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NAT JOINT VENTURE

# GEOLOGICAL AND GEOCHEMICAL REPORT

NUCLEUS 1-50 CLAIMS
(YA51189-51222, YA60256-60271)

DECEMBER, 1982

Claim Sheet 115I/6

Latitude 62°20'N; Longitude 137°20'W

W.D. Eaton, B.A., B.Sc.

Work done between May 29 and August 27, 1982



BOX 4127, 3125 THIRD AVENUE, WHITEHORSE, Y. T. Y1A 3S9

(403) 667-4415

This report has been examined by the Geological Evaluation Unit under Section 24(4) Yukon Quartz Mining Act and is allowed as representation work in the amount of $ 15,600.

P L Watson

for Regional Manager, Exploration and Geological Services for Commissioner of Yukon Territory.

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## INTRODUCTION

The Nucleus 1-34 claims were staked in August, 1980 to protect an area of anomalous gold and arsenic geochemistry lying immediately west of the Yukon Revenue porphyry copper property. In 1981, sixteen additional claims were staked and preliminary geological mapping, grid soil sampling and a magnetic survey were done. The work outlined several centres of strongly anomalous gold values (up to 3284 ppb Au) over a two sq km area and showed that the best values were associated with a zone of brecciation and alteration.

The 1982 program consisted of additional mapping, detailed soil sampling and reconnaisance chip sampling. It emphasized interpretation of bedrock geology in poorly exposed areas from rock fragments in soil, deep sampling to ensure that all soil samples were taken below an impermeable ash layer, and development of a comprehensive geological model for gold mineralization which is consistent with the structural setting, nature of intrusions, and alteration zonation. Geology around the Yukon Revenue occurrence was briefly examined so that comparison could be made between it and the geology at Nucleus.

## PROPERTY, LOCATION AND ACCESS

The Nucleus property consists of 50 contiguous mineral claims recorded in the Whitehorse Mining District as follows:

| Claim Name | Grant Numbers | Expiry Date |
|---|---|---|
| Nucleus 1-34 | YA51189-YA51222 | 19 February/84 |
| Nucleus 35-50 | YA60256-YA60271 | 1 March/84 |

The claims are located at latitude 62°20'N and longitude 137°20'W on NTS sheet 115I/6, 63 km northwest of Carmacks.

Access in 1982 was by helicopter in June and by 4-wheel drive truck using the Freegold-Revenue road system in August. The property is accessible from the end of the Freegold Road by two routes maintained by placer miners. One follows the ridge separating Big Creek from Bow Creek, while the other parallels the south bank of Big Creek. Both are useable in dry weather throughout summer and fall.

## PREVIOUS WORK

Most of the Nucleus claim group was originally staked as part of the Yukon Revenue property, which was explored as a low-grade copper-molybdenum target with minor values in tungsten, gold and silver. Although placer miner P.F. Guder discovered gold-quartz float as early as 1934 on the northeast side of what is now Yukon Revenue property, he did not stake claims until 1953 when he explored a copper showing assaying 15% Cu and 0.5 oz/ton Au over 5 m with an adit and shallow shaft. His property was optioned by Conwest, which conducted an EM survey in 1954; by Teck ECL, which drilled 5 holes (427 m) in 1955; by Cominco in 1959; by Meridian Syndicate, which drilled 3 holes (165 m) and conducted a geochemical survey in 1964; and by General Enterprises in 1967. Most of the drilling tested discontinuous lenses of chalcopyrite and pyrite in a strongly altered (propylitic and argillic) breccia zone.

In 1968, Yukon Revenue ML was formed by General Enterprises. Between 1967 and 1969, General Enterprises and Yukon Revenue ML explored the Revenue property with road building, bulldozer trenching, geochemical sampling, an IP survey and

10 drill holes (1276 m), and during 1974 and 1978 with additional bulldozer trenching. The best precious-metal zone in these trenches assayed 0.4 oz/ton Au, 2.0 oz/ton Ag and 0.28% $WO_3$ across 3.3 m.

The Yukon Revenue property was optioned by Kaiser Resources Limited in 1970, which cut a widely-spaced grid of bulldozer trails and trenches and drilled 25 percussion holes (2245 m) and 13 diamond drill holes (1851 m) on copper-molybdenum geochemical anomalies. Parts of this bulldozer grid were done on ground now covered by the Nucleus claims and provide survey control for the NAT soil sampling grids and reference locations for geological mapping.

The Nucleus 35 to 50 claims occupy ground previously staked as the Cash claims (private individuals from Whitehorse 1979-1980), Com claims (Cominco 1969), and the Roy and Tye claims (Klotassin JV, 1974). Cominco and Klotassin JV conducted geochemical soil surveys near the northwestern corner of the Nucleus claims, but only weak copper and molybdenum anomalies were outlined. Minor fluorite and rare scheelite were also found in float.

## PHYSIOGRAPHY AND GEOMORPHOLOGY

The Nucleus property lies in the Dawson Range, a west-northwest-trending range of low mountains that extends from Carmacks to Dawson. The major drainage in the Nucleus area is Big Creek which occupies a large northwest-trending topographic low that follows the trace of the Big Creek Lineament (see Figure R1 following page 5). Most tributaries of Big Creek, including Mechanic Creek which cuts the Nucleus claims, flow perpendicular to Big Creek and are strikingly linear suggesting that they are developed along subsidiary structures. Local elevations

range from 700 m in the Big Creek Valley to 1000 m on the north-trending ridge west of Mechanic Creek. The property lies below treeline and typical vegetation includes spruce and poplar trees on south- and east-facing slopes with stunted black spruce and thick moss on north-and west-facing slopes.

Although the Dawson Range was not covered by continental ice sheets during the Pleistocene Wisconsin glacial epoch, isolated alpine glaciers were present and glaciofluvial outwash is common. Minor amounts of exotic alluvium which occur along the northern and southern edges of the Nucleus grid, are probably remnants of such outwash debris.

Idealized soil profiles on the Nucleus property include 1 to 10 cm of A horizon organics, 0 to 100 cm of volcanic ash, 5 to 50 cm of B horizon soil, and 100 to 300 cm of C horizon soil over deeply weathered bedrock (there is 30 to 200 m of leaching in most parts of the Dawson Range). The ash horizon covers most of the property but its thickness is highly variable due to local remobilization by fluvial and colluvial processes. It is thickest (up to 100 cm) on flat ridge tops and in solifluction lobes on the slopes west of Mechanic Creek. Elsewhere on the property it is thin to absent. Extensive mixing between ash and locally derived soils has occurred on the lower slopes and in these areas the ash tends to occur as up to 1 cm thick lenses and individual particles within the soil.

