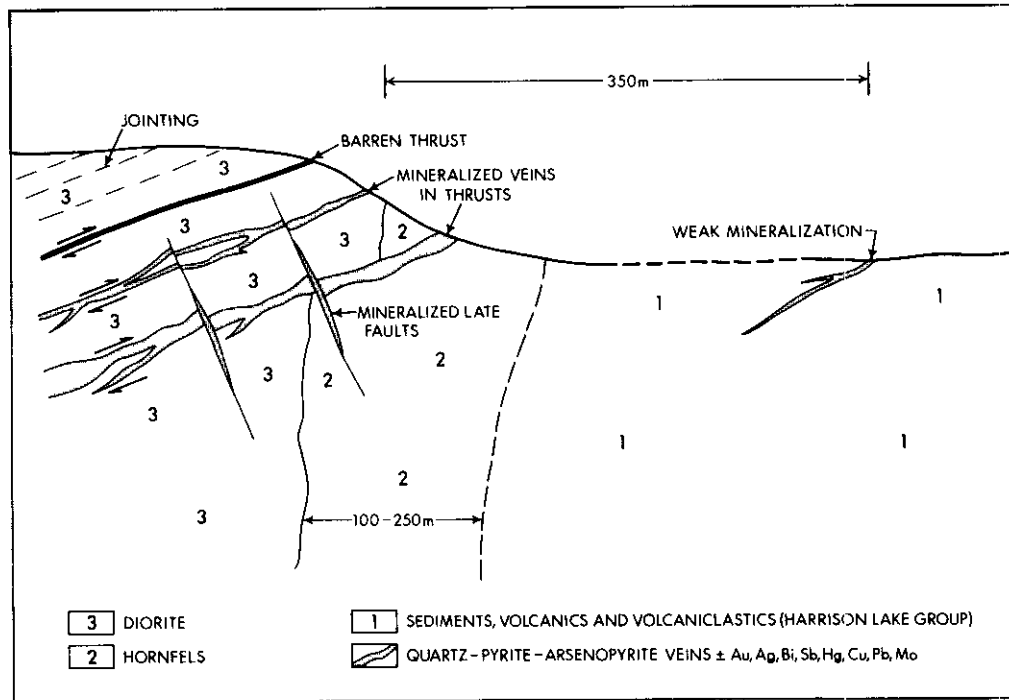


Figure 14. Schematic section showing mineralized quartz veins, Doctors Point, Harrison Lake.

The mineralized veins appear to follow, and be controlled, by a series of pre-existing, gently inclined thrust plane that cut both the diorites and the hornfels. Most of these thrusts are unmineralized and in places they form a series of narrow, subparallel shear planes placed from 5 to 20 metres apart (Fig. 14). The unmineralized thrusts are marked by slickensiding and are rarely more than 3 centimetres wide; at one locality a subparallel set of gently dipping thrusts cutting the diorite contains grey, biotite-bearing granodiorite sills up to 0.3 metre wide. Most movement along the thrusts appears to predate the quartz-sulphide veins. However, the amount of movement across individual thrust planes appears to be small and one basic dyke that intrudes the diorites is offset only 7 to 10 metres across a mineralized vein. The displacement and slickensiding suggest the thrusting involved overall easterly directed movements.

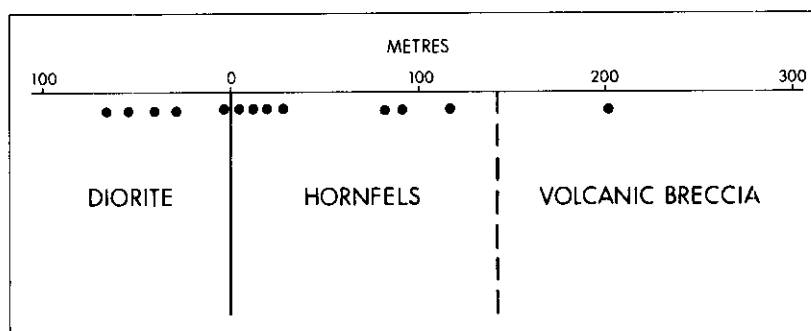


Figure 15. Relationship between mineralized veins (circles) and the diorite-hornfels contact, Doctors Point, Harrison Lake.

