

MAP NO.: ASSESSMENT REPORT X
115 II 7 PROSPECTUS
CONFIDENTIAL X
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DOCUMENT NO: 092885
MINING DISTRICT: WHITEHORSE
TYPE OF WORK: GEOLOGY
MAGNETOMETER

REPORT FILED UNDER: J.C. Stephen Explorations Ltd.

DATE PERFORMED: August 5-12, 1990

DATE FILED: OCT 31, 1990

LOCATION: LAT.: 61°22'N

AREA: Ashihik Lake

LONG.: 136°57'W

VALUE \$: 3 900

CLAIM NAME & NO.: HOP 75-102

WORK DONE BY: J.C STEPHEN EXPLORATIONS LTD

WORK DONE FOR: AURORA GOLD LTD/CASAU EXPLORATION LTD

DATE TO GOOD STANDING:

REMARKS: Copper gold skarn material occupies limey horizons of Yukon Metamorphic Complex at granodiorite contacts. Much of the skarn material examined was without economic mineralization. Magnetic anomalies outlined are of limited extent and sampling indicates relatively low grade. Skarn horizons occur within quartzite which grades down into quartz-mica schist. Best copper mineralization was found in an epidote skarn with magnetite.

REPORT ON ADDITIONAL GEOLOGICAL MAPPING
AND
PRELIMINARY MAGNETOMETER SURVEY

HOP 75 - 102 QUARTZ CLAIMS

YB 26329 - 356

NTS 115 H / 7

LATITUDE 61° 22'

LONGITUDE 136° 57'

for

AURORA GOLD LTD.
and
CASAU EXPLORATION LTD.

by

092885

J.C. STEPHEN EXPLORATIONS LTD.

North Vancouver, B.C.

Work Done

August 5 - 12, 1990



This report has been examined by
the Geological Evaluation Unit
under Section 53 (4) Yukon Quartz
Mining Act and is allowed as
representation work in the amount
of \$ 3900.

San *D. J. Quattrone*
Regional Manager, Exploration and
Geological Services for Commissioner
of Yukon Territory.

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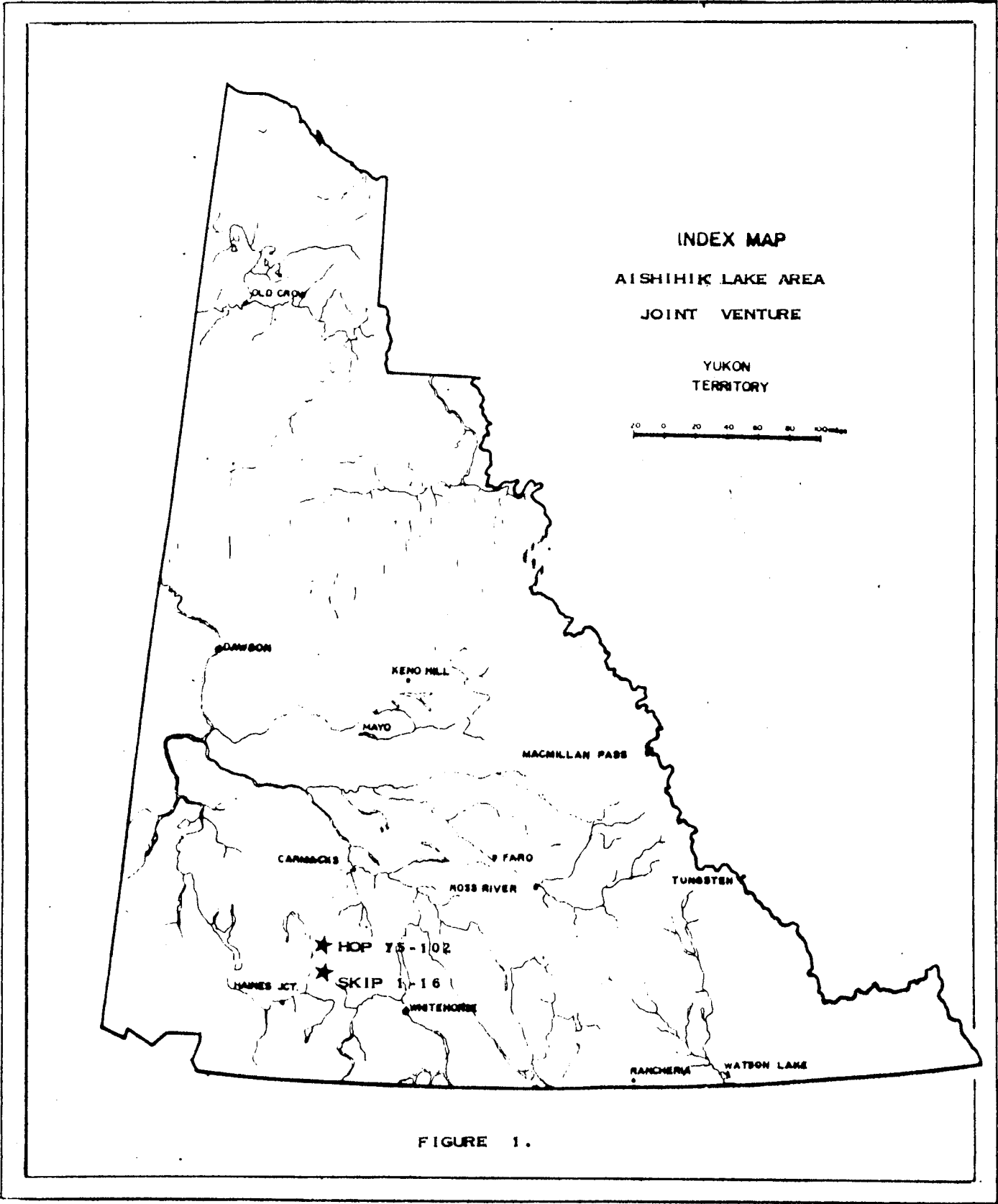
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SUMMARY

Geological mapping and a reconnaissance magnetometer survey based on hip chain and compass grid lines were conducted in the two areas of primary interest on the HOP 75-102 claims as indicated by reconnaissance during October 1989 and June 1990.

The skarn horizons on HOP 97-100 are considered to be stratigraphically equivalent to the skarn horizons on the HOP-ACME claims to the south. These horizons have been intruded by granodiorite and by a series of younger dykes. Much of the skarn examined appears to be barren of economic minerals. The magnetic anomalies outlined are of relatively limited extent and sampling indicates relatively low grades. Further work on these zones will only be justified if economic mineralization is outlined on the HOP-ACME property. These zones do not give promise of sufficient grade or tonnage on their own.

West of Hopkins Lake, magnetic profiles in the vicinity of the previously described alteration zones failed to indicate magnetic targets suggesting structures for further exploration. The zone of alteration, however, has not been adequately investigated and further work in the form of data collection, geochemical surveys and geological mapping is warranted.

