BRITISH NEWFOUNDLAND EXPLORATION, LTD.

# Figure I INDEX MAP, REPORT ON NABESCHE CLAIM GROUPS 1, 2, 3 & 4

| | | |
|---|---|---|
| DATE : JAN. 1974 | SCALE : 1" = 4167' | DRAWN BY : B.D.P. |
| LIARD & OMINECA M.D. | MAP No. | TRACED BY : B.D.P. |
| MAP REF. 94B/5E & 94B/6W | | CHECKED BY : B.D.P |

TO ACCOMPANY REPORT BY B.D. PEARSON, P.Eng., DATED JAN. 15, 1974

A —— A' : GEOLOGICAL SECTION

NO. 4874 #1

123°35'

56°20' N

56°20'

Group 4

Group 2

Group 1

Group 3

J

J'

K

K'

L

L'

M

M'

GEOLOGY MAP (KATAYAMA)

GEOLOGY MAP (DICKIE)

SILT SAMPLING MAP

56°15' N

56°15'

123°35'

123°30'

123°25' W

4874 M1

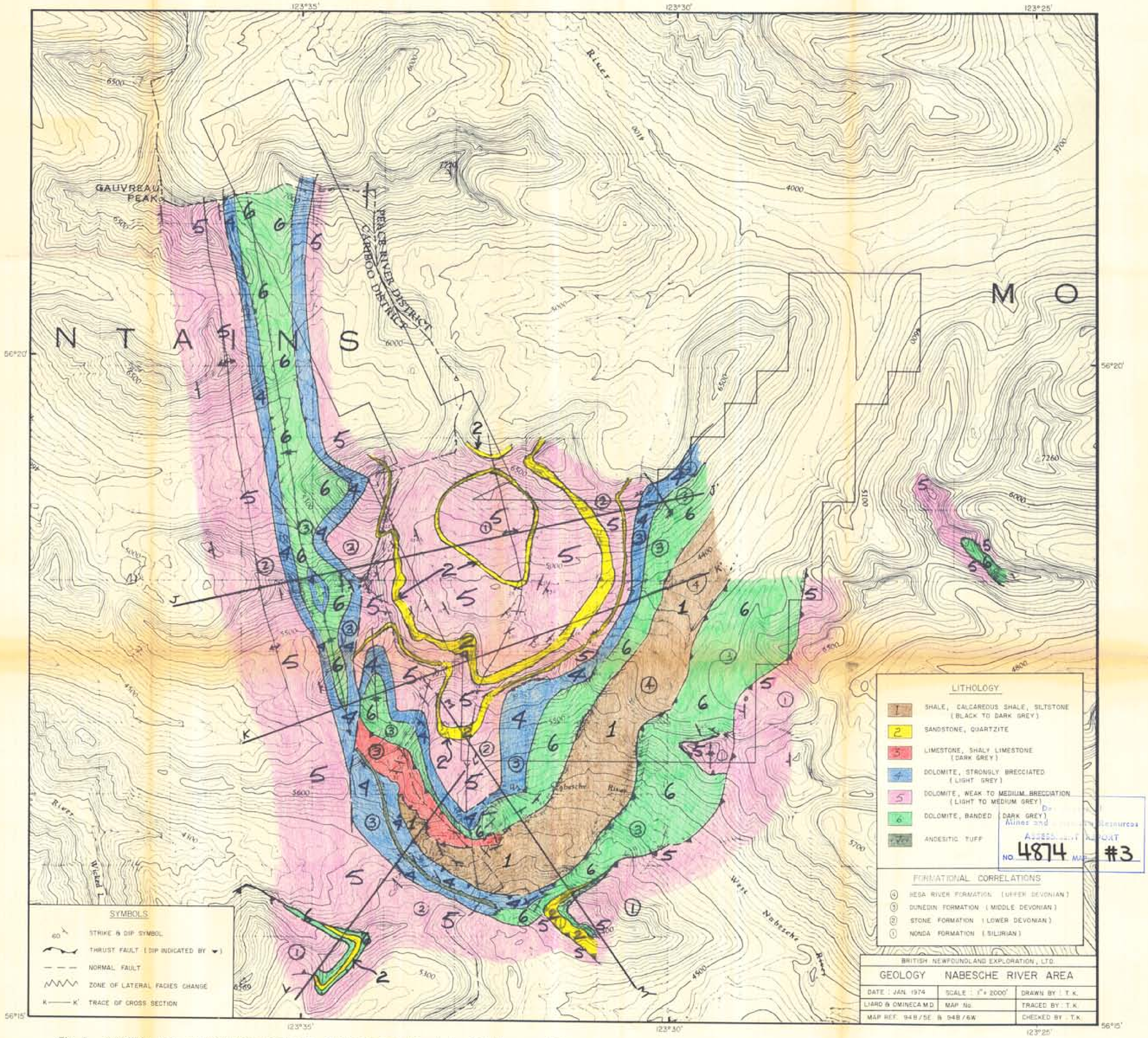
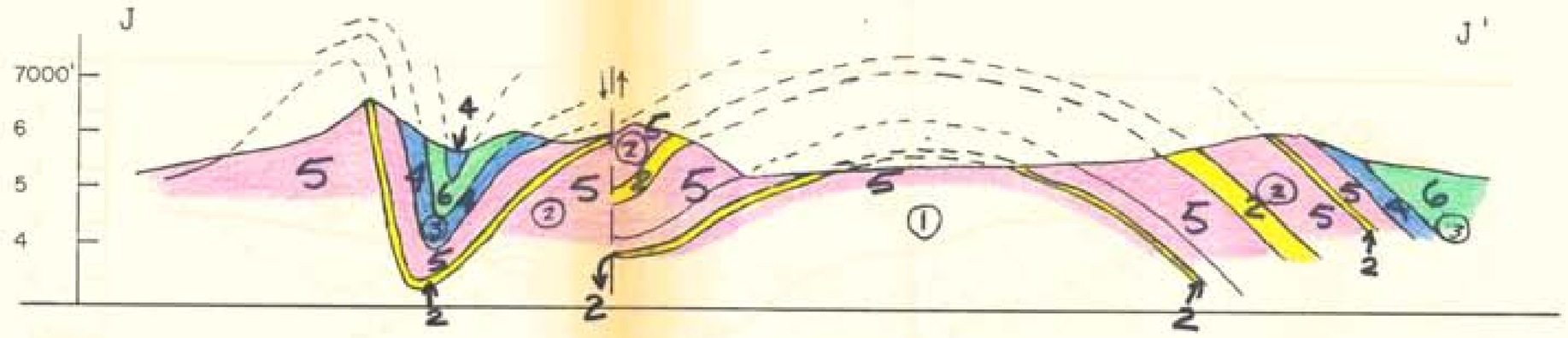