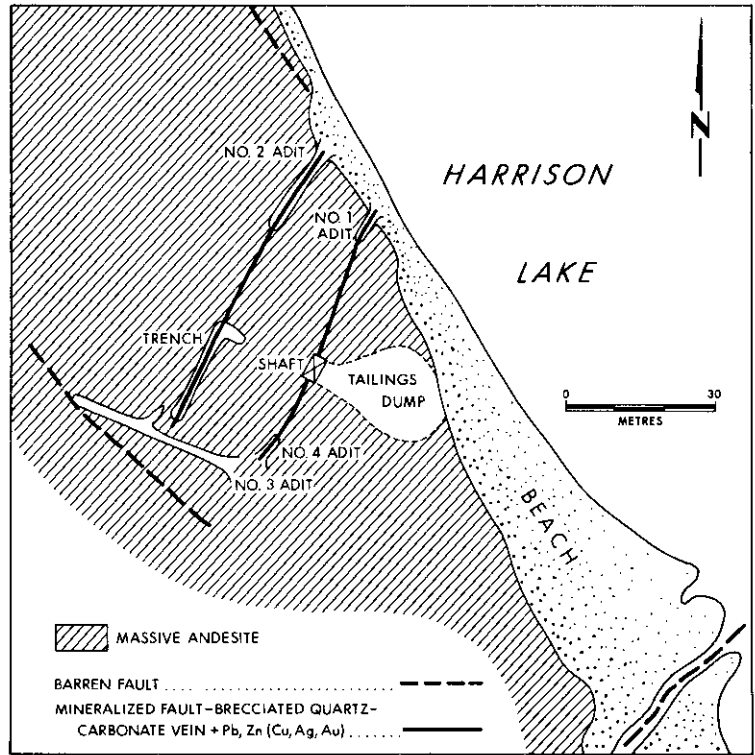


Figure 16. Geology and plan of the Providence mine workings, Harrison Lake.

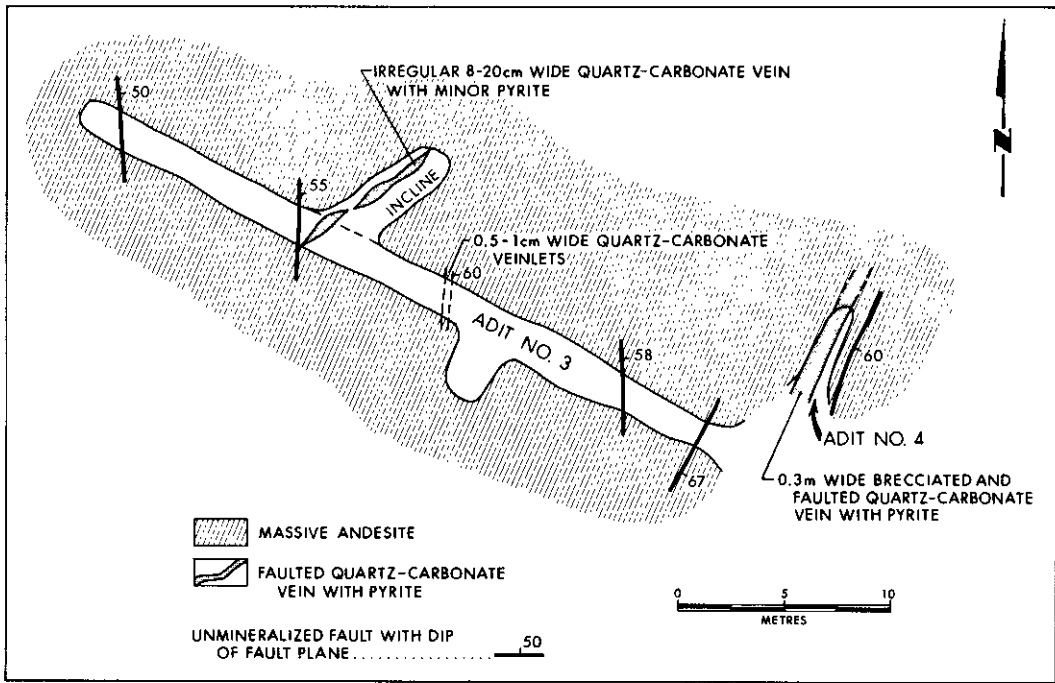


Figure 17. Geology of the Nos. 3 and 4 adits, Providence mine, Harrison Lake.

