090351

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WHITEHORSE, Y.T.

REPORT ON THE

GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL SURVEYS

AND DIAMOND DRILLING AND TRENCHING

ON THE MONI, PMJ, JANE, TELE, KIRK, AL,

RIM, EEL AND ANGIE MINERAL CLAIMS

N.T.S. 105F-15, 105K-2, 105K-3

Latitude 61°55'N Longitude 132°45'W

WHITEHORSE MINING DISTRICT, YUKON TERRITORY

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INSPECTORS OFFICE
WHITEHORSE, Y.T.

Work Period June 1 - December 7, 1977

Graham H. Scott

Vancouver, B.C.
May 26, 1978.

090351

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of $158,000.00

D. R. Craig
Assistant Geologist or
Resident Mining Engineer

Considered as representation work under Section 53 (4) Yukon Quartz Mining Act.

B.R. BAXTER
Supervising Mining Recorder

for Commissioner of Yukon Territory

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SUMMARY

The PMJ Grid areas (Sir J.A., Sunset, Piglet) included in the northwesterly section of the PMJ-ANGIE claim group are over showings of stratiform lead-zinc. The discovery of these occurrences initially attracted attention to the Woodside Project Area in 1977.

Detailed geological mapping and grid geochemistry have been completed over the Sir J.A., Sunset and Piglet grids (Fig. 10), trenching has been carried out on the Sir J.A. and Wayne showings, and electromagnetic and magnetic surveys have been completed over the Sunset showing. Initial diamond drill tests have been made of the Sir J.A. and Sunset showings.

The 1977 exploration work indicates that the grid areas are underlain by shallow marine sediments divisible into a lower Cambro-Ordovician sequence of impure limestones and siltstones and an upper Ordovician-Silurian series of argillites.

The PMJ TREND lead-zinc showings, which are believed to stratigraphically correlate, occur within the Cambro-Ordovician rocks in a semi-continuous belt some 6 miles in length.

To date, detailed investigation of the individual showings has failed to indicate commercial concentrations of lead and zinc, the best drill core intersection being 10.50 percent combined lead-zinc over a drill-indicated thickness of 15 feet. Initial exploration results however are considered sufficiently encouraging to justify the on-going exploratory program.

INTRODUCTION

Welcome North Mines Ltd., as Operator of the Woodside Joint Venture Programme with Getty Mining Pacific Ltd., holds a total of 759 mineral claims over what is termed the PMJ Trend in the Whitehorse Mining District. The AL, KIRK and RIM group, comprising 12 claims, are held under option by the joint venture. The remaining 747 claims were staked in late 1976 and mid-1977 following the discovery by Welcome North prospectors of lead-zinc-silver mineralization in the area.

In 1977, selected parts of the claim block underwent geological, geochemical and geophysical surveys, trenching and diamond drilling. This report summarizes the work carried out, and proposes further work for the 1978 season.

MINERAL CLAIMS

The claims that are the subject of the present report are as follows:

N.T.S.	CLAIMS	GRANT NUMBER	RECORD DATE
105K-3	AL 1-4	Y91287 -Y91290	October 7
105F-15, K-2	ANGIE 305-356	YA18606-YA18647	June 29
	359-362	YA18648-YA18651	June 29
	365-499	YA18652-YA18786	June 29
	502-674	YA18787-YA18959	June 29
	675F	YA18960	June 29
	678-680F	YA18961-YA18963	June 29
	681-802	YA18964-YA19085	June 29
105K-2, K-3	JANE 1- 83	YA18487-YA18569	June 21
105K-3	KIRK 1- 2	Y91291 -Y91292	October 7
105K-3	MONI 1- 60	YA18372-YA18431	June 20
	61- 65F	YA18432-YA18436	June 20
105K-3	PMJ 1- 20	YA18282-YA18301	June 15
	21- 70	YA18437-YA18486	June 21
105K-3	RIM 1- 6	Y91293 -Y91298	October 7
105K-3	TELE 1- 30	YA18342-YA18371	June 20

The claims total 740; an assessment report for the claims EEL 1-19 within the claim group, but of earlier record date, was filed early in 1978, and Certificate of Work Q73059 was subsequently issued.

LOCATION AND ACCESS

The PMJ Trend claim group is located in the St. Cyr Range of the southern Yukon, N.T.S. 105K-2, 105K-3, 105F-15 (see Fig. 1). The approximate centre of the claim group is at 61°55'N, 132°45'W.

The southernmost claims of the group can be reached by road from Ross River, a distance of 10 miles. Much of the 1977 programme was carried out using helicopters from either Ross River or Faro.

REGIONAL GEOLOGY

The PMJ claims are located on the northeast edge of the Pelly-Cassiar Platform, a major northwest-trending belt of platform carbonates and related rocks ranging in age from Cambrian to Mississippian (Tempelman-Kluit, 1977). The sediments in the map area comprise two main units:

OSslq: Ordovician-Silurian silty argillite and phyllite with minor limestone.

ЄOcsl: Cambro-Ordovician argillaceous limestone, siltstone, argillite and minor sandstone.

Rocks underlying the PMJ Trend have undergone extensive foreshortening due to intense isoclinal (?) folding. Structural complications have therefore made age and lithologic differentiations difficult in some cases, as for example, where there is considerable argillite interbedded within ЄOcsl, a Cambro-Ordovician limestone unit and some limestone within OSslq, a younger argillite unit.

A diagrammatic stratigraphic column for the PMJ group is shown in Fig. 2. The rocks exposed constitute a part of a succession of shale, sandstone and carbonate rocks deposited from Proterozoic to Triassic times near the

VANGORDA PROJECT AREA

WOODSIDE PROJECT AREA

Irene
Bev
Eva
Mabel
Alice
Wynne
Raz
Dot
Anvil
Ruth
Grum – Vangorda
Rachel
Dy
Mn
Swim
SB
Sea
Jackie
Linda
Tar
Dev
Wet
Mag
Lou
May
Sir J.A.
Wayne
Sunset
Piglet
P M J Trend
G.K.
ANGIE ST. Trend
Pim
LAPIE RIVER
CYR
Angie
RANGE
PELLY RIVER
DRURY LAKE
ROBERT CAMPBELL HIGHWAY
LITTLE SALMON LAKE
MAGUNDY RIVER
FARO
CANOL ROAD
ROSS RIVER

62°30' 62°15' 62°00' 61°45' 61°30'
134°30' 134°00' 133°30' 133°00' 132°30' 132°00' 131°30'
L8 K5 K6 K7 L1 K4 K3 K2 K1 J4
F13 F14 F15 F16 G13 F12 F11 F10 F9 G12

LEGEND

- Massive Sulphide Deposit
- Mineral Occurrence
- River, Creek
- Highway
- Claims:
  - Getty Mining Pacific – Welcome North Mines
  - Cyprus Anvil Mining — 1
  - Du Pont of Canada — 2
  - Utah Mines — 3
  - Cominco — 4
  - Amax Potash — 5
  - Kerr Addison Mines — 6
  - St. Joseph Exploration — 7
  - Brendex Resources — 8
  - Misc. Other

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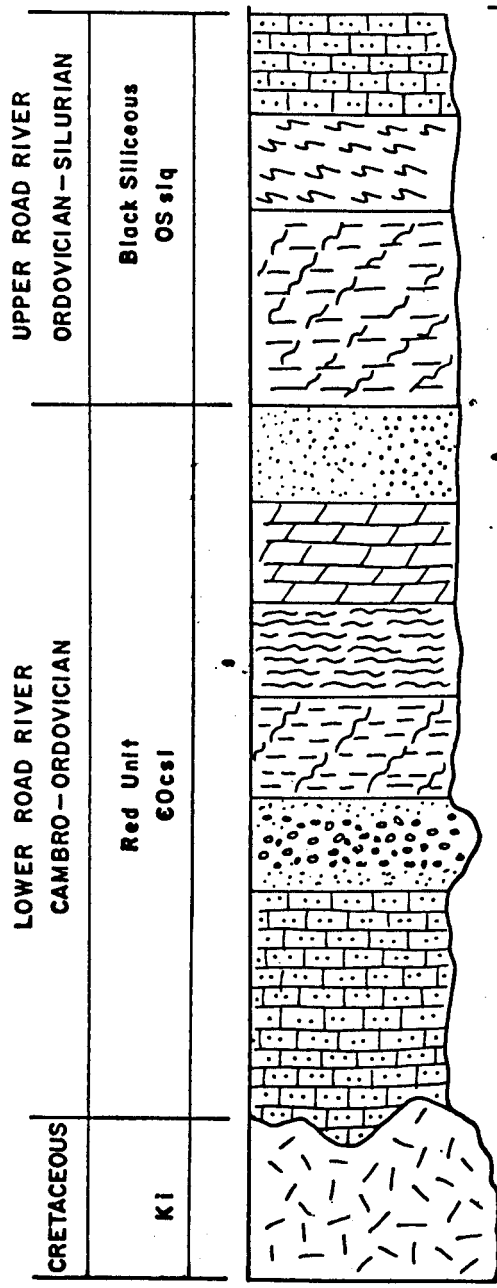
PROJECT AREA & PROPERTY LOCATIONS

Scale: 1" : 8 miles	Date: Feb. 1978	N.T.S. 105
Revised:	By:	Fig. 1



NOTE: LITHOLOGIES WITHIN EACH UNIT ARE NOT TIME RELATED AND ARE OFTEN REPEATED WITHIN THE UNIT. INDIVIDUAL UNITS DESIGNATED ON THE LEFT, HOWEVER ARE TIME RELATED AS SHOWN.
NO THICKNESSES ARE IMPLIED.

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GETTY MINING PACIFIC LIMITED

WOODSIDE PROJECT
PMJ TREND
STRATIGRAPHIC COLUMN

Scale:	Date: APRIL 1978	N.T.S. 105 F
Revised:	By: F. Foster	Fig. 2

margin of a stable continental platform. Thrust over this sequence are at least two allochthonous assemblages, believed to be Devonian-Mississippian and Permian-Triassic in age respectively.

All the rocks were arched over two large northwest-trending anticlines which were the locus of relatively long-lived heat flow accompanied by intrusion of elongate mid-Cretaceous granitic batholiths. Transcurrent movement along the Tintina Fault took place shortly after the intrusive event.

DISTRIBUTION OF EXPLORATION WORK

In addition to the reconnaissance geological and geochemical surveys, and prospecting programmes carried out during 1977, grids were cut over specific showings and further work performed as shown in Fig. 3. The following is a summary of the work carried out:

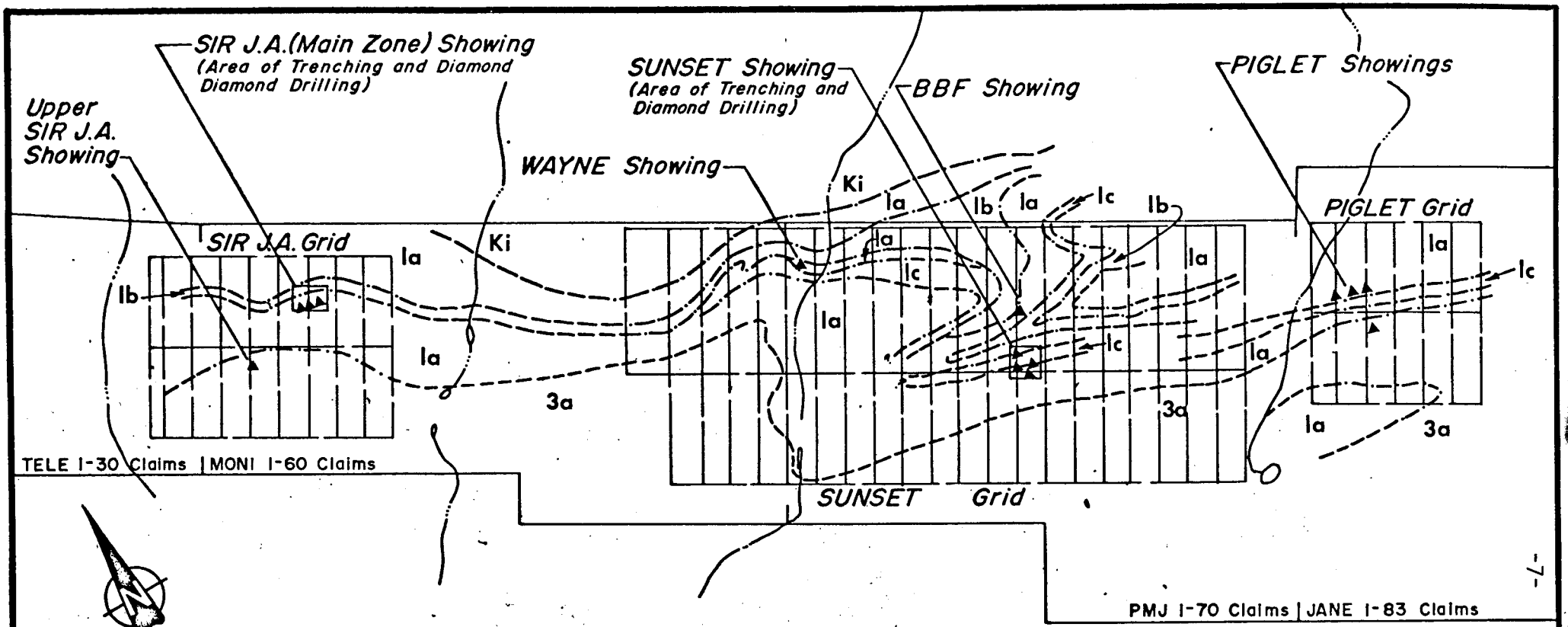
	SUNSET	SIR J.A.	PIGLET
Geological Mapping	X	X	X
Geochemical Soil Sampling	X	X	X
Trenching		X	
EQ-core Drilling	X 570'	X 347.1'	
BQ-core Drilling	X 779'		
E.M. Survey	X		
Magnetometer Survey	X		

PREVIOUS WORK

i) AL, KIRK and FARGO Claims

This group totalled 40 contiguous claims covering an area extending from west of the present SUNSET trenches to the western half of the Piglet grid.

Archer and Cathro, geological consultants, in a report dated March, 1967



CRETACEOUS (Ki)

Ki — Quartz monzonite

ORDOVICIAN-SILURIAN (OSsIq)

3a — Argillite

CAMBRIAN-ORDOVICIAN (€Ocsl)

Ic — Argillite, phyllite

Ib — Sandy limestone

Ia — Argillaceous to silty limestone

GENERAL GEOLOGY

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WOODSIDE PROJECT-PMJ TREND

Scale: 1:50000	Date: APRIL 1978	N.T.S. 105K/
Revised:	By: J. G.	Fig. 3

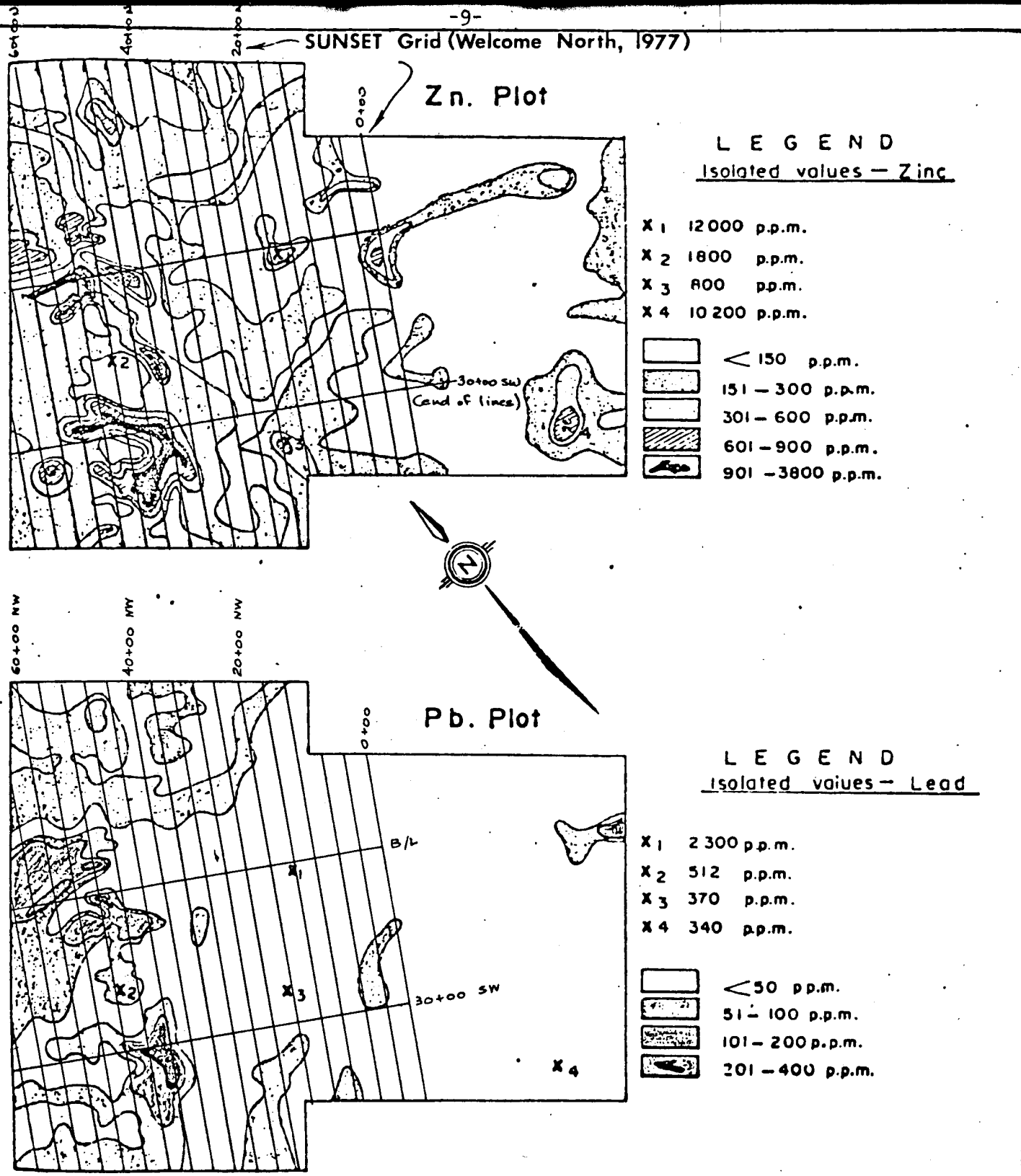
for Munster Mines Ltd., recommended a programme of soil sampling and geological mapping followed by bulldozer trenching of known showings and any targets located by the soil geochemistry.

Later in 1967, a reconnaissance soil geochemical survey was carried out, the results of which were interpreted and reported upon by Ace R. Parker and Associates Ltd. The reconnaissance work (500-foot samples on lines "mostly 400 feet apart") was supplemented by a detailed survey across the present trench area by one of the property owners in 1968.

Sunset Mines Ltd. contracted P.H. Sevensma Consultants Ltd. in 1969 to "review the available data and determine whether further exploration of these claims is warranted".

There is a generalized compilation of the 1967 Parker and Associates' geochemical maps in the Sevensma report following (Fig. 3.1). The compilation indicates anomalous lead-zinc values around the Sunset showing. There is also a somewhat stronger, crescent-shaped lead and zinc anomaly centered about 3500 feet south of the known mineralization. Superimposing the present Sunset grid lines on the compilation shows that the north part of this anomaly occurs along the southwest ends of lines 44NW to 64NW (Fig. 3.1). Welcome North's 1977 geochemical results from this area indicate an irregular anomaly with highs of up to 1000 ppm lead, 2900 ppm zinc open to the south which agrees with the previous geochemical work. Grid lines in this area should be extended to cover this anomalous feature.

Results of 1969 field work on the group are outlined in a second report by Sevensma dated November 8, 1969. A limited soil geochemical survey was conducted, the results of which confirmed the strong lead-zinc anomaly south of the present Sunset mineralization. Bulldozer stripping on this anomaly "... did not disclose any significant mineralization in place...". However a geochemical anomaly in the Sunset Trench area "... has conclusively been demonstrated to be an expression of multiple veins of fairly high grade ..." by Cat stripping.



Munster Mines Ltd. Geochemical Survey, Summer 1967
Generalization of compilation maps of Ace R. Parker, Sept. 9, 1967

SUNSET MINING CORP. LTD. (N.P.L.)	
AL — FARGO — KIRK Soil Survey	
Whitehorse M.D — Y.T.	105 — K — 3
P. H. Sevensma Consultants Ltd. Vancouver, B.C.	
	FIGURE 3-1

Two veins, about 200 feet apart in a north-south direction, with tentative lengths of 600 to 700 feet, open at both ends, and an average estimated width of 40 inches were outlined. These would appear to be the mineralized zones exposed in the two trenches between 56NW and 65NW straddling the present baseline.

Two samples taken approximately 20 inches apart across the northernmost or "No. 1 Vein: returned 30.70% Pb, 0.10% Zn, 4.6 oz. Ag over 40 inches and 19.62% Pb, 0.33% Zn, 2.6 oz. Ag over an estimated 42 inches.

A chip (?) sample across the southerly or "No. 2 Vein" returned 8.16% Pb, 10.55% Zn, 2.1 oz. Ag across 39 inches.

A $291,000 programme involving 8000 feet of drilling was recommended on the strength of the above results. There is no record of any of this work ever being carried out.

In 1977, following the staking of the Woodside claim groups by Getty and Welcome North, the remaining claims of the AL, KIRK and RIM claim groups were optioned from M. Early for the Woodside Project.

GREW Claims

Gaylord Mines Ltd. held this block of 48 claims centered about 4 miles east of the present Piglet grid in 1967. Magnetometer and electromagnetic (EM-16) surveys completed at this time outlined 26 EM conductors, three of which were considered worthy of further investigation by deep penetration EM and gravity. There are no records present of further work having been carried out.

Old pickets were encountered over the remainder of Sunset and in the area between Sunset and Sir J.A. There are no records available of this work.

GEOLOGY

€Ocsl and OSslq vary in thickness between the three grids as indicated on the cross-sections (Fig. 4, 5, 6 and Plate 1). This may be real or, more likely apparent, due to internal folding and differing erosion levels. €Ocsl has an indicated thickness of about 2800 feet on Sir J.A., 1700 feet on west Sunset and greater than 5000 feet on Piglet.

The map area rocks abut against the Tintina Fault a few miles to the northeast along which some 300 miles of right lateral movement is postulated during the late Cretaceous (Tempelman-Kluit, 1977).

i) Stratigraphy

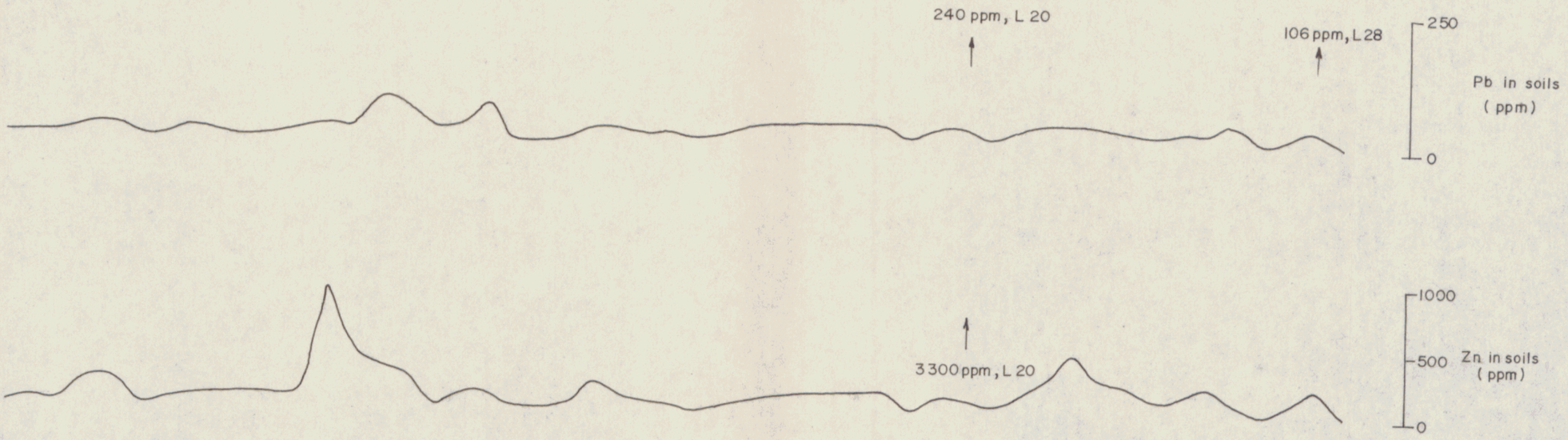
a) Cambro-Ordovician (€Ocsl) Red Unit

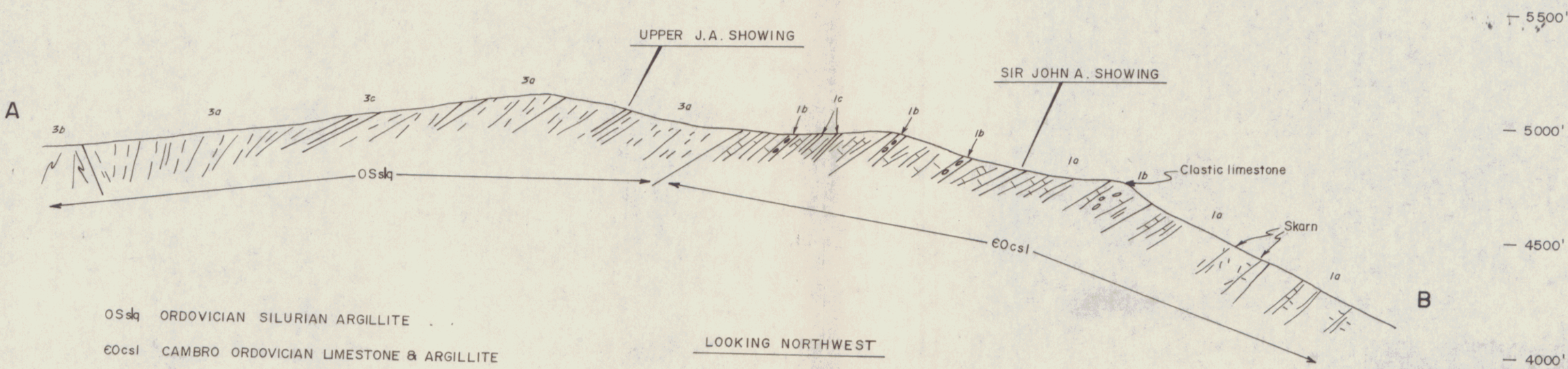
Sub-unit 1a: Argillaceous to silty limestone, laminated siltstone-limestone, limy siltstone/sandstone

The Cambro-Ordovician limy sediments are generally fine-grained, well laminated calcite-biotite-quartz aggregates interbedded on various scales. Areas containing appreciable amounts of any particular lithology are indicated in a general way on the geology maps by designations such as "buff laminated" or "gritty".

[1] Derived largely from W.E. Brereton, October 1977, Report on the Geology of the J.A., Sunset and Piglet Grids, PMJ Claim Group, Pelly Mountains, Yukon Territory. MPH Consulting Ltd.

— 30+00 S — 20+00 S — 10+00 S — BL 0+00 — 10+00 N — 20+00 N — 30+00 N





OSsl ORDOVICIAN SILURIAN ARGILLITE

€Ocsl CAMBRO ORDOVICIAN LIMESTONE & ARGILLITE

GEOLOGY BY B. Brereton

LOOKING NORTHWEST

NOTE: FOR LEGEND AND LOCATION, SEE PLATE 2

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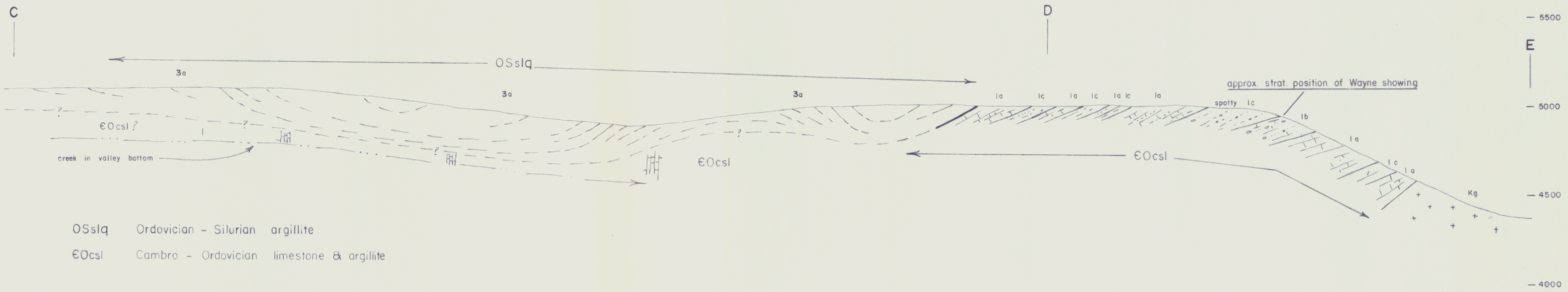
WOODSIDE PROJECT
PMJ TREND - SIR J.A. Grid
CROSS-SECTION A-B

Scale: 1" = 200 FEET	Date: JAN. 1978	N.T.S. 105 K/3
Revised:	By: F. P.	Fig. 4

— 30+00 SW — 25+00 SW — 20+00 SW — 15+00 SW — 10+00 SW — 5+00 SW — 0+00 BL — 5+00 NE — 10+00 NE — 15+00 NE — 19+50 NE



OSslq Ordovician - Silurian argillite

€Ocsl Cambro - Ordovician limestone & argillite

NOTE: For Legend and Location, see Plate 3

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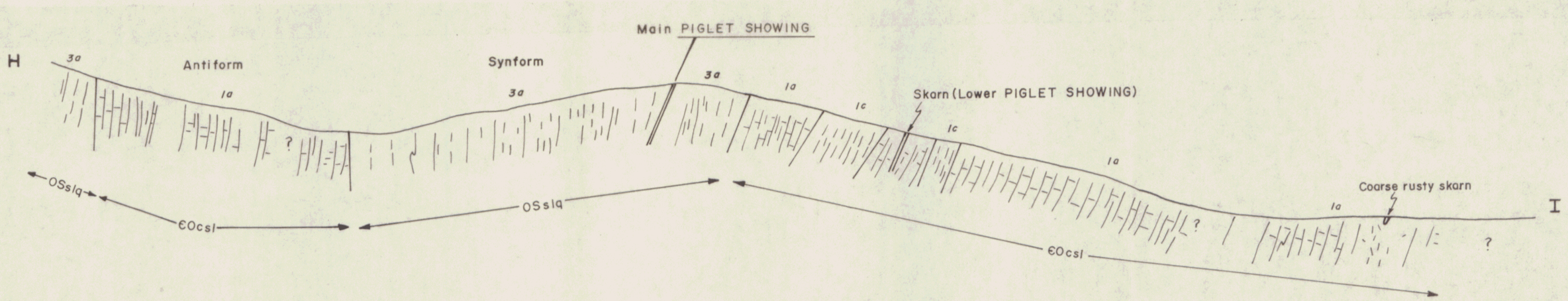
WOODSIDE PROJECT
PMJ TREND-SUNSET Grid
CROSS-SECTION C-D-E

Scale: 1": 500'	Date: APRIL 1978.	N.T.S. 105K/3
Revised:	By: F. F.	Fig. 5



OSslq ORDOVICIAN SILURIAN ARGILLITE

€Ocsl CAMBRO ORDOVICIAN LIMESTONE & ARGILLITE

GEOLOGY BY B. Brereton.

LOOKING NORTHWEST

NOTE: For legend and location, see Plate 4

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WOODSIDE PROJECT
PMJ TREND – PIGLET Grid
CROSS-SECTION H-I

Scale: 1": 500'	Date: JAN. 1978	N.T.S. 105K/2
Revised:	By: F. FOSTER	Fig. 6

The "buff laminated" refers in general to a well laminated, very limy rock in which, ideally, recessive weathering, buff-brown limestone laminae alternate with dirty grey weathering, argillaceous limestone laminae. This compositional foliation is on a scale of a few millimeters to 1 cm or more.

The buff laminated is best developed in the first 900 feet or so northeast of the Sir J.A. baseline, in the la bands north and south of the SUNSET trenches and north of the OSslq contact on the northwest Sunset lines. The "buff laminated" in the area of 7 NE, line 20 NW on the Sir J.A. grid (Plate 2 shows a distinctive dirty grey, corrugated weathering surface. The rock is thinly laminated but appears relatively massive on a fresh surface as the compositional foliation is not as well developed as elsewhere.

The purest limestone encountered was that in the area immediately southwest of the baseline on line 108 NW, Sunset grid (Plate 3. This rock exhibits a distinctive brown weathering, locally shows thin, wavy laminations and may be the northwestward continuation of a band of similar looking material ("brown weathering limestone") 400 to 500 feet southwest of the baseline at the SUNSET trenches.

Faintly to well laminated, fine-grained limy quartz siltstone and thinly laminated limestone-siltstone comprise much of the remainder of Sub-unit la. The type location is at the SIR J.A. showing, where these rocks are host to zinc-lead mineralization, and in the band of outcrop to the southwest. Where best developed this rock shows a very regular, very pronounced compositional foliation on a scale of less than 1 mm to 0.5 cm in which dark laminae rich in purple biotite alternate rhythmically with

lighter, greyish to whitish calcite-quartz laminae. Etching with hydrochloric acid shows that the biotite laminae are cemented by calcite and the quartz to be occurring as tiny, silt-sized grains. Some of the "thin laminated" at the Sir J.A. trenches is very hard, brittle and fracture sub-conchoidally. This brittleness is a diagnostic feature of the rock. Type "thin laminated" is also found in the 1a band northwest of the WAYNE showing around the Sunset trenches, at the BBF showing and around the sideritic zone on the Piglet grid.

The conspicuous thin laminations are sometimes not well developed and 1a is only faintly laminated on a larger scale or non-laminated, e.g. around 16NE, 82NW, Sunset (Plate 3). This rock is best described as a fine-grained, weakly calcareous, quartz-biotite siltstone.

The 1a on the east end of the Piglet grid and on both sides of the baseline consists of dirty grey weathering, very gritty, limy siltstone-fine sandstone to arenaceous limestone. Small scale cross-bedding is locally present. Very similar arenaceous rocks in the large outcrop area around 25NE, line 64NW of the Sunset grid have presently been included in Sub-unit 1b (following).

Thin laminated to thin bedded, limy white, quartz sandstone outcrops off the northeast end of line 52NW, Sunset grid.

Micaceous minerals in 1a generally show a moderate to strong preferred orientation, i.e. a slatey cleavage, parallel to the compositional foliation. Parting has occurred along cleavage surfaces imparting a variable fissility to the rock on a scale of 1 mm or so to several cm.

The rhythmically, often delicately laminated 1a rocks suggest a cyclical (annual?) deposition of variable amounts of clay-silt in a very quiet, lime-depositing environment. With regard to lead-zinc exploration, it may be worthwhile to look for the basinward equivalents of the rocks to the northeast which would have faulted southward into the Gataga area of northern B.C. along the Tintina Break.

Sub-unit 1b: Sandy to pebbly limestone including "clastic limestone" member; also brecciated and breccia phases of 1a

The type section is exposed on a vertical face in the area of 13 NE, line 144 NW, Sunset Grid (Plate 3).

Three distinctive sub-types are present here. The lower 60 feet or so above the contact with underlying thin laminated consists of "quartzite pebble conglomerate" which contains up to 50% of rounded, bluish-grey clasts, about 1 cm in diameter, is a thin laminated, purple biotite-rich matrix containing abundant buff calcite patches. There is a pronounced platey aspect to many of the clasts which consist of quartz and calcite (lime siltstone?).