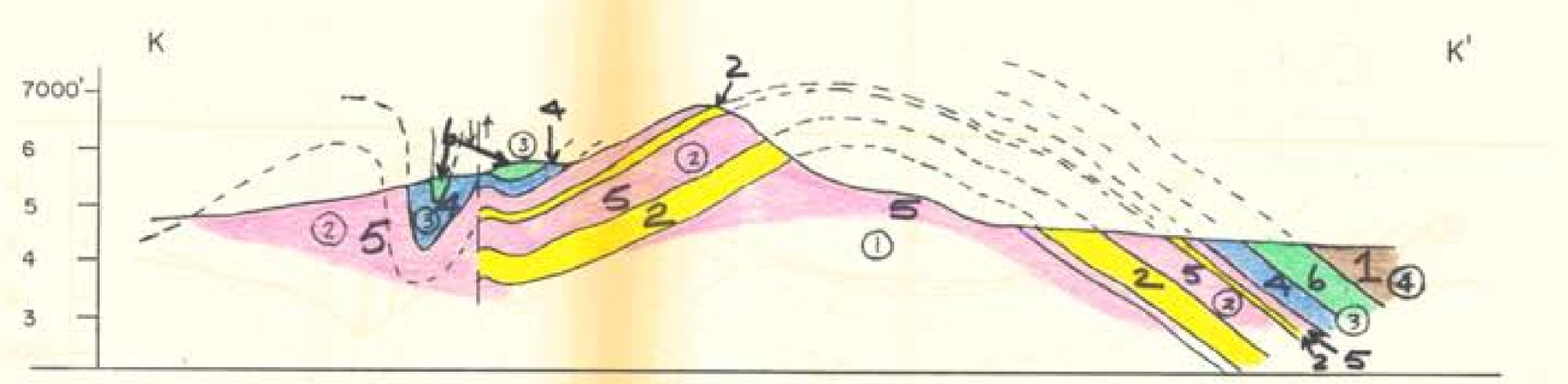


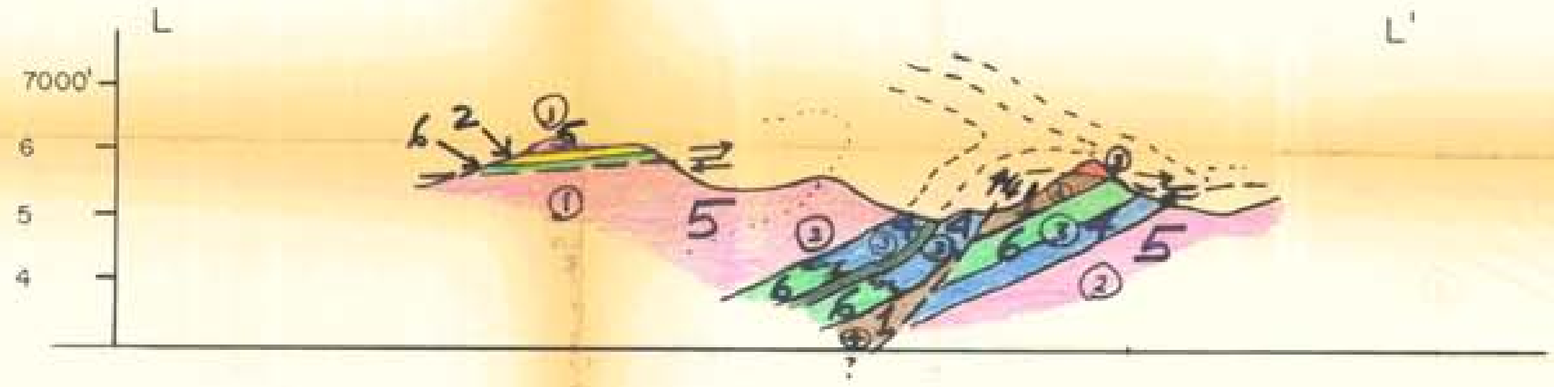

Fig. 3 Geological Map to accompany Geological & Geochemical Report by B. D. Pearson, P. Eng. on the Nabesche No. 1, 2, 3 and 4 Claim Groups, Liard & Omineca M.D., dated Jan. 15, 1974

B D Pearson

4874 M3



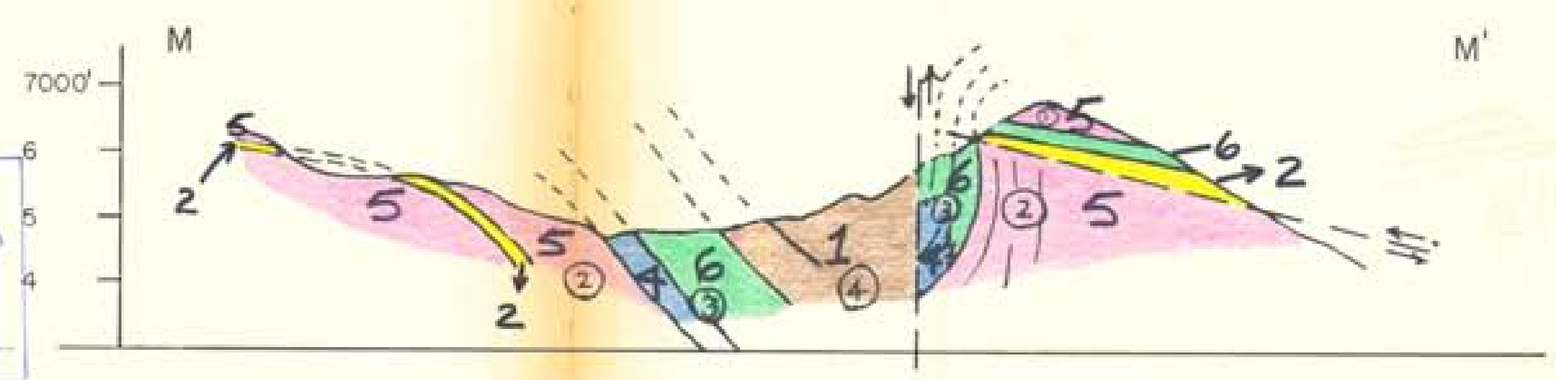






Fig. 4 Geological Sections to accompany Geological & Geochemical Report by B. D. Pearson, P.Eng., dated Jan. 15, 1974, on the Nabesche No. 1, 2,3 and 4 Claim Groups, Liard & Omineca M.D. See Fig. 3 for legend.

B D Pearson

4874 #4

4874

94B/5E, 6W

BRITISH NEWFOUNDLAND EXPLORATION LIMITED

# GEOLOGICAL AND GEOCHEMICAL REPORT

## NABESCHE NO. 1, 2, 3 AND 4 GROUPS OF MINERAL CLAIMS

## NABESCHE RIVER AREA

## LIARD AND OMINECA M.D.

56° 123° N.W.

BY: Bradford D. Pearson, P.Eng.

of

Richmond, B.C.



FIELD PERIOD: July 8 to August 29, 1973

REPORT PERIOD: September 17, 1973 to January 15, 1974

TABLE OF CONTENTS

Page

Figures:

## INTRODUCTION

This report supplements the geological and geochemical plan maps to be found in the front and back pockets.

The key map (fig. 1) gives the location of all plans and sections with respect to the claim groups involved and to the geographic co-ordinates.

The principals included in the programme are:

Dr. Neil Westoll, Manager, Western Exploration,
British Newfoundland Exploration Limited,
704 - 602 West Hastings Street, Vancouver, B.C. V6B 1P2

Dr. G.J. Dickie, Assistant Professor, Department of Geology,
University of Windsor, Windsor, Ontario.

Mr. Tsugio Katayama, Chief Geologist, Non-Ferrous Metals Section,
Marubeni Corporation, Tokyo, Japan.

Mr. Barry McHale, Senior Geologist,
British Newfoundland Exploration Limited,
704 - 602 West Hastings Street, Vancouver, B.C. V6B 1P2

Mr. Bradford D. Pearson, P.Eng.,
Project Manager and Consulting Geologist,
743 Lindsay Road, Richmond, B.C.

Contributions made by the individual are acknowledged throughout the text.

PROPERTIES AND LOCATIONS (56° 123° N.W.)

This report concerns 160 located mineral claims owned by British Newfoundland Exploration Limited, 704 - 602 West Hastings Street, Vancouver, B.C.

These are divided into groups, the Nabesche No. 1 (40 claims), No. 2 (40 claims), No. 3 (40 claims), and No. 4 (40 claims) as listed on the sketch map (Fig. 2).

