# Geochemical and Geophysical Report

# on the

# MESABI and MESABI 2 Mineral Claims

Heffley Lake
Kamloops Mining Division
British Columbia



| | |
|---|---|
| NTS: | 92I/16E<br>50° 51' North, 120° 03' West |
| Owner: | R.H. McMillan |
| Report of work by: | **Coronation Mines Ltd.** |
| Authors: | L.A. Clark and E.R. Honsinger |
| Date: | February 5, 1996 |

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## Figures



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## Introduction

This report documents soil geochemical sampling, VLF-EM surveying, and geological evaluation of the claims during July and August, 1995.

## Location and Access

These south-central British Columbia claims lie 27 km northeast of Kamloops, as shown on Figure 1. The claims lie immediately north of Heffley Lake, centered at 50° 51' north latitude, 120° 03' west longitude in NTS map sheet 92I/16E.

The property is accessed via Highway 5 approximately 21 km north of Kamloops to the community of Heffley Creek, thence 17 km east to the Mesabi Claims along the paved highway that runs to Sun Peaks Mountain ski area (see Figure 2).

## Mineral Property

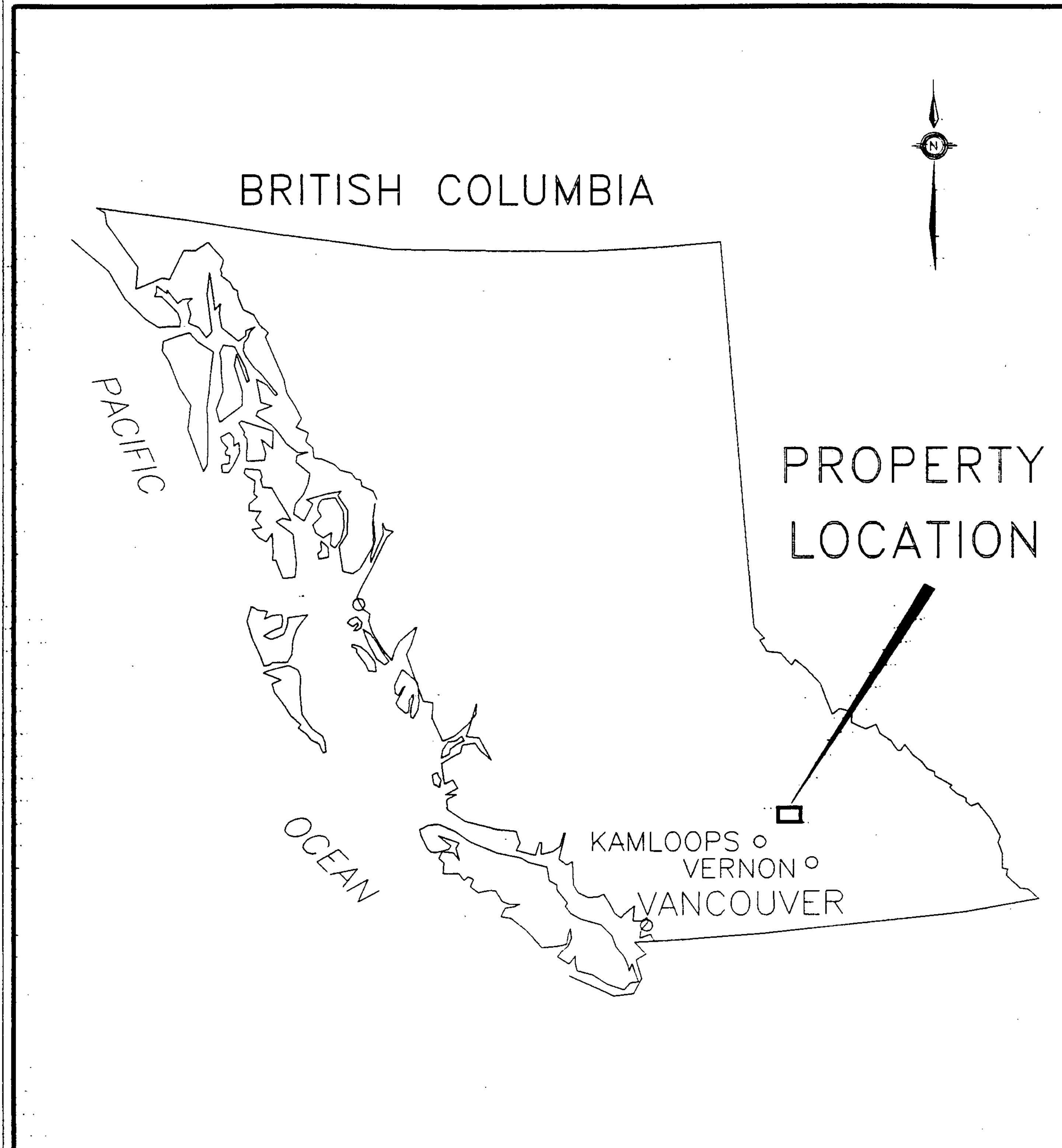
The property consists of two contiguous four-post claims comprising 24 claim units in the Kamloops Mining Division. The detailed locations of the claims, lying immediately north of Heffley Lake, are shown on Figure 3. Claim records are as follows:

| Claim Name | Units | Record Number | Record Date |
|---|---|---|---|
| MESABI | 20 | 317246 | April 21, 1993 |
| MESABI 2 | 4 | 324705 | April 13, 1994 |

## Exploration History

The exploration history is reviewed in detail in a report by Carter (1994), to which the reader is referred. In brief, copper-iron mineralization on the southwest-facing mountain slope north of Heffley Lake was investigated by pitting prior to 1915. Madison Oils Ltd. did the only drilling ever reported. After magnetic and geochemical surveying, 255 m were drilled in four holes at the south end of the anomalous area between the highway and the lake. Cominco completed 35 km of grid, geological mapping, magnetic survey, and 1052 soil geochemical samples with no reported drilling.

The present MESABI claim was staked by the Mesabi Syndicate, April 1993 and




200 Km

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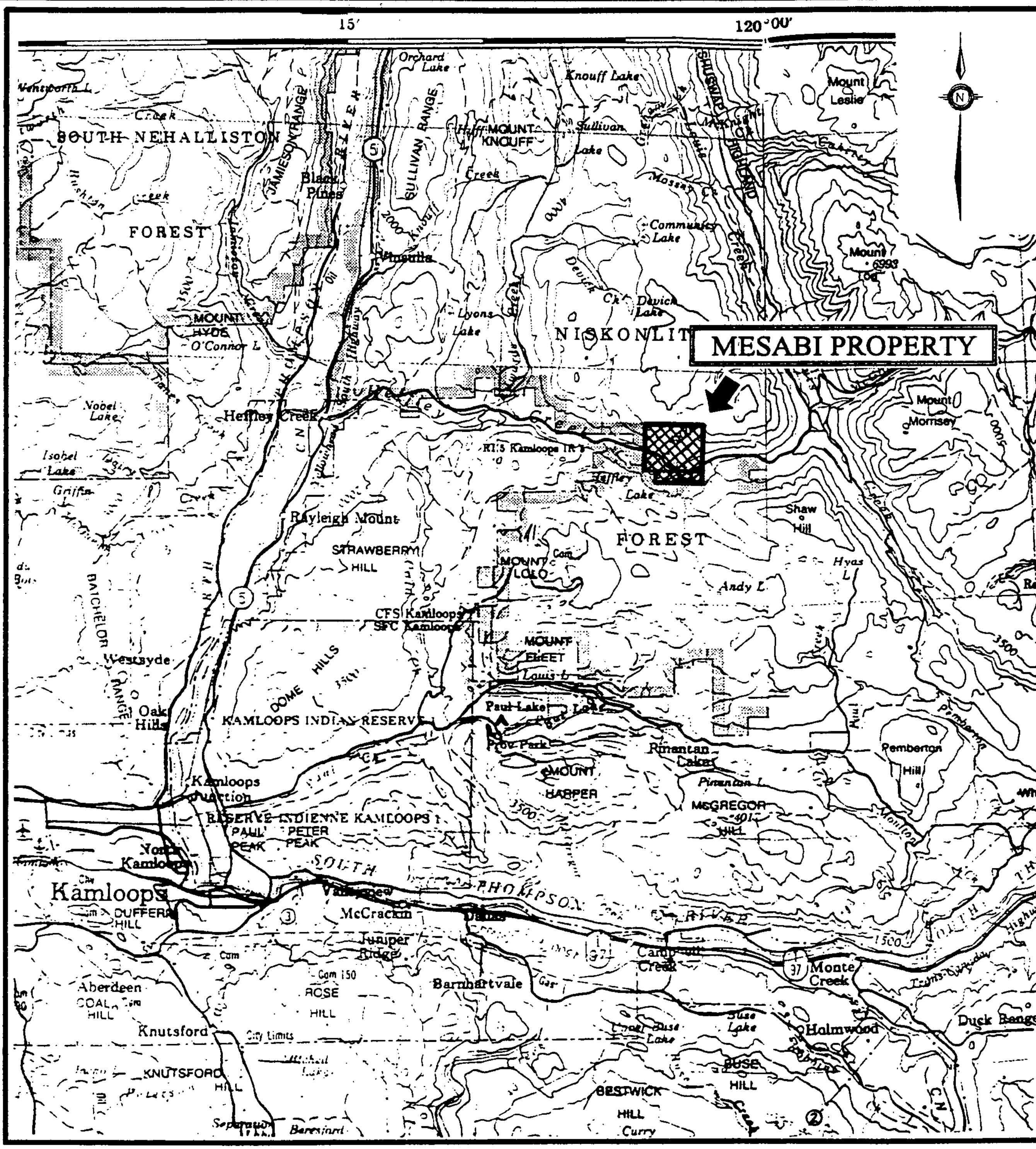
| MESABI SYNDICATE | |
|---|---|
| CORONATION MINES LTD. | |
| COMPLETED DATE: Jan.1996 / DRAFTED DATE: / REVISED DATE: / REVISED DATE: / SCALE: As Shown / FIGURE 1 | MESABI PROPERTY<br>Property Location<br>Kamloops Mining Division<br>NTS 92I/16E, Central British Columbia, Canada |




