PROSPECTUS
May 20, 1988
062294

# GEOLOGICAL REPORT

# ON THE

# BLENDE MINERAL PROPERTY

# FOR

# NDU RESOURCES LTD.

# MAYO MINING DISTRICT

# YUKON TERRITORY

BY

J.P. FRANZEN, P.ENG.

North Vancouver, B.C. June 17, 1987

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## SUMMARY

NDU Resources Ltd. holds under option agreement the fifteen claim BLENDE mineral property in the Mayo Mining District, Yukon Territory. The property covers six known silver-lead-zinc vein zones, the most significant of which has been traced over a strike length of 900 metres. Several samples of mineralized vein material returned anomalous germanium values.

A two stage work program is recommended to assess the base - precious metals and germanium potential of the property. Stage 1, at an estimated cost of $292,100, would consist of a four hole, 1000 metre diamond drill program. Contingent upon favourable results from the first stage, Stage 2 would require a follow-up diamond drill program at an estimated cost of $835,000.

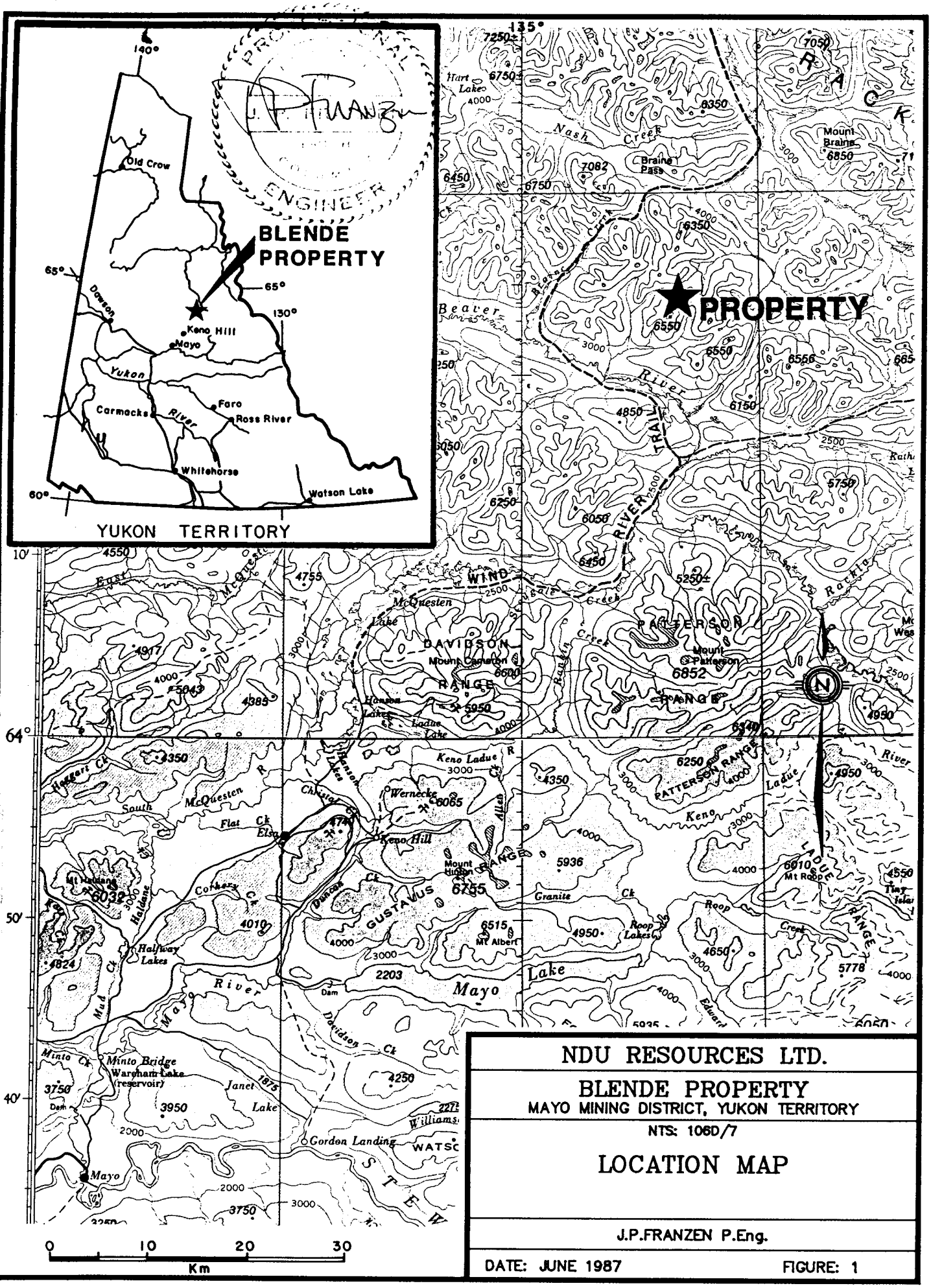
## INTRODUCTION

The BLENDE mineral property, Mayo Mining District, Yukon Territory, is held under option agreement by NDU Resources Ltd. The property is one of a number of important silver-base metals occurrences in a north belt of the prolific Keno Hill silver camp. The fifteen quartz claim property covers six known silver - lead - zinc vein zones; germanium values in vein material are significant. The main zone averages 25 metres in width and has been traced over a strike length of 900 metres and a vertical range of 250 metres. A number of talus-covered lineaments parallel the main zone. Streams draining these lineaments returned anomalous metal values.

NDU Resources Ltd. retained the writer to assess the results of earlier work on the subject property and to recommend a work program to test the potential of the property. This report is based on the writer's examination of the property on August 16, 1986 and on published and private reports and maps provided by NDU Resources Ltd. and Archer, Cathro & Associates (1981) Limited.

## LOCATION AND ACCESS

The BLENDE property is centred on Mt. Williams at latitude 64°-24° north and longitude 134°-40° west (Figure 1). The property is 64 kilometres northeast of Elsa, Yukon Territory. Elsa is a company town that is owned




| NDU RESOURCES LTD. |
|---|
| BLENDE PROPERTY<br>MAYO MINING DISTRICT, YUKON TERRITORY |
| NTS: 106D/7 |
| LOCATION MAP |
| J.P.FRANZEN P.Eng. |
| DATE: JUNE 1987 FIGURE: 1 |

and operated by United Keno Hill Mines Limited. Goods and services required for mineral exploration work are available at nearby Mayo.

Year round access to the property is by helicopter from Mayo. The Wind River winter bulldozer trail passes within 11 kilometres of the property and could be connected to the property with the construction of a 16 kilometres spur road.