Less than ten outcrops occur on the property; however, road cuts and old cat trenches expose abundant locally derived float. The degree of downhill transport of the float is difficult to estimate and unit contacts based on float mapping may be shifted downhill as much as 200 m in some areas.

# GEOLOGY

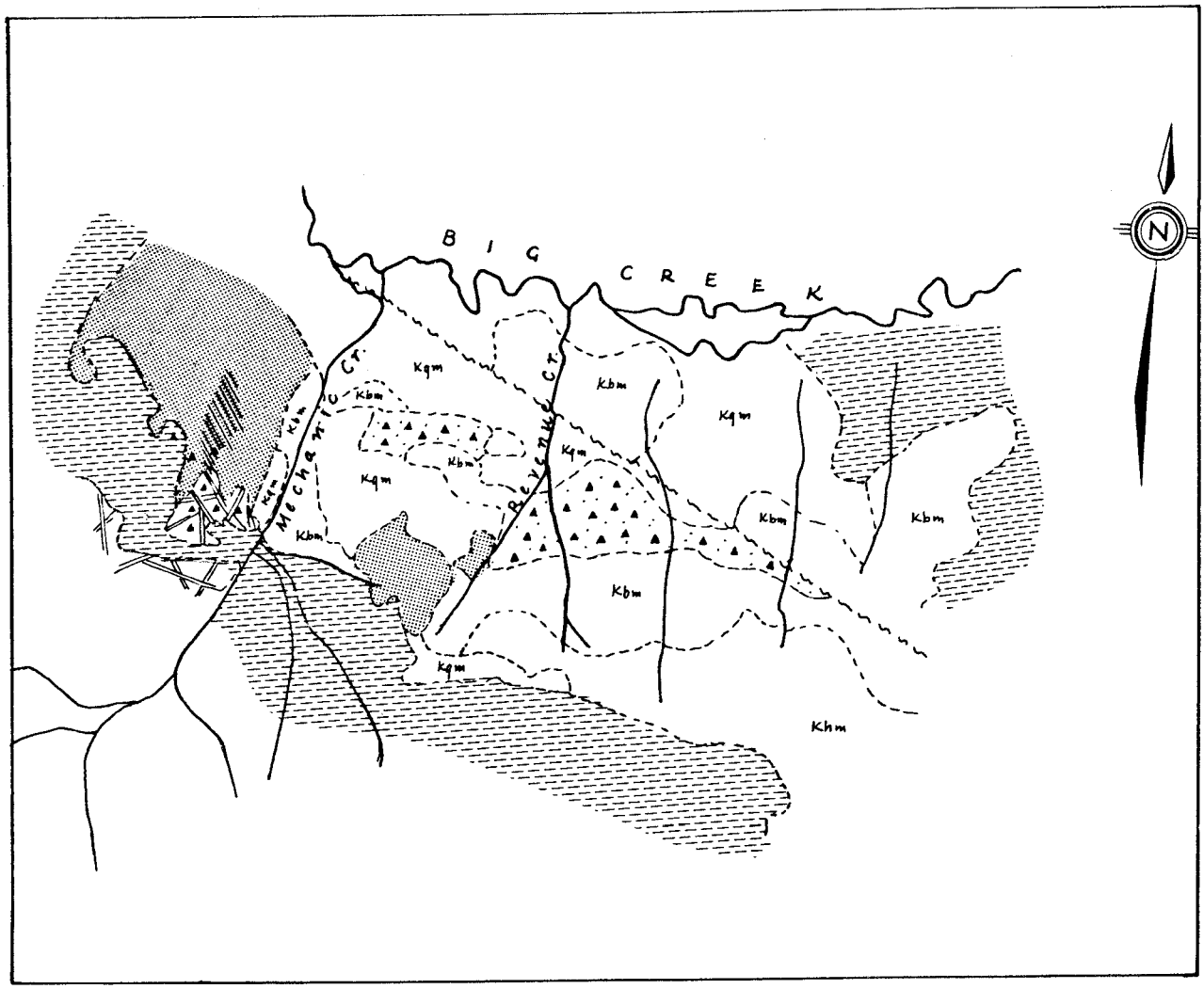
## GENERAL

The Nucleus claims are situated near the western limit of a 100 Ma intrusive complex (Tempelman-Kluit pers. comm.) which includes felsic stocks, dykes and intrusive breccias. The complex is elongated in a west-northwesterly direction parallel to the regional trend and the Big Creek Lineament, and intrudes Paleozoic Yukon Metamorphic Complex schists and pre-Cretaceous foliated intrusive rocks. Figure R1 on the following page shows the approximate outline of the entire intrusive complex.

Several phases have been recognized in the intrusive complex on the Nucleus and Yukon Revenue properties. The earliest consists of biotite monzonite and quartz monzonite plutons up to 2 km in diameter. They were succeeded by micro-granite, which forms two 0.5 to 1 km diameter bodies on the east and west side of Mechanic Creek, respectively. The final phase involved quartz-feldspar and feldspar porphyry dykes and related intrusive breccias.

Mapping by Kaiser Resources Limited (1970) showed a single, more-or-less continuous, breccia body trending west-northwest from the ridge east of Revenue Creek, across Revenue and Mechanic Creeks to the ridge top on the Nucleus property. However, 1982 Nat mapping suggests that there are two separate breccia bodies, one on Nucleus, which is described later in this report, and one on Revenue which is briefly described below.

The breccia near Revenue Creek appears to be a felsic intrusion related to the quartz-feldspar porphyry dykes which engulfed varying amounts of country rock during its emplacement. The matrix is identical to the matrix of the dykes and is a fine-grained, tan-to-cream coloured mixture of quartz and feldspar exhibiting




LEGEND

REVENUE INTRUSIVE COMPLEX

Cretaceous

- breccia/dyke unit
- intrusive breccia
- microgranite
- quartz monzonite, biotite monzonite hornblende monzonite

Paleozoic

- Yukon Metamorphic Complex
- silicification
- geologic contact (approximate)

Figure R1

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

# GEOLOGICAL SETTING

## NUCLEUS PROPERTY

## NAT JOINT VENTURE

SCALE 1:61,000

0 4000 Feet

0 Km

To accompany report dated December, 1982

JBM/83

moderate argillic alteration. Quartz and feldspar phenocrysts occur throughout the matrix. Exotic fragments comprise 1 to 20 percent of the breccia and include quartz monzonite, quartz-feldspar porphyry material similar to that in the matrix, and at least one angular massive pyrite-chalcopyrite fragment(?).