0 5 10 15 20

Kilometres

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**MESABI SYNDICATE**

# CORONATION MINES LTD.

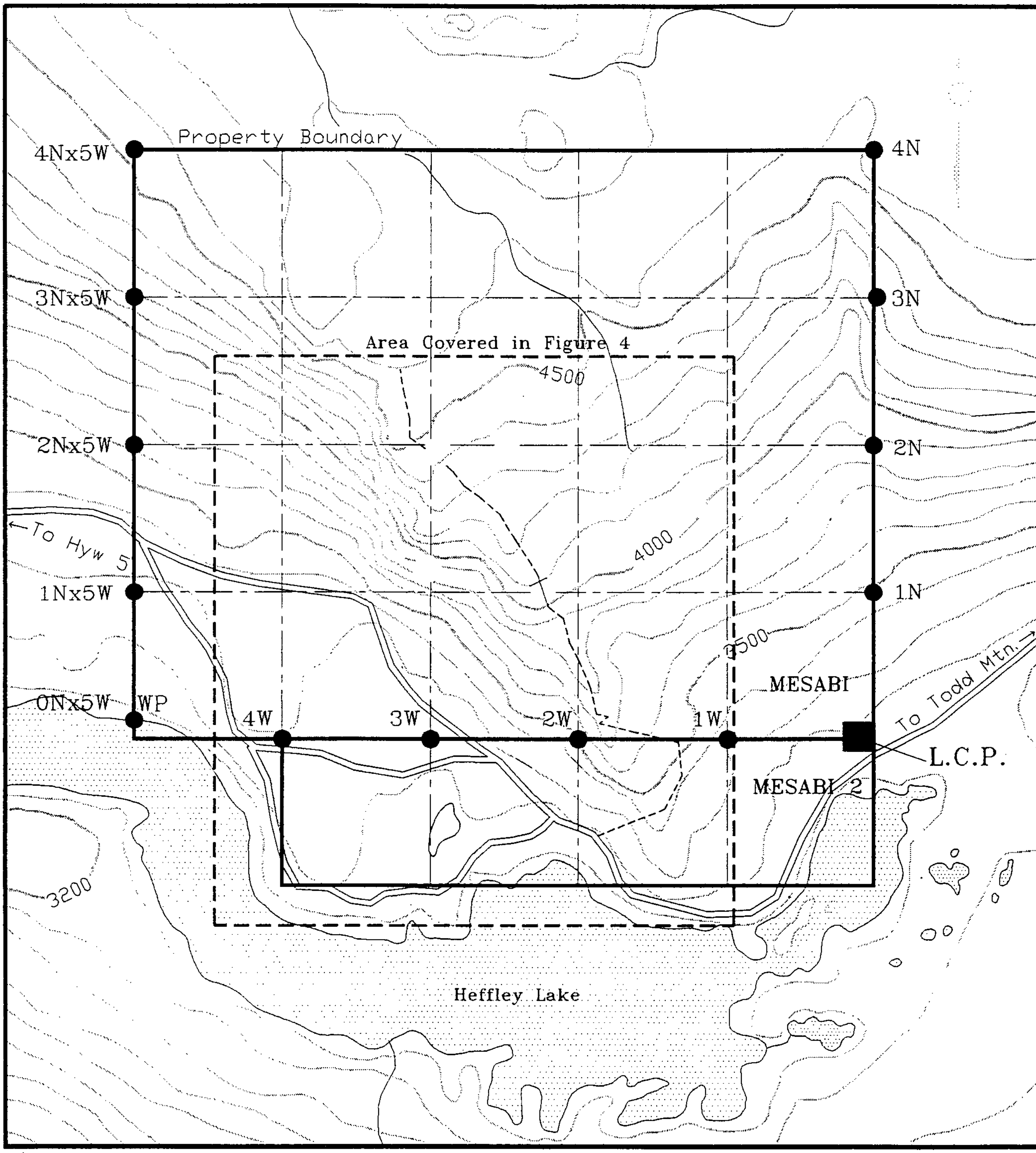
| COMPLETED DATE: | DRAFTED DATE: |
|---|---|
| Jan.1998 | |
| REVISED DATE: | REVISED DATE: |
| | |
| SCALE: 1:250,000 | |
| FIGURE 2 | |

MESABI PROPERTY

## Index Map

KAMLOOPS MINING DIVISION

NTS 92I/16E, Central British Columbia, Canada




0 250 500 750 1000

Metres

# Legend

Claim Boundary

Forest Service Trail

Access Road

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| MESABI SYNDICATE | |
|---|---|
| CORONATION MINES LTD. | |
| COMPLETED DATE: Jan.1996 / DRAFTED DATE: | MESABI PROPERTY |
| REVISED DATE: / REVISED DATE: | Claim Layout |
| SCALE: 1:20,000 | KAMLOOPS MINING DIVISION |
| FIGURE 3 | NTS 92I/16E, Central British Columbia, Canada |

was optioned by Coronation Mines Ltd. March 1994. Initial exploration, conducted by R.H. McMillan and N.C. Carter, consisted of 3.5 line km of VLF-EM and magnetic surveys plus collection and analyses of nine rock samples, as reported by Carter (1994).

