ASSESSMENT REPORT
GEOL OGY AND QUARTZ VEIN OCCURRENCES
ON THE IG CLAIMS GROUP, NEAR VERNON, B.C.
Vernon Mining Division, NTS 82L/3W, 6W
50°15' N. Lat.; 119°22' W. Long.
Gary Benvenuto, PhD.
ASSessment report

GEOLOGY AND QUARTZ VEIN OCCURRENCES ON THE IG CLAIMS GROUP, NEAR VERNON, BRITISH COLUMBIA

LOCATION: 4.5 to 9.2 air-kilometers west of Vernon, south-central British Columbia.
Vernon Mining Division
N.T.S.: 82L/3W and 6W
Latitude: 50° 15'
Longitude: 119° 22'

CLAIMS: IG 2: 2884(7)
EHU: 3168(5)
Baurb: 3188(6)

OWNERS AND OPERATORS:
B. Thomae and G. Benvenuto of 231 North Sea Avenue, Burnaby, B.C., V5B 1K6.

WORK PERIOD: May 25 - 28, and June 20 - 23, 1989

MINERALIZATION: 13 narrow, quartz veins contain low background to highly anomalous gold; they are located in three main areas within a 0.8 x 2.1 km area. The veins were explored in 1897 to 1905 by pits, shallow shafts, and an adit on the Densy, Three Tramps and Iron Cap(?) cancelled Crown Grants. The claims group is underlain by volcanic flows, limestones, and meta-sedimentary rocks of the Cache Creek Group.

REPORT AUTHOR: Gary Benvenuto

REPORT DATE: July 13, 1989
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SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Location: The IG claim group is located 4.5 to 9.2 air-km west of Vernon, south-central British Columbia, in the Vernon Mining Division (N.T.S. 82L/3W and 6W), and between Indian Reserve No.1 and Beachcomber Bay on Okanagan Lake.

Claims Group: The group consists of three adjoining, four-post claims containing a total of 24 claim-units: IG 2, 2884(7); EHU, 3168(5), and Baurb, 3188(6). The group is owned 50% by Gary Benvenuto, and 50% by Barbara Thomae. The EHU claim oversteps the British Empire, Royal Standard and Dominion claims of the Imperial Group, also owned by Benvenuto and Thomae.

Previous Exploration on the Claims Group: The claims group covers a large number of shallow pits, at least four shallow shafts and one short adit that explored for gold in quartz veins and copper in amphibolitic to basaltic flows, between 1897 and 1905. They are located on the cancelled Crown Granted claims of the Densy, Three Tramps and Iron Cap claims groups. Recently, this area has been staked and re-staked, and no assessment work recorded.

1989 Exploration Program: Reconnaissance geologic mapping, prospecting and rock sampling surveys were conducted on the IG claims group by the owners on May 25 to 28 and June 20 to 23, 1989. Chip-samples were taken from 13 different quartz vein occurrences, quartz-vein wall rock with quartz veinlets (2 samples), and mafic flows with traces of chalcopyrite (2 samples). Four samples were analyzed for 30 elements by I.C.P. and for gold by fire assay; 14 samples were analyzed for gold by atomic absorption.

Property Geology: The IG claim group is underlain by a steep dipping, west-northwest-striking, heterolithic succession that includes basaltic, andesitic(?) and amphibolitic volcanic flows, limestone, and meta-sedimentary rocks consisting of quartzite, siltstone and meta-argillaceous rocks. These comprise part of the upper unit of the Cache Creek Group, which is Carboniferous and Permian in age.

Regional Mineralization: The claims group is located near the south-central part of a roughly circular area with a diameter of 23 km, that covers 30 occurrences of gold and related mineralization in quartz veins. Two of these are proximate to the claims group: the Morning Glory occurrence, located 1 km to the southwest, comprises an 1.8 m thick quartz vein striking northwesterly, with up to 1.9 oz/t gold; The Ruby Gold occurrence, located 1.25 km to the west, consists of a 3.4 m thick quartz vein with free gold.

The Imperial Group of claims, overstaked by the central EHU claim, covers at least 18 quartz veins, 2 to 29 cm thick, generally striking east-northeasterly, and with 9 ppb to 5.5 oz/ton gold. The veins were explored by three adits and two shafts. A total of 200 tons of ore grading 0.33 oz/ton gold and 0.05 oz/ton silver were produced from the veins (and wall rock) between 1903 and 1906.
Property...Mineralization: Thirteen quartz veins were rediscovered during this survey, in the north half of the EHU claim and southwest corner of the IG 2 claim. Most of these were explored during the turn of the century by small pits and shallow shafts on the old Densy, Three Tramps and Iron Cap claims groups.

Analyses of chip samples show that one of these quartz veins contains highly anomalous gold (710 ppb), six veins contain weakly anomalous concentrations of gold (31 to 116 ppb), and six veins contain low background gold (1 to 8 ppb). The quartz veins vary in width from 6 to 130 cm. The vein with 710 ppb gold is 8 cm thick, strikes northeasterly (040°), and forms one of four veins exposed above the Densy adit just north of the Imperial Group of claims.

The quartz veins strike northwesterly to northerly to northeasterly. They do not appear to have a simple relationship to any of a large number of fault-controlled, topographic lineaments that transect the area. Five of the quartz veins, together with those on the British Empire and Dominion claims, occur within an area about 250 m wide, east-west, and 1050 m long, north-south. Perhaps the overall distribution of these quartz veins is controlled by two or more north-trending structures.

Recommendations for Future Exploration: These assume that some of the quartz veins sampled have potential for hosting ore grade concentrations of gold, which were not detected by chip-sampling because of the "nugget" effect:

1. Re-sample the quartz veins at the Densy, Three Tramps and Iron Cap(?) occurrences, to obtain sufficiently large volumes of sample to compensate for the suspected, gold "nugget" effect.
2. Map and chip-sample the veins and wall rocks in the Densy adit. Clear the portal of the upper adit on the Dominion claim; map and sample the adit.
3. Conduct a soil sampling survey for gold on the EHU claim along closely spaced, northwest-trending lines. Conduct a more detailed survey in the area of the veins on the British Empire and Dominion claims and at the Densy and Iron Cap(?) workings. Trench all anomalies.
4. Conduct VLF-EM and magnetometer surveys along the soil sample grid lines on the EHU claim to determine if the gold-bearing quartz veins are associated with a major structure.
5. Conduct detailed geologic mapping and prospecting surveys in the EHU claim and eastern half of the Baurb claim.
INTRODUCTION

Location, Physiography and Access:

The IG claim group is located 4.5 to 9.2 air-km west of the Vernon town-centre, south-central British Columbia, in the Vernon Mining Division (N.T.S. 82L/6W) (Figure 1).