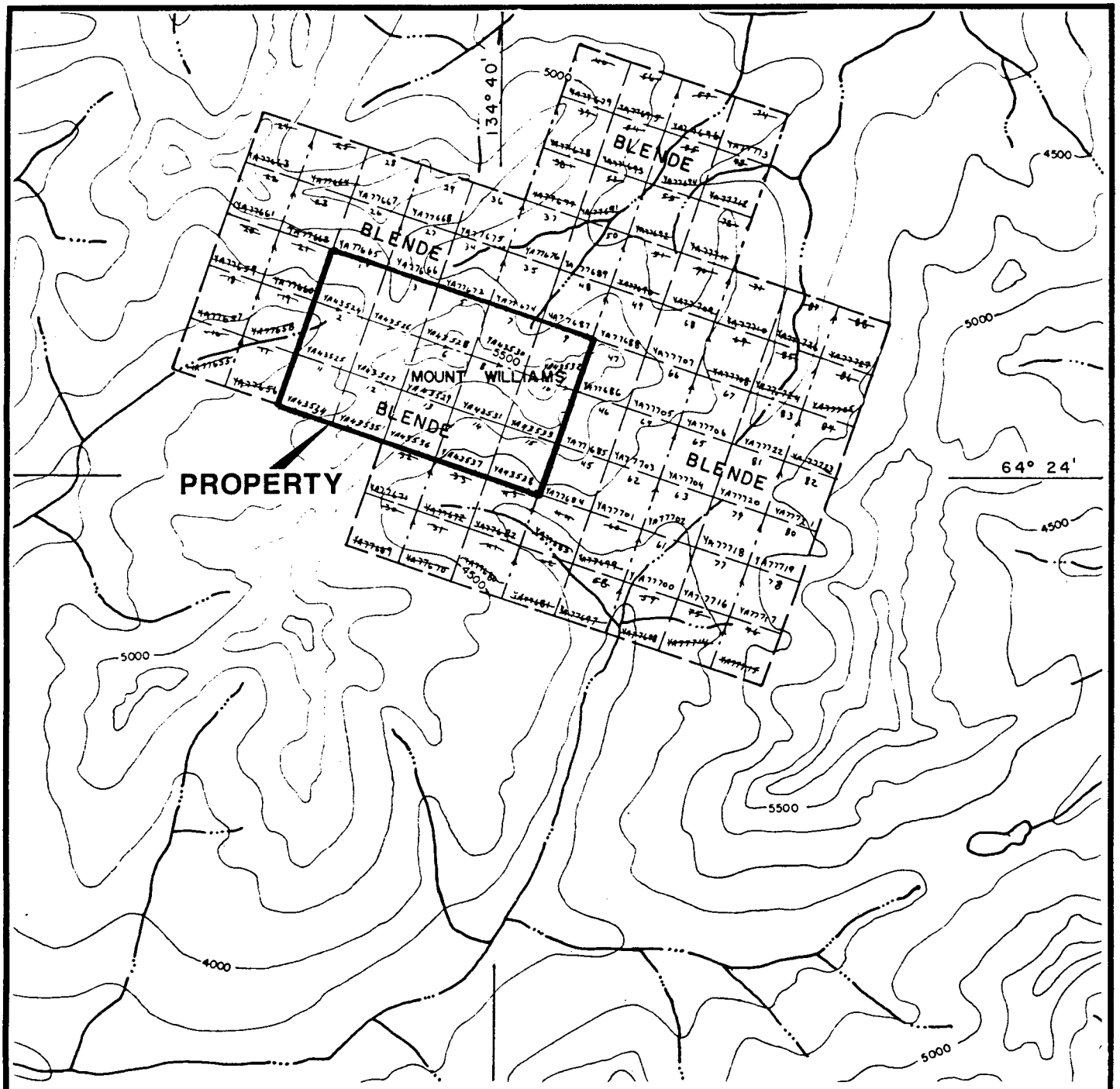
## MINERAL PROPERTY

The BLENDE property is in the Mayo Mining District, Yukon Territory. The property consists of fifteen contiguous quartz claims covering approximately 314 hectares (Figure 2). These claims are believed to have been properly located according to The Act Respecting Quartz Mining in Yukon Territory.

Details of claims, as provided by the Mining Recorder - Mayo Mining District, follow:

| Quartz Claim Name | Grant Numbers | Recorded Owner | Expiry Date |
|---|---|---|---|
| BLENDE 1-15 | YA 43524-YA 43538 | Archer, Cathro & Associates (1981) Limited | 11 March 1990 |

NDU Resources Ltd. has entered into an option agreement with Archer, Cathro & Associates (1981) Limited, the recorded owner of the claims.




ISSUED UNDER THE AUTHORITY OF THE MINISTER
OF
NORTHERN AFFAIRS AND NATIONAL RESOURCES

# NDU RESOURCES LTD.

## BLENDE PROPERTY

MAYO MINING DISTRICT, YUKON TERRITORY

NTS: 106D/7

## CLAIM MAP

J.P.FRANZEN P.Eng.

DATE: JUNE 1987 FIGURE: 2

The writer has not reviewed this agreement as this was beyond the terms of the assignment.

