GEOCHEMICAL REPORT

on the

SEL, SHIRLEY & KAREN CLAIMS

NANAIMO MINING DIVISION, B.C.

- for -

DARKHAWK MINES LTD. (N.P.L.)

323 - 409 Granville Street
Vancouver, B.C.

Covering:
SEL Claims, 1-84
SHIRLEY Claims, 1-60
KAREN Claims, 1 & 2

Located:
1) 50°25', 127°30'
2) N.T.S. Map 92 L/6 W
3) 1 mile north of Port Alice, B.C.
on Vancouver Island

- PREPARED BY -

VERSATILE
MINING SERVICES LTD.

John R. Kerr, P. Eng.
January, 1971
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SUMMARY & CONCLUSIONS

Geochemical soil sampling was partially completed over the Shirley, Sel, and Karen claim group near Port Alice, B.C. on Vancouver Island. The programme was to investigate a geological concept, relating an airborne magnetic anomaly to a favourable geological environment for mineral deposits. Sampling included collection of B-horizon soils along reconnaissance grid lines and logging roads. A total of 762 samples were collected and geochemically analyzed for copper. A metal map was prepared, and the results shown are an expression of the statistical analysis of copper content in soils.

The programme was terminated early due to heavy snowstorms and poor working conditions in the field. For this reason, the results of this programme cover only a portion of the total claim area. Two definite copper anomalies were interpreted from the results to date. Both are underlain by volcanic and sedimentary rocks of the Bonanza Group of Triassic Age. Pyrite is associated with one anomaly; however, economic mineralization has not been found on the property to date. Several small isolated anomalies are indicated on the property, mainly from samples collected along roads. Because of the inadequacy of sample density, interpretation of these anomalies is inconclusive at the present time.
It can be concluded that geochemistry aided in delineating targets for future exploration. As it is necessary to find the best targets in the claim area for follow-up work, it is suggested that the geochemical survey over the grid be completed before more detailed and refined methods are considered.
RECOMMENDATIONS

Based on the results of this programme, it is recommended that:

1) The proposed grid and geochemical soil sampling be completed over the entire claim block.

2) Detailed sampling at close spaced sample and line interval be completed over two delineated anomalies to test the continuity and further refine the shape and size of anomalies.

3) Mapping and prospecting accompany geochemical sampling.

4) Ground magnetometer, I.P., and electromagnetic surveys and bulldozing would be contingent upon the success of the above recommendations.
INTRODUCTION

During October and November, 1970, a geochemical sampling programme was completed over the Sel, Shirley and Karen claims in the Port Alice area of the Nanaimo Mining Division, B.C. An airborne magnetic anomaly is superimposed on a favourable geological environment similar to that hosting the Utah Construction Ltd. Island Copper Deposit, 10 miles to the east. This initiated the staking of Sel 1-84, Shirley 1-60, and Karen 1 and 2 mineral claims in February and April, 1970, and this geochemical programme. Technical work was completed by Versatile Mining Services Ltd., for Darkhawk Mines Ltd. (N.P.L.)

LOCATION & ACCESS:

The southwestern portion of the claim group borders the town of Port Alice, B.C. Port Alice is at the north end of Vancouver Island, at the south end of Neroutsos Inlet. This portion of Vancouver Island is accessible by land vehicle either by ferry from Kelsey Bay, B.C., or on a restricted logging road from Campbell River, B.C.
An all-weather gravel highway connects Port Alice, on the west coast of the Island, to Port Hardy on the east coast. This highway traverses the western portion of the claim block. Access into other portions of the claims is possible along the many logging roads.

**PHYSIOGRAPHY:**

Total relief in the area is approximately 3,000 feet, with elevations rising from sea level to over 2,900 feet in the central portion of the claims. Steep bluffs and river gorges in the claim area create hazardous conditions for working.

Precipitation in the west coast of Vancouver Island is extreme. Average total rainfall at Port Alice is 116.42 inches per year. Large stands of timber and heavy underbrush exist on the claims. Rayonier Canada Ltd. have logged portions of the area, and operate a small pulp mill in the town of Port Alice.
GENERAL GEOLOGY:

Regional mapping by the B.C. Department of Mines and the Geological Survey of Canada have provided most of the geological information accompanying this report. Rock identification along sampled lines and road traverses provided a refined interpretation shown on 1":1,000' detail, Figure 121-3.

The claim area is underlain by limestone of the Quatsino Formation, and sedimentary and volcanic rocks of the Bonanza Group, both of Upper Triassic Age. Small irregular masses of granodiorite, diorite, and gabbro of the Coast Intrusions intruded both formations during Cretaceous Age. Tertiary felsitic and porphyritic dikes and small stocks intrude all rocks.