**Physiographic and Regional Geological Setting**

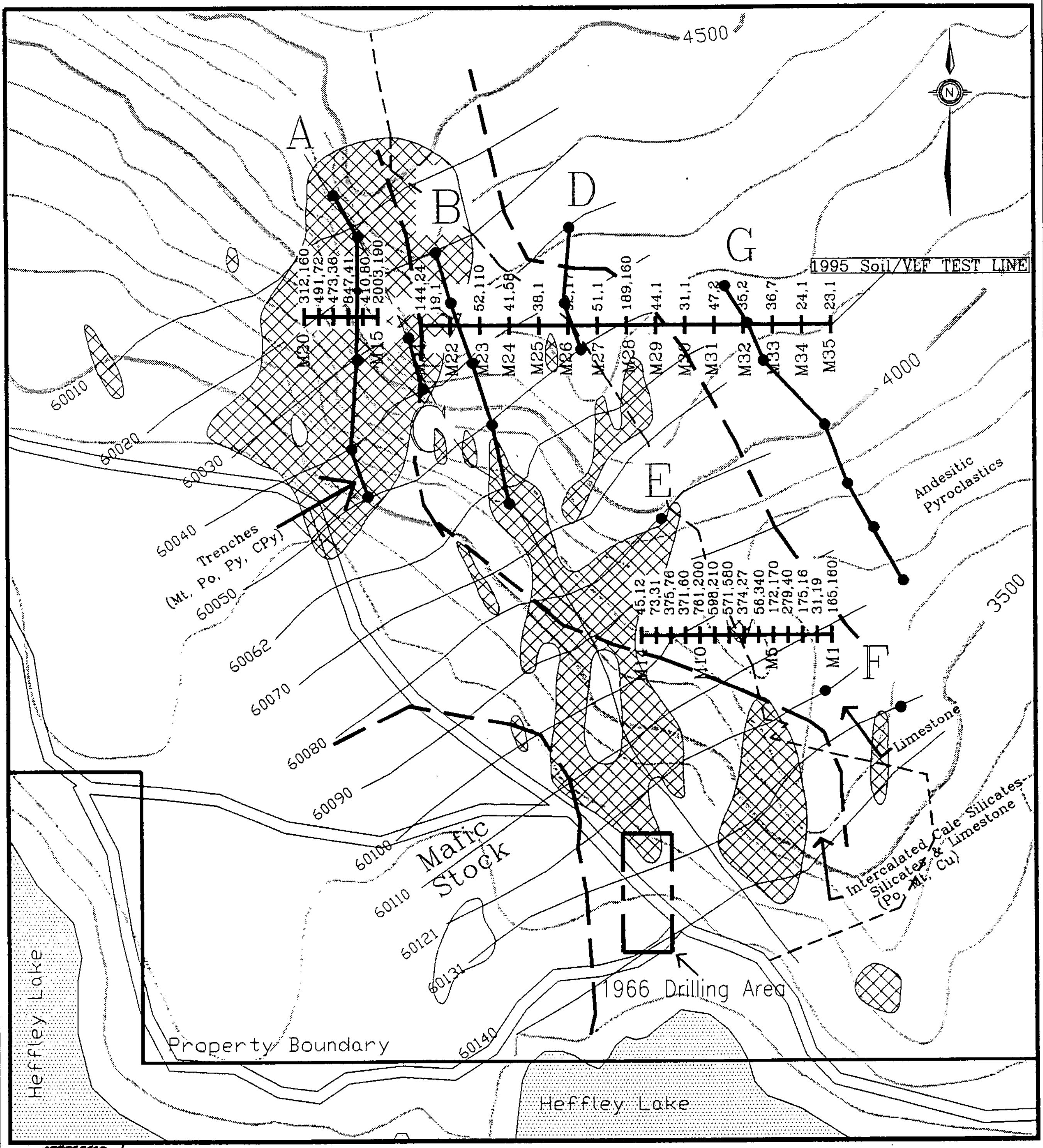
Heffley Creek and Heffley Lake occupy a valley trending east from the Thompson River valley and through the northern Thompson Plateau, as shown on Figure 2. Altitude of the property is 900 to 1400 m (Figure 3). Except for relatively steep areas, the well forested claims are covered with glacial till.

As compiled by Monger and McMillan (1989), Heffley Lake, in the Quesnel Terrane, lies in an area of Devonian to Triassic Nicola Group and/or Harper Ranch Group rocks, with more extensive Harper Ranch rocks to the southwest. The Devonian to Permian Harper Ranch is predominantly clastic sedimentary rocks, especially argillaceous ones, with some volcaniclastics and minor carbonates. The Devonian to Triassic Nicola Group has abundant mafic volcanic rocks, but the group also includes the same wide range of sediment types described above. So the Heffley area rocks have been assigned to both groups of rocks at various times by different mappers.

**Property Geology and Mineralization**

A northwest-trending series of volcanic and sedimentary rocks dips steeply northeastward, and a poorly exposed gabbro stock underlying the southwest part of the claims is reported by Casselman (1980), who did detailed mapping in connection with the Cominco exploration program. Generalized contacts of the rock units are shown on the compilation map shown in Figure 4. Volcanic rocks underly the east northeast half of the property. They include andesite and related pyroclastics, however along the soil line showing samples M21 to M35 on Figure 4, angular to subangular rubble at most of the sites and minor outcrop is mostly rhyolite to rhyodacite and minor sheared dacite with porphyritic andesite outcrops near the east end of the line.

Sediments predominate the southwest half or 40 % of the claims. Casselman mapped mainly limestone and argillite. In the current program, the rocks exposed along the top of the southwest facing cliffs appear to be almost glassy, crystalline quartzite. This may be totally silicified limestone, but in the absence of much replacement evidence, it is here interpreted as a quartzite unit in the metasedimentary sequence. Between the stock and the cliffs, Casselman observed calcsilicate skarn rocks interpreted as a




Metres

Legend

| | | | |
|---|---|---|---|
| Geophysical EM Conductor | A ●—●—● | 1995 Soil & VLF Test Lines with Soil Sample Numbers | M20 M15 |
| Geophysical Flight Line | 60010 | 1995 Soil & VLF Test Lines with Soil Geochemical Results Cu ppm, Au ppb | 312,160 |
| Inferred Geologic Contact | | | |
| Cu in Soils, >75ppm | | Forest Service Trail | |
| Claim Boundary | | Access Road | |

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MESABI SYNDICATE

CORONATION MINES LTD.

| | |
|---|---|
| COMPLETED DATE: | DRAFTED DATE: |
| REVISED DATE: | REVISED DATE: |
| SCALE: 1:10,000 | |
| FIGURE 4 | |

MESABI PROPERTY

Compilation Plan

KAMLOOPS MINING DIVISION
NTS 92I/16E, Central British Columbia, Canada

"mineral horizon". Pale greenish grey pyroxene is a major constituent of these rocks. Argillites, that are probably in part carbonaceous, are not well exposed but are abundant in some of the soils.

Trenches, located on Figure 4, expose garnet-rich skarn rocks bearing pods, disseminations and streaks of magnetite, pyrrhotite, pyrite and chalcopyrite (Casselman, 1980, and Carter, 1994). Near soil sample site M15, small slabs of massive pyrrhotite 10-15 mm thick can be found in the rubble where the top of scree slope meets the base of the rock cliffs. As summarized by Carter, the Madison Oil Ltd. drill holes, near the southern part of the present claims, intersected garnet-magnetite-iron sulphide mineralization similar to the trenches. Drill Hole 2 intersected 11 m of massive magnetite at 6.4 m depth grading 1.67 % copper and 0.5 g/t gold. This was succeeded down the hole by 13.7 m of disseminated magnetite with 0.11 % copper. The other three holes had similar mineralization with some intercalated altered volcanic rock and argillaceous siltstone.

**Airborne Geophysical Survey**

During February 1995, helicopter-borne electromagnetic and magnetic surveys were conducted employing the Dighem V system, with the results filed as an assessment report by R.A. Pritchard (1995). The area surveyed is shown on compilation Figure 4 as 14 northeast-trending flight lines at 100 m spacing and a northwest-trending tie line. The conductors labelled A to G, which are all relatively weak, follow the general northwest-trend of the geological units. Conductors A, B & G are ≥500 m long while conductors C, D, E and F reflect responses on one to three lines indicating lengths ≤200 m. A number of stronger conductive responses near the road have been eliminated due to probable causes from cultural features. Bedrock conductors may also occur in these areas, including the small area of previous drilling, but if there are bedrock conductors their responses are masked by cultural conductors.

The filtered VLF-EM shows a lot of weak conductivity in some of the same areas as the multi-frequency EM, but these responses do not show well defined linear trends that might be interpreted as structures.

Resistivity maps were computed at 900 and at 7200 Hz frequencies. The former shows rather clearly, as a band of relatively high resistivity, the ≥500 m wide northwest-trending band of metasediments shown on Fig. 4 as intercalated calc silicates and limestone, approximately as mapped by Casselman (1980). In the current program, significant parts of this metasedimentary unit were observed to be either an original quartzite or some other rock, possibly limestone, that has been totally replaced by silica and others by diopside. The volcanic rocks to the northeast are lower resistivity, as is a 500 m wide segment of what appears to be a rounded mass lying mostly southwest of area surveyed. Presumably, this is the poorly exposed gabbro or other mafic intrusive mass reported by Cassleman. The same features are shown at 7200 Hz but are less clearly resolved.

