654

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 654 MAP ....

REPORT ON THE
MO CLAIM GROUP
BEAVERDELL AREA, B.C.
GREENWOOD MINING DIVISION
82 E 6

Vancouver Office
August 24, 1965

J.M. Patterson &
R.A. Barker, P.Eng. (B.C.)

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SUMMARY

The Mo claim group lies in the Beaverdell area about 20 miles east of the Okanagan Valley in south central British Columbia. The property consists of 36 claims staked by Southwest Potash personnel in July 1964 to cover a large, 3000 x 5000 feet, area of altered quartz-feldspar porphyry. This report describes the results of the geological and geochemical work carried out during 1964 and 1965.

Work to date indicates that the alteration which is essentially argillization, silicification and potash metasomatism occurs in several zones which have yet to be delineated precisely. Exposures of altered rock up to 450 feet are present. Pyrite is the most common sulfide. Molybdenite was rarely recognized, however, rock chips taken for minor element analysis contained up to 1000 ppm molybdenum.

The grid area was soil sampled and found to contain four anomalous zones of greater than 100 ppm molybdenum. The average pH of the soil is 6.6. The three best anomalies occur in a slightly more acid soil in the bottom or sides of small draws.

CONCLUSIONS

i) the geological mapping carried out to date indicates that the Mo Claim group has a good exploration potential. The zones of altered porphyry present may be a poorly mineralized and possibly leached surface expression of a significant molybdenite deposit.

ii) The near neutral condition of the soil suggests that chemical solution and consequent downhill migration of molybdenum may have occurred resulting in soil whose molybdenum content is not representative of the underlying rock.

iii) much more information is required before the Mo claim group can be fully evaluated.

INTRODUCTION

GENERAL STATEMENT

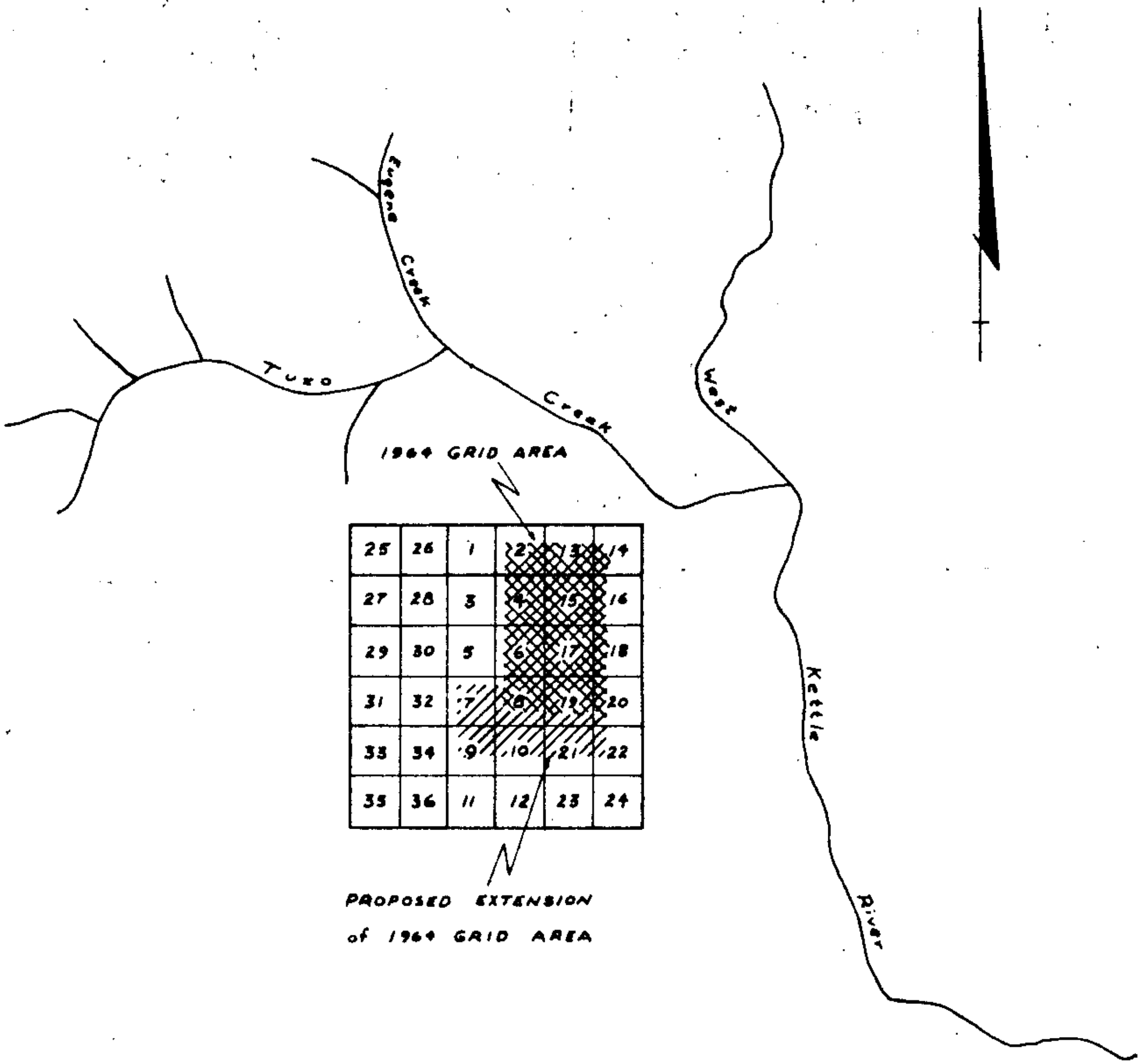
The area now covered by the Mo Claim Group, previously the Matt Group of Kennco, was initially brought to the writer's attention by brief write-ups in the Annual Report of the British Columbia Department of Mines for 1961 and 1962. On June 26th, 1964, H.T. Schassberger and J.M. Patterson briefly examined the area explored by Kennco. A more detailed examination was made during the first week in July and the most interesting area staked on July 16th, 1964. Extension of grid lines, and additional soil and rock chip sampling and geological mapping were continued in 1965.