The claim group spans the area between the border of Indian Reserve No.1, to the north, following a ridge crest, and the Vernon Creek valley and Beachcomber Bay on Okanagan Lake, to the south.

The IG claim group spans an elevation range of between 425 and 810 m ASL. The southern parts of the EHU and IG 2 claims cover a series of developed subdivisions near the shore of Okanagan Lakes. From the lake shore and the Vernon Creek valley, the slope rises to the northwest at generally between 20 to 25°, but to 30 to 35° in the west part of the Baurb claim. To the northwest of the rise, the northern part of the claims group covers rounded hills with swamps and ponds in the intervening lowlands. This part forms the ridge crest between Okanagan Lake and the Vernon-Armstrong valley.

Vegetation on the slopes of this semi-arid region, comprise sage brush and wild grass. In the northern parts of the claims group there are several stands of fir, alder and cottonwood trees. Strips of alder, hawthorne and willow trees follow portions of the dry creeks that drain southwards from the swamps and ponds along the ridge crest.

Outcrops of bedrock occur along the steeper portions of the secondary ridges and hill tops and flanks of the claims group. Talus aprons and residual soil occur between outcrops. However, the slopes in the central part of the IG 2 claim expose rare outcrops of bedrock and are covered by widespread overburden of sand and gravel with well-rounded boulders of a wide variety of lithologies, suggesting a distal source area.

Claims Information:

The IG claims group comprises three, four-post claims totalling 24 claim-units (Figure 2). The claims are 50%-owned by Gary Benvenuto and 50%-owned by Barbara Thomae, of 231 North Sea Avenue, Burnaby, B.C., V5B 1K6.

The claims data are as follows:

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<th>NO. OF UNITS</th>
<th>RECORD DATE</th>
<th>EXPIRY DATE</th>
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<td>IG 2</td>
<td>2884(7)</td>
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<td>July 18, '91</td>
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<tr>
<td>EHU</td>
<td>3168(5)</td>
<td>16</td>
<td>May 26, '89</td>
<td>May 26, '91</td>
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<tr>
<td>BAURB</td>
<td>3188(6)</td>
<td>4</td>
<td>June 21, '89</td>
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</table>

Notes: 1. After filing assessment work summarized in this report.

2. IG 2 claim reduced from 12 units to 4 units in 1989 as a result of 1989 assessment work.

The EHU claim overstages the Imperial Group of claims. This group includes three reverted Crown Grants: British Empire (L 2539), Royal Standard (L 2540) and the Dominion Fraction (L 2541), owned by myself (50%) and Barbara Thomae (50%).
FIGURE 1: 1:50,000-scale, topographic map (N.T.S. 82L/3W and 6W) showing the location of the 16 claims group, west of Vernon, south-central British Columbia. The contour interval is 50 feet.
FIGURE 2: Claims map showing the location of the IG Group, west of Vernon, south-central British Columbia.
History of Exploration on the IG Group:

The IG group covers a large number of shallow pits and several deeper shafts and one main adit that were driven to explore mineralization in the period 1897 to 1905. These include the Densy, Three Tramps and Iron Cap occurrences covered by Crown Grants that have since been cancelled. They were located in the areas now covered by the central and northeastern parts of the EHU claim and southwestern corner of the IG 2 claim (Plate I). The workings explore two types of mineralization:

1. Gold in quartz veins that vary in thickness from 4 cm to more than 1.3 m, and
2. Copper in zones within hornblendite or micro-"dioritic" flows with fracture-controlled pyrrhotite, magnetite and chalcopyrite.

In recent years, the area of the IG claims group appears to have had a history of staking and re-staking without filing assessment work. Thus, no exploration work has been documented in the public records for this area, since 1905.

Exploration on the Imperial Group of claims by B. Thomae and myself in 1987 and 1988 included collection of 18 chip-samples across quartz veins and 56 chip-samples across adjoining wall rocks in the main adit and "upper cut" on the British Empire claim and in the uppermost adit on the Dominion Fraction (results are discussed below). In addition, 108 soil samples were collected over a 250 m x 500 m area and analyzed for Au, Ag and As. Highly anomalous gold in soil samples occurs in a 100 to 180 m wide (east-west) by 200 m long (north-south) area encompassing the main workings. The survey also detected anomalous gold in nine soil samples along the most easterly and westerly grid lines.

Summary of the 1989 Work Program on the IG Claims Group:

Reconnaissance-scale geologic mapping, prospecting and rock sampling surveys were conducted on the IG claims group by B. Thomae and myself on May 25 to 28 and June 20 to 23, 1989. The results of the surveys are shown on a 1:10,000 scale topographic map (Plate I).

During the surveys, a total of 18 rock samples were collected for analyses: 14 samples of 13 separate quartz veins, 2 samples of quartz-vein wall rock with quartz veinlets, one sample of amphibolite with traces of chalcopyrite, and one sample of micro-"diorite" with pyrrhotite (see Appendix 1 for sample descriptions). Four samples were analyzed by Acme Analytical Laboratories of Vancouver for 30 trace elements by I.C.P and for gold by fire assay with an atomic absorption "finish". The remaining 14 samples were analyzed by Acme Labs for gold by atomic absorption (see Appendix 2 for certificates of analyses).

The purpose of the survey was to determine the overall succession of the lithologic units on the claims and locate and sample quartz veins or other mineralization explored by the turn-of-the-century workings.
REGIONAL MINERALIZATION:

The IG claims group is located near the south-central part of a roughly circular area with a diameter of 23 km, that covers 30 occurrences of gold and related mineralization. The area is centred on the north end of Okanagan Lake (Jones, 1959, Map 1059A). These occurrences comprise quartz veins containing gold and commonly silver, associated with one or more of the sulphides - pyrite, chalcopyrite, galena, sphalerite, arsenopyrite, and locally tetrahedrite or pyrrhotite. The quartz veins vary from 0.15 to 3.4 m wide, but generally 0.7 to 1.8 m wide. They strike northerly to northeasterly and are hosted by a variety of lithologies.

There are three main gold occurrences proximate to the IG claims group (see Figure 2 for location):

The Morning Glory occurrence is located about 1 km southwest of the southwest corner of the Baurb claim. According to B.C.D.M. Annual Reports for 1896 and 1897, The occurrence comprises a 1.8 m wide quartz vein with up to 1.9 oz/t gold. The vein occurs in granite, and contains arsenopyrite, pyrite, chalcopyrite, galena (?) and free gold. It strikes N 50° W.