In sharp, conformable contact with this is the clastic limestone member, a massive, thick bedded unit approximately 30 feet thick, of grey weathering conglomeratic limestone. Two varieties of clasts are present totalling 5% to 10% of the rock. The most numerous are small (less than 1 cm), subrounded, very soft, deep blue-grey limestone fragments along with lesser knobby limy matrix. This particular lithology forms a distinctive marker which can tentatively be traced from about line 32 NW

on the Sir J.A. grid (Plate 2) southeastward along the northeast ends of the Sunset lines until about the middle of the grid where it follows around a syncline-anticline nose plunging vertical to steeply northwest and then is lost in an area just west of Sunset trenches No. 2 and 3 (Plate 3).

These clastic rocks suggest a period of higher energy sedimentation involving both terrigenous detritus (quartz pebbles) and reef-derived (?) limestone debris, possibly contributed during a sea level regression. Some of the environment may have been turbid.

Above the clastic limestone is a bed of limestone breccia consisting of contorted bands 1 to 2 cm thick and fragments of dark impure limestone in a buff calcite matrix. Similar type breccias form thin, apparently local lenses southwest of the SIR J.A. showing. In most cases these breccias are clearly tectonically brecciated versions of the 1a lithologies, e.g. at the WAYNE showing, however some may be intraformational features.

Sandy limestones on lines 64 NW - 68 NW, Sunset grid (Plate 3) may represent a finer, (deeper water?) version of the coarser, conglomeratic variety. The clastic limestone member is present here including a very fine grained, thinly bedded version.

Sub-unit 1c: Argillite, phyllite including "spotty" varieties

These rocks form interbands within the limestones and are lithologically very similar to or identical to Sub-unit 3a where they are more completely described.

Two field observations are of interest regarding these older argillites. Firstly, where they can be observed the contacts with the la are often gradational. The argillites become coarser (siltier), show a thin compositional lamination and may be calcareous. The main limestone-argillite contact on the Sir J.A. grid is also gradational through a 5 to 10-foot zone of very shaley, limy siltstone and appears to represent an upward fining sequence.

Secondly, the "spotty" designation on the Sunset and Piglet grids refers to the presence of light grey, oval to round spots in otherwise normal black or greyish argillite-phyllite. In one specimen from line 132 NW, Sunset grid (Plate 3), slatey cleavage was seen to be deflected around rather than passing through clasts. The origin of such clasts is not certain, they appear to be metamorphic clinozoisite in some cases and sedimentary clasts in others.

Sub-unit ld: Quartz-garnet-muscovite schist

This coarse schist, which characteristically weathers to a silvery-rust appearance, forms narrow beds northeast of Sunset grid (Plate 3). Andalusite forms prisms up to 1 cm in length. The original sediment must have been highly aluminous to produce the relatively large amount of muscovite present. Last minute work showed a thick band of this rock southeast of Piglet grid.

Sub-unit le: Dolomite

A band of light brown to cream weathering, medium crystalline massive dolomite forms a marker immediately south of the granite on Sunset grid (Plate 3).

Sub-unit 1f: Quartz arenite

Thin bedded quartzose sandstone consisting of fine quartz grains in minor limy cement is in contact with dolomite off the northeast end of line 68 NW, Sunset grid (Plate 3). About 5% of biotite defines a foliation parallel to bedding.

b) Ordovician-Silurian (OSslq)

Sub-unit 3a: Argillite, silty argillite

The argillites are fine-grained, quartz-micaceous rocks typically black weathering with a grey-black or black fresh surface. The argillites in the band above the WAYNE showing (Plate 3) and southwest of the Sir J.A. baseline (Plate 3) are rusty due to minor disseminated pyrite. Locally, the Sir J.A. argillite shows a purple hue due to an increased content of fine biotite.

The argillites are, in general, non-calcareous although there are calcite laminae in grey, gritty rocks mapped as argillite southwest of the baseline on the east end of Piglet grid (Plate 4.)

The rock sometimes shows thin compositional laminations although it is usually non-laminated. Slatey cleavage and a fissibility are variably developed. These features are parallel to the bedding laminations where the latter are present. The argillites commonly contain abundant flakes of easily visible biotite, with no single preferred orientation.

Argillite at the southwest end of line 140 NW, Sunset grid (Plate 3), and in other areas shows a greyish phyllitic sheen and a crinkle lineation on the weathered surface. The latter appears to represent the intersection of a bedding cleavage with later, high angle cleavage(s). A finely speckled or knotty appearance on the fresh surface may represent the same phenomenon.

An outcrop area of lustrous locally chloritic phyllite with well developed kink banding occurs off the southwest end of line 48 NW, Sir J.A. grid (Plate 2, Sub-unit 3b).

The limestones within the Ordovician-Silurian rocks are identical in appearance to their older counterparts (Sub-unit 1a). The "calcareous mudstone" designation in the area of line 148NW, 152 NW, Sunset grid (Plate 3) refers to thin (2 inches to 1 foot) beds of a very brittle, very fine grained, grey brown, recessive weathering, limy mudstone. A fresh surface shows a homogeneous, medium-grey rock containing abundant, tiny, darker grey spots (metamorphic?) and traversed by numerous quartz-carbonate filled fractures.

c) Cretaceous (Ki)

Quartz Monzonite - Where observed near the contact with sediments, the "granite" is a medium-grained, well-foliated plagioclase-quartz-potash feldspar-muscovite-biotite rock. The feldspars were identified by staining with plagioclase making up about 50% of the rock and potash feldspar about 5%.

The granitic-sediment contact appears to be grossly conformable although it is locally cross-cutting off the northeast end of line 68 NW on Sunset grid (Plate 3).

A 3-foot dyke of dark, fine-grained basic rock with tiny plagioclase phenocrysts and epidote clots cuts arenaceous limestone northeast of Piglet grid.

ii) Metamorphism

Original pelitic sediments have been converted to the present argillites and the impure limestones to various marbles and limy quartzites apparently during regional dynamothermal metamorphism. The ubiquitous biotite suggests mid-greenschist facies.

There is development of skarn in the marbles on every grid as the granite contact is approached. Rock at 23 NE, line 20 NW, Sir J.A. grid (Plate 2) for example, is a relatively coarse, massive weathering, schistose biotitic marble containing small, usually lensoid patches of blue-green calc-silicate minerals. The la along the northeast ends of the west Sunset lines (Plate 3) is, in part, skarny marble very similar to the above. Rock immediately off the northeast end of line 32 NW, Piglet grid (Plate 4) is a well-foliated, pyritic biotitic skarn with coarse blue-green calc-silicate (pyroxene?) patches and crystals. It seems clear that the granite provided at least a heat source for the skarn development. The coarsely crystalline nature of the Sunset dolomite (Sub-unit 1e) is probably due to re-crystallization under the influence of the intrusive.

A skarn consisting of clastic-like aggregates up to 3 cm in diameter of coarse, fibrous amphibole is developed in la on the south Piglet grid (Plate 4) and may form a structural repetition of a continuous horizon which occurs at the lower PIGLET showing and at the Sunset Trenches No. 2 and 3.

At the SUNSET showings siderite appears associated with the skarn. On surface the siderite appears as large (3 mm - 5 mm) euhedral crystals in vuggy habit. Siderite observed in drill core appeared brecciated and veined by quartz and carbonate.

Thin section analysis (Brereton, January, 1978) showed that the skarn is composed of about 65-70 percent garnet porphyroblasts with interstitial quartz, magnetite, minor highly carbonatized amphibole (tremolite?) and minor sulphide. The garnets are highly fractured and veined with magnetite, biotite, and green chlorite. A pronounced greenish tinge suggests that the garnet is grossularite.

The light rock consists of an interlocking aggregate of quartz grains containing coarse opaques and abundant, locally carbonatized amphibole. Two generations of amphibole are evident - swarms of very fine, rod-like inclusions in quartz and a later, coarser variety. The latter forms megascopically visible acicular euhedra. It exhibits an anomalous pinkish pleochroism and is tentantively identified as the rare, manganiferous, tremolite-related amphibole richterite.

Rusty, quartz-siderite bearing material forms an apparently conformable band at least 300 feet long and less than 20 feet wide within a skarn zone developed in la rocks on west Piglet grid at the lower PIGLET showing. Amber garnets to 1 cm were noted scattered along bedding planes. Massive black biotite occurs in patches and veinlets in some of the siderite rock. Magnetite forms small patches of fine crystals in one sample of brecciated limy skarn. Wollastonite was tentatively identified in another specimen of hornsfelsed limy siltstone. A mineral identified as dolomite forms greyish-white, euhedral porphyroblasts, sometimes

size-distributed in definite bands, in several areas within the zone.

The origin of this skarn is as yet unclear. The stratiform nature of the skarn suggests that skarnification is not related directly to the intrusion of Cretaceous batholiths seen nearby but rather to some compositional distinction which resulted in preferential skarnification of a specific horizon during regional metamorphism. Another possibility is that skarnification may be related to the as yet undetermined mineralization process which has resulted in the concentrations of lead and zinc which are found in association with this skarn at the SUNSET and PIGLET showings.

iii) Structure

There is a variation in intensity and style of folding throughout the grid areas as presently mapped. At least two fold generations exist, both of which have created major structures on the Sunset Grid. First generation folds are formed about northwest-trending axes as ductile and isoclinal, antiformal and synformal structures which have caused considerable foreshortening. Second generation folds appear to deform first generation folds about east-northeast trending fold axes. This fold generation is likely related to movement along the Tintina Fault, located one mile northeast of the PMJ Trend.

a) Sir J.A. Grid

No major fold structures were observed but the rocks may be isoclinally folded about axial planes parallel to the lithologies and overturned to the north. About 15 feet of the axial zone of an east-west striking, south-dipping synform (syncline?) is

exposed at the north end of line 20 NW (Plate 2). Rocks here are therefore within the axial zone of a larger syncline or, based on interpreted vergence, are on the lower limb of a syncline whose axial plane is located to the southwest (in area of clastic limestone?). A complementary anticline is required before entering the younger argillites to maintain age relationship.

Steepening of dips at the southwest end of line 48 NW may be indicating a transition to non-overturned folds.

There are narrow zones of shearing developed in the Sir J.A. rocks northeast of the baseline, particularly in the shaley interbands in the limestone-siltstone.

b) Piglet Grid

No definite fold structures were mapped but isoclinal folding, causing repetition of section, is evidenced by windows of underlying, older strata folded upwards over an anticline and exposed through the argillites in the southwest (Plate 4).

c) Sunset Grid

A complex structural setting has been interpreted from geological, geophysical data and air photos. A major antiformal structure involving abundant isoclinal folding in the east portion of the Sunset grid (Plate 3 , 1) is suggested. This antiform appears to be intensely deformed by second generation folding. Opposite plunging first generation fold axes in both the east and west portions of the grid area converge in a structural basin (in the west central portion of the grid) created by second generation folding about south-plunging and south-southwest

plunging axes. Large (one mile across) second generation overturned folds have refolded the above-mentioned antiformal structure in a manner not yet fully understood.

More mapping is required to the north of the Sunset trenches in order to determine the relationship between the Sub-unit 1b rocks at the BBF showing and at SUNSET showings (Plate 3).

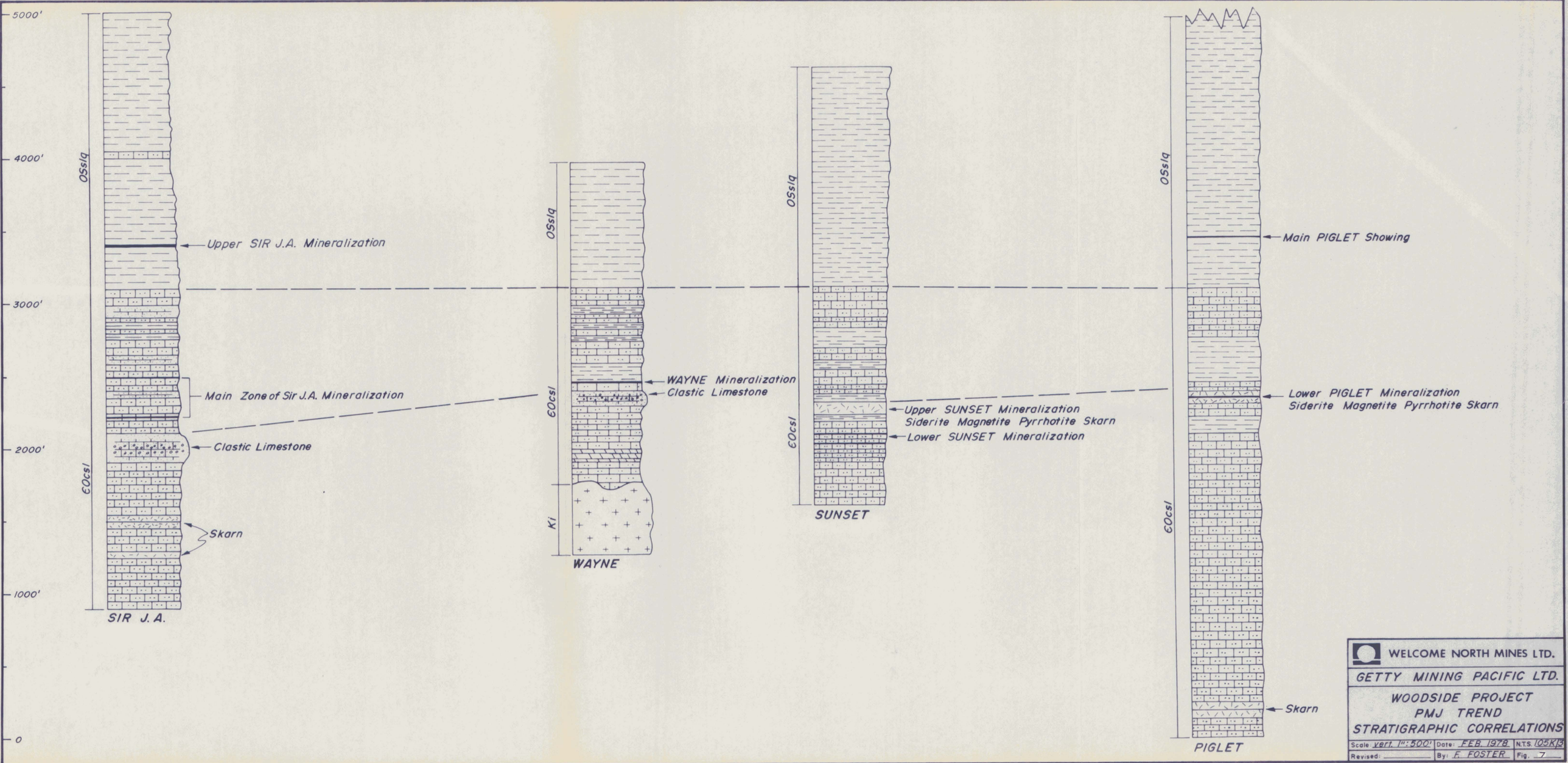
Due to a paucity of outcrop it was not practicable to make an interpretation of second generation structure on cross-section FG (Plate 1).

MINERALIZATION

Hereunder is described the style and mode of occurrence of base metal mineralization found to date on the PMJ grids. Outcrop exposure is generally poor, averaging 5 percent or less overall, due to extensive moss and brush cover. It is therefore believed that the known mineralized outcrop may represent only small parts of a continuously mineralized but largely overburden-masked band. This section of the report deals mainly with the style of mineralization. The results of more detailed work on the various mineral occurrences are discussed under Trenching.

Fig. 7 illustrates the stratigraphic correlation of mineralization found in the PMJ Trend. Two stratigraphic levels of mineralization are present.

The most significant level of mineralization occurs in argillaceous limestones of €Ocsl about 800 feet below the contact with overlying argillite of OSslq. In the PMJ Trend mineralization is seen within this stratigraphic level at the SIR J.A. (Main Zone) showings, the WAYNE showing, the



WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT
PMJ TREND
STRATIGRAPHIC CORRELATIONS

Scale: vert. 1":500'	Date: FEB. 1978.	N.T.S. 105K/5
Revised:	By: E. FOSTER.	Fig. 7

Upper and Lower SUNSET showings (Trenches 1, 2 and 3; Plate 3), and the lower PIGLET showing.

A clastic limestone, Sub-unit 1b, (described under Stratigraphy) acts as a resistant marker horizon immediately below the SIR J.A. (Main Zone) and can be traced for about 3 miles southeast to the WAYNE showing, where it also occurs immediately beneath the mineralized horizon. This poorly sorted quartz pebble limestone is traceable for approximately another mile beyond the WAYNE showing to the southeast toward the SUNSET showing before it becomes difficult to identify through either structure complexities or by facies changes.

At the upper SUNSET and lower PIGLET showings, a stratiform skarn horizon 20 to 100 feet thick hosts magnetite, siderite, pyrrhotite, sphalerite and galena. (Skarn is described under Metamorphism). Corresponding skarn horizons have not yet been identified at the WAYNE or SIR J.A. (Main Zone) showings.

In addition to the skarn related mineralization at the upper SUNSET, galena and sphalerite also occur in argillaceous limestone (lower SUNSET) about 50 feet stratigraphically beneath the upper SUNSET in identical habit to mineralization at SIR J.A. (Main Zone). Weakly disseminated pyrite and pyrrhotite also occur at the lower SUNSET such as found in association with zinc-lead mineralization at the SIR J.A. (Main Zone).

The second level of mineralization has been recognized on both the Sir J.A. and Piglet grids. Sphalerite and siderite occur together in black siliceous phyllitic argillite, Sub-unit 3a of OSslq, about 300 feet above the contact between OSslq and €Ocsl at both the upper SIR J.A. showing and the main PIGLET showing. Such mineralization has also been reported by prospectors to occur at this stratigraphic level near the WAYNE showing but its presence has not yet been confirmed. At the SUNSET strong lead and

zinc geochemical anomalies occur in an area underlain by rocks of this stratigraphic level. Due to extensive overburden cover no surface showings have been located in this area.

i) Sir J.A. Grid

a) SIR J.A. (Main Zone) Showing

At the SIR J.A. showing, zinc and minor lead mineralization occur within a 300-foot thick zone of weaker disseminated pyrite in interbedded argillaceous limestones and argillites. Mineralization consists of sphalerite-rich, quartzose laminae, generally 1 cm or less in thickness, in quartz siltstone (Fig. 8). Some local galena-rich bands have been noted. The siltstone is dark, thinly laminated, very fine grained, quartz-rich and weakly calcareous to non-calcareous. Some of the rock is abnormally hard and brittle. Variable purple biotite, easily mistaken for the fine purple-brown sphalerite, is present. The quartz-rich gangue in the mineralized laminae is, in general, lighter coloured than the siltstone.

Petrographic studies of samples taken from the showing (W.E. Brereton, January 30, 1978)[1] indicate that rock hosting the mineralization "... is a very thinly laminated quartz-carbonate-mica sediment ... Original clastic quartz grains are rounded to sub-rounded and show remarkable size conformity. ... Very fine black material thought to be graphite forms thin patchy laminations in the rock. Wavy convolutions in the laminae appear to indicate a very weak kinking at a high angle to bedding. In some cases, there appear to be graphite (?) depletion aureoles around biotite grains ..."

[1] W.E. Brereton, January 30, 1978, Petrography and Possible Genesis of Some Sphalerite-Bearing Samples from the "Red Unit", Faro-Ross River Area, Yukon Territory.

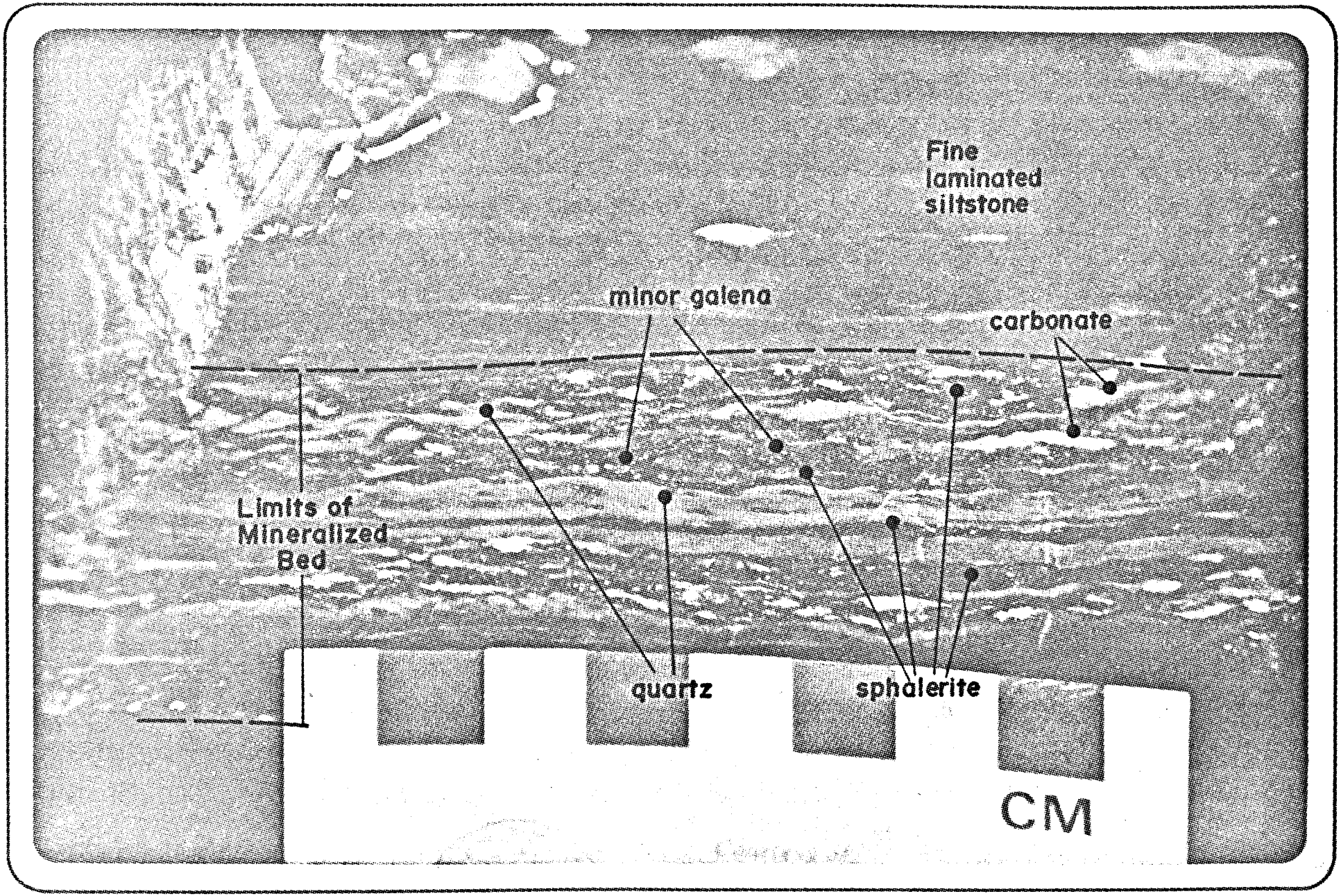


Fig. 8 Mineralized sample from Sir J.A. (Main Zone) Showing

Some of the zinc-bearing laminae consist simply of siltstone mineralized with scattered blebs of sphalerite and quartz. Others consist entirely of sphalerite and secondary quartz. Much of the quartz occurs as clear, augen-like grains up to 2 mm in diameter. Quartz also forms thin massive bands and small lensoid patches.

Grain size is invariably coarser in the sphaleritic laminae relative to the siltstone although some bands do contain very fine sphalerite. There appears to be sympathetic relationship between grain size of the clear quartz and sphalerite. In coarser laminae, the sphalerite rims and forms finely crystalline patches interstitial to the clear quartz grains. Small patches of finely crystalline pyrite occur with sphalerite and abundant quartz in lamina was observed.

It can be generally stated that contacts between mineralized and barren laminae are sharp. Individual laminae are usually either well mineralized or not mineralized at all.

Petrographic analysis of mineralization (W.E. Brereton, January 30, 1978) indicated that "... the sphalerite is clearly stratiform occurring within particular laminae as irregular grains and patches which are interstitial to quartz anhedra... The quartz in the mineralized laminae has been re-crystallized and is markedly coarser than in adjacent unmineralized laminae ... Also there is less (or no) carbonate-mica ... There has been concomitant sphalerite remobilization leading to extensive invasion and replacement of neighbouring, very fine grained laminae ... Fibrous chlorite with anomalous grey birefringence was noted, particularly in association with coarse sphalerite."

Minor zinc occurrences found along the inferred strike of the mineralized unit may be indicating some lateral continuity away from the main showing area (Plate 2).

b) Upper SIR J.A.

The upper SIR J.A. is presently considered to be a minor occurrence of very thin sphalerite-quartz-siderite laminae in laminated, black, silty argillite. The rock is non-calcareous. Siderite occurring with the sphalerite looks identical to and nearly indistinguishable from the sphalerite. Additional work may disclose more mineralization.

ii) Sunset Grid

a) WAYNE Showing

The limy quartzitic siltstones at the WAYNE (Plate 3) have been brecciated but are otherwise very similar to identical to the SIR J.A. host lithology. Some of the rock is weakly schistose with relatively coarse purple biotite forming scaley patches on schistosity surfaces. Sphalerite is, in general, coarser grained than that at SIR J.A. Chalcopyrite and pyrrhotite form minor accessory minerals to the sphalerite.

The sphalerite occurs in contorted laminae and also forms irregular patches in the matrix of a breccia containing fragments of clear to yellowish quartz and siltstone. The quartz fragments in one section of a sample often clearly represent the fragmentation of a pre-existing, continuous band.

Remobilization, coarser grain size, and brecciation at the WAYNE are probably due to the proximity of the showing to the contact between the Cambrian sediments and Cretaceous intrusive rocks 1200 feet to the north.

Deformation of quartz and siltstone has resulted in brittle fracturing while the much less competent sphalerite mineralization has been re-crystallized and has flowed under the the effect of the stress field created by granitic intrusions along the northern portion of the Sunset grid area (Plate 3).

b) SUNSET Showing Area

Present structural interpretation (Plate 1) indicates that the upper SUNSET mineralization seen in Trench No. 2 has been structurally repeated in the area of Trench No. 1.

At Trench No. 2 skarn (previously described under Metamorphism) interlayered with graphitic argillite over an approximate thickness of 100 feet hosts massive lead mineralization with lesser amounts of zinc. Individual skarn bands are as thick as 17 feet.

Galena occurs in massive concentrations and bands within the skarn. Individual mineralized bands vary in thickness from 1 millimeter to several feet. Galena also occurs as millimeter laminations and fine-grained disseminations in the graphitic argillite.

Significant sphalerite was notably absent from the skarn zone where intersected by drilling, but did occur in argillites adjacent to the skarn zone.

Fig. 9 illustrates sphalerite-galena mineralization exposed at surface in Trench No. 2 in calcareous argillite near the lower (?) contact of graphitic argillite which underlies (?) the skarn zone on line 64N (Plate 5).

Petrographic analysis (W.E. Brereton, March 9, 1978[1]) of some of

[1]W.E. Brereton, March, 1978, Petrography of Some Samples From the Sunset, Angie, and G-5 Showings - MPH Consulting Ltd.

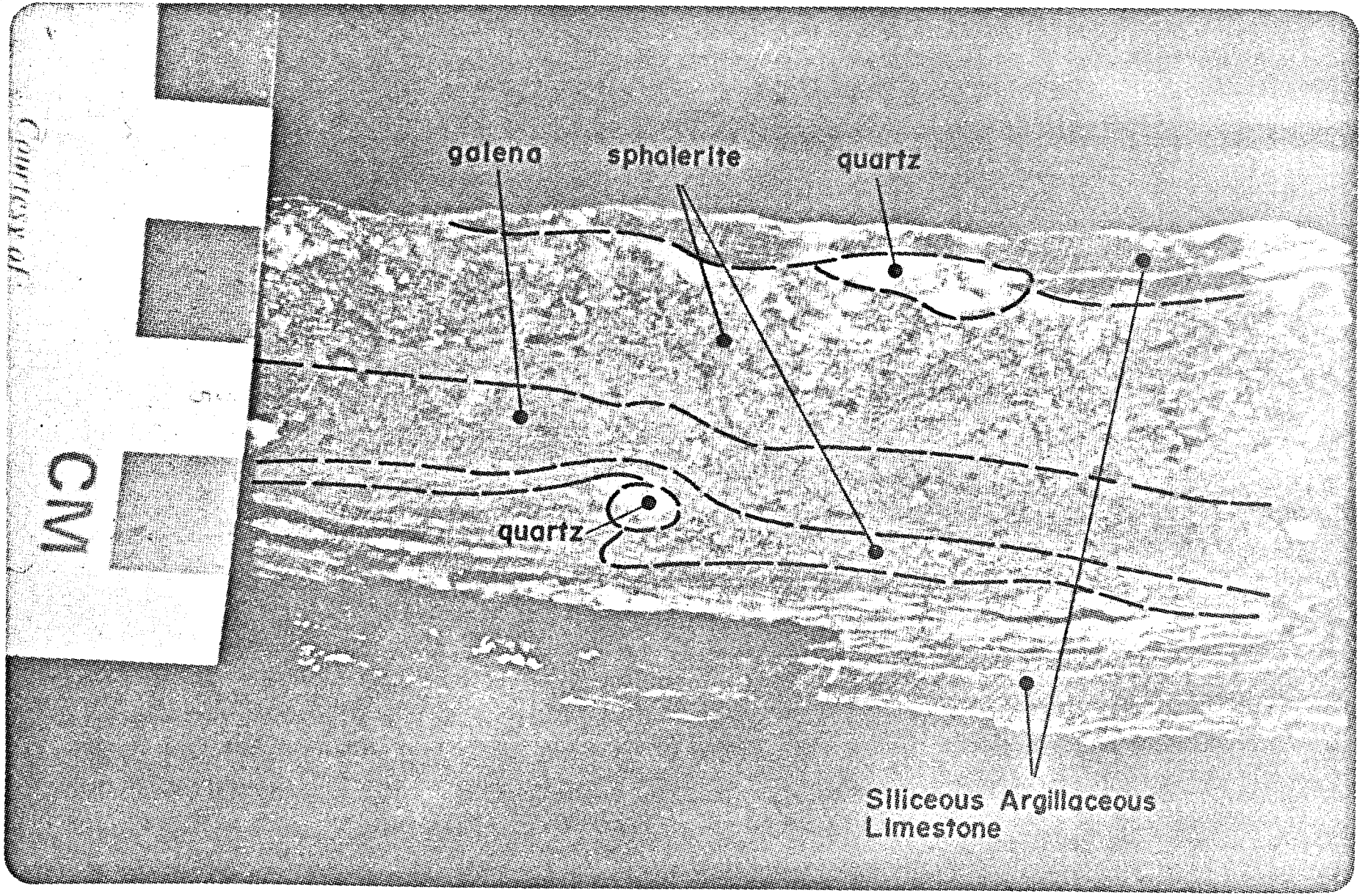


Fig. 9 Mineralized Sample from the Upper Sunset Showing (Trench No.2)

this mineralization showed "... about 80 percent total sulphides consisting of about equal proportions of galena and sphalerite. The sphalerite forms rounded, globular to colon-like aggregates and occurs along with rounded gangue fragments to 1 cm in a galena matrix. This texture is apparently fairly characteristic and may indicate replacement of the sphalerite by the galena. A few tiny chalcopyrite grains were noted enclosed by sphalerite. There are 3-4 tiny grains of native silver."

Examination of drill core revealed that magnetite, pyrite, and pyrrhotite occur in varying concentrations as coarse-grained blebs and as fine-grained, sometimes interstitial disseminations. Magnetite is restricted to skarn bands while pyrite and pyrrhotite can concentrate in both the skarn and the graphitic argillite. Locally pyrite and pyrrhotite do occur in semi-massive aggregates in graphitic argillite.

At Trench No. 1 (Plate 3) the mineralized zone, only weakly mineralized in lead and zinc, is contained within interbedded calcalreous graphitic argillite and shale. Skarn is developed only as isolated bands a few inches thick. Galena and sphalerite in the drill core are disseminated in graphitic shale accompanying (up to 10 percent) pyrite and pyrrhotite. Galena and sphalerite also occur in sideritic siltstone and as weak disseminations in siderite breccia at this location.

The lower SUNSET mineralization found in Trench No. 3 (Plate 5) closely resembles SIR J.A. (Main Zone) type mineralization. Sphalerite occurs in laminations and bands (Fig. 10) in thinly laminated calcareous siltstone. Coarse quartz-carbonate vein material is also present.

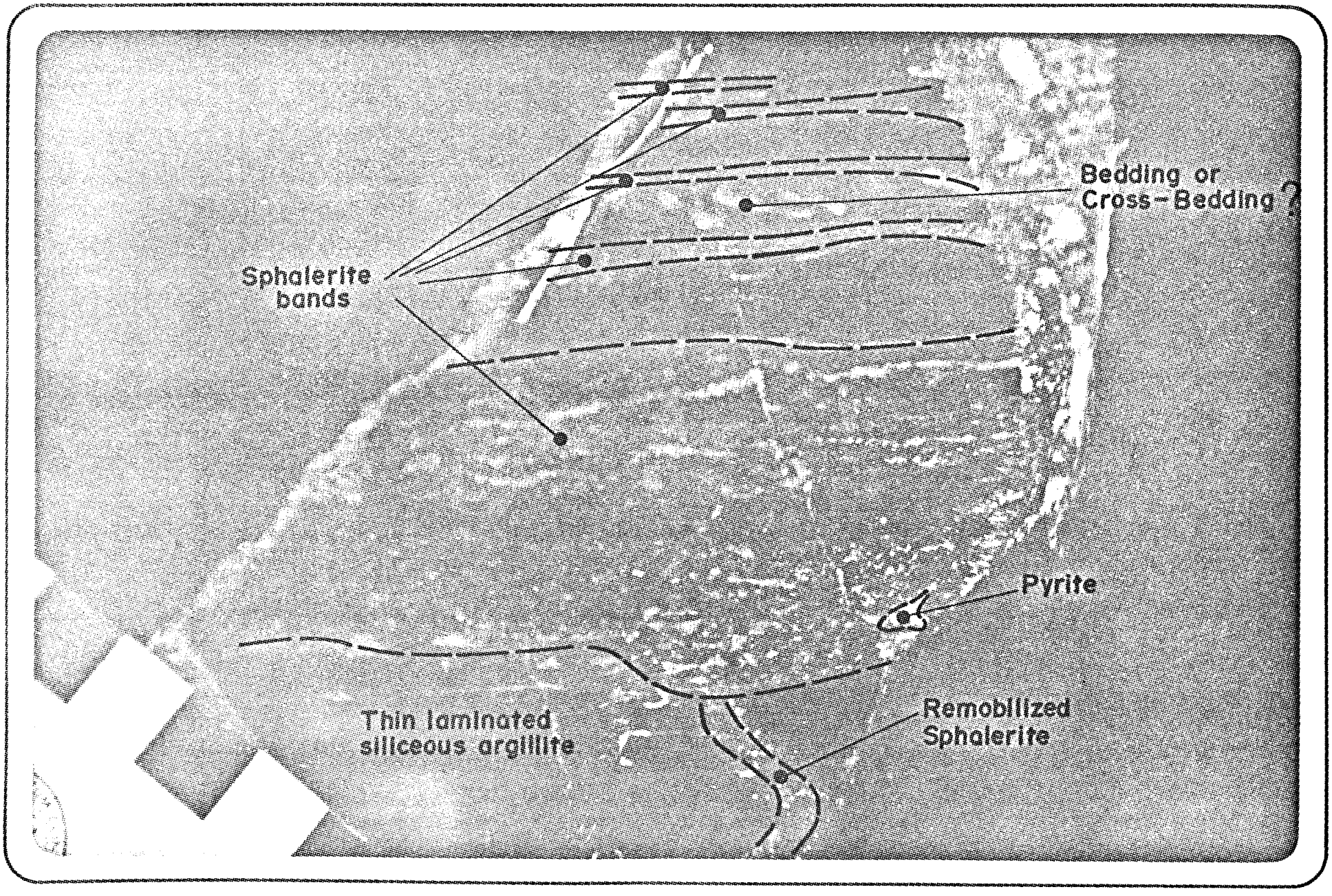


Fig. 10 Mineralized Sample from the Lower Sunset Showing (Trench No. 3)

c) Other SUNSET Showings[1]

Brittle, thin laminated, limy siltstones contain local sphalerite and galena-rich laminae at about station 20 NE between lines 60 NW and 64 NW ("BBF Showing", Plate 3). This is SIR J.A.-type mineralization and may represent a continuation of some of the SUNSET mineralization. More work is necessary to better expose the zone.