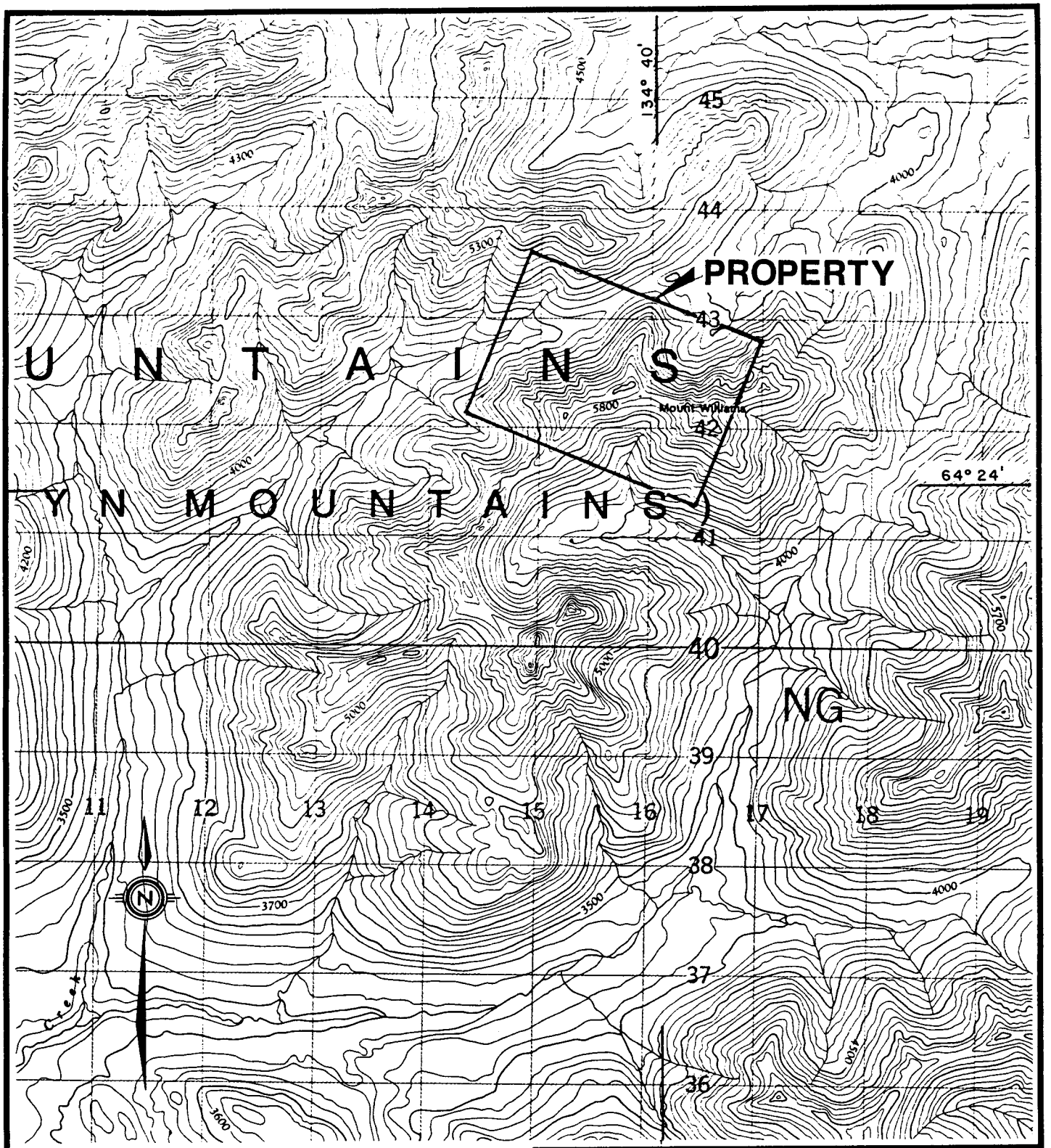
## PHYSICAL FEATURES

The BLENDE property is on the southern flank of the Wernecke Mountains (Figure 1). These mountains are formed from resistant rocks and characterized by irregular, jagged ridges incised with numerous cirques. The property is centred on Mt. Williams. Elevations range from 1200 to 1860 metres on the mineral claims and from 900 metres to 1990 metres in the surrounding area (Figure 3). Treeline is at approximately 1300 metres; property vegetation is restricted to sparse grass and lichen. Cirques are common at elevations above 1400 metres. Outcrop is most abundant on steep, north-facing cirque walls, ridge tops and in active stream cuts. South-facing exposures are normally blanketed by talus.

## PROPERTY HISTORY

Work programs on the BLENDE property are summarized below:

1975 Staked as the WILL claims by Cyprus Anvil Mining Corp. Work program: detailed geochemical silt and soil sampling, prospecting and geologic mapping (Roberts and Dean, 1975). Cost of 1975 program = $10,000.




0 1000 2000 3000 4000

METRES

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
P. FRANZEN

NDU RESOURCES LTD.

BLENDE PROPERTY
MAYO MINING DISTRICT, YUKON TERRITORY

NTS: 106D/7

TOPOGRAPHIC MAP

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DATE: JUNE 1987 FIGURE: 3

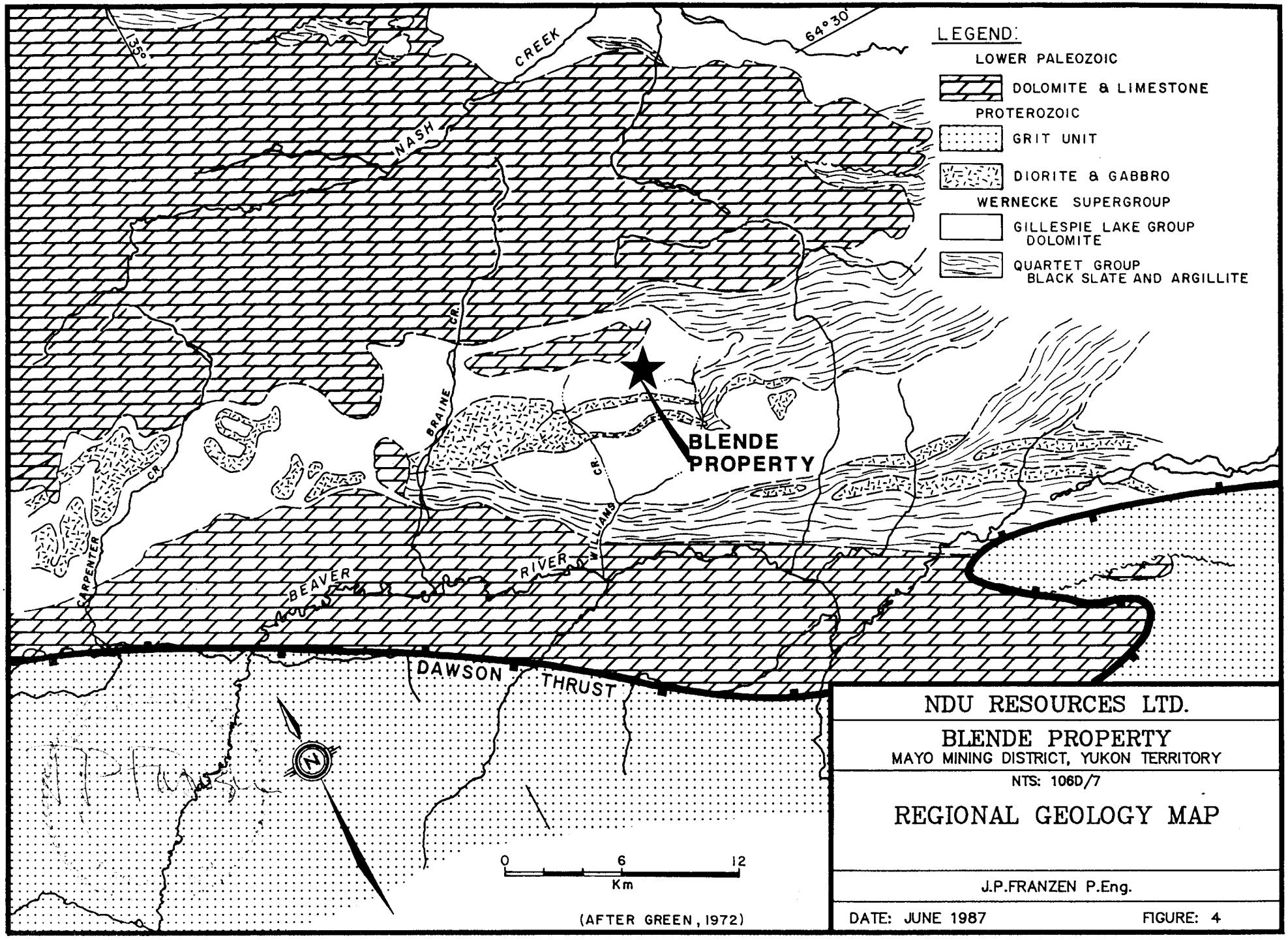
1981 Staked as the BLENDE claims by Archer, Cathro & Associates (1981) Limited.

1982 - 1984 Archer, Cathro & Associates (1981) Limited work programs: rock and chip sampling of mineralized zones, prospecting and air photograph interpretation of linear structures. Cost of programs = $22,500.

1985 Archer, Cathro & Associates (1981) Limited and Norvista Development Ltd. work program: geologic mapping, hand trenching and systematic rock chip sampling. Cost of 1985 program = $33,000.