MINERAL POTENTIAL:

The history of mining and exploration on the west coast of British Columbia has been quite continuous for over a century. Most of the known mineral deposits are contact metasomatic deposits occurring as skarn deposits in limestone or in altered volcanic rocks near the
contact of the Coast Intrusions. Examples of this type of deposits are Texada Mines, Brynnor Mines, Britannia Beach Mines, and Wesfrob Mines (Queen Charlotte Islands). Two porphyry type deposits are known of in or associated with the Coast Intrusions, Island Copper Deposit at Port Hardy, and the Catface Deposit near Tofino. Both are low-grade copper deposits with recorded tonnages in excess of 100,000,000 tons.

Within the claim block, minerals of economic significance have not been located to date. Pyrite has invaded both granitic rocks of the Coast Intrusions and volcanic rocks of the Bonanza Group. Assays of this material indicate Trace - .01% Cu.

An airborne magnetic anomaly is situated in the central portion of the claim block, superimposed on the interpreted contact of the Bonanza Group volcanic formation and a small arm of diorite or granodiorite stock. The Island Copper deposit at Port Hardy is associated with an airborne magnetic anomaly of this nature. Therefore, this anomaly may reflect a similar environment, or possibly a contact metasomatic copper-magnetite environment.
FIELD METHODS:

It was the original intent of the programme to complete sampling on a grid with lines at 1,000 foot intervals with samples collected at 200 foot intervals along all lines. 12.3 miles of control lines were cut and chained. Approximately 13 miles (25%) of the proposed grid was sampled. Due to heavy snowfall, and treacherous walking through the bush, neither the line-cutting nor grid sampling was completed. The remainder of the claim area was sampled along existing roads, samples collected at 200 foot intervals.

The soil samples were taken from the B-horizon of soil where possible. Soil cover averaged 5-10 feet deep; in relatively flat areas, overburden is quite deep. Good soil profiles are developed, with some intermixing of the horizons in steep areas. The B-horizon is 2-5 feet thick, and is generally located at depths greater than 12 inches below the surface.

Samples were collected in the field by two crews of Versatile Mining Services Ltd., headed by Mr. T.D. Marshall and Mr. C.D. Thiessen.
Mr. Marshall is a graduate exploration technician with four seasons of field experience. Mr. Thiessen is a junior geologist with one season of field experience.

Grid samples were coded and identified in the field by line and chainage number; i.e., sample collected on L 20 + 00 N at 15 + 00 W was coded 20N-15W. Road samples were initialed by the sampler, and numbered in sequence of collection.

Other sample data recorded at stations are as follows:

1) Colour
2) Texture
3) Horizon and depth
4) Remarks as to rock types & mineralization.

**ANALYTIC TECHNIQUES:**

A total of 762 soil samples were analyzed for copper in the Vancouver laboratories of Bondar-Clegg and Co. Ltd. The samples were dried at 40-50°C in infra-red ovens and sieved to -80 mesh in Tyler sieves. An aliquot of -80 mesh fraction was digested in hot aqua regia to extract the Cu. The Cu content was determined by atomic absorption spectrophotometry at a detection limit of 1 p.p.m.
CLASSIFICATION OF DATA:

A histogram was plotted for the copper content of soils, and the mean and standard deviation were calculated for the total population. The resulting histogram is an unimodal curve, thus the data was classified into the following anomalous categories:

- negative -- 0 - m
- possibly anomalous -- m - (m + s)
- probably anomalous -- (m + s) - (m + 2s)
- definitely anomalous -- >= (m + 2s)

PRESENTATION OF DATA:

Location of soil samples with copper contents are shown in Figure 121-2. Anomalous classification charts accompany each map. Definitely anomalous and probably anomalous zones are shown as contours around anomalous values. Two anomalies are referenced on the maps, and are discussed further in detail in this report.

The general geology of the claim block is shown in Figure 121-3.
DISCUSSION OF RESULTS

Dispersion of metals in areas of extreme rainfall, extensive soil overburden, and vegetation cover is largely by chemical methods. As the B-horizon is well developed, and is subjected to a continuous flow of water and high water table, the metal values would be widely and relatively evenly dispersed.

