GEOCHEMICAL AND PETROGRAPHIC REPORT ON THE DECK 1 COPPER-SILVER PROSPECT, OMINECA MINING DIVISION, B.C.

on behalf of

COMMONWEALTH MINERALS LTD.(N.P.L.)
VANCOUVER, BRITISH COLUMBIA.

by

G. H. Giroux, P.Eng.
D. F. Symonds, B.Sc.
J. H. Montgomery, P.Eng., Ph.D.

October 17, 1978.

TABLE OF CONTENTS

APPENDICES

FIGURES

1.0 INTRODUCTION

This report on the geochemistry and petrology of the DECK 1 mineral claim, Omineca Mining Division, has been prepared on behalf of Commonwealth Minerals Limited(N.P.L.), of Vancouver, B.C.

A series of geochemical rock samples was taken over the property, concentrating on the area of outcrop exposed by the creek which cuts the claim. These samples were analyzed for copper, zinc, silver and lead, and thin sections were prepared from the majority of them.

This report outlines the results of the geochemical and petrologic study of these rock samples.

2.0 SUMMARY AND CONCLUSIONS

A series of 15 rock samples were taken on the property at the locations shown in Figure 4. Samples were analyzed for copper, zinc, silver and lead and thin sections were made of the majority of the samples. An analysis of the thin sections studied can be found in Appendix I.

A number of anomalous values can be observed in scanning the data, which can be found in Appendix II. The most significant sample, #RGE 78-20-4, shows high values in copper and zinc. This sample is a crystal tuff, with visible disseminated pyrite.

Eleven rocks were studied in thin section in order to determine the classification and petrological history of the rocks typical of this property. The majority of the rocks examined are of a pyroclastic origin, and have undergone hydrothermal alteration. Mineralization, in the form of sulphides has been introduced through alteration and later as open space filling.

Further geochemical rock sampling should be carried out on the claim, wherever outcrop can be found. An electromagnetic survey may facilitate delineation of any significant sulphide zones on the claim.

3.0 LOCATION AND ACCESS

The DECK 1 mineral claims are located on Gerow Creek on the west side of Decker Lake about 10 kilometres northwest of Burns Lake, British Columbia.

The claims are located on Nechako Plateau, part of the Interior Plateaux system, at elevations ranging from 760 metres (2500 feet) to 915 metres (3000 feet).

Access to the property is by dirt road southwest from a point on Highway 16 about six kilometres northwest of Decker Lake, B.C. The distance from the highway is about eight kilometres. See Figure 1.

The general area of the claim block straddles the valley of Gerow Creek, a dissection of the gently rolling well-timbered plateau. The upper part of Gerow Creek is a canyon up to 100 metres deep and provides the major part of the outcrop in the claim area.

N.T.S. map reference is 93K/5W; Latitude 54^{o} 18'N; Longitude 125^{o} 53'W.

FIGURE 1
LOCATION MAP
DECK 1 CU-AG PROSPECT

JUNE 15, 1978 MONTGOMERY CONSULTANTS LIMITED

4.0 CLAIM INFORMATION

The DECK 1 mineral claim consists of 9 units as shown on Figure 2. Locations shown are approximate only. The claims were staked on June 26, 1975 by G.H. Rayner and appear to have been staked in accordance with British Columbia regulations.

The following table summarizes claim information:

CLAIM	RECORD NO.	EXPIRY DATE
DECK 1 (9 units)	33(6)	June 26,1978

Claim information was obtained from Commonwealth Minerals Limited, from Mr. G.H. Rayner and from the Mining Recorder's Office in Vancouver, B.C.