Minor pyrite with traces of sphalerite is present in shaley beds within limestones north of the baseline on lines 156 NW and 172 NW (Plate 3).

Mineralized rusty float grading up to 10% zinc occurs on the west-facing slope of a small indentation into higher ground around 8 NE, line 84 NW. The sample which returned 10% zinc consists of a deeply leached, coarse breccia in which angular fragments of weakly calcareous siltstone are cemented by yellowish carbonate containing crystalline sphalerite patches. Yellowish powdery incrustations in the matrix are probably smithsonite. In another float sample from the immediate area, light brown sphalerite occurs as fine disseminations and tiny veinlets along with minor very fine galena in massive limy quartz siltstone. Some of the sphalerite veins and rims patches of creamy dolomite. There is a distinct greenish, skarny hue to the rock.

iii) PIGLET

The main PIGLET showing (Plate 4) as exposed consists of two or three conformable sphalerite-rich laminae, about 10 cm wide and 203 feet long in phyllitic argillite. One of the stringers is contained within a very thin limy band. Siderite was noted in the outcrop 50 feet or so west along strike. Some of the argillites in the showing area have a skarny aspect.

[1]W.E. Brereton, 1977.

At the lower PIGLET showing very minor sphalerite and galena were noted on a joint surface in the quartz-siderite skarn zone north of the baseline (Plate 4).

MINERAL GENESIS

Possible areas of further investigation as prepared by Brereton (1977) include:

a) Exact mineralogy and chemistry of the mineralized skarns, particularly SUNSET, relative to surrounding rocks. Why have these skarns developed only locally and why is mineralization associated with them?

b) Petrography of SIR J.A. mineralization. There might be some textural or mineralogical features to support the suggestion that the mineralization here is variably re-crystallized syn-sedimentary material. A Zn-depletion halo around individual laminae or the mineralized unit as a whole might suggest lateral migration during metamorphism. Is there any significance to the apparent excess of silica at SIR J.A.?

c) Structural studies may show that the brecciation/remobilization which has clearly occurred at WAYNE may have occurred elsewhere on a larger scale. More work is necessary to decipher the deformation pattern in the area.

d) Metal zoning and sedimentary facies changes may be very important in sediment-hosted deposits but nothing obvious was noted in this regard during the mapping. Microscope work may reveal something of importance.

In keeping with these recommendations, Brereton examined two polished sections and two thin sections of lead-zinc mineralized

Cambro-Ordovician limy siltstones from the SIR J.A. and WAYNE showings.

The following tentative conclusions are extracts from his report "Petrography and Possible Genesis of Some Sphalerite-Bearing Samples from the "Red Unit", January 30, 1978", a copy of which is appended hereto.

a) Sphalerite was originally emplaced syn/diagenetically as discrete grains and patches in thinly laminated, limy, argillaceous quartz siltstone.

b) Certain laminae were preferentially mineralized, namely those laminae which were richer in quartz and possibly slightly coarser, i.e. more permeable, than their neighbours. Graphite was tentatively identified in the SIR J.A. thin section. Hydrogen sulphide gas produced as a metabolic waste product of the bacterial "consumption" of hydrocarbons and sea water sulphate could therefore have acted as a reductant to base-metal carrying groundwaters causing interstitial sulphide precipitation.

c) There has been subsequent re-crystallization and remobilization during later metamorphic/deformational events producing various epigenetic replacement textures. In the sample from the Lapie River bridge (Plate 6), sulphide is preferentially re-mobilized parallel to the axial planes of later micro-kinkfolds. Laminae relatively rich in clastic quartz and sulphide may have been the most susceptible to re-mobilization. The sulphide breccia from the WAYNE showing represents an advanced case of re-mobilization.

In exploration terms, the petrographic work further emphasizes the importance of structure as a potential control for an economic

deposit. Very close attention should be paid to later folding as a possible localizer of ore.

The field mapping established a stratigraphic control for the J.A., WAYNE and SUNSET (?) mineralization and indicated a lithologic control, i.e. mineralization seemed to be preferentially associated with the sediments richest in quartz. The limited microscope work to date substantiates the latter.

Additional microscope work is warranted in an attempt to learn more the initial sedimentary depositional environment.

TRENCHING AND SAMPLING

Mineral showings within the PMJ grid areas are in general not well exposed. Limited hand trenching and sampling were conducted in selected areas of shallow overburden near mineralized exposures in an attempt to better define the extent of such mineralization. As the priorities of the 1977 exploration program were placed on establishing a broad regional geological framework to the known mineralization, resources were not available to extend or further explore the known showings through more extensive trenching.

i) SIR J.A. (Main Zone) Showing

The SIR J.A. (Main Zone) showing consists of a series of isolated zinc occurrences over a strike distance in excess of 600 feet (Plate 7. The showings were first discovered as near "in-place" large mineralized blocks on a moderately dipping (20°) westerly facing slope overgrown by moss and light willow. The showings appear to represent a composite thickness of mineralization with the mineral in Trench No. 1 being stratigraphically above that in Trench No. 2 and Trench No. 3. Hand trenching with the aid of explosives was used to clear off the overburden and freshen up the rock in three trenches, averaging 5 feet in depth, across the showing. In most

cases what had initially been interpreted as bedrock, on excavation proved to be large angular chunks up to one-half ton, of mineralized material, several feet or more above true bedrock. Deepening of trenches did eventually expose bedrock but in all cases mineralization found in place was of much lower grade than the loose material. The source of the higher grade float, although obviously quite local, has not been found.

Character specimens taken from the large float blocks in the vicinity of Trenches 2 and 3 (location of samples not shown), assayed as follows:

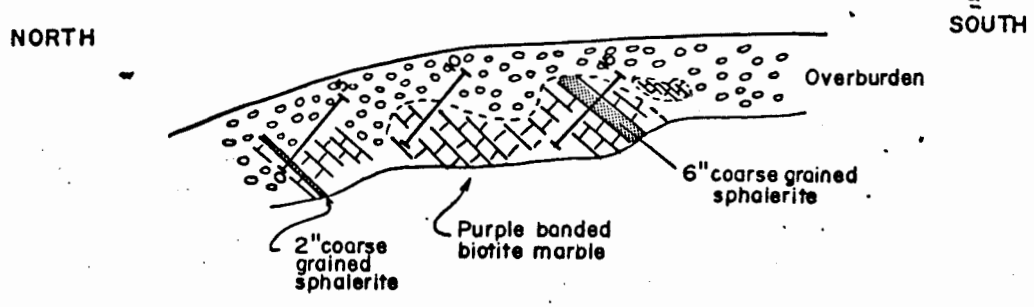
Sample No.	Lead %	Zinc %
952	-	1.6
966	-	.44
967	-	2.07
968	-	2.52
6779	.01	3.5
6780	.01	16.26
6781	.01	.43
6782	.01	3.75
6783	.01	.05

Assays from more systematic chip sampling of the Sir J.A. trenches are presented with Fig. 11, 12 and 13.

Upper SIR J.A. Showing

The upper SIR J.A. showing (located only on Plate 2) occurs in an area largely covered by overburden. Scattered mineralized outcrop are exposed over a 300-foot long area. The stratigraphic thickness of the mineralized interval cannot be determined from present exposure. No trenching was done in this area.

A character specimen from the showing assayed 3.89% zinc.



ASSAYS	Sampled By F. Foster		Sampled By B. Holland	
Footage	% Pb	% Zn	% Pb	% Zn
0 — 5	-	-	.01	.23
5 — 10	.02	.24	.01	.17
10-15	.07	2.90	ND	.07

NOTE: For location, see Plate 7

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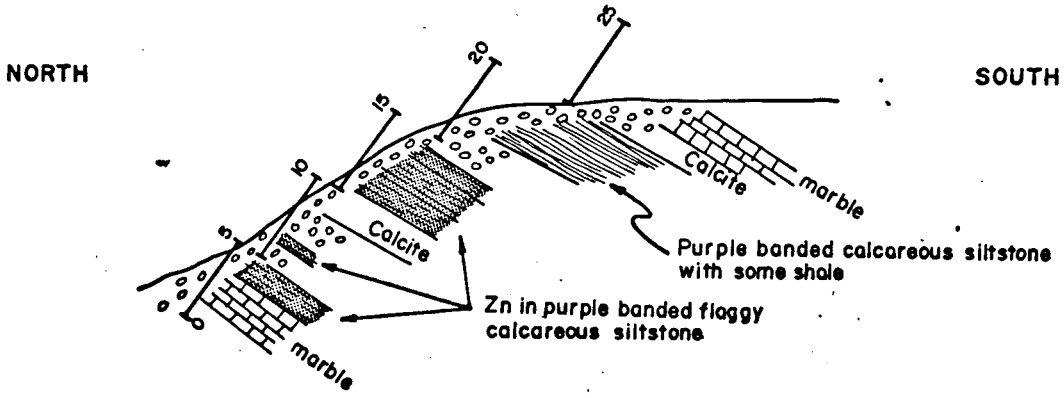
WOODSIDE PROJECT
PMJ TREND - SIR J.A. Grid

TRENCH No. 1

Scale: 1" : 10'	Date: OCT. 1977	N.T.S. 105K/3
Revised:	By: F. F., R. H.	Fig. 11



ASSAYS — Sampled By B. Holland

Footage	%Pb	%Zn
0 – 5	.07	.03
5 – 10	.05	.47
10 – 15	.01	.80
15 – 20	—	.50
20 – 25	—	.09

NOTE: For location, see Plate 7

WELCOME NORTH MINES LTD.

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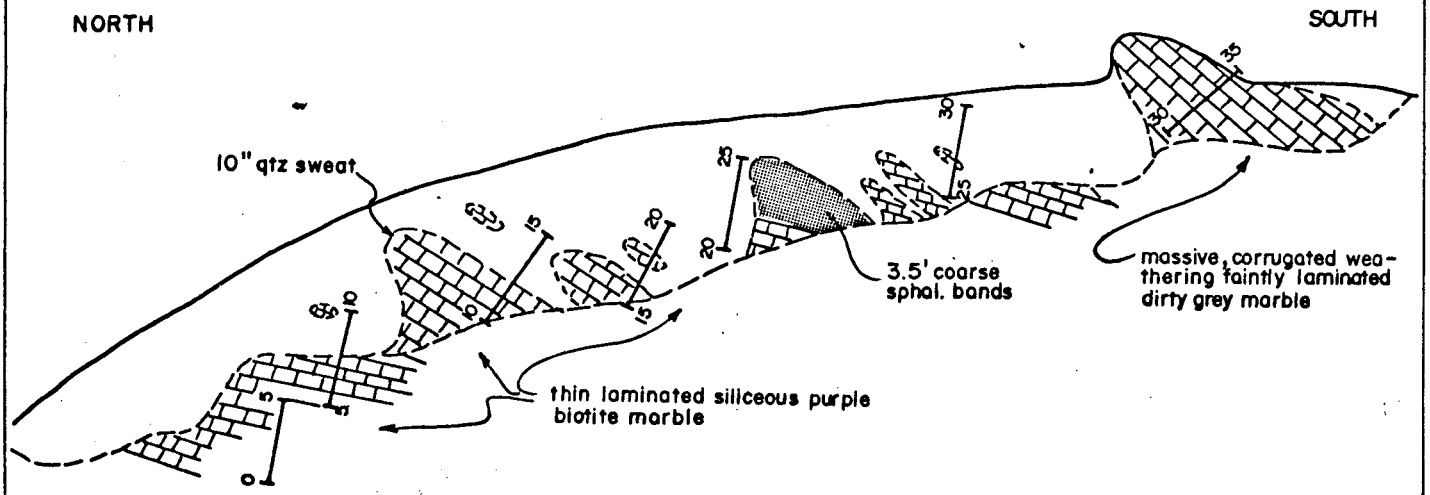
WOODSIDE PROJECT
PMJ TREND - SIR J.A. Grid

TRENCH No. 2

Scale: 1" : 10'	Date: OCT 1977	N.T.S. 105K/3
Revised:	By: F. F., R.H.	Fig. 12



ASSAYS — Sampled By B. Holland

Footage	% Pb	% Zn
0 – 5	–	.01
5 – 10	–	–
10 – 15	–	.46
15 – 20	–	.27
20 – 25	.19	.82
25 – 30	.02	.19
30 – 35	–	.04

NOTE: For location, see Plate 7

WELCOME NORTH MINES LTD.

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WOODSIDE PROJECT
PMJ TREND - SIR J.A. Grid

TRENCH No. 3

Scale: 1" : 10'	Date: OCT. 1977	N.T.S. 105K/3
Revised:	By: R. H.	Fig. 13

iii) WAYNE Showing

The WAYNE showing (location shown in Plate 3) is exposed on a steep, easterly facing, moss and spruce covered slope. Rock outcroppings in the form of steep benches are intermittently exposed. Large angular slabs composed of brecciated biotite marbles with sphalerite matrix are found on the hillside over an area several hundreds of feet square.

Hand trenching through the 2-4 feet of moss and permafrost exposed rock in a vertical section for approximately 80 feet (Fig. 14). Several narrow laminations and bands of sphalerite up to 2 inches thick were exposed in the trench floors but mineralization in the form of breccia matrix, as seen in the loose rubble, was not located in place.

Specimens of the loose mineralized slabs from the WAYNE showing assayed as follows:

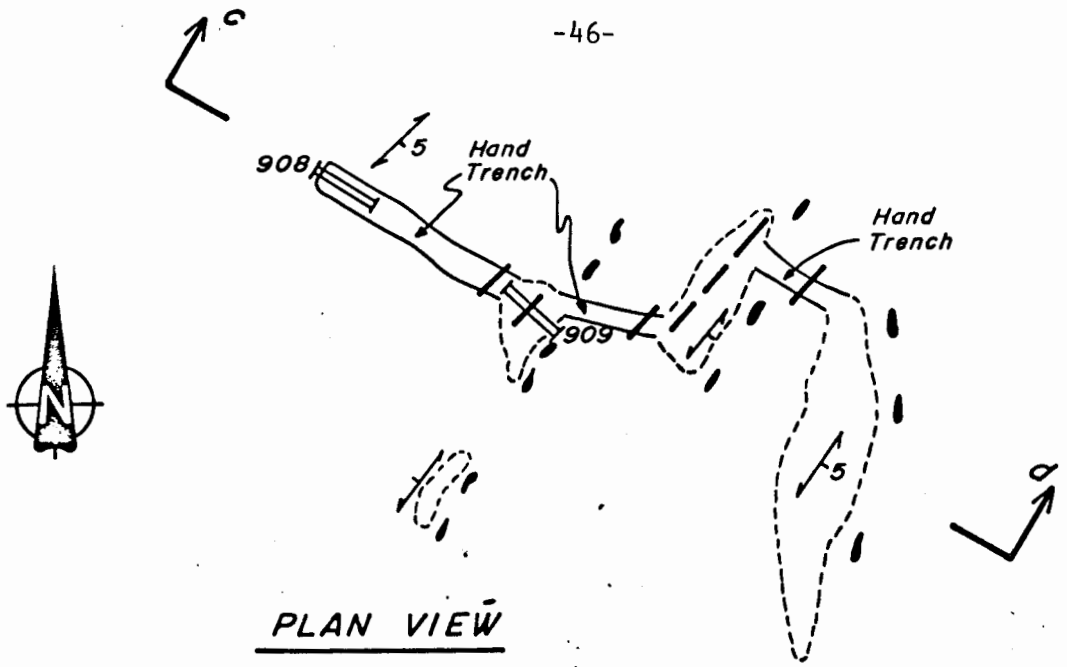
Sample No.	Lead %	Zinc %
1026	0.72	7.4
1027	0.25	11.2
1028	0.03	6.3

Chip samples from the upper section of the trench returned the following assays:

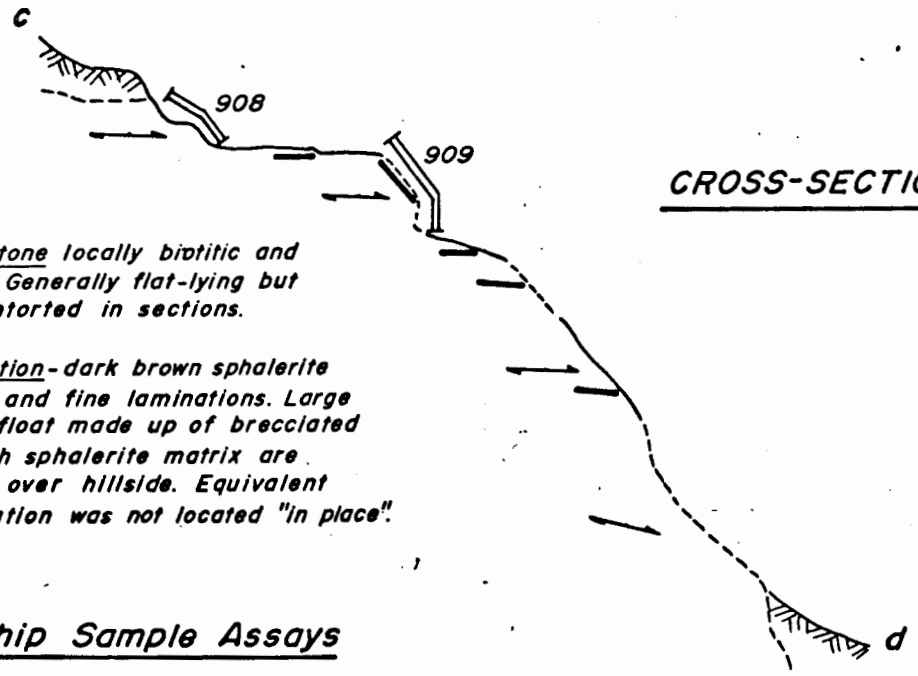
Sample No.	Footage	Width	Lead %	Zinc %
908	0- 5'	5'	Tr	0.03
909	5-15'	10'	0.01	1.84

iv) SUNSET Showing

The main SUNSET showings were excavated with a bulldozer in 1969. The trenches stripped the 1-3 feet of soil cover and penetrated decomposed bedrock for distances up to 8 feet (Plate 5). The



PLAN VIEW



CROSS-SECTION c-d

Limy Siltstone locally biotitic and schistose. Generally flat-lying but highly contorted in sections.

Mineralization - dark brown sphalerite as bands and fine laminations. Large slabs of float made up of brecciated schist with sphalerite matrix are scattered over hillside. Equivalent mineralization was not located "in place".

Chip Sample Assays

Sample No.	Width	% Pb	% Zn
908	5'	Tr.	0.03
909	10'	0.01	1.84

NOTE: For location, see Plate 3

Legend

Mineralized Slabs	Sphalerite Bands
Overburden	Outcrop
Schistosity	Chip Sample

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WOODSIDE PROJECT
PMJ TREND - SUNSET Grid

WAYNE Showing

Scale: 1" : 20'	Date: APRIL '78	N.T.S. 105K/3
Revised:	By: J. G.	Fig. 14

floors of the "cat" trenches are generally covered with rubble distributed by dozing and detailed bedrock geology is therefore obscured.

Samples taken from the SUNSET trenches are illustrated on Plate 5 and sample results are tabulated below.

Trench No. 2

	Sample No.	Sample Length	Lead %	Zinc %	Silver Oz./ton
a)	911	20'	0.41	0.10	0.35
b)	912	13'	0.06	0.10	-
c)	913	17'	0.50	0.04	-
d)	914	13'	7.04	0.06	0.94
e)	915	16'	7.10	0.10	2.22
f)	916	21'	0.10	0.04	-
g)	6832	10'	0.09	0.08	Tr

Samples a-f above were taken, in part, from loose rubble on trench floor. Sample g was chipped from rock "in place".

Trench No. 3

	Sample No.	Sample Length	Lead %	Zinc %	Silver Oz./ton
h)	6831	3.5'	0.04	0.12	Tr
i)	6827	3.5'	2.40	3.84	0.57
j)	6828	7.0'	0.09	0.10	Tr

High grade character specimens from the area of the Sunset trenching assayed as follows:

Sample No.	Lead %	Zinc %	Silver Oz./ton
6776	0.03	0.13	0.34
6777	10.83	35.87	105.4
6778	0.44	2.6	4.11

v) PIGLET Showing

The PIGLET showing has received little attention to date. No trenching was conducted in this area.

Selected high grade specimens from the showing assayed:

Sample No.	Zinc %
978	5.1
980	23.0

GEOCHEMISTRY

i) Method of Survey, Analysis, and Treatment of Data

Detailed soil geochemistry surveys were completed over the PMJ grids in an attempt to define the boundaries of known lead and zinc occurrences and aid in projecting geological contacts into areas of overburden. Samples were taken, with the aid of a prospectors grub hoe at 100-foot intervals along cut lines spaced 400 feet apart. In areas of extensive talus outcrop, where no soil was available, rock chip samples were taken instead of soil samples. All samples were collected in Kraft brown paper bags and dried prior to shipment for analysis.

All samples were analyzed by Acme Analytical Labs in Ross River, Yukon. When the samples were received, each was dried while in its Kraft bag, then screened to 80 mesh, weighed out to 0.5 grams and digested in hot aqua regia. Rock samples were crushed and pulverized before undergoing this process. Samples were then diluted, clarified for 20 hours and then tested for lead and zinc content with an atomic absorption spectrophotometer. Accuracy of the instrument ideally is 1 percent of the amount of metal present. Individual cathode lamps were used for each element determination, a direct readout being given in parts per million of the element being tested.

All geochemical assays were returned to field where anomalous results were plotted and followed up.

A statistical partitioning procedure (A.J. Sinclair, 1973) was used to separate two and sometimes three populations, one being anomalous and the others being background. The overlap of these populations was determined and thresholds chosen arbitrarily to isolate priority populations for each element analyzed.

Separate maps were prepared on a scale of 1" = 500', showing values obtained for lead and zinc. Values were contoured to aid in distinguishing areas anomalous in lead and zinc.

ii) Interpretation of Results

Separate geochemical maps for zinc and lead values are included in the pocket of this report for each of the Sir J.A., Sunset and Piglet grids (Plate 8, 9, 10, 11, 12, 13). Results are contoured and colour coded by anomalous population.

There is a general coincidence in the distribution patterns of zinc and lead geochemical assays within the PMJ grids although zinc, through greater dispersion, shows moderately larger anomalous areas in comparison to corresponding lead results. To avoid repetition anomalous results from the two metals are discussed together in the following section. Definitive "cut-offs" for the most significant and best-defined anomalies are 370 ppm zinc and 80 ppm lead.

a) Sir J.A. Grid (Plates 10 and 11)

A discrete linear easterly trending zinc anomaly across the

central Sir J.A. grid corresponds precisely with the known and projected surface trace of the SIR J.A. (Main Zone) showing. Zinc values range up to 2000 ppm and lead which forms less regular patterns along the trace may reflect local galena concentrations similar to those observed in the surface showings. The relationship of these anomalies to known mineralization lends credence to the other more lenticular anomalies both close to the mineralized trace and isolated from it in the northeast section of the grid. The latter with core values exceeding 570 ppm zinc may well directly indicate undiscovered bedrock metal concentrations. These anomalies appear to extend beyond the limits of the grid to the northeast.

The upper J.A. showing, within the argillites of unit 1c, has no apparent anomalous association.

b) Sunset Grid (Plate 10, 11)

Anomalous lead-zinc in soils on the Sunset grid also appear to relate directly to known mineralization. The striking coincident zinc-lead anomaly in the central grid area coincides with the large scale "Z" fold (Plate 3) mapped on the grid. Although the exact relationship is not at this time clearly understood, this fold is believed to some degree to control lead-zinc mineralization in the area.

Both the main surface showings on the Sunset grid and the drill-indicated metalliferous graphitic shales (D.D.H. 77WS-7) fall within the anomalous limits. Geochemical trends which are or may be related to specific mineral zones within this area are largely marked by the pervasive anomaly.

Initial geological conclusions have been strengthened by geochemical results. The broad structural warp (previously mentioned "Z" fold) is demonstrated by geochemistry to relate to metal concentrations and therefore constitutes a prime focus for future exploration.

The well defined open anomalies in the central southwestern section of the Sunset grid correspond to anomalies outlined in the same area by previous surveys.
These anomalies as well as those near the northeastern margin of the grid justify grid extension to both the northeast and the southwest to facilitate further exploration of these areas.

The more scattered, isolated anomalies apart from the obvious central feature are also worthy of additonal investigation. The WAYNE showing has a small isolated geochemical high related to it. Each of the similar highs in that vicinity should be thoroughly prospected.

c) Piglet Grid (Plate 12, 13)

The Piglet grid contains no striking geochemical features drawing attention to this area of the claim block. Known mineral occurrences within the grid can however be related to coincident lead-zinc geochemical highs, a fact which further illustrates the effectiveness of geochemistry in the exploration of this terrain. Geochemically anomalous areas in the extreme southwestern section of the Piglet grid may relate to a geologically indicated fold repetition of presently known mineralized Cambro-Ordovician rocks which form host to major mineral occurrences on the Trend.

Geochemical surveys have proven sufficiently effective as exploration tools on the PMJ Trend to warrant their extensive further utilization in future programs.

GEOPHYSICS

Orientation MaxMin II electromagnetic and magnetic surveys were conducted over a test section of the Sunset grid. The purpose of the surveys was basically to gauge the effectiveness of electromagnetic and magnetic methods in detecting conductive and/or magnetic zones caused by sulphide mineralization.

The results of the surveys are incorporated in "Report on the EM and Magnetic Surveys Welcome North Mines Ltd., Vangorda 1977 Project, Sunset Grid (Partial)" by John E. Betz, November 1977, a copy of which forms Appendix I of this report. The results of the magnetic survey, conducted by Welcome North personnel, are additionally illustrated by supplementary drawings (Plates 14 and 15).

i) Electromagnetic Surveys

Four poor to fair conductive zones (10 to 40 mhos) are indicated in the section of the Sunset grid surveyed to date. Conductors No. 2 and No. 3 (Plate 1, Betz Report) are the most prominent and each has associated erratic magnetic activity with the stronger magnetic features being more near-flanking than directly coincident. Conductor No. 2 coincides with known mineralization in the Sunset Trench No. 2 while No. 3 conductor has been substantiated as being sulphide-caused by the results obtained in D.D.H. WS 77-7 (see Diamond Drilling).

Plate 1 illustrates that conductivity symmetries were an aid to determining structural features on the property. Betz suggests that

an area of complex conductivity between 20E and 30E on line 60N (Plate 1, Betz Report) may be a conductive axis paralleling line 60N in this area. This aids in the geological interpretation of a complex second generation fold structure in the area of the EM survey (Plate 3).

ii) Magnetic Surveys

Magnetic surveys suggest that magnetite and/or pyrrhotite seen in diamond drill core associated with lead and zinc mineralization tends to occur erratically as indicated by the sporadic magnetic highs and lows outlined in the grid area. Insufficient information is available to determine whether or not the magnetics can be related to geological structures as well as mineralogical heterogeneity within specific stratigraphic levels. However anomalous magnetic trends do tend to generally conform to the gross structures as presently outlined by geologic mapping on the property.

The recommendation by Betz that the entire Sunset grid should be covered by ground EM surveys appears well founded and that recommendation should be expanded to include the Sir J.A. and the Piglet grids and magnetic surveys should also be carried out on these grids as well.

DIAMOND DRILLING

Two separate diamond drill programs were carried out on the PMJ grid areas during 1977. The first, conducted from August 8 to September 8, utilized an "X-Ray" machine recovering EQ diameter core. The second program carried out from November 24 to December 4 used a Mark Twelve machine, recovering BQ diameter core.

The first program which involved five holes on the SIR J.A. (Main Zone) showing and six holes on the SUNSET showing for a total footage of 917 feet, was designed to test and sample known mineral occurrences at a shallow depth. The program was hindered by poor core recovery (generally less than 50% in mineral zones) but it did indicate mineral grades and modes of occurrence not apparent in surface exposures.

The second program was planned to better establish the geological framework to the Sunset mineralization. The program was cut short by weather problems (temperatures to -70°F) but two holes for a total footage of 779 feet were drilled on the Sunset grid.

The following table summarizes 1977 diamond drilling on the PMJ Grid Areas.

HOLE NO.	COORDINATES NORTH	EAST	AZIMUTH	DIP	CLAIM	TOTAL DEPTH FT.
SIR J.A.						
77WJ-1	25+60N	11+40E	020°	-80°	MONI 18	90.4
77WJ-2	23+60N	11+80E	030°	-80°	MONI 18	82.6
77WJ-3	20+45N	12+50E	025°	-60°	MONI 18	103.6
77WJ-4	25+85N	11+70E	355°	-75°	MONI 18	21.1
77WJ-5	23+65N	12+10E	010°	-60°	MONI 18	49.4
					TOTAL	347.1
SUNSET						
77WS-1	60+30N	1+55E	012°	-40°	PMJ 12	104
77WS-2	60+10N	0+90E	012°	-40°	PMJ 12	113
77WS-3	59+45N	0+90W	012°	-40°	PMJ 9	121
77WS-4	58+60N	0+00E	007°	-40°	PMJ 10	61
77WS-5	62+65N	1+10W	030°	-40°	PMJ 11	92
77WS-6	62+65N	1+20E	210°	-40°	PMJ 12	79
77WS-7	62+00N	6+25E	012°	-45°	PMJ 12	382
77WS-8	62+00N	2+25E	205°	-45°	PMJ 12	397
					TOTAL	1349

The location and results of diamond drilling are illustrated on accompanying plates and figures more particularly referred to in following sections. Individual drill hole profiles incorporating lithologies, mineralization, core recoveries, assays and geochemical results for each hole are also presented. Drill logs are found in Appendix II to this report.

i) SIR J.A. Drilling

Five short bore holes were drilled within the immediate area of the SIR J.A. hand trenches in directions and at angles normal to the trend of mineralized laminations evident in the trenches (Plate 7, Fig. 15). The bore holes were designed to sample and determine the thickness of mineralization exposed in the trenches.

The drilling intersected mineralization similar in character with that seen at the surface. Sphalerite, which occurs in association with widely spaced quartz-rich bands, is broadly contained within an envelope of accessory pyrite and pyrrhotite. Mineralization intersected shows some continuity from hole to hole although the sphalerite zone intersected in 77WJ-5 was not found in hole 77WJ-2 drilled on the same section.

Samples of core from each of the holes drilled were assayed geochemically for lead and zinc in 5-foot sections. Assay results were in all cases minor in lead and less than 1% zinc. Low assay results may in part be due to preferential grinding and core loss at the zinc-rich laminations but it is estimated that grades in the core would nowhere exceed 5% zinc except over short intervals of one foot or less.

The SIR J.A. showing as drilled does not locally appear to contain economic concentrations of base metal.

Looking East

PROJECTED FROM 335 FEET TO WEST

PROJECTED FROM 580 FEET TO WEST

NOTE : ALL PROJECTIONS ARE LOCATED ACCORDING TO THEIR ACTUAL ELEVATIONS.

SYMBOLS

ZONE OF TRACE PYRITE (1% OR LESS) MINERALIZATION

ZONE OF VISIBLE SPHALERITE MINERALIZATION

€Ocsl
la

THIN LAMINATED AND LAMINATED CALCAREOUS SILTSTONES METAMORPHOSED TO PURPLE BANDED BIOTITE MARBLE AND QUARTZITE.

NOTE: For location, see Plate 7

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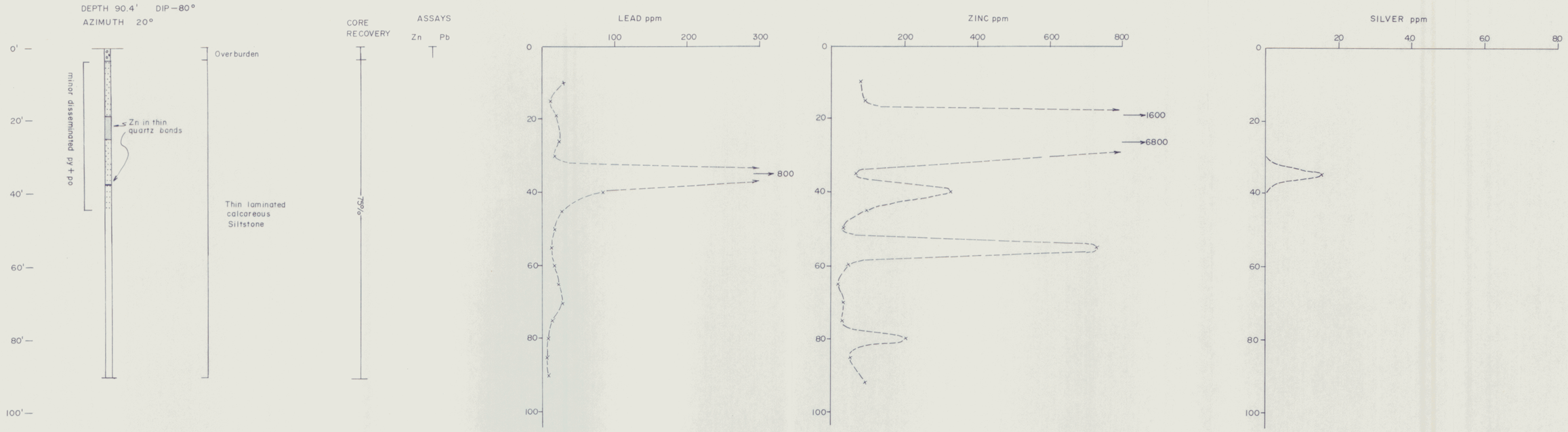
WOODSIDE PROJECT
PMJ TREND
SIR J.A. (Main Zone) Showing
CROSS-SECTION a-b

Scale: 1" = 50 FEET	Date: OCT. 1977	N.T.S. 105 K/3
Revised:	By: F. F.	Fig. 15



py pyrite

po pyrrhotite

< 2% Visible Pb-Zn

pyrite, pyrrhotite, magnetite disseminated

NOTE: For location, see Plate 7

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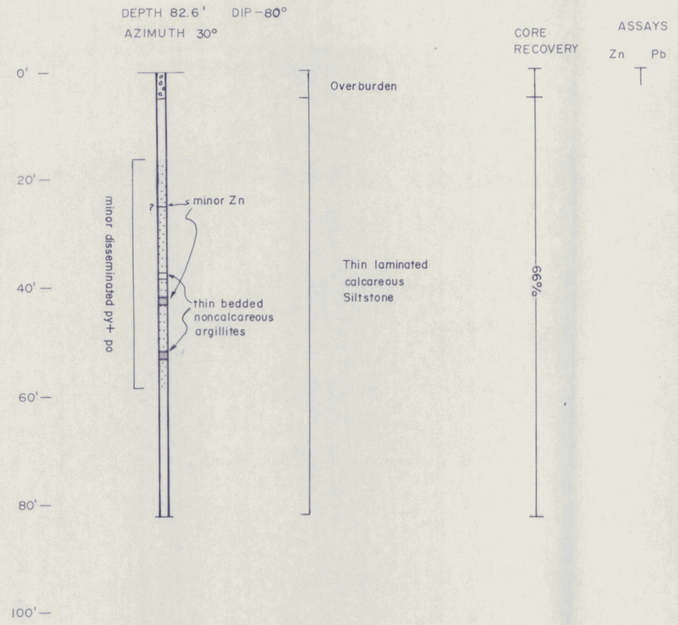
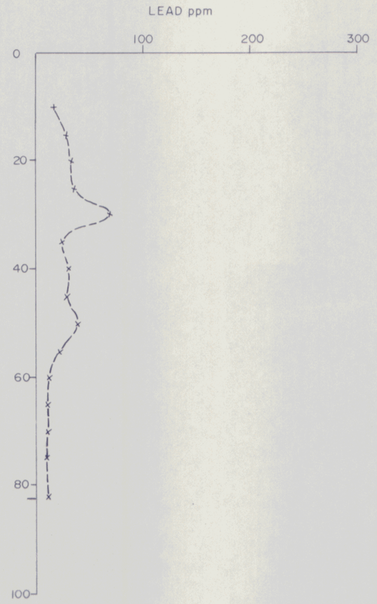
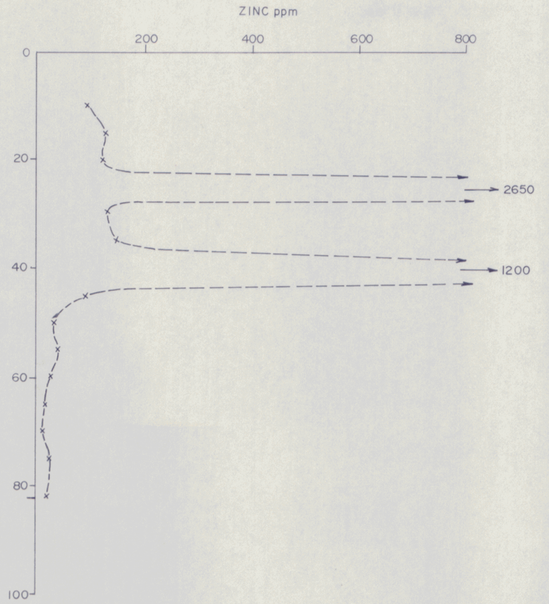
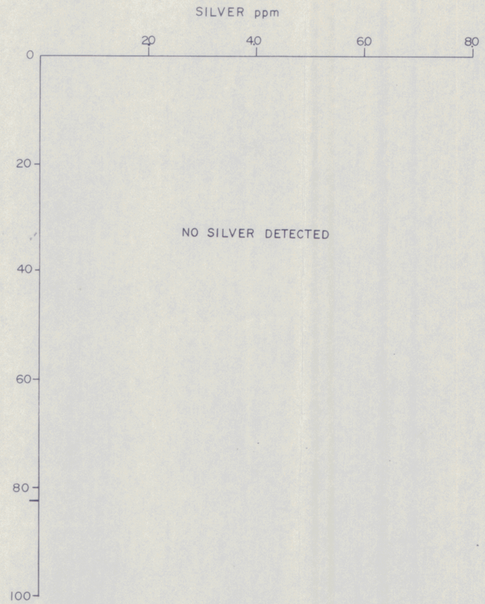
WOODSIDE PROJECT
PMJ TREND - SIR J.A. Grid
DDH 77WJ-1, PROFILE

Scale: 1" = 20 FEET	Date: OCT. 1977	N.T.S. 105 K/3
Revised:	By: F. FOSTER	Fig. 16









py pyrite

po pyrrhotite

Zn Zinc

< 2% visible Pb-Zn

Pyrite, Pyrrhotite, Magnetite disseminations

NOTE: For location, see Plate 7

WELCOME NORTH MINES LTD.