With the results of this sampling programme, two copper anomalies were recognized and considered worthy of detailed description. Several other anomalous zones are indicated; however, due to incomplete sampling, interpretation is inconclusive at the present time:

ANOMALY I:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location:</td>
<td>from L0 + 00 to L40 + 00 N @ 30 + 00 W</td>
</tr>
<tr>
<td>Length:</td>
<td>4,600 feet</td>
</tr>
<tr>
<td>Width:</td>
<td>200 - 300 feet</td>
</tr>
<tr>
<td>Total number of samples:</td>
<td>16</td>
</tr>
<tr>
<td>No. of possibly anomalous samples:</td>
<td>6</td>
</tr>
<tr>
<td>No. of probably anomalous samples:</td>
<td>4</td>
</tr>
<tr>
<td>No. of definitely anomalous samples:</td>
<td>6</td>
</tr>
</tbody>
</table>
The anomaly is in the southwestern portion of the claim area, and is underlain mainly by volcanic rocks of the Bonanza Group. The interpreted contact of the sedimentary rocks of the Bonanza Group passes through the anomaly at the northern end. Countless numbers of felsite dikes and dike swarms have been mapped in the anomaly. A small plug of granodiorite is 500 feet to the south of the anomaly, and the main intrusive mass is 1,500 - 2,000 feet east of the anomaly. Disseminated pyrite is noted in the volcanic rocks at the south end of the anomaly.

The anomaly is apparently closed off in all directions by the 1,000 foot interval grid sampling. Further detailed sampling along existing lines, and lines at 200 foot intervals between existing lines is required to substantiate and further refine the interpretation. If results indicate a favourable geochemical zone, geophysical methods would be required to delineate potential mineralized zones.

ANOMALY II:

<table>
<thead>
<tr>
<th>Location:</th>
<th>from L40 + 00 N to L80 + 00N @ 60 + 00 W.</th>
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</thead>
<tbody>
<tr>
<td>Length:</td>
<td>4,000 feet</td>
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<tr>
<td>Width:</td>
<td>300 - 500 feet</td>
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<tr>
<td>Total number of samples:</td>
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<td>Number of possibly anomalous samples:</td>
<td>6</td>
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<tr>
<td>Number of probably anomalous samples:</td>
<td>7</td>
</tr>
<tr>
<td>Number of definitely anomalous samples:</td>
<td>7</td>
</tr>
</tbody>
</table>
The anomaly falls along the contact of the volcanic rocks and the sedimentary rocks of the Bonanza Group. Several felsite dikes intrude the Bonanza Group in the anomalous area. The intrusive contact of granodiorite-diorite is approximately 1,000 feet east of the anomaly.

The north end of the anomaly is expressed only by a line of samples along a logging road. For this reason, the anomaly has not been closed off to the north. Interpretation of a possibly anomalous zone to the southeast connects anomaly I to anomaly II. Further geochemistry is required to close off the northern extension of this anomaly; to check any continuity with anomaly I; and to further refine the anomaly by detailed sampling along lines at 200 foot intervals. If a favourable geochemical environment exists, geophysical methods would be required to delineate potential mineralized zones.

The remaining anomalies so far interpreted within the claim block are indicated by only 1 - 5 samples, and are generally a result of road traverses. It is suggested that the remainder of the proposed grid sampling be completed to provide a complete geochemical picture of the claim block before other methods of exploration are considered. The structural and geological controls are present within the claim block to host both a porphyry type of deposit or a contact type of deposit.
Mapping and prospecting, noting fractures, alteration, faults, and variations in rock composition should accompany sampling.
APPENDIX A

COSTS OF GEOCHEMICAL SURVEYS
COSTS OF GEOCHEMICAL SURVEYS

1. CONSULTING COSTS:
   J. Kerr, P. Eng 1 day
   J. Dawson, P. Eng. 2 days
   3 days @ $125.00/day 3 days $375.00

2. LABOUR COSTS:
   T. Marshall, Technician 37 days
   C. Thiessen, Jr. Geologist 15 days
   52 days @ $70.00/day 52 days $3,640.00

   Assistants: (see attached list)
   72 man days @ $45.00/day 72 man days $3,240.00 6,880.00

3. LINE CUTTING CONTRACT: (attached vouchers)
   12.3 miles @ $150.00/mile 12.3 miles $1,845.00

4. TRANSPORTATION:
   Rental, 4 x 4 Crew Cab 806.00
   Travel Expenses 179.00
   (ferry charges, air fare) 985.00

5. ROOM & BOARD CHARGES:
   126 man days @ $17.00/day 126 man days $2,142.00
Costs of Geochemical Surveys (con'td.)

6. SAMPLE ANALYSIS & PREPARATION:
762 soil analysis for Cu & sample preparation
762 @ $1.20/sample

3 spectrographic analysis
@ $20.00 each

914.00

7. INTERPRETATION & REPORT PREPARATION:
J. Kerr, P. Eng.
5 days @ $125.00/day

T. Marshall
2½ days @ $70.00/day

Draftsman
8½ days @ $70.00/day

Secretarial

625.00 175.00 595.00 30.00 1,425.00

8. MISCELLANEOUS CHARGES:
Express Charges
Reproduction
Equipment Rental

20.00 60.00 108.00 188.00

TOTAL $14,804.00

John R. Kerr
APPENDIX B

STATEMENT OF QUALIFICATIONS
LIST OF PERSONNEL EMPLOYED ON PORT ALICE PROPERTY

DARKHAWK MINES LTD. (N.P.L.)