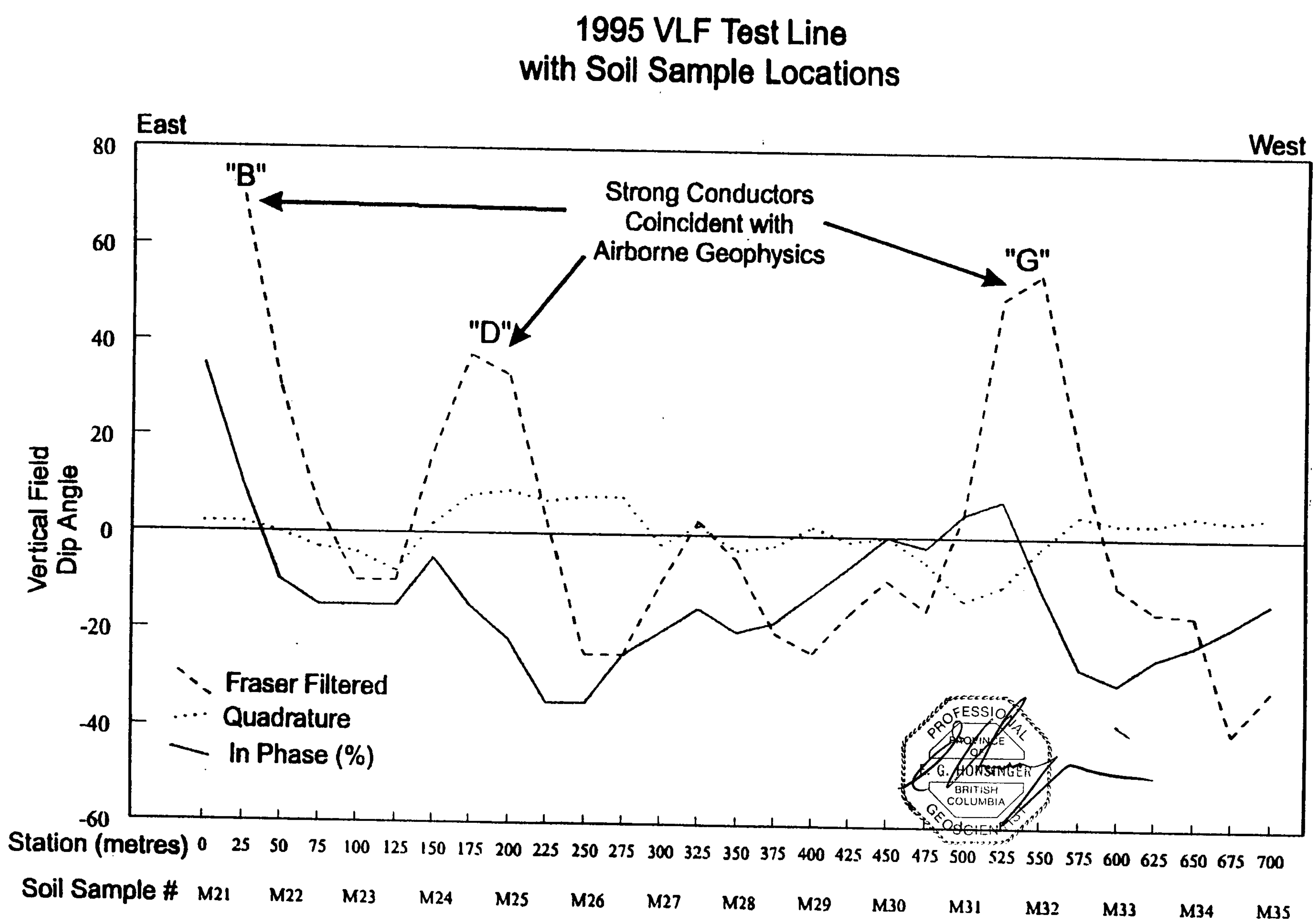
Total field magnetics show a pronounced, more or less circular, anomaly near the south edge of the survey in approximate coincidence with the area of early drill holes where some massive magnetite was identified. The anomaly has steeply defined edges at about 400 m diameter. A magnetite body of probably smaller size could be interpreted by magnetic modeling. A somewhat less intense 200 x 400 m anomaly occurs near the northwest end of the area surveyed, where it is coincident with a copper in soils anomaly.

## Ground VLF-EM Surveys

As reported by Carter (1994), McMillan and Carter did two east-west lines of VLF-EM and magnetometer readings, one along the boundary between the two claims and a parallel line 200 m to the north. A north by northwest conductor recorded on the two lines and another single line response were recorded near the margin of the mafic stock as interpreted from the 900 Hz resistivity map. The airborne EM conductors in this area were all deleted due to possible cultural interference. A possible alternative is that the VLF-EM conductor(s) reflects electrically interconnected sulphides associated with magnetite mineralization.

In the 1995 program, VLF-EM readings were taken with a Geonics EM 16 at 25 m stations along a test line labeled from M21 to M36 on Figure 4. It was designed to cross airborne EM conductors B, D, G and possibly give some measure of C, although C could not be properly tested due to coincidence with subvertical cliffs. The data are recorded in Appendix 1 and plotted on Figure 5. Strong conductors were recorded corresponding to airborne conductors B, D and G. There was scattered outcrop in these areas, and no mineralization was noted that could explain the conductors. They may reflect shears, or minor graphitic or sulphidic layers that were not recognized in the field.

# Figure 5:


1995 VLF Test Line
with Soil Sample Locations
East
West
"B"
"D"
"G"
Strong Conductors
Coincident with
Airborne Geophysics
80
60
40
20
0
-20
-40
-60
Vertical Field
Dip Angle
Fraser Filtered
Quadrature
In Phase (%)
Station (metres) 0 25 50 75 100 125 150 175 200 225 250 275 300 325 350 375 400 425 450 475 500 525 550 575 600 625 650 675 700
Soil Sample # M21 M22 M23 M24 M25 M26 M27 M28 M29 M30 M31 M32 M33 M34 M35
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## Soil Geochemistry

Results for copper in soils were reported by Casselman (1980), at least for an area covering the south central part of the present claims. The significantly anomalous areas are outlined on Figure 4. In the current program, three lines of soil samples were added for better definition and to determine the quantities of elements other than copper. Analytical data for these samples are shown in Appendix 2 with descriptions of the individual soil samples in Appendix 3.

Sampling depths for the B-horizon soils varied but was commonly in the 15-35 cm range. They were mostly light to medium brown and reddish brown silty soils containing some fine sand. Clay was estimated to be a relatively minor constituent in most samples. As noted on the report sheets, the 30 element ICP analyses were performed on aqua regia digestions of 500 mg sample aliquots. Gold was determined to 1 ppb detection on 10 g aliquots by graphite furnace AA after MIBK extraction.

Samples M1 to M14 were taken at 25 m intervals to provide up-slope definition or cut-off for one of the previously defined anomalous areas, and to provide information in the general areas of AEM conductors E and F (Fig. 4). Apart from four lower values, all copper values were highly anomalous in the 165 to 761 ppm range. Along the same line, six gold values were highly anomalous in the 160 to 580 ppb range. No other elements are significantly anomalous, but these data show that the previously defined soil anomaly extends >100 m up slope from its previous definition, and that gold should be associated with the bedrock source copper mineralization.

Soil sample line M15 to M20 angles westward from cliff base across a very steep, soil & tree-covered scree slope. This line also crosses AEM conductor A and occasional small slab-like pieces of fine grained massive pyrrhotite up to 6 cm thick were found near the cliff base around sample site M15. This is reflected by the soil copper value of 2003 ppm with all other values along the line in the 312-847 ppm copper range. Although copper values are higher, gold values in the 36 to 190 ppb range are less anomalous than the previous line. Arsenic is anomalous from 202 to 1807 ppm with weak anomalies in zinc (101 to 270 ppm) and strontium (146 to 385 ppm). Calcium mostly in the the 10 to 12 percent range reflects the prescence of at least some carbonate rocks remaining at this part of the property.

East of the cliffs on terrane sloping somewhat more gently to the south and southeast soil line M21 to M35 tested AEM conductors B, D and G. Here samples were collected at 50 m spacing in conjunction with the VLF-EM survey. In contrast with the and 25 m from the base of the cliffs where some 1-2 m bands of rusty rock are out of reach. The sample included two small pieces of scree rock containing mostly fine grained pyrrhotite and diopside with ~1 % disseminated chalcopyrite, that appeared to represent 5-15 cm beds from the cliff above. Most of the rocks are light grey or light green skarns, some with dark spots of pyroxene and some with coarse grained white tremolite. The sample is anomalous but not very metal-rich with 792 ppm copper, 80 ppb gold, 2.8 ppm silver and a surprising 359 ppm cobalt.

At 3440 feet elevation on the Embleton Mt. trail, ~300-400 m from the highway, angular rubble of aphanitic, siliceous grey volcanic rock with ~5 % pyrite and minor 1-2 mm quartz-carbonate veinlets contains 114 ppm copper and only 12 ppb gold.

At soil site M23 there was abundant angular, siliceous, possibly rhyolitic rubble with 5-8 % disseminated pyrite. This material is essentially nonanomalous with 68 ppm copper and 28 ppb gold. At this site there were also some pieces of feldspar porphyry intrusive and one of mafic to ultramafic augite porphyry.