Drilling reveals that some mineralized veins bifurcate and rejoin one another in a complex manner, similar to that shown on Figure 14. Some late, subvertical normal fractures crosscut and cause minor displacement of the main veins. These later faults can also carry 1 to 3-centimetre-wide gold-bearing quartz-sulphide veins suggesting that some late remobilization occurred.

A petrographic and scanning electron microscope (SEM) study on the Doctors Point mineralization was completed by Littlejohn (1983). He noted that the native gold is associated mainly with the pyrite and only to a lesser extent with the arsenopyrite. The gold occurs as small inclusions, mostly less than 0.01 millimetre in diameter and is generally concentrated close to the edges of the sulphide crystals. Some pyrite and arsenopyrite crystals contain abundant, minute vesicles, which Littlejohn (1983) interprets to result from boiling. The numerous microfractures cutting the sulphides are filled with calcite, together with small amounts of gel pyrite, clay, and various silver-bismuth minerals, the most abundant of which are native bismuth and lead-bismuth sulphosalts. Argentite, associated with the bismuth minerals, is also present; some native bismuth contains minute specks of chalcopyrite. Traces of galena are intergrown with and rim the arsenopyrite.

Littlejohn (1983) concludes that the veins experienced two distinct episodes of precious metal mineralization. The first involved the introduction of gold with the sulphides and quartz, followed by a period of microbrecciation. The second resulted in injection of the silver-bismuth minerals into the microfractures. A period of calcite injection postdates the early quartz-sulphide-gold episode, but its precise relationship to the later silver-bismuth phase is unknown.

PROVIDENCE MINE

INTRODUCTION

Providence mine (Mineral Inventory 92H/NW-30) is situated close to the shore of Harrison Lake, on the north side of Davidson Creek, approximately 5 kilometres southeast of Doctors Point (Fig. 13). It was worked at the turn of the century and is covered by Crown grants (Lots 1737 and 1738). To date, no published description of either the mine workings, the geology, or the mineralization is available. The Annual Report of the Minister of Mines for 1897 described the property as containing 'three distinct lodes', the middle one being vertical and the other two converging toward the middle lode with depth. A 45-metre shaft was sunk over the middle lode and over 75 metres of tunnelling completed. Approximately 180 tonnes of ore was stockpiled and in 1896 three car loads of this material were shipped to the smelter; these averaged \$27 per ton in gold and silver. However, individual assays varied from \$1 to \$2,000 per ton. The ore was described as containing about 40 per cent free gold, making it partially free milling.

GEOLOGY AND MINERALIZATION

The regional geology around the Providence mine consists primarily of massive, dark green andesites, with lesser amounts of andesitic volcanic breccia. Adjacent to the mine area is a major, north-northeast-trending fault which passes along Davidson Creek (Fig. 16). The mineralization at the mine is controlled by several fractures which are either subparallel to, or represent splays from, the Davidson Creek fault. The geology and location of the adits and shaft, as determined by chain and compass survey, are shown on Fig. 16. Despite early descriptions of 'three lodes' on the property, only two mineralized veins were found during the present survey. The third vein is probably obscured by the tailings dump lying adjacent to the shaft.

Four adits were seen on the property. Two of these were driven in from the lake shore and follow the veins for short distances (Fig. 16). A short, 4-metre-long adit was also driven along the southern end of the eastern vein, together with a 34-metre adit which was driven from close by in a westerly direction (Fig. 16).

The latter adit attempted to intersect a southern extension of the western vein; however this vein must rapidly die out because it is poorly developed in the adit and contains only minor pyrite with no gold (Fig. 17). On surface this western vein was extensively and deeply trenched, while a shaft was driven down the central portion of the eastern vein (Fig. 16).