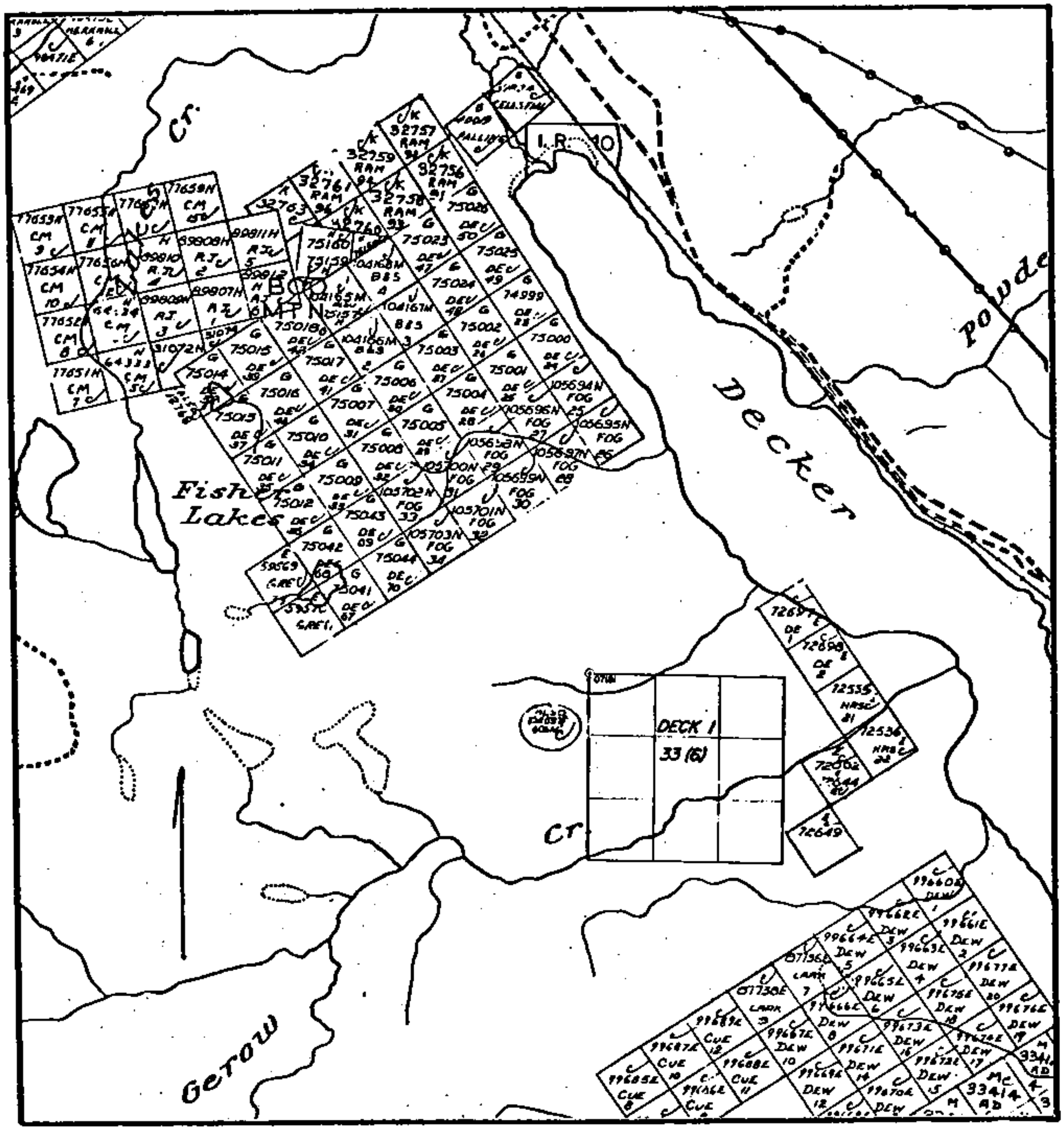

FIGURE 2
CLAIM MAP

DECK 1 CU-AG PROSPECT

500 1000 2000 3000 m

5.0 HISTORY

5.1 Summary of Previous Work

The earliest published data concerning the claim area is recorded in the Annual Minister of Mines Report for the years 1926 to 1927. However, one reference is made to a short tunnel and a small shipment of ore in 1915.

The property was originally called the Golden Glory and, during the period 1921-1930, a number of tunnels and open cuts followed veins and shear zones in Hazelton volcanic rocks. In 1926 a chalcopyrite showing with "good silver values" was found. In 1927 a vein striking N55°E containing values in lead and zinc was found and in 1930, a shear zone 125 feet wide and striking N80°E mineralized with chalcopyrite was exposed. This early work was concerned mainly with gold and silver values in the mineralized veins and shear zones.

In 1955, the property was called Kerr Copper. Seven drill holes totalling 386 feet showed the presence of a "zone of sheared and altered volcanics partly mineralized over a length of 120 feet with chalcopyrite, sphalerite and galena". At this time, the property was optioned by Trico Explorations Limited and Moneta Porcupine Mines Limited. An additional six holes were drilled totalling 1000 feet, but no mineralization was cut at depth and the option was dropped.

In a later report (1968) Dr. R.H. Seraphim observed the widespread alteration in the volcanic rocks and recommended reconnaissance geophysical and geochemical work.