CLAIMS AND OWNERSHIP

Thirty-six claims (Figure 2) were staked by Southwest Potash personnel to cover altered and gossanized granitic intrusive rocks located in the Beaverdell area (Figure 3). The claim and tag numbers, expiry and recording dates are located in the appendix. This report covers the Application for Certificate of Work on 19 of these claims, namely; Mo #2, #4 through #11, #15 through #21, #32, #34, and #36.

LOCATION

The Mo Group of claims is located about five miles southwest of Beaverdell at latitude 49°23' and longitude 119° 07'. The claims lie along the side and on top of the south



SOUTHWEST POTASH CORPORATION

MO GROUP

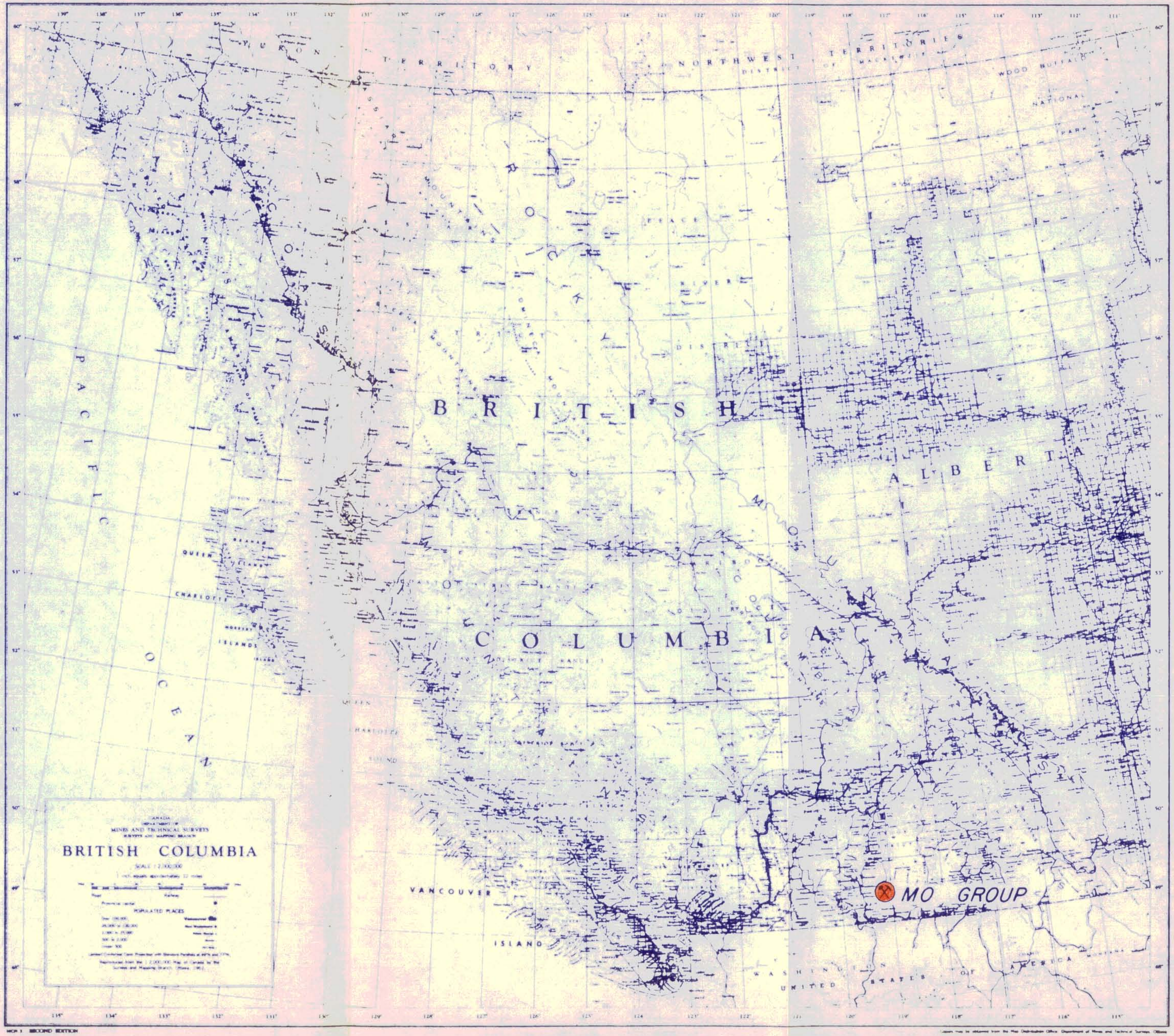
GREENWOOD M.D. — B.C.

CLAIM MAP

SCALE 1" = 1 MILE

Vancouver —

FIG. 2



LOCATION MAP

FIG. 1

wall of the Tuzo Creek Valley where it joins the West Kettle River Valley.