These groups lie in the headwaters of the Nabesche River in the Liard Mining Division. The area is in the centre of the Rocky Mountain crest, 85 miles west of Ft. St. John, B.C. Two camps were supported by helicopter from a base on Lady Laurier Lake 31 miles to the north. The elevation varies from 4,500' to 7,700'. The topography is youthful and rugged, and more than half the area lies above the timber line. Traverses can generally be made easily, but on a larger scale only a helicopter can provide suitable transportation.

## MAPPING CONTROLS

Geological observations were plotted on existing topographic maps on a scale of 1:50,000, controlled chiefly by such topographic features as streams, lakes and ridges.

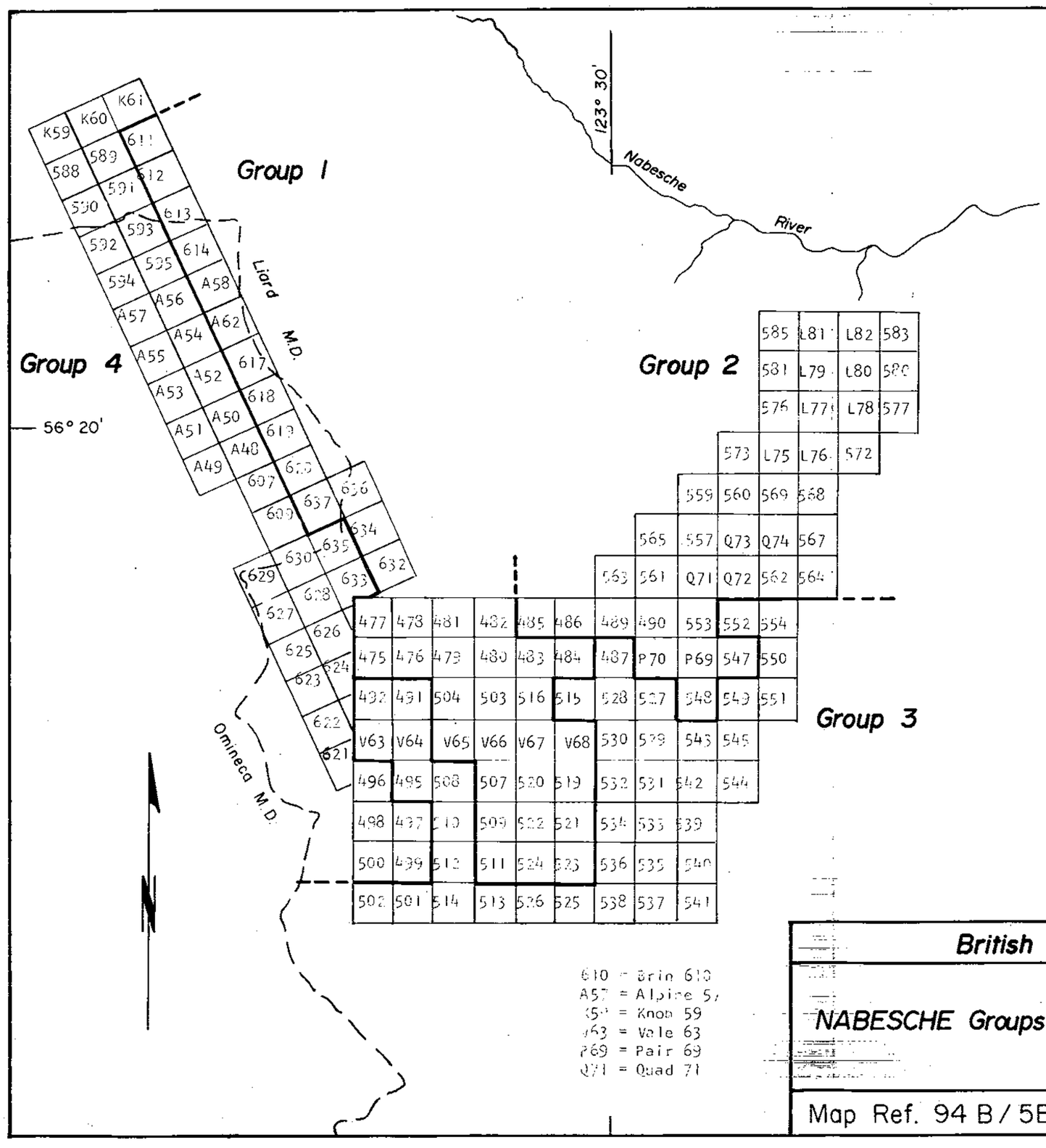
Geochemical surveys were based on the same maps, plus pace-and-compass traverses.

Some observations, both geological and geochemical, were plotted on acetate film overlying aerial photographs. Claim posts were tied to surveys where encountered.

## SURVEY PROCEDURES

### (a) Geological

Preliminary geological mapping had been carried out during the 1972 season by Dr. G.J. Dickie (Westoll et al, 1973) by means of widely separated ground traverses linked by helicopter observations. Paleontological techniques were used to establish controls along measured sections. In 1973, T. Katayama carried out systematic mapping on foot, concentrating on the detailing of lithological and textural variations in bedrock. Two geological maps are presented with this report. Katayama's map (Fig. 3) and sections (Fig. 4) detail the lithological features, and assign ages based on the framework established by Dickie in 1972. Dickie's map (Fig. 5) reinterprets the geology in the light of Katayama's observations. The results are in partial agreement over the area of the claim groups. The differences in interpretation are




610 = Brin 610
A57 = Alpine 57
Knob 59
V63 = Vale 63
P69 = Pair 69
Q71 = Quad 71

GROUP 1

40 Claims

Brin 611-614
Alpine 58, 62
Brin 617-620
632, 634
636 - 637
475 - 484
503 - 504
516, 507
509, 511
519 - 524

GROUP 2

40 Claims

Low 75 - 82
Quad 71 - 74
Pair 69 - 70
Brin 485 - 486
489 - 490
547 - 548
553
567 - 569
557
559 - 565
572 - 573
576 - 577
580 - 581
585, 589

GROUP 3

40 Claims

Vale 63 - 64
Brin 487, 515,
525 - 545
549 - 552
554
491 - 492
495 - 508
510
512 - 514

GROUP 4

40 Claims

Alpine 48 - 57
Knob 59 - 61
Brin 496 - 500
621 - 630
633, 635
607, 609
588 - 595



| British Newfoundland Exploration Limited | | |
|---|---|---|
| NABESCHE Groups | Group 1 | Group 4 |
| | Group 2 | Scale 1 : 50,000 |
| | Group 3 | Jan. 15, 1974 |
| Map Ref. 94 B/5E, 94 B/6W | | Fig. 2 |

instructive, and point up the necessity for further work.

The map area affords 50 to 70 percent rock exposure, but while there is little vegetative cover above 5,500', extensive talus slopes, especially in the more shaly areas, may conceal large areas locally. Bedding attitudes have been plotted where found. In covered areas, lithology has been inferred from the talus and by projection along strike from exposed areas. The rugged topography has added the third dimension to observations. In all cases where sections have been drawn other than normal to strike, the correct apparent dip is shown.

(b) Geochemical

Geochemical surveys involved the collection of silt samples at close intervals.

Sample preparation and analysis were performed by Chemex Labs., Ltd., North Vancouver, B.C. using standard procedures. The 80 mesh fractions of all samples were digested in hot nitric/perchloric acid and analysed by Atomic Absorption Spectrometry for copper, lead and zinc.

## SURVEY RESULTS

### (a) Geology (See Figs. 3, 4, 5)

#### 1. Stratigraphy

The stratigraphy of the area has been described briefly by Dickie (Westoll et al, 1973). The following outline incorporates revisions necessitated by the 1973 work.