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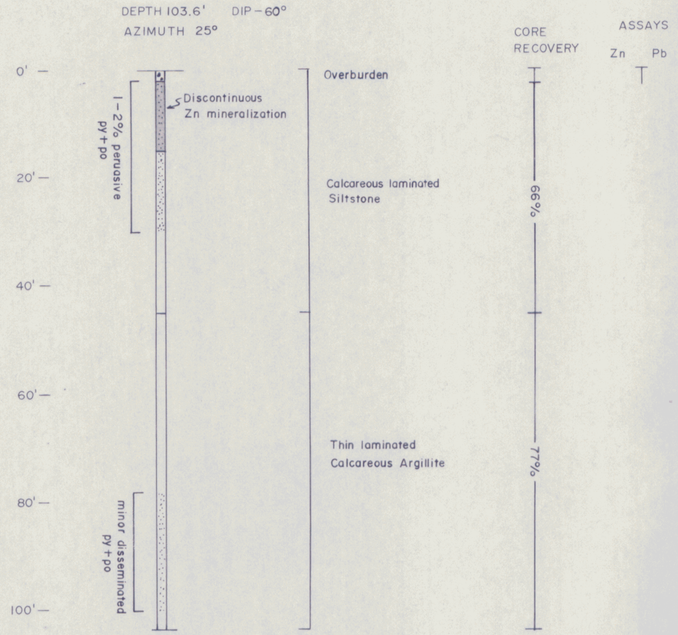
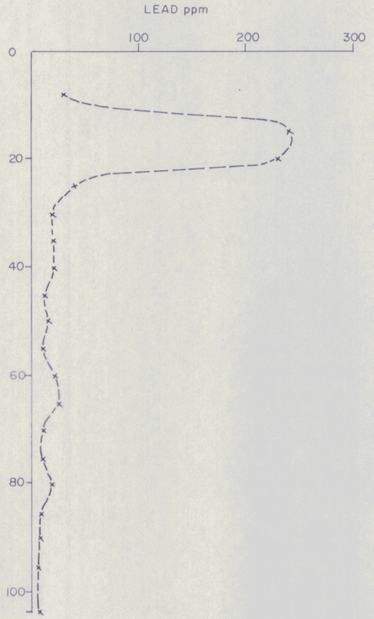
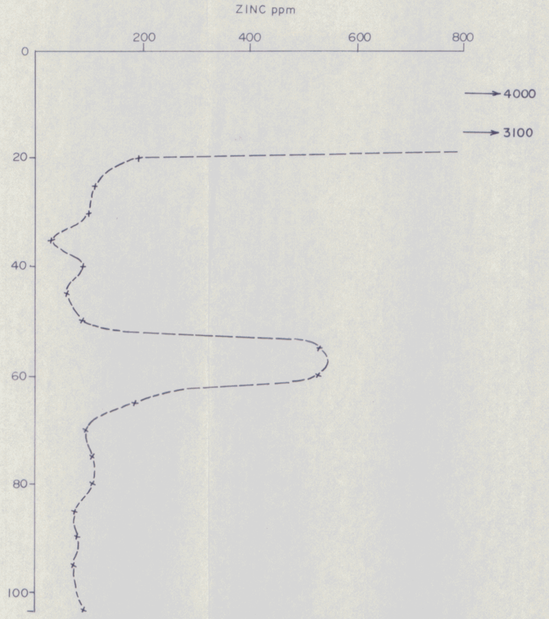
WOODSIDE PROJECT
PMJ TREND – SIR J.A. Grid

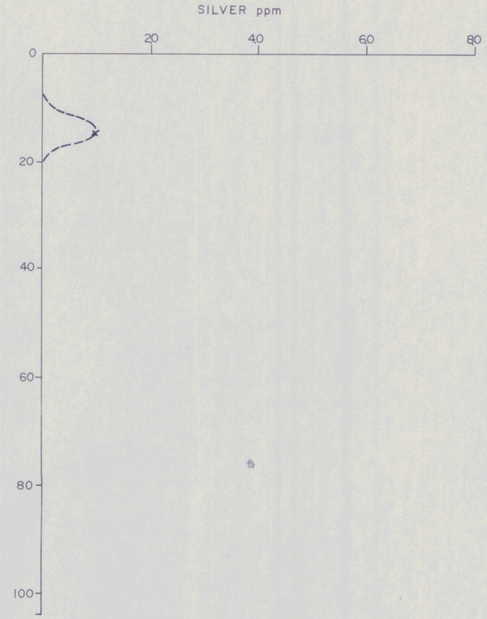
DDH 77WJ-2, PROFILE

Scale: 1" = 20 FEET	Date: OCT. 1977	N.T.S. 105 K/3
Revised:	By: F. FOSTER	Fig. 17









py pyrite
po pyrrhotite
Zn Zinc

<2% visible Pb-Zn

Pyrite, pyrrhotite, magnetite disseminations

NOTE: For location, see Plate 7

WELCOME NORTH MINES LTD.

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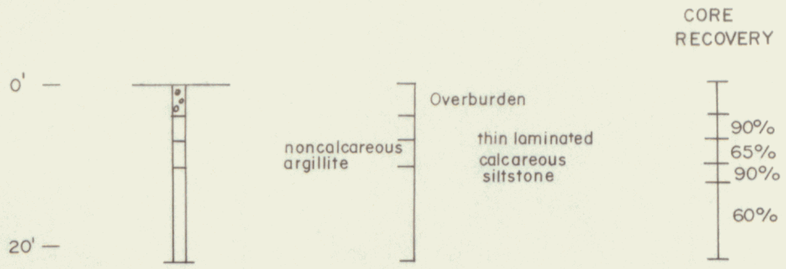
WOODSIDE PROJECT
PMJ TREND - SIR J.A. Grid

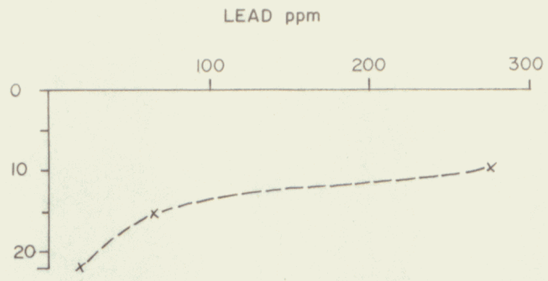
DDH 77WJ-3, PROFILE

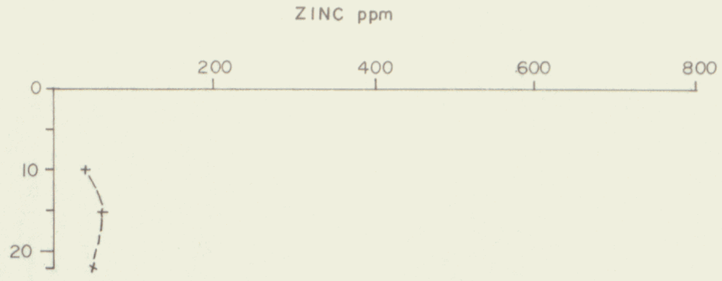
Scale: 1" = 20 FEET	Date: OCT. 1977	NTS: 105 K/3
Revised:	By: F. FOSTER	Fig. 18

DDH 77 WJ – 4

DEPTH 22 feet DIP –75°
AZIMUTH 355°



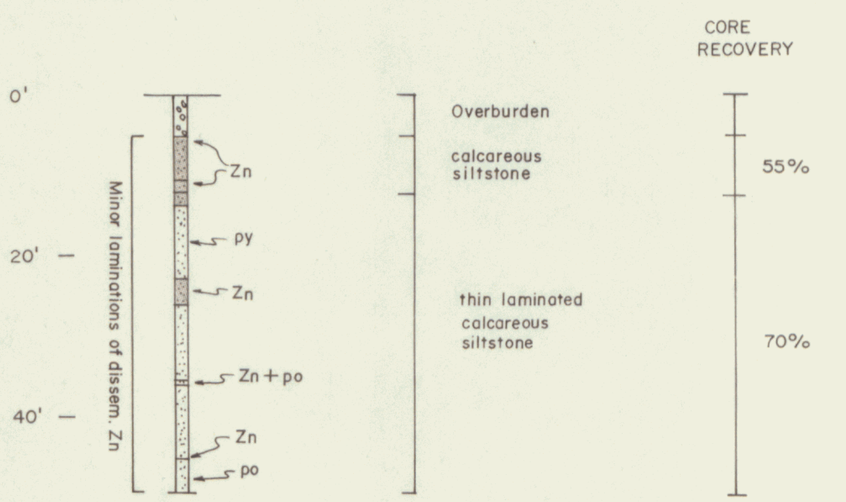


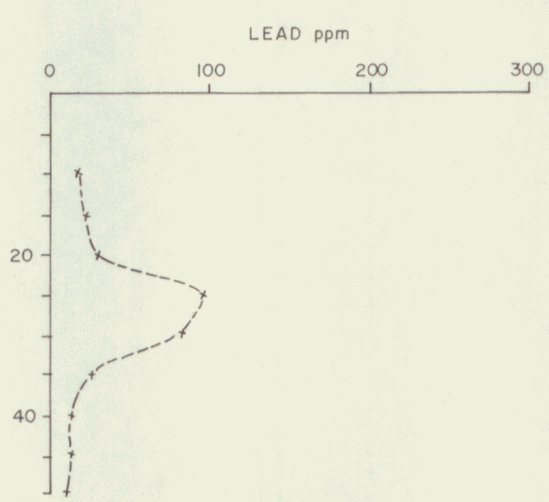


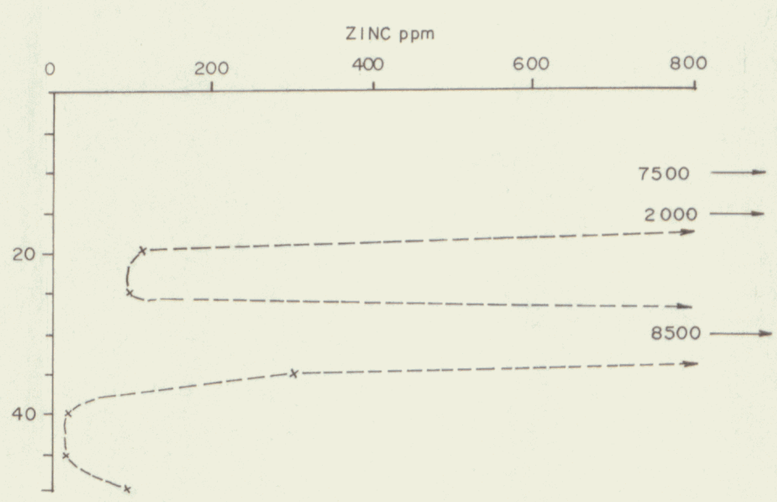
NO SILVER DETECTED

DDH 77 WJ – 5

DEPTH 49.4 feet DIP –60°
AZIMUTH 10°







NO SILVER DETECTED

py pyrite
po pyrrhotite
Zn Zinc

< 2% visible Pb-Zn

Pyrite, pyrrhotite, magnetite disseminations

NOTE: For location, see Plate 7

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT
PMJ TREND - SIR J.A. Grid

DDH 77 WJ-4+5, PROFILES

Scale: 1" = 20 FEET	Date: OCT. 1977	N.T.S. 105 K/3
Revised:	By: E. E.	Fig. 19

The combined factors of core loss, limited shallow tests to date, and the presence of higher grade float slabs not yet discovered in in place near the showing would indicate that a more persistent test is warranted. The proposed test, either by deeper drilling or by longer cross-cutting trenches, should expose the full potentially mineralized section in the area of the showings. In addition strike projections of the zone constitute important targets for further exploration.

ii) SUNSET Drilling

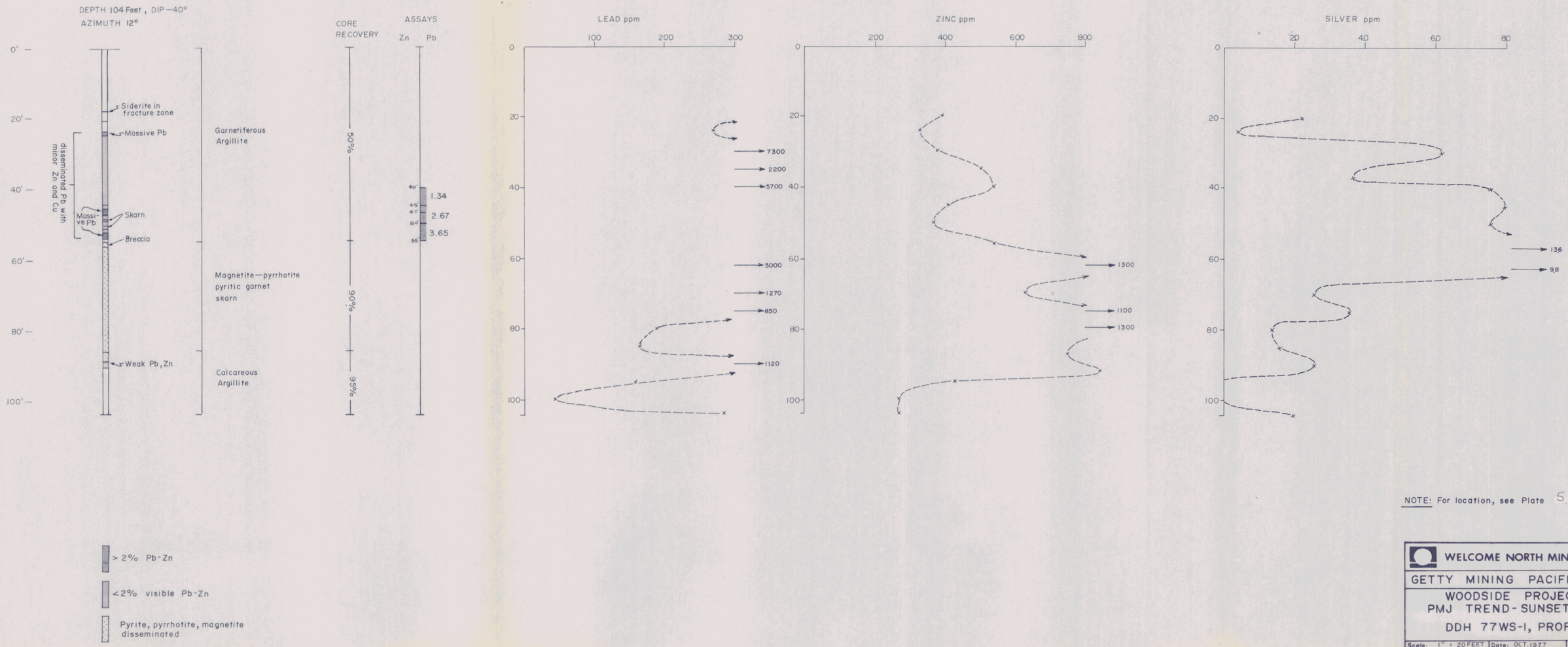
Eight bore holes were drilled on the Sunset grid, in the vicinity of Trenches 1, 2 and 3.

The locations of seven holes, drilled to test projections of surface mineralization in or near Sunset trenches 2 and 3, are illustrated on Plate 5, which map also contains pertinent drill core assays in table form. The location of the eighth hole, 77WS-7, drilled to the northeast of the main trench area is indicated on Plate 3.

Diamond drill holes 77WS-1 and 77WS-2 (Fig. 20 and 21) were drilled on section, under Sunset trench No. 2. They intersected an apparently conformable pyrite-pyrrhotite-magnetite, garnet-amphibole skarn horizon 75 feet in thickness near the contact between rocks of Sub-units 1a and 1c. The skarn contains pods and irregular bands of galena in discrete zones which probably correlate with surface showings.

Zone A which was intersected in DDH 77WS-1 averages 2.62% lead across 16 feet (true thickness (?) approximately 10 feet). It occurs 30 feet in the hanging wall of Zone B which was intersected in DDH 77WS-2 and averages 10.34% lead across 15 feet.

Diamond drill hole 77WS-8 (Fig. 27) intersected a projection of the skarn horizon 140 feet to the west of drill holes 77WS-1 and 77WS-2.



NOTE: For location, see Plate 5

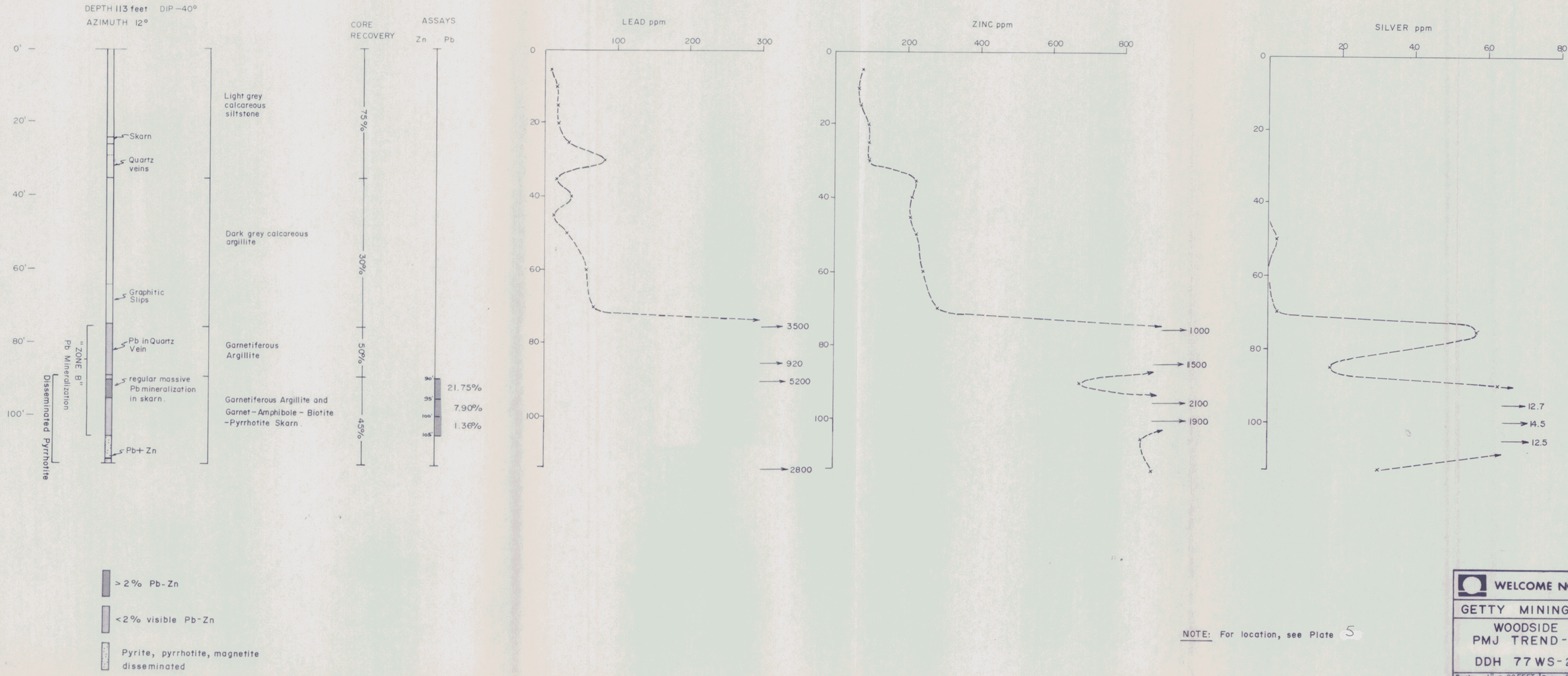
WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT
PMJ TREND - SUNSET Grid

DDH 77WS-1, PROFILE

Scale: 1" = 20 FEET	Date: OCT. 1977	N.T.S. 105 K/3
Revised:	By: F. FOSTER	Fig. 20



NOTE: For location, see Plate 5

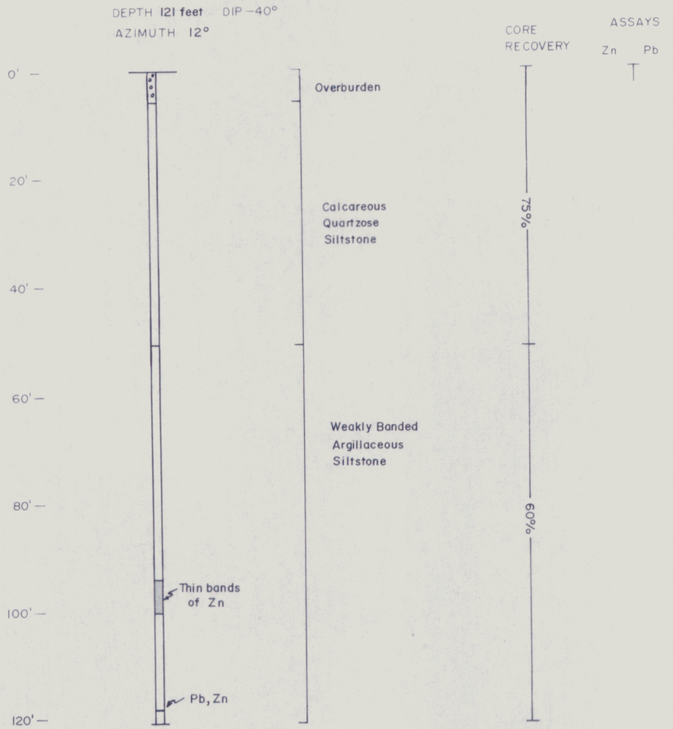
WELCOME NORTH MINES LTD.

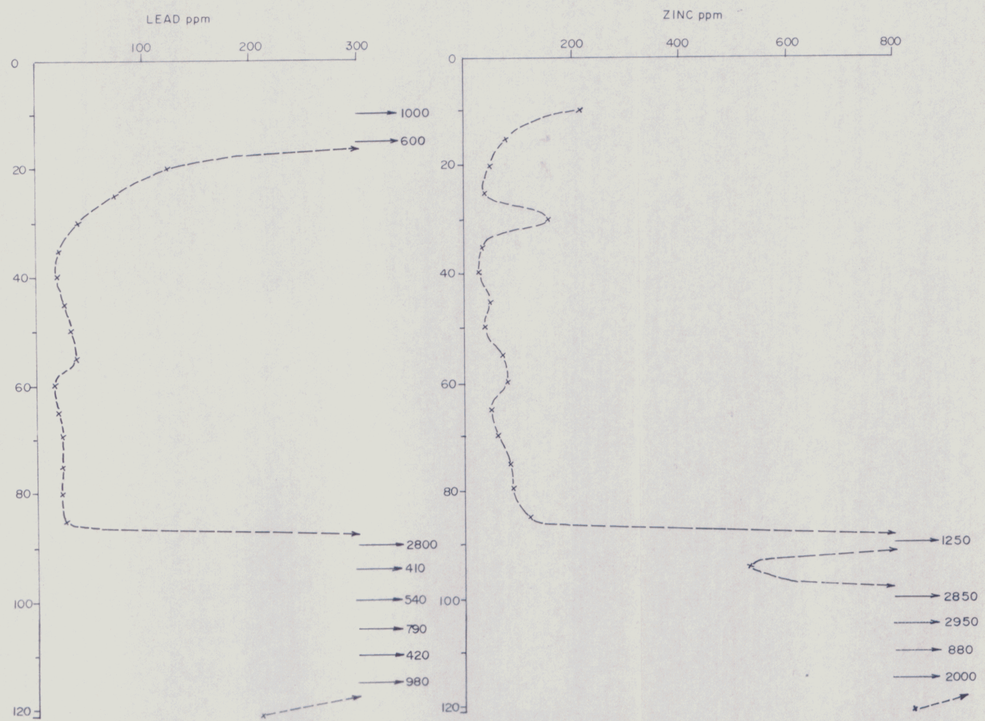
GETTY MINING PACIFIC LTD.

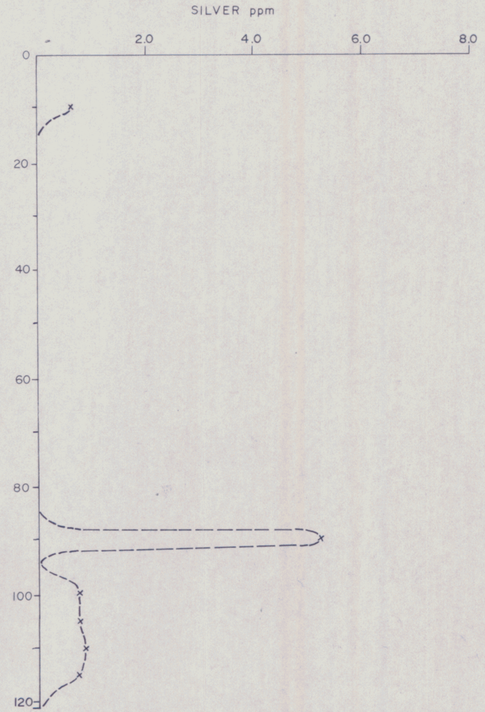
WOODSIDE PROJECT
PMJ TREND - SUNSET Grid

DDH 77 WS-2, PROFILE

Scale: 1" = 20 FEET	Date: OCT. 1977	N.T.S. 105 K/3
Revised:	By: F. FOSTER	Fig. 2L







NOTE: For location, see Plate 5

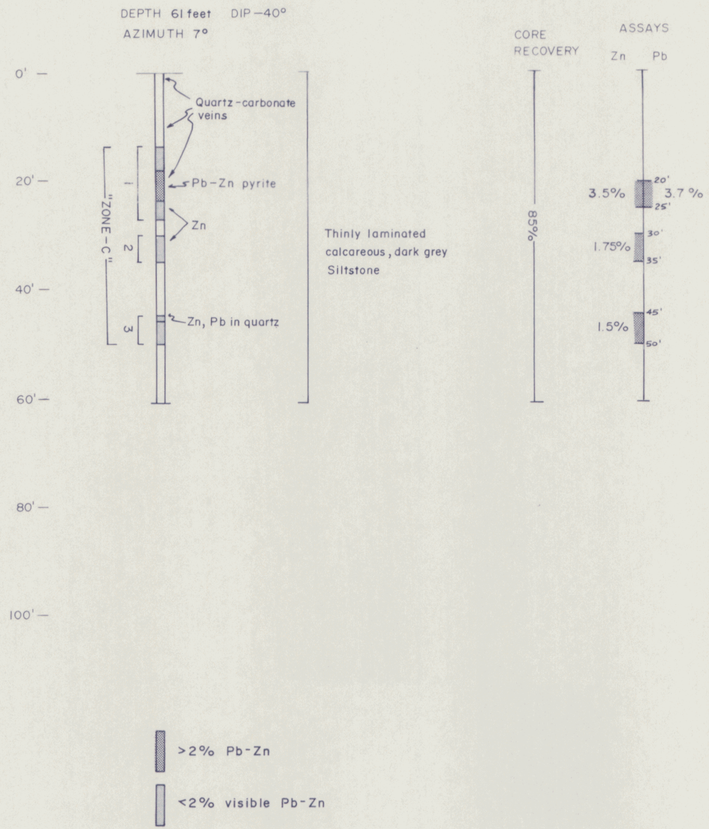
WELCOME NORTH MINES LTD.

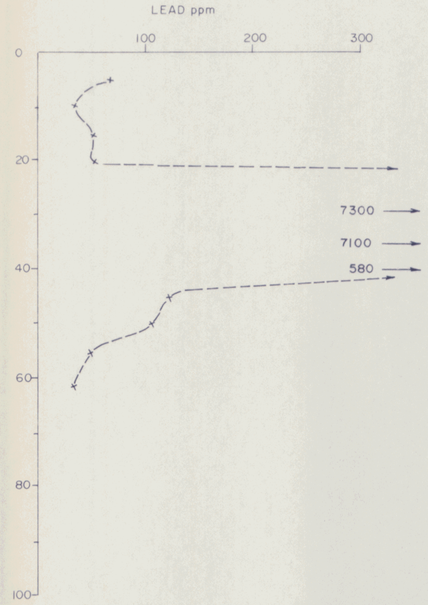
GETTY MINING PACIFIC LTD.

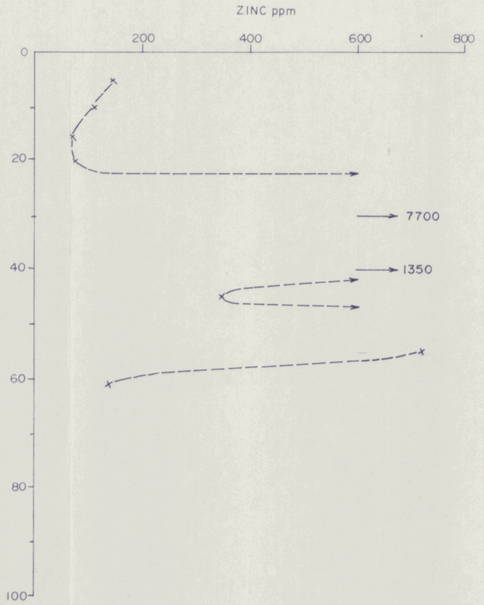
WOODSIDE PROJECT
PMJ TREND - SUNSET Grid

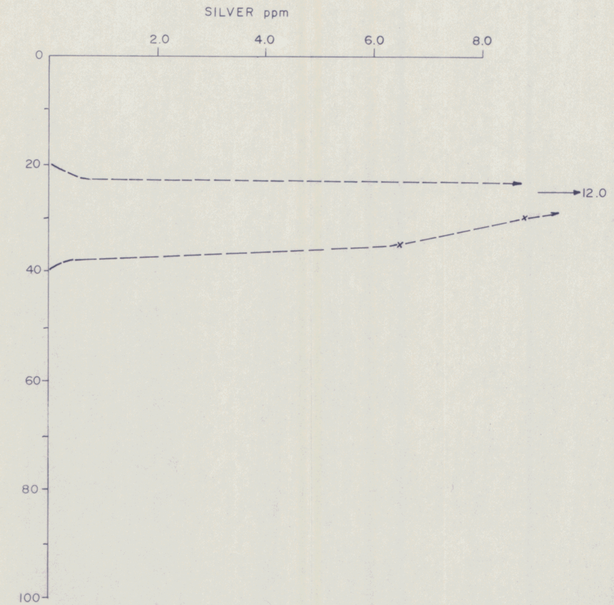
DDH 77WS-3, PROFILE

Scale: 1" = 20 FEET	Date: OCT. 1977	N.T.S. 105 K/3
Revised:	By: F. FOSTER	Fig. 22









>2% Pb-Zn

<2% visible Pb-Zn

NOTE: For location, see Plate 5

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT
PMJ TREND - SUNSET Grid

DDH 77 WS-4, PROFILE

Scale: 1" = 20 FEET	Date: OCT. 1977	NTS 105 K/3
Revised:	By: F. FOSTER	Fig. 23

The hole cut anomalous lead values from 113 to 133 feet with the best section assaying 10% lead and 2.15 oz./ton silver across a 5-foot core length.