PREVIOUS WORK

The history of the Mo Group goes back to approximately the early 20th century when prospectors are reported to have worked on several lead-zinc veins located on or near the claim group. The first attempt to systematically explore the area was begun by Kennco in 1961 when road building, geochemical sampling, trenching and prospecting were carried out under the direction of J.M. Anderson. Work was continued in 1962 when an induced polarization survey was completed in addition to geological mapping and some trenching. Apparently work was terminated in 1962 as there is no mention of work being done in the 1963 Annual Report of the British Columbia Department of Mines.

PRESENT WORK (to July 29th, 1965)

i) 6,000 feet base-line cut

ii) 48,000 feet of picket-lines cut

iii) 6,000 feet tie-line cut

iv) All lines chained and soil sampled and 100 feet horizontal intervals, and barometer surveyed.

v) Geological mapping.

The dates, amounts, and costs of this work are as follows:

<u>September 1964</u>	
9.4 miles of line cutting @ $115/mile	$1081.00
Labour on above	12.00
<u>October 31 - November 2, 1964</u>	
3 men for 3 days chaining and soil sampling	123.30
George Leary, Brian Weir, Cary McLeod	
<u>May 4 - 8, 1965</u>	
3 men for 5 days - 19,200' line cutting	172.50
Axel Kellner, Sandy McDonald, Ian Hedley	
<u>June 20 - July 2, 1965</u>	
2 men for 13 days chaining and soil sampling	373.75
George Leary, Frank Ferguson	
<u>July 21-29, 1965</u>	
1 man for 9 days mapping	148.05
George Leary Total	$ 1910.60

TOPOGRAPHY

The Mo claim group is located on the southwest wall of the southeast trending Tuzo Creek Valley between elevations of 3000 and 5000 feet above sea level.

In general the slope of the hill is rather steep; diagonally across the grid area the vertical rise in one half mile is approximately 1000 feet. Numerous small draws are present, however, water occurs in only a few small seepages which dry up during the summer.

The lower part of the claim group has a rather dense growth of immature evergreens; the upper part has an open parkland type of forest growth.

REGIONAL GEOLOGICAL SETTING

The Beaverdell area as shown by Little (Figure 3) is essentially a core of Mesozoic Nelson granodiorite with some older included metamorphic rocks surrounded by younger Mesozoic Valhalla granitic rocks; several plutons of Valhalla intrude the core. Three small intrusions of Tertiary Coryell occur along or adjacent to the Valhalla and/or Nelson contacts. Four other plutons of Coryell are present.

Although the latest work in the area was carried out under the direction of Little in 1958 and 1959 a more complete examination of the area was made by L. Reinecke when he mapped the area in 1911. With the exception of the rocks eight miles northeast of Beaverdell, the Valhalla of Little is the equivalent of the Beaverdell batholith of Reinecke. Little mapped the Beaverdell batholith-type rocks of Reinecke northeast of Beaverdell as Coryell. The Nelson granitic rocks of Little are the equivalent of the West Kettle quartz diorite of Reinecke.

The Nelson Intrusives ranging from quartz monzonite to diorite in composition are grey, or black and white, in general medium-grained non porphyritic, granular rocks composed largely of feldspar, quartz, biotite and hornblende. Foliated outcrops occur, particularly adjacent to the younger Valhalla intrusions. The Nelson granitic rocks are intruded into a volcanic-sedimentary complex known as the Anarchist Group.

Intruded into the above are the Valhalla intrusive rocks which in general are pinkish white medium to coarse grained unfoliated granitoid rocks which locally at least have numerous phenocrysts of potash feldspar. Biotite is the only common mafic mineral present. The youngest intrusive rocks are the Coryell syenitic plugs.

Reinecke came to the conclusion that the widespread mineralization in the Beaverdell area is related to the Beaverdell (Valhalla) quartz monzonite. Reinecke classified the mineralization as follows:

i) Mineralized Shear Zones

  a) galena, sphalerite, pyrite silver-bearing zones

  b) chalcopyrite, gold-bearing zones

ii) Stocks

  a) pyrrhotite-chalcopyrite-pyrite with gold values

iii) Contact metamorphic deposits

The Mo Group and its particularly interesting type of alteration and mineralization occurs just south of the area mapped by Reinecke and will be described later.

The great deal of intermittent prospecting carried out in this general area, dating as far back as 1889, has resulted in a number of old mines, adits and trenches. At present only the Highland Bell Mine is producing in the Beaverdell area.

DESCRIPTION OF ROCK TYPES

IRON FORMATION

Two outcrops of iron formation are present (Figure 4) one thirty feet long and the other one hundred feet long. The shorter outcrop is a banded rock composed of irregular dark bands, up to one-quarter inch wide, of magnetite and lighter granitic bands. The longer outcrop has less magnetite and is more of a granitic schist. Although the relationship of these outcrops to the other rocks is not known they are probably pre-Nelson and thereby the oldest rocks on the claim group.

NELSON GRANODIORITE

The Nelson granodiorite is a light grey, commonly greenish tinged, rock composed essentially of grey plagioclase, quartz, hornblende and biotite.

Although the most intense alteration, to be discussed later, occurs in the porphyry, the granodiorite is altered but in general to a much lesser degree, However, secondary specularite, largely in short discontinuous veinlets is more extensively developed in the granodiorite than in the porphyry.

