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92H/5W  
Report on  
GEOLOGY AND GEOCHEMISTRY  
of the  
SF 1-20 Mineral Claims

92H/5W

Harrison Lake Area  
New Westminster M.D.

49°25'N, 121°53'W  
NTS 92H/5W

for

SWIM LAKE MINES LTD. (N.P.L.)

August 16-October 6, 1974

M. J. Fitzgerald  
Min-Ex Services Ltd.  
North Vancouver, B. C.

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Department of	
Mines and Petroleum Resources	
ASSESSMENT REPORT	
NO. 5340	MAP

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## SUMMARY

Geochemical soil sampling on the SF group has revealed the presence of 7 areas with anomalous zinc, copper, and cadmium content. The area of 6 of the anomalies has been geologically mapped and it was found that 3 of the anomalies occur in areas of intermediate to acid pyroclastic rocks which are strongly altered to quartz-sericite-pyrite.

Small amounts of disseminated sphalerite and chalcopyrite have been found in rocks underlying several of the anomalies and the geologic environment appears to be favourable for the occurrence of volcanogenic massive sulfide deposits. Additional geologic mapping, prospecting, fill-in geochemical sampling, an EM survey, and possible bulldozer trenching are recommended.

## INTRODUCTION

The following describes the results of work conducted on the SF 1-20 mineral claims located approximately 10 miles north-northwest of Harrison Hot Springs, B. C., in the New Westminster Mining Division. The work, which consisted of establishment of picket-line grid, geologic mapping, and a geochemical survey was done at the request of the owners, Swim Lake Mines Ltd. (N.P.L.) and Mr. William McCullagh.

Work completed during 1973 on the SF group revealed the presence of extensive zinc anomalies in soil and the 1974 work programme was intended to determine the extent of the anomalies and to map the exposed rocks within and near the area of anomalous geochemical response.

The work was supervised and conducted in part by the writer. The grid work and geochemical sampling was done by personnel of Min-Ex Services Ltd. and Atled Exploration Management Ltd.

## CLAIMS

The SF 1-16 claims are owned by Swim Lake Mines Ltd. (N.P.L.) and the SF 17-20 claims are owned by William McCullagh, a director of Swim Lake Mines Ltd. Data on the claims are as follows:

<u>Claim</u>	<u>Record Number</u>	<u>Expiry Date</u>	<u>Mining Division</u>
SF 1-14	28219-28232, incl.	Dec. 4, 1974	New Westminster
SF 15-16	28982-28983	Dec. 3, 1974	" "
SF 17-20	29200-29203	May 22, 1975	" "

The claims form a contiguous block; layout of the claims and location of the grid are shown on Fig. 2.

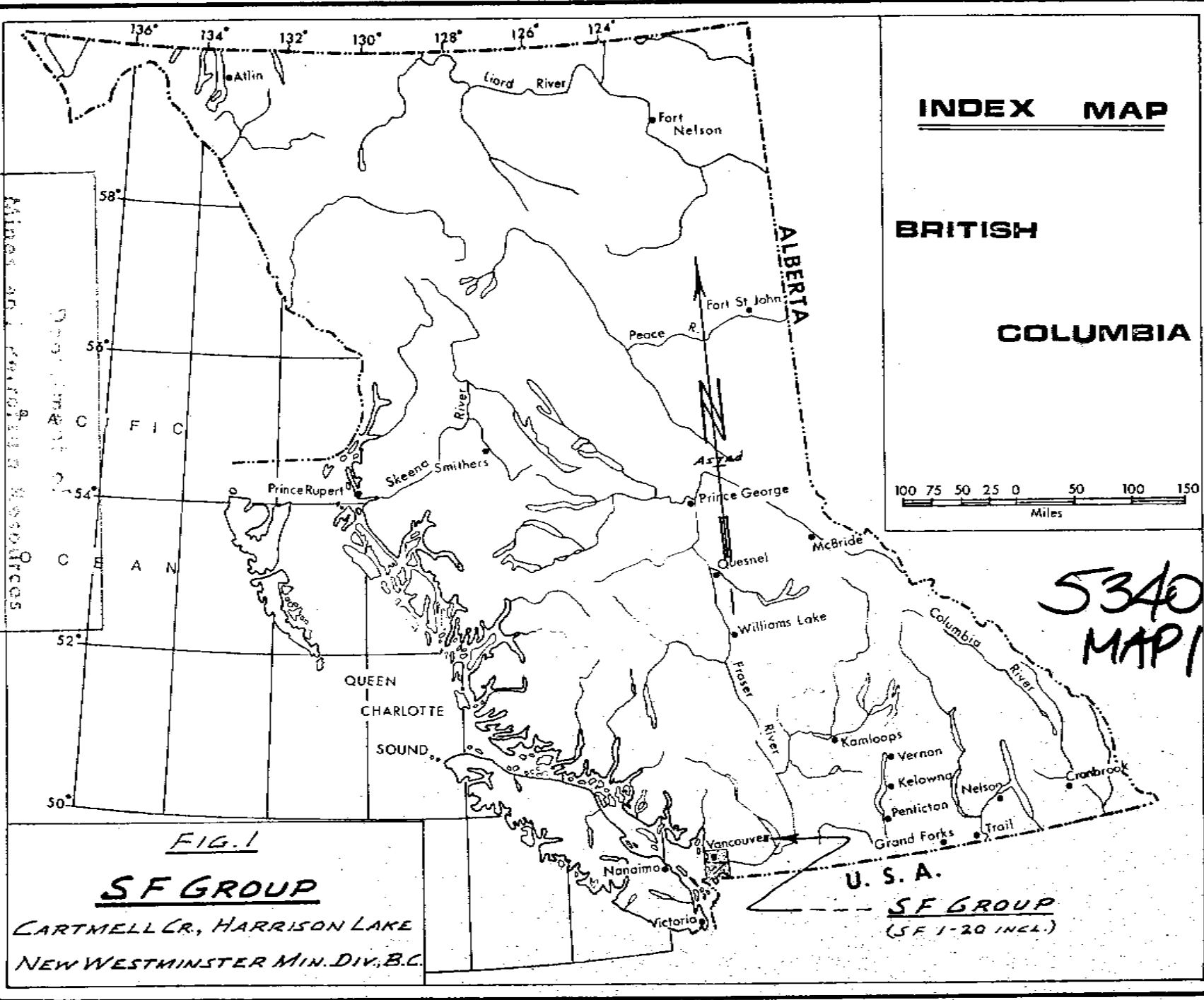
## LOCATION AND ACCESS

The SF claim group is located approximately 10 miles north-northwest of Harrison Hot Springs and 2 miles west of Harrison Lake. Access is by 22 miles of fair to good gravel road from B. C. Highway 7. The access road leaves Highway 7 near Harrison Mills and extends northward beyond Cartmell Creek to join the Weldwood

NO. 5340 MAP #1

ACCESSIBLE REPORT

MINES AND GEOLOGICAL RESOURCES



**INDEX MAP**

**BRITISH COLUMBIA**



5340  
MAP 1

FIG. 1

**SF GROUP**

CARTMELL CR., HARRISON LAKE  
NEW WESTMINSTER MIN. DIV., B.C.

U. S. A.

**SF GROUP**  
(SF 1-20 INCL.)

south haul road. The latter road is followed 2-1/2 miles westerly to the property. During dry weather, all roads are passable by most 2 wheel-drive vehicles. Numerous branch logging roads provide convenient access to most parts of the claim group.

The local terrain is only moderately rugged and topographic relief on the claim group is less than 1000 feet. Most of the area has been logged within the past few years and only a small portion is covered by mature timber. Due to general dense second growth, about one-half of the property is difficulty accessible and the remainder is moderately accessible.

#### PAST WORK

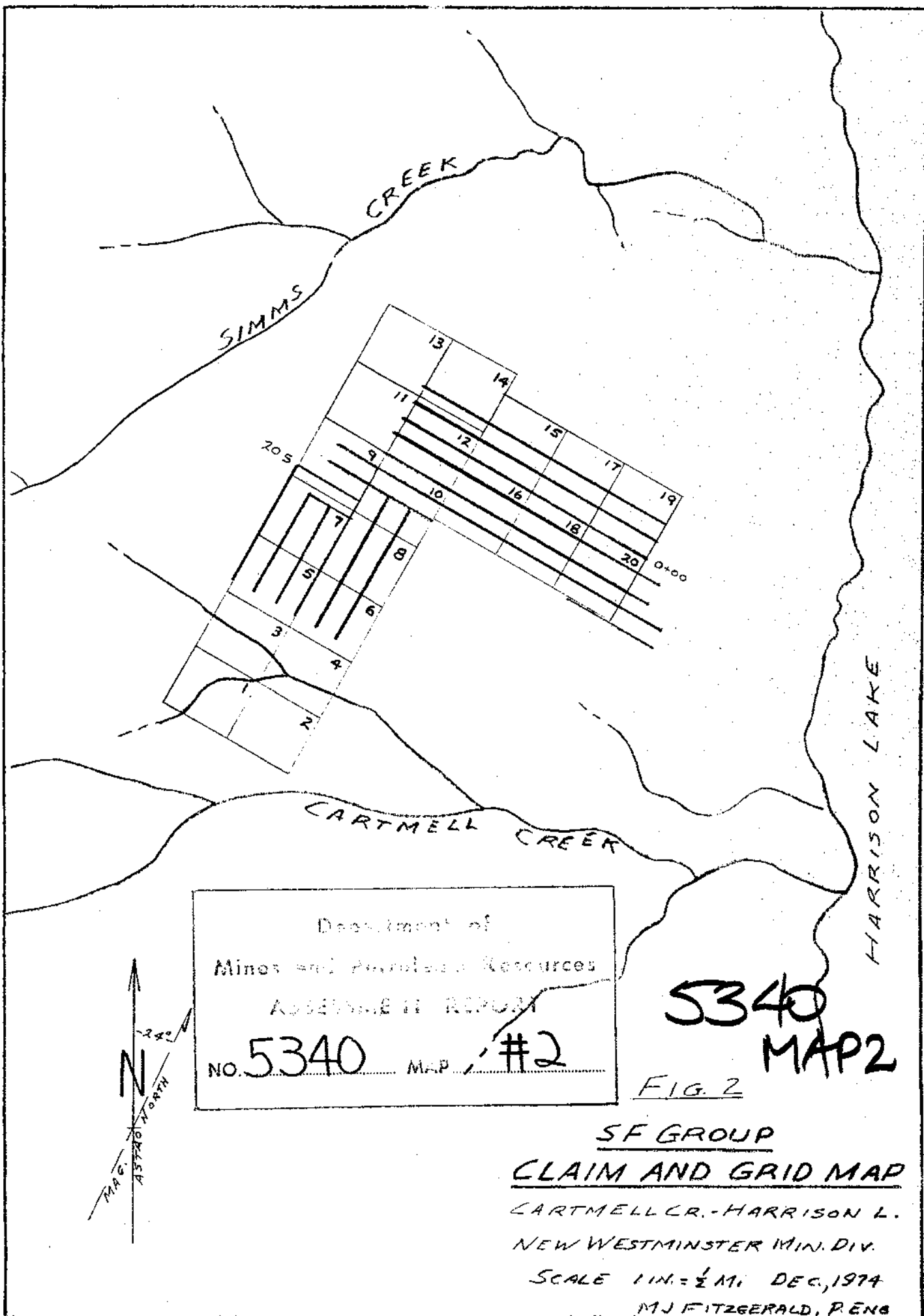
A minor amount of reconnaissance soil sampling and field testing is known to have been conducted in the area of the claim group during the 1964-66 period but other than the presence of a few old pits there is no record or evidence of exploratory work prior to 1972. Work at the time of staking the original SF 1-14 claims consisted of a geochemical traverse and mapping of outcrops along the main access road. During 1973 the SF 15 and 16 claims were staked, 13,100 feet of line was cut and marked, and 166 soil and 23 rock chip samples were collected.