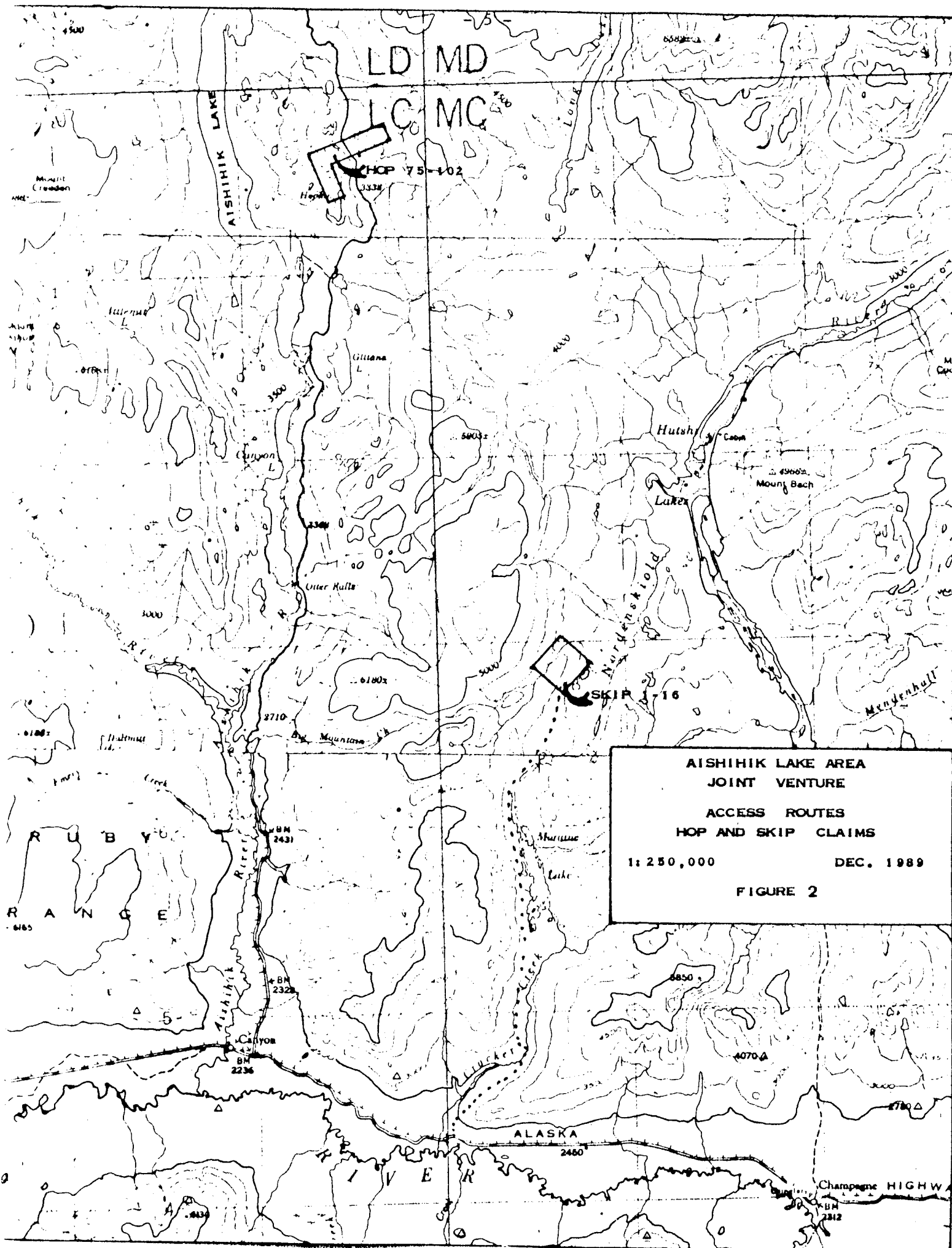


ACCESS AND TOPOGRAPHY

The HOP 75-102 Yukon Quartz claims are located east of Aishihik Lake in south-central Yukon adjoining the HOP-ACME claim group on the north and west. The property can be reached by gravel road north from the paved Alaska Highway at the Otter Falls or Aishihik turn off. Total road distance from Whitehorse is about 175 kilometres and travel time is about 2.3 hours.

The HOP 75-102 claims form a 2 claim wide strip with part of the property covering relatively low ground surrounding the north end of Hopkins Lake in an area occupied by glacial moraine and outwash deposits. West of Hopkins Lake rock ridges consist mainly of limestone. The northeast portion of the claim group covers rugged hillsides underlain by Yukon schists intruded by granodiorite. Extensive skarn zones exist in this area. Overall relief ranges from 990 to 1,375 metres elevation.

The access route by way of the Alaska Highway and Aishihik (Otter Falls) road is illustrated by Figure 2.



**AISHIHIK LAKE AREA
JOINT VENTURE**

**ACCESS ROUTES
HOP AND SKIP CLAIMS**

1:250,000 DEC. 1989

FIGURE 2

CLAIM STATUS

The HOP 75-102 claims were staked as "Area of Mutual Interest" claims under a letter agreement of May 4, 1989. Interests in the claims are 75% Aurora Gold, 25% Casau Exploration. Assessment work to June 29, 1990 was filed providing two year's work on certain claims and one year on the remainder.

The following is a tabulation of the claims and their current status.

<u>Claims</u>	<u>Record Number</u>	<u>Date of Record</u>	<u>Current Expiry Date</u>	<u>Recorded Owner</u>
HOP 75 - 85	YB 26329 - 339	29 June 1989	1992	Aurora Gold Ltd.
HOP 86 - 96	YB 26340 - 350	"	1991	"
HOP 97 - 102	YB 26350 - 356	"	1992	"

Figure 3 illustrates layout of the claim group.

REGIONAL GEOLOGY

The claim group lies within a series of highly metamorphosed sediments considered to be of Proterozoic and/or Paleozoic age and commonly considered part of the Yukon Metamorphic Complex. Locally this complex consists of grey brown weathering biotite quartz schist, micaceous quartzite, marble and skarn.

The biotite schist is in contact with granodiorite of Triassic age and has been intruded by stocks of granodiorite of Cretaceous age. It is cut by younger feldspar porphyry dykes.

To the east, the Yukon Metamorphic Complex is in fault contact with the Upper Triassic age Lewes River Group volcanics and sediment and with the Jurassic age Laberge Group conglomerates, greywackes and siltstones. These sedimentary and volcanic formations are intruded on a regional scale by granitic rocks of the Triassic-Cretaceous Coast Intrusions.

Within both the Yukon Metamorphic Complex and the Lewes River - Laberge Group, iron, copper, gold skarn deposits have been formed where limey sedimentary rocks are in proximity to intrusive stocks related to the Coast Intrusives. Thus mineralized skarns may occur both in roof pendants within the Coast batholith and adjacent to intrusive stocks at considerable distance to the northeast of the main batholith contact. Cockfield (1926) concluded that "... the mineral deposits of the region occur in a belt following the eastern margin of the batholith ..." and "It follows that on the whole the eastern margin of the batholith ... slopes gently eastward with recurrent upward projections whose summits have been laid bare to the east of the main margin".

The mineralogy of the skarn deposits is, in general, similar whether they occur in the older Yukon Metamorphic rocks or in the Triassic and possibly Jurassic rocks. Magnetite, sometimes with hematite as in the Macks deposit, chalcopyrite, with considerable bornite in some of the Whitehorse Copper deposits, and gold with low values in silver are the more important minerals. Pyrrhotite is common as a minor and sometimes major constituent. Traces of molybdenite and scheelite occur in some skarns.

Although exploration of the copper gold skarns has been concentrated on their economic viability for copper production, it was the purpose of the regional exploration portion of the Aurora - Casau joint venture to explore for gold bearing skarns possibly similar to the Fortitude deposit, Nevada (P.R. Wotrub, et al, 1987). The demonstrated gold content of the copper skarns at Whitehorse and Aishihik Lake support this view and the occurrence of rich gold deposits of Tertiary epithermal type in the Mt. Skukum area, together with very late stage epithermal type "chalcedony breccias" on the HOP-ACME claims suggests a possible late stage gold enrichment is possible.

The HOP 75-102 property was glaciated and extensive unsorted glacial till, with many large boulders, covers some of the elevated portion of the property. Glacial kames, kettles and variable till deposits occupy the low ground along the Hopkins Lake valley.