The Ruby Gold occurrence is located about 1.25 km west of the Baurb claim, and apparently proximate to a road that is under construction as part of a proposed sub-division and development. The occurrence comprises a 3 to 3.7 m wide quartz vein with free gold and minor pyrite, that occurs in schist. The vein breaks up into a number of quartz stringers at the bottom of a 9.1 m deep shaft collared on the vein (B.C.D.M. Annual Report for 1897).

The Rex occurrence is located just north of the northeastern corner of Beachcomber Bay and about 100 to 200 m east of the EHU claim. According to the B.C.D.M. Annual Report for 1899, an 8 m deep shaft was driven on a banded quartz lead with free gold. There is, however, some confusion between mineral occurrences on the cancelled Rex Crown Grant (L3328) and the cancelled Three Tramps Crown Grant (discussed below), both of which formed part of the Three Tramps Group.

There are three main groups of old workings that explore gold-bearing quartz veins on the IG claims group and the Imperial Group:

The Imperial Group (consisting of the Royal Standard, Dominion Fraction and British Empire claims) is over-staked by the central portion of the EHU claim. The reverted Crown Grants cover three adits, 130 m, 60 m and 7.5 m long, and two main shafts located within a 70 x 250 m area (Plate I). This exploration was conducted between 1901 and 1906 and appears to have been centred on two, main gold-bearing quartz veins, about 27 and 29 cm thick, and striking northerly. Between 1903 and 1906, a total of 200 tons of ore were produced from these workings. The ore graded 0.33 oz/ton gold and 0.05 oz/ton silver.

The Imperial Group workings expose 18 narrow, gold-bearing quartz veins that commonly vary from 2 to 13 cm thick, and contain from 9 ppb Au to 5.5 oz/ton gold. The relatively erratic variation of gold concentrations in the veins probably reflects the difficulties in obtaining sufficient volumes of sample to overcome the
"nugget" effect. Wall rock adjoining the veins contain from 1 to 2,400 ppb Au. The two best length-weighted averages for samples from the adit on the British Empire claim are:

- 0.13 oz/t gold over 3.27 m
- 0.47 oz/t gold over 1.07 m

The veins contain up to 1 to 2%, disseminated pyrite and arsenopyrite. They commonly form lenses that pinch and swell along shears and fractures, and are locally tightly folded. The majority (13 of 18) of the veins strike between 065° and 085° and dip from 70° northerly to 75° southerly. The two thickest veins (27 and 29 cm) strike northerly and dip steeply to the east. Chip-sampling in 1987 indicates they contain only 9 and 440 ppb Au. These two north-trending veins, however, appear to have been the source of the 1903-06 production from the workings.

**GEOLGY**

**Introduction:**

The IG claim group is underlain by a steep dipping, west-northwest-striking heterolithic succession of volcanic flows, limestone and meta-sedimentary rocks comprising part of the upper unit of the Cache Creek Group, which is Carboniferous and Permian in age (Jones, 1959). Reconnaissance geologic mapping of portions of the claims suggest the succession, at least in part, comprises the following, from the southwest to northeast (Plate I):

- **Meta-basaltic flows**, which form a prominent hill and steep-sided ridge in the southwestern half of the Baurb claim.
- **Meta-sedimentary rocks**, comprising a complexly interbedded and intergradational succession that includes quartzite, "dirty" quartzite, siltstone, meta-argillaceous siltstone, meta-argillite and at least two intervals of limestone. This succession appears to underlie the southwestern half of the EHU claim, and appears to host most of the significant occurrences of gold-bearing veins on the claim group.
- **Andesitic and basaltic flows** are exposed in the north-central part of the EHU claim.
- **Hornblendite** complexly interlayered with hornblende-actinolite(?)—amphibolite, micro-"diorite" and meta-basalt and feldspar porphyritic andesite(?) in the northeastern EHU claim and southwestern IG 2 claim. These rocks may comprise thick flows. They host at least one significant occurrence (Three Tramps) of quartz veins with anomalous gold. In addition, a large number of old pits and shallow shafts explored these rocks for copper mineralization.
- **Limestone and argillaceous limestone**, which form a major unit at least 1.5 km wide in the IG 2 claim.

The contact relationships between these major lithologic units were not observed.

Bedding is rarely apparent in the meta-sedimentary rocks and limestone. Layering with the flow units was not observed. Measurements of the orientation of bedding planes in portions of the major limestone unit in the IG 2 claim suggest that this unit strikes from 105 to 135° and dips steeply southwest to vertically.
However, interpretation of aerial photographs suggest that the prominent feldspar porphyritic andesite flow in the southwestern IG 2 claim, strikes about 125° but dips 60° to the northeast.

**Lithologies:**

**HORNBLENDITE/AMPHIBOLITE:**

Hornblendite and hornblende-actinolite(?) amphibolite is near black on a fresh surface. It is medium to coarsely (to locally finely) crystalline (subhedral) hornblende (up to 95%) and variable proportions of actinolite(?) (up to 50%). The hornblende crystals are locally up to 3 to 4 cm long and appear sub-aligned. Locally, there is up to 5%, epidote-altered feldspar, interstitial to the hornblende crystals. The rock is weakly to strongly magnetic and contains up to 1 to 3%, medium grained, disseminated pyrrhotite. Locally, the amphibolite contains up to 3% disseminated pyrite crystals up to 4 x 4 mm and a few percent magnetite.

The amphibolites locally appear to grade into meta-basalt. This suggests they form part of recrystallized, thick flows within the succession.

The hornblendite is locally cut by calcite veinlets; calcite also locally forms the matrix to hornblende crystals. Pyrrhotite or magnetite (with pyrrhotite) stringers appear fairly common. Rusty fractures are generally abundant.

Jones (1959) indicates that "hornfels" is one of the contact metamorphic equivalents of rocks in the Cache Creek Group. Thus, the hornblendite might by a contact metamorphic rock. However, no intrusive rocks are exposed in the immediate area of the hornblendite.

**META-BASALT:**

Meta-basalt consists of very dark grey to medium to dark grey-green, very fine to fine grained, moderately to strongly sericite-epidote-chlorite-, to strongly sericite-biotite(?)-altered mafic and feldspar crystals. Locally, the basalt contains up to 10% feldspar phonocrysts. Locally, it contains up to 5%, quartz or calcite-filled amygdules. It is weakly to non-magnetic.

The basalt appears to be closely associated with microdiorite-textured rocks, which may be a coarser grained phase of the basalt.

The meta-basalt appears weakly sheared or cut by an incipient schistosity. It is commonly cut by 1 to 3%, calcite-filled fractures. Generally, the basalt is cut by abundant rusty fractures.