The geochemical results indicated the presence of an east-southeasterly trending zone 2600 feet long by 700 feet wide which contains zinc values in soil above the threshold anomalous level. Six areas with strongly anomalous zinc content lie within the area of threshold anomalous content.

The SF 16-20 claims were staked during May, 1974 and work was begun during August to determine the extent of the anomalous area and to begin geologic mapping of the claim group.

#### GRID

Flagged picket lines were used to expand the 1973 grid to the north, east, and west during the 1974 work programme. In addition, a new base line 4000 feet long was cut along the western claim line and five parallel picket lines were established to investigate the SF 5-10 claims. The original base line was designated the East Base Line and the related grid (1973 and 1974) was designated the North Grid. The new base line was designated the West Base Line and the related grid was designated the South Grid. All line was run using a compass and Topofil chain.



Department of  
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5340  
 MAP 2

FIG. 2

SF GROUP  
CLAIM AND GRID MAP  
 CARTMELL CR. - HARRISON L.  
 NEW WESTMINSTER MIN. DIV.  
 SCALE 1 IN. = 1/2 MI. DEC, 1974  
 M.J. FITZGERALD, PENG

Tie lines were carefully run along Lines E15 and E45 on the North Grid and were also run on Lines S24 and S45 on the South Grid in order to provide better control. Based on the tie lines, the North and South Grids were adjusted on a best-fit basis. A total of 49,100 feet of picket line grid was established.

## GEOLOGY

### Regional

The area west of the southern portion of Harrison Lake is underlain by an 11-mile wide, northwest trending belt of volcanic and volcanic epiclastic rocks mapped by the G.S.C. as the Harrison Lake formation of probable Middle Jurassic age (Monger, 1970). Regional mapping was carried out by the B. C. Department of Mines in the area south of the SF claims in 1972 (Thompson, 1972) and the rock classification used in this report generally follows that established by the Department of Mines personnel.

The Harrison Lake formation is part of a eugeoclinal assemblage of marine-clastic and volcanic rocks which evolved from probable Middle Devonian through Middle Cretaceous time. This depositional regime was ended by widespread and intense orogenic activity from Early to mid-Late Cretaceous time. The Harrison Lake formation west of Harrison Lake comprises a complexly interdigitating pile of volcanic, volcanoclastic, and epiclastic rocks which range from porphyritic flows to sandstones and conglomerates (Thompson, 1972). The total estimated stratigraphic thickness of the formation is in excess of 9240 feet.

Monger reports that the unit is folded in broad, open, roughly northeast trending folds. Dips range from horizontal up to 70° and faults are common. The base of the formation is exposed on the west side of Harrison Lake 3 to 4 miles southeast of the claim group.

Examination of air photos covering the general area of the SF claims reveals the presence of strong linear drainage trends which are interpreted as zones of faulting and fracturing. The most prominent linear feature is the striking northeast trend of Simms Creek one mile northwest of the northern portion of the SF group. This northeast trend is reflected in a drainage which crosses the SF 10 and 16 claims.

Northwest linear trends are also evident on the photos in the area between the Simms Creek and the last-mentioned drainage. These northwest trends are interpreted to be a reflection of northwest



fracturing (or faulting) and, as described below, geochemically anomalous trends closely follow this northwest linear zone, lying parallel to and on the north side of the most prominent northwest linear.

### Property

The B. C. Department of Mines (Thompson, 1972) used a rock classification based on origin (volcanic, volcanoclastic, epiclastic) and composition (rhyolite, dacite, andesite) during the 1972 mapping. The pyroclastic rocks were further subdivided into groups based on movement or lack of it from the site of deposition (primary, secondary) and on size (tuff, lapilli, breccia). Due to the limited size of the area mapped and the lack of thin section identifications, the writer used a simpler field classification of the observed rocks. This classification is shown on Plate I and is reproduced below:

Sedimentary Rocks	conglomerate bedded tuff
Pyroclastic Rocks	acid (rhyolitic?) tuff intermediate (dacitic?) tuff and breccia basic (andesitic?) tuff and breccia
Flow Rocks	andesite andesite porphyry
Intrusive Rocks	diorite

The volcanoclastic rocks were termed tuffs regardless of the size of the fragments and those units with rock fragments greater than  $\frac{1}{4}$  inch across were termed tuff breccias.

The geologic mapping was confined to the North Grid and covered approximately 90% of the area of the Grid. The dense second growth over most of the Grid made mapping slow and difficult. Traverses were made along grid lines and although an attempt was made to cover the area between the lines, some outcrops were undoubtedly missed. The mapping was conducted at a scale of 1 inch = 100 feet and was reduced for presentation on Plate I at a scale of 1 inch = 200 feet. A description of the rock units follows:

## Flow Rocks

### Andesite and Andesite Porphyry

The andesite flows are generally dark greenish gray, massive, and fine grained. Flow breccia is evident locally and thin bedded andesite was found intercalated with tuff at one locality.

The andesite porphyry unit is similar to the andesite except in that it contains white feldspar phenocrysts up to 0.15 inches long. The andesite porphyry, which is much less abundant than the non-porphyrific andesite, is uniformly massive and blocky.

The two flow units are found largely in the eastern portion of the grid, southeast of 25E on the grid lines. Several small exposures are also found on the 4N line northwest of 4W. The andesite flows locally contain fine grained pyrite but in general are unmineralized and unaltered except for weak chloritization of mafics.

Observed flow bedding indicates that this unit generally strikes west to west-northwest and dips  $19^{\circ}$  to  $45^{\circ}$  to the south over most of the grid; however, strikes of  $N45^{\circ}E$  and  $N60^{\circ}W$  with dips of  $60^{\circ}E$  and  $13^{\circ}S$ , respectively, were measured in the extreme southern portion of the grid.

## Pyroclastic Rocks

### Basic Tuff

Rocks termed basic tuff are restricted to the northern portion of the grid, largely along Line 8N and northwest of 4E. In hand specimens, rocks of this unit consist of light coloured feldspathic fragments in a fine grained, dark greenish black matrix. Locally, fragments in this unit become quite large (to 5 inches across) and these outcrops are shown as basic tuff breccia on Plate I.

Bedding is not evident in rocks of this unit and the rocks weather to an uneven, rubbly surface. Except for very local pyrite, the basic tuff is unaltered and unmineralized.

### Intermediate Tuff

Rocks designated as intermediate tuff occur largely east of the East Base Line. Where unaltered or weakly altered, they consist of fragments ranging from sand-size to blocks several inches across set in a medium gray, crystal tuff matrix. In some areas the

coarser fragments appear to be of the same composition as the crystal matrix while in others the coarser fragments are darker coloured and appear to be of more basic composition than the matrix.

Unmineralized and unaltered intermediate tuff is present in the southernmost portion of the North Grid and alteration increases progressively to the north and west (Plate II).

As alteration increases, coarser fragments are increasingly silicified and often contain abundant disseminated pyrite although the matrix remains unaltered and unmineralized. In these instances, the coarser fragments may have been derived from earlier mineralized rocks which were incorporated into the unmineralized matrix during a post-mineralization explosive event. Further to the north, however, both coarser fragments and matrix are uniformly altered to chlorite-sericite-clay or to quartz-sericite-pyrite suggesting that two periods of alteration took place or, alternatively, that the coarser fragments were more susceptible to alteration than the matrix.

Rocks mapped as intermediate tuff are present within the central area of intense alteration but, due to the difficulty of recognizing strongly altered rock units in hand specimen, there may be some confusion with rocks of the acid tuff unit in this area.

Rocks of the intermediate tuff unit are massive and no bedding is apparent.

#### Acid Tuff

Rocks of the acid tuff unit are present throughout the North Grid except in the extreme southern and northern portions. The unit is generally fine grained and visible coarser fragments are rare. Where unaltered, the rocks are composed of shards and fine crystal fragments and usually contain small rounded quartz grains or crystals which have the appearance of phenocrysts. Feldspar crystals (phenocrysts?) up to  $\frac{1}{4}$  inch long are also present locally giving the rocks the appearance of a quartz-feldspar porphyry in hand specimen.

The unaltered rocks are light to medium gray in colour, massive, blocky, and weather to a white colour. No bedding is evident in rocks of this unit. The acid tuff usually exhibits some hydrothermal alteration and over large areas is intensely altered to very fine grained quartz-sericite-pyrite rock. This alteration is so complete that only the rounded quartz crystals are unaffected. In fact, in the area of intense alteration, the presence of rounded quartz "phenocrysts" is the only sure means of identifying the acid tuff unit.

Outside the zone of intense quartz-sericite-pyrite alteration, rocks of the acid tuff unit exhibit varying degrees of alteration ranging from the development of sericite-clay+pyrite to chlorite-epidote-pyrite before alteration dies out completely. Pyrite content of the acid tuff ranges from nil in unaltered phases to 3-15% in the areas of intense alteration.

### Sedimentary Rocks

#### Waterlain Tuff

Rocks of this unit are confined to the vicinity of Line 8N from 10E to 16E in the east-central portion of the North Grid. These rocks are well bedded and grainy, consisting of rounded fragments of quartz and feldspar. Locally the unit is conglomeratic with pebbles and fragments up to 2 inches across. Alteration of the waterlain tuffs is minor, ranging from very weak development of chlorite and sericite to very local moderate development of sericite and clay. These rocks weather to a light tan colour and the bedding attitudes average about N90°E with dips of approximately 35°SW.

#### Conglomerate

One small area of bedded tuff conglomerate was noted centred on 8S/39E. The rocks consist of rounded pebbles to 3 inches across in a fine grained, tuffaceous matrix. The pebbles are altered to quartz, sericite, and clay and contain epidote, limonite, pyrite and local possible sphalerite. The matrix is unaltered and unmineralized.

Small exposures of limonite-stained conglomerate are present below glacial drift elsewhere within the North Grid, mainly in road cuts, but these are believed to be very young geologically and no attempt was made to determine their extent.

### Intrusive Rocks

#### Diorite

One exposure of medium grained diorite was mapped near 0+00/15W. This rock, which is somewhat foliated, contains a trace of pyrite and the mafics are strongly altered to chlorite.

### Structure

Bedding attitudes in the two units in which bedding could be seen (andesite and waterlain tuff) indicate the rocks in the volcanic pile generally strike easterly and dip to the south at attitudes of 20° to 45°. It is not known if these attitudes reverse to the north.

Two fracture sets are evident in rocks within the grid. The dominant set strikes N30°W to N30°E and dips range from 70°W through vertical to 70°E. The secondary set strikes from N60°W to S60°W, dips 65° to 80° south in the western portion of the grid, and generally dips 75° to 80°N in the eastern portion of the grid. The fractures are often stained with limonite but, with only a few exceptions, most do not appear to have contained sulfides.