CENOZOIC

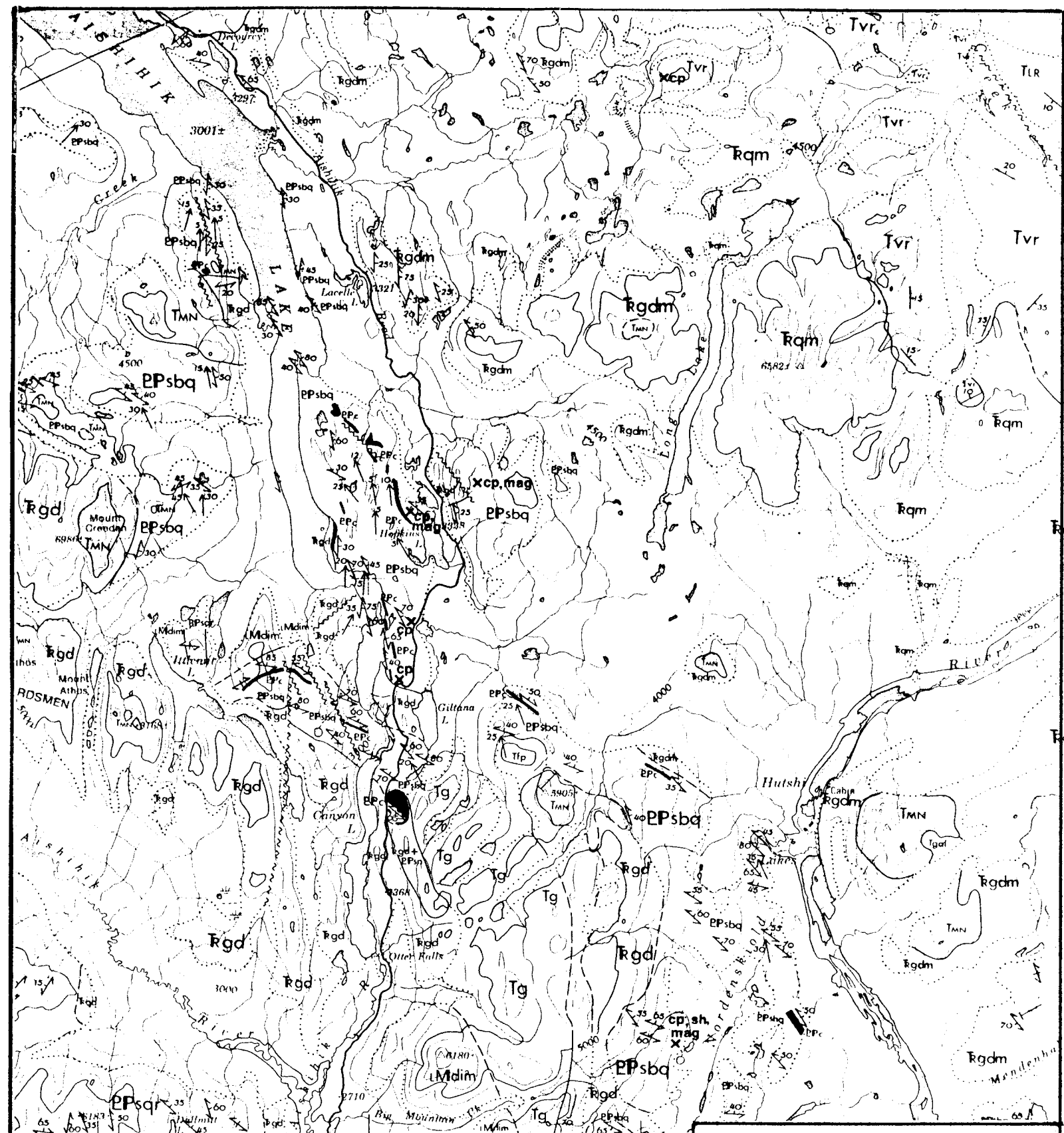
- Tvr** VARICOLOURED ACID TUFF: brightly coloured, light-weathering acid vitric crystal tuff, lapilli tuff and welded tuff; includes plugs and necks that are feeders to these extrusive rocks
- TMN** MOUNT NANSEN GROUP: dark grey to black weathering (blocky talus), dark greenish-grey, aphanitic, intermediate to acid, massive, tuff and tuff-breccia
- Tfp** FELDSPAR PORPHYRY: orange and buff weathering light-coloured feldspar porphyry dyke and flow rocks of intermediate to acid composition; may include Nisling Range Alaskite (Tgal) undifferentiated. Where these rocks are represented by intrusive phases this is indicated by a lined pattern defining the trend of dykes, where they are extrusive this pattern is not shown
- Tgal** NISLING RANGE ALASKITE: fine-grained, miarolitic, buff-weathering leucogranite or alaskite; may include Coffee Creek (Tg), and feldspar porphyry (Tfp) undifferentiated
- Tg** COFFEE CREEK GRANITE: coarse-grained, equigranular, buff-weathering, homogeneous biotite granite and quartz monzonite; includes Nisling Range Alaskite undifferentiated

MESOZOIC

- LMdim** HORNBLende DIORITE: melanocratic fine-grained equigranular biotite hornblende diorite; may include Ruby Range granodiorite (Rgd) undifferentiated
- LOWER CRETACEOUS AND/OR UPPER JURASSIC**
- LKT** TANTALUS FORMATION: chert pebble conglomerate with minor interbedded sandstone and shale
- LOWER AND MIDDLE JURASSIC**
- J** LABERGE GROUP: poorly sorted, white and buff weathering, medium bedded to massive sandstone with interbedded pebble and boulder conglomerate and minor shale
- Mqmp** PORPHYRITIC QUARTZ MONZONITE: porphyritic (pink K-feldspar) medium-grained, hornblende biotite quartz monzonite; includes minor pink quartz monzonite (Rqm) and hornblende granodiorite (Rgdm) undifferentiated
- TRIASSIC (?)**
- Rqm** PINK QUARTZ MONZONITE: pink coarse-grained leucocratic quartz monzonite and porphyritic pink quartz monzonite; may include porphyritic quartz monzonite (Mqmp) undifferentiated
- Rgdm** HORNBLende GRANODIORITE: dark grey weathering, coarse-grained, equigranular biotite hornblende granodiorite to quartz diorite; commonly shows layering or foliation by alignment of mafics; includes pink quartz monzonite (Rqm) and porphyritic quartz monzonite (Mqmp) undifferentiated
- Rgd** RUBY RANGE GRANODIORITE: medium-grained, equigranular, grey, hornblende biotite granodiorite; includes undifferentiated diorite (LMdim); may include biotite granite (Tg)
- Rvb** MASSIVE GREEN VOLCANICS: massive dark green epidotized basalt; minor tuff breccia

PROTEROZOIC AND/OR PALEOZOIC

- EPm** AMPHIBOLITE: dark green fine-grained amphibolite; includes interfoliated schist and gneiss
- EPsqr** HORNFESELD SCHIST: dark purplish brown staurolite cordierite biotite hornfels with relict schistose texture
- EPc** MARBLE: light grey and white coarsely crystalline, locally finely laminated fetid marble
- EPsbq** BIOTITE SCHIST: brown grey weathering, recessive, chlorite muscovite biotite quartz schist and micaceous quartzite; garnetiferous; minor amphibolite, marble and skarn



15° 137°00' 45'

MAP 17-1973
PAPER 73-41
GEOLOGY

AURORA - CASAU JOINT VENTURE
HQP 75-102 CLAIMS
REGIONAL GEOLOGY
1 250,000 AUG. 1990
FIGURE 4

PROPERTY GEOLOGY

Procedure

The following text is adapted from the text in "Preliminary Geological Report on the HOP 75-12 Quartz Claims."

Mapping in the main outcrop areas of the claim group was done by hip chain and compass from a local compass and hip chain flagged grid shown on Map I. Map I is at a scale of 1:1,000. Magnetometer results are plotted on the same map. Future mapping will require establishment of grid lines or use of orthophoto maps.

Outcrop Distribution

Spotty rock outcrops occur east of the Aishihik road north of HOP 93 and near the boundary of HOP 93 with HOP 95. To the east, steep rock slopes rise through HOP 95-98 which were assumed to consist of granodiorite. However, mapping high on that slope on HOP 97, 98 located extensive skarn horizons within quartzites and micaceous gneiss. The slopes below these exposures deserve more detailed examination, particularly on HOP 97. In the plateau area on claims 99 - 102, mapping was controlled by hip chain and compass lines at varied intervals as shown by Map I. Mapping control suffers from the inherent inaccuracy of such a grid but, possibly more importantly, because of the overall flat dip of the formations the survey suffers from lack of vertical control.

The extensive limestone exposures west of Hopkins Lake had received attention during the previous work in October 1989 and June 1990, because of the copper, gold assays obtained in that area. The underlying schist, gneiss complex is well exposed in part of this area and more intrusive dykes were encountered within the schist-gneiss than within the limestone. The magnetometer profiles produced during the current work failed to indicate a structure controlling the alteration zones. No further mapping or sampling was done to compliment this magnetic reconnaissance.