## PROPERTY GEOLOGY

Units occurring on the property are described below from oldest to youngest and are shown on Figure R2 in the pocket.

### Pre-Cretaceous Country Rocks

Yukon Metamorphic Complex (PYMC) - A 500 m wide band of Yukon Metamorphic Complex rocks trends northwesterly across the property and is exposed in placer workings in Mechanic Creek and outcrops on a ridge top 700 m to the west. The unit exhibits strong heterogeneity and includes chlorite schist, quartz-biotite schist, quartz-muscovite schist, amphibolite, impure quartzite and quartz-feldspar granulite. This suite is consistent with a paleolith composed of intermediate-to-felsic tuffs, sediments and mafic-to-felsic dykes. Foliations on the ridge show gentle dips but steepen toward Mechanic Creek. Outcrops are too sparse to allow structural interpretations. Rare garnet porphyroblasts indicate greenschist facies metamorphism.

Gabbro-diorite (PMgb) - An irregular, 100 by 200 m, mafic intrusion invades the Yukon Metamorphic Complex east of Mechanic Creek. In places it exhibits strong compositional layering parallel to foliation in the enclosing schists. This texture shows that it is syntectonic and thus probably pre-Jurassic in age.

Cretaceous Intrusive Complex

Quartz monzonite/biotite monzonite (Kqm/Kbm) - These two units are medium-to-coarse grained, equigranular and non-foliated. Relations between the two are uncertain but they are compositionally distinct in that one contains greater than 10 percent quartz and less than 5 percent biotite, while the other contains little or no quartz and up to 15 percent biotite. They occur mainly east of Mechanic Creek and west of the main ridge on the property.

Microgranite (Kmcg) - This unit covers a 2 sq km area on the hillside west of Mechanic Creek. Previous mapping (Kaiser R.L. 1970; Nat Final Report 1981) showed quartz monzonite cut by aplite (microgranite) dykes in this area. However, no quartz monzonite was observed during detailed mapping. The microgranite is a fine-grained, extremely felsic rock which commonly contains between 1 and 5 percent, small (1 to 3 mm), euhedral plagioclase phenocrysts in a matrix of anhedral quartz and feldspar. Biotite originally comprised up to 3 percent of the rock but is generally altered to sericite. Flow banding is occasionally present particularly adjacent to the overlying Yukon Metamorphic Complex. The microgranite-schist contact is nearly horizontal near the ridge top but steepens toward Mechanic Creek. The microgranite-biotite monzonite contact has not been observed.

Quartz-feldspar porphyry (Kqfp) - These rocks occur as dykes and consist of 1 to 5 percent quartz and feldspar phenocrysts in a tan, nearly aphanitic, locally flow banded matrix. Argillic alteration is common. In most specimens collected at surface, feldspar phenocrysts appear as holes and the matrix is punky rather than vitreous. The dykes are most abundant in the Mixed Unit (KØX, see below) but a few isolated dykes cut Yukon Metamorphic Complex schists and microgranites. Sparse clasts found in some dykes strongly resemble matrix material.

Mixed Unit (KØX) - This unit includes two separate zones, both of which contain a mixture of quartz-feldspar porphyry and schist float. The degree of heterogeneity of float in soil far exceeds that of simple colluvial mixing and likely represents debris from an extensive dyke swarm superimposed on an irregular microgranite-schist contact. These zones form mappable units surrounded by more uniform lithologies which lack significant amounts of dyke material.

## Brecciation

A 100 by 300 m breccia zone occurs on the hillside west of Mechanic Creek and cuts both microgranite and the Mixed Unit. The breccias are typically clast-dense and consist almost entirely of angular microgranite and schist fragments although mixing of the two rock types is minimal. The fragments are commonly rotated, indicating some degree of movement during formation. A few slickensides occur in breccia cobbles.

The matrix differs from the matrix in the Revenue breccias, in that it consists of secondary alteration products (quartz or punky gossan material) rather than fine-grained felsic intrusive material. Silicification of clasts, as well as matrix, is particularly evident in breccias composed of microgranite fragments.

## Alteration

Two large alteration zones and several small ones have been identified on the Nucleus property, as shown on Figure R2 in the pocket.

The largest, which coincides with the main geochemical anomalies, is an irregular 50 to 300 m wide, 1100 m long, north-trending zone. The southern third of the zone coincides with the breccia zone described above, while the northern two-thirds affects microgranite. An extensive stockwork of hairline to 3 cm wide quartz veins is developed in the core of the zone but near the edges swarms of

parallel veinlets are seen. Silicification is rarely pervasive. Pervasive sericite and clay alteration is common within the zone and often completely destroys primary textures. Sericitization occurs as greasy, pale green fracture fillings and alteration envelopes with or without quartz. This alteration is distinct from the mere replacement of biotite by sericite which occurs outside the zone. The argillic alteration attacks feldspar phenocrysts and matrix. In most cases it is not possible to distinguish hypogene argillic alteration from supergene weathering.

A poorly-defined, weak argillic alteration zone is developed in the microgranite peripheral to the quartz-sericite zone.

In the Mixed Unit (KØX), quartz-sericite alteration similar to that described above affects the microgranite breccia float, but the schists are typically fresh. The quartz-feldspar dykes, which postdated the alteration event, characteristically show argillic alteration.

The second large alteration zone lies 600 m southwest of the main zone and coincides with the southern KØX unit. Altered float covers a 100 by 400 m area and includes Yukon Metamorphic Complex schists which are strongly clay-altered and bleached, and quartz-feldspar porphyry rocks that typically show pervasive argillic alteration and occasionally are intensely silicified. Some of the silicified rocks also contain finely disseminated pyrite. As this alteration affects the porphyry dykes, it may have occurred later than the main zone.