**ANDESITE:**

Flows of andesitic(?) composition occur in the north-central EHU claim. The rock is sub-brittle, and very dark to locally light (greenish) grey on a fresh surface. It is very finely crystalline, and locally amygdaloidal, with up to 1 to 2%, quartz-filled amygdules. The lighter coloured andesite is strongly calcite-altered.

The andesite commonly contains about 0.5% disseminated pyrite. Rusty fractures commonly cut the rock.
FELDSPAR PORPHYRY ANDESITE(?) / MICRO-“DIORITE” FLOW(?)

This flow(?) crosses the southwest corner of the IG 2 claim and forms a series of small, prominent, steep sided hills that can be traced on aerial photographs for at least 3 km. It is possible that the andesite/micro-diorite comprises a dyke, however, Jones (p.40, 1959) indicates that porphyritic (augite) andesite with fine grained diorite phases commonly form flows (within the limestone division of the Cache Creek Group). Flow breccias, which are common within the flows according to Jones (1959), however, were not observed on the IG 2 claim. Quartz and calcite veins and veinlets, which occur locally in the other lithologies, do not appear to occur within this andesite/micro-diorite flow.

Feldspar Porphyry Andesite(?)

Porphyritic andesite appears to form the southwestern flank of the flow(?). It forms higher relief hills than the flanking micro-diorite. Aerial photograph interpretation suggests that the andesitic part of the flow varies from 30 to 85 m wide, but generally is 50 m wide.

The andesite(?) comprises a medium orange-brown and white speckled, strongly iron-carbonate(?) -clay(?) -altered groundmass and about 10%, white feldspar phenocrysts commonly up to 3 to 5 mm in diameter. It may be a marginal phase of the micro-diorite immediately to the northeast.

Micro-"diorite”:

Micro-"diorite” locally forms prominent hummocks or small hills. Aerial photographs suggest the micro-"diorite” has a strike-length of at least 1 km and has a width that varies from 50 m to possibly 180 m. It appears to occur on the northeasterly flank of the porphyritic andesite, which may be a marginal phase of the diorite-textured flow(?). In addition, micro-diorite-textured rocks occur in the northern part of the EHU claim, where they appear to be coarser grained equivalents of the basaltic flows.

The micro-"diorite” of the flow(?) in the southwestern IG 2 claim is moderately hard and comprises finely to medium crystalline, strongly sausserite(?) -altered feldspar and 5 to 10% biotite. Where the micro-"diorite” occurs in association with meta-basalt, it contains up to 35 to 50% hornblende, which form criss-crossing laths. On a fresh surface it varies from medium grey-green to "salt-and-pepper”. It generally weathers a dark rusty brown. It is weakly to non-magnetic, and locally(?) contains a few percent disseminated pyrrhotite grains. The rusty weathering colour results from abundant fractures lined with pyrrhotite.

LIMESTONE:

The limestone is finely crystalline and appears completely recrystallized. It generally varies from dark to medium grey on a fresh surface. The limestone appears to be commonly meta-argillaceous, where it weathers a buff colour. Locally, the limestone contains up to 5 to 10%, clear grey calcite crystals that are elliptical in cross-section. These may be deformed crinoid columnals.
The limestone forming the northwest-trending ridge in the west-central part of the IG 2 claim is generally delicately laminated and very thinly to thinly bedded. The limestone capping the western part of the split hill in the northwest corner of the IG 2 claim varies from thin to medium(?), bedded, and is locally laminated. It contains rare quartz veinlets that appear parallel to bedding. The bluff-forming limestone capping the eastern part of the hill is not distinctly bedded. This limestone is dark grey and appears non-argillaceous.

The limestone is commonly cut by a moderately to strongly developed fracture-shear cleavage which comprises an anastomotic series of very closely spaced (1 mm or less) planes. The limestone is also commonly cut by 3 to 4%, criss-crossing, calcite-filled fractures and deformed veinlets up to 4 cm thick. The fractures are locally limonite-stained. Rare quartz veinlets also cut limestone.

META-SEDIMENTARY ROCKS:
The complex array of meta-sedimentary rocks in the central part of the EHU claim comprise interbedded to intergradational quartzite, "dirty" quartzite (meta-quartzo-feldspathic siltstones and sandstones), siltstone, argillaceous (graphitic) siltstone and quartzite, meta-argillite and cherty argillite. The succession also includes several major intervals of limestone.

The siltstones are generally strongly iron-carbonate-sericite-altered and contain 2 to 3%, disseminated, limonitic specks. They are commonly cut by rusty, limonite-stained, calcite-filled fractures.

More detailed descriptions of the meta-sedimentary rocks exposed by the underground workings in the British Empire and Dominion Fraction claims are provided in my assessment report on the Imperial Claims Group, (Benvenuto, 1987).

MINERALIZATION:
Introduction:
Thirteen quartz veins were re-discovered in the north half of the EHU claim and southwest corner of the IG 2 claim. Most of these veins were explored during the turn of the century by small pits and shallow shafts (Plate I).

Analyses of chip samples show that one of these veins contains highly anomalous gold (710 ppb), six veins contain weakly anomalous concentrations of gold (31 to 116 ppb), and six veins contain low background gold (1 to 8 ppb) (Appendices 1 and 2). The quartz veins vary in width from 6 to 130 cm. The vein with 710 ppb gold is 8 cm thick and strikes northeasterly (040°). It forms one of a series of at least four veins of the Densy occurrence in the west-central part of the EHU claim.

Five of the quartz veins, together with those on the British Empire and Dominion Fraction claims, occur within an area that is about 250 m wide, east-west, and 1050 m long, north-south. It may be that the overall distribution of the volume of rock containing most of the quartz veins is controlled by two or more north-trending structures. However, the orientation of the veins within
this area is variable: two veins strike northerly, two northwesterly and one northeasterly. In the main adit on the British Empire claim all but one of the 12 veins strike east-northeasterly. It is interesting to note that the four thickest veins (27, 29, 94 and 130 cm) within this area, are all north-trending, parallel to the most abundant aerial photograph lineaments. Resolution of the vein structures and discovery of additional veins within this north-trending zone will be hampered by the extensive overburden that occurs between the north end of the Dominion Fraction and the north end of the EHU claim.

The thirteen quartz veins are all relatively similar in appearance. The quartz is milky white and moderately to strongly fractured. Patches of limonite occur along most of the fractures, which form a complex, criss-crossing array. However, there is usually a more strongly developed fracture-cleavage that is parallel to the contacts of the vein. Limonite also occurs in angular pockets and vugs that may have originally been calcite crystals. Sulphides rarely occur, or are preserved in the quartz veins. One narrow vein in the southwestern IG 2 claim contains 0.5% chalcopyrite (Sample 3038: 34 ppb Au over 13 cm). Two other veins contain about 0.5% pyrite disseminated along fractures.

