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GEOLOGY OF THE GEM MOLYBDENUM DEPOSIT

BY

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INTRODUCTION

LOCATION:

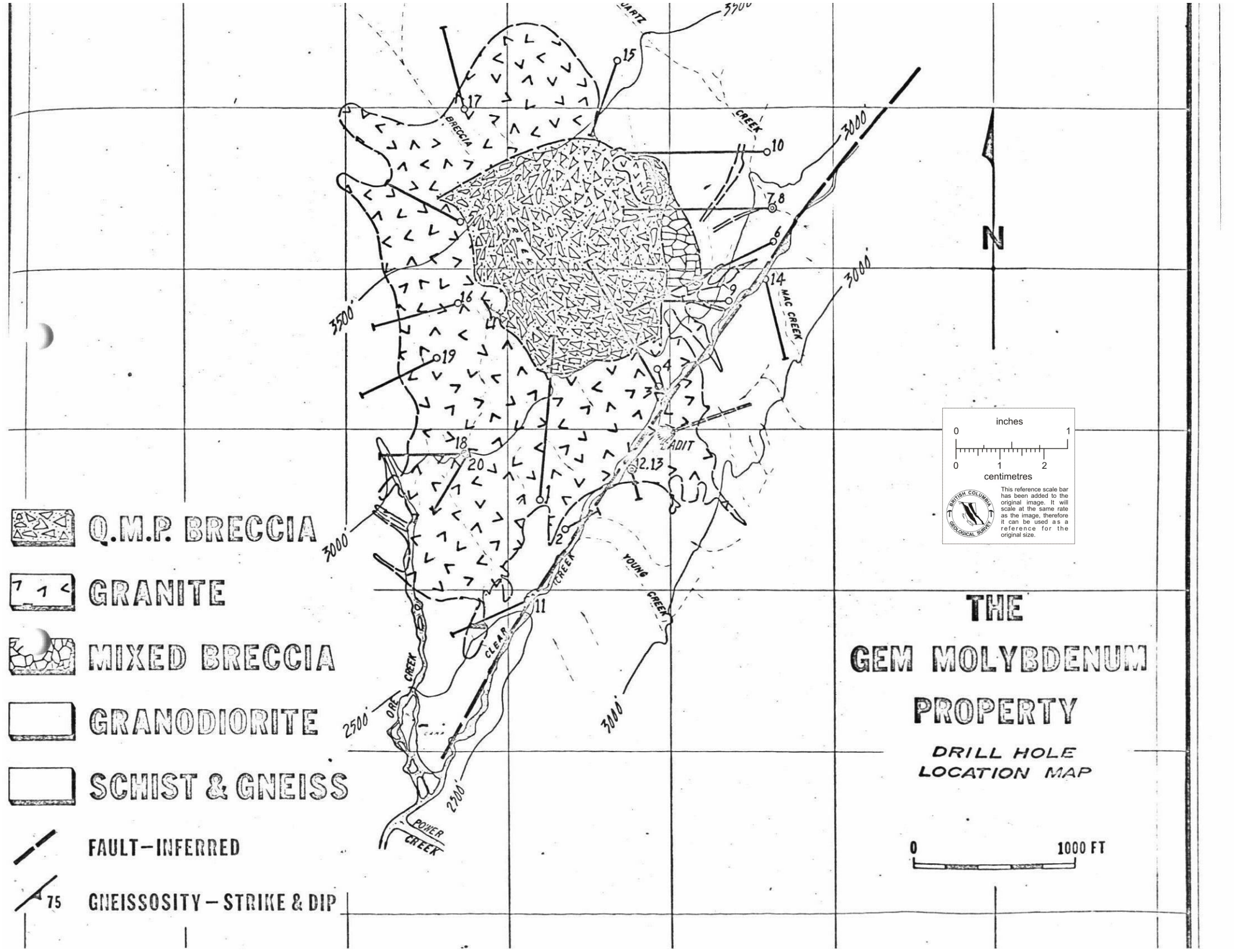
The Consolidated Gem Explorations Ltd. (formerly Gem Explorations Ltd.) property optioned by Utah Construction & Mining Co in the fall of 1964 is located 29 air line miles north of Harrison Hot Springs and about 14 miles west of the Alexandra Bridge over the Fraser River on the Trans Canada Highway. Vancouver B.C. is 72 air miles to the southwest. The approximate geographic co-ordinates are lat 49°N and long. 121° 43' 30" W.