PORPHYRY

The porphyry is a light grey to whitish rock containing numerous and conspicuous phenocrysts of euhedral quartz and potash feldspar. Quartz phenocrysts, commonly glassy and from slightly to strongly smoky in color, are generally 0.1 inch in diameter but grains up to one half inch have been observed. The phenocrysts of potash feldspar are commonly twinned and range in size from less than one inch up to four inches in length but average from one to two inches in length. Locally the potash phenocrysts are coated with clay minerals and are partly to completely weathered out. The matrix is fine to medium grained and composed largely of white feldspar containing a few percent of fine-grained disseminated biotite.

Alteration, to be discussed under a separate heading, is common and ranges in intensity from slight to intense. Although silicification and argillization dominate, other notable features are:

i) presence of fluorite in two highly altered outcrops
ii) rearrangement and introduction of potash feldspar
iii) widespread occurrence of specularite.

DYKE ROCKS

The dykes present (Figure 4) appear to be post-mineralization and, except for several potash-rich Coryell-type dykes, are generally high in ferromagnesian minerals.

Below in relative order of abundance, is a brief description of the dykes observed.

i) fine-grained dark grey (tinge of mauve) rock containing phenocrysts (5%) of plagioclase (grey centres, white rim) and a few phenocrysts of hornblende and biotite.

ii) fine-grained light grey rock with phenocrysts (5%-10%) of white plagioclase distinctly smaller than those in i).

iii) fine-grained dark green rock containing subhedral to euhedral phenocrysts of feldspar and hornblende.

ALTERATION

Many of the outcrops examined are argillized and silicified to varying degrees. The lengths, widths and relative degree of alteration of the various zones are unknown. However, exposures of porphyry up to four hundred and fifty feet long have been observed which are from twenty to sixty percent altered to silica and clay minerals. Within the large zones are small zones up to ten feet wide almost completely converted to silica and clay minerals. Commonly the soft alteration, strong argillization and weak silicification, is best developed in north to northeast trending shear zones. However, strong silicification is present with no apparent structural control.

The mixture of unalatered and altered porphyry in many outcrops (Figure 4) indicates a spotty and erratic alteration pattern. However, one unaltered porphyry dyke was observed cutting altered porphyry. Similar, but unrecognized dykes may account for much of the unaltered porphyry present in the grid area.

SILICIFICATION

Silicification ranges in intensity from a fine-grained silicification of the matrix with minor argillic alteration of K-feldspar phenocrysts over several hundred feet to narrow, ten feet, zones composed largely of silica containing nearly completely argillized potash feldspar phenocrysts. Quartz veins up to one half inch in widths are common but form only limited, tens of square feet, well defined stockworks.

ARGILLIZATION

Argillization is an integral part of all the altered outcrops, but is best developed in the soft shear zones which are generally a few feet wide. Clay minerals make up from a few to almost fifty percent of outcrops of altered porphyry. The cores of potash phenocrysts appear to be preferentially argillized.

MINERALIZATION

Molybdenite was observed in the altered porphyry, however, visually recognizable molybdenite is rare. The presence of some form of molybdenum is also indicated by the highly anomalous values, up to 1000 ppm molybdenum, obtained from the rock chip samples taken for minor element analysis.

Pyrite is common but not abundant and occurs generally as disseminations or in discontinuous veinlets. Specularite is the second most common mineral and occurs either along dry fractures or in quartz veinlets. Fluorite was observed in several outcrops and Kennco reported the presence of topaz.

RESULTS OF SOIL SAMPLES

The molybdenum contents of the soils collected are plotted in Figure 5 and summarized below:

Number of Samples	Value Mo (ppm)
362	0 - 49
21	50 - 99
10	$>$ 99

The range in values is from 0 to 1600 ppm molybdenum. The average pH of the soil is 6.6 (range of 5.3 to 7.7). Less than 5 percent of the samples taken had a pH of less than 6.0. With few exceptions the samples were obtained from the "b" horizon at depths from 2 to 10 inches.

The four north to northeast trending anomalies (Figure 5) of greater than 100 ppm Mo located and summarized below have an average pH of 6.2.

Name	Location	Length	Width	Peak in ppm Mo (pH)
A	L8N, 19+00E	800'	100-250'	1600 (5.8)
B	L0 , 8+00E	700'	70-200'	900 (6.1)
C	L8N, 6+00E	450'	80'	180 (5.6)
D	L32N, 4+00E	670'	50-100'	180 (6.6)

The best three zones (A, B, and C) appear to be topographically controlled. They are all parallel to the slope in the bottom or on the sides of small draws. Zone B occurs approximately 100 feet downhill from an outcrop of highly altered porphyry from which grab samples gave 100 ppm Mo. The fourth anomaly does not appear to be controlled by the topography. The near neutral environment of the soil is suitable for the solution and chemical transportation of molybdenum. The ground waters carrying the soluble molybdate ions are probably funnelled into the draws. The location of the three best anomalies in the draws suggests that the slightly more acid soil present in the draws (Figure 5) causes the precipitation of an unknown quantity of molybdenum.

The distribution of copper in the soil (Figure 6) roughly coincides with that of the molybdenum, however, the plus 300 ppm copper anomalies do not coincide with the molybdenum anomalies described above. The north trend of the copper contour map (Figure 6) as opposed to the northeast trend of the molybdenum contour map (Figure 5) may be due to the near neutral condition (average pH of 6.6) of the soil. Copper is insoluble in neutral solutions and is fixed in the soil. Molybdenum on the other hand is soluble in near neutral solutions and will migrate downhill producing Mo anomalies that will tend to be at right angles to the topographic contours, resulting in this case in northeast trending anomalies.