## REGIONAL GEOLOGY AND MINERALIZATION

The Dawson Thrust is the major geologic structure in the region (Figure 4). It is a steeply inclined, several kilometres wide, composite fault that contains slices of volcanic and ultramafic basement rocks. It is coincident with an important facies boundary and separates Proterozoic and early Paleozoic carbonate and other platform strata on the north from Paleozoic and Mesozoic clastic rocks on the south (Tempelman-Kluit, 1980). Subsidiary fractures and faults commonly parallel this regional fault system.

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BLENDE PROPERTY
MAYO MINING DISTRICT, YUKON TERRITORY

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REGIONAL GEOLOGY MAP

J.P.FRANZEN P.Eng.

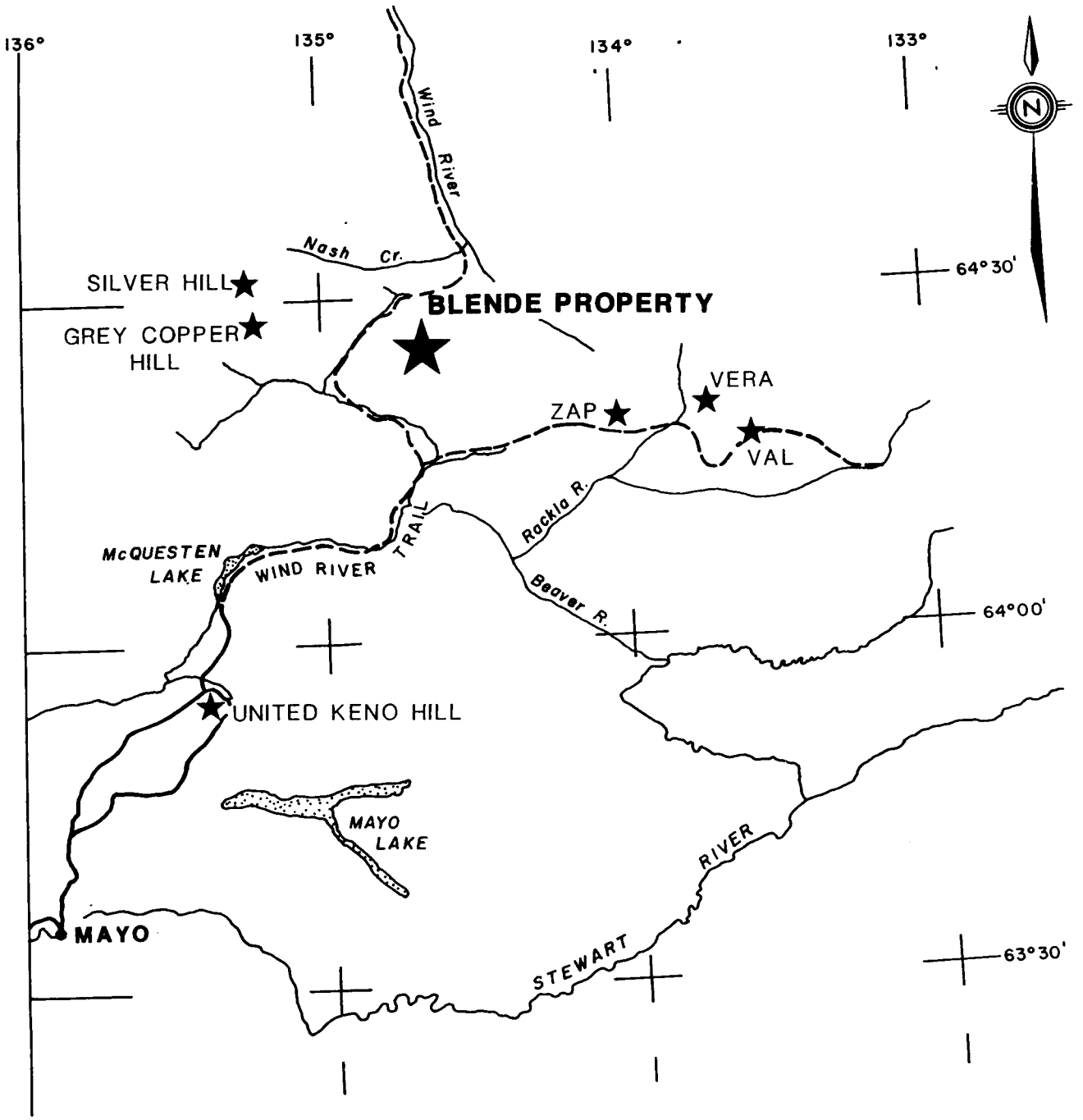
DATE: JUNE 1987 FIGURE: 4

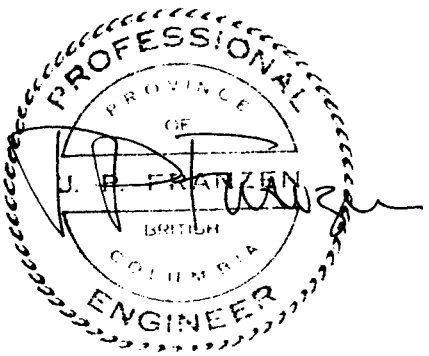
The oldest rocks in the region are fine-grained terrigenous and carbonate sediments of the mid-Proterozoic Wernecke Supergroup (Delaney, 1981). These rocks are represented by Quartet Group black slate and argillite and Gillespie Lake Group orange weathering dolomite. The contact between Quartet and Gillespie rocks is transitional. The Wernecke Supergroup is unconformably overlain by Lower Paleozoic limestone and dolomite. Dykes and sills of diorite and gabbro intrude Wernecke strata. The intrusive outcrop pattern is parallel to the Dawson Thrust (Figure 4). Some intrusions are truncated at the unconformity separating strata of the Wernecke Supergroup from younger rocks, whereas others cross this boundary. Recent Rb-Sr age determinations indicate that dyke rocks are Hadrynian or older.

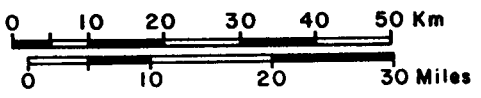
Two styles of deformation are recognized in the Wernecke Supergroup. On a regional scale, open, northwest-trending folds control the distribution of bedrock units (Figure 4); however, tight, northeasterly-trending folds can be locally important. These small-scale structures are refolded by the younger and larger-scale structures.

Fault and fracture systems mimic fold trends but differ in their apparent ages with northwest-trending faults truncated and offset by younger northeast-trending structures.