PROPERTY

The property consists of 96 full size claims and 4 fractions, all held by location and recorded in the New Westminster Mining Division.

ACCESS:

The Gem camp is accessible by logging and Forest Service roads from Harrison Hot Springs. A road runs along the east side of Harrison Lake for about 25 miles to Larson's Logging camp at the mouth of Big Silver Creek and from there 12 miles of logging and rough access roads run up Big Silver and Clear Creeks to the camp which is situated on the divide between Clear and Spuzzum Creeks. Water taxis for charter trips are available at Harrison Hot Springs and the logging camps on the Lake. A converted landing barge is available for transporting heavy or bulky equipment. Harrison Lake is accessible by tug and barge from tidewater via the Fraser and Harrison rivers. Access could be provided by constructing about a 2 mile section of road to connect with logging roads on Spuzzum creek which join the Trans Canada Highway near Spuzzum.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GRANITE
MIXED BRECCIA
GRANODIORITE
SCHIST & GNEISS
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75 GNEISSOSITY — STRIKE & DIP
THE
GEM MOLYBDENUM
PROPERTY
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ADIT
BRECCIA CREEK
MAC CREEK
YOUNG CREEK
CLEAR CREEK
ORE CREEK
POWER CREEK
3500'
3000'
2500'
2300'

CLIMATE:

The climate is classified as West Coast type. Mean daily temperatures for January are believed to be 20° to 30° F and for July 60° F to 65° F. No records have been kept for the immediate area but precipitation is likely to exceed 100 inches annually, with the majority falling as rain. Snowfall is heaviest at the camp in January, February and March. In March 1966 eight feet of snow had accumulated at the camp. Snow slides at several locations along the road below the camp can delay access in the spring.

TOPOGRAPHY:

The center of the claim group lies along Clear Creek and Spuzzum Creek drainages between elevations of 2500' and 3000'. The claims extend up the steep slopes to the northwest and southeast to an approximate elevation of 5500 feet.

HISTORY & DEVELOPMENT:

The original molybdenite discovery in the area was made prior to 1912. In subsequent years intermittent interest was shown both by prospectors and major mining companies. J.B. Bailey optioned the property to Gem Explorations Ltd N.P.L. in 1961.