Only two (see below) of the copper anomalies are of a magnitude, considering the neutral nature of the soil, to warrant additional work.

i) 1400 ppm Cu - L36N at 1+00 to 3+00 east

ii) 1000 ppm Cu - L8S at 23+00 east.

EXPLORATION POTENTIAL

The Mo group is considered to have a good exploration potential because of the following factors:

i) presence of a young relatively small quartz-feldspar porphyry intrusive body similar to those known to be genetically and spatially related to significant molybdenum deposits,

ii) the size, degree and types of alteration present in the porphyry,

iii) the widespread anomalous amounts of molybdenum in the altered rocks and overlying soil.

In contrast to the above the exploration potential is reduced by the apparent lack of molybdenite mineralization and a well defined quartz stockwork. It must be pointed out, however, that only a small amount of geological mapping has been completed to date. Evidence also indicates that surface leaching of molybdenum may have occurred.

In brief the large altered area of quartz feldspar porphyry present may be a poorly mineralized and possibly leached surface expression of a significant molybdenite deposit.

J. M. Patterson

R.A. Barker, P.Eng. (B.C.)

Vancouver Office
August 24, 1965.

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1961: Geology of the Kettle River (West Half) B.C.; G.S.C. Preliminary Map 15-1961

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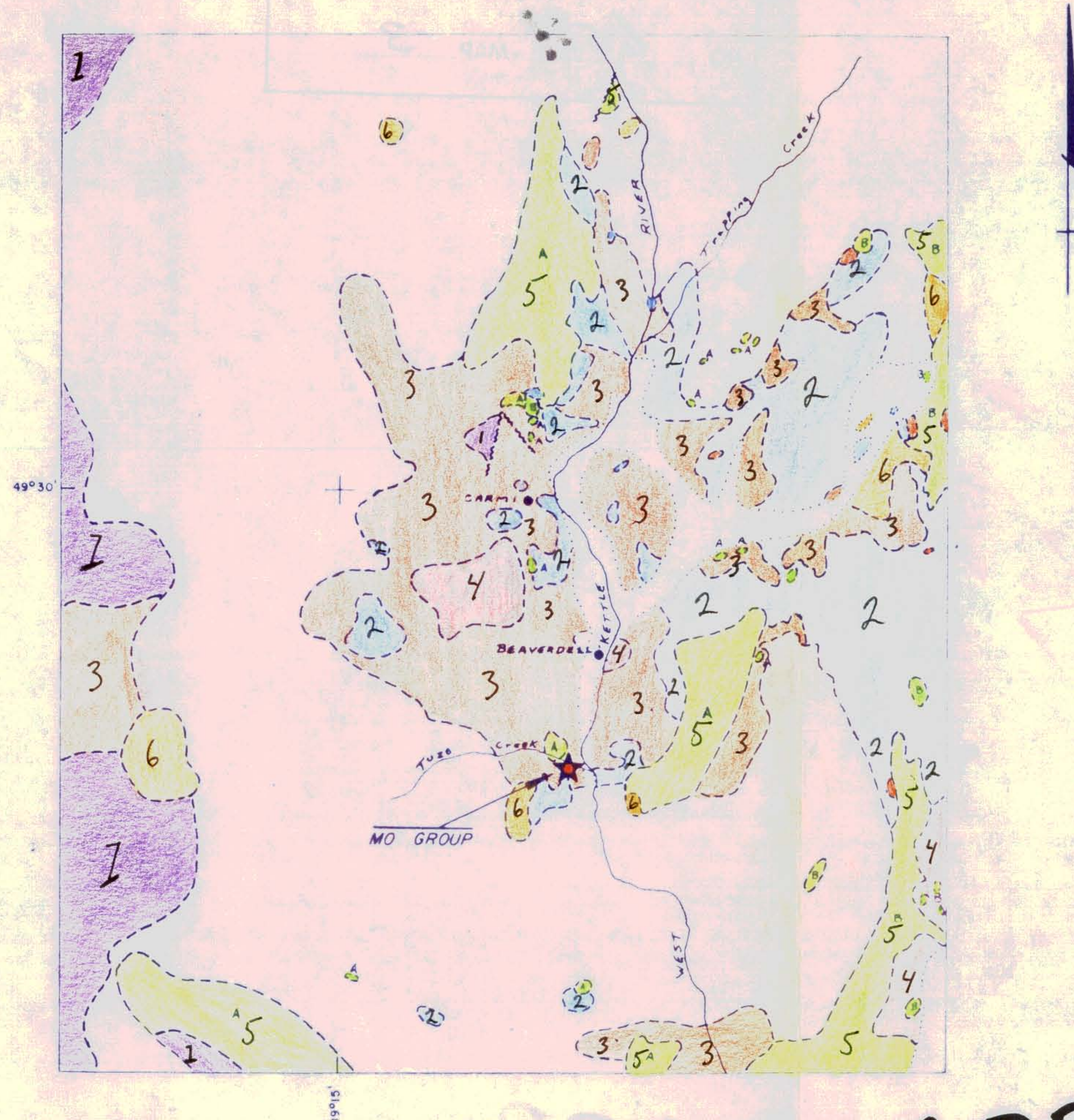

L E G E N D

C E N O Z O I C

- 6 — Coryell Plutonic Rocks
- 5 — Sedimentary and Volcanic Rocks (A) Pre Coryell. (B) Post Coryell.