Rock Units

Intrusives

- | | |
|---|---------------------------------|
| 9 | Epithermal Breccia |
| 8 | Basalt Dykes, 8a Andesite |
| 7 | Feldspar Porphyry Dykes |
| 6 | Monzonite 6a Hornblende Diorite |
| 5 | Hornblende Biotite Granodiorite |

Metasediments

- | | |
|---|--------------------|
| 4 | Quartzite / Gneiss |
| 3 | Limestone |
| 2 | Skarn |
| 1 | Quartzite / Gneiss |

Unit 1 **Quartz Mica Schist (Gneiss)**

Morin describes this gneiss as "greyish brown weathering and grey on fresh surface, the gneiss has medium to coarse grained flakes of mica aligned along the gneissosity and 2 to 5 mm thick bands of quartz and minor feldspar are between these mica rich layers. The rock commonly breaks along the foliation and fragments display a lustrous sheen."

The schist varies gradationally from a dark "dirty" nearly black rock through all gradations to quartzite. Schistosity, imparted by varied amounts and degree of development of micaceous partings, is parallel to bedding unless modified by later shearing. Locally thin beds of finer grained mica schist occur within the quartz mica schist.

Quartzite

The quartz mica schist grades through quartzitic schist to clean quartzite. This change may be observed both laterally along strike and vertically. On occasion a complete transitional section from quartz mica schist through quartzite schist to "clean" quartzite may be observed. Beds are generally thin, in the order of a few millimeters to a couple of centimetres as a rule. Much quartzite splits along apparent bedding showing sparkling surfaces lightly coated with sericite. The quartzite is generally fine grained although locally broken surfaces across bedding will reveal relatively coarse sand grains. Locally skarn minerals, epidote, actinolite, diopside occur disseminated or in narrow conformable bands within the quartzite.

Unit 2 **Skarn**

Major skarn horizons occur on claims HOP 97, 98, 99 interbedded, where mapped, with thin bedded impure quartzites and, just west and south of the small pond on HOP 99, with thin bedded limestone. These skarns are extremely variable in composition over relatively short

distances with coarse red garnets, epidote, tremolite or magnetite being locally predominant. Copper mineralization as chalcopyrite and malachite was noted particularly on HOP 98. The most extensive skarn development is essentially a thick monotonous dark green epidote skarn well exposed on HOP 99. Locally this horizon contains low grade copper / sulphide mineralization.

On the east side of the pond on HOP 99 the skarns are cut by several zones of "chalcedony breccia" and are overprinted by a strong tan rusty coloration.

Correlation of this main epidote skarn with magnetite, garnet skarns on HOP 98 is uncertain due to lack of vertical control and several north trending faults.

Within the thick limestone horizons west of Hopkins Lake the skarns are generally small in size with lenses (boudins) of pale green tremolitic skarn being fairly prominent on the east side of the main limestone ridge. These boudins range up to 10 metres long and 3 metres thick and may be compressed out at their ends to a long tapering tail. A series of these probably represent a once continuous bed. No mineralization of importance was seen with this skarn occurrence.

On the west side of the main limestone ridge a thin, 1 metre thick, copper bearing skarn was encountered above the south trending fault well within the limestone. This skarn has sharp upper and lower contacts with limestone. It is possible this horizon corresponds to the fragmented and broken skarn, dyke, breccia complex with heavy pyrrhotite, minor chalcopyrite mineralization to the south on HOP 80. Further mapping is warranted.

At several locations within the limestone complex small knots of skarn and sulphide occur. These may be in the order of 0.3 to 1 metre long and 0.2 metres thick.

At several other locations local skarn occurrences are associated with dykes of andesitic, feldspar porphyry or grey granodiorite composition. At these locations copper mineralization in the form of chalcopyrite and malachite and/or azurite may occur.

On HOP 83 two lenses, or short beds, of dark green diopside? skarn were observed within the limestone. A small dark garnetiferous skarn occurs associated with a dyke of hornblende feldspar porphyry.

Unit 3 Limestone

Beds of limey rock which scratch easily and effervesce with cold, dilute (10% - 15%) hydrochloric acid have been classified as limestone. Limestone horizons vary from about one metre to about 30 metres in total thickness. Individual beds, where bedding is apparent, are generally thin. Exposures of a rather friable, easily fragmented limestone were mapped as "thin bedded" limestone. The weathered surface is marked by small "shards" of limestone often crumbly or sugary in texture. The limestone is white to light grey in colour.

On HOP 98-100, limestone occurs as thin, discontinuous beds above some skarn occurrences. Two or more horizons exist but lack of topographic control makes correlation difficult and time consuming.

Unit 4 Quartzite / Gneiss

The quartzite, gneissic and schistose rock formations, which appear to be stratigraphically above the main skarn horizon, has been separated as another rock unit during this mapping program. The rock types are not obviously different from Unit 1.

Unit 5 Hornblende Biotite Granodiorite

Northeast of Hopkins Lake areas of hornblende biotite granodiorite occur on HOP 93 - 102 as well as on the HOP-ACME claims to the south. This rock type is generally magnetic. Grain size varies from medium fine to medium coarse and colour from dark to light grey. In general the rock is fresh but in certain areas it is seen to intrude an older diorite? phase of dark fine grained intrusive. The granodiorite in such areas may be somewhat darker, finer grained and contains angular to rounded fragments of the dioritic intrusive.

Where the granodiorite intrudes the schist-gneiss complex the contact may be somewhat gradational with some apparent assimilation of the schist.

On the east and west sides of the local rounded peak on HOP 98 the granodiorite is perhaps darker in colour, strongly jointed vertically trending north and, near the contact, jointed at dips of 20° to 45° to the south. In these areas some joints are lightly coated with malachite though the rock itself is fresh and unmineralized between the joints. It is assumed the malachite is a result of assimilation of, or weathering of, nearby copper bearing skarns.

Narrow dykes of granodiorite were observed on HOP 9, 11, 82 intruding limestone. Contacts are sharp and may, or may not, have skarn in the vicinity.

Unit 6 Monzonite

The long narrow ridge east of the fault and creek on HOP 101, 102 and extending onto HOP 61 - 62 within the tractor trenches consists of a dark grey to black fine to coarse grained basic looking rock. A specimen containing chalcopyrite was found on HOP 61 and a petrographic report identifies the rock as monzonite. This rock is

intruded by the hornblende biotite granodiorite. No mineralization was seen on the HOP 101 - 102 claims.

Unit 6a Hornblende Diorite

West of the fault draw on HOP 102, a single outcrop of dark fine grained hornblende-bearing rock has been termed dioritic. This could be a phase of either the monzonite or of the granodiorite.

Unit 7 Feldspar Porphyry Dykes

The schist-gneiss and limestone complex has been intruded by numerous dykes ranging in width from 0.3 to 20 metres. Most of these dykes trend north to north 20° east and contacts, although sometimes irregular, appear to be near vertical. Varieties include a fine dense black basaltic variety with pale creamy feldspar phenocrysts, grey fine to medium grained hornblende biotite feldspar porphyry and fine grained greenish grey andesitic? dykes.

**Unit 8 &
Unit 8a** Basaltic and andesitic dykes intrude the monzonite and granodiorite in the south portions of HOP 100, 102 and it is generally assumed this family of variable intrusive dykes is younger than the stock-like intrusive bodies. Andesitic dykes intrude Unit 4 on HOP 100, 101 and Unit 2 on HOP 98. West of the southwest corner of HOP 85 the dyke-like intrusive beside the postulated fault (linear) seems to change composition from basaltic feldspar porphyry to granodiorite. More detailed mapping might locate contacts between these phases however, north of HOP 93 small aplitic dykes intrude the schist/gneiss complex and the main intrusive body is assumed to underly these outcrops.

Unit 9 Epithermal Breccia

The term "epithermal breccia" is adopted from mapping on the HOP-ACME claims. This unit consists of variable jointing, fracturing, brecciation, "ankerite" rusty alteration, quartz and chalcedony veining along steep north trending zones generally 1 to 10 metres wide. On the HOP 75 - 102 claims these zones are particularly prominent in the northeast wall of the south trending fault on HOP 98, east of the pond on HOP 99 and on the spur on the west side of the limestone ridge on HOP 82. Many other occurrences exist.