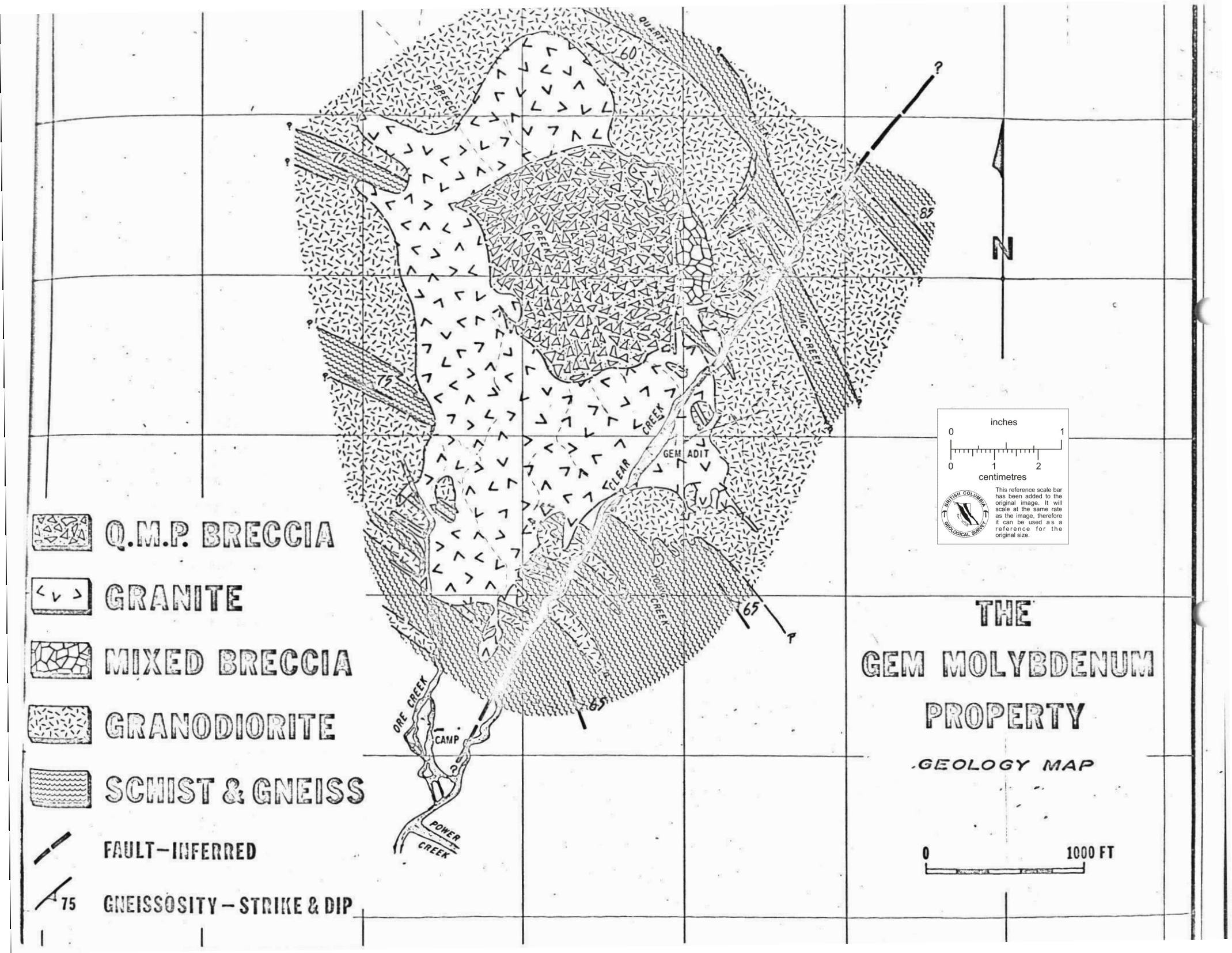
In 1962 and 1963 Gem constructed a camp and several helicopter landing sites on the property. A limited amount of stripping, bulk sampling and X-Ray diamond drilling was done. In 1963 and 1964 a 493' adit was driven on the southeast side of Clear Creek.

The property was presented to Utah Construction & Mining Co. and a formal option-agreement was signed on July 27 1964.

Basic control was established and geologic mapping of the mineralized area on a scale of 1=200' was completed by Utah personnel in late August and early September, 1964. A geochemical soils survey was conducted during the same period.

In October, 1964, induced polarization and resistivity surveys were conducted over the main showings by Utah personnel using equipment obtained from Hewitt Enterprises, Sandy, Utah.

Early in 1965, Consolidated Gem Explorations Ltd completed the road to the property from Larsons Logging Camp on Harrison Lake and Utah let the first contract for diamond drilling. Drilling was continued in 1966 and 1967.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REGIONAL GEOLOGY

The property lies within an area underlain by Coast Range intrusions, Jurassic or later in age, consisting of granite, granodiorite, quartz diorite and diorite; and a series of metamorphic rocks, consisting of quartzose granulites and fine grained schists and gneisses. The age of these latter rocks, all of which are highly dioritized are uncertain but they are likely late Paleozoic or early Mesozoic. Schistosity and gneissosity trends are northerly on the ridges southeast of the property. In the vicinity of the granite plug these trends are northerly on the ridges southeast of the property. In the vicinity of the granite plug these trends turn northwest indicating a broad ~~fold~~ WARP STRUCTURE. The crest of this fold may have influenced emplacement of the Gem intrusives.