M E S O Z O I C

- 4 — Valhalla Plutonic Rocks.
- 3 — Nelson Plutonic Rocks.

P A L E O Z O I C

- 2 — Anarchist Group.

P R E C A M B R I A N

- 1 — Monashee Group

NOTE –

After G.S.C. maps 6-1957 and 15-1961 by H.W. Little.

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SOUTHWEST POTASH CORPORATION

MO GROUP

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REGIONAL GEOLOGY MAP

SCALE 1" = 4 MILES

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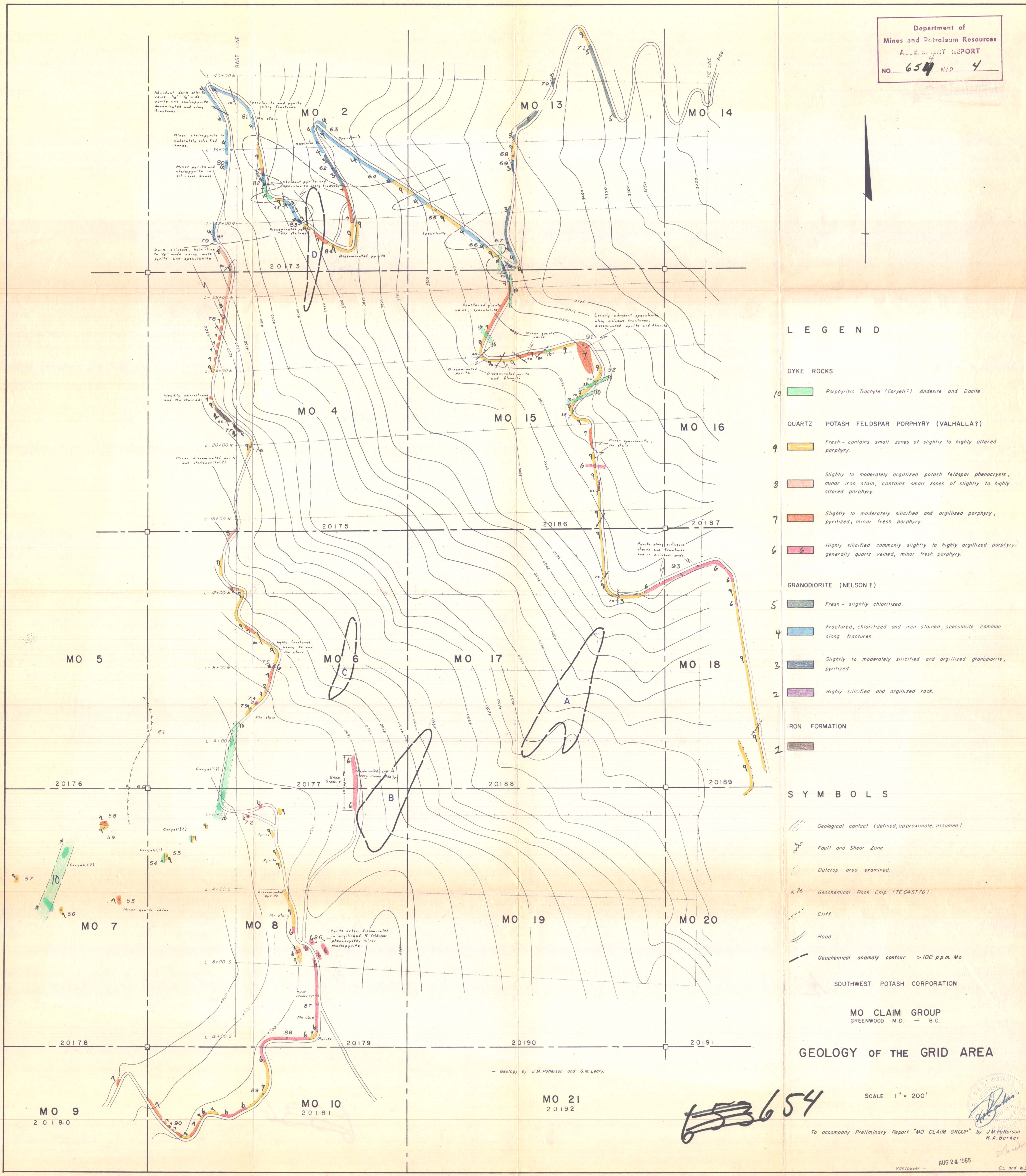
FIG. 3