In 1971, an electromagnetic survey was conducted over an area of about 8000 feet by 4400 feet (Assessment Report 3065) by P.P. Nielsen and G.C. Gutrath, P. Eng. Four low amplitude anomalies were detected by the survey and the authors recommended additional investigation consisting of an induced polarization survey, a magnetometer survey and an air-photo interpretation of the claim area.

In 1973, Hudson's Bay Oil and Gas Company Limited under the supervision of Mr. A.J. Schmidt, P. Eng., conducted a geochemical and induced polarization survey (Assessment Report No. 4849). Their objective was to determine whether or not a porphyry copper deposit existed on the property. No such deposits were found.

6.0 GEOLOGY AND MINERALIZATION

The regional geology of the area has been mapped by Armstrong (1965) and more recently by Church (1972). Armstrong mapped the west side of Decker Lake as Hazelton Group andesite, trachyte, basalt and related breccias of Jurassic and Cretaceous age. He describes these rocks as follows:

> "The andesitic flows south of Decker Lake are generally dark greenish-grey, rusty weathering, and massive, and exhibit little flow structure. In places they are porphyritic, and the phenocrysts, which are rarely more than 1/8th inch long, consist of white feldspar or dark green pyroxene. Calcite amygdules up to several inches in diameter are fairly common. Thin sections of these green andesites are composed of saussuritized andesine and chloritized augite phenocrysts embedded in a groundmass consisting of feldspar, augite, devitrified glass and alteration products, chlorite, epidote and secondary quartz predominating. Near Gerow Creek the Hazelton group rocks dip steeply and strike about northeast. South of Decker Lake they are unconformably overlain by Endako lavas of Tertiary age."

Church classifies the rocks west of Decker Lake as Early to Middle Mesozoic acid and intermediate lavas and pyroclastic rocks, some argillite, sandstone and conglomerate. A portion of his map is reproduced in

Figure 3. He reports similar rocks, dacitic tuff, tuff breccias and cherty conglomerates, as host rocks for the Goosly Lake copper-silver deposit about 27 kilometres to the southwest. Here, a shattered dacite hosts a mineralized zone about 175 feet thick consisting of disseminated chalcopyrite, pyrite, pyrrhotite and tetrahedrite.

On the DECK mineral claims, outcrop is restricted to a narrow belt of rock along Gerow Creek, the site of most of the previous work.

Mineralization on the DECK property consists of chalcopyrite, pyrite, galena and sphalerite. These minerals occur disseminated and in fractures in a light colored, brecciated, intermediate volcanic rock. The altitude of the mineralized structure is uncertain. The original drilling on the property has indicated copper values in the range 1.3 to 5.4 per cent and silver values in the range 0.5 to 5.4 oz./ton over thicknesses of 3 to 19 feet. The present exposure extends about 100 feet along the north bank of Gerow Creek.

The possibility that a copper-silver volcanogenic deposit exists on the DECK claim is suggested by the following:

1. Mineralization appears to be stratabound.
2. It is associated with acid to intermediate volcanic flows and pyroclastic rocks.

3. Barite, commonly associated with bedded cupriferous iron sulfide deposits, occurs with mineralization in some of the acid breccias.

4. Although no colliform textures were recognized (possibly because of remobilization), the mineralization consists of a massive aggregate of pyrite, chalcopyrite with minor sphalerite and galena.

5. According to Tatsumi (1970), in the Sanbagawa metamorphic terrain of Japan, "conformable copper-pyrite deposits occur commonly in frequently alternating basic, quartzose and pelitic schists (originally composed of pyroclastics, siliceous chemical sediments and fine-grained clastic sediments." An outcrop in Gerow Creek exposes alternating beds of acid and intermediate volcanic beds which may be similar to those described by Tatsumi.