A number of silver-base metals prospects are known in the region (Figure 5). These prospects form a 90 kilometre long belt that is parallel to and immediately north of the Dawson Thrust (Cockfield, 1923; Templeman-



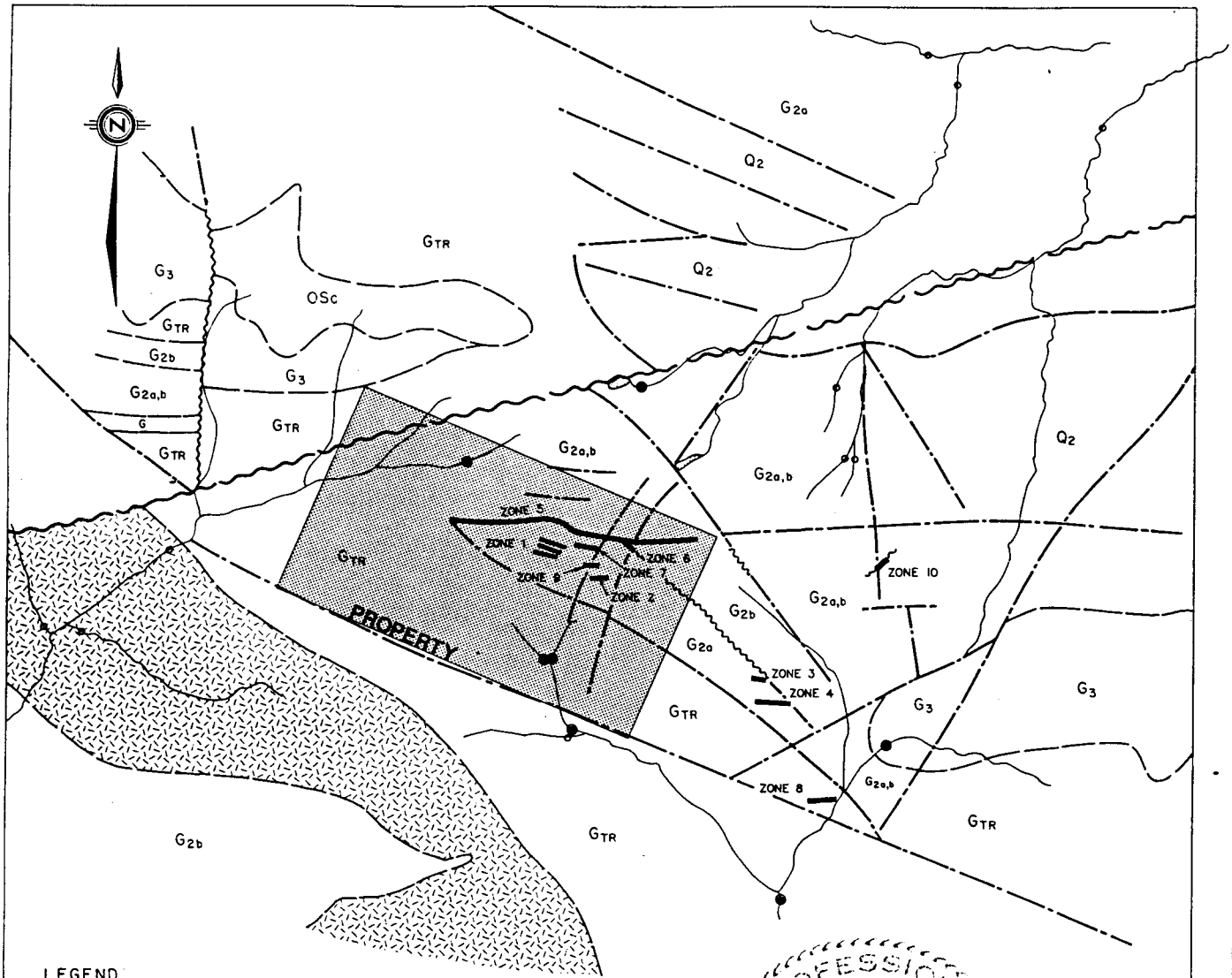

| NDU RESOURCES LTD. |
|---|
| BLENDE PROPERTY<br>MAYO MINING DISTRICT, YUKON TERRITORY |
| NTS: 106D/7 |
| REGIONAL MINERALIZATION MAP |
| J.P.FRANZEN P.Eng. |
| DATE: JUNE 1987 FIGURE: 5 |

Kluit, 1980). The belt is 60 kilometres northeast of the prolific Keno Hill silver camp. Most recent exploration work in the belt was in the late 1970's and early 1980's and focussed on the VERA prospect where Prism Resources Ltd. and partners completed 12,000 metres of diamond drilling and 700 metres of underground development. This work outlined 950,000 tons averaging 9 oz. Ag/ton and 3% combined Pb + Zn. Mineralization consists of sphalerite, galena and carbonate gangue in vertical, northeast-trending fracture zones. Host rocks are Gillespie Lake Group dolomite.

## PROPERTY GEOLOGY

The BLENDE property is underlain by layered rocks of the Gillespie Lake Group (Figure 6). A large diorite to gabbro dyke flanks the property to the south; Quartet Group and Paleozoic carbonate rocks are to the north. Upright, east-northeast trending vein faults occur in Gillespie Lake Group rocks.

Three mappable Gillespie Lake Group units underlie the property (Cathro and Carne, 1984). Unit $G_{TR}$ forms the base of the group and is regionally transitional with Quartet Group shales and argillites. It consists of light orange to maroon-green weathering dolomite shale with white to tan dolomite interbeds. Unit $G_2$ conformably overlies Unit $G_{TR}$. The contact is marked by an abrupt stratigraphic break. Unit $G_{2a}$ is a shallow water sequence of massive, orange weathering, argillaceous and stromatolitic dolomite. This unit is host to known mineralization on the property. Unit $G_{2b}$ rocks conformably overlie $G_{2a}$ and are characterized by interbedded




LEGEND

ORDOVICIAN – SILURIAN

OSc — LIGHT GREY TO WHITE WEATHERING MASSIVE TO THICK BEDDED LIMESTONE AND DOLOMITE

HADRYNIAN or OLDER

ORANGE TO BROWN WEATHERING DIORITE AND GABBRO DYKE

HELIKIAN or OLDER

GILLESPIE LAKE GROUP

G3 — MASSIVE STROMATOLITIC DOLOMITE

G2b — INTERBEDDED BLACK ARGILLITE SHALE AND CHERT; MINOR ORANGE WEATHERING DOLOMITE INTERBEDS.

G2a — ORANGE WEATHERING, MASSIVE GREY TO INTERBEDDED LIGHT GREY AND BLACK ARGILLACEOUS AND STROMATOLITIC DOLOMITE WITH MINOR CHERT INTERBEDS.

GTR — LIGHT ORANGE TO MAROON – GREEN WEATHERING INTERBEDDED MAROON AND GREEN SHALE WITH WHITE TO TAN DOLOMITE INTERVALS.

QUARTET LAKE GROUP

Q2 — INTERBEDDED BLACK SHALES, PHYLLITES, ARGILLITES AND QUARTZITES.