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ASSESSMENT REPORT
NO. 654 MAP 4
MO 2
MO 13
MO 14
MO 4
MO 15
MO 16
MO 5
MO 6
MO 17
MO 18
MO 7
MO 8
MO 19
MO 20
MO 9
MO 10
MO 21
BASE LINE
TIE LINE
20173
20175
20186
20187
20176
20177
20188
20189
20178
20179
20190
20191
20180
20181
20192
A
B
C
D
LEGEND
DYKE ROCKS
10 Porphyritic Trachyte (Coryell?) Andesite and Dacite.
QUARTZ POTASH FELDSPAR PORPHYRY (VALHALLA?)
9 Fresh - contains small zones of slightly to highly altered porphyry.
8 Slightly to moderately argillized potash feldspar phenocrysts, minor iron stain, contains small zones of slightly to highly altered porphyry.
7 Slightly to moderately silicified and argillized porphyry, pyritized, minor fresh porphyry.
6 Highly silicified commonly slightly to highly argillized porphyry, generally quartz veined, minor fresh porphyry.
GRANODIORITE (NELSON ?)
5 Fresh - slightly chloritized.
4 Fractured, chloritized and iron stained, specularite common along fractures.
3 Slightly to moderately silicified and argillized granodiorite, pyritized.
2 Highly silicified and argillized rock.
IRON FORMATION
1
SYMBOLS
Geological contact (defined, approximate, assumed)
Fault and Shear Zone
Outcrop area examined.
Geochemical Rock Chip (TE 64 ST 76)
Cliff.
Road.
Geochemical anomaly contour > 100 p.p.m. Mo
SOUTHWEST POTASH CORPORATION
MO CLAIM GROUP
GREENWOOD M.D. — B.C.
GEOLOGY OF THE GRID AREA
SCALE 1" = 200'
— Geology by J.M. Patterson and G.M. Leary.
To accompany Preliminary Report "MO CLAIM GROUP" by J.M. Patterson R.A. Barker
Vancouver — AUG 24 1965
G.L. and W.S.
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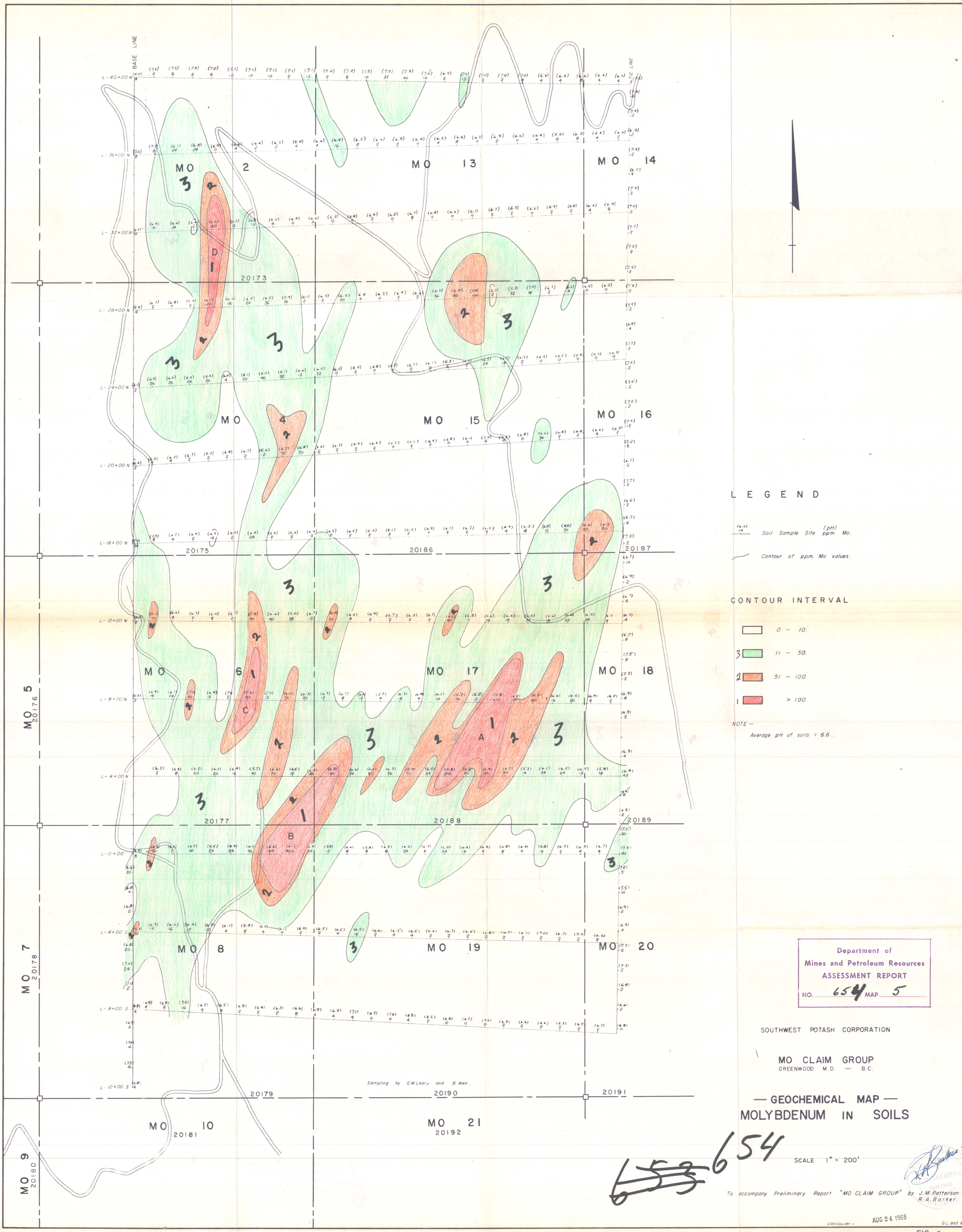
FIG. 4