At site M29, aphanitic, buff coloured possibly rhyolitic rubble has ~5 % very fine grained pyrite. It is also low in metals with 88 ppm copper and 14 ppb gold.

## Petrography of Mineralized Rocks

Immediately west of soil site M20, a dry rill 5 m wide by 2-3 m deep trends S30°W. Torrential run-offs have transported angular boulders from the scree slopes and cliff that lie to the northeast. Rocks included dark green diopside skarn with ≥5 % disseminated pyrrhotite, feldspar porphyry with ≤1 % disseminated pyrrhotite, white tremolite with minor epidote and pyrrhotite, fine grained quartz-tremolite with disseminated pyrite, dark grey to black biotitic metasiltstones and some fine sandstone.

A polished thin section of the fine grained, light grey rock (sample 8393B) with ~20 % of 1-5 mm rounded to irregular diopside grains, contains an additional ~20 % fine grained diopside in the matrix. Pleochroism indicates a composition closer to the magnesium end rather than the iron-rich hedernbergite end of the series. The matrix is very fine grained with no planar fabric. In addition to diopside, the section contains ~30 % plagioclase, 15 % quartz, 7 % sericite, 2 % of leucoxene-type breakdown products of sphene, 8 % of finely disseminated pyrrhotite and <0.5 % chalcopyrite. There is no carbonate, so it is uncertain if such a skarn assemblage can totally replace limestone.

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Polished thin section 8394A is from the pyrrhotite-rich sample collected near the cliff base, for which a geochemical analysis was discussed above. Surprisingly, the outcropping cliff rocks appear to strike N40°E and dip 50 to 90° southeast. Clearly, this is a drag fold of some size as the formation crosses the property in a north northwest direction. The thin section contains nearly 50 % each of pyrrhotite and diopside, including one 6 mm band of almost pure diopside. There is also ≤2 % of magnesium-rich chlorite, probably near the antigorite end member, <0.5 % plagioclase and ~0.5 % chalcopyrite. All minerals are very fine grained, and there is no evidence about the nature of the precurssor rock, except to note that neither carbonate nor quartz occur in the section.

Two different specimens of the rather similar-looking sulphide-rich sample were sectioned. Polished thin section 8394B contains about 40 % calcite, 20 % diopside and <0.5 % plagioclase. The rest of the section is partially weathered, fine grained pyrrhotite that is criss-crossed by veinlets of the supergene iron sulphide, smythite and other veinlets of hydrous iron oxides. Estimates of opaque mineral contents are: pyrrhotite 25 %, smythite 10 %, chalcopyrite 0.2 %, goethite 2 % and lepidocrocite 2 %. This is interpreted as an incomplete replacement of carbonate and silicate beds.

Specimen 8402 was from the same site as soil sample M29 (Fig. 4). In the field it appeared to be a hard, aphanitic, buff to light grey rhyolite. In polished thin section, it con-tains ~5 % biotite and <1 % quartz as 50-100 $\mu$m grains. These are incipient phenocrysts in a much finer grained matrix. Mineralogy of the latter is difficult to determine but appears to be ~ 40 % plagioclase, 20 % epidote, 15-20 % chlorite, 10-15 % pyroxene and ≤5 % opaques. About 4 % pyrrhotite appears as very fine grains clustered into aggregates up to 0.3 mm. There is <0.2 % chalcopyrite intergrown with the pyrrhotite and <<0.1 % pyrite. The minor quartz may be metasomatic, and the rock is probably andesite and certainly not rhyolite.

## Summary and Conclusions

The property is underlain by mafic volcanics rocks on the east northeast side and clastic sediments and limestone on the west. The latter rocks are intruded by a previously reported mafic stock, not seen in the present work. However, its outline is clearly defined by the 900 Hz calculated resistivity map from the helicopter-borne electromagnetic and magnetic survey done at 100 m line spacing. The belt of more resistive sedimentary rocks is also distinct from the less resistive mafic volcanics. Pieces of locally derived feldspar porphyry intrusive are occasionally found in the overburden.

Seven AEM conductors ranging from single line responses to >500 m length were defined. They are of only modest conductivity. A line of ground VLF-EM, across the northeastern part of the AEM surveyed area, clearly defined three of the conductors in an area of light overburden. Aphanitic andesitic rubble at a number of soil sample sites contains ~5 % finely disseminated pyrrhotite and <0.2 % chalcopyrite in polished thin section. The soils along that line were mostly nonanomalous. However, a soil sample line approximately 500 m farther south down the mountain was highly anomalous in copper to 598 ppm and gold to 580 ppb. This line of data enlarges the copper anomalous area previously reported by Casselman (1980). A short soil sample line extending west from the southwest-facing cliffs was anomalous, mostly from 312 to 847 ppm copper with one value of 2003 ppm, however gold was only moderately anomalous with values from 36 to 190 ppb. A scree sample of semi-massive pyrrhotite from the inaccessible cliffs, which location is also marked by an AEM conductor, contained only 792 ppm copper and 80 ppb gold. In thin section, the skarn minerals with the semimassive pyrrhotite are principally diopside and calcite. Diopside is the principal skarn mineral on the property with tremolite in some rocks and more minor plagioclase, quartz, sericite and leucoxene. No garnet or magnetite were observed.

In addition to the semi-massive pyrrhotite, disseminated pyrrhotite occurs over wide areas at about the 5 % level, but only minor copper was associated in samples studied and analyzed herewith. Analyses of semi-massive pyrrhotite collected from historic trenches, with associated garnet and magnetite, were reported by Carter (1994) to contain up to 3570 ppm copper and 120 ppb gold. Old drill holes south of the paved highway were reported by Sheppard (1966) to contain magnetite, garnet, and up to 1.67 % copper and 0.50 g/t gold over 11.0 m.

Further exploration may be impractical around the area previously drilled due to cultural encroachment. Significant amounts of copper or gold have not been found in exposed mineralization studied here, but the southernmost line of soil samples, collected at 25 m spacing, were markedly anomalous in these elements. Future exploration should focus on defining the up-slope limit anomalous metals in soils on that part of the property and carefully prospecting of the same area. Although outcrop is not abundant examination of angular rubble in the soils should be able to define the sourse and nature of the anomalous copper and gold.

## References

Carter, N.C. (1994) Geophysical and geochemical report on the Mesabi and Mesabi 2 mineral claims, Heffley Lake, Kamloops Mining Division, B.C. BCMEMPR assessment report, 15 pages + figures & appendix.

Casselman, M.J. (1980) Assessment report of line cutting and geological, soil geochemical and magnetometer surveys of the Heff Lake property, Heffley Lake area, Kamloops Mining Division, B.C. BCMEMPR Ass. Rept. 8246.

Monger, J.W.H. & McMillan, W.J. (1989) Geology, Ashcroft, B.C. Geol. Survey of Can. Map 42-1989, scale 1:250,000.

Pritchard, R.A. (1995) Dighem V survey of five properties for Coronation Mines Ltd., Vernon area, B.C. BCMEMPR assessment report 24040.

Sheppard, E.P. (1966) Geophysical and geological reports on the Hal Group of claims, Heffley Lake, B.C. BCMEMPR Assessment Reports 820 & 821.

# Cost Statement

| | | |
|---|---|---|
| Field Wage Costs - July 12-14 and August 21-22, 1995 | | |
| L.A. Clark | 5 days @ $400/day | $2,000.00 |
| E.G. Honsinger | 2 days @ $350/day | 700.00 |
| Y. Douma | 2 days @ $200/day | 400.00 |
| Transportation | | |
| Vehicle | 5 days @ $60/day | 300.00 |
| | 705 km @ $0.20/km | 141.00 |
| | Gasoline | 99.46 |
| | Highway tolls | 20.00 |
| Accomodation, Meals | | |
| July 12-14 | | 125.00 |
| August 21-22 | | 331.94 |
| Equipment Rentals | | |
| Omni EDA EM 16 | 2 days @ 25 | 50.00 |
| Analytical Charges | | |
| Rock samples | 4 @ $16.91 (including GST) | 67.64 |
| Soils | 35 @ $14.02 " " | 490.70 |
| Petrographic Analyses | | |
| Polished thin sections | 4 @ $23.54 (including GST) | 94.16 |
| Analysis | 1 days @ $300/day | 300.00 |
| Miscellaneous Supplies | | |
| Batteries, flagging tape, topofil, sample bags, etc. | | 50.00 |
| Report Preparation & Management | | |
| L.A. Clark | 2 days @ $400 | 800.00 |
| Diagrams - E.G. Honsinger | 2 days @ $350 | 700.00 |
| Printing and duplication | | 16.00 |
| | TOTAL EXPENDITURES | $6,685.90 |

## Qualifications of theAuthors

I, LLOYD A. CLARK, of 7337-145A Street, Surrey, B.C., certify that:

1. I am a Geological Engineer, registered with the Association of Professional Engineers and Geoscientists of British Columbia since 1991;
2. I am a graduate of the University of Saskatchewan with B.E. (1954), M.Sc. (1955) and McGill University with Ph.D. (1959);
3. I have lived and practiced my profession in eastern and western Canada, parts of the United States, Australia, Italy and Japan for more than 40 years; and
4. The geochemical and geophysical surveys, described in this report, were performed by the undersigned July 12-14, 1995 and by E.R. Honsinger and the undersigned August 21-22, 1995.