Ordovician

The oldest rocks in the study area are probably Ordovician in age. They occur west of a major thrust bordering the western edge of the Bernard anticline (See Fig. 5), and consist of brown and black shales, dolomites, limestones, quartzites and locally beds of andesitic tuff and sills and flows of vesicular basalt. Although Katayama (Fig. 3) has placed these rocks in the Lower and Middle Devonian on the basis of earlier work by Dickie (Westoll et al, 1973), Dickie's new map (Fig. 5, this report) refers them to the Silurian, correlating them with the Nonda Formation. The presence of extensive black shale sections and volcanics within these rocks makes it more likely that they are a part of the Kechika Group of Early Ordovician age.

Taylor and Stott (1973) mention thick units of volcanic sediments within a shale sequence in the Kechika south of Tuchodi Lakes and dikes and sills further south in the Redfern Lake area. We have traced a swarm of sills along the western margin of the Bernard anticline almost continuously from Lady Laurier Lake to Wicked Lake. These sills are composed of amygdaloidal basalt, now largely chloritized and are emplaced within a sequence of dark brown shales containing minor limestone beds. To the west of these sills, and west of the area of our detailed mapping, the rocks appear from the air to consist entirely of dark shales. To the east, carbonates become more prominent.

There is no evidence for Paleozoic volcanic activity above the Middle Ordovician within the eastern cordillera (Gabrielse, personal communication). On this basis the author favours an Ordovician age for the sequence in which the volcanics occur. The fact that the outcrop pattern of the volcanics seems to coincide with a change from shales on the west to carbonates on the east is probably more than coincidental. It may be legitimate to speculate that the volcanics were introduced along a tensional zone which acted as a hinge in the development of an Ordovician facies front.

Silurian

Rocks of Silurian age are exposed in the center of the Bernard anticline throughout its length. They consist of well-bedded, dark grey, fossiliferous dolomites, sandstones and quartzites, and have been referred to the Nonda Formation by Dickie. This unit is a cliff-former, a characteristic which, taken in conjunction with its dark grey color, facilitates recognition. Norford et al (1966) have described the regional distribution of the Nonda.

Upper Silurian - Lower Devonian

Immediately above the Nonda is a sequence of well-bedded, light grey, finely crystalline dolomites assigned by Taylor (personal communication to Dickie) to the Muncho-McConnell Formation, and said by him to be of Lower Devonian age. (Taylor and MacKenzie, 1970). Fossils are rare and not usually diagnostic. Gabrielse (personal communication to McHale) believes the unit to be diachronous, spanning the period from Upper Silurian into Lower Devonian.

Lower Devonian

The unfossiliferous Wokkpash Formation overlies the Muncho-McConnell Formation. A relatively thin unit (100' - 200'), it is composed of sandy dolomite and sandstone, and weathers recessively, developing a knichtpoint in the slope profile, a characteristic which Taylor (personal communication) has found helpful in regional mapping.

Lower to Middle Devonian

The section above the Wokkpash consists of a relatively thick ( > 1,000') sequence of well-bedded, light grey and brownish grey sandy dolomites referred by Dickie to the Stone Formation. In the Nabesche River area and to the south, the most distinguishing characteristic of the unit is a cyclical development of contrasting brown and grey beds throughout the lower two thirds of the section. The upper third is much more uniformly grey in colour. In the absence of diagnostic fossils, Taylor and Stott (1973) suggest the age adopted here by reference to fossil ages for underlying and overlying units.

Middle Devonian

Above the Stone Formation lies an assemblage of dark grey, largely recrystallized dolomites which are highly fossiliferous. Dickie assigns this assemblage to the Pine Point Formation, and correlates it with the Dunedin Formation in the Lady Laurier Lake area to the north. This correlation may be in error or at least an oversimplification, for Taylor (1969), in a brief statement, refers to the Pine Point as a biostromal unit overlying Dunedin-equivalent

carbonates. He also mentions the presence of the Watt Mtn. and Slave Point Formations in the Nabesche area. Presumably he is referring to the section shown in the southeastern corner of Figs. 3 and 5, but equivalent rocks may exist within the Bernard anticline which we have not recognized or have misidentified (see following descriptions). Consultations with Taylor may clarify the situation.

Upper Devonian to Mississippian

Above the Pine Point Formation is a sequence of dark grey-brown, shaly, fossiliferous limestone with patch reefs developed locally. Dickie's map (Fig. 5) refers the unnamed unit to the Upper Devonian, but Dickie has located fossils of Mississippian age at one point within the sequence, indicating that the sequence spans the time boundary between the systems.

Above, and on a regional basis, adjacent to the unit just described lies the Besa River Formation, composed of black non-calcareous highly fissile shale. Fig.10 shows the relations of these formations as interpreted by Dickie (see Pearson, 1974 for details of the Laurier area).

Mississippian

The Prophet Formation is the name given to a sequence of thin-bedded black shaly limestones lying above and in gradational contact with the Besa River Formation. Irish (1970) gives the thickness as approximately 2,000' in the Nabesche River area.

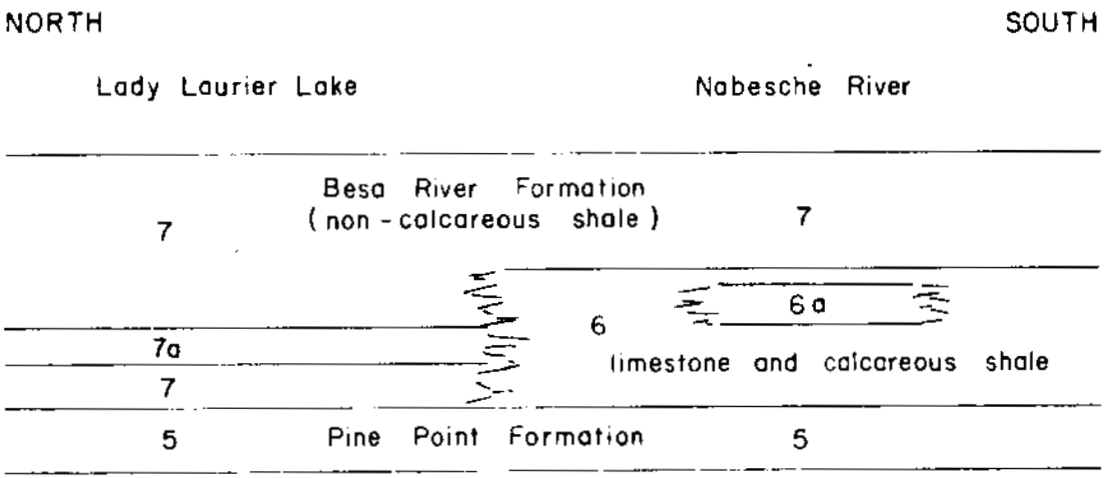



Fig. 10 Middle and Upper Devonian Stratigraphy, Nabesche River and Lady Laurier Lake areas. (After Dickie.)

No rocks younger than Mississippian are present in the immediate vicinity of the Nabesche claims.

## 2. Structure

The dominating structural element in the Nabesche area is the south-plunging nose of the north-south trending Bernard anticline. On the west side of the anticline, the Stone and Pine Point Formations are tightly folded into a syncline which has been cut at one point by a high-angle fault trending slightly east of north. Along the western edge of this syncline, carbonates of Silurian (Dickie) or Ordovician (Pearson) age are overthrust from the west. One mile further to the west, another major thrust carries Ordovician shales in from the west (see Irish, 1970).