LEGEND
Soil Sample Site (pH) ppm. Mo.
Contour of ppm. Mo values.
CONTOUR INTERVAL
0 - 10.
3 11 - 50.
2 51 - 100.
1 > 100.
NOTE -
Average pH of soils = 6.6.
Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 654 MAP 5
SOUTHWEST POTASH CORPORATION
MO CLAIM GROUP
GREENWOOD M.D. — B.C.
— GEOCHEMICAL MAP —
MOLYBDENUM IN SOILS
SCALE 1" = 200'
To accompany Preliminary Report "MO CLAIM GROUP" by J. M. Patterson, R. A. Barker.
Sampling by G.M.Leary and B.Weir
AUG 24 1965
Vancouver
G.L. and W.S.
FIG. 5
BASE LINE
TIE LINE
MO 2
MO 4
MO 5
MO 6
MO 7
MO 8
MO 9
MO 10
MO 13
MO 14
MO 15
MO 16
MO 17
MO 18
MO 19
MO 20
MO 21
20173
20175
20176
20177
20178
20179
20180
20181
20186
20187
20188
20189
20190
20191
20192
L-40+00 N
L-36+00 N
L-32+00 N
L-28+00 N
L-24+00 N
L-20+00 N
L-16+00 N
L-12+00 N
L-8+00 N
L-4+00 N
L-0+00
L-4+00 S
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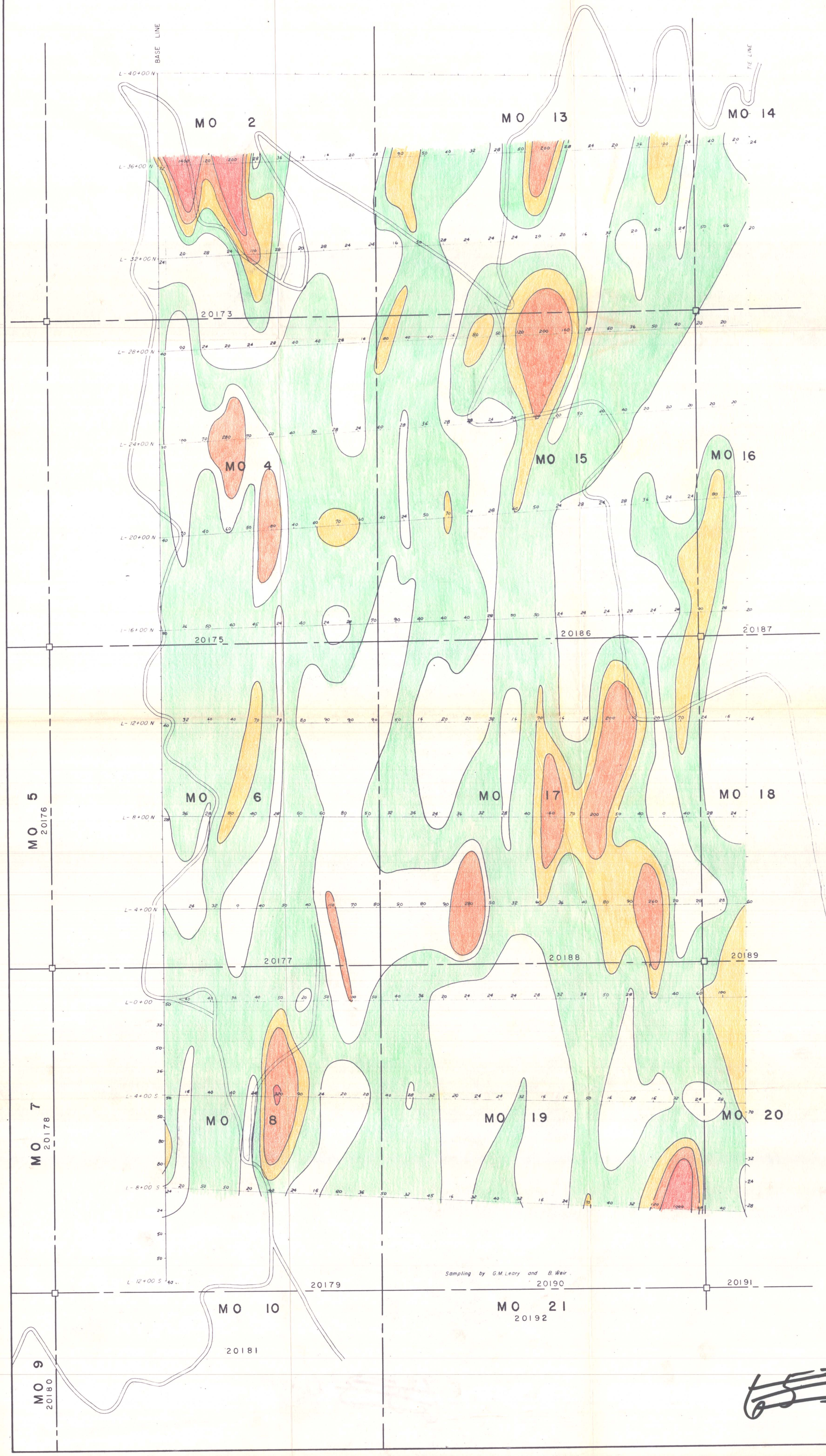
L-12+00 S
A
B
C
D
654



LEGEND

Soil Sample Site ppm Cu.

Contour of ppm Cu values.

CONTOUR INTERVAL

0 – 30

31 – 60.

61 – 100.

101 – 300.

> 300.

NOTE –
Average pH of soils = 6.6
(For detail see Figure 5)

SOUTHWEST POTASH CORPORATION

MO CLAIM GROUP
GREENWOOD M.D. – B.C.

— GEOCHEMICAL MAP —
COPPER IN SOIL

654

SCALE 1" = 200'

To accompany Preliminary Report "MO CLAIM GROUP" by J.M. Patterson. R.A. Barker

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FIG. 6