A number of small alteration zones up to 50 m wide and 200 m long are found northwest of the main zone. They are confined to the microgranite and exhibit alteration similar to that in the main zone but lack the intense quartz stockworks.

Immediately south of the main zone, pebbles of cockade quartz, massive magnetite and punky gossanous material occur with unaltered schist in soil. This is best seen in the gully which follows line 1+85 S. These vein fragments may be related to the quartz-sericite alteration and may represent a zone of iron enrichment peripheral to a zone of depletion.

Structure

Because of lack of outcrop data, little is known about the structure of the metamorphic rocks except that they may dip shallowly on the ridge top but steepen toward Mechanic Creek.

A number of NNE-trending air photo lineaments, which are perpendicular to the Big Creek Lineament, occur along and west of Mechanic Creek as illustrated on Figure R2 in the pocket. These topographic lineaments are recognizable on the ground as poorly defined slope breaks and vegetation anomalies, and one of them forms the straight channel of Mechanic Creek. Although most of them do not show offsets or lithologic breaks and thus appear to be fractures rather than faults, one lineament located 200 m west of Mechanic Creek forms the eastern limit of the microgranite (Kmcg) and KØX units.

## MINERALIZATION

Sulphide mineralization is rare at surface and is restricted to traces of fine-grained pyrite in quartz veins. A few veins exhibit a medium to dark blue-grey colour which may be due to finely disseminated, microscopic sulphides. Grab samples of this material produced values up to 847 ppb Au. Yellow-to-brown limonite is found in a few quartz veins and on some fractures but is not abundant. Malachite, galena and sphalerite have been reported in previous work on the eastern tributary of Mechanic Creek but have not been relocated by NAT. Magnetite float and cockade quartz vein fragments are common in road cuts immediately west of Mechanic Creek. Selected specimens of this material returned assays up to 1740 ppb Au.

Two of the seven 1970 Kaiser diamond drill holes were relogged by NAT in 1981 and the results were included in Appendix I of the 1981 Assessment Report. The holes were collared away from the main area of interest, as shown on Figure R2 in the pocket. In one hole (DDH 70-5), nearly all sulphides were leached to a depth of 40 m and in the other (DDH 70-6) to a depth of 15 m. Below the oxidized cap, pyrite, pyrrhotite and chalcopyrite were seen as veinlets and disseminations. Limonite with traces of malachite, azurite and chalcocite were noted in the oxidized zone but decreased toward surface. The most abundant sulphides (up to 30 percent pyrite with 5 percent chalcopyrite) were associated with 1 to 3 m wide, quartz-flooded breccia zones. The best assays were 3582 ppb Au, greater than 1000 ppm As, and 620 ppm Pb from the same 1.3 m interval; 13.2 ppm Ag from an adjacent 3 m interval; 0.06% Cu from a 3 m interval in the supergene zone; and, 0.003% Mo from several 3 m intervals. The two holes drilled nearest to the main area of interest were percussion drill holes PDH 79-8 and 79-9 (shown on Figure R2). Composite samples representing the entire length of the hole assayed 0.01 oz/ton Au with 0.03% Cu over 67. 1 m and 0.007 oz/ton Au with 0.05% Cu over 91.5 m, respectively.

## GEOCHEMISTRY

### General

Figure R3 in the pocket illustrates results of 1982 detailed soil and rock sampling, together with 1981 results from the detail area. The 1982 work used the same grid as the 1981 sampling including a 2900 m long baseline (azimuth 008°) cut perpendicular to the 1970 Kaiser bulldozer grid lines, which are approximately 100 m apart.

Initial work was done in early June and consisted of deepening (to ensure samples were obtained below the ash layer) and resampling of 1981 soil sample pits in areas of anomalous gold response. These samples were taken at 50 m intervals along the bulldozer lines and covered a 1700 by 1200 m area. Follow-up sampling was done in August to provide more detail around anomalous results. The most encouraging targets were sampled at 25 m intervals on lines spaced approximately 25 m apart, while secondary targets were sampled at 50 m intervals along lines spaced approximately 50 m apart. The 1981 baseline, previously marked with 1 m lath pickets, was reflagged. Each 1982 sample location was marked by a flagged, half-metre picket bearing its grid co-ordinate and sample number.

Bulk samples were collected along road cuts and from selected 1970 Kaiser trenches. Each sample weighed 7 to 12 kg and consisted of chips from float in C horizon soils and occasionally from sub-outcrops. Rock chips collected along the road cuts were taken at regular intervals along 50 m lengths, while those collected from trenches were taken at uniform intervals throughout the trench floor.

A few representative grab samples were also collected from specific types of material including a variety of quartz veins, different types of alteration, sulphide-and/or magnetite-bearing specimens, and gossanous material.

A total of 907 soil, 46 bulk rock and 24 grab rock samples were taken in 1982 and sent to Chemex Labs Ltd., North Vancouver, B.C. All were analyzed for gold and a few representative bulk rock and grab samples were also analyzed for arsenic, bismuth and tungsten. Analytical techniques used are described in Appendix III,

Results

The 1982 soil sampling outlined four centres of moderately to strongly anomalous gold values on the property and a large anomaly extending downhill from one of the centres onto the Yukon Revenue claims, as shown on Figure R3 in the pocket. These anomalies generally coincide with those outlined by the 1981 survey and it appears that concerns about the validity of the 1981 sampling were unwarranted.

A total of 88 of the 1981 locations were resampled in 1982; of these, 45 returned values within ±20 ppb of the 1981 gold value, 22 returned values more than 20 ppb higher and 21 returned values more than 20 ppb lower. As great care was taken to ensure that all 1982 samples were taken from below the ash layer, these irregularities are probably a result of an inhomogeneous distribution of the gold (the "nugget affect").

This irregularity of response is particularly noticeable in the area sampled in detail in 1982. In order to smooth the contours and highlight the anomalous centres, an experimental averaging technique was used. This involved averaging all 1982 soil values within a 50 m radius of a given sample point. All points were weighed equally, except the value at the centre of the circle which was doubled as experimentation showed this produced contour patterns closer to those of the unaveraged data. Figure R4 in the pocket illustrates the averaged data.

Both the actual and averaged values were used for interpretative purposes. In general, gold values from bulk rock samples are two to four times higher than adjacent soils and are usually less erratic. Most anomalies from bulk rock samples occur in two clusters which coincide with soil anomalies.