LOCAL GEOLOGY

The distribution of the various rock types is shown on the accompanying geology map. Rock names have been assigned in the field and very little detailed petrographic work has been done. The oldest rocks in the mapped area are the quartz-feldspar-biotite schists and gneisses which occur as alternate bands rich in quartz-feldspar or biotite. Schistosity is well developed in the biotite parallel to the banding. The rock is non-magnetic, non-calcareous and the hardness is quite variable.

The schists and gneisses are intruded by a light grey, medium grained, gneissic granodiorite composed mainly of quartz and feldspar with about 20% biotite and exhibiting prominent lineation. This rock is not magnetic. The gneissic granodiorite occurs as sill or dike-like masses in the metamorphic series and becomes more massive near the granite contact. It's gneissic character changes to a granitoid texture in a few places.

The granite is typically a white to light grey, medium grained rock, containing numerous smokey quartz phenocrysts. Locally the quartz is massive with a somewhat graphic texture. There are places where the granite has a porphyritic appearance, becoming coarse grained with grey plagioclase and white potash feldspar cyrstals up to 1/4" long.

OF THE SMALL PLUTON THAT INTRUDES THE SCHISTS & GNEISSES & GRANODIORITE OF THE GEM PLUTON ?

Some of the feldspar has a pinkish cast, which may be due to an introduction of pink orthoclase or possibly to slight iron staining. The granite occurs as a plug roughly 4000 feet by 1800 feet in plan at the surface, with the long dimension trending north-south. Numerous discontinuous granite dikes and/or sills were noted in the dioritic and metamorphic rocks near the periphery of the plug.

The granite is intruded by a smaller plug or pipe of quartz-monzonite porphyry breccia. This is a medium to dark grey, hard rock with an aphanitic groundmass containing phenocrysts of euhedral quartz, and fine to coarse subhedral and anhedral potash and plagioclase feldspar crystals. Fragments within the breccia mass consist of granite, gneissic granodiorite and quartz-monzonite porphyry and are subangular to round. They vary in size from less than 1 inch to several feet in diameter and represent up to 60% of the breccia mass. The breccia pipe outcrops on the northeast side of the intrusive granite plug suggesting that the fold in the metamorphic section, mentioned under the previous section on regional geology, may plunge to the northeast. Evidence in the core from drill hole C-10 suggests that the north side of the granite dips to the north. Drilling elsewhere around the eastern half of the intrusive indicates that the granite contact and the breccia pipe contact here both dip westerly in toward the center of the plug. Results of the drilling in 1967 suggest that the granite-metamorphic contact on the west side of the intrusive dips steeply to the west. A mixed breccia outcrops along the northeast edge of the quartz-monzonite porphyry breccia. The mixed breccia consists of tightly packed angular to sub-angular fragments of quartz-feldspar-biotite schist, gneissic granodiorite, granite, and aplite. A peculiar feature of this rock is the absence of any introduced matrix material between the fragments. Surface outcrops indicate the mixed breccia is in contact with quartz-monzonite porphyry breccia, granite, and quartz-feldspar-biotite schists and gneiss. In drill hole C-7 the mixed breccia is bounded by granite, and their contact is gradational.

Diamond drill holes which penetrate the granite-granodiorite contact indicate there has been some brecciation of the granodiorite presumably during the emplacement of the granite intrusion.

Numerous granite pegmatite dikes and pegmatitic phases occur in the schists and especially in the granodiorite and are thought to have a close age relationship with the granodiorite.

Quartz latite dikes logged in hole C-3, and resembling a fine grained phase of the granite, occur in the breccia pipe. The dike rocks are fine grained, aphanitic, light grey, hard, and contain a few quartz phenocrysts. Occasional light coloured feldspar phenocrysts and about 5% fine grained mafics are disseminated throughout the dikes. In hole C-3 the latite contains numerous narrow quartz seams but very minor molybdenite. One joint plane noted carried a smear of chalcopyrite, pyrite, sphalerite and an acicular sulpho-salt.