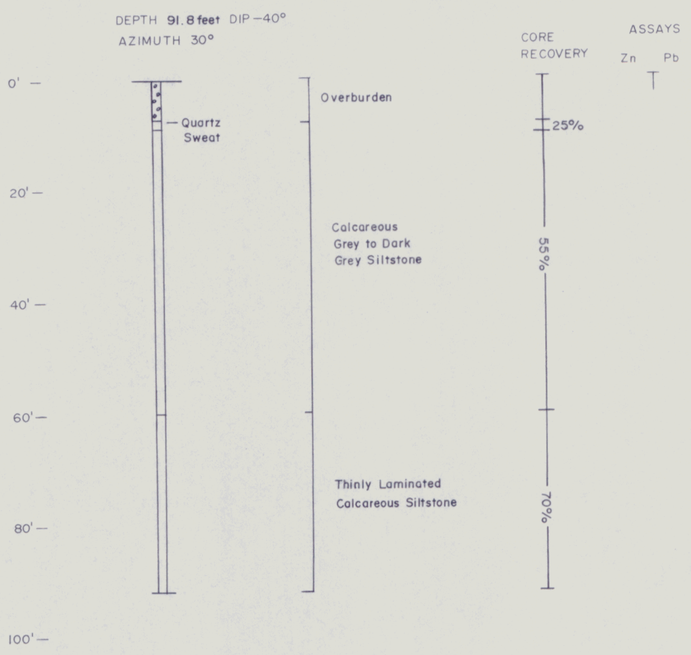
Diamond drill holes 77WS-3 and 77WS-4 (Fig. 22 and 23) intersected mineralization on dip projection from surface mineral zones within the limy siltstones of Sub-unit 1 (Plate 5). DDH 77WS-3 cut short sections of visible mineral which assayed less than 1% combined lead-zinc. DDH 77WS-4 intersected three sections as follows:

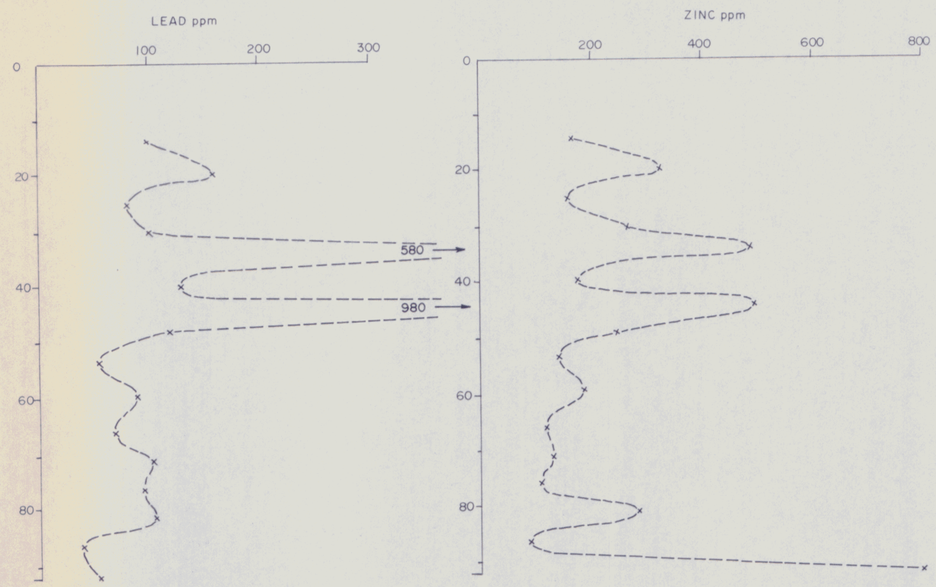
FOOTAGE From	To	Lead %	Zinc %	Silver Oz./ton
20'	25'	3.73	3.50	0.90
30'	35'	0.71	1.75	0.28
45'	50'	0.01	1.50	-

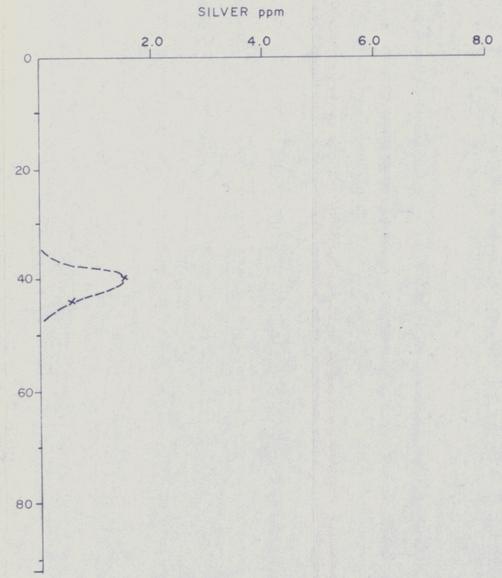
Diamond drill holes 77WS-5 and 77WS-6 (Fig. 24 and 25) did not intersect dip projections of surface mineral occurrences within Sub-unit 1a (Plate 5). Core recovery was low and as drilling was hampered by permafrost the holes were stopped short of their proposed depths.

Diamond drill hole 77WS-7 (Fig. 26, Plate 3) was a step-out hole northeast of the main Sunset trenches No. 2 and 3. Its purpose was to test an electromagnetic conductor indicated in the preliminary MaxMin II survey (Plate 1, Betz Report, Appendix I this report). The conductor is similar to that associated with mineralization in Sunset trench No. 2. Graphitic shale and argillite were intersected from 124 to 336 feet. These rocks are considered sufficiently conductive to cause the anomaly. A 30-foot pyritic, graphitic shale zone within this section assayed 0.78% combined lead-zinc from 260 to 290 feet.

Diamond drilling on the Sunset grid during 1977 clarified the geologic







NOTE: For location, see Plate 5

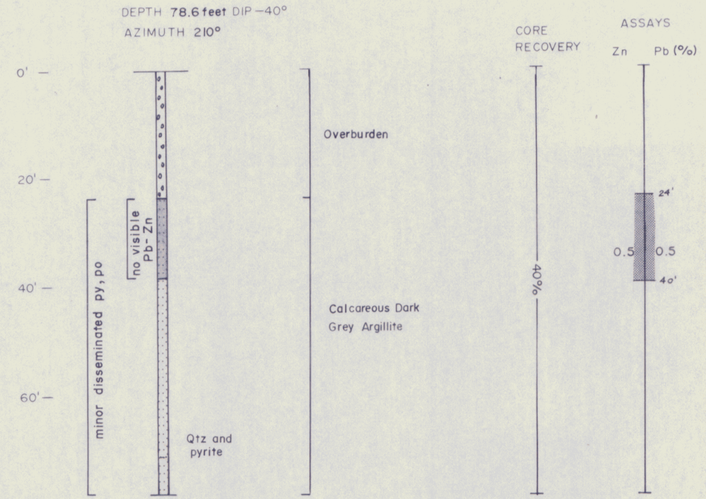
WELCOME NORTH MINES LTD.

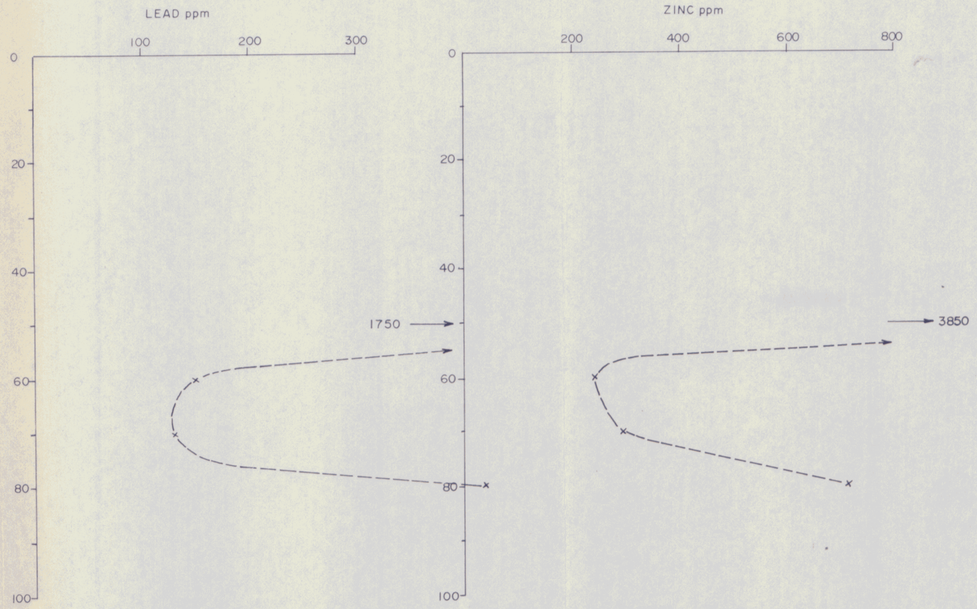
GETTY MINING PACIFIC LTD.

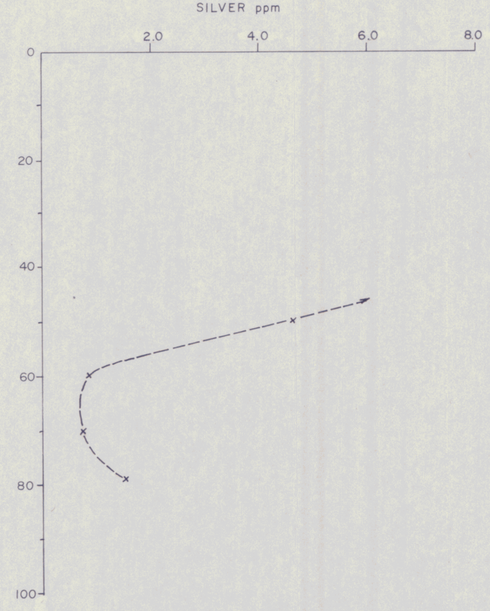
WOODSIDE PROJECT
PMJ TREND - SUNSET Grid

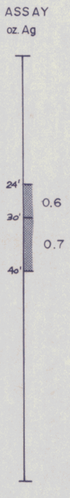
DDH 77 WS-5, PROFILE

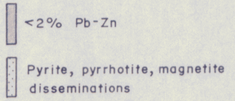
Scale: 1" = 20 FEET	Date: OCT. 1977	NTS 105 K/3
Revised:	By: F. FOSTER	Fig. 24











NOTE: For location, see Plate 5

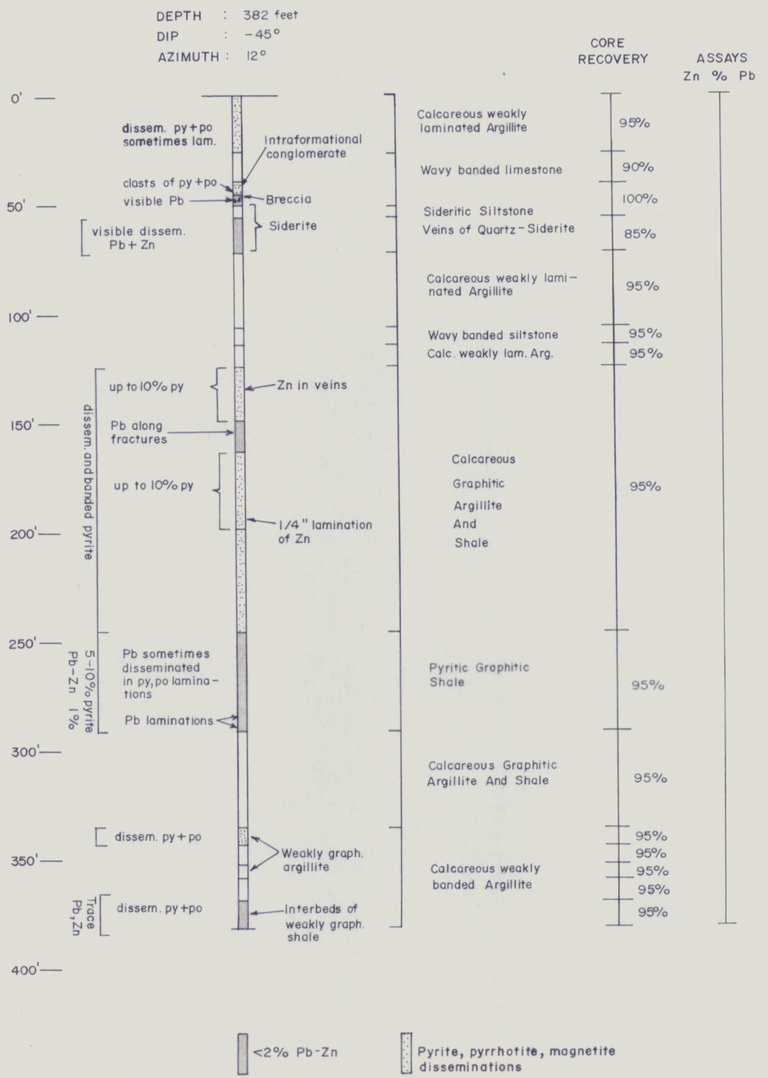
WELCOME NORTH MINES LTD.

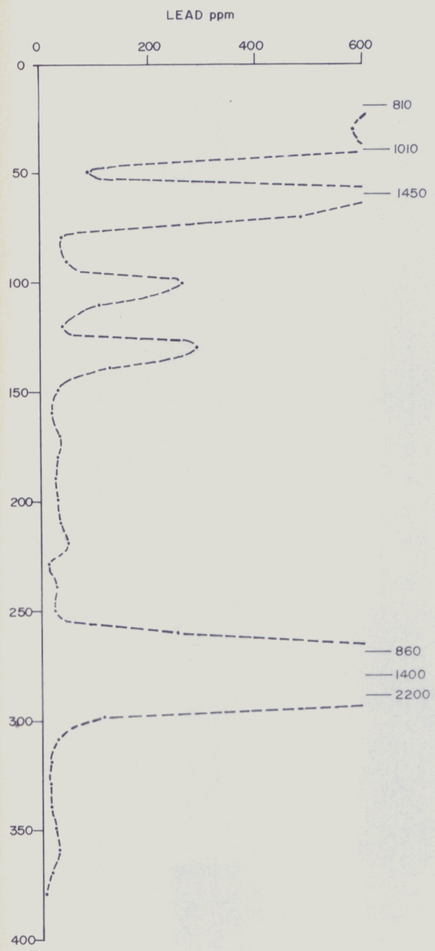
GETTY MINING PACIFIC LTD.

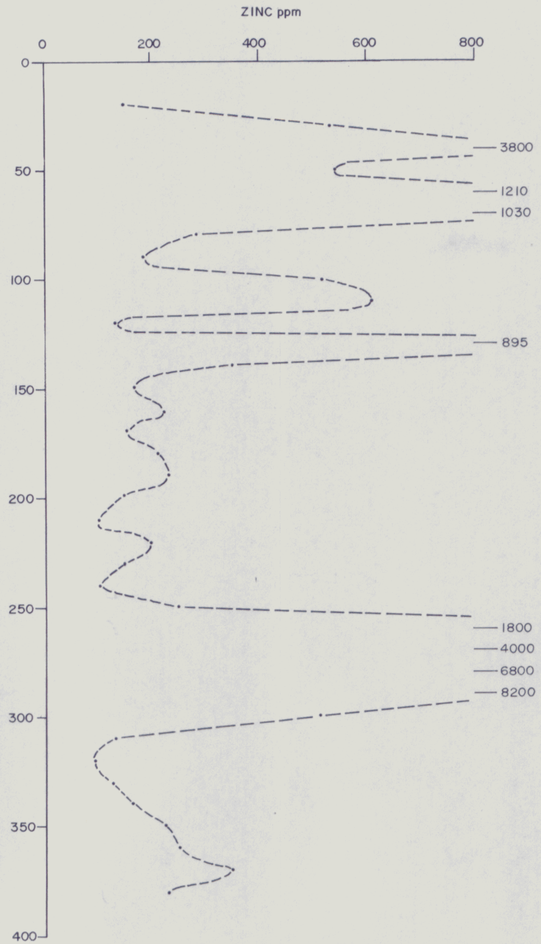
WOODSIDE PROJECT
PMJ TREND - SUNSET Grid

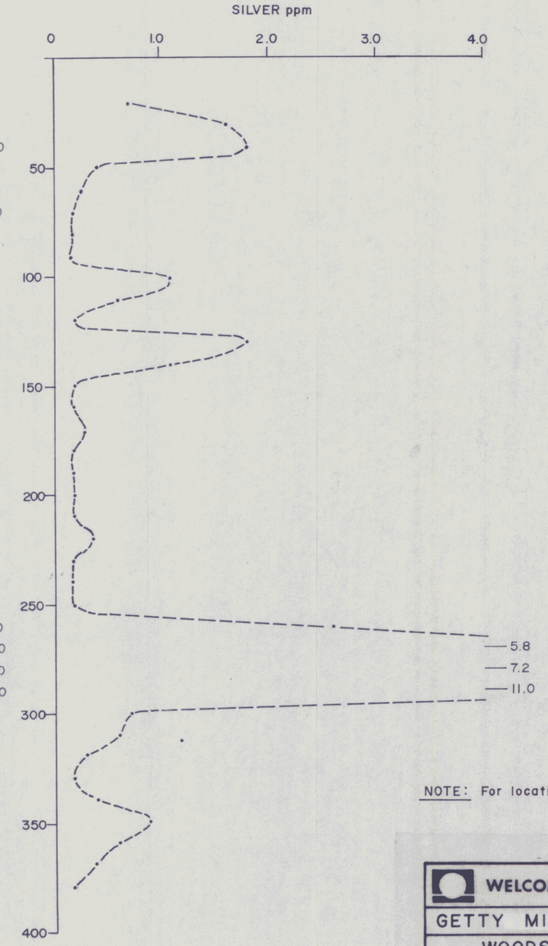
DDH 77 WS-6, PROFILE

Scale: 1" = 20 FEET	Date: OCT. 1977	N.T.S. 105 K/3
Revised:	By: F. FOSTER	Fig. 25





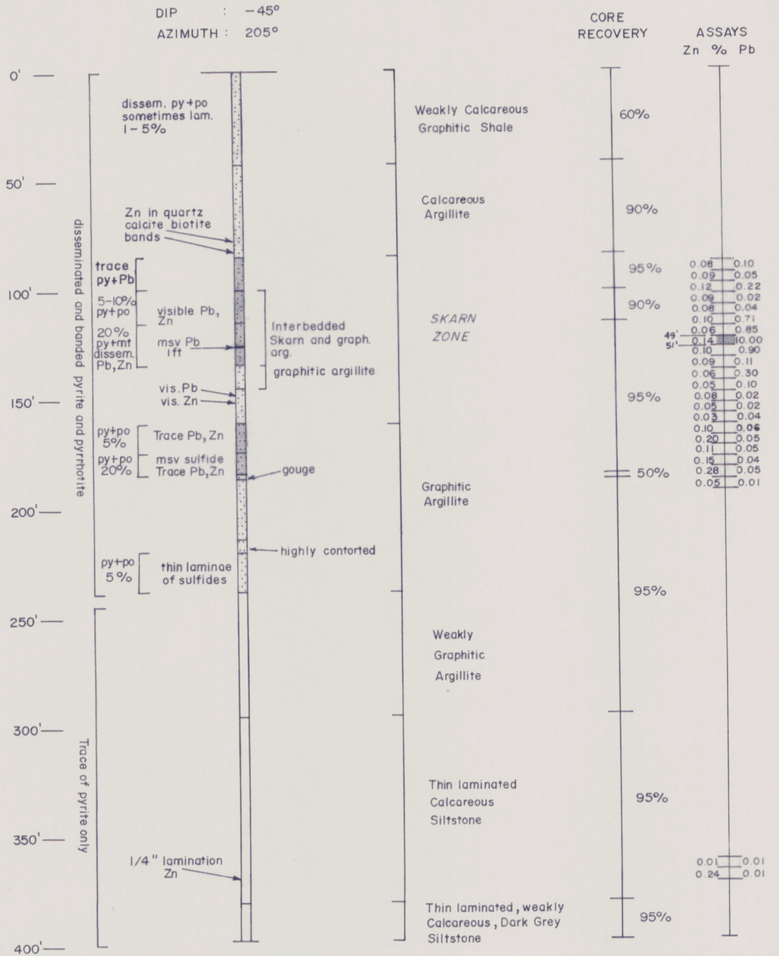




NOTE: For location, see Plate 5

WELCOME NORTH MINES LTD.
GETTY MINING PACIFIC LTD.
WOODSIDE PROJECT
PMJ TREND - SUNSET Grid
DDH 77WS-7, PROFILE
Scale: 1" : 50 FEET | Date: JAN. 1978 | NTS 105 K/3
Revised: | By: F. FOSTER | Fig. 26

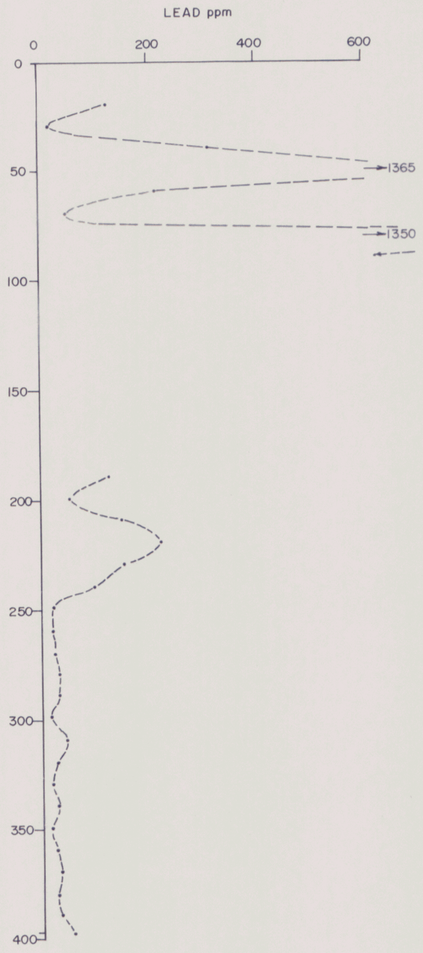
DEPTH : 397 feet
DIP : −45°
AZIMUTH : 205°

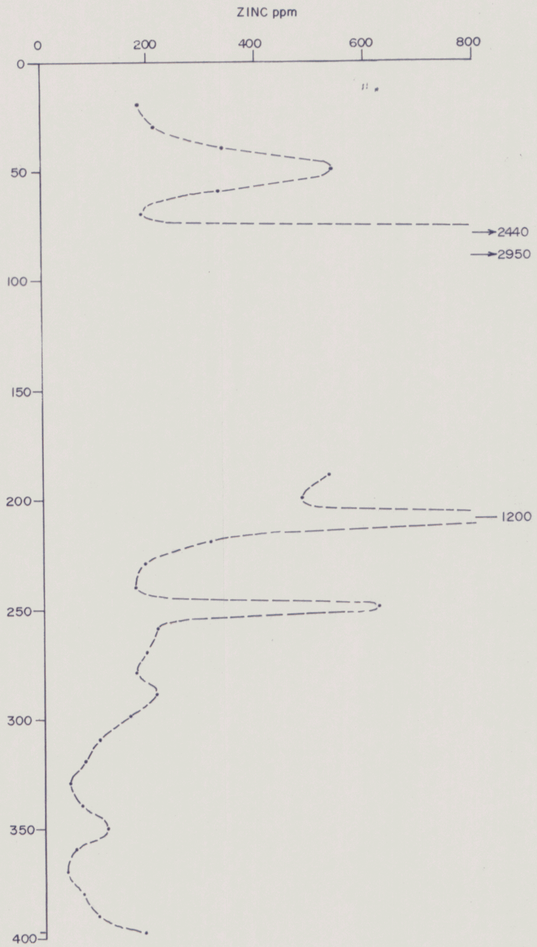


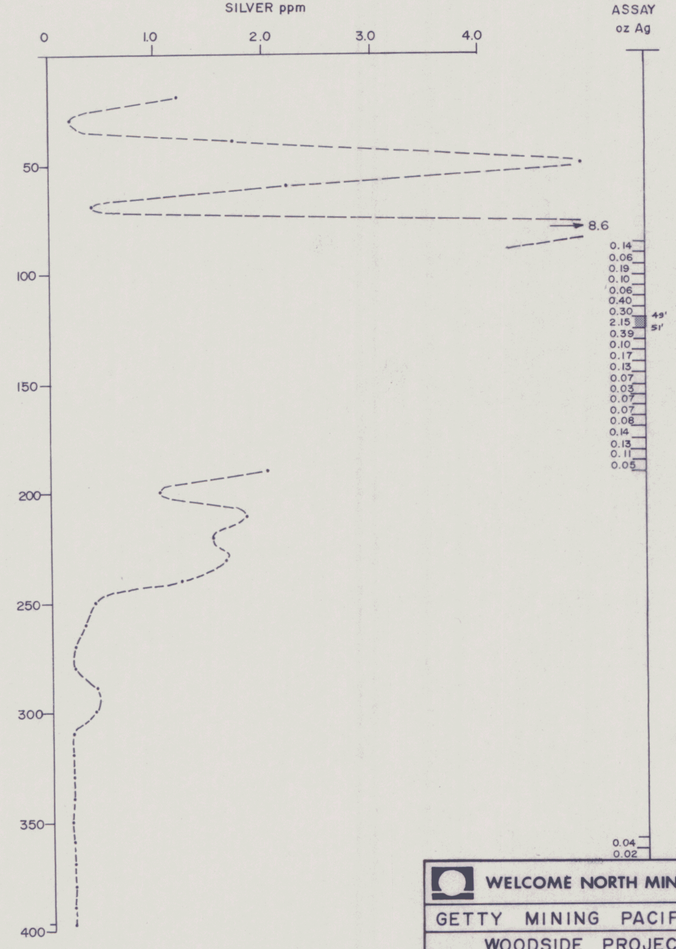
py = pyrite
po = pyrrhotite
mt = magnetite

<2% Pb-Zn

Pyrite, pyrrhotite, magnetite disseminations







NOTE: For location, see Plate 5

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT
PMJ TREND - SUNSET Grid

DDH 77 WS-8, PROFILE

Scale: 1" = 20 FEET	Date: JAN. 1978	NTS 105 K/3
Revised:	By: F. FOSTER	Fig. 32

understanding of the area and succeeded in intersecting narrow sections of significant mineralization. Future drilling should be directed towards tracing mineralized horizons both further down dip and along strike projections.

All remaining core from the diamond drill programme is stored in Welcome North's warehouse in Ross River, Yukon.

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APPENDIX I

BETZ GEOPHYSICAL REPORT

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CANADA, M9C 2W1

REPORT ON THE EM AND MAGNETIC SURVEYS
WELCOME NORTH MINES LTD
VANGORDA 1977 PROJECT
SUNSET GRID (PARTIAL)
WHITEHORSE MINING DISTRICT, YUKON TERR.
LAT 62 03'N LONG 133 03'N N.T.S. 105 K/3

Toronto, Ontario
November, 1977

John E. Betz
John Betz Limited

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INTERPRETATION OF RESULTS.	5
CONCLUDING REMARKS	8
WRITER'S DECLARATION	9

POCKET--Plan of Sunset Grid (partial) Showing Topo Contours and Interpreted Conductive Zones.

REPORT ON THE ELECTROMAGMETIC AND MAGNETIC SURVEYS,
WELCOME NORTH MINES LTD,
VANGORDA 1977 PROJECT,
SUNSET GRID,
WHITEHORSE MINING DISTRICT, YUKON TERRITORY.
LAT 62°03'N LONG 133°03'N N.T.S. 105 K/3

INTRODUCTION

The main objective of this survey was to detect conductive and/or magnetic zones on the property, which are due to massive sulphides or are indirectly related to massive sulphides. One area of known interest on the grid is in the trench near 2+00E on L-60NW, where massive sphalerite has been exposed.

The ground EM system used on this project was the MaxMin II made by Apex Parametrics Ltd of Markham, Ontario. The ground magnetic system was the MF-2 fluxgate magnetometer made by Scintrex Ltd of Concord, Ontario. The specifications for, and methods of operating, these systems are amply described in the operating manuals and other literature provided by these two companies. They will not be repeated here.

For the Sunset project, the MaxMin II system was used in a maximum-coupled coplanar mode with the turns of the transmitting and receiving coils held parallel to the mean slope of the terrain (along the traverse line) between the coils. The coils were kept at a constant straight-line separation. On flat ground, this mode of operation is the well-known horizontal loop mode.

Coil control is of paramount importance in getting "clean" in-phase data in rough terrain. By secant chaining* the lines and recording the contingent slope information in the process, it is possible to get very accurate coil control under all conditions of rough terrain. In the absence of secant chaining, it is possible to get reasonably good coil control under many conditions of rough terrain. But to achieve this, continual use of a hand-held inclinometer and continual use of graduation marks on the reference cable are required during the course of the MaxMin II work.

In extremely choppy tree-covered terrain, it could be more time-consuming to get reasonably "clean" in-phase data with the simultaneous inclinometer-graduation mark technique than to get very "clean" in-phase data with pre-secant chaining. However, in

*The method of secant chaining, and subsequent data reduction, is described in the MaxMin II operations manual. It will not be repeated here.

fairly open rolling terrain with long sustained slopes, some saving in field time can be obtained by the use of the simultaneous inclinometer-graduation mark technique during the course of the MaxMin II coverage. The most time-consuming part of the latter technique is the control of the coils when they straddle sharp crests and valleys. For a sharp crest, in-the-field calculations are required from the picket-to-picket inclinometer shots across the crest, in order to determine the mean slope between the coils. Generally for sharp valleys, there is a direct line of sight across the valley; so, the inclinometer can be used directly to determine the mean slope between the coils. But, for both sharp crests and sharp valleys, it is difficult to keep the coil spacing constant, because it is difficult to make an on-the-spot estimate of the amount of reference cable "consumed" by such topographic features. However, by taking picket-to-picket inclinometer shots across crests and valleys, it is possible to reconstruct a topographic section and to make a first order determination of the straight-line distance between the coils. This will permit a first order correction to the MaxMin II in-phase readings prior to plotting.

With a conscientious simultaneous inclinometer-graduation mark approach, the in-phase noise envelope can be kept to within 5 to 6 parts per hundred of the primary field strength, while it can be kept to within 2 parts per hundred with secant chaining.

The smaller in-phase noise envelope achieved through secant chaining is certainly advantageous in the search for deep "good" conductors, where the last anomalous "gasp" is always in the in-phase reading. Apart from the greater search-depth advantage for "good" conductors, secant chaining leads to accurately located stations in plan, and to directly calculated accurate topographic profiles. Secant chaining also leads to more accurate location and width determinations for conductive zones.

The greater search-depth capability, more accurate station and conductor locations, and more accurate topographic profiles afforded by secant chaining are to be weighed against the slower rate of coverage in the field. For example, of a full day in Sunset-type terrain, it would be possible to secant chain 3 miles of line per day (moving previously marked pickets), or to run 3 miles of MaxMin II per day on pre-secant chained lines, giving an average production of 1½ miles per day. On the other hand, it would be possible to run

2 miles of MaxMin II per day using the simultaneous inclinometer-graduated mark technique. So, the advantage in field production of the latter technique is about 33% over the former technique in Sunset-type terrain. However, some of this field-time advantage is lost in the office, when it is necessary to reconstruct ridge and valley pictures to correct for coil spacing errors. Still more of the field-time advantage is lost in the office, when it is necessary to consruct topographic profiles to help in the interpretation of the conductor picture, because the profiles must be first constructed from orthophoto countours then amended by the mean slope values determined by the inclinometer. Without orthophoto contours, it is even more difficult to construct topographic profiles from the mean slope inclinometer measurements, and the end product is much more approximate.

For the sake of reducing the time spent in the field, the simultaneous inclinometer-graduated-mark technique was used on the Sunset grid. The topographic profiles shown on the profile sheets were taken from the orthophoto contour plan and amended by the mean slope figures obtained during the MaxMin II survey.

Actually, the grid was quickly rechained by the line cutting contractor using the secant chaining method, between stages of the EM and magnetometer coverage. Unfortunately, the contractor neglected to record the slope values between stations; so, the secant-chained pickets could not be taken advantage of. This added a complication on the steep slopes, because with the inclinometer-graduation mark technique one coil would fall as much as 70 ft short of a secant-chained picket, when the other coil was held beside another secant-chained picket. In other words, it required about 470 ft of cable on the slope to cover a 400 ft horizontal distance. In using a fixed-length 400 ft cable, there was always a shortage on the slopes. This in turn complicated the plotting of the reading point (half-way between the coils), and the picking of the edges of the conductive zones which is based on knowing the coil location in the field.

Another complication was added to the interpretation of the results by rechaining the lines between stages of the EM and magnetometer coverage. Because some appreciable picket shifts were involved, there were problems making profiles mate on lines, which had not been completely covered before the change in chaining. Also, there

were problems in matching magnetic and electromagnetic anomalies, in the cases where one method was done on one system of chainig and the other method on the other system of chaining. Further to this, anomaly locations based on the earlier system of chaining do not necessarily fall where they are plotted on the present plan.

As far as the MaxMin II work is concerned, it is known that L's 60NW, 64NW, 68NW and 72NW were done from west of the base line to about 15+00E of the base line on the old system of chaining. These lines were completed to 40+00E on the new system of chaining. Lines 76NW and 80NW were done from about 15+00W to about 44+00E on the new system of chaining. The mating of "before" and "after" profiles on L's 60NW, 64NW, 68NW and 72NW indicated shifts of from 20 to 80 ft for station 15+00E. The discrepancy between the picket locations was not due simply to the difference between secant, and constant-slope-distance, chaining. But, it was also due to the fact that one of the Topofil machines used for the chaining was measuring 6 to 7 ft per 100 too long--a fact established by observing that a taut 400 ft cable (as measured by a steel chain) was 25 to 30 ft short of covering the distance between pickets four stations apart in fairly flat sections of the grid.

The only part of the grid, for which the magnetometer results are known to correspond exactly with the EM results is between 10+00W and 15+00E on L's 60NW and 64NW. Both systems were run on the same day on the old chaining system. However, the mag work was continued to the east end of these lines on the old chaining system, while the EM was done on the new. The status of the magnetometer work with respect to the chaining systems is not known for L's 68NW, 72NW, 76NW, and 80NW. In all, a shocking mess!

A reconnaissance coil spacing of 400 ft (122 meters) and frequencies of 222 and 3555 Hz were used throughout the survey. The reasons for this choice of coil spacing and frequency are:

a) A coil spacing of 400 ft is a compromise value to get moderately good resolution of near-surface conductors and moderately good search-depth for deep conductors. It is always possible to use another coil spacing for follow-up work.

b) Two widely-spaced frequencies lead to a fairly accurate conductivity-thickness estimate for conductive zones, as well as helping to interpret the shape and attitude of non-simplistic conductive zones. A very high frequency will detect very "poor"

conductors which are scarcely visible to a very low frequency. A very low frequency will detect deep "good" conductors in the presence of shallow "poor" conductors--something that a very high frequency cannot do.

c) The results at one frequency serve to monitor the inevitable reading and/or recording error at the other frequency.

The magnetometer was used in the frequent looping technique to monitor and correct for diurnal variations and instrument drift. In the absence of magnetic storms and micropulsations, the noise envelope of this model of magnetometer, used in this technique, is 50 to 60 gammas; so, anomalous readings would have to be above this value in order to be detectible with certainty.

The writer operated the MaxMin II receiver throughout the survey with one, and sometimes two, assistants provided by Welcome North Mines Ltd. The entire grid was not covered by the MaxMin II--only L's 60NW, 64NW, 68NW, 72NW, & 80NW from about 15+00W to about 40+00E.

The magnetometer work was done by Welcome North personnel, and it covered the entire grid.

Location and access maps and descriptions have been and will be given in other reports composed by Welcome North personnel. They will not be repeated here beyond the latitude, longitude, and N.T.S. number.

PRESENTATION OF RESULTS

The MaxMin II profiles, topographic profiles, magnetic profiles, and the interpreted conductor picture for each line were plotted on special profile sheets. Reduced-scale copies of these sheets are bound with an index and legend sheet toward the end of this report.

A plan--showing the grid lines, topographic contours, and interpreted conductive zones--is included in the pocket at the end of this report. A plan of the magnetic contours is not included in this report. It was prepared separately by Welcome North personnel.

INTERPRETATION OF RESULTS

The conductive zones are numbered from 1 to 8 on the plan, and they will be discussed in that order. However, it must be remembered in the following discussion that some of the magnetic results were obtained on a different chaining system than the EM results, which

can make a difference in interpretation between a coincident and a flanking magnetic zone. Also, the conductive zones interpreted from work on the old chaining system do not necessarily fall where shown on the plan. However, they are believed to fall within 50 ft of where shown, following the adjustment of the "old system" profiles to fit the "new" at their point of overlap.

Conductor #1 extends from 3+80W on L-60NW to 8+25W on L-80NW. It is quite poorly conductive and it may be nothing more than the southern edge of the large very poorly conductive unit shown on the plan. It is difficult to distinguish between the edge effect of a wide conductive unit, and a conductor on the edge of a wide conductive unit, when there is only a little conductivity contrast between the two. There is some erratic magnetic activity around conductor #1, but it appears to be as much immediately flanking as coincident.

Conductor #2 is one of the more prominent on this grid, insofar as it was surveyed at least. It extends from 2+00E on L-60NW (the trench area) to 2+70NW on L-80NW. It is coincident with a hillside valley, which fact no doubt has some structural or geomorphological significance. With the exception of parts of conductor #8, the σ.t (conductivity-thickness) of conductor #2 is the largest encountered to date on this grid. It ranges from about 15 mhos at the east end to about 40 mhos at the west end. The consequence of these mho values will be discussed at the end of this section. The magnetic activity is erratic around the conductor with the stronger magnetic features being more near-flanking than coincident.

Conductor #3 has generally a little smaller σ.t value than #2. It extends from 5+70N on L-60NW to 1+40N on L-80NW. The response of this conductor is quite clear-cut on L's 60NW through 72NW. But, it is less clear-cut on L's 76NW and 80NW due to an increase in the depth of the zone and to the interfering effect of the neighbouring conductors. Magnetically, it is in the same category as conductor#2.