Only one definitely faulted zone was mapped. This zone is located at 4S/26E and separates intermediate tuff from acid tuff. The fault, which strikes N45°E and dips 80°NW, could not be traced to the northeast or southwest. It lies, however, at the base of prominent cliffs which trend northerly through the grid and may be of considerable importance. These cliffs generally divide strongly altered tuffs to the northwest from unaltered to weakly altered tuffs and andesite flows to the southeast and may represent a fault line scarp.

#### Hydrothermal Alteration

As mapping progressed, notes were kept on the type and strength of hydrothermal alteration in each exposure. These notes were compiled into the alteration map shown as Plate II. The various areas outlined on Plate II are labeled by the characteristic alteration minerals in each. These areas can be further classified into an alteration zoning scheme as follows:

<u>Zone</u>	<u>Characteristic Assemblage</u>
Central	quartz-sericite-pyrite (including strong silicification)
Intermediate	sericite-clay-chlorite(-pyrite)
Peripheral	chlorite-pyrite

It should be noted that the alteration assemblages shown on Plate II are based on hand lens identification supplemented only by minor binocular microscope examination.

The central zone of strong quartz-sericite-pyrite is arc-shaped, concave to the south. This zone is underlain largely by acid tuff. The alteration zoning is by no means classic as the central zone is variously bounded by unaltered rocks as well as by alteration assemblages of the peripheral and intermediate zones. The northwest portion of the central zone is characterized by intense silicification, minor sericite, and abundant pyrite.

Several areas within the central zone are characterized by minerals of the intermediate zone and, based on only one exposure, a zone with only chlorite alteration and with no accompanying pyrite may be present on the interior edge of the concave side of the central zone.

The amount of pyrite varies within the alteration zones and is locally strong (+10%) in all zones (but not in unaltered rock). However, within the central alteration zone, pyrite content is consistently moderate to strong (5% to 15% by weight) and is consistently weaker in the intermediate and peripheral zones. The pyrite is generally in the form of fine disseminations (90%) although a minor portion is in the form of veinlets.

#### Sulfide Mineralization

Pyrite has been treated in preceding sections as an alteration mineral but is also discussed in this section. The areas of central and intermediate zone alteration are generally underlain by rocks which are bleached and have a red, brown, or tan limonite-stained surface. Surface oxidation and leaching are strong in the central zone and oxidation of sulfides there is often 80%-100% complete. Where alteration is less intense and pyrite content less, oxidation is considerably weaker and 30% to 50% of the sulfides present are preserved.

The presence of small amounts of disseminated black sphalerite is suspected at a number of localities within the area of central zone alteration but no exposures of massive mineralization were found. Very small amounts of disseminated chalcopyrite were seen at a number of localities but in no instance was the content significant.

The widespread anomalous zinc content in soil within the area of the North Grid suggests strongly that significant zinc mineralization is present in bedrock in the area. The intense oxidation within the central zone coupled with the extreme solubility of sphalerite and the presence of strong alteration suggests that the limited presence of sphalerite in the mapped exposures is not necessarily a negative factor. It does seem unlikely to the writer, however, that the strong geochemical values in the extreme southern portion of the grid are closely related to a bedrock zinc source as rocks there exhibit little evidence of hydrothermal alteration or sulfide mineralization. The chance of finding significant zinc mineralization within or near the zone of central alteration is believed to be excellent.

## General

The observed assemblage of andesitic flows, flow breccias and basic to acid tuffs overlain by waterlain tuff and conglomerate coupled with widespread, intense alteration suggest that the geologic environment is one favourable for the occurrence of massive sulfide deposits. Known showings in nearby areas and the great dominance of zinc over copper or lead in the soil geochemical results suggest that mineralization at shallow depth would be largely zinc-bearing.

## GEOCHEMICAL SURVEY

### History

Reconnaissance soil sampling along the main access road and along claim location lines during November, 1972 revealed the presence of three areas with anomalous zinc-in-soil in the area of the claim group. These areas are located on the SF 12, SF 8, and SF 1-4 claims. Follow-up work during 1973 was concentrated on the SF 10, 12, 15 and 16 claims. Open anomalies on the SF 15 and 16 claims led to staking of the SF 17-20 claims during May, 1974. Geochemical surveys during 1974 covered portions of the SF 17-20 and SF 5-10 claims. All 1972 and 1973 samples were analysed for zinc and copper and, in addition, 43 of the 1973 samples were analysed for silver content, 28 were analysed for cadmium content, and 15 were analysed for lead content.

### Soil conditions and survey procedure

The area of the SF group has been glaciated and very little, if any, residual soil is present. The overburden cover consists largely of unsorted glacial till of variable thickness although an apparently persistent conglomerate horizon with a clayey matrix was noted in the central portion of the survey area. The intercalated conglomerate horizon appears to be rather impermeable and anomalous geochemical results in the central portion of the grid were quite surprising to the writer.

A two-man crew was used to simultaneously establish a flagged picket line and collect soil samples. Samples were taken at 100-foot intervals along the base lines and along cross-lines which were established at 400-foot intervals. A total of 431 soil and 11 rock chip samples were collected.

The soil samples were collected in kraft paper bags and the grid location of each sample was marked on the exterior of the bag. Notes recording sample depth, horizon sampled, type of soil, and

moisture were also kept on the exterior of the specially designed bags. In locations where sufficient fines could not be found or organic material was too thick to reach the "B" soil horizon, no samples were taken. Care was taken to sample the "B" soil horizon below the leached "A" zone.

The glacial drift in the area of the survey ranges from yellow-brown to grey-brown to red in colour. Throughout most of the grid area, the drift is limonite-stained. The "A" soil horizon is usually distinctly lighter in colour (leached) than the underlying "B" horizon. Sample depths on grid locations ranged from 6 to 12 inches and average approximately 8 inches. Plots of sample depth vs. metal value show no positive correlation.

The soil samples were taken to Chemex Labs Ltd. and each was analysed for copper and zinc content. In addition, 31 of the samples were analysed for silver and cadmium content. Each sample was screened to -80 mesh and a 0.5 gm portion was digested with a mixture of nitric and perchloric acids. After dilution to 25 ml., metal content was determined using a Tectron AA5 atomic absorption spectrophotometer.

The rock chip samples were pulverized to -100 mesh and were then treated in the same manner as the soil samples.

Results of the 1974 and 1973 surveys are shown on Plates III to VI. Zinc, cadmium, and silver results are shown on Plate III for the North Grid and Plate V for the South Grid. Copper results are shown on Plate IV for the North Grid and Plate VI for the South Grid.

## Discussion of Results

### Background and Anomalous Value Ranges

No regional soil sampling has been conducted by the writer in the Harrison Lake area but samples from the northern portion of the North Grid and from the South Grid suggest that the regional zinc background is probably in the 40-55 ppm range. Histograms of zinc content in soil indicate that local background in the area surveyed is 65 ppm. Threshold anomalous values were selected at 135-184 ppm, anomalous at 185-244 ppm, and strongly anomalous at 245 ppm and above.

Copper results indicate that the local background is 17 ppm; threshold anomalous values were selected at 35-54 ppm, anomalous at 55-69 ppm, and strongly anomalous at 70 ppm and above.

Sampling during 1973 indicated cadmium background in the area was probably less than 0.2 ppm. Of 28 samples analysed, the highest values received from the 1973 analyses was 0.8 ppm. The



31 samples analysed for cadmium during 1974 returned a much greater spread in values, ranging from less than 0.2 ppm to 28.0 ppm. The lowest values seem to compare well with those received in 1973 and the cadmium background is still considered to be less than 0.2 ppm. Samples containing 0.5 ppm or more are considered anomalous and those containing more than 2 ppm are considered to be strongly anomalous.

Silver analyses of the 1974 samples correspond closely with those determined in 1973. Background values are less than 0.5 ppm and values in excess of 0.5 ppm may be significant.

#### Zinc - North Grid

The combined 1973-1974 results of sampling in the North Grid area indicate the presence of three large areas of threshold anomalous zinc content or greater. These areas are aligned in a S60°E direction along the long axis of the grid. Two of the large areas are closed-off within the limits of the grid; the third extends off the grid in three directions (Plate III)

Within the three areas of threshold anomalous zinc content are six sizeable areas containing strongly anomalous zinc content. All six zinc-anomalous areas are at least partially coincident with copper anomalies and all contain anomalous cadmium. Both copper and cadmium are less mobile than zinc in an oxidizing environment and the areas of coincident anomalous zinc, copper, and cadmium content are believed to be of greatest interest. The location and size of the zinc anomalies together with the peak values in zinc, copper, and cadmium are as follows:

<u>Anomaly</u>	<u>Grid Location</u>	<u>Size (feet)</u>	<u>Peak Values</u>		
			<u>Zinc (ppm)</u>	<u>Copper (ppm)</u>	<u>Cadmium (ppm)</u>
A	0+00/7W	900 x 60	800	86	0.8
B	0+00/2E	450 x200	1280	64	0.8
C	0+00/6E	700 x400	854	70	0.7
D	4S/15E	500 x400	1760	94	0.6
E	0+00/30E	1000 x400	1260	528	2.0
F	8S/43E	2200 <sup>+</sup> x400 <sup>+</sup> , 1200 <sup>+</sup> x500 <sup>+</sup> , irregular	3470	620	28.0

Anomaly A lies within an area of chlorite-pyrite alteration and rock exposures within and near the anomaly consist of intermediate tuff and basic tuff breccia. Areas of strong central zone alteration lie to southeast, south, and west. Possible bedrock zinc mineralization may be related to an unexposed vein system.

Anomaly B crosses the boundary between strong central zone quartz-sericite-pyrite alteration and strong sericite-clay-pyrite alteration. Acid tuff with suspected disseminated sphalerite is exposed within the area of the anomaly.

Anomaly C lies almost entirely within the area of central zone alteration. Rocks exposed are acid and intermediate tuffs containing strong disseminated pyrite. The anomaly is definitely worthy of further investigation.

Anomaly D lies entirely within the area of strong central zone alteration. Rocks exposed consist of acid tuffs with moderate to strong disseminated pyrite. Oxidation of sulfides is very strong in this area and further investigation is warranted.

Anomaly E is puzzling as it lies largely in an area of unaltered rocks. Only a few exposures are present within the anomaly, however, and further investigation may be warranted as the anomaly lies just east of an area of moderate quartz-sericite-clay-chlorite alteration.

Anomaly F is even more puzzling than Anomaly E as it lies entirely within an area of unaltered rocks. Most of the anomalous area is covered by surficial deposits (90%) but nearly all rock types mapped are present within its limits. The area of the anomaly is low-lying and a major drainage trends down a portion of it. The very high zinc, copper, and especially, cadmium content of portions of the anomaly, however, indicate that this area cannot be ignored. Cadmium is closely associated with sulfide zinc (sphalerite) and, due to its lesser mobility, tends to remain behind after the zinc has been mobilized by oxidation. As a consequence the high (28 ppm) cadmium content of a portion of the anomaly may be very significant.

#### Copper - North Grid

The combined 1973-1974 results of sampling in the North Grid area indicate the presence of six general areas containing threshold anomalous copper content or greater. All contain at least one sample having anomalous or strongly anomalous copper content and all are associated with areas of anomalous zinc content.