The contact between the quartz veins and the wall rocks commonly appears sheared. In addition, the veins appear deformed and have a wavy form. Some of the veins are clearly offset or truncated by small-scale faults.

The three main occurrences of quartz veins located on the EHU claim are as follows:

**Densy:** The Densy quartz veins are located in the west-central part of the EHU claim and near the north boundary of the Dominion Fraction. They were covered by the cancelled (1939) Densy Crown Grant. The B.C.D.M. Annual Report for 1899 (p. 746) states that a 40 m long adit was driven on three narrow quartz veins with free gold and 0.97 oz/t gold; one vein is up to 1.8 m thick.

Four quartz veins are exposed in outcrops above the adit and 13 to 75 m southeast of the portal. The adit is accessible, but requires detailed mapping and sampling. From west to east, these are:

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Quartz vein Thickness (cm)</th>
<th>Strike/Dip</th>
<th>PPB Gold</th>
<th>Distance to Next Quartz Vein</th>
</tr>
</thead>
<tbody>
<tr>
<td>3040</td>
<td>2.5 to 10</td>
<td>032°/70°SE</td>
<td>3</td>
<td>15.4 m</td>
</tr>
<tr>
<td>3042</td>
<td>up to 8</td>
<td>040°/90°</td>
<td>710</td>
<td>0.5 m</td>
</tr>
<tr>
<td>3041</td>
<td>4 to 21 (SW)</td>
<td>185°/73°W</td>
<td>37</td>
<td>23.0 m</td>
</tr>
<tr>
<td>3043</td>
<td>≥ 130</td>
<td>173°/??</td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>

The narrow quartz vein (8 cm) with highly anomalous gold (710 ppb) resembles the other three veins in appearance.

The Densy veins are hosted by strongly iron-carbonate-sericite-altered, "dirty" quartzite with up to 1 to 2% disseminated pyrite and/or arsenopyrite. The 3041 quartz vein occurs in strongly iron-carbonate-sericite-altered, argillaceous siltstone.
These meta-sedimentary rocks appear to form part of the same lithologic unit that contains the quartz veins on the British Empire and Dominion Fraction claims, 220 to 250 m to the southeast. It appears from the waste rock from the Densy adit that very little quartz veining was intersected. However, the adit may be too short to have reached the most easterly, and thickest vein exposed on surface.

**Iron Cap(?):** The B.C.D.M. Mineral Inventory Map (82L/SW) indicates that the quartz veins exposed in the north-central part of the EHU claim may have originally been covered by the Iron Cap cancelled Crown Grant. Two quartz veins were explored with shallow pits and a shallow shaft, 600 and 650 m northeast and north of the Densy adit.

The thickest vein is exposed on the north wall of a 1.5 m deep shaft filled with garbage (sample site #3052). The vein is 94 cm thick and dips 75" SW. A chip sample across the vein (#3052) yielded weakly anomalous concentrations of gold (116 ppb). Quartz vein float 26 m to the northwest of the shaft suggests the vein strikes about northwesterly (300°). The basaltic flow rock in the immediate walls of the vein appears strongly iron-carbonate-sericite-altered.

About 235 m to the northwest of the #3052 vein, a series of three shallow pits explored a narrow quartz vein along 31 m of its strike (estimated as 150°). The vein (sample site #3053) is not exposed in any of the pits, but pieces of quartz vein material beside them suggest the vein averages about 6 to 10 cm in thickness. A composite chip sample across about 20 pieces of the quartz vein yielded background concentrations of gold (7 ppb). The host rock appears to be quartzite with minor disseminated pyrite.

**Three Tramps:** The cancelled (in 1939), Three Tramps Crown Grant now covered by the northeastern corner of the EHU claim, is the site of an inclined shaft exploring two quartz veins and a shaft exploring amphibolite with chalcopyrite.

The inclined shaft (sample sites #3047 to 3050) is about 2.5 m deep and driven down the footwall of quartz vein that strikes 223° and dips 45° northwest. The vein is generally 7 to 8 cm thick, but up to 17 cm thick in the centre of the shaft. On the northwest corner of the shaft, the vein is 5 cm thick, but underlain to the south, by 7 cm of limonitic, strongly sheared rock, then a 9 cm thick quartz vein. A chip-sample (#3048) across the 8 to 17 cm thick vein contained only background concentrations of gold (8 ppb).

The quartz vein occurs at the sheared contact between a micro-"diorite" dyke or flow, in the hanging wall, and an amygdaloideal(?), basaltic flow, in the footwall. The 20 cm of micro-"diorite" adjoining the vein is moderately iron-carbonate-altered. The 2 m interval of basalt in the immediate footwall of the vein and on the east wall of the shaft, is moderately to strongly fractured, deeply weathered and very strongly iron-carbonate-sericite-(pyrite-) altered, with alteration intensity decreasing away from the vein. This interval of footwall rock contains, overall about 1%, sheeted quartz veinlets, generally 1 to 6 mm
thick and oriented parallel to the main quartz vein. The 0.9 m wide interval adjoining the vein contains minor quartz veinlets; a chip-sample (#3049) across this interval yielded 40 ppb gold (weakly anomalous). The interval 0.9 to 1.7 m from the footwall contact of the vein contains about 3 to 4% quartz veinlets, one of which is 4 cm thick. A chip sample (#3050) across this 0.8 m wide interval of footwall rock contained 4 ppb gold (low background).

On the west wall of the inclined shaft, near the southwest corner, there is a second quartz vein that is 10 to 18 cm thick. It strikes 163°, or 60° from that of the main vein, and dips 37° southwest. A chip-sample (#3047) across the 10 to 18 cm thick vein contained 1 ppb gold.

A third quartz vein is exposed about 15 m southeast of the inclined shaft. Little or no work appears to have been done on this vein, which is poorly exposed over a 0.5 x 0.7 m area. The quartz vein appears to be at least 41 cm thick, strikes about 205° and dips about 25° northwest. It, however, appears fault-bounded to the north and to the east. A chip-sample across 41 cm (#3051) yielded 1 ppb gold.

The other main working on the old Three Tramps claim is a shaft located on the south side of the main old ranch road through the EHU claim; the shaft is filled with garbage to within 2 m of its collar. From the dump, which is 8 m in diameter, it appears the shaft explored for copper mineralization in hornblende-actinolite (?) amphibolite. Traces of chalcopyrite occur as disseminated grains or along minor pyrrhotite or minor magnetite stringers up to 3 mm thick, that cut the hornblende. A grab-sample (#3045) of this type of rock, contained only 17 ppb gold (not analyzed for copper). Interestingly, the B.C.D.M. Annual Report for 1899 (p.746) reports that at a depth of 10 m a shaft on the Three Tramps claim intersected “copper ore of good grade”.