Specific soil and rock anomalies are described below.

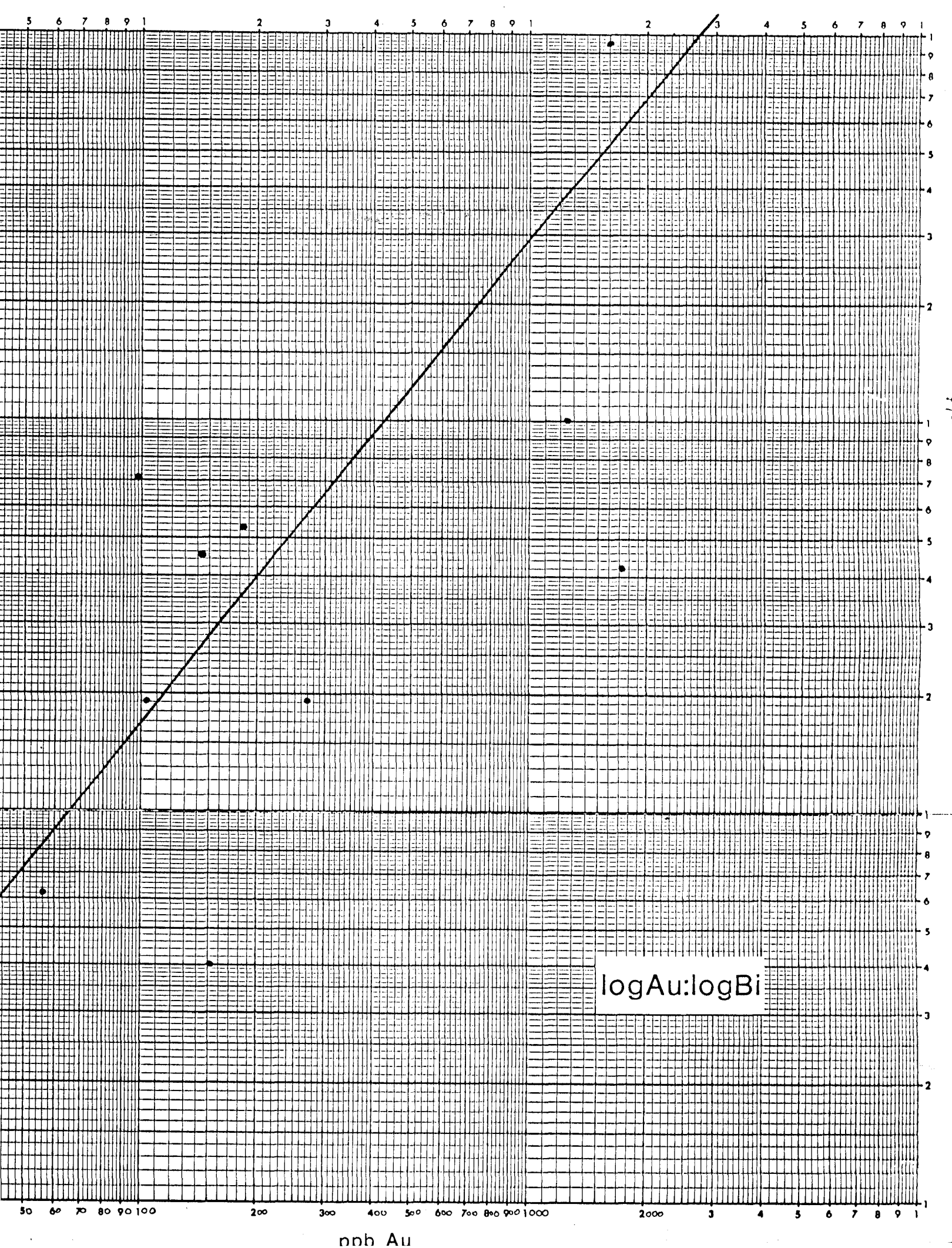
Anomaly 1 is located near the north end of the grid, is 400 m long and averages 150 m wide, and contains soil values up to 4127 ppb Au. The long axis of the anomaly is perpendicular to the hillside, suggesting strong downhill dispersion from a source just west (uphill) of the baseline. Anomaly 1 is underlain by unbrecciated microgranite and lies within the zone of intense quartz-sericite-clay alteration. Bulk rock samples collected near the probable source of the soil anomaly returned values of 693, 113 and 400 ppb Au from adjoining 50 m intervals along the road cut paralleling the baseline. A fourth bulk sample taken from a trench 50 m west of the baseline assayed 321 ppb Au.

Anomaly 2 lies 500 m south of Anomaly 1 and consists of erratic high values (up to 1940 ppb Au) over a 400 by 200 m area. The long axis of the anomalies parallels the hillside and a broad zone of anomalous values extends downhill onto the Yukon Revenue claims. Sample density is low below the property boundary and it is not clear whether the values on the Yukon Revenue claims are part of a dispersion train or are associated with a separate centre. Anomaly 2 coincides with a quartz, sericite, and clay-altered breccia zone that is developed in microgranite and the Mixed Unit. Eight bulk rock samples taken along two road cuts in a 250 by 150 m area near the centre of the soil anomaly returned values up to 523 ppb Au and averaged 250 ppb Au.

Anomaly 3 is located 400 m southeast of Anomaly 2 and includes scattered moderately anomalous values (up to 218 ppb Au) over a 150 by 200 m area. The sample density is low in this area and the quality of some samples is questionable as the area is heavily vegetated and the ground badly frozen. The underlying rocks are believed to be Yukon Metamorphic Complex schists. Occasional cockade quartz and magnetite vein float were observed in a road cut nearby and grab samples of this material returned up to 1740 ppb Au. No bulk rock samples were taken in this area.

Anomaly 4 lies near the ridge top some 250 m west of Anomaly 2. Sample density over most of the area is low and the outline of the anomaly is poorly defined. The anomalous values (up to 3248 ppb Au) appear to form a northeasterly-trending linear zone, 150 m wide and 500 m long. The axis of the anomaly is aligned roughly perpendicular to the slope but the topography is relatively subdued and the linear pattern is probably not due to gravity dispersion. The anomaly is underlain by schist with minor 1 to 10 cm wide quartz veins and up to 1 m wide quartz-feldspar porphyry dykes , both of uncertain attitudes. Foliation in the schist is nearly horizontal. In 1981 a specimen of cockade, weakly limonitic quartz vein, similar to the veins in the area of Anomaly 4, returned an assay of 1824 ppb Au. This specimen was collected 150 m to the northwest from a vein also cutting schist and its assay is the highest gold value obtained to date on the property from rocks collected at surface.