L.A. Clark

L.A. Clark, P. Eng.

I, E.R. (Rick) HONSINGER, of 152 East 17th Avenue, Vancouver, B.C., certify that:

1. I am a Professional Geoscientist, registered with the Association of Professional Engineers and Geoscientists of British Columbia since 1992;
2. I am a graduate of the University of British Columbia with a B.Sc. in Geology (1985) and the Southern Alberta Institute of Technology with a diploma in Geophysics (1981) from the Department of Mathematics;
3. I have practiced my profession continually for over 10 years involving properties in British Columbia, Ontario, Arizona, Idaho, Oregon and Nevada; and
4. The geochemical and geophysical surveys, described in this report, were performed by L.A. Clark and the undersigned August 21-22, 1995.

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E.G. Honsinger, P. Geo.

# APPENDIX 1

## EM 16 TEST LINE DATA
## MESABI PROPERTY

**Line Bearing:** 090 Degrees
**Station Used:** Seattle
**Latitude:** 50° 51' North
**Longitude:** 120 ° 03' West
**Location:** See Figure 4

| Station (m) | InPhase (%) | Fraser Filtered | Quad-rature | Terrain Slope (%) | Notes |
|---|---|---|---|---|---|
| 0 | 35 | | 2 | 55 | Conductor B |
| 25 | 10 | 70 | 2 | -15 | (Probable cliff effect) |
| 50 | -10 | 30 | 0 | 0 | |
| 75 | -15 | 5 | -3 | -2 | |
| 100 | -15 | -10 | -4 | 15 | |
| 125 | -15 | -10 | -8 | -25 | |
| 150 | -5 | 17 | 2 | 10 | |
| 175 | -15 | 37 | 8 | 5 | |
| 200 | -22 | 33 | 9 | 0 | Conductor D |
| 225 | -35 | 3 | 7 | 20 | |
| 250 | -35 | -25 | 8 | 25 | |
| 275 | -25 | -25 | 8 | -15 | |
| 300 | -20 | -10 | -2 | -13 | |
| 325 | -15 | 3 | 2 | -17 | |
| 350 | -20 | -5 | -3 | -25 | |
| 375 | -18 | -20 | -2 | -18 | |
| 400 | -12 | -24 | 2 | 5 | |
| 425 | -6 | -16 | -1 | 0 | |
| 450 | 0 | -9 | 0 | 25 | |
| 475 | -2 | -15 | -5 | 0 | |
| 500 | 5 | 5 | -13 | 10 | |
| 525 | 8 | 50 | -10 | 0 | |
| 550 | -10 | 55 | -2 | -15 | Conductor G |
| 575 | -27 | 18 | 5 | -15 | |
| 600 | -30 | -10 | 3 | -20 | |
| 625 | -25 | -15 | 3 | -30 | |
| 650 | -22 | -16 | 5 | 5 | |
| 675 | -18 | -40 | 4 | -25 | |
| 700 | -13 | -31 | 5 | -20 | |

# APPENDIX 2

APPENDIX 2

**PIONEER LABORATORIES INC.** 5-730 EATON WAY NEW WESTMINSTER, BC CANADA V3M 6J9 TELEPHONE (604)522-3830

# G E O C H E M I C A L   A N A L Y S I S   C E R T I F I C A T E

**FORMATION CAPITAL CORPORATION**
Project:
Sample Type: Soils/Rocks

Multi-element ICP Analysis - .500 gram sample is digested with 3 ml of aqua regia, diluted to 10 ml with Water. This leach is partial for Mn, Fe, Ca, P, La, Cr, Mg, Ba, Ti, B, W and limited for Na, K and Al. Detection Limit for Au is 3 ppm.
*Au Analysis- 10 gram sample is digested with aqua regia, MIBK extracted, graphite furnace AA finished to 1 ppb detection.

Analyst RSam
Report No. 9531223
Date: July 27, 1995

| ELEMENT<br>SAMPLE | Mo<br>ppm | Cu<br>ppm | Pb<br>ppm | Zn<br>ppm | Ag<br>ppm | Ni<br>ppm | Co<br>ppm | Mn<br>ppm | Fe<br>% | As<br>ppm | U<br>ppm | Au<br>ppm | Th<br>ppm | Sr<br>ppm | Cd<br>ppm | Sb<br>ppm | Bi<br>ppm | V<br>ppm | Ca<br>% | P<br>% | La<br>ppm | Cr<br>ppm | Mg<br>% | Ba<br>ppm | Ti<br>% | B<br>ppm | Al<br>% | Na<br>% | K<br>% | W<br>ppm | Au*<br>ppb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Soils*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M1 | 4 | 165 | 5 | 80 | .4 | 45 | 25 | 363 | 4.16 | 7 | 5 | ND | 2 | 31 | .4 | 4 | 3 | 32 | .35 | .103 | 12 | 18 | .28 | 173 | .11 | 4 | 2.18 | .03 | .15 | 8 | 160 |
| M2 | 1 | 31 | 3 | 79 | .3 | 16 | 8 | 354 | 1.93 | 10 | 5 | ND | 2 | 28 | .2 | 2 | 2 | 32 | .30 | .111 | 5 | 11 | .24 | 93 | .10 | 3 | 2.15 | .03 | .08 | 2 | 19 |
| M3 | 2 | 175 | 8 | 61 | .4 | 23 | 18 | 443 | 2.88 | 12 | 5 | ND | 2 | 26 | .2 | 3 | 2 | 33 | .25 | .095 | 8 | 11 | .20 | 109 | .13 | 3 | 2.89 | .03 | .07 | 2 | 16 |
| M4 | 2 | 279 | 9 | 72 | .3 | 128 | 45 | 380 | 3.58 | 8 | 5 | ND | 2 | 28 | .3 | 2 | 7 | 41 | .40 | .084 | 6 | 32 | .40 | 79 | .12 | 3 | 2.39 | .03 | .08 | 2 | 40 |
| M5 | 4 | 172 | 7 | 97 | .3 | 37 | 25 | 1231 | 4.63 | 18 | 5 | ND | 2 | 39 | .5 | 4 | 2 | 46 | .43 | .165 | 8 | 19 | .28 | 176 | .14 | 4 | 3.10 | .02 | .07 | 2 | 170 |
| M6 | 6 | 56 | 10 | 52 | .6 | 45 | 25 | 870 | 7.05 | 47 | 5 | ND | 3 | 53 | .6 | 2 | 2 | 177 | .63 | .056 | 10 | 169 | 3.08 | 216 | .22 | 3 | 4.06 | .01 | .94 | 2 | 340 |
| M7 | 3 | 374 | 12 | 47 | .3 | 69 | 50 | 312 | 5.87 | 17 | 5 | ND | 3 | 65 | .2 | 2 | 2 | 73 | .53 | .032 | 12 | 53 | 1.19 | 129 | .16 | 3 | 3.39 | .02 | .21 | 2 | 27 |
| M8 | 12 | 571 | 7 | 61 | .9 | 195 | 102 | 979 | 7.83 | 51 | 5 | ND | 2 | 77 | .3 | 2 | 2 | 153 | 2.16 | .074 | 9 | 108 | 2.75 | 104 | .16 | 3 | 3.06 | .01 | .78 | 2 | 580 |
| M9 | 22 | 598 | 11 | 46 | .8 | 65 | 62 | 694 | 8.53 | 34 | 5 | ND | 3 | 53 | .2 | 2 | 2 | 107 | .91 | .053 | 10 | 57 | 1.52 | 77 | .16 | 3 | 2.10 | .01 | .26 | 2 | 210 |
| M10 | 20 | 761 | 18 | 75 | .4 | 85 | 88 | 1029 | 9.72 | 100 | 5 | ND | 3 | 95 | .2 | 2 | 3 | 78 | 1.25 | .049 | 10 | 44 | 1.17 | 110 | .13 | 9 | 2.33 | .01 | .79 | 2 | 200 |
| M11 | 3 | 371 | 18 | 129 | .5 | 59 | 34 | 595 | 6.88 | 84 | 5 | ND | 2 | 382 | 1.1 | 2 | 2 | 32 | 9.10 | .200 | 8 | 11 | .50 | 96 | .06 | 13 | .75 | .01 | .33 | 2 | 60 |
| M12 | 3 | 375 | 15 | 217 | .5 | 70 | 48 | 1007 | 9.31 | 57 | 5 | ND | 2 | 200 | .9 | 2 | 4 | 41 | 2.59 | .464 | 8 | 14 | .25 | 212 | .06 | 5 | .79 | .01 | .13 | 2 | 76 |
| M13 | 1 | 73 | 7 | 71 | .3 | 28 | 11 | 373 | 3.28 | 23 | 5 | ND | 2 | 48 | .2 | 2 | 2 | 48 | .55 | .028 | 9 | 23 | .60 | 74 | .13 | 5 | 1.80 | .01 | .37 | 2 | 31 |
| M14 | 1 | 45 | 11 | 140 | .4 | 32 | 11 | 495 | 2.96 | 12 | 5 | ND | 3 | 44 | .2 | 2 | 4 | 40 | .39 | .054 | 8 | 22 | .53 | 136 | .12 | 7 | 2.14 | .02 | .33 | 2 | 12 |
| M15 | 23 | 2003 | 19 | 101 | 1.8 | 90 | 146 | 1353 | 16.87 | 1807 | 8 | ND | 3 | 146 | .2 | 2 | 7 | 89 | 2.85 | .096 | 12 | 23 | 1.16 | 103 | .08 | 5 | 1.18 | .01 | .31 | 2 | 190 |
| M16 | 5 | 410 | 10 | 152 | .6 | 91 | 50 | 942 | 6.59 | 340 | 5 | ND | 2 | 385 | 1.9 | 2 | 2 | 35 | 12.52 | .087 | 5 | 11 | .91 | 53 | .04 | 9 | .60 | .01 | .13 | 2 | 80 |
| M17 | 6 | 847 | 16 | 145 | .6 | 85 | 78 | 654 | 7.97 | 663 | 5 | ND | 2 | 232 | .6 | 2 | 5 | 29 | 11.57 | .112 | 8 | 10 | .61 | 38 | .03 | 12 | .54 | .01 | .08 | 2 | 41 |
| M18 | 3 | 473 | 20 | 250 | .7 | 73 | 38 | 429 | 6.85 | 238 | 5 | ND | 2 | 285 | 3.5 | 2 | 2 | 23 | 11.24 | .106 | 6 | 8 | .40 | 48 | .04 | 12 | .45 | .01 | .05 | 2 | 36 |
| M19 | 4 | 491 | 15 | 235 | .8 | 86 | 51 | 594 | 8.41 | 242 | 5 | ND | 2 | 278 | 3.0 | 2 | 7 | 26 | 11.25 | .099 | 7 | 11 | .56 | 53 | .04 | 15 | .52 | .01 | .06 | 2 | 72 |
| M20 | 2 | 312 | 15 | 270 | .7 | 68 | 29 | 462 | 6.77 | 202 | 5 | ND | 2 | 233 | 2.3 | 2 | 2 | 32 | 9.97 | .094 | 7 | 15 | .68 | 64 | .05 | 10 | .55 | .01 | .08 | 2 | 160 |
| ***Rocks*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8394A-*Mesabi* | 1 | 792 | 3 | 46 | 2.8 | 92 | 359 | 61 | 33.85 | 2 | 5 | ND | 4 | 11 | 1.4 | 2 | 2 | 5 | .24 | .044 | 1 | 4 | .05 | 6 | .01 | 21 | .12 | .01 | .02 | 2 | 80 |