An aplite dike trending about N 30° in the northeast corner of the mapped area is light grey to buff, very hard, aphanitic, non-magnetic and non-calcareous and locally shows a distinct grey-buff colour banding. The banding was thought to represent bedding but the rock on the surface cuts across the schistosity planes and granodiorite. Aplite fragments in the mixed breccia exhibit no colour banding. Aplite examined in the core contains numerous narrow quartz seams containing disseminated molybdenite.

Late dike rocks include andesite, porphyritic andesite and lamprophyre. These rocks are all dark and aphanitic and in some cases contain prismatic mafic phenocrysts and/or small calcite phenocrysts. They do not contain any quartz veins or molybdenite.

Drill holes C-2 and C-4 were drilled under Clear Creek to determine whether the stream valley was the surface expression of a major mineralized fault. The core in both holes was badly broken and contained considerable fault gauge.

MINERALOGY

The various forms of molybdenite mineralization present can be classified as follows:-

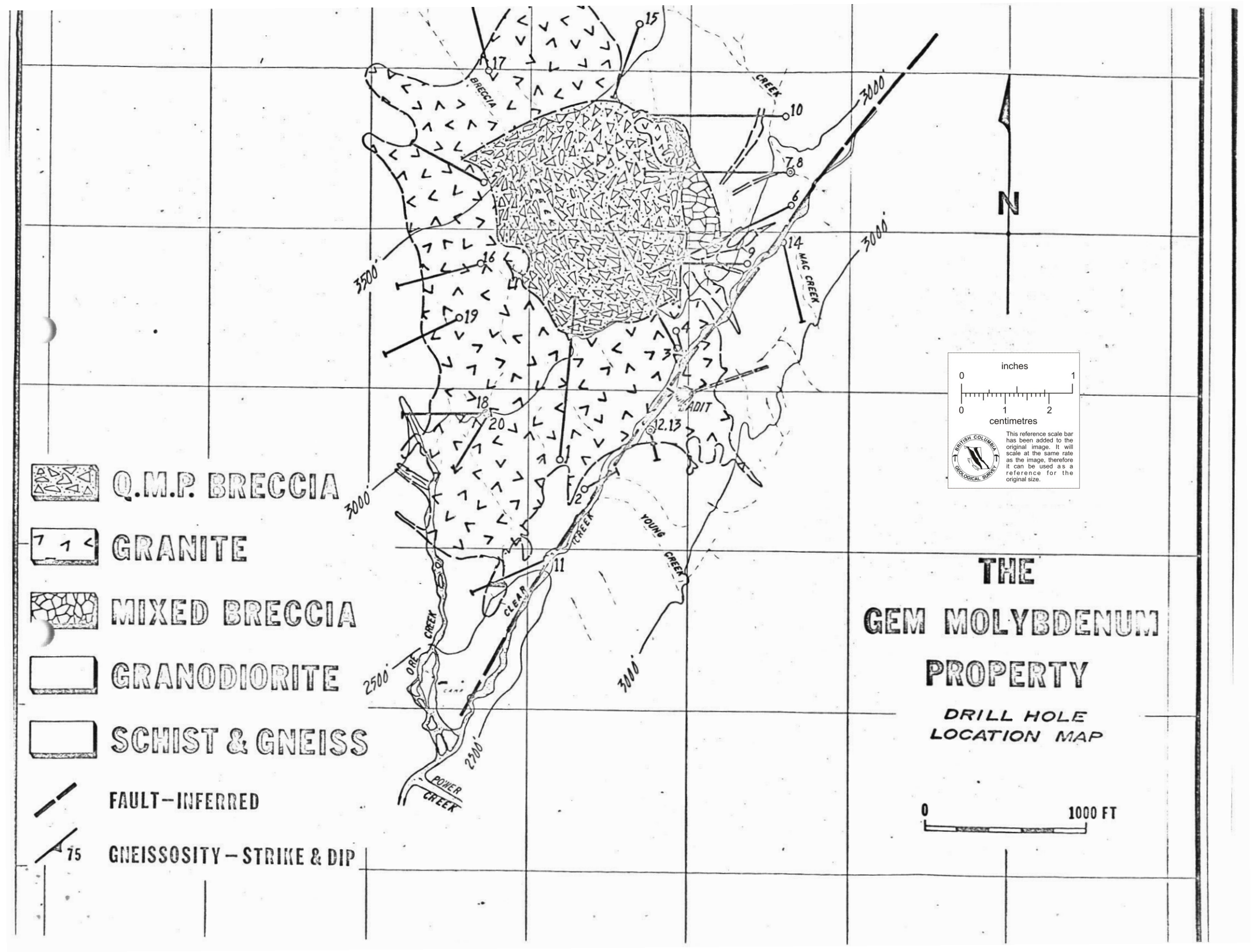
1) coarse disseminations of molybdenite along edges of quartz veins which vary in width from a fraction of an inch to two feet,
2) massive molybdenite veins associated with quartz
3) fine grained molybdenite in quartz veins giving the vein a bluish colour.
4) fine grained molybdenite in quartz as closely spaced bands many of which show slickensided surfaces.