Twenty-two representative grab samples from various parts of the property were analyzed for arsenic, bismuth and tungsten. These assays are shown on Figure R3 , while Graphs R1 and R2 on the following pages are scatter plots comparing arsenic and bismuth values to gold values. Both plots clearly show a positive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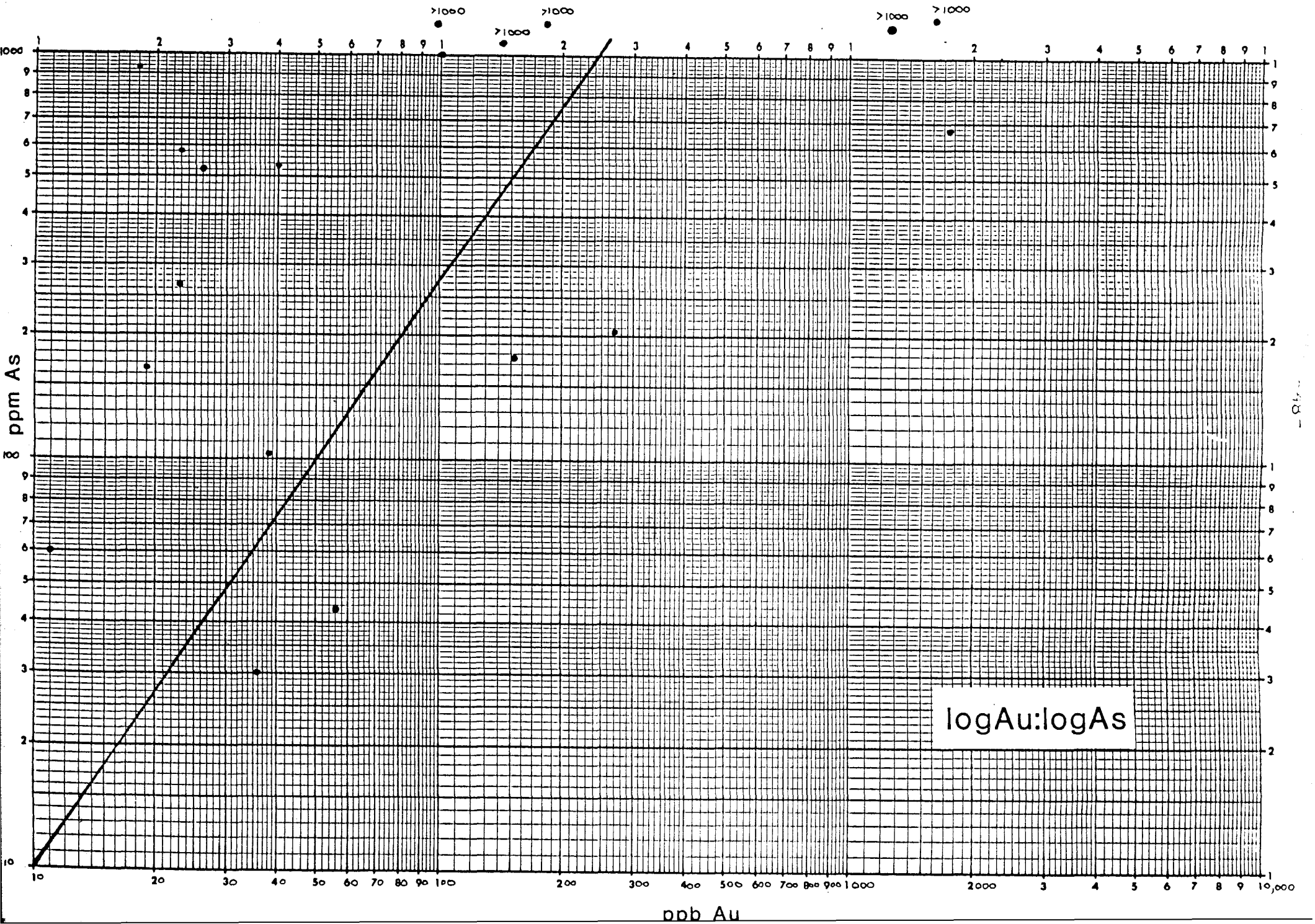


correlation with gold, with bismuth being the better of the two. The highest arsenic values exceeded 1000 ppm, while the highest bismuth value was 950 ppm. Tungsten values were only 9 ppm or less and for this reason have not been plotted on Figure R3.

## DISCUSSION AND CONCLUSIONS

Exploration has shown that the main areas of anomalous gold soil and rock geochemistry (Anomalies 1 and 2) are derived from a 1100 by 150 m quartz stockwork zone accompanied by pervasive sericitization and clay alteration, while two nearby lesser anomalies are underlain by relatively unaltered Yukon Metamorphic Complex schists which are cut by narrow cockade quartz and magnetite veins. The stockwork zone partially coincides with a 300 by 100 m breccia zone developed in a Cretaceous microgranite and adjacent schists, as shown on Figure R5 on the following page, a schematic cross-section illustrating intrusive relationships and potential gold targets The microgranite is a high-level felsic intrusion which is probably a late phase of a larger biotite monzonite and quartz monzonite intrusive complex. Post-breccia quartz-feldspar porphyry intrusions occur as dyke swarms in the schists and as isolated dykes cutting both the schists and the microgranites. It is not clear if the volatiles which erupted to form the breccia zone represent late dewatering of the microgranite or an early explosive event which preceded emplacement of the quartz-feldspar porphyries. Textural evidence suggests the latter is the more probable. This conclusion is supported by mapping on the Revenue property which showed that the breccia hosting low-grade porphyry copper-gold-tungsten mineralization there is intimately associated with quartz-feldspar porphyry intrusions.