The results of the copper analyses are shown in digital and contoured form on Plate IV. The copper anomalies are smaller and more restricted in area than the corresponding zinc anomalies. In the anomalies defined by the 1974 sampling, the location of the highest copper content corresponds closely with the highest cadmium content. The copper results suggest strongly that, although they are of rather low absolute content, further investigation of the zinc anomalies should be centred on the portions which also contain anomalous copper content.

### Zinc - South Grid

Results of the 1974 sampling on the South Grid are shown on Plate V. The results reveal the presence of three significant east- to northeast-trending zones with strongly anomalous zinc content. The location, size, and peak values for zinc and associated copper and cadmium of the anomalies are as follows:

<u>Anomaly</u>	<u>Grid Location</u>	<u>Size</u> <u>(feet)</u>	<u>Peak Values</u>		
			<u>ppm Zn</u>	<u>ppm CU</u>	<u>ppm Cd</u>
G	20S/ 7W	1400x200	1840	332	6.8
H	5W/26S	600x100	1080	68	1.5
I	5W/40S	900x100	1080	56	<0.2

Anomalies H and I trend downslope and the lack of close correspondence with copper anomalies suggests that they are caused by localized sources and are exaggerated by downslope seepage. Anomaly G trends across slope in part and is largely coincident with anomalous copper and cadmium content. No geologic mapping has been conducted on the South Grid so further interpretation is not possible but it appears likely that Anomaly G is caused by a linear mineralized zone and further investigation is definitely warranted.

### Copper - South Grid

Results of the 1974 sampling on the South Grid are shown on Plate VI. Four areas of anomalous copper content are evident in the results. The northernmost anomaly is closely coincident with zinc anomaly G and strongly supports it. The next anomaly to the south is much weaker and is coincident only with the upslope end of zinc Anomaly H suggesting that Anomaly H is largely due to downslope seepage. The remaining two anomalies are quite weak and coincide only in part with zinc Anomaly I. It is probable that the zinc and copper anomalies in the Anomaly I area represent localized sources.

### Lead - North Grid

The lead content of 15 soil samples was analysed during 1973 with results ranging from 20 to 46 ppm. The low lead content showed little relation to zinc content and the 1974 samples were not analysed for lead.

### Silver - North and South Grids

The silver content of 43 samples was determined during the 1973 survey and the content of an additional 31 samples was determined during 1974. Of the 74 samples analysed, 55 contained less than 0.5 ppm and it is concluded that background values are

less than 0.5 ppm. The highest silver content determined in the 1974 samples analysed was 1.5 ppm and the significance of the weakly anomalous silver content at several locations is uncertain.

#### Cadmium - North and South Grids

Due to the relatively high mobility of zinc in sulfide environments, the cadmium content of all 1973 samples containing in excess of 200 ppm zinc was determined in an attempt to more closely pinpoint the bedrock source of the geochemical anomalies. During 1974, the cadmium content of an additional 31 samples containing in excess of 200 ppm zinc was determined. Cadmium is closely associated with sulfide zinc (sphalerite) and due to its lesser mobility, tends to remain behind after zinc has been mobilized by oxidation.

Although all samples analysed for cadmium contained anomalous zinc, 14 of 59 analysed contained less than 0.2 ppm Cd. Because of these results and the general very low geochemical content of zinc in rocks in the southwestern part of the province, the background for cadmium is considered to be less than 0.2 ppm.

Anomalous cadmium content was detected in all but one of the zinc anomalies described herein. Unexpectedly, strongly anomalous cadmium is present in two zinc anomalies which lie in areas of unaltered rocks. These two zinc anomalies (F and G) would probably not warrant further work except for the accompanying strongly anomalous copper and cadmium content. The anomalies may possibly represent mineralization at a flat-lying altered-unaltered interface which lies at shallow depth.

#### CONCLUSIONS

Although the stratigraphic succession has not yet been determined, the presence of basic to acid pyroclastic rocks, post-pyroclastic waterlain tuffaceous sediments, and strong alteration zoning suggests that an environment favourable for the occurrence of volcanogenic massive sulfide deposits exists within the claim group which is similar to that further south near known deposits on the Chehalis River. The numerous zinc-in-soil anomalies, supported in part by coincident anomalous copper and cadmium content, strengthen the hypothesis although no occurrences have yet been found on the claim group. The geochemical values suggest any massive sulfide deposits present will contain predominant zinc with subordinate copper values.

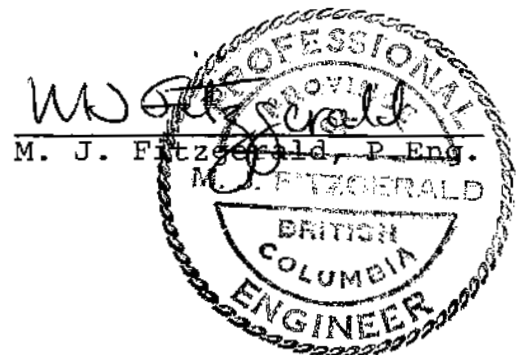
The zinc anomalies warranting further investigation are B, C, D, and G. Questionable anomalies whose metal content is of a magnitude that further work to assess their validity is warranted are A, E, and F.

RECOMMENDATIONS

The following work programme is recommended in the area of the zinc anomalies:

1. Conduct further detailed geologic mapping and careful prospecting in the area of zinc anomalies A-G. If favourable rocks or showings are found in the areas of Anomaly G, expand the North Grid to the south and east and stake additional claims, if necessary.
2. Conduct fill-in geochemical sampling so that zinc-anomalous areas are covered by a sampling grid with stations 100 feet apart on lines 200 feet apart.
3. Conduct an electromagnetic (EM) test survey in the area of the zinc anomalies using shootback-type equipment to determine if conductive zones are present. It should be noted that the conductivity of any massive sulfide bodies present will be dependent on the presence of pyrite or base metals other than sphalerite as the latter is usually non-conductive. The survey should be expanded if positive results are encountered.
4. Conduct bulldozer trenching in the area of any shallow conductors found by the EM survey to determine the nature of mineralization present.

Drilling would be indicated if the recommended work programme is successful in finding significant mineral showings and defining drilling targets.



STATEMENT OF EXPENDITURE

Min-Ex Services Ltd., August 29, 1974 Geochemical Survey	\$1,263.69
Min-Ex Services Ltd., November 21, 1974 Geochemical Survey, Geologic Mapping, Map Preparation, Report	3,042.98
Chemex Labs Ltd.	
Invoice # 11387 - \$ 45.75	
12378 - 382.72	
12551 - 111.83	
12586 - 28.80	
12638 - 41.85	
12642 - 11.03	
12732 - 19.80	
12841 - 135.45	
13222 - 15.50	
	<u>792.73</u>
	<u>\$5,099.40</u>

Personnel

Dates Worked on Property

Kerry McCullagh

August 16-23, October  
4-6, 1974

Matthew Fitzgerald

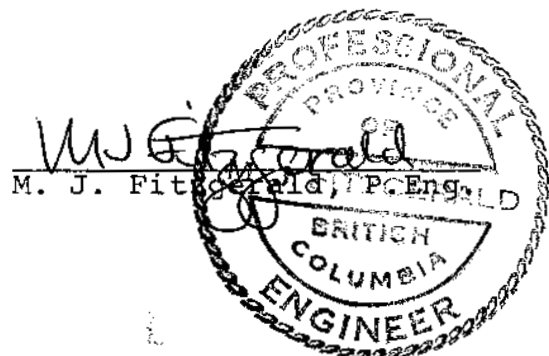
August 15-23, October  
4-6, 1974

Pat Henry

August 16-20, 1974

M. J. Fitzgerald, P.Eng.

August 16-17, 21-22,  
September 26-27, October  
4-6, 1974



A P P E N D I X

Geochemical Results

Invoices



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212 BROOKSBANK AVE.  
NORTH VANCOUVER, B.C.  
CANADA  
TELEPHONE: 985-0648  
AREA CODE: 604

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## CERTIFICATE OF ANALYSIS

TO: Mr. Wm. McCullagh  
Ste. B. 101 - 535 Thurlow St.,  
Vancouver, B. C.

CERTIFICATE NO. 26808

INVOICE NO. 11387

RECEIVED May 21/74

ANALYSED May 28/74

ATTN: cc: Min-Ex Services

SAMPLE NO. :		PPM Copper	PPM Zinc		
ON	16E	20	375	20	
	17	14	360	20	
	18	50	174	20	
	19	20	160	20	
	20	7	86		
	21	10	89		
	22	16	330	20	
	23	6	77	20	
	24	20	206	20	
	25	14	160	20	
	27	520	1260	20	
	35	20	164	20	
	37	10	248	20	
	38	12	160	20	
	39	8	184	20	
	40	8	248	20	
	41	10	344	20	
	44	28	246	20	
ON	45E	22	285	20	
ON	16+40E	13	127	20	Rock
	18	21	850	20	"
	23	14	65		"
	25	10	62		"
ON	28E	24	127		"



MEMBER  
CANADIAN TESTING  
ASSOCIATION

CERTIFIED BY:

*R. L. Swaites*





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## CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 28225  
 INVOICE NO. 12378  
 RECEIVED Aug. 27/74  
 ANALYSED Aug. 30/74

TO: Swim Lake Mines Ltd.,  
 c/o Mr. Wm. McCulloch  
 101 - 535 Thurlow  
 Vancouver, B. C.

ATTN: cc: Min-Ex

SAMPLE NO. :	PPM	
	Copper	Zinc
W10 S24	36	148
26	36	72
28	68	233
30	40	57
32	52	108
34	16	86
36	8	60
38	3	9
40	4	34
42	7	248
44	21	77
46	18	155
W10 S48	7	65
W5 S24 A	24	55
24 B	13	179
26	28	1080
28	3	22
30	34	108
32	22	131
34	63	127
35	33	105
36	33	62
38	56	265
40	26	1080
42	3	24
44	7	39
46	14	86
W5 S48	8	189
E5 S18	41	52
20	6	28
22	7	24
24A	28	24
26	6	70
28	8	24
30	7	13
32	3	5
34	13	34
36	22	65
38	28	115
40	26	115
E5 S42	12	25
Std.	70	50



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## CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 28226

TO: Swim Lake Mines Ltd.,  
 c/o Mr. Wm. McCulloch  
 101 535 Thurlow  
 Vancouver, B.C.

INVOICE NO. 12378

RECEIVED Aug. 27/74

ATTN:

cc: Min-ex

ANALYSED Aug. 30/74

SAMPLE NO. :	PPM Copper	PPM Zinc
E5 S44	3	7
46	12	20
E5 S48	8	34
E10 S18	12	43
20	7	24
22	38	80
24	30	34
26	20	102
28	22	57
30	12	30
32	28	123
34	8	43
36	6	13
38	10	34
40	18	65
42	7	30
44	13	47
E10 S48	42	233
N8 E1	20	105
2	36	375
3	70	70
4	36	55
6	22	127
8	10	50
10	3	7
12	26	70
14	18	62
16	8	47
17	20	65
19	10	62
20	8	65
22	14	218
24	24	108
26	10	120
28	8	83
30	10	32
32	10	120
34	10	135
36	4	18
N8 38	50	406
Std.	70	50



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## CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 28227  
INVOICE NO. 12378  
RECEIVED Aug. 27/74  
ANALYSED Aug. 30/74

TO: Swim Lake Mines Ltd.,  
c/o Mr. Wm. McCulloch  
101 - 535 Thurlow  
Vancouver, B.C.