The quartz veining, with which the molybdenite is associated, has a random orientation and is most intense at the contact between the granite and the older rocks and also at the contact of the quartz-monzonite porphyry breccia with the granite. The area of best mineralization is arcuate in shape and fits around the northeast edge of the quartz-monzonite porphyry breccia, where the granite envelope thins. Granodiorite seems to be the best host rock and the molybdenite seems to have an affinity for the coarse biotite.

Locally small amounts of disseminated pyrrhotite, pyrite, chalcopyrite, sphalerite and scheelite occur with the quartz veins. Acicular bismuthinite is found in some of the vugs in the quartz. Normally the vugs have only a carbonate coating.

Very finely disseminated pyrite occurs in the schistose rocks south of the granite plug.

Disseminated pyrite, pyrrhotite, and chalcopyrite in schists over narrow widths are exposed on the southwest side of the granite intrusive. Lenses of massive pyrrhotite have been noted in the schist on the ridge south of the property. It is reported these vary in size up to 40 feet long and 5 feet wide. Smaller lenses of massive pyrrhotite were also seen on reconnaissance traverses in the ridge west of the Gem intrusive plug. It is believed that the sulphides occurring in the schists are indigenous and have no genetic relationship with the molybdenite.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GEOPHYSICS

The I.P. and resistivity survey was conducted using a pulse type instrument. Current was pulsed for 4 sec. with a 1/2 sec time gap between the end of the pulse and the measuring of the decay charge. A wenner array was used with a 150 "a" spacing. No significant anomalies were discovered. Rock specimens containing disseminated MoS_2 were tested in a test cell and did not produce anything considered anomalous. The resistivity results did not contribute anything concrete.

DIAMOND DRILLING

The accompanying illustration shows the number of holes drilled, their location with respect to the rock contacts and the direction of the hole. In 1965 holes numbers one to five, totalling 4300 feet of standard BX, were drilled. This area was chosen because it initially contained the best quartz stockwork. Core recovery was about 80%. Four BQ wireline holes, numbers seven to ten were drilled in 1966. A total of 3600 feet was drilled and core recovery was 97%. The remaining ten BQ wireline holes were drilled in 1967 to complete the coverage around the granite intrusive. Core recovery was in the 95% range.

Drilling costs average $15.00/foot for the standard BX drilling in 1965 and $20.50/foot for BQ wireline in 1966. Costs in 1967 were $19.50 per foot for BQ wireline. Relatively high costs are due to inaccessability of drill sites necessitating helicopter support.

CONCLUSIONS

Low grade molybdenite occurs in quartz veins in surface outcrops of granite, granodiorite and schists and gneisses in an arcuate shape on the south and eastern side of the quartz monzonite breccia. Better grade material outlined by the drilling was found in the granodiorite and schists and gneisses where the granite envelops them near the northeast border of the instrusion.