The veins are steeply dipping and have a maximum width of approximately 0.7 metre; they largely comprise a complex quartz-carbonate breccia that has sharp, often fractured contacts with the surrounding andesites. However, the wallrocks up to 3 metres from the veins carry irregular, subparallel veinlets of quartz and calcite, while the andesites immediately adjacent to the main veins contain disseminated pyrite. Sulphides are sporadically developed in the veins; in the No. 3 and No. 4 adits (Fig. 16) only weak pyrite is seen, while the trench overlying the western vein carries pyrite with weak chalcopyrite and rare bornite. On the tailings dump, however, numerous large specimens containing pyrite, galena, sphalerite, and lesser amounts of chalcopyrite are seen. In hand specimen the brecciated and mineralized vein material consists of angular to rounded clasts of rhythmically layered, crystalline and vuggy quartz up to 8 centimetres in diameter, embedded in a carbonate matrix. These quartz fragments tend to be matrix supported and do not appear to carry any sulphides. The carbonate cement is often rhythmically banded and associated with colliform layered, dark-coloured sphalerite, together with fine galena, chalcopyrite, and pyrite. In parts the carbonate material is also extensively brecciated and recemented, indicating the vein has suffered repeated fault movements. Trace element analyses on samples collected from the tailings dump are shown in Table 2. These show the lead-zinc-copper mineralization is associated with highly anomalous amounts of antimony, silver, and mercury; the latter reaching concentrations of up to 17 ppm (Table 2). The gold content, however, is surprisingly low (Table 2), which seemingly contradicts the early reports of high gold values in these veins (*Minister of Mines, B.C., Ann. Rept., 1897*). However, the samples assayed in Table 2 were selected from the galena-sphalerite-chalcopyrite-bearing carbonate matrix, and none of the quartz breccia clasts were assayed. Thus, the gold in these veins is probably confined to the quartz clasts and is absent from the sulphide-bearing carbonate matrix.

TABLE 2
TRACE ELEMENT ANALYTICAL RESULTS,
PROVIDENCE MINE, HARRISON LAKE

	28084 ¹	28085 ²	28086 ³	28087 ⁴
Au	0.7	<0.3	<0.3	0.7
Ag	30	<10	86	23
Cu	0.1 %	115	0.55%	160
Pb	0.36%	255	0.7 %	590
Zn	2.04%	910	2.6 %	0.37%
Co	6	16	5	7
Mo	<3	3	<3	4
Ni	6	16	10	12
Hg	17	2	13	9
Sb	38	23	43	95
Bi	15	<5	7	7

All values (including Hg) in ppm except where recorded in per cent.

¹⁻⁴ Grab samples of galena-sphalerite-chalcopyrite-bearing material from the tailings dump at Providence mine, Harrison Lake.

Au-Ag by fire assay; other elements by AA (Hg by cold vapour AA).

The complex brecciated textures in the veins suggest that the following sequence of deformation and mineralization occurred:

- (1) Early northeast-trending, brittle faulting in the andesites produced subvertical, open fractures.
- (2) Deposition of banded, crustiform, vuggy, possibly epithermal quartz, which probably carried the gold, mercury, bismuth, and antimony.

- (3) A second period of faulting causing brecciation of the quartz vein.
- (4) The introduction of the carbonate matrix, together with the lead, zinc, silver, and copper mineralization.
- (5) A third period of faulting causing rebrecciation of the quartz and fracturing of the carbonate matrix.

This overall pattern of an early generation of quartz and gold, followed by the carbonate and silver, is similar to the sequence of mineralization in the Doctors Point area (Littlejohn, 1983). This, together with the enrichment of antimony and mercury, could indicate that mineralization in both areas is genetically and temporally related. The complex history also suggests that mineralization may have occurred over a relatively long time interval.

RN MINE (GEO) (Mineral Inventory 92H/SW-92)

INTRODUCTION

A very brief visit was made to the disused RN gold mine, situated approximately 4 kilometres northeast of Harrison Hot Springs. The property is being re-evaluated by Abo Oil Corporation who recently reported (Huber, 1983) that a 1 100-tonne test bulk sample averaged 45 grams gold per tonne (1.32 ounces gold per ton). The gold is hosted in quartz veins cutting a diorite-quartz-diorite pluton, close to its intrusive contact with hornfelsed, deformed slaty pelitic metasedimentary rocks. The latter are believed to belong to the Chilliwack Group. The visit involved both a surface examination of the old RN adit area and collection of mineralized samples from the nearby waste dump for assay (Table 3) and thin-section work.

**TABLE 3
TRACE ELEMENT ANALYTICAL
RESULTS,
RN MINE, HARRISON LAKE**

	28088 ¹	28089 ²
Au	1.4	4.3
Ag	<10	<10
Cu	690	240
Pb	10	3
Zn	21	16
Co	19	31
Mo	<3	6
Ni	15	8
Sb	<3	<3

All values in ppm.

¹⁻² Grab samples of sulphide-rich quartz vein material from waste dump, RN mine.