ATTN: cc: Min-ex

SAMPLE NO. :		PPM Copper	PPM Zinc
N8	E40	3	13
	44	24	112
N8	E45	21	127
N4	E16	7	41
	17	7	34
	18	1	7
	19	1	9
	20	14	67
21		1	2
	22	3	45
	23	7	112
	24	14	189
	26	138	766
	27	34	800
	28	30	420
	30	41	275
	32	8	92
	34	33	225
	36	8	155
	38	16	218
	40	26	344
	42	8	164
	44	16	83
N4	E45	10	95
S4	E16	33	190
	17	94	600
*	18	60	400
	20	28	450
	21	6	65
	22	23	86
	23	52	95
	24	80	255
	25	20	127
	26	50	211
	27	33	206
	28	11	200
	30	45	285
	32	22	92
S4	34	14	211
* S4	19	18	194
	Std.	72	47



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TO: Swim Lake Mines Ltd.,  
c/o Mr. Wm. McCulloch  
101 - 535 Thurlow  
Vancouver, B. C.

CERTIFICATE NO. 28228  
INVOICE NO. 12378  
RECEIVED Aug. 27/74  
ANALYSED Aug. 30/84

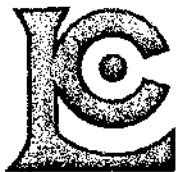
ATTN: cc: Min-ex

SAMPLE NO. :	PPM Copper	PPM Zinc
S4 E36	13	144
38	12	225
40	29	330
42	11	57
44	6	43
S4 E45	14	160
S8 E10	14	57
11	32	120
12	22	144
13	24	140
14	8	65
15	5	18
16	30	295
17	8	28
18	32	127
20	12	115
21	27	131
22	10	62
24	28	131
26	16	200
28	16	174
30	32	169
32	18	148
34	14	189
36	12	112
38	6	50
40	22	265
42	620	268
44	295	2500
S8 E45	30	179
EBL 9S	20	65
10S	18	92
11S	24	89
12S	20	98
EBL S12 E1	47	72
3	22	105
4	12	22
5	118	70
6	26	86
EBL S12 E7	37	127
Std.	72	47



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## CERTIFICATE OF ANALYSIS

TO: **Santa Lake Mines Ltd.,**  
 c/o Mr. Wm. McCullagh,  
 103 - 535 Thurlow,  
 Vancouver, B.C.

ATTN:

CERTIFICATE NO. 23225  
 INVOICE NO. 12078  
 RECEIVED August 27/74  
 ANALYSED August 30/74

SAMPLE NO.	1st	2nd
ESL S12 23	27	39
9	19	30
10	20	32
11	20	36
12	18	43
13	10	16
14	4	5
15	19	45
16	14	47
17	15	34
18	20	75
19	20	33
20	17	32
23	44	160
24	24	52
26	24	120
28	22	33
30	27	33
32	4	16
34	0	25
36	28	169
38	205	320
40	0	41
42	106	700
44	44	300
ESL S12 145	20	300
ESL S12 W0	0	24
WBL 12S	16	65
16	4	9
17	17	35
18	14	30
19	26	410
20	24	28
21	12	57
22	32	305
23	14	70
24	48	32
25	16	28
26	26	57
WBL 27S	17	89
Std.	72	47



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 AREA CODE: 604

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## CERTIFICATE OF ANALYSIS

TO: **Swim Lake Mines Ltd.,**  
**c/o Mr. Wm. McCullagh,**  
**101 - 535 Thurlow,**  
**Vancouver, B.C.**

ATTN:

CERTIFICATE NO. **28230**  
 INVOICE NO. **12378**  
 RECEIVED **August 27/74**  
 ANALYSED **August 30/74**

cc:Min-Rx

SAMPLE NO. :		PPM Copper	PPM Zinc
WBL	28S	54	77
	29	32	105
	30	11	20
	31	62	65
	32	6	18
	33	40	77
	34	57	169
	35	18	36
WBL	36S	9	22
WBL S12	E2	20	30
	4	19	80
	6	56	295
	8	10	70
	10	22	70
	12	12	47
	13	19	127
	14	30	92
WBL S12	E15	14	45
WBL S12	W0	46	1840
	2	36	65
	4	26	50
	6	10	43
	8	21	55
WBL S12	W10	10	34
WBL S16	W2	9	98
	4	52	1640
	6	No sample	
	8	10	32
WBL S16	W10	11	50
WBL S16	E4	26	25
	6	20	34
	8	11	39
	10	14	47
	12	10	45
	14	9	34
WBL S16	E15	20	52
WBL S20	W2	24	57
	4	16	50
	6	48	1040
WBL S20	W8	9	34
	Std.	72	50

(lost)



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 AREA CODE: 604

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## CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 28426

TO: Swim Lake Mines  
 101 - 535 Thurlow  
 Vancouver, B. C.

INVOICE NO. 12551

RECEIVED Sept. 13/74

ATTN: Mr. William McCulloch

ANALYSED Sept. 18/74

cc: Mr. Fitzgerald - Minex Services

SAMPLE NO. :	PPM Copper	PPM Zinc
N4 E25	40	164
29	12	105
31	13	123
33	28	211
35	10	179
37	22	72
39	22	680
41	28	225
N4 E43	10	77
S4 E29D	20	392
31	6	295
33	30	123
35	22	189
37	8	255
39	12	164
41	22	660
S4 E43	8	233
N8 E7	13	80
9	10	55
21	3	34
33	8	89
35	12	102
37	40	295
39	18	72
N8 E42Y	4	28
S8 E19	56	211
23	52	360
25	22	275
27	14	86
29	152	174
31	20	360
33	14	95
35	36	127
37	13	144
39	13	105
41	12	295
S8 E43	470	2000
WBL S 12 W1	21	169
E1	3	41
WBL S12 E5	18	123
Std.	72	55



MEMBER  
 CANADIAN TESTING  
 ASSOCIATION

CERTIFIED BY:

*B. Swaiter*





# CHEMEX LABS LTD.

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 NORTH VANCOUVER, B.C.  
 CANADA V7J 2C1  
 TELEPHONE: 985-0648  
 AREA CODE: 604

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## CERTIFICATE OF ANALYSIS

TO: **Swin Lake Mines**  
**101 - 535 Thurlow**  
**Vancouver, B. C.**

CERTIFICATE NO. **28427**  
 INVOICE NO. **12551**  
 RECEIVED **Sept. 13/74**  
 ANALYSED **Sept. 18/74**

ATTN: **Mr. W. McCulloch** cc: **Mr. Fitzgerald - Min-Ex Services**

SAMPLE NO. :	PPM Copper	PPM Zinc
WBL S12 E7	12	160
S12 E21	30	83
22	22	77
35	6	22
37	18	95
39	10	155
41	14	295
S12 E43	18	392
S16 E 7	12	34
9	8	30
E11	12	45
W3	21	211
5	42	140
S16 W7	92	1720
S20 W5	21	950
7	56	305
S20 W10	332	525
S24 W1	34	83
3	16	206
4	22	184
5	21	65
S24 W7	10	115
E5 S17	10	62
E5 S19	7	28
E10 S46	28	179
W5 S25	14	45
27	4	144
37	36	305
39	10	60
41	18	152
W5 S47	No sample	
Std.	74	52



MEMBER  
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 TELEPHONE: 985-0648  
 AREA CODE: 604

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## CERTIFICATE OF ANALYSIS

TO: **Swim Lake Mines**  
**c/o Mr. W. McCulloch**  
**101 - 535 Thurlow**  
**Vancouver, B. C.**

ATTN:

CERTIFICATE NO. **28578**  
 INVOICE NO. **12732**  
 RECEIVED **Sept. 30/74**  
 ANALYSED **Oct. 4/74**

SAMPLE NO. :	PPM	PPM	
	Copper	Zinc	
S4/E42 B	20	525	
S7+60/E44+80	62	77	Rock
S8/E39+50A	50	20	Rock
S8/E39+50B	30	22	Rock
S8/E43+50	304	3470	
S8/E44	112	2390	
S8+25/E37+00	20	77	Rock
S11/E32	22	75	Rock
S16/W4B	54	1080	
S16/W4 RC	10	67	Rock



MEMBER  
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 ASSOCIATION

CERTIFIED BY:

*[Handwritten Signature]*



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## CERTIFICATE OF ANALYSIS

TO: Swim Lake Mines,  
c/o Mr. William McCulloch,  
101 - 535 Thurlow,  
Vancouver, B.C.

CERTIFICATE NO. 27062  
INVOICE NO. 12638  
RECEIVED Sept. 20/74  
ANALYSED Sept. 25/74

ATTN: cc:Min-Ex Services Ltd.

SAMPLE NO. :		PPM	
		Cadmium	Silver
S12 WD	2.8	6.0	1.0
S16 WA	4.8	8.7	< 0.5
W5 S26	1.5	3.7	< 0.5
W5 S40	< 2	1.3	< 0.5
W10 S42	< 2	1.0	< 0.5
S20 W6	1.2	3.7	< 0.5
S12 E38	< 2	2.0	< 0.5
S12 E42	1.2	2.5	< 0.5
S12 E44	4.0	4.7	< 0.5
S12 E45	4.5	5.7	< 0.5
S8 E16	< 2	1.7	< 0.5
S8 E42	2.8	31.0	1.0
S8 E44	1.5	15.5	1.0
S8 E45	1.5	1.7	1.0
S4 E30	1.2	3.5	0.5
N4 E26	2.0	3.7	1.5
N4 E27	1.0	2.3	1.0
N4 E28	1.2	2.0	0.5
N4 E38	< 2	1.0	< 0.5
N4 E40	1.5	2.3	< 0.5
N8 E38	1.5	2.5	< 0.5
ON 16E	< 2	1.3	< 0.5
ON 17E	< 2	1.5	< 0.5
ON 24E	< 2	1.5	< 0.5
ON 27E	1.8	4.0	1.0
ON 35E	1.2	1.0	< 0.5
ON 37E	1.2	1.0	< 0.5
ON 40E	1.5	1.7	< 0.5
ON 41E	1.2	1.5	< 0.5
ON 44E	1.2	2.0	< 0.5
ON 45E	< 2	1.3	< 0.5

unrec'd to C.



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TELEPHONE: 985-0648  
AREA CODE: 604

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## CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 28670  
INVOICE NO. 12841  
RECEIVED Oct. 17/74  
ANALYSED Oct. 21/74

TO: Min-Ex Services Ltd.,  
254 E 4th  
North Vancouver, B. C.