GEOLOGICAL CONTACT

FAULT

AIR PHOTO LINEAMENT

STREAM SEDIMENT SAMPLE

STREAM SEDIMENT SAMPLE ANOMALY >200 ppm Pb

MINERALIZED VEIN FAULT

PROFESSIONAL ENGINEER — PROVINCE OF — J.P. FRANZEN

# NDU RESOURCES LTD.

## BLENDE PROPERTY

MAYO MINING DISTRICT, YUKON TERRITORY NTS: 106D/7

## PROPERTY GEOLOGY

0 400 800 1200 1600 2000

SCALE IN METRES

DATE: JUNE, 1987

BY: J.P.FRANZEN PEng

FIGURE No. 6

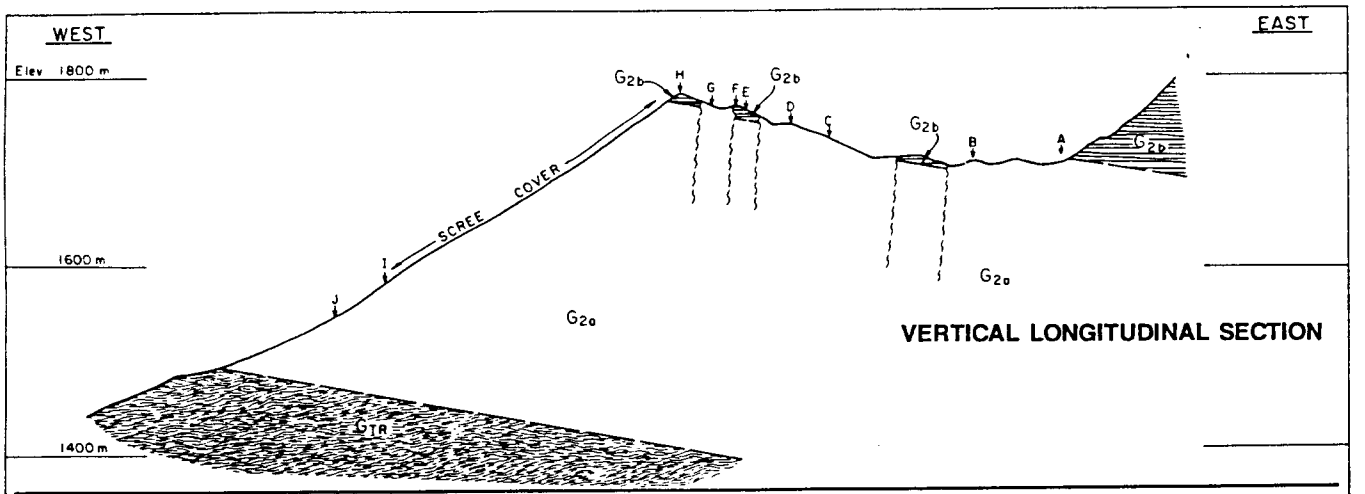
*Prepared by: RWR MINERAL GRAPHICS LTD.*

shale and chert. Unit $G_3$ is a buff weathering, massive stromatolitic dolomite. A low angle unconformity separates it from Unit $G_{2b}$.

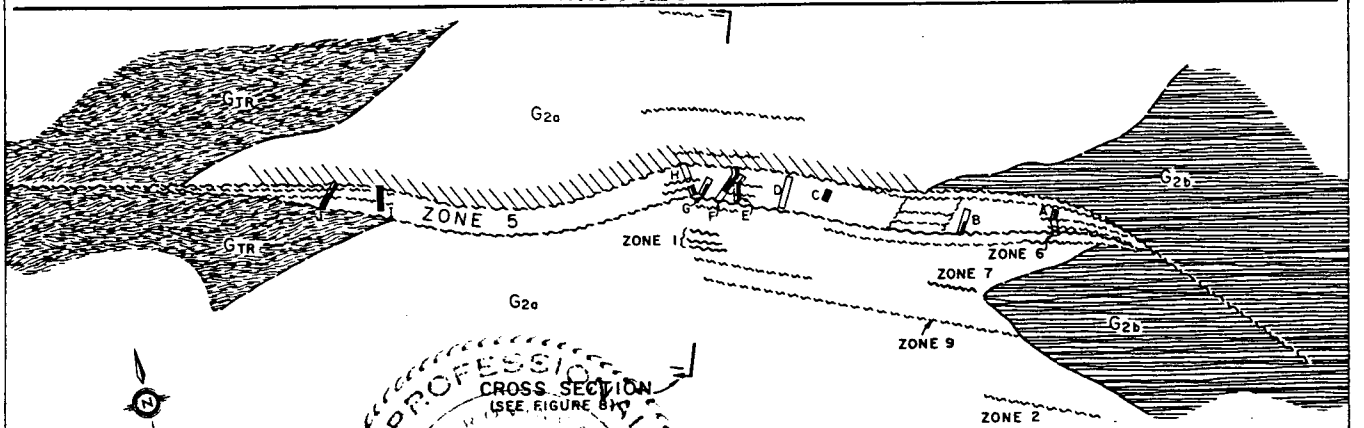
Layered rocks trend northwest and dip gently to moderately to the northeast. Numerous small-scale folds parallel this trend and overprint older northeast-trending folds that are associated with slaty cleavage in fine-grained sedimentary rocks. Two major fault and/or lineament orientations occur on the property (Figure 6). The most prominent structures are steeply inclined and trend west-northwest. A 5 kilometre long diorite to gabbro dyke parallels this trend. The resulting west-northwest fault blocks are offset by north-northeast structures. These structures also displace Paleozoic carbonate rocks. Known mineralization is associated with the older west-northwest structures (Figure 6).

Ten mineralized vein fault zones are known in the Mt. Williams area (Figure 6). Six of the zones are on the BLENDE property. All of the zones occur in massive dolomite (Unit $G_{2a}$) of the Gillespie Lake Group, are steeply inclined and trend west-northwest. Mineralization is predominantly light brown to yellow sphalerite with minor galena; gangue is secondary dolomite. Each of the mineralized zones is described below.

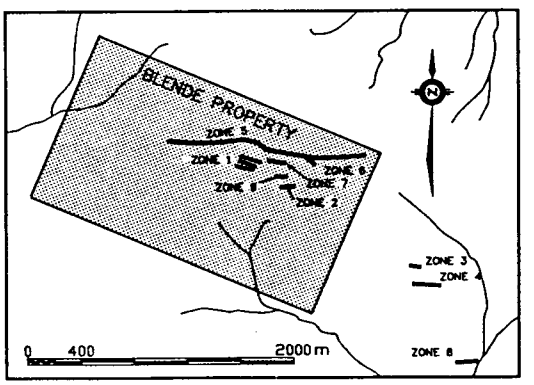
**Zone 5** is the largest known mineralized structure on the property (Figure 6). The vein fault crosses a steep cliff face on the north side of Mt. Williams, and has been traced over a strike length of 900 metres and a vertical range of 300 metres (Figure 7). Average width of the zone is 25




VERTICAL LONGITUDINAL SECTION




PLAN




LEGEND:

ORDOVICIAN – SILURIAN

OSc — LIGHT GREY TO WHITE WEATHERING MASSIVE TO THICK BEDDED LIMESTONE AND DOLOMITE

HADRYNIAN or OLDER

ORANGE TO BROWN WEATHERING DIORITE AND GABBRO DYKE

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QUARTET LAKE GROUP

Q2 — INTERBEDDED BLACK SHALES, PHYLLITES, ARGILLITES AND QUARTZITES.