Several old pits and a shallow shaft also explore a pyrrhotitic, micro-“dioritic” flow for its copper mineralization, in the southwest corner of the IG 2 claim, about 700 m northeast of the shaft at sample site #3045. However, a chip-sample (#3037) across 1.45 m in the north wall of the shallow shaft, contained only 43 ppm copper (and 7 ppb gold).

Conclusions:

There appears to be a discrepancy between the fact that most of the quartz veins sampled as part of this survey were explored with pits, shafts and an adit during the turn-of-the-century, and the fact that my samples contained only low background to weakly anomalous gold concentrations (1 to 116 ppb), with one exception (710 ppb). Furthermore, the B.C.D.M. Annual Report for 1899 indicates that the Densy claim veins contain up to 0.97 oz/ton gold, whereas the highest concentration of gold in our sampling of the surface exposures of the veins was only 710 ppb gold. It is possible that the turn-of-the-century exploration work was part of a scam. However, it seems more likely that gold was not detected by our sampling in some of the veins because of the “nugget” effect, which is clearly reflected in the gold assays of samples of veins in the adit in the British Empire claim.
LINEAMENT ANALYSIS FROM AERIAL PHOTOGRAPHS:

A study of the distribution and orientation of lineaments on aerial photographs was made for the area of the property. The purpose of this analysis was to determine if the gold-bearing veins in the underground and surface workings on the British Empire and Dominion Fraction claims are associated with a distinctive pattern of lineaments and/or a prominent structure(s) with topographic expression. Recognition of these might aid in exploration on the property, of the strike-projections of the veins in the underground workings and identification of analogous structural settings of the veins on the IG claim group.

A total of 133 aerial photograph lineaments were identified and their trends measured (Figure 4). The trends of the lineaments were divided into five main sets on the basis of visual inspection of the lineament map and by identification of inflections of a log-probability plot of the trends (Figure 3), as follow:

<table>
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<tr>
<th>RANGE OF TRENDS OF LINEAMENT SET</th>
<th>AVERAGE TREND OF SET</th>
<th>PERCENTAGE OF TOTAL LINEAMENTS (132)</th>
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<tr>
<td>335 - 0 - 022&quot;</td>
<td>002°</td>
<td>39%</td>
</tr>
<tr>
<td>023 - 067&quot;</td>
<td>047°</td>
<td>26%</td>
</tr>
<tr>
<td>068 - 102&quot;</td>
<td>084°</td>
<td>11%</td>
</tr>
<tr>
<td>103 - 120&quot;</td>
<td>112°</td>
<td>4%</td>
</tr>
<tr>
<td>121 - 155&quot;</td>
<td>134°</td>
<td>20%</td>
</tr>
</tbody>
</table>

The high-grade gold-bearing quartz veins in the workings on the British Empire adit have an average strike of about 075°. This strike is sub-parallel to the set of prominent lineaments with an average trend of 084°, shown in Figure 5, in which all northerly trending lineaments are removed for simplicity. The three prominent lineaments with an east-northeast trend (A, B, and C in Figure 5) in the area of the adit, are defined by very prominent breaks in slope that parallel the north coast of Okanagan Lake in this area. It is interesting to note that the two quartz veins exposed in the southwest corner of the IG 2 claim (#2, Figure 5) occur along one of these linears (C), even though the veins strike 000° and 105° and are not parallel to the linear. The area of linear C appears, on this basis, to warrant additional exploration. However, northeast of the quartz veins in southwestern IG 2, extensive overburden covers linear C.
FIGURE 3: Log-probability plot of cumulative % of number of lineaments trends.

- Average = 47° (26%)
- Average = 84° (11%)
- Average = 112° (6%)
- Average = 154° (20%)
- Inflection Point
- (335° - 0° - 22°) Average = 5° (3% of total)
- (23° - 67°)
- (67° - 102°)
- (102° - 120°)
- (120° - 155°)

Log-Probability of Cumulative % of Number of Lineament
FIGURE 4: Aerial photograph topographic lineaments on, and proximate to the Baurb, Eh-U, and IG 2 claims. The inset shows the average trend and percentage of linears of the total (133) for each of the five sets of linear trends determined from a log probability plot.
FIGURE 5: Aerial photograph lineaments on and proximate to the Baurb, Eh-U and IG 2 claims. The set of linears with trends between 355°-0°-22° is not included to emphasize a possible relationship between the location of quartz veins and east-northeast-trending linears.
RECOMMENDATIONS FOR ADDITIONAL EXPLORATION:

The following recommendations are based on the assumption that some of the quartz veins sampled have potential for hosting ore grade concentrations of gold, which were not detected by our chip samples because of the "nugget" effect:

1. Re-sample the quartz veins comprising the old Densy, Three Tramps and Iron Cap(?) occurrences, obtaining sufficiently large volumes of sample to attempt to compensate for the suspected "nugget" effect on the distribution of gold.

2. Map and chip-sample the veins and wall rocks in the Densy adit. In addition, the portal of the upper adit on the Dominion Fraction claim should be cleared and the adit mapped and sampled.

3. Conduct a soil-sampling survey for gold on the EHU claim along closely spaced, northwest-trending lines. A more detailed survey should be conducted in the area covering the vein occurrences on the British Empire and Dominion Fraction claims and at the Densy and Iron Cap(?) workings. All anomalies should be trenched where feasible.

4. Conduct V.L.F. E.M. and magnetometer surveys along the soil sample grid lines on the EHU claim to determine if the gold-bearing quartz veins are associated with a major structure.

5. Conduct detailed geologic mapping and prospecting surveys in the EHU claim and eastern half of the Baurb claim.
REFERENCES


Okulitch, A.V. and Woodsworth, G.J., G.S.C. Open File Map #481.
APPENDIX 1

ROCK SAMPLE DESCRIPTIONS
IG Claims Group

3036: Quartz vein material from waste rock beside small, shallow pit in northwestern EHU claim. No bedrock exposed in pit. Quartz is milky white and cut by a few limonite-stained fractures. Chip sample across the largest boulder, 28 cm wide (smallest dimension).

46 ppb Au, 139 ppm As.

3037: Micro-"diorite" with fracture-pyrrhotite exposed in small shaft in southwest IG 2 claim. Shaft: 1.5 x 1.75 x 2.1 m deep. Micro-"diorite": salt and pepper textured, finely crystalline, weakly magnetic, sausserite(?)-altered feldspar and 5% biotite; cut by abundant rusty fractures lined with pyrrhotite. Micro-"diorite" contains locally up to a few percent disseminated pyrrhotite. It is strongly fractured (fractures with a variety of orientations) and cut by two narrow shears striking about 245°, dipping 40° NW. Chip across 1.45 m (northeast wall of shaft).