In general, where reasonably well developed, these zones contain white quartz veining, drusy quartz and chalcedony near the middle of the zone flanked by fractured rock, apparently altered to a fine grained "ankerite" tan rusty colour. It is generally difficult to obtain a fresh surface for examination in this altered zone. Usually no significant sulphide mineralization is evident although a little fine pyrite may be found.

These "epithermal breccia" zones on HOP-ACME include breccias with sharp to rounded fragments rimmed with silica and sometimes fine quartz crystals. These zones have been found to cut all rock types including skarns, granodiorite and all varieties of dykes.

Wide zones of skarn are altered by these epithermal breccias east of the pond on HOP 99. The granodiorite east of the fault in the west portion of HOP 98 is cut by multiple zones giving the area a light tan rusty appearance. The major alteration zone on the spur on HOP 82 is cut by multiple zones and the character of the original rock is nearly obliterated.

Mineralization

Exploration on the HOP-ACME claims to the south has outlined significant showings of copper-gold mineralization in skarns. On the HOP 75-102 claim group prospecting and mapping has concentrated on locating similar skarn mineralization.

Minor occurrences of chalcopyrite and molybdenite in intrusive rocks suggest the possibility of porphyry copper style mineral deposits but, to date, no significant amount of such mineralization has been located.

No significant precious metal values have been located in the various epithermal breccia zones.

Copper - Gold Bearing Skarn

Extensive skarn development occurs on HOP 97-98. Initial observations indicate two main skarn bands up to 10 m thick separated by quartzite. Chalcopyrite and malachite occur sporadically. Prospectors' grab samples returned 0.93% Cu, 75 ppb Au, 3.4 ppm Ag on the claim line and 665 ppm Cu, 435 ppb Au, less than .2 ppm Ag about 200 metres to the south. A composite sample of the main skarn has been taken for 32 element ICP analysis. This sample was made up of random pieces along 180 metres of strike and is not representative of exposed mineralization. Significant values include 8123 ppm Cu, 12.1 ppm Ag, 40 ppb Au, 61 ppm Mo, 112 ppm W. A reasonably representative sample of magnetite skarn (30318) was taken on line 9+50N which returned 6416 ppm Cu, 13.6 ppm Ag, and 20 ppb Au, over a vertical face of approximately 2 metres.

Three samples of sulphide-rich material were collected near line 13+00N on HOP 99 (Map I). Results were:

Geochemical Results in ppm, gold in ppb

<u>Sample No.</u>	<u>Cu</u>	<u>Zn</u>	<u>Ag</u>	<u>Co</u>	<u>Au</u>
30307	4028	101	0.4	219	140
30310	179	31	0.2	9	5
30311	1097	52	0.9	74	5

On HOP 80 and 82 two separate exposures of copper bearing skarn were noted during June. These lie on trend with each other and may prove to be a continuous band. This skarn is thin, 1 to 5 metres in thickness, and is mineralized with chalcopyrite and malachite where enclosed by limestone and by massive pyrrhotite, chalcopyrite, pyrite and arsenopyrite where brecciated and intruded by dykes near a SE trending fault. Assay of large talus fragments returned 0.73% Cu, 0.06 oz. Ag and 0.009 oz. Au.

Prospecting sample 10-4-1 was taken from a highly oxidized skarn within limestone at the contact of a feldspar porphyry dyke. A 5 m x 3 m pit had been blasted here. Mineralization, heavily oxidized, includes pyrrhotite and fairly massive chalcopyrite. The sample assayed 0.016 oz. Au, 5.83 oz. Ag, 19.2% Cu, 0.22% WO₃. Sample 10-4-2, 80 metres to the north of 10-4-1, was taken from similar skarn with magnetite and chalcopyrite. That sample assayed 0.162 oz. Au, 1.41 oz. Ag, 7.92% Cu and 0.03% Mo. This site was not positively identified during mapping but this or similar small skarn pods were observed in the vicinity. These pods have no significant size but occur in fractured areas of limestone or on the contacts of intrusive dykes.

Sample 10-2-5 from dark green skarn on HOP 80 assayed 410 ppb Au, 10.2 ppm Ag, 0.72% Cu, 0.159% WO₃, 0.09% Mo. Lenses of skarn in this area are generally limited to boudin remnants of former beds.

On the east slopes of the limestone ridge on HOP 78, 80, 82 copper minerals occur in skarns associated with massive limestone, feldspar porphyry dykes and faulting. Sample 10-4-3 assayed 80 ppb Au, 5.0 ppm Ag, 0.38% Cu while Sample 10-4-4 assayed 125 ppb Au, 23.2 Ag, 1.54% Cu, 0.10% WO₃.

Copper Bearing Granodiorite

A specimen of chalcopyrite bearing monzonite had been found on HOP 61 which assayed 0.46% Cu. Tractor trenches in that general area were examined during this mapping program without finding similar mineralization.

On HOP 98 strong jointing exists which is lightly coated with malachite in certain areas. The granodiorite between the joints is fresh, massive and unmineralized. No material was seen which might contain economically significant copper values. It is the opinion of the author that the granodiorite in this area has been contaminated by copper derived from the intruded copper-bearing skarn horizon.

"Epithermal Breccia" Zones

North striking fracture zones had been located on the HOP-ACME claims. These zones exhibit a characteristic tan rusty "ankerite" alteration over varied width outward from quartz veining varying from thin quartz stringers to silicified and quartz veined zones to breccia zones with silicified fragments, silica rimmed fragments, drusy quartz veining, limonite and hematite alteration.

Similar zones are widespread on the HOP 75-102 claims. Widths of single zones range up to 10 metres. Certain areas, however, contain multiple zones and result in wide, altered, rusty looking areas. These are most marked within skarns east of the pond on HOP 99, within the jointed granodiorite in the west portion of HOP 98 and on the spur on the west side of the limestone ridge on HOP 82. Other strong zones occur on the east side of the ridge on HOP 78, the nose of the limestone ridge on HOP 80 and the east face of the ridge on HOP 81, apparently below the limestone contact.

Sample 30308, taken from a small exposure of skarny gneiss cut by quartz stringers and rusty "epithermal" alteration, within a strong negative magnetic anomaly returned 210 ppm Cu, 17 ppm Co and 5 ppb Au. Sample 30309 from a quartz veined shear zone 65 metres to the west returned 43 ppm Cu, 15 ppm Co and 5 ppb Au.

These zones rarely contain fine pyrite mineralization. On HOP 78, 80, 81 they also contain minor copper mineralization, primarily malachite.

The following samples were taken from extensively buff altered rocks cut by "epithermal breccia" on the face of the spur, west side of the limestone ridge, HOP 82.

<u>Prospectors Sample</u>	<u>Gold ppb</u>	<u>Silver ppm</u>	<u>Copper ppm</u>	<u>Mo ppm</u>	<u>As ppm</u>
10-2-1	5	0.2	309	7	-
10-2-2	560	1.0	497	28	256
10-2-3	435	0.2	665	16	-

Copper in Limestone

Chalcopyrite and malachite occurs on fractures in limestone in areas close to strong faulting on both sides of the limestone ridge HOP 80 and in fairly extensive talus above the spur on HOP 82.

Limestone Breccia

A persistent zone of brecciated limestone on the west slopes of the ridge, HOP 82, reaches widths of 15 metres. Minor silicification and the presence of limonite suggested the possibility of epithermal precious metal mineralization. A sample containing no visible sulphides returned 238 ppm Cu, 5 ppb Au, 20 ppm Mo.

Structure

Mapping on the HOP-ACME claims had located small scale isoclinal folding within the schist gneiss complex in the lowest stratigraphic exposures below the skarn limestone horizons within the grid area east of Hopkins Lake. Good exposures of similar isoclinal folding on a small but complex scale west and northwest of HOP 85 shows fold crests plunging 15° at N20°E. West limbs dip at about 10°-15° west while east limbs dip about 65° west.

On claims HOP 83, 85 dips and strikes observed in the massive limestone areas, including narrow beds of skarn and an outcrop of schist, indicate dips of 10° to 30° east on the west side and top of the ridge but 75° west on the east side of the ridge.