ATTN:

SAMPLE NO. :		PPM Copper	PPM Zinc
S12	E50	16	620
	51	122	1400
	52	33	950
	53	36	1360
	54	18	900
S12	E55	13	400
S16	E34	13	89
	35	22	105
	36	44	127
	37	14	62
	38	13	47
	39	24	184
	40	26	83
	41	24	148
	44	7	144
	45	10	344
	46	28	850
	47	22	1120
	48	10	575
	49	14	700
	51	14	317
	52	30	60
S16	E55	14	105
S20	W12	28	200
	14	16	70
S20 W	15	28	144
W15	S22	22	144
	24	44	105
	25	10	60
	26	31	108
	27	6	18
	28	1	13
	29	4	14
	30	7	32
	31	6	24
	32	4	28
	33	10	24
	34	7	30
	36	16	123
W15 S	38	12	62
Std.		74	50



MEMBER  
CANADIAN TESTING  
ASSOCIATION

CERTIFIED BY: *J. Lee*



# CHEMEX LABS LTD.

212 BROOKSBANK AVE.  
 NORTH VANCOUVER, B.C.  
 CANADA V7J 2C1  
 TELEPHONE: 985-0648  
 AREA CODE: 604

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

## CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 28669

TO: Min-Ex Services Ltd.,  
 254 E 4th  
 North Vancouver, B. C.

INVOICE NO. 12841

RECEIVED Oct. 17/74

ANALYSED Oct. 21/74

ATTN: Swim Lake Mines Ltd.,

SAMPLE NO. :		PPM Copper	PPM Zinc
BL	S12	20	102
	S13	21	72
	S14	18	67
	S15	7	22
	S37	40	120
	S38	4	36
	S39	4	30
	40	20	45
	41	28	600
	42	20	102
	43	3	18
	45	21	62
	47	24	55
BL	S48	48	123
ON	E28	277	900
	29	410	1080
	30	76	660
	31	34	482
	32	26	344
	33	16	800
	34	13	127
	35	13	135
	36	13	265
	46	26	135
	47	14	148
	48	13	105
	49	10	105
ON	E50	20	105
S4	E46	20	211
	48	14	102
	49	22	155
S4	E 50	277	2460
S8	E46	13	248
	47	13	392
	48	56	950
	49	300	1840
S8	E 50	173	950
S12	E 46	8	255
	47	18	305
	48	14	620
S12	E 49	21	525
Std.		72	50



MEMBER  
 CANADIAN TESTING  
 ASSOCIATION

CERTIFIED BY: 





# CHEMEX LABS LTD.

212 BROOKSBANK AVE.  
 NORTH VANCOUVER, B.C.  
 CANADA V7J 2C1  
 TELEPHONE: 985-0648  
 AREA CODE: 604

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: Min-Ex Services Ltd.,  
 254 E 4th  
 North Vancouver, B. C.

CERTIFICATE NO. 28670  
 INVOICE NO. 12841  
 RECEIVED Oct. 17/74  
 ANALYSED Oct. 21/74

ATTN:

SAMPLE NO. :	PPM Copper	PPM Zinc
S12 E50	16	620
51	122	1400
52	33	950
53	36	1360
54	18	900
S12 E55	13	400
S16 E34	13	89
35	22	105
36	44	127
37	14	62
38	13	47
39	24	184
40	26	83
41	24	148
44	7	144
45	10	344
46	28	850
47	22	1120
48	10	575
49	14	700
51	14	317
52	30	60
S16 E55	14	105
S20 W12	28	200
14	16	70
S20 W 15	28	144
W15 S22	22	144
24	44	105
25	10	60
26	31	108
27	6	18
28	1	13
29	4	14
30	7	32
31	6	24
32	4	28
33	10	24
34	7	30
36	16	123
W15 S 38	12	62
Std.	74	50



MEMBER  
 CANADIAN TESTING  
 ASSOCIATION

CERTIFIED BY: *[Signature]*





# CHEMEX LABS LTD.

212 BROOKSBANK AVE.  
 NORTH VANCOUVER, B.C.  
 CANADA V7J 2C1  
 TELEPHONE: 985-0648  
 AREA CODE: 604

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

## CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 28669  
 INVOICE NO. 12841  
 RECEIVED Oct. 17/74  
 ANALYSED Oct. 21/74

TO: Min-Ex Services Ltd.,  
 254 E 4th  
 North Vancouver, B. C.

ATTN: Swim Lake Mines Ltd.,

SAMPLE NO. :		PPM Copper	PPM Zinc
WBL	S12	20	102
	S13	21	72
	S14	18	67
	S15	7	22
	S37	40	120
	S38	4	36
	S39	4	30
	40	20	45
	41	28	600
	42	20	102
	43	3	18
	45	21	62
	47	24	55
BL	S48	48	123
ON	E28	277	900
	29	410	1080
	30	76	660
	31	34	482
	32	26	344
	33	16	800
	34	13	127
	35	13	135
	36	13	265
	46	26	135
	47	14	148
	48	13	105
	49	10	105
ON	E50	20	105
S4	E46	20	211
	48	14	102
	49	22	155
S4	E 50	277	2460
S8	E46	13	248
	47	13	392
	48	56	950
	49	300	1840
S8	E 50	173	950
S12	E 46	8	255
	47	18	305
	48	14	620
S12	E 49	21	525
Std.		72	50



MEMBER  
 CANADIAN TESTING  
 ASSOCIATION

CERTIFIED BY: *S. Lo*





# CHEMEX LABS LTD.

212 BROOKSBANK AVE.  
NORTH VANCOUVER, B.C.  
CANADA V7J 2C1  
TELEPHONE: 985-0648  
AREA CODE: 604

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

## CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 27062 B

TO: Min-Ex Services Ltd.,  
254 E 4th  
North Vancouver, B. C.

INVOICE NO. 13222

RECEIVED

ATTN: Mr. M. Fitzgerald

ANALYSED Dec. 31/74

SAMPLE NO. :	PPM Corrected Cadmium
WBL S12 W0	3.8
WBL S16 W4	6.8
W5 S26	1.5
W5 S40	< 0.2
W10 S42	< 0.2
WBL S20 W6	1.8
EBL S12 E38	< 0.2
E42	1.2
E44	4.0
EBL S12 E45	4.5
S8 E16	< 0.2
E42	28
E44	14
S8 E45	0.5
S4 E30	1.8
N4 E26	2.0
E27	1.0
E28	1.2
E38	< 0.2
N4 E40	0.5
N8 E38	0.5
ON 16E	< 0.2
17E	< 0.2
24E	< 0.2
27E	1.8
35E	0.2
37E	0.2
40E	0.5
41E	0.2
44E	0.2
ON 45E	< 0.2



MEMBER  
CANADIAN TESTING  
ASSOCIATION

CERTIFIED BY:

MIN - EX SERVICES LTD.

GEOLOGICAL CONSULTING  
AND  
MINERAL EXPLORATION MANAGEMENT

M. J. FITZGERALD, P. Eng.  
GEOLOGICAL ENGINEER

254 EAST 4th STREET  
NORTH VANCOUVER, B.C.  
TEL. 980-4312

August 29, 1974

Swim Lake Mines Ltd.  
101 - 535 Thurlow  
Vancouver, B. C.

Attention: Mr. Wm. McCullagh

SF 1-20 Group - Geochemical Survey

Partial Billing

Wages

Matthew Fitzgerald Aug. 15-27, 1974 Preparation of Field Equipment 1/2 day @ \$20/day	\$ 10.00
Geochemical Survey 7 1/2 days @ \$30/day	225.00
Sorting of samples, delivery to lab 1/2 day @ \$20/day	10.00
Kerry McCullagh Aug. 16-23, 1974 Geochemical Survey 7 1/2 days @ \$30/day	225.00
Pat Henry Aug. 16-20, 1974 Atled Exploration Management Contract Party Chief Geochemical Survey 4 1/8 days @ \$80/day	330.00
Workmen's Compensation	12.38
Sub Total	<u>\$ 812.38</u>

See Page Two

Expenses

Western Technical Supply flagging	\$ 21.86
Camp Gear Rental 8 days @ \$10/day	80.00
Min-EX Laboratories Zinc Spray	19.50
Beaver Lumber Plastic Ground Sheet	9.45
Meals 26 man-days @ \$7/day	182.00
Mileage Station Wagon 220 miles @ .20	44.00
Volkswagen 630 miles @ .15	94.50
	<hr/>
Sub Total	\$ 451.31
	<hr/>
Total Billing	\$1,263.69
	<hr/> <hr/>

MJ Fitzgerald  
M. J. Fitzgerald, P. Eng.

MJF/sjb

MIN - EX SERVICES LTD.

GEOLOGICAL CONSULTING  
AND  
MINERAL EXPLORATION MANAGEMENT

M. J. FITZGERALD, P. Eng.  
GEOLOGICAL ENGINEER

254 EAST 4th STREET  
NORTH VANCOUVER, B.C.  
TEL. 980-4312

November 21, 1974

Swim Lake Mines Ltd.  
101-535 Thurlow St.  
Vancouver, B.C.

Attn: Mr. William McCullagh

AF 1-20 Group - Geochemical Survey  
and Geologic Mapping

August 29 - November 21, 1974

Geochemical Survey

Wages

Matthew Fitzgerald Oct. 4 - 6, 1974	
Establishing grid and collection of soil samples	
3 days @ \$30/day	\$ 90.00
Kerry McCullagh Oct. 4-6, 1974	
Establishing grid and collection of soil samples	
3 days @ \$30/day	90.00
Workmen's Compensation	<u>4.95</u>
Sub total Wages	184.95

Expenses

Oct. 4	meals	16.00
Oct. 5	meals	16.25
Oct. 6	meals	9.75
	motel	24.00
Survey Thread, Flagging, Markers		<u>41.79</u>
Sub total Expenses		107.79

Total Geochemical Survey \$292.74

Geologic Mapping and Supervision  
of Geochemical Survey

Professional Services - M.J. Fitzgerald, P. Eng.

Field Work - Geologic Mapping

Aug. 16-17; 21-22, Sept. 26-27  
Oct. 4-6, 1974

9 days @ \$135/day \$1,215.00.

Office Work

Preparation, research, sorting and  
delivery of samples to laboratory

1 1/2 days @ \$85/day 127.50

Preparation of grid map, plotting of sample  
results, contouring of results

4 days @ \$85/day 340.00

Plotting of geology, transfer from field sheets,  
examination of rock samples, preparation of  
map and overlay

4 1/2 days @ \$85/day 382.50

Preparation of report

3 1/2 days @ \$85/day 297.50

Sub total Professional Services \$2,362.50

Expenses

Map Drafting 225.00

Map Printing 45.00

Xerox Copies of Report  
102 pages @ 15¢ 15.30

Typing 25.00

Auto Mileage  
Oct. 4-6 307 miles @ 17¢ 52.19

Meals Sept. 26 - 27 17.25

Meals Sept. 26 - 27 8.00

Sub total Expenses \$387.74

Total Geologic Mapping	\$ 2,750.24
Total Billing	<u>3,042.98</u>
Less Advance	<u>500.00</u>
Total Due	<u>\$2,542.98</u>

M. J. Fitzgerald

M.J. Fitzgerald, P. Eng.





# INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 985-0648

Mr. Wm. McCullagh

DATE May 28/74

Ste. B. 101 - 535 Thurlow St.,

INVOICE NO. 11387

Vancouver, B. C.

CERTIFICATE NO. 26808

ATTN: \_\_\_\_\_

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
24	Analyzed for Copper & Zinc @ \$1.50	\$36.00	
19	Prepared @ \$0.25	4.75	
5	Prepared @ \$1.00 (rock)	5.00	
			\$45.75



# INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 985-0648

Swim Lake Mines Ltd.,

DATE August 30/74

c/o Mr. Wm. McCullagh,

INVOICE NO. 12378

101 - 535 Thurlow,

CERTIFICATE NO. 28225-28231

Vancouver, B.C.