7 ppb Au.

3038: Quartz vein in outcrop along ranch road, SW IG 2 claim. 6 to 13 cm thick, milky white quartz, strongly fractured, with about 0.5% copper stains and about 0.5%, fine to medium grained chalcopyrite disseminated along fractures cutting quartz. Quartz vein exposed on north side of, and in centre of road. Vein sporadically exposed along 3.7 m of strike-length. Vein strikes 180° and dips about 80° W. Main vein with 1 or 2 quartz veinlet splays into hanging wall of main vein. Chip sample across 13 cm thick part of the vein.

34 ppb Au, 1.7 ppm Ag, 1104 ppm Cu.

Host rock: strongly sericite-chlorite-altered, very fine grained, meta-basalt(?) with 1-3%, calcite-filled fractures.

3039: Quartz vein, in outcrop along ranch road in SW IG 2 claim. Vein 22 to 24 cm thick, milky white, moderately fractured, cut by a few rusty fractures; minor, small drussy, rusty vugs; one patch of copper stain. Vein strikes 285° and dips 85° north; exposed along 2.5 m strike-length. Chip sample across 24 cm.

5 ppb Au.

Host rock: meta-basalt(?): sericite-chlorite-altered, weakly sheared; rare feldspar phenocrysts; weakly to non-magnetic.

3040: Quartz vein in outcrop, 12.6 m SE of Densy adit portal, central EHU claim. Vein 2.5 to 10 cm thick, exposed along 1.4 m strike-length; strikes 032° and dips 70° SE. Quartz is milky white with 2 to 4%, irregular, limonite patches in discontinuous, irregular fractures; about 1%, irregular vugs with limonite.
stains; trace of fine to medium-grained, disseminated pyrite (with black oxide coating). Chip sample across 10 cm.

3 ppb Au.

Host rock: "dirty" quartzite: strongly iron-carbonate, weakly sericite-altered, moderately fractured. Fresh colour is light grey-buff.

3041: Quartz vein: in outcrop 5.4 m east of #3940. Vein is 4 cm (to SW) to 21 cm thick; 2.75 m of strike-length exposed (~25% exposure). Vein is somewhat irregular and wavy; strikes 185° and dips about 73° west. It resembles vein 3040; with about 1%, medium grained, disseminated pyrite (sub-hedral). Vein is moderately fractured and with 2-3% limonitic fractures. Chip sample across 21 cm.

37 ppb Au.

Host rock: dark grey, meta-argillaceous, siltstone(?): strongly iron-carbonate-sericite-altered; strong fracture-cleavage, which strikes 135° and dips about 80° SW.

3042: Quartz vein: up to 8 cm thick, and exposed 0.5 m west of main vein 3041, along 0.7 m. Vein appears to be a lens (faulted?); strikes 040° and dips about 90°. Quartz resembles that of 3041 Chip sample across 8 cm.

710 ppb Au.

3043: Quartz...vein: at least 1.3 m thick, located about 45 m southeast of 3042. Vein partly exposed in very small cut. Float scattered along hillside for 32 m suggests vein strikes about 173°. Only easterly contact of vein exposed in cut. Vein: milky white and with 1-3%, limonitic stained fractures and lenses. Quartz is strongly to moderately fractured, with a criss-crossing fracture cleavage; one set of which appears more strongly developed parallel to the strike and dip of the vein. Chip sample across 1.3 m thick vein.

31 ppb Au.

Host rock: "dirty" quartzite: light buff, very strongly iron-carbonate-sausserite(?)-altered, with 1 to 2%, disseminated, fine to very fine-grained pyrite and/or arsenopyrite; abundant limonitic fractures; moderately fractured; poorly exposed.

3044: Quartz...vein: about 4 to 6 cm thick; exposed for 0.8 m of strike-length, in the north-central EHU claim. The quartz is milky white and cut by a few rusty fractures. It is moderately to strongly fractured, and contains about 1%, angular, rectangular vugs. Chip sample across 6 cm.

2 ppb Au.

Host...rock: Andesite(?) flow(?): very rusty weathering, dark to light grey, strongly sausserite(?)-altered, very finely crystalline, sub-brittle, cut by abundant rusty fractures.
3045: **Amphibolite**: waste rock around garbage-filled, 2 m deep, pit along main ranch road, in northeastern EHU claim and in cancelled Three Tramps Crown grant. Amphibolite varies from hornblendite to hornblende-actinolite (?) amphibolite. It is medium grained, equigranular, and generally with 1 to 3%, fine grained, disseminated pyrrhotite. It is weakly to moderately magnetic, and locally cut by 1 to 2 stringers to 3 mm thick of massive pyrrhotite with traces of chalcopyrite, and locally stringers of massive magnetite to 2 mm thick. It is cut by abundant rusty fractures. Sample is a grab of hornblendite with 3% disseminated pyrrhotite and one pyrrhotite and one magnetite stringer.

17 ppb Au.

3046: **Quartz vein rubble**: located 43 m and 195° from 3036, in northwestern EHU claim. Rusty quartz vein material occurs in a 1 m diameter area and may have been collect from an old trench. Pieces are up to 10 cm wide. Quartz contains about 3 to 4%, fracture-controlled limonitic staining, and is very strongly fractured, milky white to locally translucent grey. Chip across largest piece, 10 cm wide (perpendicular to fracture-cleavage and rusty shear).

4 ppb Au.

3047: **Quartz vein**: in western wall of short inclined shaft, 42 m north of main ranch road, in northeastern EHU claim and Three Tramps cancelled Crown Grant. Vein is 10 to 18 cm thick, and exposed 1.1 m along strike. It strikes about 163° and dips 37° SW. The quartz is milky white and with a few percent, fracture-controlled limonitic stains; it is strongly fractured. Chip sample across 18 cm thick vein.

1 ppb Au.

3048: **Quartz vein**: forming back (north wall) of short inclined shaft; same location as 3047. Vein is generally 7 to 8 cm thick, but in the centre of the shaft, 17 cm thick. It is exposed for 2.7 m of strike-length and 2.5 m of dip-length. It strikes 223° and dips 45° NW. The upper and lower contacts of the vein appear sheared. It is very strongly fractured, white to locally sub-translucent grey, and contains about 5%, limonitic fracture-stains. On the west wall of the shaft, the vein is 5 cm thick, and underlain to the south by 7 cm of limonitic, strongly sheared rock, and then a second quartz vein, 9 cm thick. Chip sample across 8 to 17 cm thick vein.