Au-Ag by fire assay, other elements by AA.

GEOLOGY

The RN mine adit lies within a coarse, massive hornblende-biotite diorite close to its intrusive margin with Chilliwack Group metapelites. The diorite is cut by narrow, subhorizontal thrust planes which bifurcate and rejoin in places. These thrust planes vary from 8 to 25 centimetres wide and generally contain fault gouge and finely brecciated material. The gold is hosted in gently dipping to subhorizontally inclined white quartz veins. On surface near the adit portal, these have a maximum width of 0.3 metre. The veins have sharp contacts with the diorite; in some parts the margins are weakly sheared and exhibit slickensiding.

The veins contain both masses and disseminations of pyrrhotite with lesser amounts of pyrite. Pyrite locally forms coarse cubes. The pyrite distribution is patchy and appears to be a late mineral as it is associated with late crystalline quartz. Rare chalcopyrite is also present, and a single flake of molybdenum was noted in one sample. No gold was seen in any of the samples collected.

Fine sericite is also commonly associated with the veins, mostly being concentrated toward the margins and occasionally forming thin seams that separate the veins from the diorite. Some quartz crystals in the veins also include small blebs of calcite, while the diorite contains finely disseminated pyrrhotite and pyrite some considerable distance from the vein contacts. The analytical results (Table 3) indicate that the sulphide-rich, gold-bearing quartz veins contain weakly anomalous amounts of copper and molybdenum. However, in contrast to the mineralization at Providence mine and Doctors Point, there is no enrichment in either mercury or antimony.

GENERAL CONCLUSIONS ON THE HARRISON LAKE AREA

- (1) Gold mineralization along the Harrison Lake fracture system is hosted in rocks of various ages and lithologies, including basic volcanic rocks, plutonic diorites, and hornfelsed volcanic and sedimentary rocks.
- (2) It is unknown whether the various occurrences are the result of a single, regionally distributed gold-mineralizing event, or whether they are of widely different ages. Age dating of both the host rocks and the sericite-bearing occurrences could resolve this question.
- (3) All the gold occurrences and deposits represent vein-type mineralization. Two examples (Dandy and Providence mine) are hosted in quartz-carbonate veins, while the remainder are in quartz-rich veins.
- (4) At both Doctors Point and the RN mine the veins were controlled by pre-existing, gently inclined thrust planes. Thus, thrusting may have played an important role in both the regional tectonic history and in locally controlling some of the gold mineralization. The remainder of the occurrences are found in steeply dipping, fracture-filled veins.
- (5) Gold throughout the region is always associated with varying amounts of sulphides, of which pyrite and chalcopyrite are the most widespread. Abundant galena and sphalerite are found at the Dandy occurrence and Providence mine. Arsenopyrite is abundant at Doctors Point but is absent from the RN and Providence mines mineralization.
- (6) Mercury, antimony, and bismuth are associated with the gold at Providence mine and Doctors Point. By contrast, no mercury and antimony are present at the RN mine. (Bismuth analyses on samples from the RN property are not yet available.)
- (7) Both the Doctors Point and Providence mine mineralization involved an early generation of gold-quartz injection followed by a later phase of carbonate-silver-lead mineralization.
- (8) The vuggy, rhythmically layered quartz at Providence mine, together with mercury and antimony enrichment, suggests it represents lower temperature, possibly epithermal-type mineralization. By contrast, the presence of abundant sericite at Doctors Point and the RN mine suggests the mineralization in these two areas represents higher temperature, possibly mesothermal-type veining.

- (9) The mineralized veins at Doctors Point are spatially related to the intrusive margins of diorite plutons. However geological evidence suggests no genetic relationship exists because the plutonic intrusion and mineralization were separated by a considerable time interval.
- (10) Reconnaissance mapping indicates the Doctors Point area lies close to a Middle Jurassic acid volcanic centre. Similar volcanic centres could exist elsewhere in the Harrison Lake Group and these would represent good targets for gold exploration.
- (11) To date, no large tonnage, low-grade epithermal-type gold mineralization has been discovered along the Harrison Lake fracture system. This could reflect the lack of modern geological mapping and exploration in the area. The fracture system is associated with many highly favourable geological and geochemical factors that indicate it represents an excellent, highly accessible regional exploration target for both vein-type and Carlin or Cinola-type gold mineralization.