ATTN: \_\_\_\_\_

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
243	Analyzed for Copper & Zinc @ \$1.50	\$364.50	
243	Prepared @ \$0.25	60.75	
	Less 10%	\$425.25	
		42.53	
			\$382.72

**PAID**

*# 33 Sept 5/74*



# INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 985-0648

Swin Lake Mines

101 - 535 Thurlow

Vancouver, B. C.

DATE Sept. 18/74

INVOICE NO. 12551

CERTIFICATE NO. 28426 & 28427

ATTN: Mr. W. McCulloch

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
	Samples from Mr. Fitzgerald - Min-Ex services.		
71	Analyzed for Cu & Zn @ \$1.50	\$106.50	
71	Prepared @ \$0.25	17.75	
	Less 10%	124.25	
		12.42	
			\$111.83



# INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 985-0648

Swin Lake Mines

101 - 535 Thurlow

Vancouver, B. C.

DATE Sept. 23/74

INVOICE NO. 12586

CERTIFICATE NO. 28426

ATTN: Mr. William McCulloch

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
32	Analyzed for Ag & Cd @ \$1.00	\$32.00	
	Less 10%	3.20	
			\$28.80

**PAID**

*33 Sept 25/74*  
*m*



# INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 985-0648

Swim Lake Mines,  
c/o Mr. William McCulloch,  
101 - 535 Thurlow,  
Vancouver, B.C.

DATE September 25/74  
INVOICE NO. 12638  
CERTIFICATE NO. 27062 ✓  
ATTN: \_\_\_\_\_

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
31	Analyzed for Cadmium & Silver @ \$1.50	\$46.50	
	Less 10%		\$46.50 4.65



# INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 985-0648

Swim Lake Mines,  
c/o Mr. W. McCulloch,  
101 - 535 Thurlow,  
Vancouver, B.C.

DATE September 25/74  
INVOICE NO. 12642  
CERTIFICATE NO. 28509  
ATTN: \_\_\_\_\_

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
7	Analyzed for Copper & Zinc @ \$1.50	\$10.50	
7	Prepared @ \$0.25	1.75	
	Less 10%		\$12.25 1.22
			\$11.03

**PAID**  
#35 Row 6/74  
m



# INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 985-0648

Swim Lake Mines

c/o Mr. W. McCulloch

101 - 535 Thurlow

Vancouver, B. C.

DATE Oct. 4/74

INVOICE NO. 12732

CERTIFICATE NO. 28578

ATTN: \_\_\_\_\_

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
	Samples from Mr. Fitzgerald		
10	Analyzed for Cu & Zn @ \$1.50	\$15.00	
6	Prepared (rock) @ \$1.00	6.00	
4	Prepared @ \$0.25	1.00	
		22.00	
	Less 10%	2.20	
			\$12.80



# INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 985-0648

Min-Ex Services Ltd.,

254 E 4th

North Vancouver, B. C.

DATE Oct. 22/74

INVOICE NO. 12841

CERTIFICATE NO. 28669 to 28671

ATTN: \_\_\_\_\_

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
	Swim Lake Mines Ltd.,		
86	Analyzed for Cu & Zn @ \$1.50	\$129.00	
86	Prepared @ \$0.25	21.50	
		150.50	
	Less 10%	15.05	
			\$135.45



# INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 985-0648

Min-Ex Services Ltd.,

254 E 4th

North Vancouver, B. C.

DATE Dec. 31/74

INVOICE NO. 13222

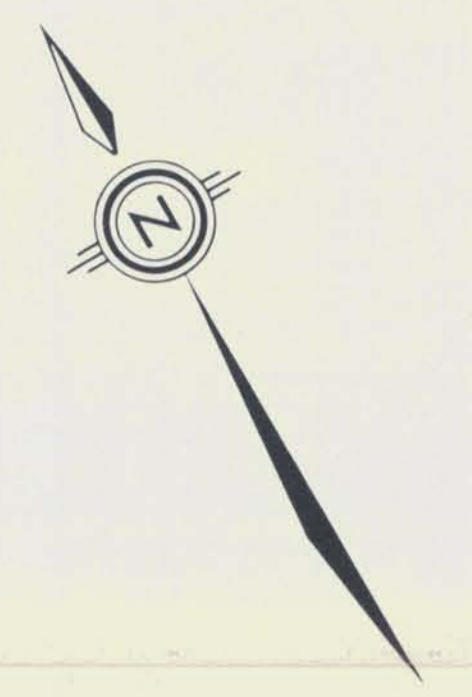
CERTIFICATE NO. 27062 B

ATTN: Mr. M. Fitzgerald

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
31	Analyzed for Cadmium - Corrected @ \$0.50	\$15.50	
			\$15.50

TERMS - NET 30 DAYS





- Soil Sample Site
- Rock Chip Sample Site
- △ Survey Traverse Station
- ▬ Bedding
- ▬ Fracturing
- ▬ Vertical fracturing
- ▬ Contact
- ▬ Drainage
- ▬ Creek bottom
- ▬ Road
- ▬ Unusable road

**LEGEND**

- SEDIMENTARY ROCKS**
- cg Conglomerate
  - tu Tuff bedded, water lain
- PYROCLASTIC ROCKS (tuffs and breccias)**
- at Acid tuff
  - it Intermediate tuff and breccia (itbx)
  - bt Basic tuff and breccia (btbx)
- FLOW ROCKS**
- an Andesite (an) and andesite porphyry (ap)
- INTRUSIVE ROCKS**
- di Diorite

Department of  
 Mines and Technical Surveys  
 RECONNAISSANCE REPORT  
 NO. 5340 MAP #3  
 PLATE I

5340  
 MAP 3

**S. F. GROUP**  
 HARRISON LAKE, NEW WESTMINSTER, M.D.  
 NORTH GRID  
**GEOLOGY**

SCALE: 1" = 200'

200 100 0 200 400 600

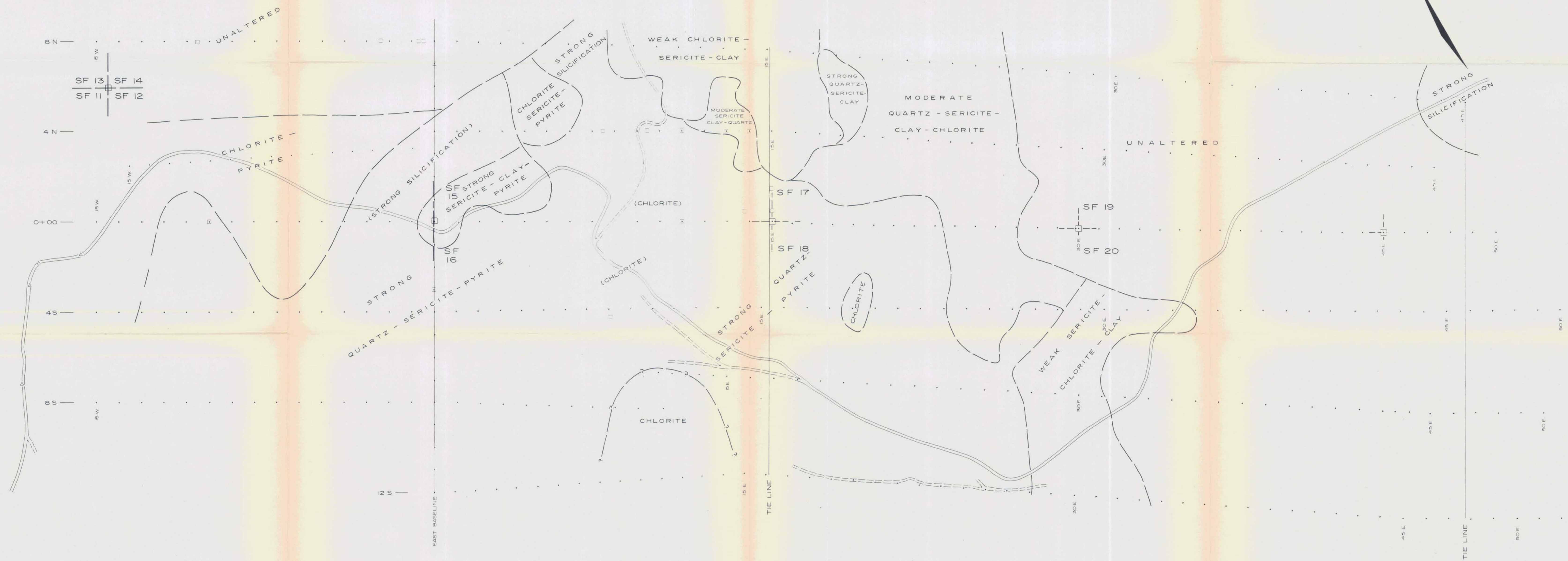
MIN-EX SERVICES LTD.  
 NORTH VANCOUVER, B.C.

M. J. FITZGERALD  
 DEC. 1974



To accompany a report on Geology and Geochemistry of the SF 1-20 claims by M. J. Fitzgerald, P. Eng., dated Dec. 31, 1974





- Soil Sample Site
- Rock Chip Sample Site
- △ Survey Traverse Station

Exploration of  
 Claims and Prospects  
 Alteration Report  
 No. 5340 MAP #4

5340  
 MAP4

PLATE II

**S. F. GROUP**  
 HARRISON LAKE, NEW WESTMINSTER, M.D.  
 NORTH GRID  
**ALTERATION**

SCALE: 1" = 200'

200 100 0 200 400 600

MIN-EX SERVICES LTD.  
 NORTH VANCOUVER, B.C.