GEOLOGICAL CONTACT

MINERALIZED VEIN FAULT

D — CONTINUOUS CHIP SAMPLE LOCATION

D — <5 % Pb+Zn

G — 5-8 % Pb+Zn

C — >9 % Pb+Zn

IRON CARBONATE AND SILICA ALTERATION

(AFTER CATHRO AND CARNE, 1984)

PROFESSIONAL ENGINEER
J. P. FRANZEN

# NDU RESOURCES LTD.

## BLENDE PROPERTY

MAYO MINING DISTRICT, YUKON TERRITORY NTS: 106D/7

## ZONE 5 GEOLOGY

0 100 200 300 400 m

SCALE IN METRES

DATE: JUNE, 1987

BY: J P FRANZEN PEng

FIGURE No. 7

*Prepared by: RWR MINERAL GRAPHICS LTD.*

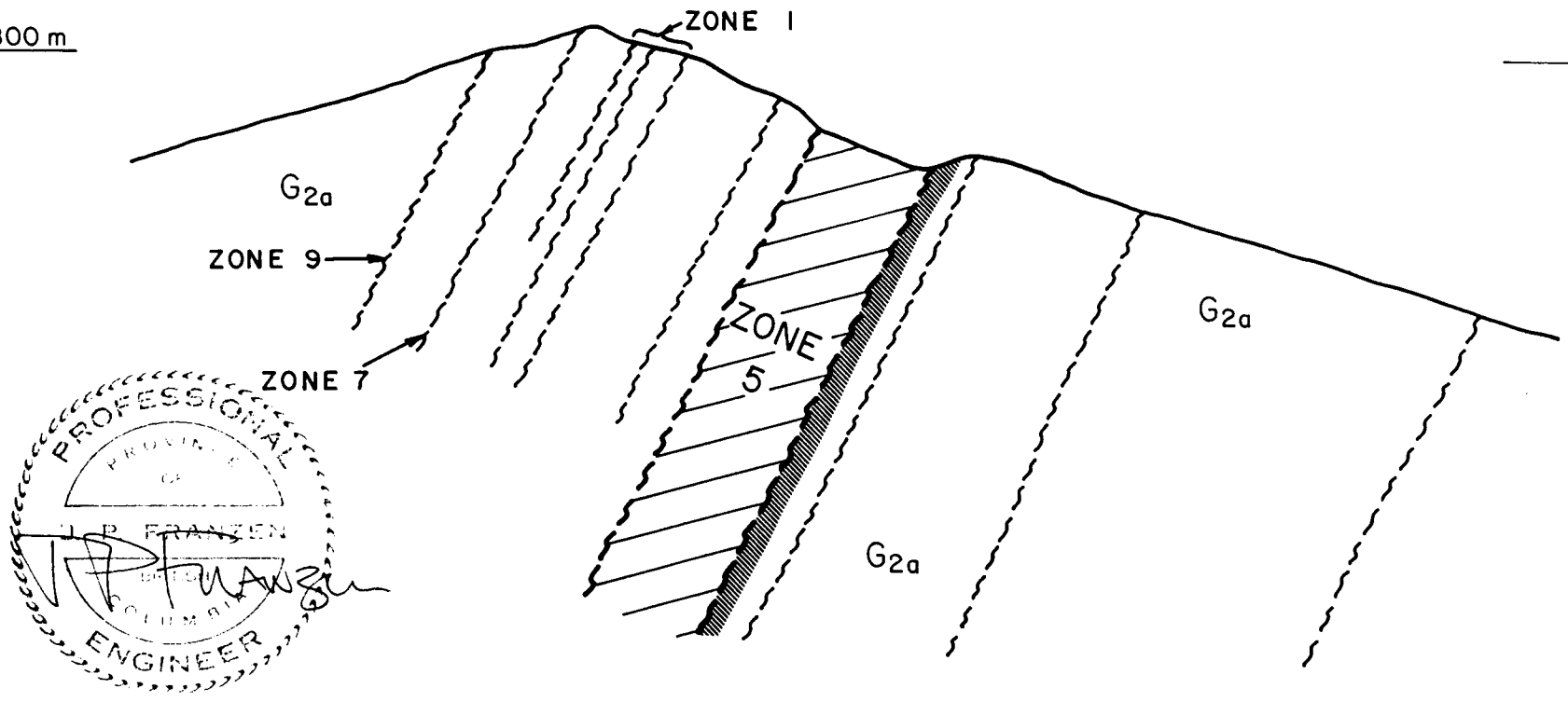
metres. The zone is recessively weathered and much of it talus covered. Several parallel zones occur in the hanging wall of Zone 5 (Figure 8).

Mineralization in Zone 5 is stratabound in Gillespie Lake Group Unit $G_{2a}$ dolomite. The mineralized fault panel is 400 metres high (Figure 7 - Vertical Longitudinal Section) and dips 65° to 80° to the south. Incompetent pelitic $G_{TR}$ and $G_{2b}$ units sandwich the competent dolomite unit and as a result the vein fault pinches at the upper and lower dolomite contacts (Figure 7 - Plan). The fault is not mineralized in pelitic wallrocks. A 3 to 8 metre wide iron carbonate and silica alteration zone flanks the footwall of Zone 5 (Figure 8). This alteration is a complete replacement of bedded dolomite by structureless, fine-grained siderite and quartz.

Ten hand trenches have been excavated to bedrock on the mineralized zone (Cathro and Carne, 1984). Trench locations are shown in Figure 7; trench assay results for the total width of the vein fault and for those intervals > 5% Pb + Zn are summarized in Table 1. These data demonstrate that:

1. The surface expression of the zone is mineralized over a strike length of 800 metres and a vertical range of 250 metres.

2. Some of the sample locations are partially covered by scree; however, where sampled, they are continuously mineralized. Total mineralized true widths range from 11.9 to 47.3 metres.




PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
J.P. FRANZEN

## LEGEND:

| | |
|---|---|
| $G_{2a}$ | ORANGE WEATHERING, MASSIVE GREY TO INTERBEDDED LIGHT GREY AND BLACK ARGILLACEOUS AND STROMATOLITIC DOLOMITE WITH MINOR CHERT INTERBEDS. |
| | Fe - CARBONATE AND SILICA ALTERATION |
| | MINERALIZED VEIN FAULT |

0 50 100
METRES

(After CATHRO AND CARNE, 1984)

NDU RESOURCES LTD.

# BLENDE PROPERTY

MAYO MINING DISTRICT, YUKON TERRITORY

NTS: 106D/7

## CROSS SECTION 1 – 1'

(SEE FIGURE 7 FOR LOCATION)

J.P. FRANZEN P.Eng.