Other faults shown on Figs. 3 and 5 are more problematic, and the subject of controversy among the participants in this project. Both Dickie and Katayama show a thrust bordering the southeastern edge of the Bernard anticline. A number of factors suggest that the fault is instead a west-side-down gravity fault. These include the apparently vertical orientation of the fault plane in conjunction with the subhorizontal attitude of the strata on either side, the relative absence of deformation in adjacent beds, and the fact that younger rocks lie west of the fault, a contrast with the age relations of other thrusts in the Rockies which have older rocks on the west.

Katayama shows another thrust slightly to the west of the fault discussed above, but its existence is questioned by both Dickie and the writer.

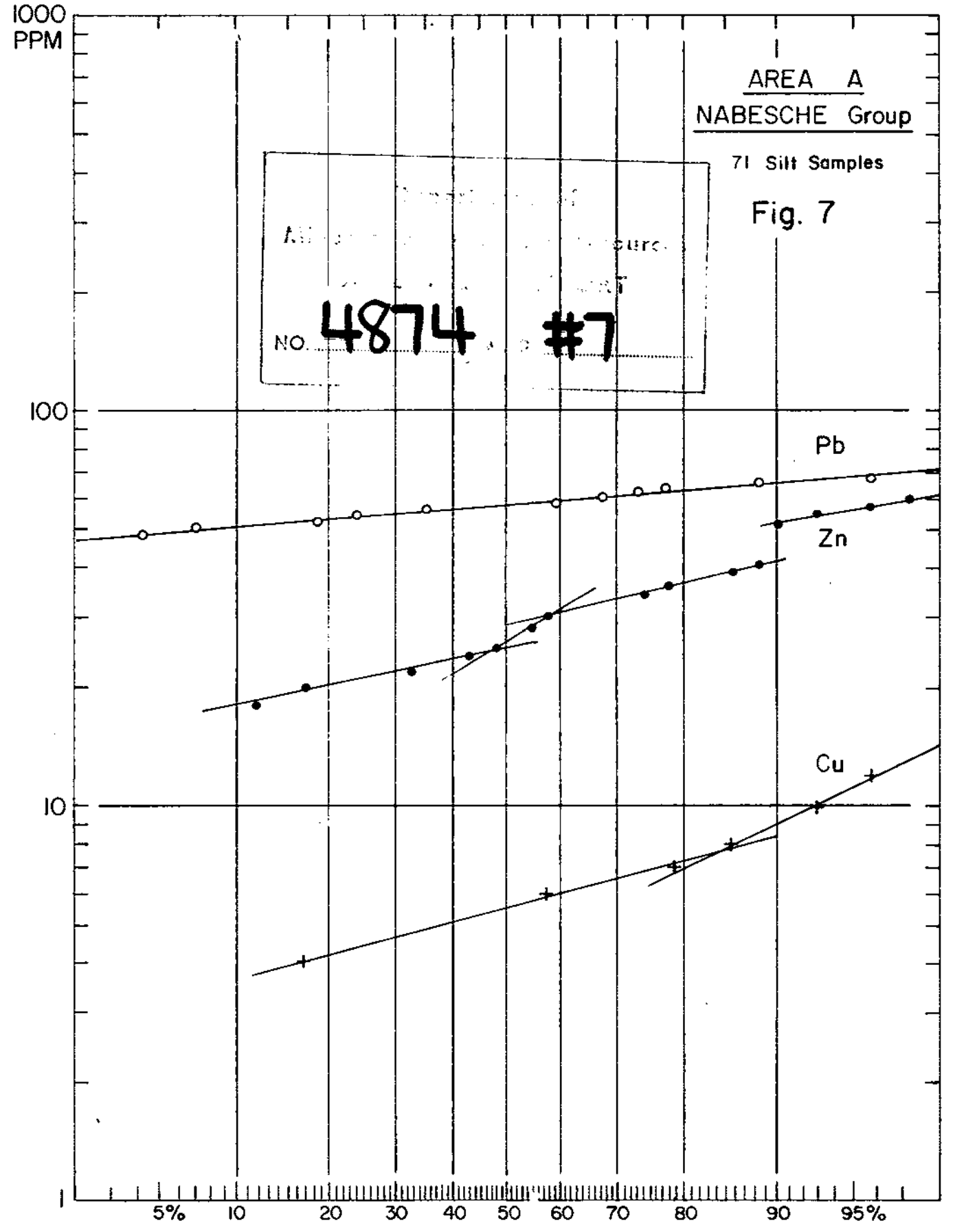
Dickie shows a thrust extending from the vicinity of Wicked Lake to the nose of the Bernard anticline for which the writer can find no satisfactory evidence beyond a variation in structural trends across the area. Obviously more work is needed in order to resolve these varying interpretations.