On claims HOP 80, 82 the limestone dips east at about 30° to 35° on the west side of the ridge. No satisfactory dips were recorded on the east side of the ridge.

Overall the rock sequence is considered to be a complex of isoclinally folded schists and gneiss overlain by a thick and variable sequence of limestone and skarn with interbedded schist and quartzite. East of Hopkins Lake this sequence strikes north and dips east at 10° to 30° . It is overlain by similar schistose metasediments.

The sedimentary sequence is intruded by fine grained dark diorite? and monzonite as seen on HOP 99-102. These rocks are all intruded by more extensive grey granodiorite as a stock like intrusive east of Hopkins Lake and by granodiorite dykes in other areas.

A younger family of feldspar porphyry dykes, of varied appearance and composition, intrudes the schist, limestone, skarn, granodiorite complex. These dykes, and possibly sills, strike north or slightly east of north, have sharp chilled to brecciated contacts and sometimes exhibit silicification or quartz veining along their contacts.

A late series of north trending fractures contain quartz veins, drusy quartz, chalcedony, silicified breccias and relatively wide zones of bleaching and tan coloured alteration. These are essentially vertical and cut all rock types.

Airphoto linears mark topographic structures which are thought to reflect fault structures. These fall into several overall trends at about $N30^{\circ}W$, $N05^{\circ}-20^{\circ}E$ and $N45^{\circ}-75^{\circ}E$. Relative movement on these faults is uncertain. Slickensides were observed on north trending faults which indicated horizontal movement. In general it is presently thought that movement is generally west side down.

The more detailed mapping carried out during this program has been limited to HOP 97-102. This mapping indicates a complex series of quartzite beds (Unit 1) which have been affected by alteration which locally produced skarnification within the quartzite. Overlying the quartzites are a series of skarn beds, interbedded quartzite and gneiss, and at least two thin horizons of limestone. Above the main skarn-limestone series is another series of quartzite-gneiss similar to Unit 1 but termed Unit 4 because of its stratigraphic position.

In general the beds of Units 1 to 4 on HOP 97-102 strike northerly and dip (10° - 35°) to the east and south. Locally, as at 10+40N, 54+00E, bedding is complexly folded and in some areas bedding appears to be deformed where intruded by granodiorite.

On line 7+50N mapping, and the magnetometer survey, extended to 46+00E within the granodiorite. At 46+50E to 46+25E, this line crosses a marked gully trending $S35^{\circ}E$ which is part of a major fault marked by an airphoto linear extending to Franklin Creek and claims HOP 28 and 30. At 46+25E, 15 metres south of the line, a steep outcrop face shows grey feldspar porphyry cut by anastomosing, ankeritic rusty, reddish feldspar porphyry which appears altered and weathered and cut by quartz stringers up to 2 cm in width. This represents part of a system of southeast trending faults.

On HOP 99, 100, 102 a second system of faults trending $N10^{\circ}E$ to $N25^{\circ}E$ occupies topographic low, linear valleys. These faults are marked by strong vertical jointing, often accompanied by rusty ankeritic alteration and quartz veining (epithermal breccia zones). The fault trending through the middle of HOP 99 shows extensive skarn on its elevated east wall suggesting movement is relatively small with west side down. Along the fault on the east boundary of HOP 99 the direction of movement may not be the same since skarn would therefore be expected to the east but none was found except for boulders of magnetite skarn near the tractor trench and claim post in the northeast corner of the map.

Several of the north trending granodiorite and feldspar porphyry dykes are thought to occupy earlier faults, or zones of weakness essentially part of the same system of fractures.

A northwest trending fault is suspected at about 10N, 47+80E since the slope to the north is composed of altered sediments and line 10N follows a rather broad gully.

MAGNETOMETER SURVEY

Procedure

Hip chain and compass flagged lines were established with chainages marked at 25 metre intervals. Rough topography and magnetic deviations caused variations in location of the lines and the inherent inaccuracies of the hip chain caused problems with accuracy of chaining. Lines were to be nominally at 100 metre spacing although short-fill in-lines were later established and lines were placed at 50 metre intervals over the main anomaly.

Magnetometer readings were taken at 12.5 metre intervals with readings having been taken along the baseline at 10+00E from 6+00N to 12+00N prior to conducting the survey. A Scintrex MP-2 magnetometer was used and most stations were read at least twice to ensure stability of readings. Values for each loop of lines were adjusted to baseline values to accommodate diurnal changes. Readings west of Hopkins Lake were normalized to a base station at the lake.

The MP-2 proton precession magnetometer is unable to take a reading in locations where the magnetic gradient is extremely strong (about 5000 gammas per metre) and as a result there are a few survey stations marked N/R for "no reading" where the instrument failed to give an acceptable reading after repeated attempts.

After correction, gamma values were plotted on the geological map and contoured.

Observations

Map I shows the contoured magnetometer results with the main magnetic anomalies concentrated in the east part of HOP 98 and northwest portion of HOP 100. The main magnetic anomaly shows a sharp cut-off at about 48+50E where the steep west facing hillside terminates the north striking, gently east-dipping magnetite bearing skarn horizons. The anomaly is about 160 metres from north to south at its west margin tapering off to the east over 130 to 170 metres which would be expected since the bed dips east and the topography reaches a

peak at about 49+25E. The anomaly is bounded by a magnetic low around its margin to the north and east.

North and east of the magnetic low zone, a series of isolated magnetic highs mark the general trend of one or more skarn horizons with thin limestone lenses. If survey lines were more closely spaced and extended to the northwest, the pattern might more closely resemble the curved trend of the magnetic low. That pattern would reflect the trace of flat-lying skarn horizons outcropping around the nose of the local topographic ridge. There is little rock exposure but there is no doubt these anomalies are due to skarn beds. At 9+50N, 48+80E the skarn contains considerable magnetite.

Within HOP 99 extensive barren epidote skarn is well exposed. Magnetic values are relatively flat between 500 and 1000 gammas with little indication of anomalies which would attract further examination. On line 13N, local extreme high and low magnetic anomalies mark areas of sulphide and magnetite mineralization occurring on steep north-facing slopes.

A magnetic low at 53+75E, 12N is in an area of rather general overburden but small outcrops of skarn and quartzitic gneiss occur. Nothing is immediately evident to explain the presence of these strongly negative readings.

Areas underlain by granodiorite are not readily defined by the current survey. Survey lines at closer spacing might help but better control of more detailed geological mapping could do this more accurately.

West of Hopkins Lake (Map II) a magnetometer traverse was done to trace the magnetic profile surrounding the limestone ridge which hosts a number of small mineral showings. It was expected from the aeromagnetic map that the magnetic field would drop off from the area of magnetic intrusives, as is shown by the readings along the north side of HOP 88, but that local magnetic anomalies would be detected in the alteration zone area on HOP 81-82 and along the south boundary of HOP 80. Such anomalies were not located. Local magnetic highs of up to 300

gammas are probably due to north trending intrusive dykes previously mapped in the gneissic metasediments.

Interpretation

The positive and negative magnetic anomalies readily indicate the areas of mineralized skarn. Surface exposures of the skarn in areas of neutral magnetic readings are extensive and show those skarns to be barren.

The main anomalous area on HOP 98 is the main target. North of the surveyed area, the topography drops off steeply and probably removes any hope of finding mineralization in that direction.

The magnetometer traverse west of Hopkins Lake failed to indicate patterns which might assist further exploration.

RECOMMENDATIONS

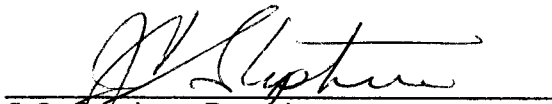
The copper-gold bearing mineral occurrences west of Hopkins Lake have not been shown to be related to any obvious magnetic feature. Future work here should commence with an attempt at locating the exploration results obtained by Hudson Bay Mining and Smelting in 1954. It is understood geophysical surveys were followed by diamond drilling on, or near, Hopkins Lake. It is reported graphite was encountered. The HBM&S grid lines can still be recognized.

Anomalous gold values indicate a comprehensive geochemical soil survey would be warranted on HOP 79-82 in the limestone-schist contact and alteration areas.