M. J. FITZGERALD  
 DEC 1974

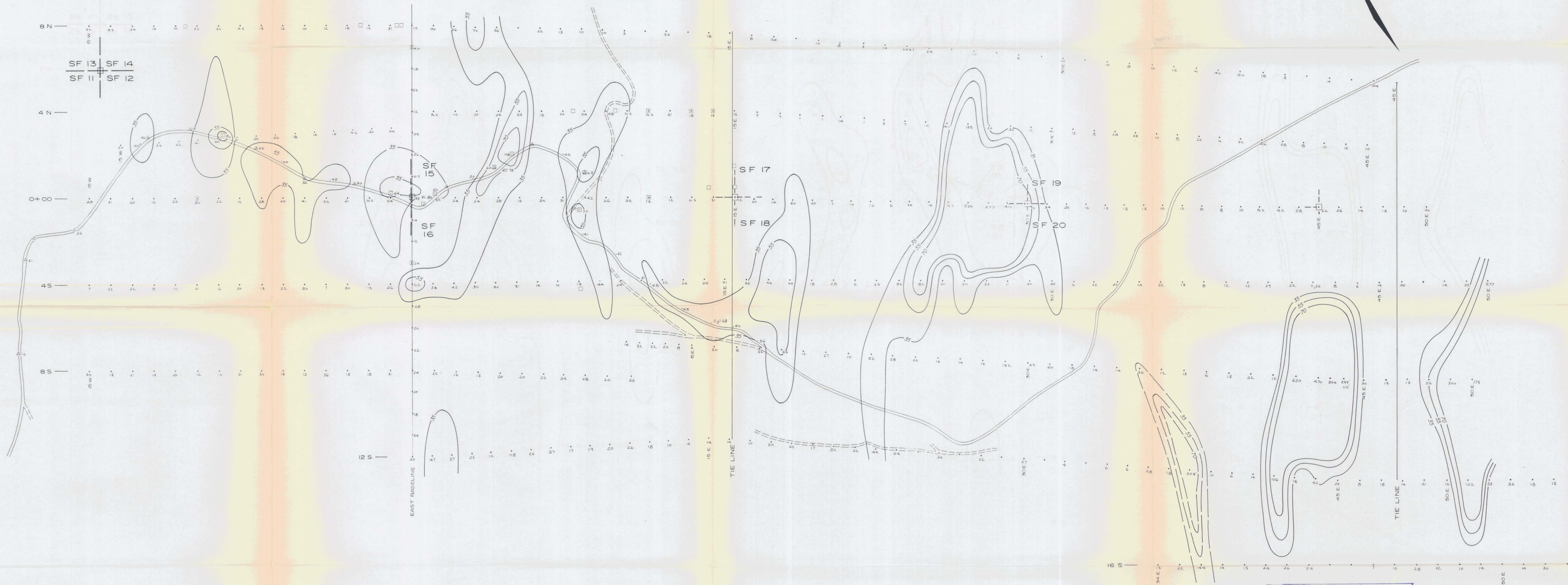
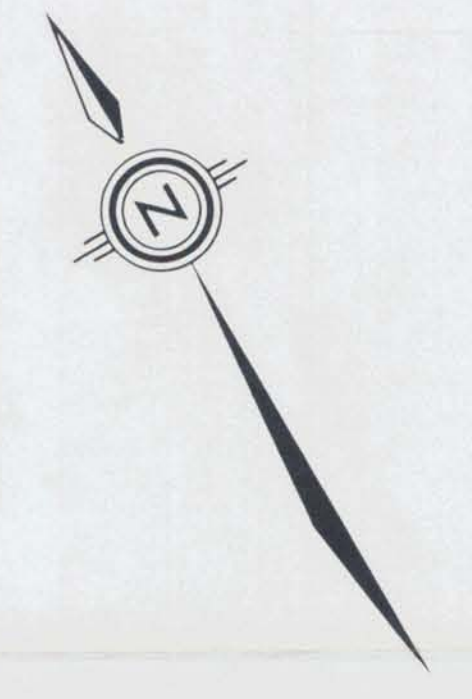


To accompany a report on Geology and Geochemistry of the SF 11-20 claims by M. J. Fitzgerald, P. Eng, dated Dec. 31, 1974









**LEGEND**

- Soil Sample Site
  - Rock Chip Sample Site
  - △ Survey Traverse Station
  - ▲ Copper content in p.p.m.
- COPPER**
- 17 p.p.m. Background
  - 35-54 p.p.m. Threshold anomalous
  - 55-69 p.p.m. Anomalous
  - >70 p.p.m. Strongly anomalous
- SF 16 Claim post
  - SF 17 Claim post
  - Road

Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 No. 5340 MAP #6

**5340  
 MAP 6**

PLATE IV



**S. F. GROUP**  
 HARRISON LAKE, NEW WESTMINSTER, B.C.  
 NORTH GRID  
**GEOCHEMICAL SURVEY**  
**COPPER**

SCALE: 1" = 200'  
 200 400 600

To accompany a report on Geology and Geochemistry of the SF 1-20 claims by M.J. Fitzgerald, P. Eng., dated Dec. 31, 1974





FOR RESULTS SEE PLATE IV, III



**LEGEND**

- Soil sample site
- Rock Chip Sample Site
- △ Survey Traverse Station
- Zinc/Cadmium/Silver content in p.p.m.
- ZINC**
- 20-50 p.p.m. Probable regional background
- 65 p.p.m. Local background
- 135-184 p.p.m. Threshold anomalous
- 185-244 p.p.m. Anomalous
- >245 p.p.m. Strongly anomalous
- SF 8 Claim post
- SF 6 Claim post
- Road

Department of  
 Mines and Petroleum Resources  
**ASSESSMENT REPORT**  
 NO. 5340 MAP #7

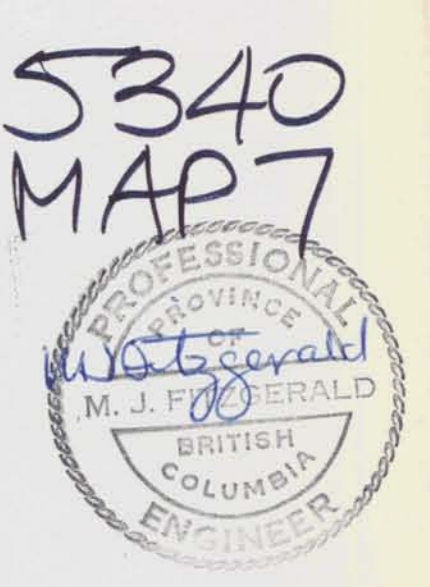


PLATE V

**S. F. GROUP**

HARRISON LAKE, NEW WESTMINSTER, M.D.  
 SOUTH GRID

**GEOCHEMICAL SURVEY**  
**ZINC**

SCALE: 1" = 200'

200 100 0 200 400 600

MIN-EX SERVICES LTD.  
 NORTH VANCOUVER, B.C.

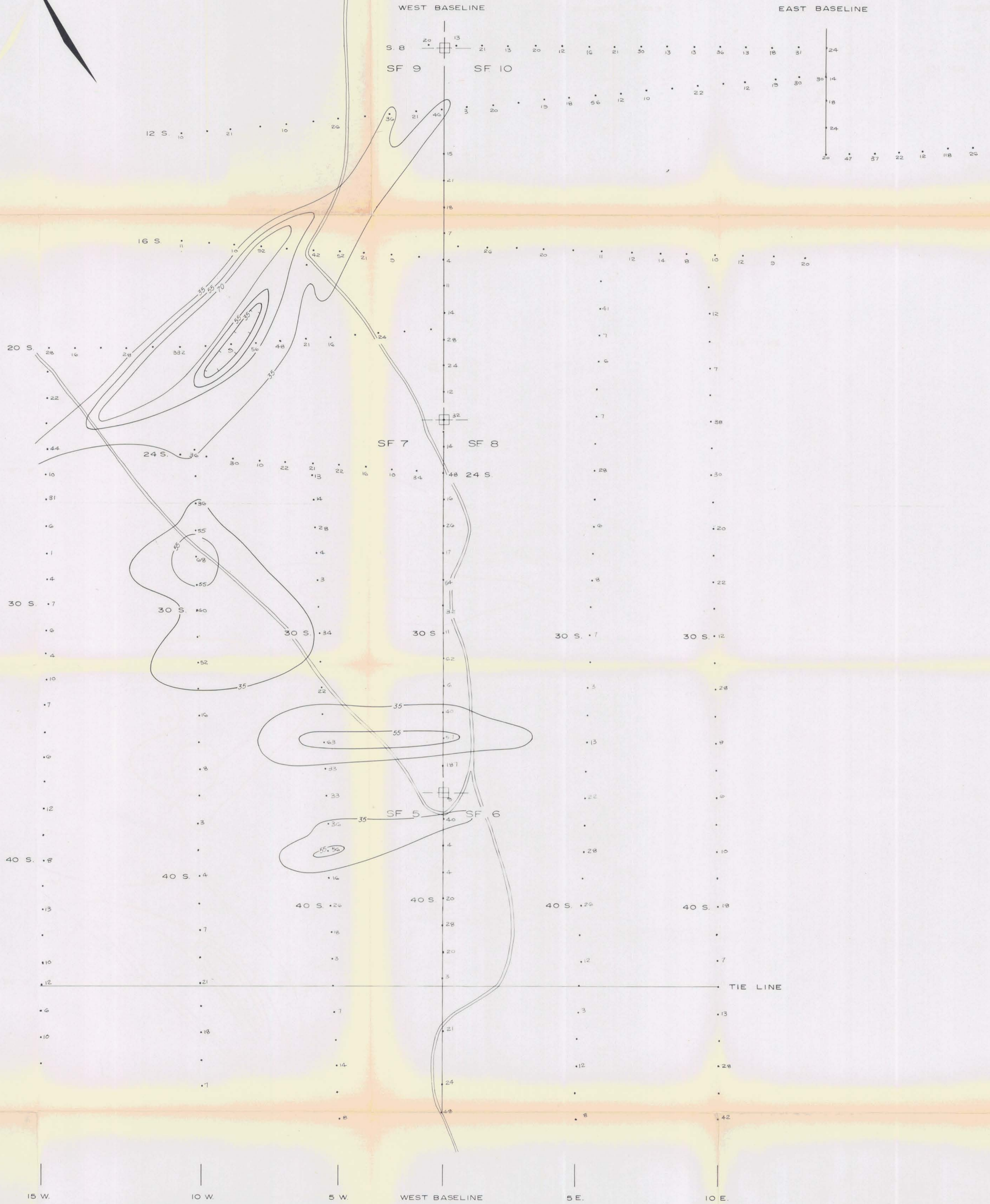
M. J. FITZGERALD  
 DEC. 1974

To accompany a report on Geology and Geochemistry of the SF 1-20 claims by M. J. Fitzgerald, P. Eng., dated Dec. 31, 1974





FOR RESULTS SEE PLATE IV

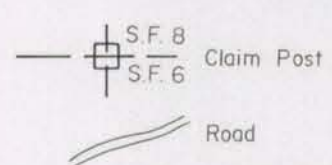


**LEGEND**

- Soil sample site
- Rock Chip Sample Site
- △ Survey Traverse Station
- Copper Contact in ppm

**COPPER**

- 17 p.p.m. Background
- 35-54 p.p.m. Threshold anomalous
- 55-69 p.p.m. Anomalous
- >70 p.p.m. Strongly anomalous



Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. 5340 MAP #8

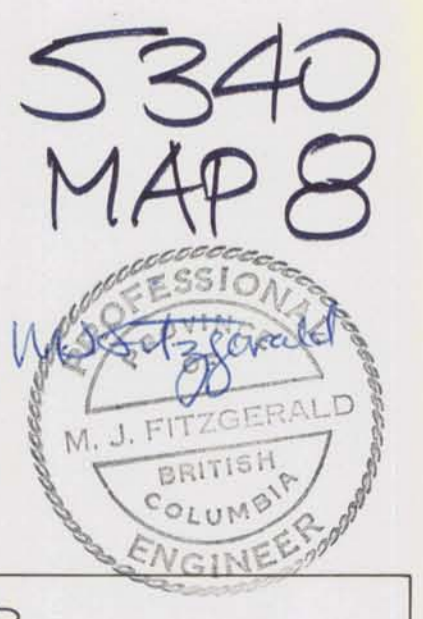


PLATE VI

**S. F. GROUP**

HARRISON LAKE, NEW WESTMINSTER, M.D.  
 SOUTH GRID

**GEOCHEMICAL SURVEY  
 COPPER**

SCALE: 1" = 200'

200 100 0 200 400 600

MIN-EX SERVICES LTD.  
 NORTH VANCOUVER, B.C.

M. J. FITZGERALD  
 DEC. 1974

To accompany a report on Geology and Geochemistry of the SF 1-20 claims by M. J. Fitzgerald, P. Eng., dated Dec. 31, 1974