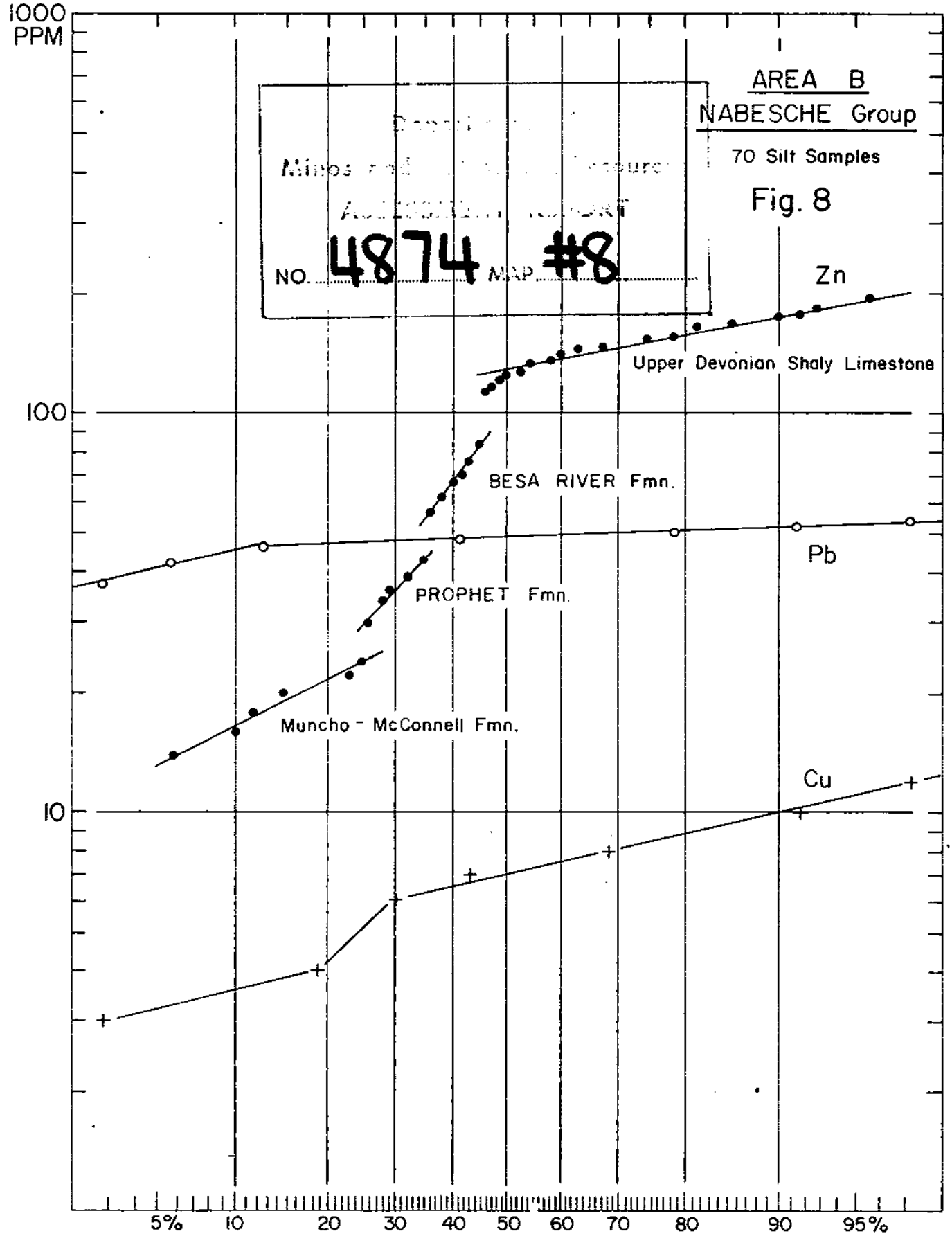
(b) Geochemistry

Silt samples were taken from three drainage systems in the Nabesche area. In most cases a 200' spacing, approximated by pacing, separates sampling sites. Fig. 6 shows sample locations and assay results for copper, lead and zinc in parts per million. Figs. 7, 8 and 9 show frequency distributions for the three metals in each of the drainage systems.

Area A

This area lies in the northwestern portion of the district covered by Fig. 5. It is largely floored by Muncho McConnell Formation, though both Wokkpash and Nonda Formation rocks can be found on the periphery of the basin. Reference to Fig. 7 shows the presence of a single population of lead with most values in the range 48 - 70 ppm. There are two copper populations. The larger population (85% of the samples) has a median value of 5 ppm. The smaller population, with a median value of 10 ppm, can be seen (Fig. 6) to derive entirely from the lower reaches of the western-most tributary. The zinc distribution in Area A is more complex. The frequency distribution has been interpreted as indicating the presence of three populations, (median values 20, 35 and 58 ppm zinc) with a zone of mixing between the 20 ppm and 35 ppm populations. Reference


1000
PPM
100
10
1
AREA A
NABESCHE Group
71 Silt Samples
Fig. 7
NO. 4874 #7
Pb
Zn
Cu
5%
10
20
30
40
50
60
70
80
90
95%


1000
PPM
100
10
AREA B
NABESCHE Group
70 Silt Samples
Fig. 8
NO. 4874 MAP #8
Zn
Upper Devonian Shaly Limestone
BESA RIVER Fmn.
Pb
PROPHET Fmn.
Muncho - McConnell Fmn.
Cu
5%
10
20
30
40
50
60
70
80
90
95%

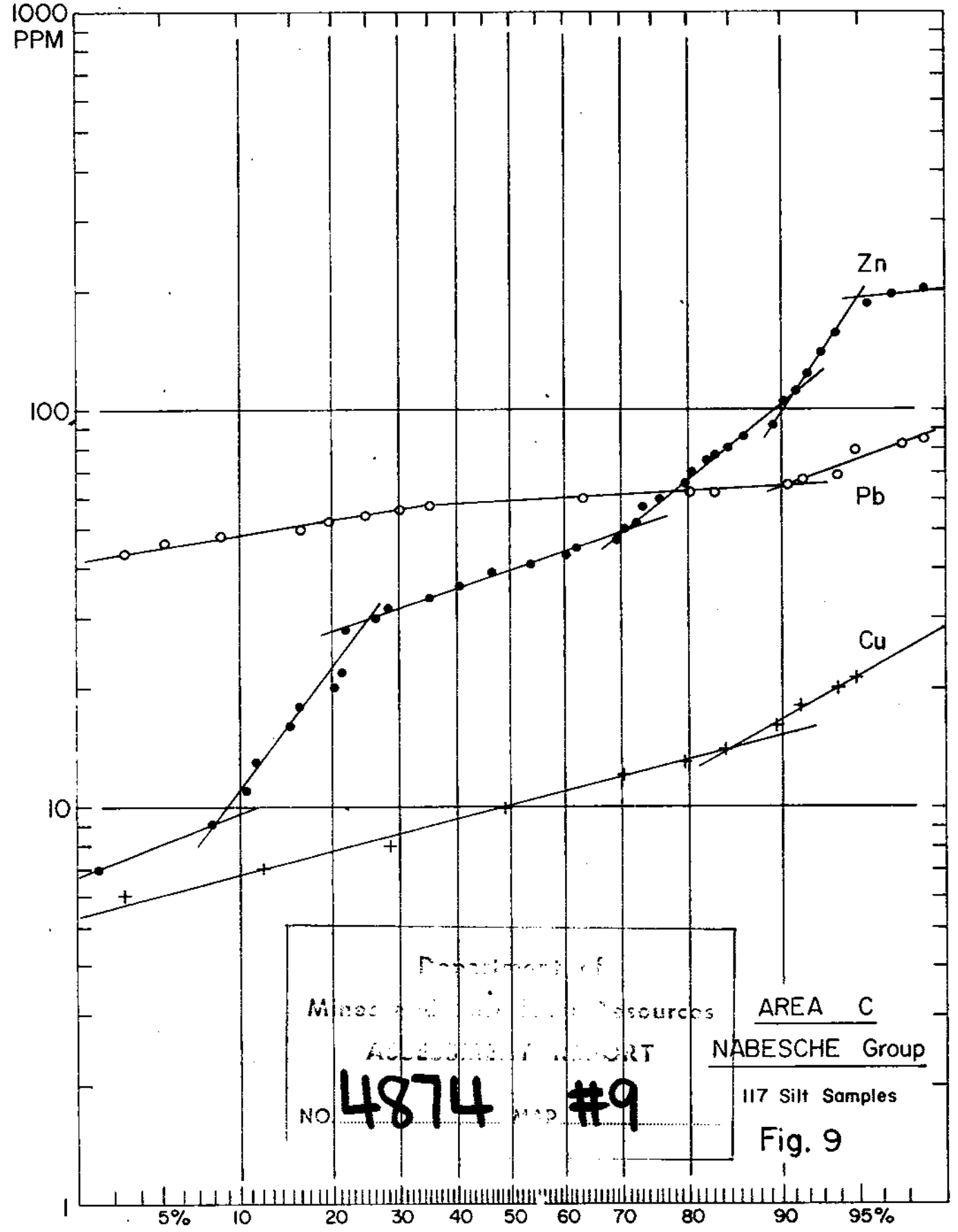





Fig. 9

to Fig. 6 shows that these populations are geographically distinct and that the 58 ppm zinc population correlates with the 10 ppm Cu population. Follow-up mapping will be required to establish the lithological controls for this sample cluster.

Area B

Sampling in this area shows an excellent spatial separation of zinc populations which correlates well with variations in lithology across the stratigraphic section. There are four populations present with no zones of mixing, a rather unusual occurrence. These populations, from the head to the mouth of the drainage, have median values of 19, 36, 70 and 150 ppm zinc. They correlate respectively with the Muncho-McConnell, Prophet, and Besa River Formations and the underlying unnamed shaly limestone unit. A low copper population (median value 3.5 ppm) also correlates with the Muncho-McConnell Formation at the top of the drainage. Lead values are sufficiently uniform as to be of no value in differentiating units though there are two populations present (median values 42 and 50 ppm Pb).

Area C

Element distribution is extremely complex, as can be expected by reference to the geological maps (Figs. 3 and 5). The Besa River Formation zinc population (median value 75 ppm) is present in the lower reaches of the main drainage, and a number of small tributaries, in agreement with the geological mapping. However, another zinc population (median value 40 ppm), well developed upstream to the west and northwest, appears to be

contributing heavily to downstream sediment. On the basis of the mapping, this population is inferred to represent the Stone - Pine Point (Dunedin?) succession.