On HOP 97-102, some further mapping and prospecting, particularly on HOP 97 and 99 would be warranted. More expensive drilling of the main anomalies and mineralized zones is not presently justified due to the low grades obtained and limited size of anomalies. This might be reconsidered in light of future drill results on the adjoining HOP-ACME claim group.

This report is respectfully submitted as part of the exploration program funded by Aurora Gold Ltd. under a letter of agreement with Casau Exploration Ltd.

J.C. STEPHEN EXPLORATIONS LTD.



J.C. Stephen, President

COST STATEMENT

HOP 75-102

AUGUST - SEPTEMBER 1990

Personnel	
J.C. Stephen Explorations Ltd., Contractor	
J.C. Stephen, August 5-12	\$ 2,400.00
H. Pierce, August 5-12	1,600.00
Truck rental & mileage	688.77
Fuel and Oil	376.36
Magnetometer rental	300.00
Airphotos, maps	18.76
Flagging, hip chain, sample bags, etc.	65.00
Camp equipment, supplies	125.00
Groceries	120.00
Travel, hotel, meals	569.49
Geochemical, assays	113.50
Drafting, report	<u>360.00</u>
TOTAL	<u><u>\$ 6,736.88</u></u>

APPENDIX I

ROCK SAMPLE RECORD

GEOCHEMICAL ANALYSIS CERTIFICATE

STATEMENT OF QUALIFICATIONS

J.C. STEPHEN



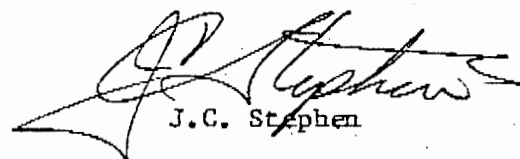
Academic

- 1950 Associate Member British Institute Engineering Technology
- 1950-1951 One year Geology University of Alberta

Experience Summary

- 1947-1955 Development and production experience in engineering and geology at Central Patricia Gold Mines, Eldorado Mining and Refining, Madsen Gold Mines, Hasaga Gold Mines, Pickle Crow Gold Mines as Surveyor, Assistant to the Engineer, Geologist.
- 1955-1959 Regional exploration experience with Pickle Crow Gold Mines, Combined Developments Ltd., R.G. Crosby and Associates, Jay-Kay Syndicate as Field Geologist.
- 1959-1961 Municipal construction including monolithic concrete tunnels as Senior Inspector.
- 1962-1968 Regional exploration with Mastodon Highland Bell Mines as field geologist.
- 1968-1976 Regional exploration with Bacon and Crowhurst Ltd., as supervisor of exploration syndicates.
- 1977-Present President J.C. Stephen Explorations Ltd.

Management of various exploration syndicates. B.C. and Yukon Management of publicly listed resource companies and supervision of exploration and development programs. Operations in Quebec, Ontario, Manitoba, Saskatchewan, Northwest Territories, Yukon, British Columbia, western United States.


J.C. Stephen

ROSSBACHER LABORATORY LTD.

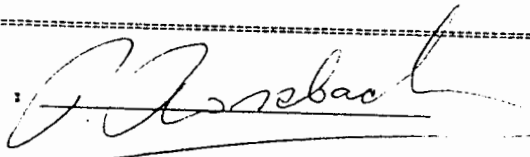
CERTIFICATE OF ANALYSIS

2225 S. Springer Ave., Burnaby,
British Columbia, Can. V5B 3R1
Ph: (604)299-5910 Fax:299-6252

TO : J.C.STEPHEN EXPLORATION LTD.
746 REGAL CR.
VANCOUVER, B.C.
PROJECT : AURORA-CASAU JV
TYPE OF ANALYSIS : ICP

CERTIFICATE # : 90412A
INVOICE # : 10576
DATE ENTERED : 90-09-12
FILE NAME : JCS90412.I
PAGE # : 1

PRE FIX	SAMPLE NAME	PPM MO	PPM CU	PPM PB	PPM ZN	PPM AG	PPM HI	PPM CO	PPM MN	I FE	PPM AS	PPM U	PPM AU	PPM HG	PPM SR	PPM CD	PPM SB	PPM BI	PPM V	I CA	I P	PPM LA	PPM CR	I MG	PPM BA	I TI	PPM B	I AL	I NA	I SI	PPM W	PPM BE	PPM Au	PPB AA
A	30307	1 4028	44	101	0.4	112	219	407	19.21	2	5	ND	ND	1	1	5	3	21	0.22	0.01	13	15	0.20	13	0.01	100	0.15	0.01	0.01	2	1	140		
A	30308	5 210	45	59	0.2	19	17	1983	7.13	46	5	ND	ND	102	1	7	2	35	5.03	0.01	4	21	0.80	61	0.01	91	0.60	0.02	0.01	8	1	5		
A	30309	2 43	35	45	0.2	452	15	477	1.76	23	5	ND	ND	47	1	8	3	32	2.71	0.01	9	85	2.17	41	0.11	28	0.96	0.02	0.01	5	1	5		
A	30310	2 179	21	31	0.2	34	9	165	6.44	8	5	ND	ND	22	1	4	2	36	1.58	0.36	11	5	0.77	38	0.15	38	0.38	0.01	0.01	1	1	5		
A	30311	1 1097	31	52	0.9	66	74	269	13.66	10	5	ND	ND	3	2	6	2	9	1.06	0.08	1	11	0.13	18	0.01	95	0.13	0.01	0.01	1	1	5		
A	30312	58 6898	23	122	9.1	11	28	257	11.04	8	5	ND	ND	64	1	10	2	50	1.03	0.05	15	11	0.36	24	0.20	73	1.05	0.01	0.02	214	1	60		
A	30313	28 3236	37	102	4.8	13	55	973	18.11	4	5	ND	ND	53	1	10	2	23	3.49	0.10	12	12	0.34	31	0.05	200	0.43	0.01	0.01	229	1	20		
A	30314	3415 3439	89	124	26.4	6	24	532	13.36	100	5	ND	15	77	1	64	11	35	2.55	0.03	11	18	0.21	45	0.06	40	0.71	0.01	0.02	284	1	120		
A	30315	39 363	26	54	0.4	11	11	658	9.00	13	5	ND	ND	112	2	2	2	46	5.69	0.01	7	21	0.31	15	0.11	17	0.91	0.01	0.02	84	2	5		
A	30316	693 24336	33	476	56.8	57	23	821	8.90	20	5	ND	ND	67	5	18	11	46	3.24	0.01	12	24	0.25	28	0.03	92	0.98	0.01	0.02	366	1	1400		
A	30317	5 1704	463	248	25.0	16	45	10257	11.01	60	5	ND	ND	408	4	2	2	11	9.19	0.01	23	11	0.75	200	0.03	10	1.52	0.01	0.01	1	2	1940		
A	30318	4 6416	35	158	13.6	21	33	881	12.54	7	5	ND	ND	19	1	6	2	33	3.44	0.04	21	11	0.38	41	0.01	55	0.48	0.01	0.01	1	1	20		
A	30319	1 4812	31	3305	49.2	45	113	1063	25.97	2	5	ND	ND	5	33	13	2	23	0.20	0.01	1	28	0.49	20	0.01	54	0.23	0.01	0.01	1	1	110		

CERTIFIED BY : 