The existence of conductor #4 is somewhat doubtful. It's weak response could be taken as the normal "rebound" between conductors #3 and #5, and it is seen on one line (L-60NW) only. However, it was picked by virtue of a prominent magnetic (negative remenantal) response.

It is a moot point whether or not conductors #5 and #6 are separate conductors or separate phases of the same conductor. A

prominent direct, or near-flanking, magnetic response from L-60NW to L-76NW suggests that they may be part of the same conductive horizon. However, an apparent offset between L's 68NW and 64NW, and a small increase in σ.t to the northeast of this offset, suggest that they are separate conductors, It would require detailing along a fill-in line (66NW) to resolve this issue.

Conductor #7 is only apparent on L-80NW. There is not enough information on it to determine its true attitude. There is no definitive magnetic anomaly associated with it.

Conductor #8 presents somewhat of an enigma. From the data on hand, it cannot be said for certain whether or not there are one or two conductive horizons involved. The interpretation shown on the plan favours an upward-folding of a single thick horizon between L's 60NW and 80NW. Alternative to the interpretation shown on the plan, it is possible that there is a short upper horizon from 34+50E on L-64NW to 36+25E on L-72NW, and a long lower horizon lying just past the northeast end of the grid lines. Traverses between L's 60NW and 64NW and L's 72NW and 76NW would be required to resolve this matter.

In any event, the dip of the conductive zone(s) at the northeast end of the grid appears to be quite flat, as evidenced by the very slow tail-off of the positive shoulder on the southwest side of the zone (s). The σ.t's are somewhat variable along the interpreted conductor. They reach one of the higher values encountered during the survey (circa 40 mhos) under L-80NW.

The dips of conductors #1 through #6 are not accurately determinate due to the mutual interference effects of their anomalous responses. However, the dips of these conductors appear to be fairly steep as indicated by the absence of an apparent bending as they traverse the steeply sloping ground between L's 64NW and 80NW. Any flat dipping conductor would have an apparent bend in strike in the same direction as its dip.

The interpreted flat southerly dip of conductor #8 and steep dip of conductors #5-6 would lead to a meeting of the two at depth, unless the dip of the latter conductors flattens abruptly toward the southwest. A likely possibility is that the flat and steeply dipping conductors meet to form a near-overturned syncline, the axis of which would run along the north-facing slope of the hill. Conductor #7 could merely reflect a sharp upward buckling in the bottom

of this syncline. The validity, or possible validity, of this interpretation may be apparent from the geological mapping.

The conductive picture between 19+00E and 29+00E on L-60NW is somewhat complex. It appears almost as if a conductive zone runs under the line, or almost under the line, in this area. It would be necessary to have data from L-56NW, and from a cross-line around 25+00E, as a bare minimum, in order to throw more light onto this picture.

Now a comment on the consequence of the σ.t values shown for the different conductive zones on this grid. The largest σ.t values of circa 40 mhos are not large in terms of some of the massive volcanogenic deposits of the Superior province of eastern Canada. Of the latter deposits, those with massive coarse-grained pyrite, and/or pyrrhotite, and/or chalcopyrite have σ.t's of >1000 mhos, e.g. New Insco 9000 mhos, Lemoine 2500 mhos, Iso (central part) 1000 mhos. However, when the massive sulphides are very fine-grained (as is oftimes the case for pyrite), and the guange material becomes somewhat siliceous, then the σ.t value can drop dramatically. This is the case for the west end of the Iso deposit, for which the σ.t value is only 50 mhos or less. The presence of a sphalerite-rich layer in the latter case does nothing to improve the σ.t value, because sphalerite is a non-conductor. The central part of the Iso deposit differs only from the west end by the presence of a "thin" chalcopyrite-rich layer, which hooks up the pyrite grains resulting in a sharp rise in the σ.t value. By way of interest, the three above-mentioned orebodies all have a distinctive magnetic response.

With sphalerite being non-conductive, it is obvious that a sphalerite-rich body is only as conductive as its associated metallic sulphides, the conductivity of which varies widely with their concentration and grain size. A pure sphalerite body would have zero σ.t, i.e. would not be detectable electrically or electromagnetically. However, it is in the nature of volcanogenic sulphide bodies that sphalerite occurs in the presence of other metallic sulphides, which make for some kind of electrical or electromagnetic response, albeit weak at times.

CONCLUDING REMARKS

The comparatively low σ.t values encountered on this grid to date, rule out the existence of volcanogenic deposits of the Lemoine, NewInsco, and Iso (central part) types. However with sphalerite

being a non-conductor, any amount of it could exist in the "poorly" conductive zones encountered on this property.

It would appear that the geological mapping of the abundant outcrops in the area should point toward the favourably located conductors, and the geochemical results should point toward the concentrations of sphalerite within these conductors.

Because the EM method has shown itself to be a positive tool to date on the Sunset grid, the entire grid should be covered by this method, including the extending of the lines to the east of 40+00E. The latter step is necessary to outline completely the conductive phenomenon in this area.

WRITER'S DECLARATION

Neither I, nor John Betz Limited, have any financial interest in any of the properties of the Welcome North Mines Ltd or its joint venture partners.

I hold BA (1952) and MA (1953) degrees in geophysics from the University of Toronto. I have worked full time in mining exploration geophysics since 1953, and two summer seasons prior to 1953.

All statements made in this report are correct to the best of my knowledge.

November, 1977
Toronto, Ontario

John E. Betz, M.A.,P.Eng.,Ont.
John Betz Limited

APPENDIX II

DIAMOND DRILL LOGS

WELCOME NORTH MINES LTD. — DIAMOND DRILL LOG

Collar:		Hole Survey		
		Footage	Azimuth	Dip
NORTH	25+60N	0	20°	80°
EAST	11+40E			
ELEVATION				
LOGGED BY	B. Holland	90.4	EOH	
DATE LOGGED	Sept. 22, 1977			
MAP REFERENCE	105K-3	Method:		

PROJECT WOODSIDE
PROPERTY NAME PMJ Claim Group - Sunset Showing
DRILLING CONTRACTOR MARTINSON BROS.
ASSAYER
PURPOSE OF HOLE BEDROCK TESTING

HOLE NO. 77WJ-1
CLAIM NAME MONI 18
COMMENCED
FINISHED

From	To	Rcvy %		Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
0	3'6"		QUARTZ MONZONITE DYKE - fine grained intrusive dyke - fresh, approximately 30% quartz, 45% feldspar, 25% biotite (partly altered to chlorite).							
3.6	90.4	75%	THIN LAMINATED LIMY SILTSTONE - grey to purplish grey, faintly to well laminated biotite-rich, strongly calcareous siltstone. Laminations, dipping 70° relative to core axis, consists of very thin alternating bands of biotite-rich and biotite-poor siltstone, on scale of 1-5 mm. White quartz sweats up to 10" thick are common and often contain minor disseminated pyrite and/or pyrrhotite. Minor pyrite and pyrrhotite also found disseminated within the siltstone (especially between 5.3 and 16.4, and 29.2 and 35.0)							
			Mineralization:							
			19.0 1-2 mm band of quartz and sphalerite.							
			20.0 2 mm rusty siliceous band with minor fine disseminated sphalerite							
			21.0 3-9 mm band of quartz and fine to coarse-grained sphalerite							
			22.5 5-8 mm band of quartz with some fine-grained sphalerite							
			22.9 minor sphalerite over 5 mm band							
			24.0 10 mm band of quartz, biotite, with some fine grained sphalerite							
			24.4 3-5 mm band of sphalerite with quartz							
			24.8 Minor sphalerite over 5 mm band							
			25.0 2 bands, 3-5 mm with some fine-grained sphalerite							
			36.9 2 bands, 2-4 mm and 1-2 mm - quartz and sphalerite							
90.4			END OF HOLE							

WELCOME NORTH MINES LTD. — DIAMOND DRILL LOG

Collar:
NORTH 23+60N
EAST 11+80 E
ELEVATION
LOGGED BY F. Foster
DATE LOGGED Sept. 24/77
MAP REFERENCE 105K-3

Hole Survey		
Footage	Azimuth	Dip
0	30°	-80°
82.6	EOH	

Method:

PROJECT WOODSIDE
PROPERTY NAME PMJ GROUP - SIR JOHN A. SHOWING
DRILLING CONTRACTOR MARTINSON BROS.
ASSAYER
PURPOSE OF HOLE BEDROCK TESTING

HOLE NO. 77WJ-2
CLAIM NAME MONI 18
COMMENCED
FINISHED

From	To	Rcvy %		Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log	Min.
0	5.1		OVERBURDEN								
5.1	82.6	66	THIN LAMINATED CALCAREOUS SILTSTONE								
			Thin laminated purple and grey limestone. Laminations range in thickness from 1/16" to 1/4". Laminations sometimes faintly developed or occasionally disrupted by zones of quartz remobilization. Purple laminations contain abundant biotite. Grey laminations composed of calcite and quartz. Locally at 37 feet and at 52 feet non-calcareous thinly bedded argillites occur as 1-foot thick bands. Minor limonite staining along fractures. Last 10 feet laminations show strong colour contrasts and thickness of 1/8" to 1/4".								
			END OF HOLE								
			MINERALIZATION (Visible)								
			17.4' Pyrrhotite disseminated in 1/8" quartz band								
			22.6' Pyrite disseminated in 1/8" quartz band as blebs								
			34.10' Pyrite disseminated in 1/8" quartz band.								
			44.2' Pyrite and minor sphalerite occur as thin laminations less than 1/16" thick spaced 1/2" to 1" apart. Sometimes quartz bands host pyrite. Occurs over 1 foot.								
			48.2' Pyrrhotite disseminated in 1" bands of thinly laminated siltstone over thickness of 6".								
			54.11' Pyrrhotite disseminated over 2". Concentrated in 1/16" l laminations.								
			58.6' Pyrrhotite in 1/16" laminations over 1"								

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

Collar:		Hole Survey		
		Footage	Azimuth	Dip
NORTH	20+45N	0	025°	-60°
EAST	12+50E			
ELEVATION				
LOGGED BY	F. Foster			
DATE LOGGED	Sept. 24/77	103.6	EOH	
MAP REFERENCE	105K-3	Method:		

PROJECT WOODSIDE
PROPERTY NAME PMJ GROUP - SIR JOHN A. SHOWING
DRILLING CONTRACTOR MARTINSON BROS.
ASSAYER
PURPOSE OF HOLE BEDROCK TESTING

HOLE NO. 77WJ-3
CLAIM NAME MONT 18
COMMENCED
FINISHED

From	To	Rcvy %		Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
0	2.5		OVERBURDEN							
2.5	45	66	CALCAREOUS LAMINATED SILTSTONE							
			Purple laminated limestone. Alternating well developed laminations of calcareous biotite-rich rock and grey siliceous rock. Laminations quite contrasting in colour. Vary in thickness from 1/16" to 1/2". Local rusty quartz sweats up to 4" thick. Laminations sometimes have irregular contacts. Marble developed occasionally on the scale of inches.							
			Mineralization:							
			2-15' - Zone of discontinuous sphalerite mineralization. Where visible, sphalerite occurs as disseminations and blebs which form discontinuous layers in the core. Concentrations are in layers up to 1/8" thick in zones up to 4" thick. Visible zinc - 3, 4.8, 6, 11-11.6'.							
			2-30' - Zone of pervasive pyrite and pyrrhotite development. Occasionally concentrations from 1/16" laminations of massive pyrite or pyrrhotite. Where not occurring in this manner, the sulphide is finely disseminated and visible only under magnification. Overall content 1-2%							
34	103.6	77	THIN LAMINATED CALCAREOUS ARGILLITE							
			Purple calcareous argillite with phyllitic partings and sometimes weakly developed thin planar laminations. Where well developed, laminations consist of biotite-rich laminations and light grey to white							

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

PMJ GROUP-
PROPERTY SIR JOHN A. SHOWING HOLE NO. 77WJ-3 LOGGED BY E. Foster DATE Sept. 24, 1977

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%						Visual Log	MIN
45	103.6	77	(cont.)													
			siliceous laminations. Of particular note is the consistent planar													
			character of the laminations.													
			Mineralization:													
			Accessory pyrrhotite and pyrite are almost continuously disseminated													
			throughout the interval 78' to 100' giving the core a weakly magnetic													
			character. Occasionally pyrite or pyrrhotite are concentrated in													
			1/16" laminations sometimes associated with quartz.													

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

Collar:		Hole Survey		
		Footage	Azimuth	Dip
NORTH	25+85N	0	355	-75°
EAST	11+70E			
ELEVATION				
LOGGED BY	F. Foster	21.11	EOH	
DATE LOGGED	Sept. 22/77			
MAP REFERENCE	105K-3	Method:		

PROJECT WOODSIDE
PROPERTY NAME PMJ GROUP - SIR JOHN A. SHOWING
DRILLING CONTRACTOR MARTINSON BROS.
ASSAYER
PURPOSE OF HOLE BEDROCK TESTING

HOLE NO. 77WJ-4
CLAIM NAME MONI 18
COMMENCED
FINISHED

From	To	Rcvy %		Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
0	4		OVERBURDEN							
4	6.11	90	CALCAREOUS SILTSTONE							
			Purple banded limestone with light grey siliceous bands and calcareous							
			purple biotite-rich bands all ranging in thickness from 1/8" to 1/2".							
			Some limonite staining along fracture surfaces.							
6.11	10.3	65	NON CALCAREOUS ARGILLITE							
			Dark purple fine-grained argillite with 1/16" shale partings. Six inch							
			rusty white quartz sweat.							
10.3	12.4	90	CALCAREOUS SILTSTONE							
			Purple-grey thinly laminated (1/16" to 1/8") limestone. Colour banding							
			not as contrasted as in 4-6.11' interval. Appears to be more biotite							
			in siliceous bands.							
12.4	21.11	60	CALCAREOUS SILTSTONE							
			Same as in 4-6.11' interval							
			END OF HOLE							
			No mineralization noted.							

WELCOME NORTH MINES LTD. — DIAMOND DRILL LOG

Collar:		Hole Survey		
		Footage	Azimuth	Dip
NORTH	23+65N	0	10°	-60°
EAST	12+10E			
ELEVATION				
LOGGED BY	F. Foster	49.4	EOH	
DATE LOGGED	Sept. 22, 1977			
MAP REFERENCE	105K-3	Method:		

PROJECT: WOODSIDE
PROPERTY NAME: PMJ GROUP - SIR JOHN A. SHOWING
DRILLING CONTRACTOR: MARTINSON BROS.
ASSAYER:
PURPOSE OF HOLE: BEDROCK TESTING

HOLE NO. 77WJ-5
CLAIM NAME MONI 18
COMMENCED
FINISHED

From	To	Rcvy %		Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
0	5.0		OVERBURDEN							
5.0	12.6	55	CALCAREOUS SILTSTONE							
			Poorly laminated, purple banded quartzitic marble. Laminations where							
			developed range from 1 mm to 5 mm in thickness. Sometimes boudins							
			developed. Quartz sweats up to 6 inches.							
12.6	49.4	70	THINLY LAMINATED CALCAREOUS SILTSTONE							
			Alternating laminae, up to 2 mm thick, of purple biotite-rich and white							
			quartz-rich limestone. Sometimes 6 inch sections show disrupted lamina-							
			tions. Minor quartz sweats vary from 1 inch to 3 inches. Rusty coatings							
			along fractures.							
49.4			END OF HOLE							
			Mineralization (Visible)							
			5.6' One inch of disseminated sphalerite in siltstone							
			10.5' Blebs of sphalerite in 1/4 inch quartz limestone							
			12.0' Lamination of red sphalerite in siltstone.							
			13.6' One-inch band of siliceous siltstone containing irregular							
			blebs of sphalerite.							
			17.5' Pyrite and pyrrhotite band 1/4 inch thick.							
			23.0' Band of quartz containing disseminated sphalerite 1/16" thick							
			26.0' Two bands over 4 inches. Each band 1" thick composed of							
			irregular coarse blebs of reddish metallic sphalerite in							
			siliceous bands.							
			35.6' Sphalerite and pyrrhotite occur as blebs and disseminations							

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

PROPERTY PMJ GROUP - SIR JOHN A. SHOWING HOLE NO. 77WJ-5 LOGGED BY F. Foster DATE Sept. 22, 1977

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
			35.6' (cont.)							
			over 1 inch in siliceous beds.							
			35.9' Same as above.							
			45.2' 1/16" siliceous bed with disseminated sphalerite							
			49.6' Minor pyrrhotite as stringers in 1/4" siliceous band.							

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

Collar:		Hole Survey		
NORTH	60+30N	Footage	Azimuth	Dip
EAST	1+55E	0	012°	-40°
ELEVATION				
LOGGED BY	J. Guild	104	EOH	
DATE LOGGED	Sept. 2/77			
MAP REFERENCE	105K-3	Method:		

PROJECT WOODSIDE
PROPERTY NAME PMJ Group - Sunset Showing
DRILLING CONTRACTOR Martinson Bros.
ASSAYER
PURPOSE OF HOLE BEDROCK TESTING

HOLE NO. 77WS-1
CLAIM NAME PMJ 12
COMMENCED
FINISHED

0	56	50	ARGILLITE GARNETIFEROUS
			Dense black fine-grained with poorly developed slatey cleavage at 60-75° to core axis; non-calcareous, sprinkled throughout with very fine white to pinkish garnet which makes up 10-15% of rock mass. Minor rusty slips and fractures.
			4-18': only 2-1/2' of rubble and buttons recovered, cased to 12'
			18-21': rusty fracture zone with associated quartz limonite and siderite, cuts core at 50°.
			48.5-49 and 50-51': skarn zones, (see below).
			Mineralization: scattered irregular blotchy segregations of fine-grained galena from 24 to 54'. Minor associated chalcopyrite and sphalerite. Galena variously occurs in association with quartz-rich layers parallel to banding, with irregular cross-cutting quartz veinlets and mainly as clean irregular quartz free masses. In general galena is sparse (1%?) but locally more concentrated i.e. 24-25', 46-47.5' and 52.5-54'. Some galena chips occur as rubble in areas of poor recovery
56	86	90	SKARN GARNET-BIOTITE-AMPHIBOLE PYRRHOTITE
			Variably developed in garnetiferous argillite. Rusty dirty brown garnets, mostly pink, much coarser than in previous section. Strongly magnetic locally possibly some fine-grained magnetite. Indistinct banding at 60° to core axis preserved only locally. Graphitic patches.

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

PROPERTY PMJ Group - Sunset Showing HOLE NO. 77WS-1 LOGGED BY J. Guild DATE Sept. 2/77

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
56	86	cont.	Mineralization: no Pb/Zn noted. Pyrrhotite with lesser pyrite makes up a part of skarn mass.							
86	104	95	ARGILLITE - LIMY dense black, poorly developed compositional banding @ 65°. Shot through with wispy white calcite laceworks, locally uniformly oriented at low angles to the core axis. Possible this represents a cleavage direction. Whole section appears to have been weakly shattered with calcite healing. Brecciated 55-56' at skarn contact. 56-58' contains dark black limy, angular fragments, possibly correlates with map unit "clastic limestone". Biotitic throughout. Traces of galena; fine reddish sphalerite 89-91' associated with quartz rich beds or bands							
	104		END OF HOLE							

WELCOME NORTH MINES LTD. — DIAMOND DRILL LOG

Collar:		Hole Survey		
		Footage	Azimuth	Dip
NORTH	60+10N	0	012°	-40°
EAST	0+90E			
ELEVATION				
LOGGED BY	J. Guild	113	EOH	
DATE LOGGED	Sept. 2/77			
MAP REFERENCE	105K-3	Method:		

PROJECT WOODSIDE
PROPERTY NAME PMJ Group - Sunset Showing
DRILLING CONTRACTOR Martinson Bros.
ASSAYER
PURPOSE OF HOLE BEDROCK TESTING

HOLE NO. 77SW-2
CLAIM NAME PMJ 12
COMMENCED
FINISHED

0	35	75	LIMY SILTSTONE
			Light grey coloured, finely laminated with biotite rich layers accentuating the banding which lies at 40° to core axis. Short localized sections contain coarse pink garnets.
			24-26': quartz rubble - 6" recovered white quartz with accessory pink garnet and biotite
			29-36': white quartz as above - very poor recover (1'). Much of the core is rubbley and broken up with sections of very low core recovery.
35	75	30	LIMY ARGILLITE
			Dark grey to black, limy, banding much less evident, biotite developed along banding. Very rubbley and broken core with poor recovery.
			Evidence of several graphitic slips cutting core at low angles 65-75'.
75	89	50	GARNETIFEROUS ARGILLITE
			Non limy, massive, black, fine-grained. Sprinkled throughout with clear to slightly pinkish garnet. Poor core recovery.
			Fine-grained galena associated with veining; 88' - 1.4" quartz - 1/8" galena.
			Some galena rich rubble in areas of poor core recovery.
89	113	45	SKARN ZONE WITH GARNETIFEROUS ARGILLITE
			Mixed zone 50% garnetiferous argillite - 50% garnet-amphibole-biotite-pyrrhotite skarn. Vague banding at 65° to core axis.
			* 90-95': Some massive very fine-grained galena irregularly intermixed with skarny assemblage, minor sphalerite (2-1/2' of core recovered)

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

PROPERTY PMJ Group - Sunset Showing HOLE NO. 77SW-2 LOGGED BY J. Guild DATE Sept. 2/77

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
			112': Galena and reddish sphalerite as an irregular							
			bleb or band (3/8") in slightly skarny argillite.							
	113		END OF HOLE							

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

Collar:		Hole Survey		
		Footage	Azimuth	Dip
NORTH	59+45N	0	012°	-40°
EAST	0+90W			
ELEVATION				
LOGGED BY	J. Guild	EOH 121		
DATE LOGGED	Sept. 2/77			
MAP REFERENCE	105K-3	Method:		

PROJECT WOODSIDE PROJECT
PROPERTY NAME PMJ Group - Sunset Showing
DRILLING CONTRACTOR Martinson Bros.
ASSAYER
PURPOSE OF HOLE Bedrock Testing

HOLE NO. 77WS-3
CLAIM NAME PMJ 9
COMMENCED
FINISHED

0	6		Casing
6	50	75	LIMY QUARTZITIC SILTSTONE
			Coloured in shades of grey from light to dark, thinly laminated at 60-75°. Alternating light grey silica rich with darker biotite rich bands. Some bands 1/8 - 3" thick are formed by quartz-carbonate.
50	121	60	SILTSTONE
			Arbitrary contact with the above. This is a darker coloured rock, less well banded, more argillaceous component predominates.
			Mineralization: 94-100' - fine bands of reddish sphalerite occurs parallel to laminations, commonly in association with quartz-calcite rich bands. Very minor associated galena. Zinc content estimated less than 1%.
			118' - galena-sphalerite rich band at 55°; associated with quartz.
	121		END OF HOLE

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

Collar:		Hole Survey		
		Footage	Azimuth	Dip
NORTH	58+60N	0	007°	40°
EAST	0+00E			
ELEVATION				
LOGGED BY	J. Guild	61	EOH	
DATE LOGGED	Sept. 3, 1977			
MAP REFERENCE	105K-3	Method:		

PROJECT WOODSIDE
PROPERTY NAME PMJ Group - Sunset Showing
DRILLING CONTRACTOR Martinson Bros.
ASSAYER
PURPOSE OF HOLE BEDROCK TESTING

HOLE NO. 77WS-4
CLAIM NAME PMJ 10
COMMENCED
FINISHED

0	61	85	THINLY LAMINATED SILTSTONE
			Limy, dark grey, fine-grained, hard, uniformly laminated @ 50-65° core axis. Biotite developed along laminations giving a flecked appearance, fine quartz-carbonate bands make up 10% of rock mass. Progressively lighter grey, more distinctly banded and harder towards end of hole. Quartz-carbonate veins, apparently parallel to laminations occur at 0-2', 11.5-12', 19-24' (zone of broken quartz bands and cross-cutting stringers.
			Mineralized Zone 15-27': Lead-zinc is sparsely scattered throughout zone, some aligned along banding and some associated with what appears to be later quartz. Approximately 50% core recovery in this zone.
			15': 1" massive fine-grained galena and sphalerite cementing sub-angular quartz fragments @ 65° to core
			18-24': coarser grained lead-zinc-pyrite in association with broken quartz-carbonate which is irregular and in part cross-cutting
			27': 1/4" clean chocolate brown sphalerite parallel laminations
			46.5': 2" dark reddish brown sphalerite with lesser galena, occurs as infilling in and around crackled white quartz.
	61		END OF HOLE

WELCOME NORTH MINES LTD. — DIAMOND DRILL LOG

Collar:		Hole Survey		
		Footage	Azimuth	Dip
NORTH	62+65N	0	030°	-40
EAST	1+10W			
ELEVATION				
LOGGED BY	B. Holland	92	EOH	
DATE LOGGED	Sept. 22, 1977			
MAP REFERENCE	105K-3	Method:		

PROJECT: WOODSIDE
PROPERTY NAME: PMJ Group - Sunset Showing
DRILLING CONTRACTOR: Martinson Bros.
ASSAYER:
PURPOSE OF HOLE: BEDROCK TESTING

HOLE NO. 77WS-5
CLAIM NAME: PMJ 11
COMMENCED:
FINISHED:

				SAMPLE FROM	TO	WTH	NO.	ASSAYS
0	7.4		Overburden	0	9	9ft.		
7.4	9.0	25	QUARTZ SWEAT	9	14.4	5.4		
9.0	59.5	55	LIMY SILTSTONE	14.4	19.4	5.0		
			Grey to dark grey massive to faintly laminated strongly calcareous	19.4	25.0	5.6		
			siltstone. Massive phase tends to be darker and contains abundant	25.0	30.3	5.3		
			disseminated biotite. Faintly laminated phases tend to be lighter	30.3	34.4	4.1		
			and to be biotite poor. May contain some more strongly laminated	34.4	39.4	5.0		
			siltstones distinguished by their thin light grey calcareous and	39.4	43.1	3.7		
			dark purplish biotite-rich laminations	43.1	49.4	6.3		
59.5	91.8	70	THIN LAMINATED LIMY SILTSTONE	49.4	53.6	4.2		
			Grey to purplish grey faint to well laminated strongly calcareous biotite	53.6	59.5	5.9		
			siltstone. Well laminated phase consists of grey calcareous siltstone	59.5	65.1	5.6		
			with abundant very thin purple biotite and thicker, less abundant light	65.1	71.0	5.9		
			grey quartz-carbonate laminations at 50-60° to core axis.	71.0	76.0	5.0		
			Thin quartz sweats are common, up to 4" thick, minor pyrite in quartz	76.0	81.3	5.3		
			sweats at 75.0 and 80.4	81.3	86.9	5.6		
				86.9	91.8	4.9		
			No mineralization observed in this hole.					
			END OF HOLE					

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

Collar:		Hole Survey		
NORTH	62+65N	Footage	Azimuth	Dip
EAST	1+20E	0		40°
ELEVATION			210°	
LOGGED BY	B. Holland	78.6	EOH	
DATE LOGGED	Sept. 24, 1977	---		
MAP REFERENCE	105K-3	Method:		

PROJECT WOODSIDE
PROPERTY NAME PMJ Claim Group - Sunset Showing
DRILLING CONTRACTOR MARTINSON BROS.
ASSAYER
PURPOSE OF HOLE BEDROCK TESTING

HOLE NO. 77WS-6
CLAIM NAME PMJ 12
COMMENCED
FINISHED

From	To	Rcvy %		Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
9	24.0		OVERBURDEN							
24	78.6	40	LIMY ARGILLITE - dark grey, calcareous, massive to faintly laminated	0	30	30				
			argillite - contains fine disseminated pyrite and occasional very thin	30	40.4	10.4				
			bands of fine-grained massive pyrite and quartz oriented parallel to	40.4	50.2	9.8				
			laminations at 40° to core axis - fine quartz-calcite stringers are	50.2	60.4	10.2				
			common in upper part of hole along with occasional thicker veinlets -	60.4	70.6	10.2				
			at 74.2' have quartz-pyrite band 1/2" thick - very poor recovery at	70.6	78.6	8.0				
			this point - no significant lead-zinc mineralization observed.							
78.6			END OF HOLE							

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

Collar:		Hole Survey		
		Footage	Azimuth	Dip
NORTH	62+00			
EAST	6+25	0	12°	-45
ELEVATION	5600'			
LOGGED BY	F. Foster			
DATE LOGGED	Nov. 27/77	382	EOH	
MAP REFERENCE	105K-2	Method:		

PROJECT WOODSIDE
PROPERTY NAME SUNSET
DRILLING CONTRACTOR CANADIAN LONGYEAR
ASSAYER
PURPOSE OF HOLE

HOLE NO. 77WS-7
CLAIM NAME PMJ-12
COMMENCED Nov. 24, 1977
FINISHED Nov. 27, 1977

From	To	Rcvy %		Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log	Min.
0	10		Casing and triconing - no overburden								
10	27	95	CALCAREOUS WEAKLY LAMINATED ARGILLITE (Unit 1c)								
			Thin, weak laminations 1/8 inch to 1/16 inches.								
			Spotted with fine-grained tabular black mineral (actinolite?). Whitish								
			laminations are more calcaeous. Slightly graphitic in some places.								
			Limonite staining along fractures.								
			Mineralization:								
			Fine-grained smears of pyrite parallel to the foliation (?) as well a								
			thin (1 mm) bands of pyrite and calcite. Content 1-2%.								
27	41	90	WAVY BANDED LIMESTONE (Buff laminated? Unit 1a)								
			Badly broken core. 1/4 inch to 1/2 inch laminations of white lime-								
			stone interbedded with dark grey graphitic partings 1/16 inch thick.								
			Some places banding disrupted and veined with quartz-calcite. Some								
			brecciated quartz-limonite-manganite (?) veins up to 8 inches thick.								
			Mineralization:								
			Traces of pyrite.								
41	46	100	INTRAFORMATIONAL CONGLOMERATE								
			Poorly sorted, non-bedded conglomerate. Clasts of dark grey argillite								
			ranges in size from .8 inches to .1 inches and vary from subrounded to								
			subangular. Clast of white limestone as well but size ranges from								
			<.1 inches to .3 inches and are much more angular.								
			Argillite clasts are sometimes thinly laminated with calcite.								
			(cont. on p. 2)								

PROPERTY SUNSET HOLE NO. 77WS- 7 LOGGED BY F. Foster DATE November 27, 1977

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log	Min.
41	46		(cont.)								
			Argillite clasts decrease in size and number and siderite occurs as								
			interstitial cement deeper in this interval.								
			Mineralization:								
			Some clasts of pyrite. Content less than 1%.								
46	51	100	BRECCIA ZONE								
			Hydrothermal quartz and siderite hosting angular fragments of grey								
			argillite; argillite veined and floating in quartz-carbonate-hydrotherm.l								
			replacement?								
			Mineralization:								
			Non noted except for a few blebs of galena (less than 1%)								
51	57	100	THIN LAMINATED SIDERITIC SILTSTONE								
			Interbedded pale brown siderite and light grey non-calcareous siltstone								
			Beds range from less than .1 inches to .2 inches in thickness.								
			Siderite also appears as veins cross cutting laminations in an ir-								
			regular pattern. Sometimes fragments of siltstone floating in these								
			veins. Veins may be tension gashes.								
57	73	85	VEINS OF QUARTZ-SIDERITE								
			57-60 Milky quartz with irregular intergrowths of pale brown siderit.								
			60-65 Silicified thick laminated siltstone (1/4 inch) of white and								
			light grey colour. Laminations of milky quartz grade to grey								
			siliceous siltstone (?) laminations.								
			65-73 Badly broken core. Milky quartz with vugs of darker brown								
			siderite, sometimes drusy. Yellow ankerite also present.								
			Mineralization:								
			57-60 Crystals of galena embedded in siderite. Content 1%?								
			65-73 Sphalerite in with siderite ??								

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

PROPERTY WUNSET HOLE NO. 77WS-7 LOGGED BY F. Foster DATE November 27, 1977

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
73	107	95	CALCAREOUS WEAKLY LAMINATED ARGILLITE (Unit 1c)							
			Same as 10-27 feet. Sometimes laminations not developed at all.							
			Laminations where well developed alternate biotite-rich and biotite-poor. No mineralization present. Some fractures filled with ankerite.							
107	115	95	SLIGHTLY CALCAREOUS WAVY BANDED (Buff laminated) SILTSTONE							
			Well developed dark grey and white .1-.2 inch laminations with distinct contacts. Limonite stains along fractures and some ankerite veins at 110 feet. White laminations calcareous.							
			Mineralization:							
			Occasional bleb of very fine grained sphalerite (?) along ankerite-filled fractures.							
115	124	95	CALCAREOUS WEAKLY LAMINATED ARGILLITE (Unit 1c)							
			Same as above.							
124	246	95	CALCAREOUS GRAPHITIC ARGILLITE AND SHALE							
			Dark grey weakly laminated to non-laminated beds. Carbonate content and graphite content vary inversely with each other. Where not laminated, bands of light grey and darker to medium grey beds vary in thickness from 1 inch to 3 inches.							
			Quartz sweats vary from 2 inches to 8 inches in thickness. Occur at 135', 150', 198', 200', 208', 230'.							
			124-151 Pyritiferous graphitic shale (only weakly calcareous).							
			151-166 Thin laminated calcareous argillite							
			174-180 Badly broken core - 20% recovery.							
			180-189 Dendritic quartz-CO_3 veinlets abundant.							
			Mineralization:							
			Pyrite occurs as fine-grained disseminations and occasionally as blebs. Where more highly concentrated pyrite occurs as thin							

PROPERTY SUNSET HOLE NO. 77WS-7 LOGGED BY F. Foster DATE November 27, 1977

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log	Min.
124	246	con	.)								
			laminations (1/8-1/4") and in quartz laminations as coarse blebs.								
			Laminations sometimes concentrated enough to get 10% pyrite over								
			5-foot sections.								
			Main concentrations occur:								
			125-150 feet								
			167-201 feet								
			Visible galena: 156 feet (along fractures)								
			Visible sphalerite: 136 feet (in veins)								
			196 feet (as 1/4" laminations)								
246	292	95	PYRITIC GRAPHITIC SHALE								
			Dark grey highly graphitic poorly laminated non-calcareous shale with								
			1/8" to 1/16" quartz laminations and siderite (?) laminations (may be								
			zinc). Occasional veining by siderite and quartz. Very high graphite								
			content.								
			Mineralization:								
			Pyrite occurs as disseminations and laminations in the graphitic								
			groundmass in the thin quartz laminations. Sphalerite sometimes								
			occurs as fine disseminations in the vicinity of, or in contact with, the								
			pyrite hosted in the quartz laminations. Galena also occurs in this								
			manner but is noted in several places (285', 291') to form lamina-								
			tions in the quartz laminations. Galena and sphalerite both occur								
			as disseminations in hairline fractures filled with limonite (?) and								
			cerrusite (?)								
			Pyrite content: 5-10%								
			Galena and Sphalerite Content: 1% or less								

PROPERTY SUNSET HOLE NO. 77WS-7 LOGGED BY F. Foster DATE November 27, 1977

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
292	336	95	CALCAREOUS GRAPHITIC ARGILLITE AND SHALE							
			Same as 124-246							
			Pyrite content similar or less.							
336	344	95	NON-CALCAREOUS WEAKLY GRAPHITIC ARGILLITE							
			No laminations present except for discontinuous laminations of							
			graphite which occur every few inches . Colored dark grey with							
			graphitic slips being darker.							
			Mineralization:							
			Disseminated and laminated pyrite.							
			Content 1-3%							
344	353	95	CALCAREOUS WEAKLY BANDED ARGILLTE							
			Laminations of dark grey and medium grey argillite. Lighter colored							
			laminations very calcareous. Laminations range from .1 inches to							
			.3 inches in thickness. Trace of pyrite.							
353	360	95	NON-CALCAREOUS WEAKLY GRAPHITIC ARGILLITE							
			Same as 336-344							
360	370	95	CALCAREOUS WEAKLY BANDED ARGILLITE							
			Same as 344-353							
			Some pyrite laminations up to 1/4 inch thick at 368 feet.							
370	382	95	INTERBEDDED CALCAREOUS WEAKLY BANDED ARGILLITE AND BLACK WEAKLY							
			GRAPHITIC SHALE							
			Beds up to 5 feet thick.							
			Shale sometimes has quartz-talc? laminations which contain pyrite and							
			sphalerite.							
			Mineralization:							
			Disseminated pyrite							
			Pyrite and sphalerite occur together in quartz-talc? laminations							

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

PROPERTY SUNSET HOLE NO. 77WS-7 LOGGED BY F. Foster DATE November 27, 1977

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
370	382		(cont.)							
			as very fine-grained disseminations.							
			Sphalerite content 1%?							
			Pyrite content 1-2%							
			END OF HOLE							

WELCOME NORTH MINES LTD. DIAMOND DRILL LOG

Collar:		Hole Survey		
		Footage	Azimuth	Dip
NORTH	62+00	0	205°	-45
EAST	2+25			
ELEVATION	5550 feet			
LOGGED BY	F. Foster			
DATE LOGGED	Dec. 1, 1977	397	EOH	
MAP REFERENCE	105K-3	Method:		

PROJECT WOODSIDE
PROPERTY NAME SUNSET
DRILLING CONTRACTOR CANADIAN LONGYEAR
ASSAYER
PURPOSE OF HOLE

HOLE NO. 77WS-8
CLAIM NAME PMJ 12
COMMENCED November 30, 1977
FINISHED December 4, 1977

From	To	Rcvy %		Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Visual Log
0	32	60	WEAKLY CALCAREOUS GRAPHITIC SHALE							
			Badly broken core. Dark grey very poorly laminated rock with occasional sharp lamination of pyrite and quartz. "Mirmekitic" bands bands of calcite, micaceous minerals (biotite, chlorite, talc?) and minor pyrite occur at 23 ft.							
			Mineralization:							
			Pyrite is disseminated in groundmass but also concentrates in thin (.1 inches or less) laminations, sometimes associated with quartz. Content varies from 1-5%.							
43	85	90	CALCAREOUS ARGILLITE							
			Dark grey, massive, poorly laminated argillite. Graphitic partings are common. Irregular quartz laminations vary from .1 inches to .3 inches. Quartz sweats occur at 73 feet. Calcite, quartz, biotite pyrite and lead-zinc(?) form intergrowths as bands up to 2 inches thick. Quartz veinlets appear as tension gashes. Limonite staining on fracture surfaces.							
			Mineralization:							
			Pyrite occurs as disseminations as well as concentrating in thin laminations occasionally. Often see in association with quartz-calcite-biotite bands. Sphalerite is visible in these same quartz-calcite-biotite bands as very fine blebs and disseminations.							
			Pyrite content 1%.							
			Sphalerite content < 1% visible at 77 feet and 83 feet.							