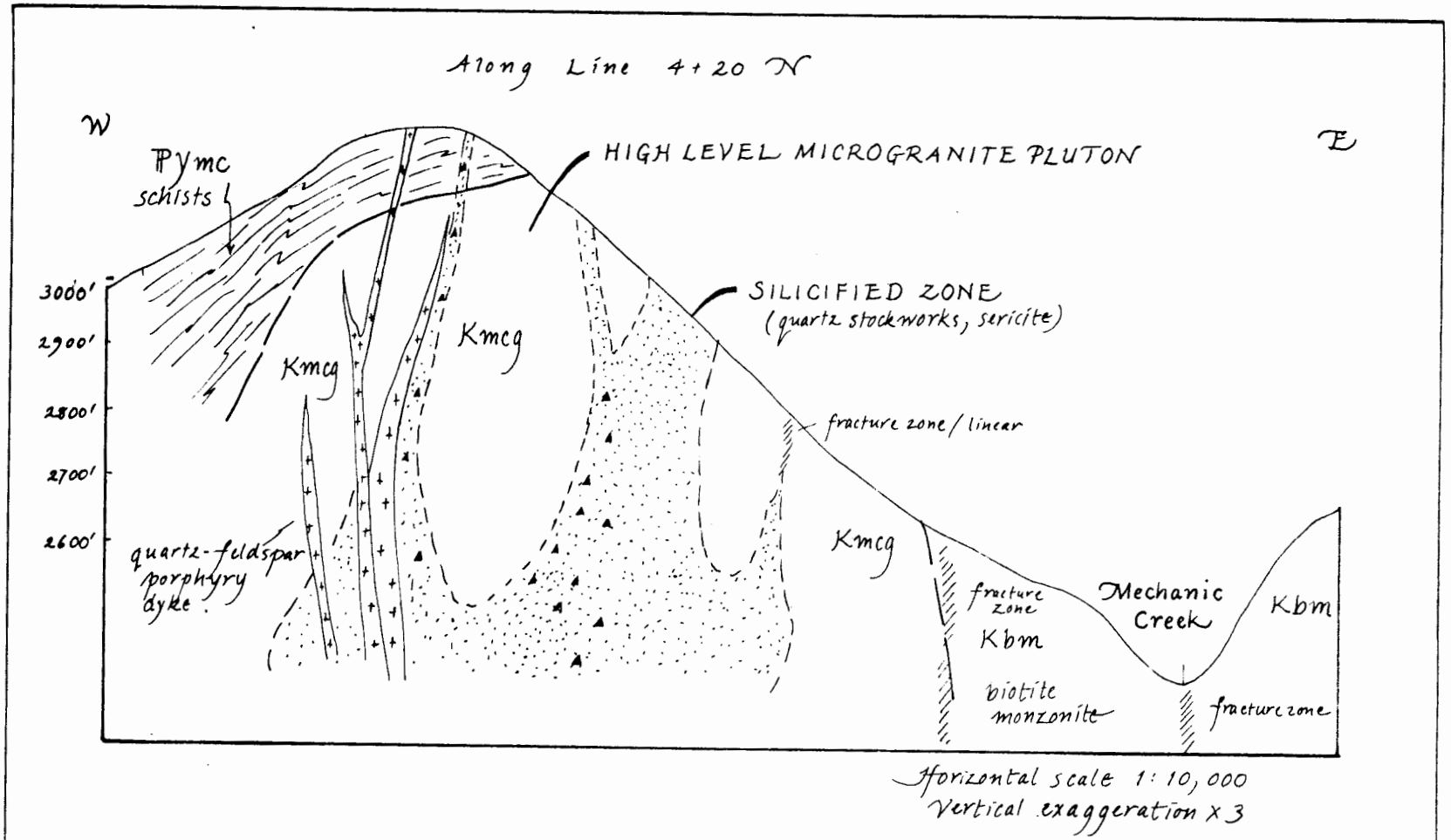


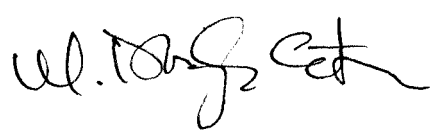

**Figure R5 East-west cross section, Nucleus property**

The Nucleus breccia-stockwork zone lacks many characteristics of a classic porphyry system, notably: strong magnetic response; extensive low-grade alteration halos surrounding the high-grade core; and, significant base metal mineralization. On the other hand, the high arsenic values and the presence of occasional cockade quartz veins, particularly in the area of the lesser anomalies, suggests an epithermal environment. Based on all available evidence, the breccia-stockwork zone appears to be a mesothermal occurrence while the adjacent veins are probably epithermal. It is conceivable that a Revenue-type porphyry system underlies the breccia-stockwork zone.

Although soil and rock values obtained by NAT to date are sub-economic, there is good evidence for surface depletion of gold. In general, gold values in soils increase with depth and rock assays normally average 2 to 4 times higher than soil values taken in the immediate vicinity. Surface depletion is further indicated by two 1970 Kaiser percussion holes (drilled away from the main gold soil anomalies) which averaged 0.01 and 0.007 oz/ton Au (343 ppb and 240 ppb) over the length of the holes, compared to an average of 47 and 29 ppb Au in adjacent soils.

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED



/mc

W. Douglas Eaton, B.A., B.Sc.

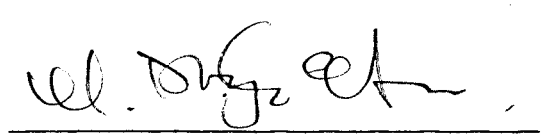
# APPENDICES

# APPENDIX I - STATEMENT OF QUALIFICATIONS

## STATEMENT OF QUALIFICATIONS

I, W. Douglas Eaton, geologist, with business addresses in Whitehorse, Yukon Territory and Vancouver, British Columbia, and residential address in Burnaby, British Columbia, do hereby declare:

1. I graduated from the University of British Columbia in 1980 with a B.Sc. and am currently enrolled in a M.Sc. majoring in Geological Sciences.
2. From 1971 to the present, I have been actively engaged in mineral exploration in British Columbia and Yukon Territory and on June 1, 1981, became a partner in Archer, Cathro & Associates (1981) Limited.
3. I have personally participated in or supervised the field work reported herein and have interpreted all data resulting from this work.