<table>
<thead>
<tr>
<th>Name</th>
<th>Days</th>
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<tbody>
<tr>
<td>T.D. Marshall, C.E.T.</td>
<td>37 days</td>
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<tr>
<td>C.D. Thiessen, Jr. Geologist</td>
<td>15 days</td>
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<tr>
<td>Assistants:</td>
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<tr>
<td>R. Bouchard</td>
<td>18 days</td>
</tr>
<tr>
<td>M. Christie</td>
<td>18 days</td>
</tr>
<tr>
<td>B. Nelson</td>
<td>10 days</td>
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<tr>
<td>P. Lindenbach</td>
<td>8 days</td>
</tr>
<tr>
<td>J. Becker</td>
<td>7 days</td>
</tr>
<tr>
<td>K. Sys</td>
<td>5 days</td>
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<tr>
<td>M. Sargeant</td>
<td>3 days</td>
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<tr>
<td>D. Shea</td>
<td>3 days</td>
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Total: 72 man days
Re: Number of Man-days spent on line cutting contract done in Port Alice Area.

Property of Versatile Mining Services
West Trans-Canada Highway
Kamloops, B.C.

<table>
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<th>Name</th>
<th>From</th>
<th>To</th>
<th>Man-days</th>
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</thead>
<tbody>
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<td>Edouard Morrissette</td>
<td>Nov 2</td>
<td>Nov 22</td>
<td>20</td>
</tr>
<tr>
<td>Michel Proulx</td>
<td>Nov 2</td>
<td>Nov 22</td>
<td>20</td>
</tr>
<tr>
<td>Gilles Grondin</td>
<td>Nov 16</td>
<td>Nov 22</td>
<td>7</td>
</tr>
<tr>
<td>Rosaire Neault</td>
<td>Nov 16</td>
<td>Nov 22</td>
<td>7</td>
</tr>
<tr>
<td>Jean P. Neault</td>
<td>Nov 16</td>
<td>Nov 22</td>
<td>7</td>
</tr>
<tr>
<td>Richard Beauvais</td>
<td>Nov 16</td>
<td>Nov 22</td>
<td>7</td>
</tr>
<tr>
<td>Eddy Beauvais</td>
<td>Nov 2 to Nov 11</td>
<td>Nov 16 to Nov 22</td>
<td>18</td>
</tr>
</tbody>
</table>

86 days

We, Jean Alix Company Limited, Certifie that the above figures are correct, And we remain,

Yours very truly,
Jean Alix Co Ltd,

Per: Eddy Beauvais,
Western Representative.
JEAN ALIX COMPANY LTD.
LINE CUTTING & STAKING CONTRACTOR
HEAD OFFICE: VAL D'OR, P.QUE.
TEL. 824-4060

PROPERTY: Port Alice, B.C.
CHARGE TO: Versatile Mining Services Ltd.
ADDRESS: West Trans-Canada Hwy,
Kamloops, B.C.
TWP: PROV: B.C.
DATE: November 25, 1970

Charge to: Versatile Mining Services Ltd.
Date: November 25, 1970

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<th>Length South</th>
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<th>South Tie Line</th>
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Grand Total: $1,845.00

Total $1,845.00

Total $1,845.00

Pickets Lines: 12.3
Miles at $150.00
Total $1,845.00
APPENDIX B

STATEMENT OF QUALIFICATIONS
STATEMENT OF QUALIFICATIONS

I, JOHN R. KERR, of Kamloops, B.C., HEREBY CERTIFY THAT:

1) I am a member of the Association of Professional Engineers in the Province of British Columbia.

2) I am a geologist residing at 295 Greenstone Drive, Kamloops, B.C., and am employed by Versatile Mining Services Ltd., P.O. Box 609, Kamloops, B.C.

3) I have practised as a geologist for 6½ years since graduation from the University of British Columbia in 1964, with a B.A.Sc. in Geological Engineering.

4) The work completed and described in this report was supervised by J.M. Dawson, P. Eng., and myself. I compiled and interpreted the technical data.

John R. Kerr, P. Eng.
VERSATILE MINING SERVICES LTD.