ACKNOWLEDGMENTS

The authors wish to thank the management and staff of Rhyolite Resources Inc. for their active cooperation and assistance during this project, particularly the President, Mr. J. Stewart. Assistance in the field by P. Desjardins is gratefully acknowledged as are informative discussions with W. J. McMillan, A. Panteleyev, and P. Wilton.

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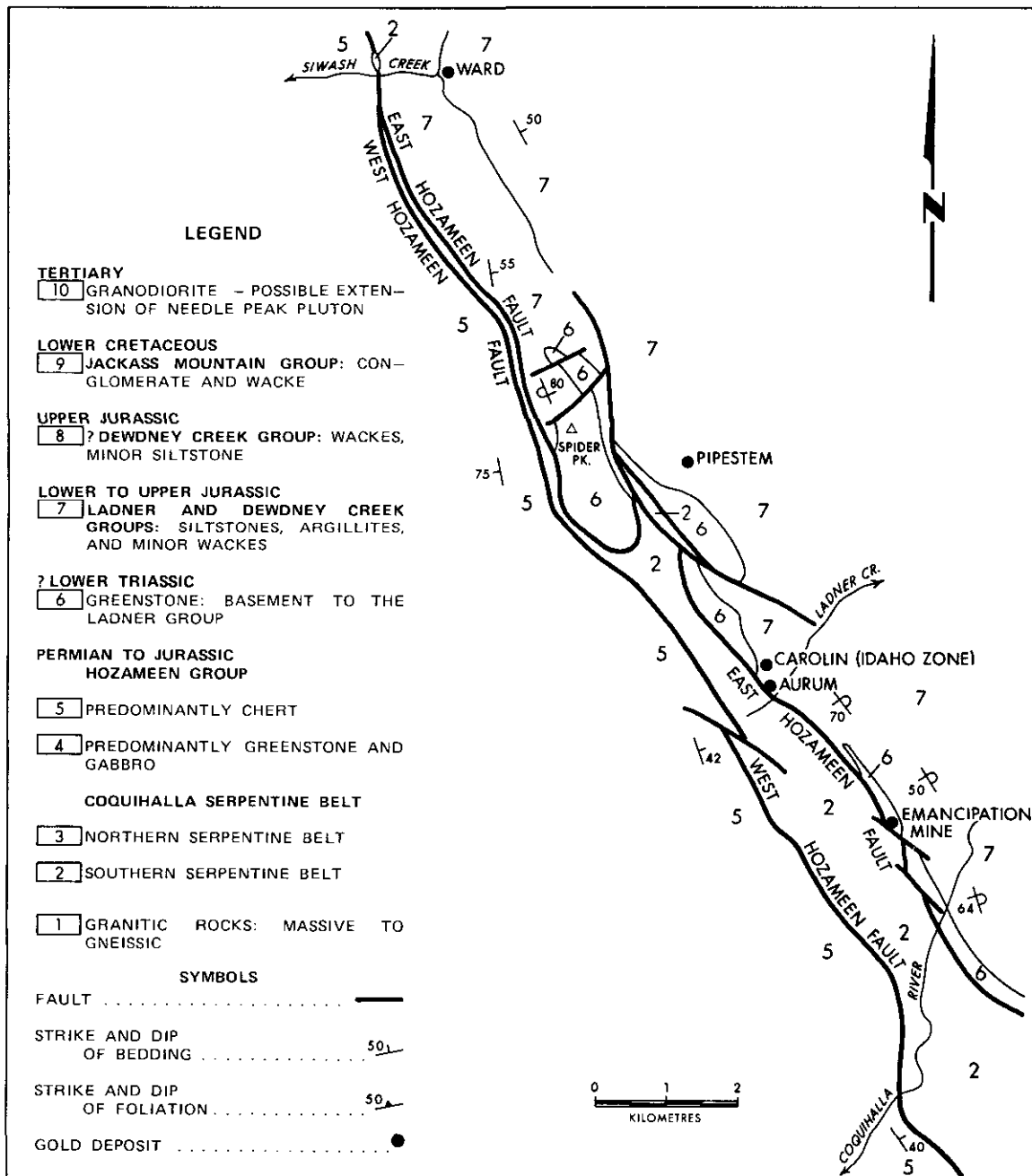


Figure 18. Geology between Coquihalla River and Siwash Creek.