LEGEND

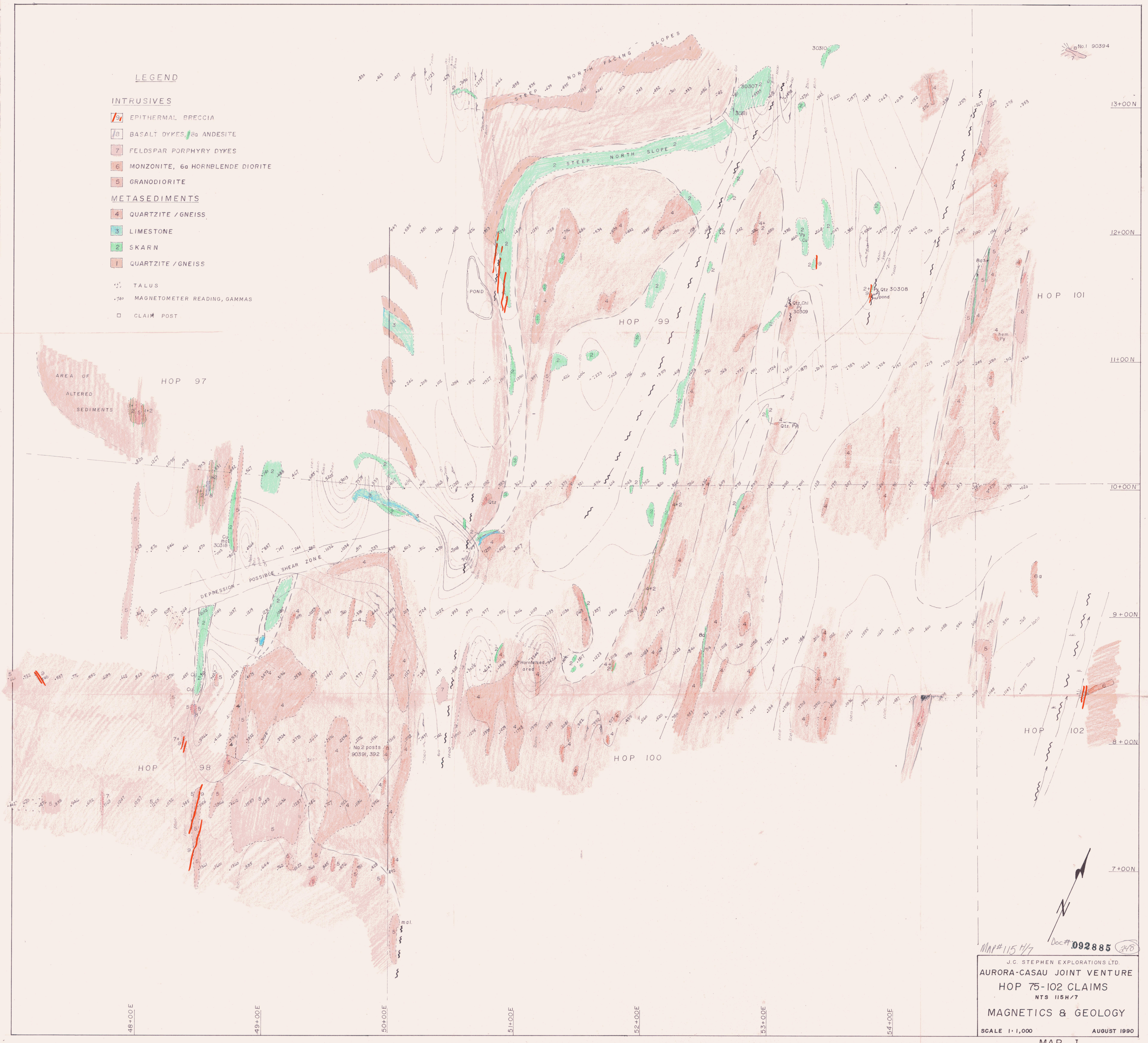
INTRUSIVES

- 9 EPITHERMAL BRECCIA
- 8 BASALT DYKES, 8a ANDESITE
- 7 FELDSPAR PORPHYRY DYKES
- 6 MONZONITE, 6a HORNBLende DIORITE
- 5 GRANODIORITE

METASEDIMENTS

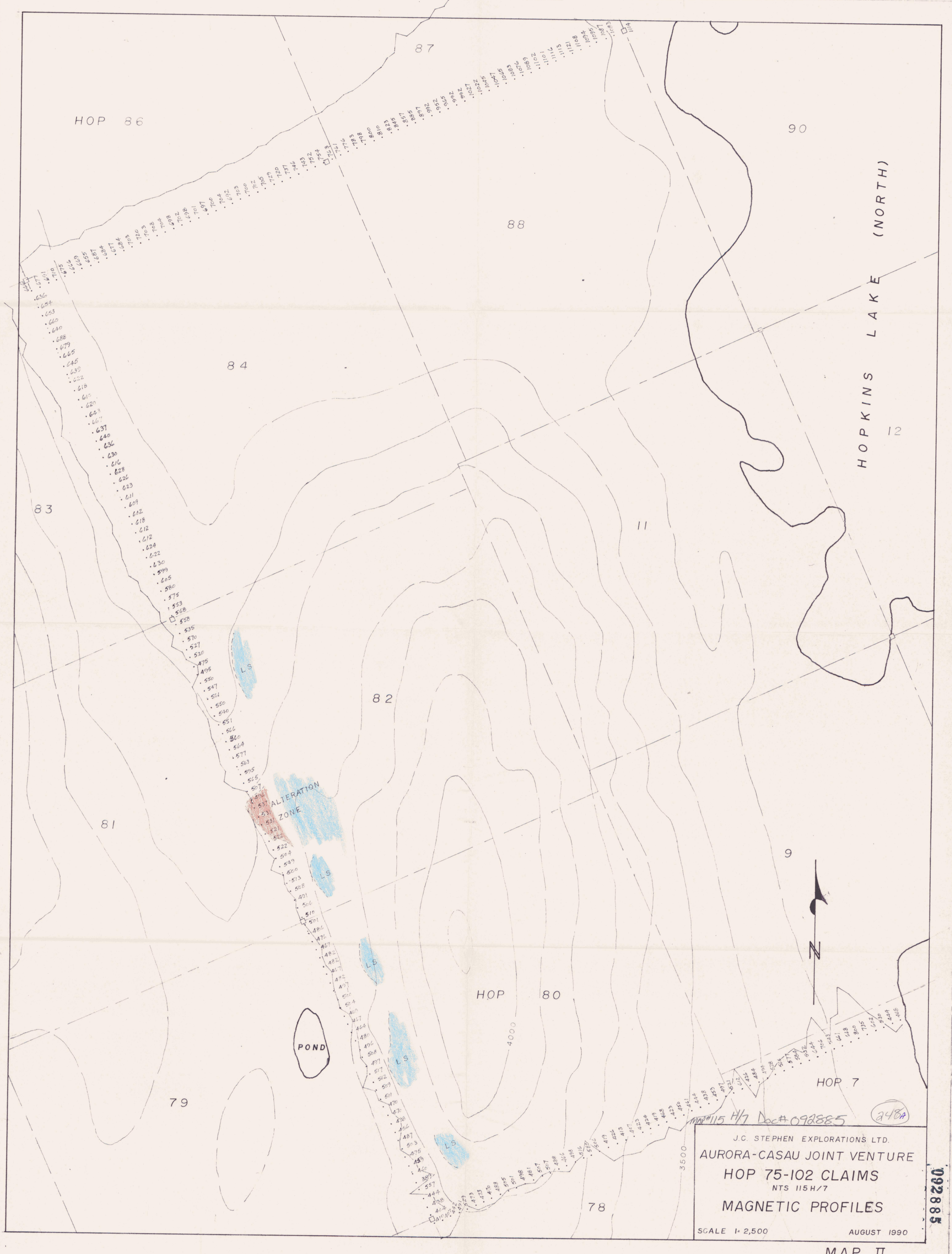
- 4 QUARTZITE / GNEISS
- 3 LIMESTONE
- 2 SKARN
- 1 QUARTZITE / GNEISS

- TALUS
- .740 MAGNETOMETER READING, GAMMAS
- CLAIM POST



MAP# 115 H/7 Doc# 092885 248

J.C. STEPHEN EXPLORATIONS LTD.
 AURORA-CASAU JOINT VENTURE
 HOP 75-102 CLAIMS
 NTS 115H/7
 MAGNETICS & GEOLOGY
 SCALE 1:1,000 AUGUST 1990



HOP 86

90

88

HOPKINS LAKE (NORTH)

12

84

83

11

82

81

9

HOP 80

POND

79

HOP 7

Map 115 H/7 Doc# 092885

248A

J.C. STEPHEN EXPLORATIONS LTD.
AURORA-CASAU JOINT VENTURE
HOP 75-102 CLAIMS
NTS 115H/7
MAGNETIC PROFILES
SCALE 1:2,500
AUGUST 1990

092885

MAP II

78

4000

3500