PIONEER LABORATORIES INC. 5-730 EATON WAY NEW WESTMINSTER, BC CANADA V3M 6J9 TELEPHONE (604)522-3830

# GEOCHEMICAL ANALYSIS CERTIFICATE

**FORMATION CAPITAL CORPORATION**
Project:
Sample Type: Rocks

Multi-element ICP Analysis - .500 gram sample is digested with 3 ml of aqua regia, diluted to 10 ml with Water. This leach is partial for Mn, Fe, Ca, P, La, Cr, Mg, Ba, Ti, B, W and limited for Na, K and Al. Detection Limit for Au is 3 ppm.
*Au Analysis- 10 gram sample is digested with aqua regia, MIBK extracted, graphite furnace AA finished to 1 ppb detection.

Analyst R Sam
Report No. 9521394
Date: September 1, 1995

| ELEMENT SAMPLE | | Mo ppm | Cu ppm | Pb ppm | Zn ppm | Ag ppm | Ni ppm | Co ppm | Mn ppm | Fe % | As ppm | U ppm | Au ppm | Th ppm | Sr ppm | Cd ppm | Sb ppm | Bi ppm | V ppm | Ca % | P % | La ppm | Cr ppm | Mg % | Ba ppm | Ti % | B ppm | Al % | Na % | K % | W ppm | Au* ppb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8400 | Mesabi | 2 | 114 | 3 | 9 | .3 | 2 | 10 | 80 | 2.51 | 2 | 5 | ND | 2 | 53 | .2 | 2 | 2 | 27 | .70 | .078 | 5 | 44 | .21 | 67 | .14 | 3 | .69 | .08 | .29 | 2 | 12 |
| 8401 | Mesabi | 2 | 68 | 3 | 25 | .3 | 15 | 16 | 104 | 3.53 | 5 | 5 | ND | 2 | 87 | .6 | 2 | 2 | 20 | 1.48 | .129 | 7 | 24 | .14 | 64 | .09 | 3 | .53 | .02 | .12 | 2 | 28 |
| 8402 | Mesabi | 3 | 88 | 3 | 52 | .3 | 10 | 16 | 427 | 2.65 | 6 | 5 | ND | 2 | 91 | .3 | 2 | 2 | 32 | 1.18 | .119 | 3 | 26 | .84 | 243 | .19 | 3 | 1.41 | .03 | .43 | 2 | 14 |
| **Soils** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M-21 | Mesabi | 2 | 144 | 11 | 195 | .6 | 61 | 16 | 296 | 4.97 | 35 | 5 | ND | 2 | 112 | 2.0 | 3 | 2 | 44 | 1.20 | .032 | 13 | 17 | .40 | 127 | .14 | 4 | 2.28 | .02 | .21 | 2 | 24 |
| M-22 | Mesabi | 1 | 19 | 7 | 134 | .3 | 40 | 11 | 378 | 2.47 | 22 | 5 | ND | 2 | 51 | .8 | 2 | 2 | 36 | .44 | .040 | 4 | 16 | .32 | 127 | .12 | 3 | 1.99 | .03 | .14 | 2 | 1 |
| M-23 | Mesabi | 2 | 52 | 12 | 113 | .6 | 38 | 14 | 439 | 3.32 | 32 | 5 | ND | 3 | 62 | 1.0 | 3 | 2 | 51 | .74 | .030 | 13 | 21 | .72 | 148 | .11 | 3 | 2.13 | .02 | .14 | 2 | 110 |
| M-24 | Mesabi | 1 | 41 | 9 | 199 | .3 | 43 | 14 | 604 | 2.72 | 14 | 5 | ND | 2 | 38 | 1.3 | 2 | 2 | 47 | .48 | .078 | 7 | 20 | .68 | 110 | .11 | 3 | 2.25 | .03 | .13 | 2 | 58 |
| M-25 | Mesabi | 2 | 38 | 9 | 195 | .3 | 52 | 10 | 378 | 3.37 | 39 | 5 | ND | 2 | 36 | 1.2 | 2 | 2 | 33 | .40 | .058 | 11 | 19 | .37 | 123 | .08 | 3 | 1.88 | .02 | .11 | 2 | 1 |
| M-26 | Mesabi | 1 | 92 | 6 | 96 | 1.1 | 14 | 17 | 565 | 7.03 | 62 | 5 | ND | 2 | 32 | 1.0 | 3 | 2 | 50 | .44 | .057 | 29 | 11 | .56 | 75 | .01 | 3 | 1.20 | .01 | .07 | 2 | 17 |
| M-27 | Mesabi | 1 | 51 | 9 | 117 | .3 | 28 | 13 | 392 | 3.01 | 18 | 5 | ND | 2 | 40 | .8 | 2 | 2 | 46 | .40 | .050 | 6 | 23 | .58 | 128 | .11 | 3 | 2.42 | .02 | .13 | 2 | 1 |
| M-28 | Mesabi | 2 | 189 | 10 | 92 | .3 | 55 | 34 | 515 | 4.67 | 60 | 5 | ND | 3 | 49 | 1.3 | 2 | 2 | 62 | .84 | .052 | 6 | 55 | .87 | 119 | .14 | 4 | 3.89 | .02 | .29 | 2 | 160 |
| M-29 | Mesabi | 1 | 44 | 4 | 179 | .3 | 32 | 14 | 370 | 3.00 | 55 | 5 | ND | 2 | 39 | .9 | 2 | 2 | 33 | .62 | .017 | 5 | 20 | .55 | 79 | .14 | 3 | 2.60 | .03 | .10 | 2 | 1 |
| M-30 | Mesabi | 1 | 31 | 9 | 323 | .3 | 27 | 13 | 543 | 2.42 | 54 | 5 | ND | 2 | 36 | 1.1 | 2 | 2 | 39 | .47 | .027 | 4 | 20 | .62 | 66 | .14 | 3 | 2.06 | .04 | .08 | 2 | 1 |
| M-31 | Mesabi | 2 | 47 | 8 | 104 | .3 | 31 | 16 | 327 | 3.09 | 30 | 5 | ND | 2 | 39 | .8 | 2 | 2 | 54 | .40 | .031 | 5 | 26 | .76 | 109 | .14 | 3 | 2.19 | .02 | .14 | 2 | 2 |
| M-32 | Mesabi | 1 | 35 | 10 | 107 | .3 | 30 | 15 | 511 | 2.60 | 19 | 5 | ND | 2 | 40 | .6 | 2 | 2 | 41 | .50 | .075 | 4 | 21 | .60 | 132 | .12 | 3 | 2.12 | .02 | .20 | 2 | 2 |
| M-33 | Mesabi | 1 | 36 | 12 | 154 | .3 | 18 | 16 | 1454 | 2.80 | 47 | 5 | ND | 2 | 58 | .6 | 2 | 2 | 46 | .79 | .104 | 5 | 18 | .45 | 257 | .08 | 4 | 2.43 | .02 | .11 | 2 | 7 |
| M-34 | Mesabi | 1 | 24 | 6 | 128 | .3 | 16 | 11 | 438 | 2.04 | 37 | 5 | ND | 2 | 57 | .2 | 2 | 2 | 41 | .42 | .121 | 3 | 15 | .34 | 156 | .11 | 3 | 2.21 | .03 | .07 | 2 | 1 |
| M-35 | Mesabi | 1 | 23 | 8 | 162 | .3 | 18 | 11 | 482 | 2.11 | 20 | 5 | ND | 2 | 72 | .5 | 2 | 2 | 35 | .54 | .324 | 5 | 16 | .38 | 152 | .11 | 3 | 2.72 | .04 | .09 | 2 | 1 |