PROPERTY SUNSET HOLE NO. 77WS-8 LOGGED BY F. Foster DATE December 1, 1977

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Assays Oz./Ag	Visual Log
85	102	95	SKARN AND CALC SILICATE								
			Greenish-grey, irregularly banded, massive skarn. White irregular bands and laminations of quartz-carbonate vary from .2 inches to 4 inches in thickness.								
			90-92'-Light grey and dark grey interbanded argillite with rusty coatings on fractures and rusty spots suspected as lead disseminated through the groundmass. Some bands up to 6 inches thick composed of biotite (fine grained) and garnet (pink) and well developed porphyroblasts of vitreous silvery grey mineral. These bands have high specific gravity. Porphyroblasts appear hexagonal, square and sometimes tabular.								
			Larger 2 foot interbeds of hornfelsed argillite, strongly calcareous								
			White bed rich in calcite at 101 feet contains visible lead.	88	93		626	0.08	0.10	0.14	
				93	98		627	0.09	0.05	0.06	
				98	103		628	0.12	0.22	0.19	
			Mineralization:								
			Pyrite less than 1%.								
			Lead visible in calcite-rich laminations with pyrite at 96', 99', 100', 101'.								
			Content over 1" and 2" sections is 5%								
			Overall content less than 1%.								
102	111	90	GRAPHITIC ARGILLITE AND MINOR INTERBEDDED SKARN								
			Dark blue-grey weakly laminated calcareous argillite with minor skarn interbeds. Argillite is weakly laminated with .1 inch laminations of whitish quartz-rich rock. These laminations are sometimes irregular and discontinuous. Laminations become much weaker after 112 feet.								

PROPERTY SUNSET HOLE NO. 77WS-8 LOGGED BY F. Foster DATE December 2, 1977.

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Assays Oz./Ag	Visual Log
102	111		(cont.)								
			Skarn bands occur up to 6 inches thick but are not abundant. These								
			are composed of pink garnet, diopside (?) and wollastonite (?)								
			Tension gashes of quartz crosscut the laminations and banding.								
			Argillite contains finely disseminated vitreous silver-grey mineral as								
			porphyroblasts.								
			Mineralization:								
			Pyrite occurs as disseminations, tending to concentrate more in								
			thicker laminations of quartz. Pyrite with lead and zinc occur as								
			abundant disseminations of fine-grained nature at 113-115'.								
			Skarn band at 105' contains massive pyrite and minor sphalerite.	103	108		629	0.09	0.02	0.10	
			Pyrite content: Local - up to 20% over 1 inch	108	113		630	0.08	0.04	0.06	
			Overall - 5-10%								
			Lead-zinc - where visible - concentrates up to 1 or 2%								
111	136	90	INTERBEDDED GRAPHITIC ARGILLITE AND SKARN								
			Skarn beds much more abundant than in previous interval. Argillite								
			as previously described but contains abundant lead mineralization.								
			Argillite very poorly laminated. Skarn bands up to 2 feet thick.								
			These contain pink garnet, abundant biotite, magnetite, wollastonite,								
			and sulphides. Argillite hosts abundant porphyroblasts of silver-								
			grey mineral as previously described.								
			Mineralization:								
			Pyrite and magnetite occur in great abundance in skarn bands.								
			Concentrates up to 20%.								
			Galena also present in these bands.								
			Galena is disseminated and concentrated in thin laminations in the								
			argillite. Suspect much lead is disseminated and hidden with								

PROPERTY SUNSET HOLE NO. 77WS-8 LOGGED BY F. Foster DATE December 2, 1977.

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Assays Oz/Ag	Visual Log	Mag
111	136	(cont.)										
			graphite in the argillite groundmass.	113	118		631	0.10	0.71	0.41		
			Visible galena: 116-120'	118	123		632	0.06	0.85	0.30		
			124-128' (1 ft. of massive galena)	123	128		633	0.14	10.00	2.15		
			132'	128	133		634	0.10	0.90	0.39		
			135'	133	138		635	0.09	0.11	0.10		
136	147	95	GRAPHITIC ARGILLITE									
			Dark grey as previously described with discontinuous and disrupted									
			.1" or less laminations of quartz-carbonate sometimes containing									
			specks of lead. Occasional 2" bands of garnetiferous skarn.									
			Graphitic partings, abundant.	138	143		636	0.06	0.30	0.17		
			Mineralization:	143	148		637	0.05	0.10	0.13		
			Pyrite finely disseminated within groundmass occasionally									
			coincident with quartz laminations.									
			Pyrite content less than 1%.									
147	162	95	SKARN ZONE									
			Light brownish, speckled skarn containing lighter cream coloured									
			irregular crosscutting skarn bands. Note abundant development of fine-grained									
			vitreous, silvery-grey, soft (?) metamorphic mineralization.									
			Thin laminations up to 1" thick contain drusy, limonitic vugs.									
			Limonitic staining along fractures.									
			Mineralization:									
			Lighter coloured skarn bands contain disseminated pyrite-pyrrhotite,	148	153		638	0.08	0.02	0.07		
			traces of lead-zinc as disseminations.	153	158		639	0.05	0.02	0.03		
			Overall content 1-2% sulphides	158	163		640	0.03	0.04	0.07		
			Visible galena 147'									
			Visible sphalerite 152'									

PROPERTY SUNSET HOLE NO. 77WS-8 LOGGED BY F. Foster DATE December 16, 1977

From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Assays Oz/Ag	Visual Log
162	174.5	95	GRAPHITIC ARGILLITE								
			Dark grey, sooty, highly graphitic partings weakly laminated (less								
			than .1"), laminations filled with quartz-carbonate mineralized with								
			pyrite-pyrrhotite + traces of lead-zinc.								
			Mineralization:								
			Granular pyrite disseminated in graphitic argillite tends to	163	168		641	0.10	0.06	0.07	
			concentrate in bands	168	173		642	0.20	0.05	0.08	
			Sulphide content 5%								
174.5	185		CONTORTED SULPHIDE-BEARING GRAPHITIC ARGILLITE								
			Contorted weakly laminated dark grey graphitic argillite containing								
			abundant disseminated and layered sulphide. Highly irregular and								
			disrupted quartz veinlets and sweats. Fragmented and shattered								
			argillite locally healed by the fine veinlets.								
			Mineralization:								
			Pyrite-pyrrhotite occur in very irregular bands often disrupted ;	173	178		643	0.11	0.05	0.14	
			sometimes concentrated into almost massive sulphide. In places	178	183		644	0.15	0.04	0.13	
			proportion of quartz-pyrite make up 50% of rock. Sulphide content								
			15-20%. Traces of lead adjacent or within quartz veins.								
185	188	50	GRAPHITIC GOUGE								
			Broken rubbly core	183	188		645	0.28	0.05	0.11	
188	215		GRAPHITIC ARGILLITE								
			As 162-174.5'								
			Occasionally veined with quartz								
			202-203' - light grey bedded quartzite with light grey								
			paper-like laminations	188	193		646	0.05	0.01	0.05	
			207' - 1' skarn band								

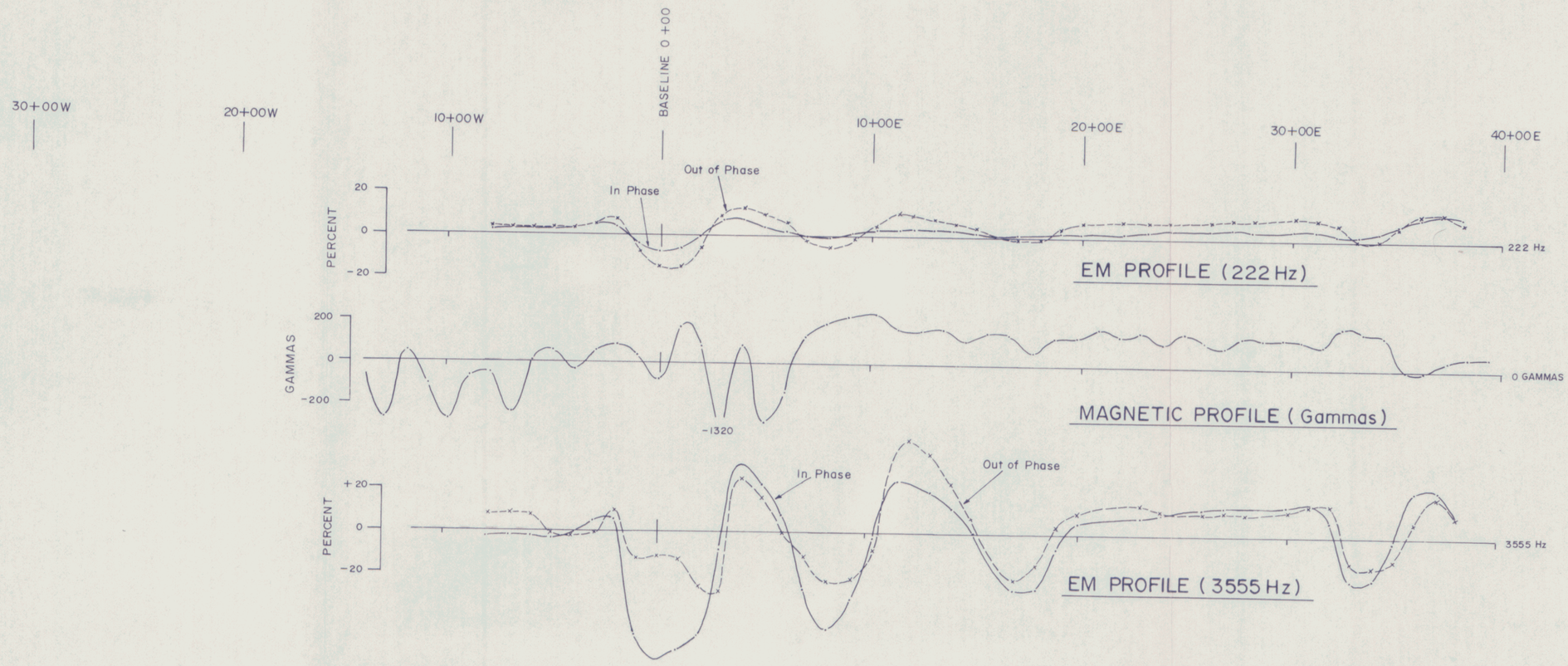
PROPERTY SUNSET HOLE NO. 77WS-8 LOGGED BY F. Foster DATE December 6, 1977

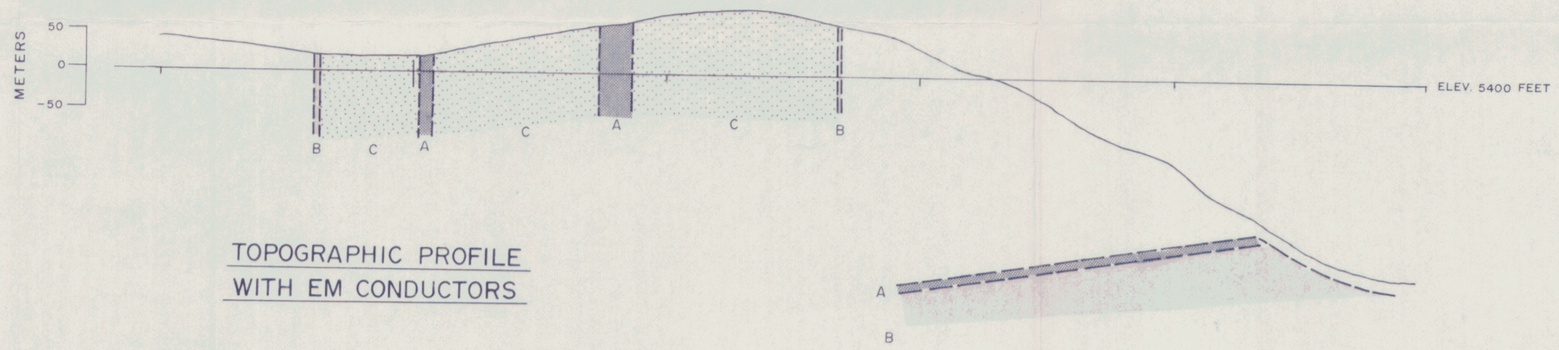
From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Assays Oz/Ag	Visual Log
88	215	(cont.)									
			Mineralization:								
			Less than 5% disseminated pyrite-pyrrhotite generally aligned and strung out along lamination.								
215	220		CONTORTED GRAPHITIC ARGILLITE								
			As 174.5-185'- Rock composed of graphite, quartz and pyrite. Core broken and rubbley.								
220	238	95	GRAPHITIC ARGILLITE								
			As 188-215'								
			227-228'- chlorite and talc along partings								
			Mineralization:								
			Approximately 5% pyrite								
238	295	95	WEAKLY GRAPHITIC ARGILLITE								
			Lighter shade of grey, more massive, comparatively few quartz stringers. Still graphitic partings but markedly less than previous rocks.								
			256-268' - distinctive light grey bands of limestone make up 50% of rock. Bands up to 1" thick alternating with chlorite-rich argillaceous bands. Minor pyrite along partings.								
			271-279' - badly broken graphitic core. 30% core recovery								
			Mineralization:								
			Approximate pyrite dissemination locally blebby, generally aligned along foliation.								
295	381	95	THIN LAMINATED CALCAREOUS SILTSTONE								
			Medium grey, brownish assy. Alternating light and medium grey								

WESTMIN NORTH MINES LTD. DIAMOND DRILL LOG

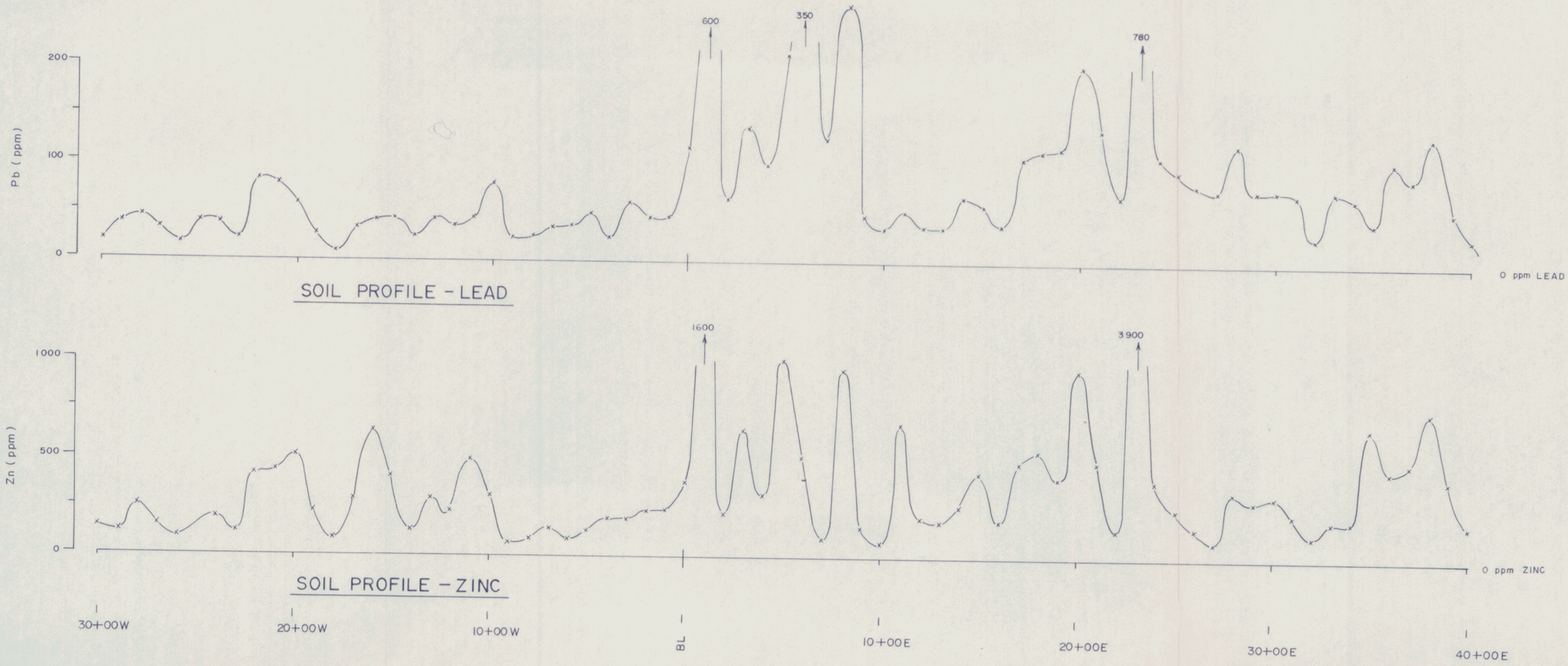
PROPERTY SUNSET HOLE NO. 77WS-8 LOGGED BY F. Foster DATE December 6, 1977

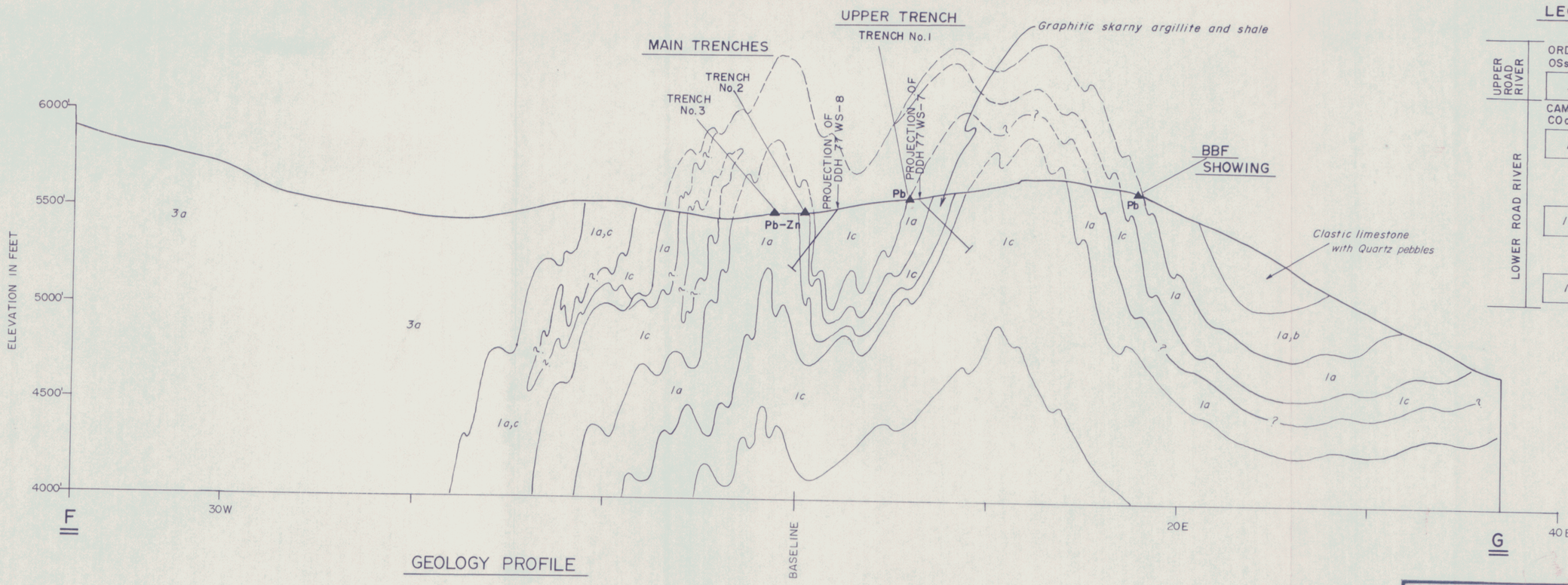
From	To	Rcvy %	Description	Sample From	Sample To	Sample Width	Sample No.	Assays Zn%	Assays Pb%	Assays Oz/Ag	Visual Log
295	381 (cont.)										
			laminations less than 1 mm thick. Medium grey laminations take on brownish hue due to the presence of very fine-grained lustrous biotite. Latter mineralization gives rock a fine speckled appearance. Occasional quartz sweats containing massive pyrrhotite. Occasional 1"-1/4" quartz-carbonate laminations conformable to overall layering in rock.								
			327.5' - 1' rubble coated with yellowy brown secondary mineralization, 2" at end of section laced with fine, irregular quartz veinlets.	362	367		647	0.01	0.01	0.04	
				367	372		648	0.24	0.01	0.02	
			Mineralization: Trace of pyrite.								
			369' - 1/4" band blackjack and brown sphalerite, look similar to very fine speckles seen through-out core.								
381	397	95	THIN LAMINATED DARK GREY WEAKLY CALCAREOUS SILTSTONE								
			As previously described (295-381') suggestion of increase in shaley component. Shaley laminations give rock a comparatively darker hue. Quartz laminations more abundant than previous section.								
			Mineralization: as above.								
397			END OF HOLE								





TOPOGRAPHIC PROFILE
WITH EM CONDUCTORS





GEOLOGY PROFILE

NOTE: All DDH's projected to plane of this cross-section. For location of section and DDH's, see Plate 3

LEGEND

UPPER ROAD RIVER

ORDOVICIAN & SILURIAN
OSsIq – Black Siliceous

3a — LAMINATED TO MASSIVE, GREY TO BLACK ARGILLITE AND SILTY ARGILLITE.

CAMBRIAN & ORDOVICIAN
COcsl – Red Unit

LOWER ROAD RIVER

1a — LAMINATED, DRAB GREY, ARGILLACEOUS TO SILTY LIMESTONE (INCLUDING "BUFF LAMINATED") LAMINATED SILTSTONE – LIMESTONE, LIMY SILTSTONE (INCLUDING "THIN LAMINATED").

1b — SANDY TO PEBBLY LIMESTONE (INCLUDING "CLASTIC LIMESTONE" AND "QUARTZITE PEBBLE CONGLOMERATE"). UNIT INCLUDES BRECCIATED PHASES OF 1a.

1c — ARGILLITE, PHYLLITE INCLUDING "SPOTTY" VARIETIES (AS 2a).

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT
PMJ TREND - SUNSET Grid

CROSS-SECTION F-G

Scale: 1" : 500'	Date: NOV. 1977	N.T.S. 105K/3
Revised:	By: F. F.	Plate 1

LEGEND

ROAD RIVER UPPER SELWYN BASIN

ORDOVICIAN & SILURIAN

OSslq - BLACK SILICEOUS

- **3a** — LAMINATED TO MASSIVE, GREY TO BLACK ARGILLITE AND SILTY ARGILLITE.
- **3b** — NON CALCAREOUS PHYLLITE
- **3c** — LAMINATED SILTSTONE – LIMESTONE (as *1a*)

ROAD RIVER LOWER SELWYN BASIN

CAMBRIAN & ORDOVICIAN

€Ocsl - RED UNIT

- **1a** — LAMINATED, DRAB GREY, ARGILLACEOUS TO SILTY LIMESTONE (INCLUDING "BUFF LAMINATED"); LAMINATED SILTSTONE – LIMESTONE; LIMY SILTSTONE (INCLUDING "THIN LAMINATED")
- **1b** — SANDY TO PEBBLY LIMESTONE (INCLUDING "CLASTIC LIMESTONE" AND "QUARTZITE PEBBLE CONGLOMERATE"); UNIT INCLUDES BRECCIATED PHASES OF 1a.
- **1c** — ARGILLITE, PHYLLITE INCLUDING "SPOTTY" VARIETIES. (as *3a*)

SYMBOLS

- CREEK
- CLAIM POST
- ROCK OUTCROP, SUBCROP
- FLOAT
- FAULT
- STRIKE & DIP OF COMPOSITIONAL FOLIATION (PROBABLE BEDDING) OR SCHISTOSITY. (S_1)
- STRIKE & DIP OF MINOR FOLD AXIAL PLANE.
- STRIKE & DIP OF BEDDING
- STRIKE & DIP OF LATER CLEAVAGE (S_2,S_3)
- TREND & PLUNGE OF MINOR FOLD AXES
- GEOLOGICAL CONTACT (APPROX., ASSUMED)
- MINERALIZED FLOAT
- BREAK IN SLOPE
- TRENCH
- DIAMOND DRILL HOLE
- MINERAL OCCURRENCE, MINOR
- MINERALIZED BED

NOTE: For Grid location, see Figure 3

WELCOME NORTH MINES LTD.		
GETTY MINING PACIFIC LTD.		
WOODSIDE PROJECT PMJ TREND - SIR J. A. Grid GEOLOGY		
SCALE 1" = 500'	DATE AUGUST 1977	NTS 105 K/3
BY W. BRERETON R. HOLLAND	REVISED	PLATE 2

L – 172 NW

180 NW 176 NW 172 NW 168 NW 164 NW 160 NW 156 NW 152 NW 148 NW 144 NW 140 NW 136 NW 132 NW 128 NW 124 NW 120 NW 116 NW 112 NW 108 NW 104 NW 100 NW 96 NW 92 NW 88 NW 84 NW 80 NW 76 NW 72 NW 68 NW 64 NW 60 NW 56 NW 52 NW 48 NW 44 NW 40 NW 36 NW 32 NW 28 NW 24 NW 20 NW 16 NW 12 NW 8 NW 4 NW LINE 0 + 00

BASE LINE 00

BASE LINE 0 + 00

40E 35E 30E 25E 20E 15E 10E 5E 5W 10W 15W 20W 25W 30W 40 E 35 E 30E 25 E 20E 15 E 10 E 5E 5 W 10 W 15 W 20 W 25 W 30 W

TRACE OF AXIAL PLANE

TRACE OF AXIAL PLANE

TRACE OF AXIAL PLANE

"WAYNE SHOWING" Zn

Area of Wayne Showing See Fig. 15

Old Camp

BBF Showing

Zn Float

Sunset Trench 1

DDH 77 WS-7

DDH 77 WS-8

Hornfels – skarn Zone

Area of Main Sunset Trenches 2 and 3 See Plate 5

Zn, Pb

Pb, Zn

CAT TRAIL

Ponds

POOR TO FAIR CONDUCTIVE ZONE 2–5 mhos

C See Fig. 5 for X-Section

F See Plate 1 for X-Section

LEGEND

ROAD RIVER UPPER CLASTIC BASIN

KI

CRETACEOUS ( )

KI

KI — MEDIUM TO COARSE GRAINED QUARTZ MONZONITE AND GRANODIORITE.

ORDOVICIAN & SILURIAN

OSslg

3a — LAMINATED TO MASSIVE, GREY TO BLACK ARGILLITE AND SILTY ARGILLITE.

3c — LAMINATED SILTSTONE – LIMESTONE. (as 1a)

ROAD RIVER LOWER CLASTIC BASIN

CAMBRIAN & ORDOVICIAN

COcsl

1a — LAMINATED, DRAB GREY, ARGILLACEOUS TO SILTY LIMESTONE (INCLUDING "BUFF LAMINATED"); LAMINATED SILTSTONE – LIMESTONE, LIMY SILTSTONE (INCLUDING "THIN LAMINATED")

1b — SANDY TO PEBBLY LIMESTONE (INCLUDING "CLASTIC LIMESTONE" AND "QUARTZITE PEBBLE CONGLOMERATE"); UNIT INCLUDES BRECCIATED PHASES OF 1a.

1c — ARGILLITE, PHYLLITE INCLUDING "SPOTTY" VARIETIES. (as 2a)

1d — COARSE GRAINED QUARTZ–GARNET–MUSCOVITE SCHIST.

1e — BROWN-WEATHERING, MASSIVE DOLOMITE.

1f — THIN BEDDED QUARTZ ARENITE.

SYMBOLS

- MINERAL OCCURENCE
- DIAMOND DRILL HOLE (BQ / Xray)
- CLAIM POST
- ROCK OUTCROP
- FLOAT
- STRIKE & DIP OF COMPOSITIONAL FOLIATION (PROBABLE BEDDING) OR SCHISTOSITY
- STRIKE & DIP OF BEDDING
- STRIKE & DIP OF LATER CLEAVAGE (Sa, Ss)
- STRIKE & DIP OF MINOR FOLD AXIAL PLANE
- TREND & PLUNGE OF MINOR FOLD AXES
- SYNCLINE
- ANTICLINE
- FAULT
- CONTACT (APPROXIMATE, INFERRED)
- TRENCH
- SECOND GENERATION ANTIFORM–SYNFORM PAIR (ARROWS INDICATE DIRECTION OF CLOSURE)
- SECOND GENERATION AXIAL PLANE

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LIMITED

WOODSIDE PROJECT
PMJ TREND : SUNSET GRID
GEOLOGY

SCALE 1" = 500'	DATE AUGUST 1977	NTS 105 K/3
BY W. Brereton, R. Holland	REVISED JAN. 1978	PLATE 3

L-48 N | L-44 N | L-40 N | L-36 N | L-32 N | L-28 N | L-24 N | L-20 N | L-16 N | L-12 N | L-8 N | L-4 N | L-0

25 E | 20 E | 15 E | 10 E | 5 E | BASE LINE 0 | 5 W | 10 W | 15 W | 20 W | 25 W

skarny
basic dike 3'
thin laminated limy sandstone
Cat Road
rusty skarn, py
Pond
AIRPHOTO LINEAR: (SHARP BREAK IN SLOPE)
skarny
brittle
To Sunset Trenches
rusty siderite zone qtz, mag., trace sp, gn in garnet bearing skarn
LOWER PIGLET SHOWING
qtz veining
arg. lst
MAIN PIGLET SHOWING
minor Zn siderite
skarn
sheared
skarn
arg. lst.
3a rubble
qtz – CO_3 vein 2'
amphibole skarn
arg. lst
arg. lst
arg. lst
3a rubble
phyllitic (3b?)
arg. lst
gritty
sheared
arg. lst
spotty
gritty
3a, arg. lst
3a coarse
4" qtz rod

For detail, see Fig. 6

SYMBOLS

- Creek
- Claim Post
- Break in slope
- Outcrop
- Float

LEGEND

ORDOVICIAN & SILURIAN

OSslq - Black Siliceous

UPPER ROAD RIVER

- 3a — Laminated to massive, grey to black argillite and silty argillite.
- 3b — Noncalcareous phyllite
- 3c — Laminated siltstone-limestone and limestone (as 1a).

CAMBRIAN & ORDOVICIAN

ϵOcsl - Red Unit

LOWER ROAD RIVER

- 1a — Laminated, drab grey, argillaceous to silty limestone (including "buff laminated"); laminated siltstone-limestone; limy siltstone (incl. "thin laminated").
- 1c — Argillite, phyllite (as 3a).