In the southwestern headwaters, both lead and zinc distribution are extremely complex. (Elsewhere lead is relatively uniformly distributed, and independent of formational control.) Reference to Fig. 9 shows a small lead population (median value 79 ppm) which is spatially concentrated over the volcanic-carbonate sequence of Pre-Devonian age as discussed above. Zinc values here are low. (There is a small but distinct population with a median value of 8 ppm zinc.) Immediately to the north, a small drainage yields samples with median values of 190 ppm zinc and 28 ppm copper. Reference to Fig. 5 shows that this correlates with the unnamed shaly limestone of Upper Devonian age, and the zinc values here tend to confirm this correlation.

(c) Prospecting

A total of 32 mandays were spent in prospecting. No lead-zinc occurrences were discovered.

## CONCLUSIONS

A study of analyses of stream silt samples taken at close intervals in conjunction with geologic mapping have shown that zinc values can be broken down into distinctive populations which may then be correlated with variations in the lithology of the underlying bedrock. Since stratigraphic units have been defined in part on the basis of lithology, the use of silt sampling results may serve as a tool in correlation in further mapping. In certain cases, variations in copper content may also be of use in correlation studies.

Respectfully Submitted

Bradford D. Pearson, P. Eng.

Vancouver, B.C.
January 15, 1974

## BIBLIOGRAPHY

Irish, E.J.W.: Halfway River Map-Area, B.C.; G.S.C. Paper 69-11, 1970

Norford, B.S., Gabrielse, H. and Taylor, G.C.: Stratigraphy of Silurian Carbonate Rocks of the Rocky Mountains, Northern B.C.; Bull. Can. Petroleum Geol. 14; 504-519, 1966

Pearson, B.D.: Geological and Geochemical Report on the Perkins, Westoll, Dickie, Grimley and Burnett Groups of Mineral Claims, Lady Laurier Lake, Liard M.D., B.C., 1974

Taylor, G.C.: Report of Activities, 1968; G.S.C. Paper 69-1, Part A, p. 246, 1969

Taylor, G.C. and MacKenzie, W.S.: Devonian Stratigraphy of Northeastern B.C.; G.S.C. Bull. 186, 1970

Taylor, G.C. and Stott, D.F.: Tuchodi Lakes Map-Area, B.C.; G.S.C. Mem. 373, 1973

Westoll, N. and Sullivan, J.: Geological and Geochemical Report on Nabesche River Claim Groups, Liard and Omineca M.D., B.C., 1973

## APPENDIX II

## CONSOLIDATED DECLARATION OF COSTS

| EXPENSES | NABESCHE CLAIM GROUP NO. 1 (40 Claims) | NO. 2 (40 Claims) | NO. 3 (40 Claims) | NO. 4 (40 Claims) |
|---|---|---|---|---|
| Wages and Board | $1,290.00 | $ 430.00 | $1,935.00 | $ 645.00 |
| Helicopter Costs | 1,989.00 | 663.00 | 2,983.50 | 994.50 |
| Geochemical Analyses | 360.09 | 120.03 | 540.14 | 180.04 |
| Report Preparation | 180.00 | 60.00 | 270.00 | 90.00 |
| TOTALS | $3,819.09 | $1,273.03 | $5,728.64 | $1,909.54 |

Declared before me at the City of Vancouver, in the Province of British Columbia, this 14th day of February, 1974, A.D.

Linda Lou Pearson

John Paul Sub-mining Foreman

A Commissioner for taking Affidavits within British C
A Notary Public in and for the Province of British C...

## APPENDIX I

### ITEMIZED MANDAYS OF WORK

| PERSONNEL | SALARY ($/Day) | NABESCHE CLAIM GROUP NO. 1 (40 Claims) | NO. 2 (40 Claims) | NO. 3 (40 Claims) | NO. 4 (40 Claims) |
|---|---|---|---|---|---|
| PEARSON | $62.00 | 2 | 1 | 3 | 1 |
| WILLIAMS | 75.00 | 0.5 | - | 0.5 | - |
| McHALE | 41.00 | - | 0.5 | - | 0.5 |
| SMITH | 36.75 | 5 | 2 | 7 | 2 |
| PERKINS | 21.00 | 4 | 1 | 6 | 2 |
| LEE | 22.00 | 4 | 2 | 6 | 2 |
| KATAYAMA | 75.00 | 3 | 1 | 5 | 1 |
| WONG | 21.00 | 2 | - | 2 | - |
| HUBL | 19.25 | 1 | - | 1 | 1 |
| DICKIE | 75.00 | 0.5 | - | 1 | 0.5 |
| GHANDI | 75.00 | - | 0.5 | 0.5 | - |
| MASTERTON | 23.80 | 1 | 1 | 1 | 1 |
| DRUMMOND | 28.40 | 2 | - | 2 | 2 |
| TOTAL PER CLAIM BLOCK | | 25 | 9 | 35 | 13 |