# APPENDIX 3

## Appendix 3 - Descriptions of Individual Soil Samples

(about half the samples from M1 to M20 include material from two similar sites collected 2-3 metres apart)

M-1 25-30 cm depth, light brown silty B-horizon soil, some clay, ~5 cm of black A horizon with minor leached zone; line slopes up to the west ~5°

M-2 20-25 cm depth, very similar to M-1

M-3 ~25 cm depth, light-medium brown, similar to M1 with minor amount of leached material in sample.

M-4 40-70 cm depth from a bear den (unoccupied), very similar to M-1, all still 5-10° slope up to west

M-5 ~25 cm, medium brown silt-rich soil still on east slope,approaching ridge

M-6 10 cm, medium reddish brown soil on outcrop on top of gently south-sloping north-south ridge

M-7 10-20 cm, medium riddish brown, on 30° slope to west southwest with outcrops, but slope is stabilized

M-8 5-15 cm, medium brown, slightly leached soil on 40° more active slope, but still weak soil profile develoment

M-9 10-20 cm, medium brown, very similar to M-8, good B horizon on 35° slope to west southwest

M-10 20-25 cm, B soil in shades of red and dark brown, sand, silt clay and rock fragments on 25° slope

M-11 15-25 cm, dark grey and brown, profile stabilized at base of big tree, still 25° slope

M-12 35 cm, reddish brown B-type soil in rock rubble on 15° slope

M-13 25 cm, medium brown with slight grey caste, typical of most of the sites there is ≤5 cm of black A horizon, the occasional thin leached zone is missing at this site, slope to south southwest now decreased to ~10°

M-14 20-25 cm, light-medium brown, may be slightly leached (?), 2-3 cm A-horiz. and no leached zone; 5° slope; is 5 m up slope from small, dry gully ahead (end of line).

M-15 This is the first sample of another line of samples running from east to west and is collected near the head of a scree slope containing sparse 5-6 cm thick pieces of fine grained massive pyrrhotite from somewhere on cliffs immediately above; 10-20 cm depth, reddish brown soil, stabilized under tree root 3-5 m from cliff

M-16 15-20 cm depth, dark brown silty soil developed on scree, 35° slope 12 m from base of cliff (line runs west and cliff west northwest along this section)

M-17 35 cm, medium brown silty soil between 3-10 cm scree pieces under 10-20 cm sandy black organic layer;

M-18 Very similar to M-17; 30-35° scree slope, now 50-70 m below cliff to the north;

M-19 25-30 cm, very similar to M-17 & 18, dark brown with greyish caste, silt and sand on slope ~30°;

M-20 20-35 cm, similar to 17-19, still 25-30° slope; this last sample on the line is only 15-20 m from a steep-sided, rocky, dry gulch that obviously has flood torrents during wet periods;

M21 30-35 cm, medium brown sany soil with minor clay, on top of scree and below 5 cm black soil and 5-30 cm dark brown sandy soil; slope steeply to southwest;

M22 5-22 cm dark brown B-type soil under 5 cm black organic soil and over subrounded-ed rocks; slope 5° to south southeast;

M23 3-27 cm medium-dark brown B-soil under 3 cm black organic and over flat cobbl-es of black phyllitic argillite; slope 8° SE;

M24 0-10 cm black organic, 10-30 cm medium brown B-soil over a lot of angular rubble of hard, aphanitic, light grey rock resembling rhyolite but is probably andesite (see thin secstion of similar rock at site M29 below) with disseminated pyrrhotite (see rock analysis 8401); slope 15° south;

M25 0-7 cm black organic, 7-25 cm medium brown, sandy, silty soil with little or no clay, over abundant pebbles and cobbles of weakly sheared andesite(?) with limonite after carbonate, no sulphides; slope 4° south;

M26 0-7 cm black organic, 7-20 cm medium orangish brown B-soil with abundant pebbles of fine grained, light coloured intermed. or mafic volcanics, sheared with limonite, no sulphides; slope 5° east;

M27 0-3 cm black organic, 3-35 cm light-medium brown, sand & silt with medium-dark grey unsheared mafic volcanic cobbles, no limonite or sulphide;

M28 0-1 cm black, 1-12 cm brown soil on outcrop and rubble of aphanitic, light grey intermediate (?) volcanic rock, no sulphides, sparse vuggy veinlets of quarts and carbonate; slope 40°SE. Polished thin section and rock analysis 8402 is andesite;

M29 0-12 cm black soil, 12-22 cm medium brown sand & silt; slope 5° SE; lot of light grey to buff, aphanitic, hard rubble resembles rhyolite, but rock analysis and polished thin section 8402 shows it is andesite with ~4 % disseminate pyrrhotite;

M30 0-10 cm black organic, 10-30 cm medium brown sand & silt; slope 5° south; cobbles include feldspar porphyry, dark grey mafic volcanics and light grey vol-canic that looks felsic but is probably andesite as at M29;

M31 0-8 cm black organic, 8-35 cm medium brown sand & silt, slope 15° SE; rocks subrounded light grey mafic volcanic, igneous feldspar porphyry and dark grey meta-argillite;

M32 0-5 cm black organic soil, 5-25 cm light brown soil, may be slight leaching? Slope 8° south southeast; sheared intermediate volcanics, one felsic intrusive, trace iron sulphide;

M33 0-5 cm black organic soil, 5-7 cm light grey, leached soil, 7-18 cm medium-dark brown B-soil; slope 5° SE; outcrop of dark grey, aphanitic, mafic volcanic rock;

M34 0-5 cm black soil, 5-17 cm medium brown sand and silty soil; slope 5° SE; outcrop of medium grey andesite flow, sparse plagioclase & mafic phenocrysts;

M35 0-5 cm black organic soil, 5-20 cm medium brown sandy, silty soil; slope 15° ESE; rocks of black meta-argillite.