8 ppb Au.

**Host rocks:**
In the hanging wall of the quartz vein: diorite dyke(?) with "salt and pepper" textured: 90%, very strongly saussereite(?) -altered feldspar and about 10% hornblende and minor quartz. Rock is non-magnetic. The 20 cm of diorite adjoining the vein is weakly to moderately iron carbonate-altered.

In the footwall: see samples 3049 and 3050.
3049: Sheeted quartz veinlets in altered mafic flow: ≤ 1% quartz veinlets in the interval 0 to 0.9 m into the footwall of the main quartz vein (3048); exposed in the east wall of the inclined shaft. Veinlets oriented parallel to main quartz vein.

Host rock: Amygaloidal(?), mafic flow: fresh colour is medium buff-grey; weathered colour is medium rusty orange. Mafic is very strongly iron carbonate-sericite-(pyrite-) altered, with about 0.5 to 1%, fine grained, disseminated pyrite. The carbonate-sericite alteration appears to decrease in intensity away from the quartz vein. Rock is moderately to strongly fractured.

Chip sample across 0.9 m (at right angle to main quartz vein). 40 ppb Au.

3050: Sheeted quartz veinlets in altered mafic flow 0.9 to 1.7 m into the footwall of the main vein (3048): about 3 to 4% quartz veinlets, generally 1 mm to locally 6 mm thick, except one veinlet, 4 cm thick. Veinlets are parallel to the orientation of the main vein (3048).

Host rock: see sample 3049.

Chip sample across 0.8 m of mafic flow with quartz veinlets, 0.9 to 1.7 m into the footwall of main vein. 4 ppb Au.

3051: Quartz vein: ≥ 41 cm thick, located 15 m south of inclined shaft in northeastern EHU claim (samples 3047 – 3050). Quartz vein is poorly exposed in a 0.5 x 0.7 m outcrop of the vein. It appears to form a fault-bounded (to the north and east) wedge. The vein comprises milky white quartz with 1 to 2%, weakly limonite-stained, criss-crossing fractures. The quartz is moderately to strongly fractured. The vein strikes about 205° and dips about 25° northwest. Chip sample across 41 cm exposure of the vein. 1 ppb Au.

3052: Quartz vein: 0.94 m thick; exposed in the north wall of a shallow, garbage-filled shaft beside an old, secondary ranch road in the north-central EHU claim. Exposure of vein is 1 m high. Quartz vein float about 26 m to the northwest suggests this vein strikes about 120° and the shaft exposure indicates it dips 75° southwest. The quartz is milky white, moderately to strongly fractured and contains about 0.5%, limonite fractures. It contains about 0.5%, stringer-like zones of clear grey quartz with 0.5%, disseminated, very fine grained pyrite along them. Chip sample across 0.94 m thick vein. 116 ppb Au.

Host rock: mafic flow(?): dark green-grey, finely crystalline(?) feldspar (and mafic grains). Rock is moderately sericite (feldspar) – strongly epidote-chlorite-altered. The mafic appears very strongly iron-carbonate altered in the walls of the quartz vein.

3053: Quartz vein rubble: in 1.5 m diameter pile halfway between two of three shallow pits in northwestern EHU claim. Quartz vein is not exposed in any of the 'pits', which occur along a distance of
31 m, along a line trending 150°. Quartz is milky white and with about 3%, limonite-filled, angular, irregular vugs (after weathered calcite(?)). Rubble suggests quartz vein is on the average, ≥ 6 to 10 cm thick. Composite chip sample from 20 cobbles and pebbles of quartz vein material.

7 ppb Au.

Host rock: quartzite: medium to light grey, with minor, disseminated pyrite and abundant rusty fractures.
GEOCHEMICAL ANALYSIS CERTIFICATE

ICP - 500 ppm sample is digested with 3ml 3:1-2 HCl-HNO3-H2O at 95 deg. C for one hour and is diluted to 10 ml with water.
This leach is partial for Na, K, Ca, Mg, Ba, Ti, Si, B and limited for Na, K and Al. Au detection limit by ICP is 5 ppm.

SAMPLE TYPE: ROCK  
ANALYSIS BY: FAXING FRO3, C. LEUNG, J. WANG; CERTIFIED B.C. ASSAYERS

DATE RECEIVED: MAY 29, 1989  
DATE REPORT MAILED: JUNE 9/89  
SIGNED BY: C. LEUNG, J. WANG; CERTIFIED B.C. ASSAYERS

GARY BENVENUTO PROJECT I.G.  
File # 89-1248

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Date: 1989-05-29  
Signed: ...
GEOCHEMICAL ANALYSIS CERTIFICATE

- SAMPLE TYPE: ROCK
- ANALYSIS BY ACID LEACH/AA FROM 10 GM SAMPLE.

SIGNED BY... D.TOYE, C.LBONG, J.WANG; CERTIFIED B.C. ASSAYERS

MINTREK EXPLORATION PROJECT IG 89 FILE # 89-1739

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APPENDIX 2

LIST OF EXPENDITURES
IG Claims Group
Work Periods: May 25 - 28 and June 20 - 23, 1989

WAGES:
G. Benvenuto, geologist:
4 field days + 1 travel day = 5 days
5 days @ $250./day = $1,250.
B. Thomae, geologist:
2 field days + 1 travel day = 3 days
3 days @ $175./day = $525.

$1,775..................$1,775 sub-total

TRANSPORTATION:
Coquilla Highway tolls: 2 x $10 = $20.
Mileage: 1,112 kms total x $0.25/km = $278
$298...........$298 sub-total

FOOD: 8 person-days x $25/person/day = $200 sub-total

ACCOMMODATION: $200 sub-total

ROCK ANALYSES:
14 rock samples, A.A. for Au: $119.

$185 sub-total

REPORT:
Writing: 1.5 days @ $250./day = $375.
Typing, reproduction, drafting: $200...

$575. sub-total

TOTAL EXPENDITURES: $3,234
CERTIFICATE OF QUALIFICATIONS

I, Gary L. Benvenuto, of the City of Burnaby, hereby certify that:

1. I am a consulting geologist with an office and residence at 231 North Sea Avenue, Burnaby, B.C., V5B 1K6.

2. I graduated with a BSc. degree in geology from California State University at Los Angeles, California in 1972, and with a PhD. degree in geology from Queen's University at Kingston, Ontario in 1978.

3. I am a fellow of the Geological Association of Canada.

4. I have practised exploration geology with Cominco Ltd. from May to October, 1979, and with Westmin Resources Ltd. from January, 1980 to April, 1985, and have practised as a consulting exploration geologist from May, 1985 to present.

Date: August 8, 1987

Burnaby, B.C.