82 TOTAL MANDAYS

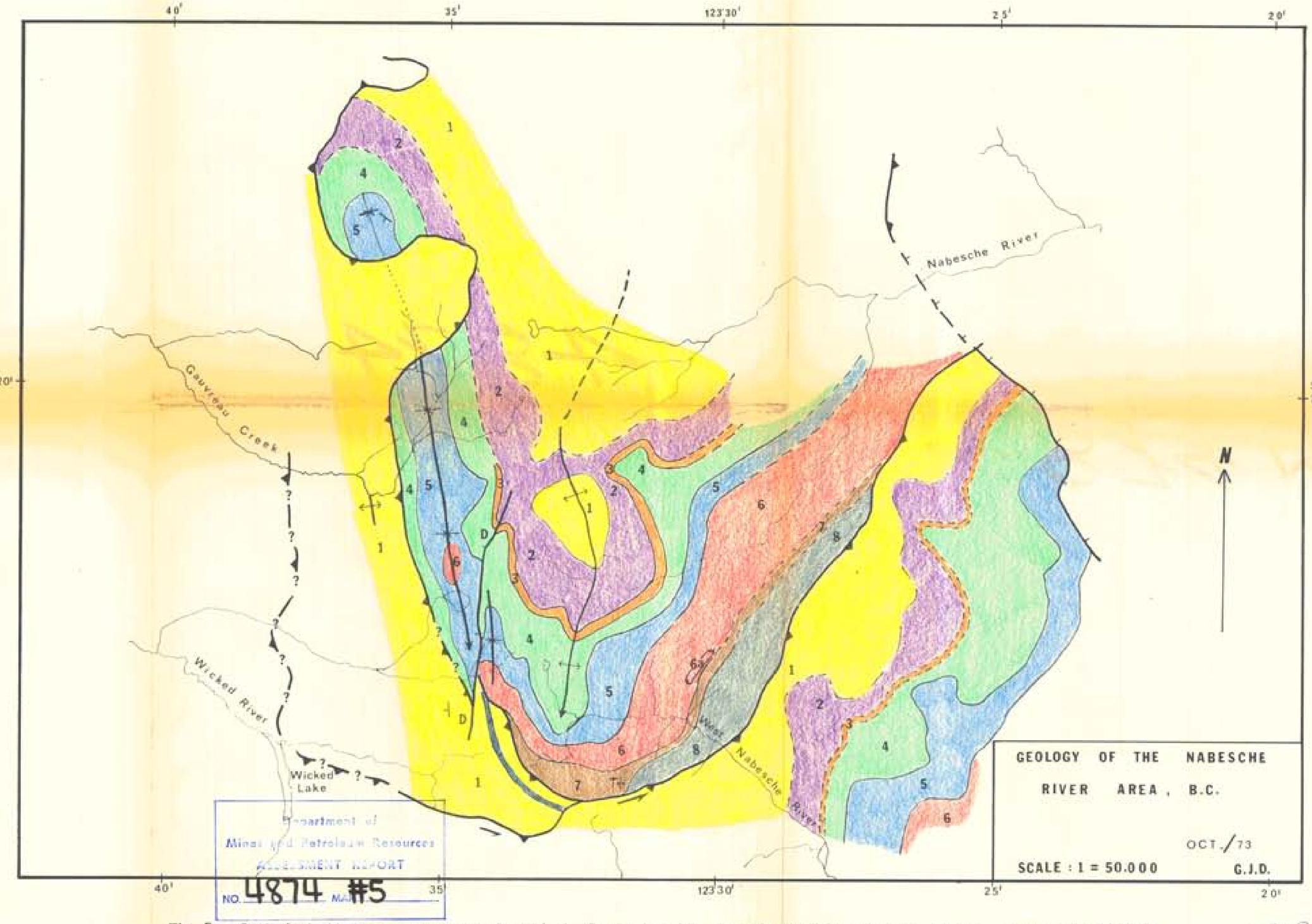



Fig. 5 Geological Map to accompany Geological & Geochemical Report by B. D. Pearson, P. Eng., dated Jan. 15, 1974 on the Nabesche No. 1, 2, 3 and 4 Claim Groups, Liard & Omineca M.D.

B D Pearson

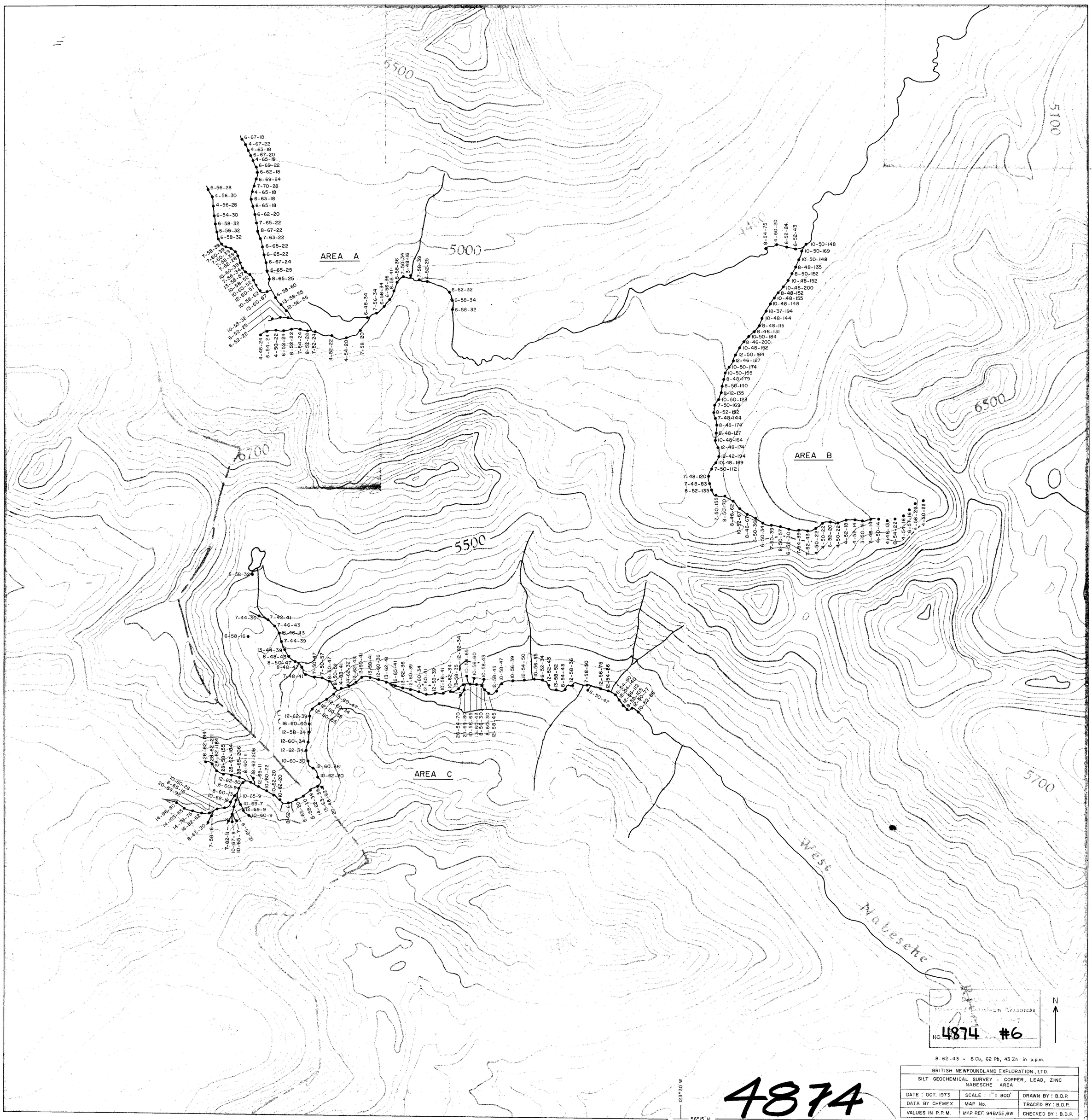
LEGEND

| | | FORMATION | AGE |
|---|---|---|---|
| 8 | Black, thin-bedded fossiliferous shaly limestone | PROTEST | MISSISSIPPIAN |
| 7 | Black, non-calcareous, fissile shale | BESA RIVER | MISSISSIPPIAN TO UPPER DEVONIAN |
| 6 (Σ 6a Σ) | Dark grey-brown shaly limestone, fossiliferous. Reefal unit | ? | UPPER DEVONIAN |
| 5 | Dark grey, richly fossiliferous, recrystallised dolomite | PINE POINT | MID DEVONIAN |
| 4 | Light grey, bedded, non-fossiliferous sandy dolomite | STONE | MID-LOWER DEVONIAN |
| 3 | Brown weathering dolomitic sandstone | WOKKPASH | LOWER DEVONIAN |
| 2 | Grey, thick-bedded non-fossiliferous dolomite | MUNCHO-McCONNELL | LOWER DEVONIAN |
| 1 | Dark grey, well-bedded dolomite, cherty, fossiliferous and sandy in part. Andesitic(?) tuff bed | NONDA | SILURIAN |

SYMBOLS

- Strike and dip (measured)
- Strike and dip (estimated)
- Strike and dip of overturned beds
- Synclinal axis
- Anticlinal axis (with plunge)
- Overturned anticline (with plunge)
- Thrust fault (dip indicated by)
- Thrust fault suspected
- Normal fault D- downthrown block
- Geological boundary observed
- Geological boundary inferred

4874 M5




| BRITISH NEWFOUNDLAND EXPLORATION, LTD. | | |
|---|---|---|
| SILT GEOCHEMICAL SURVEY - COPPER, LEAD, ZINC NABESCHE AREA | | |
| DATE : OCT. 1973 | SCALE : 1" = 800' | DRAWN BY : B.D.P. |
| DATA BY CHEMEX | MAP No. | TRACED BY : B.D.P. |
| VALUES IN P.P.M. | MAP REF. 94B/5E,6W | CHECKED BY : B.D.P. |

Fig. 6 Silt Sampling Map to accompany Geological & Geochemical Report by B. D. Pearson, P. Eng. on the Nabesche No. 1, 2, 3 and 4 Claim Groups, Liard & Omineca M.D., dated Jan. 15, 1974

M6 B.D. Pearson