- Strike and dip of compositional foliation (probable bedding) or schistosity (S_1)
- Strike & dip of bedding
- Strike & dip of later cleavage (S_2,S_3)
- Trend and plunge of minor fold axes
- Geological contact (defined; approx.)
- Anticline indicating plunge
- Jointing
- Mineralized bed
- Mineral occurrence, minor

NOTE: For Grid Location, see Figure 3

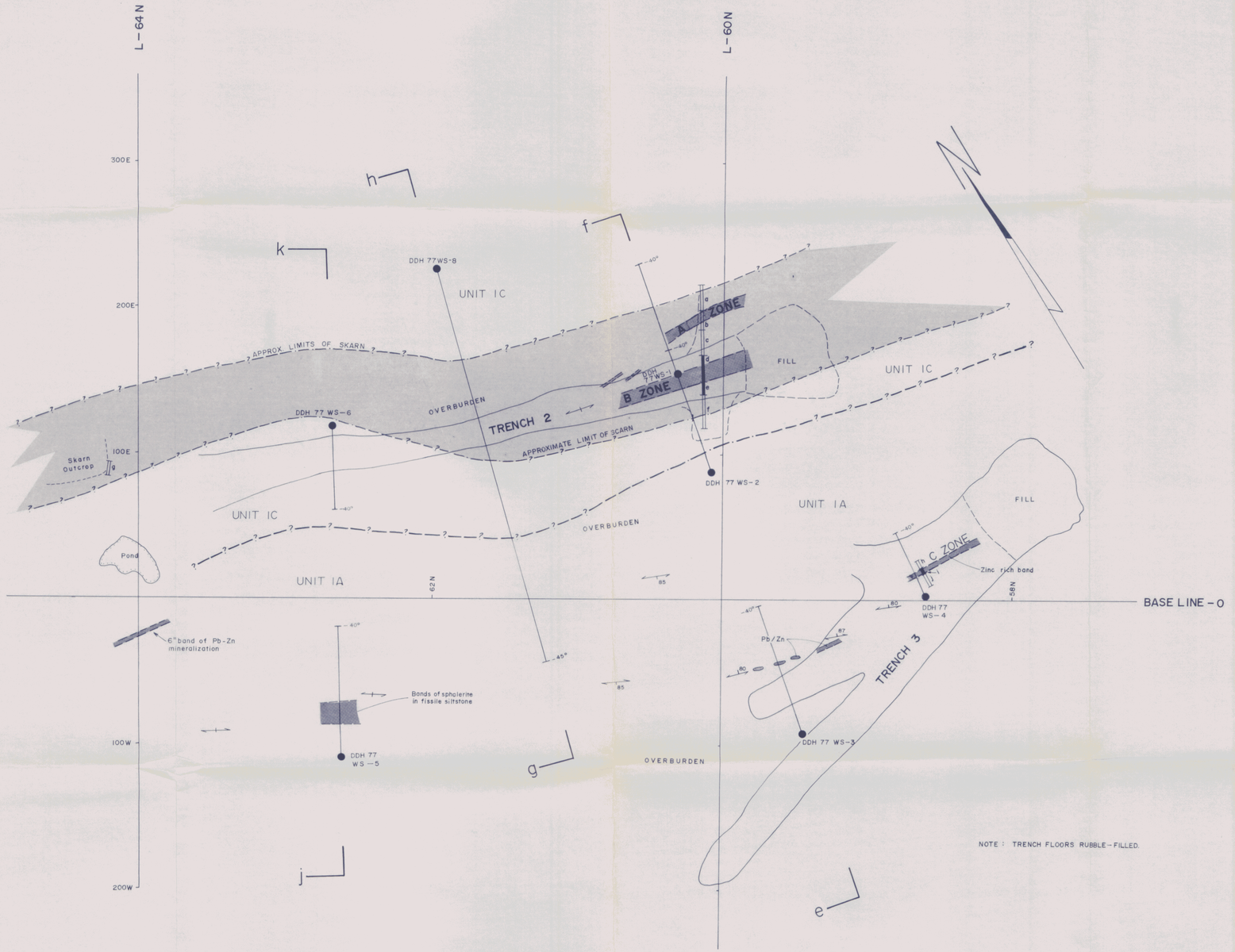
WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

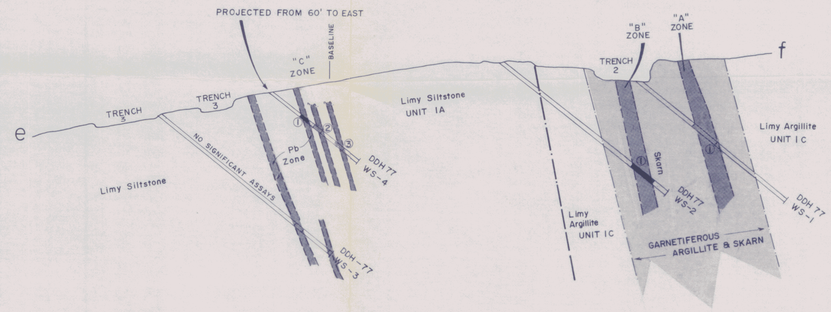
WOODSIDE PROJECT
PMJ TREND – PIGLET Grid

GEOLOGY

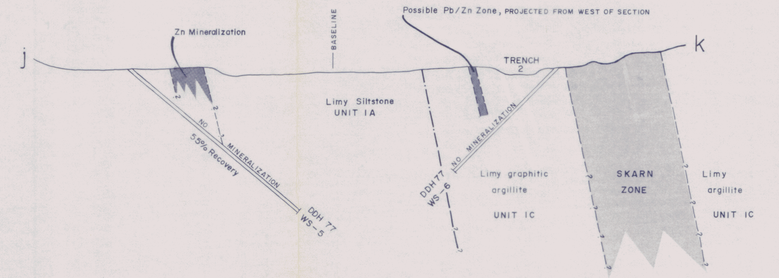
SCALE 1" = 500 FEET	DATE AUGUST 1977	NTS 105 K/2
BY W. Brereton	REVISED	PLATE 4



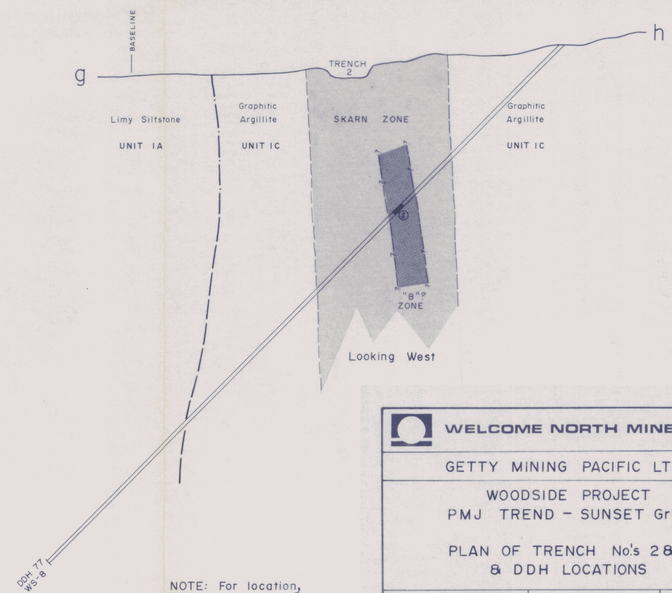
NOTE : TRENCH FLOORS RUBBLE-FILLED.



Looking West



Looking West



Looking West

NOTE: For location, see Plate 3

CHIP SAMPLE ASSAYS

	SAMPLE No.	SAMPLE LENGTH	% Pb	% Zn	Oz/T Ag
NORTH TRENCH A and B ZONES	a) 911	20'	0·41	0·10	0·35
	b) 912	13'	0·06	0·10	-
	c) 913	17'	0·50	0·04	-
	d) 914	13'	7·04	0·06	0·94
	e) 915	16'	7·10	0·10	2·22
	f) 916	21'	0·10	0·04	-
	g) 6832	10'	0·09	0·08	Tr.
SOUTH TRENCH C ZONE	h) 6831	3·5'	0·04	0·12	Tr.
	i) 6827	3·5'	2·40	3·84	0·57
	j) 6828	7·0'	0·09	0·10	Tr.

NOTE: Samples a) - f) were taken, in part, from loose rubble on trench floor. Samples g) - j) were chipped from rock "in place".

DIAMOND DRILL HOLE ASSAYS

DDH No.	ZONE	WIDTH	% Pb	% Zn	Oz/T Ag
77WS-1	A-1	16'	2·62	0·04	0·62
77WS-2	B-1	15'	10·34	0·16	2·07
77WS-8	B?-2	5'	10·00	0·14	2·15
77WS-4	C-1	5'	3·73	3·50	0·90
-4	C-2	5'	0·71	1·75	0·28
-4	C-3	5'	0·01	1·50	-

LEGEND

UPPER CAMBRIAN and ORDOVICIAN
€Ocsl
- IC — Limy, graphitic argillite
- Skarn — amphibole-garnet pyrite-pyrrhotite-magnetite
- IA — Limy siltstone

Diamond Drill Hole
Geologic Contact - defined
- approx.
- assumed.
Chip Sample
Foliation, Cleavage
Pb/Zn Mineralization
Assay greater than 2%

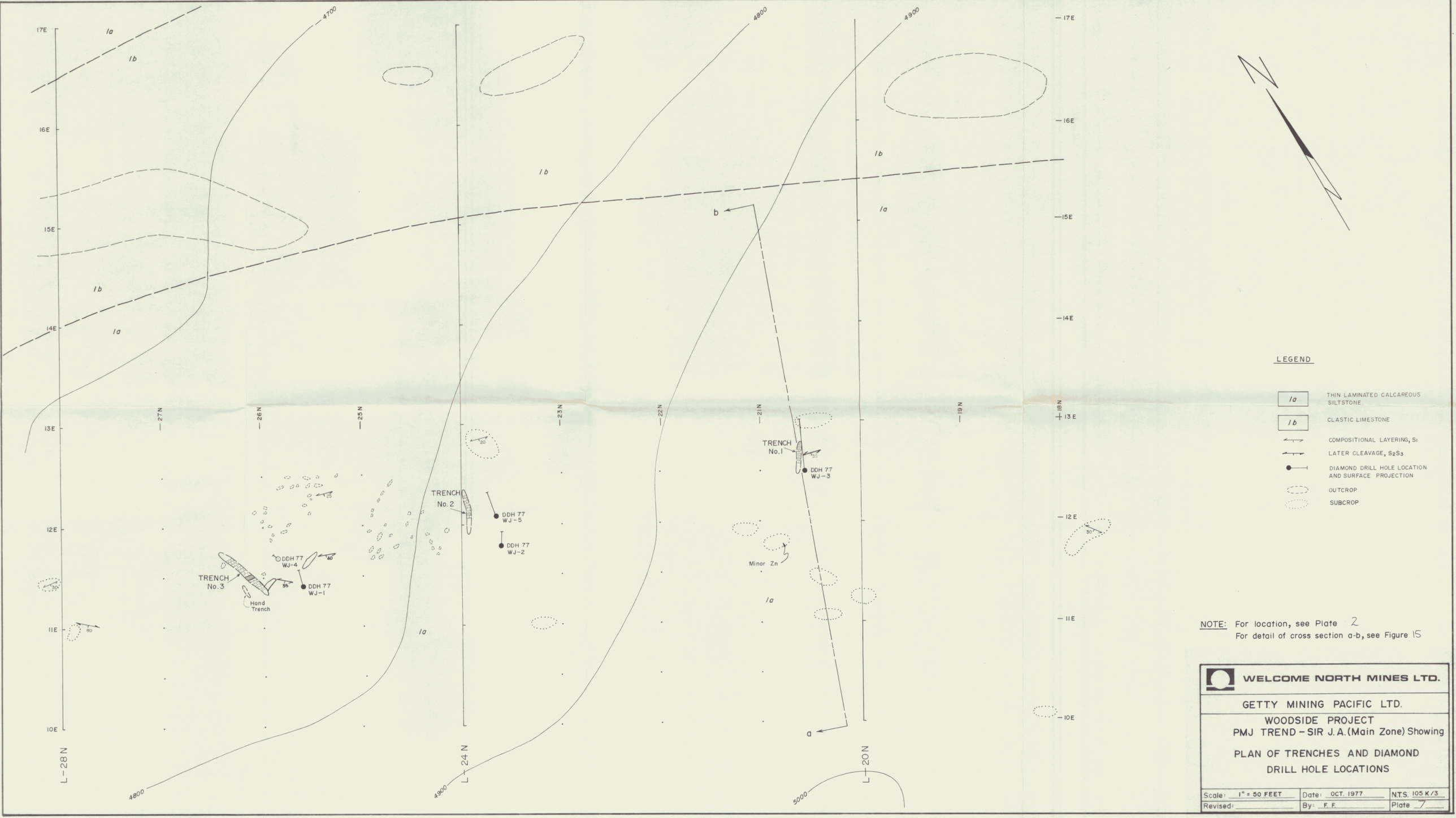
WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT
PMJ TREND - SUNSET Grid

PLAN OF TRENCH No's 2&3
& DDH LOCATIONS

Scale: 1" = 40 FEET	Date: OCT. 19, 1977	N.T.S. 105 K/3
Revised:	By: J. GUILD	Plate 5



NOTE: For location, see Plate 2
For detail of cross section a-b, see Figure 15

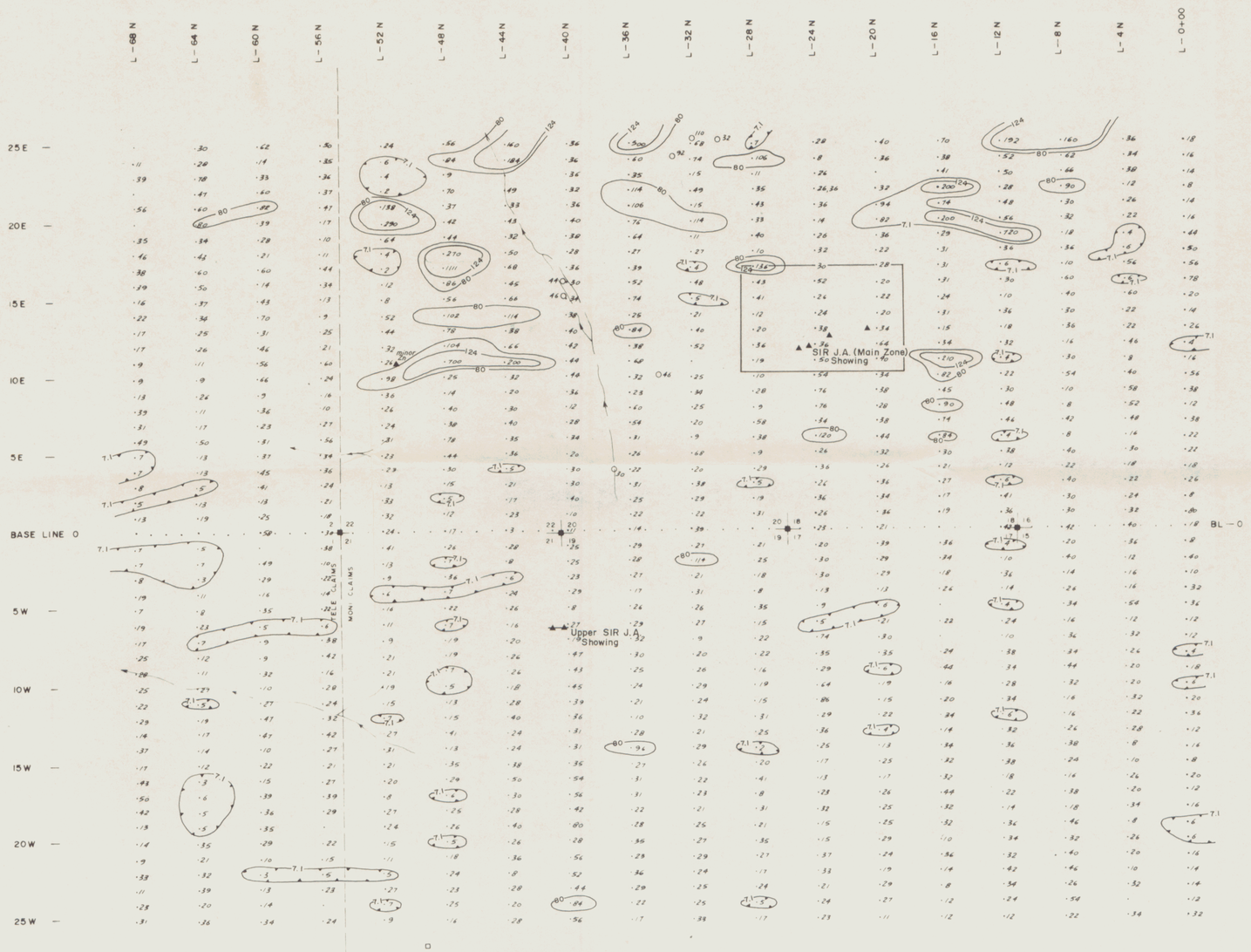
WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT
PMJ TREND – SIR J.A. (Main Zone) Showing

PLAN OF TRENCHES AND DIAMOND DRILL HOLE LOCATIONS

Scale: 1" = 50 FEET	Date: OCT. 1977	N.T.S. 105 K/3
Revised:	By: F. F.	Plate 7



SYMBOLS

CREEK

CLAIM POST

MINERAL OCCURRENCE

MINERALIZED BED

> 124 ANOMALOUS POPULATION

81 — 124 THRESHOLD "

7.1 — 80 HIGH BACKGROUND POPULATION

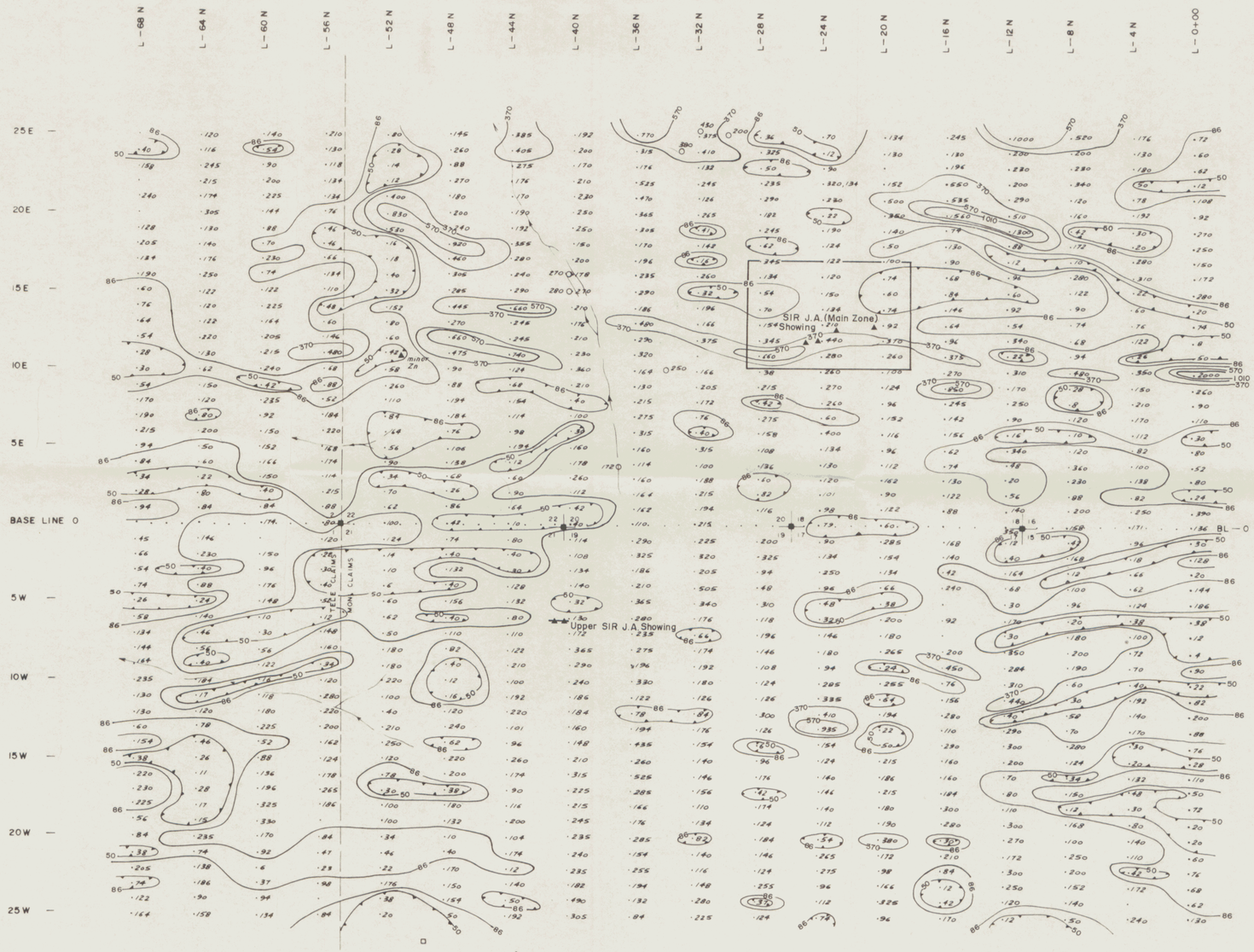
< 7.1 LOW " "

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT
PMJ TREND : SIR J.A. Grid
LEAD GEOCHEMISTRY

SCALE 1" = 500'	DATE AUGUST 1977	NTS 105 K/3
DRAWN P PECEK	REVISED	PLATE 8



N

SYMBOLS

- CREEK
- CLAIM POST
- MINERAL OCCURRENCE
- MINERALIZED BED

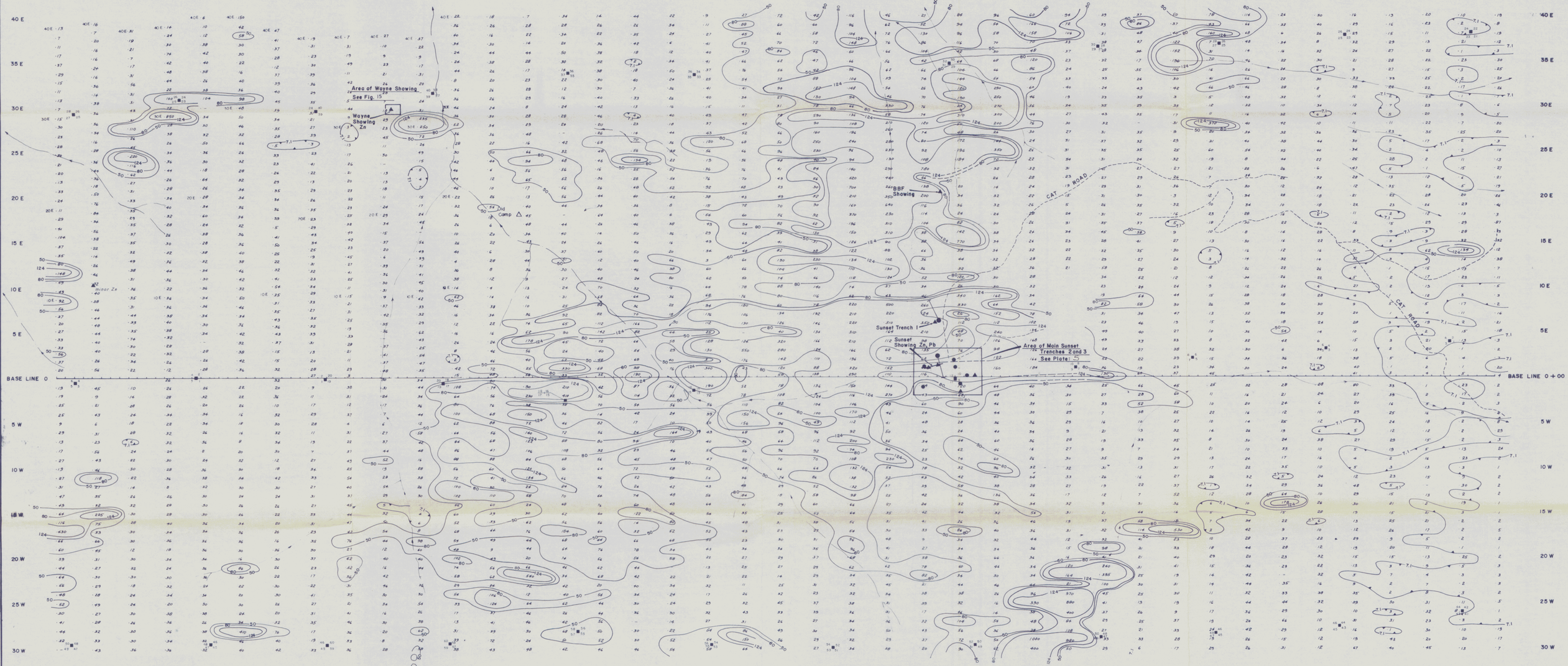
	> 1010	ANOMALOUS POPULATION
	571 – 1010	HIGH THRESHOLD POPULATION
	371 – 570	LOW " "
	86 – 370	HIGH BACKGROUND "
	< 86	LOW " "

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT
PMJ TREND : SIR J.A. Grid
ZINC GEOCHEMISTRY

SCALE 1" = 500'	DATE AUGUST 1977	NTS 105 K/3
DRAWN P. PECEK	REVISED	PLATE 9



SYMBOLS

- CREEK
- GRID LINE
- CLAIM POST
- DIAMOND DRILL HOLE (BQ / X ray)
- MINERAL OCCURRENCE
- MINERALIZED BED

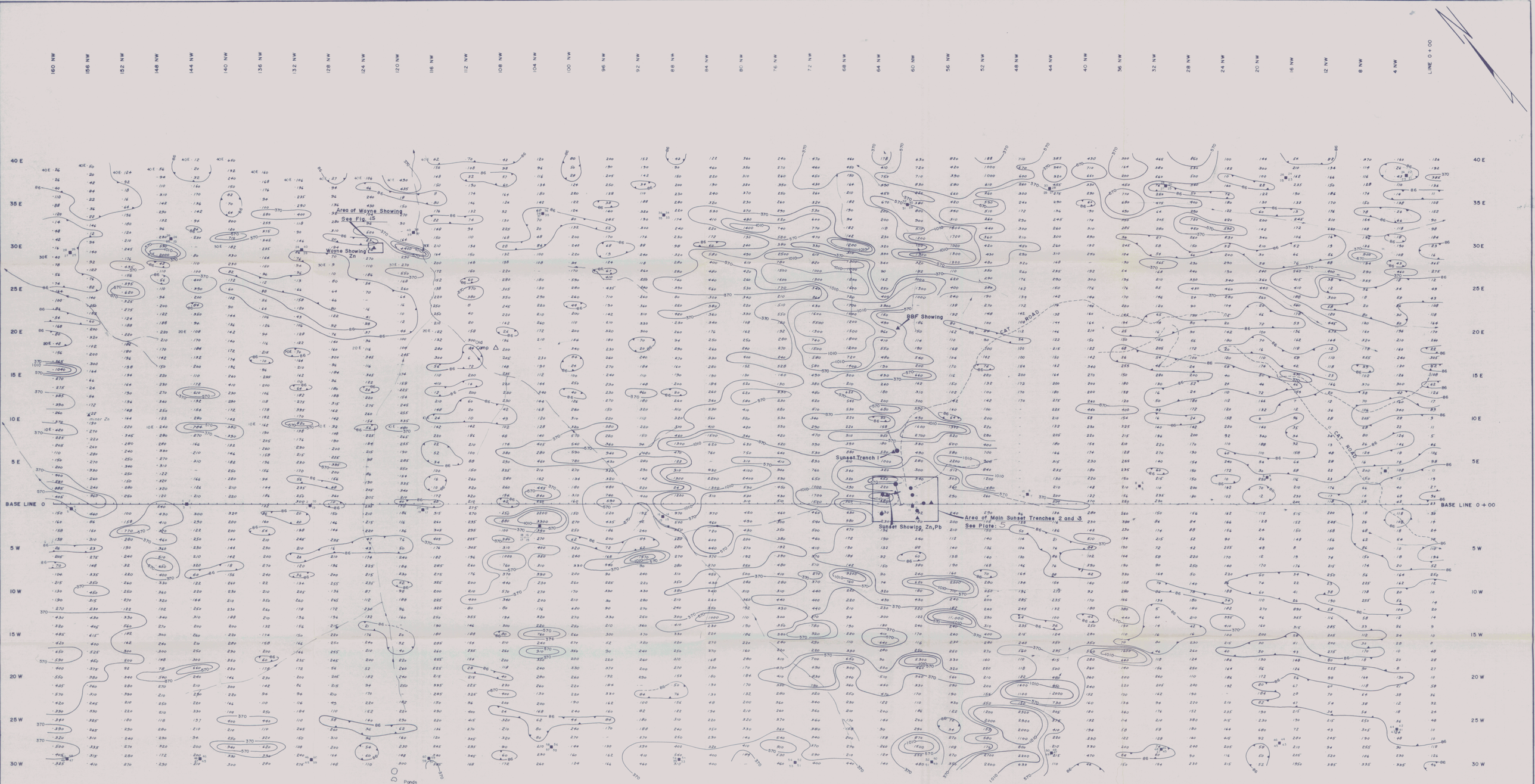
	124	ANOMALOUS POPULATION
	81 – 124	THRESHOLD POPULATION
	7.1 – 80	HIGH BACKGROUND "
	< 7.1	LOW " "

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LIMITED

WOODSIDE PROJECT
PMJ TREND : SUNSET GRID
LEAD GEOCHEMISTRY

SCALE 1" = 500'	DATE AUGUST 1977	NTS 105 K/3
BY	REVISED	PLATE 10



SYMBOLS

- CREEK
- GRID LINE
- CLAIM POST
- DIAMOND DRILL HOLE (BQ/Xray)
- MINERAL OCCURRENCE
- MINERALIZED BED

> 1010	ANOMALOUS POPULATION
571 – 1010	HIGH THRESHOLD POPULATION
371 – 570	LOW " "
86 – 370	HIGH BACKGROUND "
< 86	LOW " "

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LIMITED

WOODSIDE PROJECT
PMJ TREND : SUNSET GRID
ZINC GEOCHEMISTRY

SCALE 1" = 500'	DATE AUGUST 1977	NTS 105 K/3
BY	REVISED	PLATE: 11

L-48 N | L-44 N | L-40 N | L-36 N | L-32 N | L-28 N | L-24 N | L-20 N | L-16 N | L-12 N | L-8 N | L-4 N | L-0

25 E

20 E

15 E

10 E

5 E

BASE LINE 0

5 W

10 W

15 W

20 W

25 W

Cat Road

AIRPHOTO LINEAR (SHARP BREAK IN SLOPE)

Pond

LOWER PIGLET SHOWING

MAIN PIGLET SHOWING

	> 124	ANOMALOUS POPULATION
	81 – 124	THRESHOLD POPULATION
	7.1 – 80	HIGH BACKGROUND POPULATION
	< 7.1	LOW " "

SYMBOLS

Creek

Claim Post

Break in slope

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT

PMJ TREND : PIGLET Grid

LEAD GEOCHEMISTRY

SCALE 1" = 500 FEET	DATE AUGUST 1977	NTS 105 K/2
BY	REVISED	FIGURE 12

L-48 N | L-44 N | L-40 N | L-36 N | L-32 N | L-28 N | L-24 N | L-20 N | L-16 N | L-12 N | L-8 N | L-4 N | L-0

Cat Road

AIRPHOTO LINEAR (SHARP BREAK IN SLOPE)

Pond

LOWER PIGLET SHOWING

MAIN PIGLET SHOWING

25 E

20 E

15 E

10 E

5 E

BASE LINE 0

5 W

10 W

15 W

20 W

25 W

SYMBOLS

Creek

Claim Post

Break in slope

> 1010	ANOMALOUS POPULATION
571 – 1010	HIGH THRESHOLD POPULATION
371 – 570	LOW " "
86 – 370	HIGH BACKGROUND "
< 86	LOW " "

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LTD.

WOODSIDE PROJECT

PMJ TREND : PIGLET Grid

ZINC GEOCHEMISTRY

SCALE 1" = 500 FEET	DATE AUGUST 1977	NTS 105 K/2
BY	REVISED	FIGURE 13

160 NW 156 NW 152 NW 148 NW 144 NW 140 NW 136 NW 132 NW 128 NW 124 NW 120 NW 116 NW 112 NW 108 NW 104 NW 100 NW 96 NW 92 NW 88 NW 84 NW 80 NW 76 NW 72 NW 68 NW 64 NW 60 NW 56 NW 52 NW 48 NW 44 NW 40 NW 36 NW 32 NW 28 NW 24 NW 20 NW 16 NW 12 NW 8 NW 4 NW LINE 0 + 00

40 E 35 E 30 E 25 E 20 E 15 E 10 E 5 E

Area of Wayne Showing See Fig. 15

Wayne Showing, Zn

Old Camp

BBF Showing

CAT ROAD

CAT ROAD

Sunset Trench I

Sunset Showing Zn, Pb, Cu

Area of Main Sunset Trenches 2 and 3 See Plate 5

BASE LINE 0 + 00

5 W 10 W 15 W 20 W 25 W 30 W

Ponds

SYMBOLS

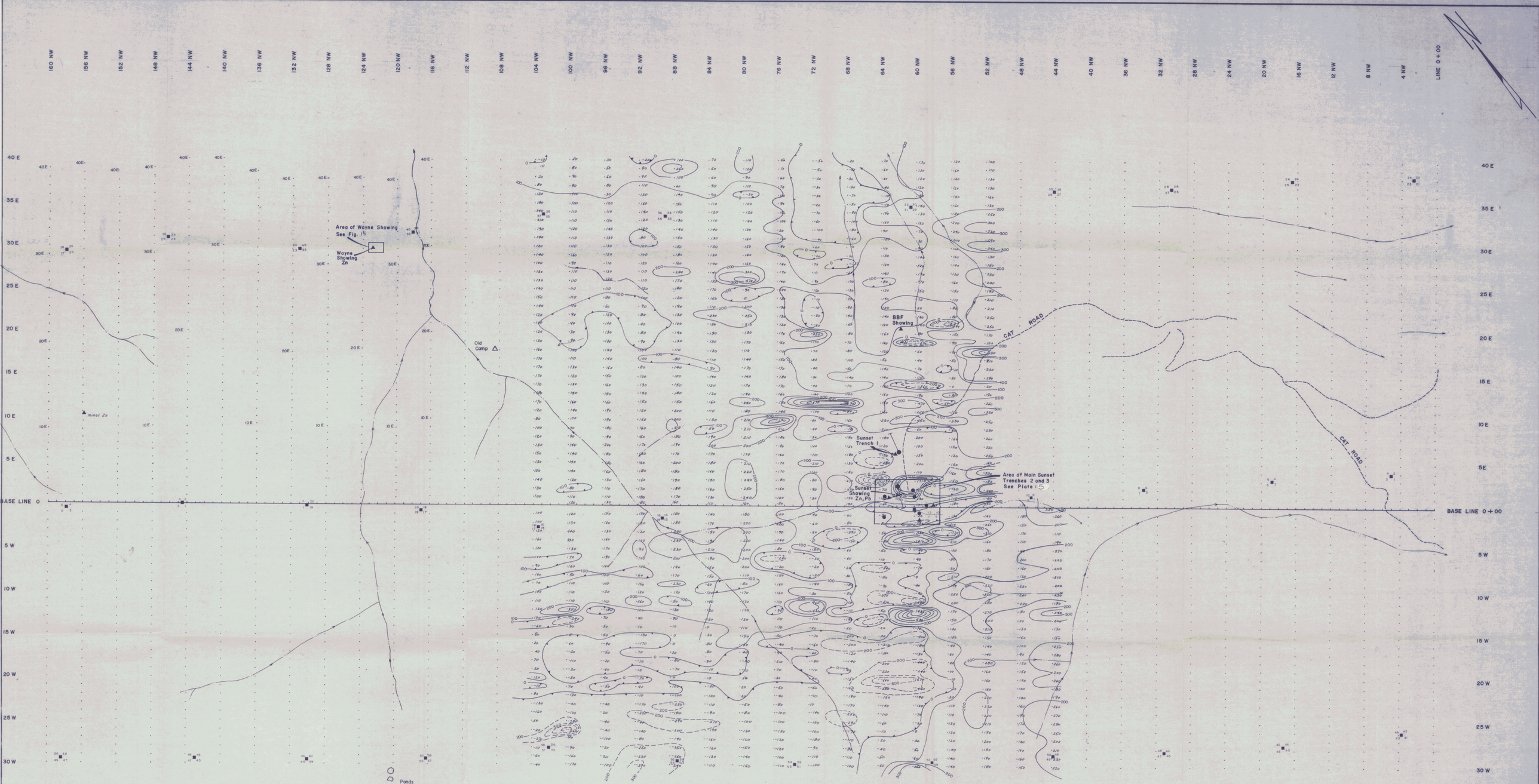
- CREEK
- GRID LINE
- CLAIM POST
- DDH (BQ/Xray)
- MINERAL OCCURRENCE
- MINERALIZED BED

WELCOME NORTH MINES LTD.

GETTY MINING PACIFIC LIMITED

WOODSIDE PROJECT
PMJ TREND: SUNSET GRID
MAGNETOMETER SURVEY-PROFILES

SCALE 1" = 500'	DATE AUGUST 1977	NTS 105 K/3
BY	REVISED	FIGURE 14



SYMBOLS

- CREEK
- GRID LINE
- CLAIM POST
- DIAMOND DRILL HOLE (BQ / X-ray)
- MINERAL OCCURRENCE
- MINERALIZED BED

CONTOUR INTERVAL IS 100 GAMMAS

- MAGNETIC DEPRESSION
- NEGATIVE CONTOUR

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WOODSIDE PROJECT
PMJ TREND : SUNSET GRID
MAGNETOMETER SURVEY - CONTOURS

SCALE 1" = 500'	DATE AUGUST 1977	NTS 105 K/3
BY	REVISED NOV. 1977	PLATE 15

LEGEND

- Poor to fair conductor 10 to 40 mhos
- Very poor to poor conductor 0·5 to 10 mhos
- Very poorly conductive material ≥ 40 ohm meters
- 5500 Topo contour – elevation in feet above sea level

NOTE: Depths only shown where greater than 50ft.

WELCOME NORTH MINES LTD.

VANGORDA 1977 PROJECT

SUNSET CLAIM GROUP

WHITEHORSE MINING DISTRICT, YUKON TERR.

62°03'N, 133°03'W

N.T.S. 105-K-3

REGISTERED PROFESSIONAL ENGINEER
J. E. BETZ
PROVINCE OF ONTARIO

0 500 1000 FEET

TO ACCOMPANY REPORT

JOHN BETZ LTD.
NOVEMBER, 1977