DATE: JUNE 1987 FIGURE: 8

## TABLE 1

## BLENDE PROPERTY

### Zone 5 Chip Sample Assays

| Sample Location | Total Vein Fault Zone | | | | Vein Interval > 5% Pb + Zn | | | |
|---|---|---|---|---|---|---|---|---|
| | True Width (m) | Pb % | Zn % | Ag oz/ton | True Width (m) | Pb % | Zn % | Ag oz/ton |
| A | 23.0 | 2.7 | 1.6 | 0.8 | 9.2 | 4.4 | 2.4 | 1.6 |
| B | 31.3 | 2.6 | 1.2 | 1.3 | 12.1 | 5.4 | 2.2 | 2.6 |
| C | 11.9 | 7.8 | 2.1 | 3.5 | 11.9 | 7.8 | 2.1 | 3.5 |
| D | 35.1 | 0.5 | 1.7 | 0.3 | - | - | - | - |
| E | 30.6 | 0.8 | 4.1 | 0.8 | 20.4 | 0.9 | 5.1 | 0.8 |
| F | 47.3 | 1.6 | 4.3 | 0.9 | 19.6 | 2.8 | 6.1 | 1.7 |
| G | 21.4 | 1.9 | 2.2 | 0.8 | 13.1 | 3.0 | 3.4 | 1.2 |
| H | 21.5 | 1.2 | 3.6 | 0.6 | 8.2 | 1.8 | 3.6 | 0.7 |
| I | 25.0 | 3.4 | 6.1 | 1.8 | 25.0 | 3.4 | 6.1 | 1.8 |
| J | 28.0 | 3.7 | 3.0 | 3.8 | 13.0 | 6.1 | 3.8 | 7.2 |

* See Figure 7 for sample locations.

3. There are significant panels of higher grade material within the mineralized vein fault. These panels range in width from 8.2 to 25.0 metres. Continuity of this material has not been established.

4. Zinc values are significantly higher in the western half of the zone. One sample from this area returned an assay of 18.6% Zn and 200 ppm germanium.

5. Silver and lead values are higher at the scree-covered western end and cap rock-covered eastern end of the zone.

**Zone 1** is of minor economic importance at surface. It consists of several narrow (0.5 - 1.0 metre) and discontinuous vein faults (Figure 8). Mineralized material is brecciated wallrock cemented by secondary dolomite with limonite, galena and minor sphalerite (Roberts and Dean, 1975). Sphalerite and galena occur in hydrozincite - stained wallrocks peripheral to the breccia zones. Samples from this area in 1984 returned values of less than 1% Pb + Zn and 1.0 oz Ag/ton (Cathro and Carne, 1984).

**Zone 7** is in the hanging wall of Zone 1 (Figure 8). It has not been systematically mapped or sampled and is probably small. A composite sample of mineralized float downslope from the approximate position of the mineralized trend assayed 12.8% Pb, 23% Zn and 10.2 oz Ag/ton (Cathro and Carne, 1984).

**Zone 6** consists of two parallel faults in the hanging wall of Zone 5 (Figure 6). The faults are up to 1 metre wide and are approximately 10 metres apart. They contain limonite, secondary dolomite, galena and minor sphalerite. Wallrock between the faults is mineralized with minor galena and sphalerite in fracture fillings.

**Zone 9** is in the hanging wall of Zone 7 (Figure 8). It is heavily weathered and forms a prominent recessive lineament. The zone is 2 to 3 metres wide and approximately 300 metres long. Two composite samples of limonitic breccia material averaged 14.1% Pb, 9.3% Zn, and 5.2 oz Ag/ton (Cathro and Carne, 1984).

**Zone 2** is sub parallel to Zone 9 (Figure 6). It is a highly brecciated fracture zone approximately 1.5 metres wide and contains limonite, galena and minor sphalerite.

The above mineralized zones are restricted to outcrop areas on ridge tops and/or the steep north facing slopes of Mt. Williams. Most of the property is scree and talus-covered. Stream sediment samples from a talus-covered south-facing slope returned strongly anomalous Pb values (Figure 6). A strong lineament underlies the talus area. This lineament is parallel to Zone 5.

## CONCLUSIONS AND RECOMMENDATIONS

The BLENDE property covers a number of structurally controlled silver - lead - zinc occurrences in dolomite. The largest known mineralized fault is Zone 5. This zone has been traced on surface for 800 metres and is up to 47 metres wide. Much of the zone is covered by scree and talus.

Zone 5 mineralization is stratabound and consists of sphalerite and argentiferous galena in dolomite gangue. The mineralization is zoned. Silver and lead values are highest in areas with limited exposure and appear to increase with depth below surface. A limited sampling program has demonstrated that some of the sphalerite contains significant germanium values. This high technology metal could make a major contribution to the commercial value of Zone 5 mineralization.

The writer recommends a two-stage work program to evaluate Zone 5 mineralization. The first stage would include a four hole, 1000 metre diamond drill program. This work would test mineralization under scree and where it plunges beneath cover rocks. It would also allow the evaluation of parallel hanging wall zones. Mineralized material should be analyzed for silver, lead, zinc, copper and germanium. A small metallurgical test program is required to determine the mode of occurrence of germanium and its potential significance to project economics. Contingent upon positive results, a Stage 2 diamond drill program would be required to properly assess the significance of Stage 1 work.

## COST ESTIMATE

**Stage 1** (Engineer and two assistants - 60 days)

| | |
|---|---|
| DIAMOND DRILLING<br>1,000 metres | $ 165,000 |
| CAMP SUPPORT<br>300 man days | 10,000 |
| HELICOPTER SUPPORT<br>35 hours | 22,000 |
| ASSAY - GEOCHEMICAL<br>250 samples | 7,500 |
| METALLURGICAL TEST WORK | 2,500 |
| ENGINEER<br>Field and report | 24,500 |
| FIELD CREW<br>Camp, prospecting, drill sites | 12,500 |
| TRANSPORTATION | 5,000 |
| REPORT SUPPORT | 5,000 |
| CONTINGENCIES AT 15% | 38,100 |
| Stage 1 Total | $ 292,100 |

**Stage 2** (Contingent on results Stage 1)

| | |
|---|---|
| DIAMOND DRILLING<br>3,750 metres | $ 615,000 |
| SUPERVISION, SUPPORT, TRANSPORTATION, CAMP, REPORT, ETC. | 220,000 |
| Stage 2 Total | $ 835,000 |
| GRAND TOTAL STAGES 1 AND 2 | $1,127,100 |

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## CERTIFICATE

I, Jeffrey Paul Franzen, P.Eng., of 4990 Cedarcrest Avenue, North Vancouver, B.C. do hereby certify that:

1. I am a Consulting Mining Geologist registered with the Association of Professional Engineers of British Columbia since 1982.

2. I am a graduate of the University of British Columbia with B.Sc. (1972) and Carleton University with M.Sc. (1974).

3. I have practiced my profession continuously since 1974. In Yukon: as Mine Geologist, Research Geologist and Chief Geologist, United Keno Hill Mines Ltd., and Exploration Geologist, Cyprus Anvil Mining Corp. In British Columbia: Regional Geologist - Western Canada, Billiton Canada Ltd.

4. This report is based upon research of published reports and maps and data supplied by Archer, Cathro & Associates (1981) Limited and NDU Resources Ltd. The writer visited the property on August 16, 1986.

5. I have no interest, direct or indirect, in the BLENDE property or NDU Resources Ltd.

6. Permission is hereby granted to NDU Resources Ltd. to use this report in support of any Prospectus, Statement of Material Facts or Filing Statement to be submitted to the Superintendent of Brokers and the Vancouver Stock Exchange.

North Vancouver, B.C.
June 17, 1987

J.P. Franzen, P.Eng.

PROFESSIONAL ENGINEER
J. P. FRANZEN
BRITISH COLUMBIA