W. Douglas Eaton, B.A., B.Sc.

# APPENDIX II - PERSONNEL

| NAME | ADDRESS | POSITION |
|---|---|---|
| J. Nelson | 2980 West 8th,<br>Vancouver, B.C. | Geologist |
| D. Eaton | 6108 Burns Street,<br>Burnaby, B.C. | Geologist |
| L. Cymbalisty | 1602 #5 Morey Road,<br>Nanaimo, B.C. | Student assistant |
| A. Reid | 151 Goulburn Road,<br>Ottawa, Ontario | Student assistant |
| D. Lister | c/o 106A 93 Lewes Blvd.<br>Whitehorse, Y.T. | Student assistant |
| D. Staniforth | 81C - 1321 Sherbrooke St. West,<br>Montreal, Quebec | Student assistant |
| B. Sinclair | 314 - 10229 - 149th Street,<br>Surrey, B.C. | Student assistant |
| S. Price | R.R. #2, Site 265,<br>Courtenay, B.C. | Student assistant |

# APPENDIX III - ANALYTICAL TECHNIQUES

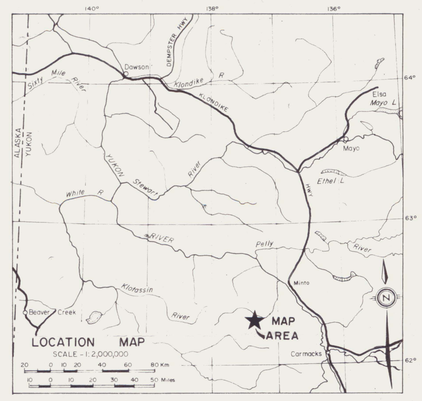
## PREPARATION

All soil samples were dried and sieved through an ASTM 35 mesh screen (0.50 mm). The minus 35 mesh fraction was then pulverized and homogenized in a ring grinder to approximately minus 100 mesh (0.15 mm). For drill core and grab and chip rock samples, the entire sample was crushed and split. A sub-sample was then pulverized in a ring grinder to approximately minus 100 mesh.

## ANALYTICAL TECHNIQUES

Gold was analyzed by a "combo technique" consisting of a fire assay followed by neutron activation, while silver, copper, arsenic, zinc, and lead were allanalyzed using a perchloric-nitric acid extraction followed by atomic absorption spectrometry, except arsenic which used a flameless atomic absorption finish.

Antimony analysis involves a hot HCI bath followed by reduction of iron and antimony complexing with I-. The complex was extracted with TOPO-MIBK and the analysis completed by atomic absorption.




## LEGEND

**LATE CRETACEOUS**

- Køx — Mixed intrusive unit, includes quartz-feldspar porphyries (Kfp), microgranites and schists. Breccia zones (bx) are common within this unit.
- Kmcg — Microgranite
- Kbm / Kqm — Biotite monzonite (Kbm) and quartz monzonite (Kqm)

**PALEOZOIC–MESOZOIC**

- PMgb — Hornblende gabbro

**PALEOZOIC**

- PYmc — Yukon Metamorphic Complex, mostly quartz-biotite feldspar and chloritic schist but also includes quartz-muscovite schist (qms), amphibolite (amph), quartz-feldspar gneiss (qfg), rare fine grained quartzite.

- Geologic contact (approximate, assumed)
- Limit of meaningful float mapping; hatchures towards areas of alluvial cover or extreme colluvial mixing
- Intense quartz-sericite alteration around quartz stockworks
- Breccia zone
- Foliation
- Mapping station and rock type
- Road
- Ripper trench
- Claim post (yc indicates Yukon Revenue claims)
- DDH 70-8 PYmc — Drill Hole (Kaiser Resources 1970) with collar lithology
- Claim boundary
- Air photo lineament

NUCLEUS CLAIMS

FIGURE 2

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

# GEOLOGY

NUCLEUS DETAIL

NAT JOINT VENTURE

SCALE 1:5000

100 50 0 50 100 200 300 400 Metres

100 50 0 50 100 200 300 400 Yards

091439

To accompany report dated Dec., 1982

091429

ANOMALY 4

ANOMALY 2

ANOMALY 3

ANOMALY 1

Køx

IPYmc

Kmcg

DDH 70-8

0.01 oz/ton Au composite assay

DDH 70-9

0.007 oz/ton Au composite assay

REVENUE

NUCLEUS

LOCATION MAP

SCALE - 1:2,000,000

MAP AREA

## LEGEND

**CRETACEOUS**

- Køx — Mixed unit including quartz-feldspar porphyry dikes, breccia, microgranite and schist
- Kmcg — Microgranite

**PALEOZOIC**

- IPYmc — Yukon metamorphic complex

- Geological contact
- Limit of quartz-sericite alteration and quartz stockworks
- Breccia
- DDH 70-8 — 1970 Kaiser Resources percussion drill hole with Au assay results averaged over hole.
- Reconnaissance chip sample
- Bulk rock sample
- Grab rock sample
- Soil sample
- Trench soil sample

(with Au assay in ppb)

50 — 1982 SOIL VALUE CONTOUR LINE

Figure: R3

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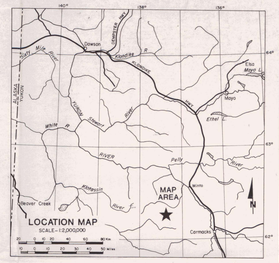
# GOLD GEOCHEMISTRY

## NUCLEUS DETAIL

NAT JOINT VENTURE

SCALE 1:1250

To accompany report dated December, 1982


## LEGEND

**CRETACEOUS**

- Køx — Mixed unit including quartz-feldspar porphyry dikes, breccia, microgranite and schist
- Kmcg — Microgranite

**PALEOZOIC**

- PYmc — Yukon metamorphic complex

- Geological contact
- Limit of quartz-sericite alteration and quartz stockworks
- DDH 70-8 — 1970 Kaiser Resources percussion drill hole with Au assay results averaged over hole
- Reconnaissance chip sample with Au assay in ppb
- 50 — Contour line based on averaged Au values
- Actual Au soil values between 100 and 500 ppb Au
- Actual Au soil values exceeding 500 ppb Au

AVERAGE VALUES WERE CALCULATED BY AVERAGING ALL VALUES WITHIN 50 METRES OF THE SAMPLE POINT WITH ALL VALUES WEIGHTED EQUALLY, EXCEPT THE VALUE AT THE POINT WHICH WAS DOUBLED

Figure #4

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# AVERAGED GOLD GEOCHEMISTRY

NUCLEUS DETAIL

NAT JOINT VENTURE

SCALE 1:1250

0 50 100 150 metres

091439

To accompany report dated December, 1982