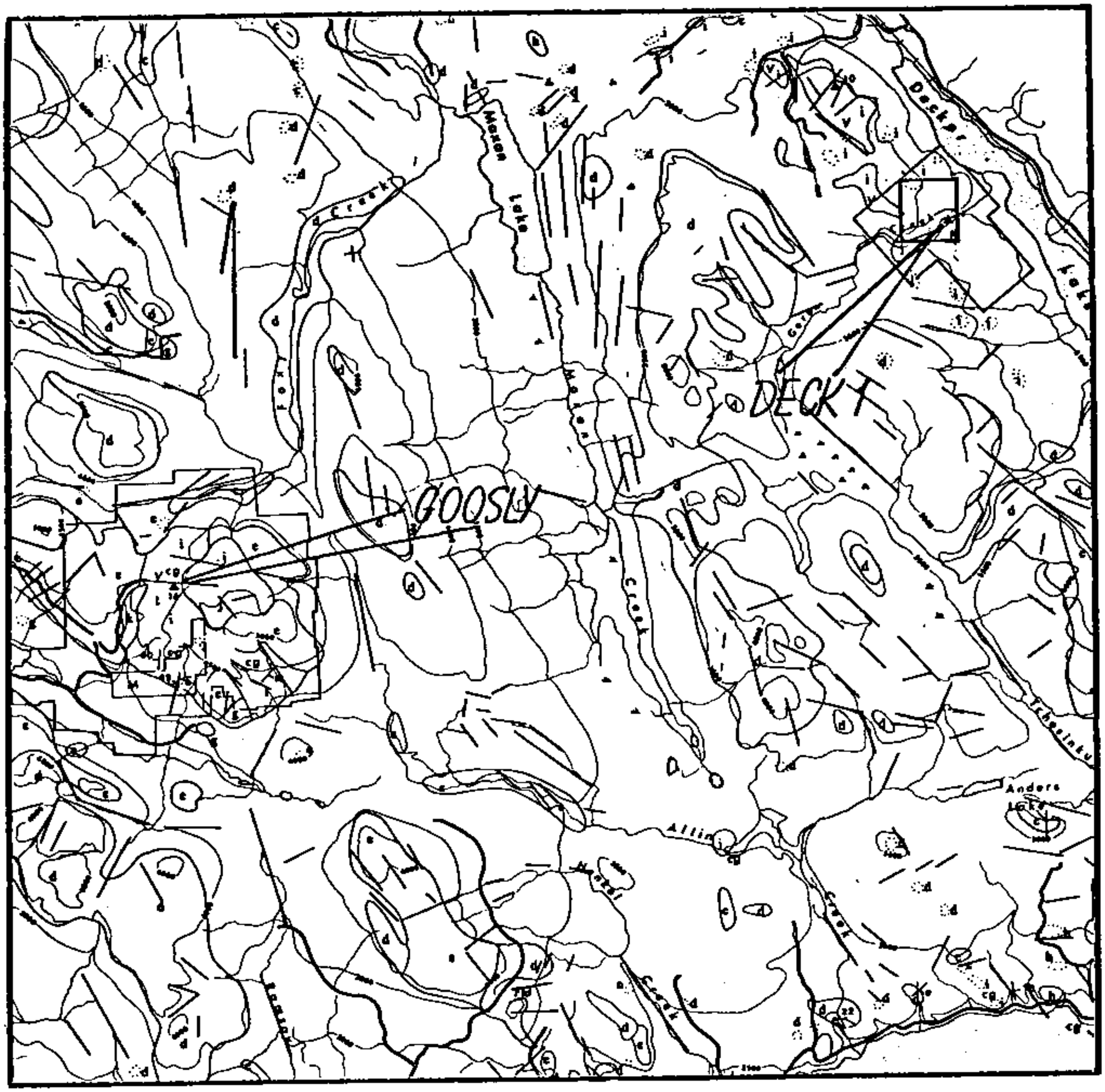

FIGURE 3
REGIONAL GEOLOGY
(AFTER B.N. CHURCH - 1972)

LEGEND

b, c, d - BUCK LAKE VOLCANIC ROCKS

g, h - TIP TOP HILL VOLCANIC ROCKS

e, f - GOOSLY LAKE VOLCANIC ROCKS

i - ACID, INTERMEDIATE LAVAS

7.0 ROCK GEOCHEMISTRY

A series of 15 rock samples was taken on the property at the locations shown in Figure 4. Samples were analyzed for copper, lead, zinc and silver. Results are shown in Appendix II.

A number of anomalous values can be observed in scanning the data. The most significant sample, #RGE 78-20-4, shows high values in copper and zinc. This sample is a crystal tuff, with visible disseminated pyrite.

From the sample results obtained on this claim, it is apparent that the entire claim should be sampled in a systematic manner in order to determine a pattern to the mineralization. It may be possible to resample the underground workings with some preparation.

8.0 PETROLOGY

(See Appendix I for Petrology)

9.0 COST STATEMENT

Airfares	$567.60	
Geochemical Analysis	$54.00	
Accomodation	$44.20	
Meals	$60.00	
Supplies	$14.13	
Professional fees:		
J.H.Montgomery -	$1080.00	(June 11,12,16,19;July 11,12)
G.H.Giroux -	900.00	(Sept.5,6,7,8,11,19,21;Oct.10,11)
D.F.Symonds -	$412.50	(July 19.20,21,22)
TOTAL	$3132.43	

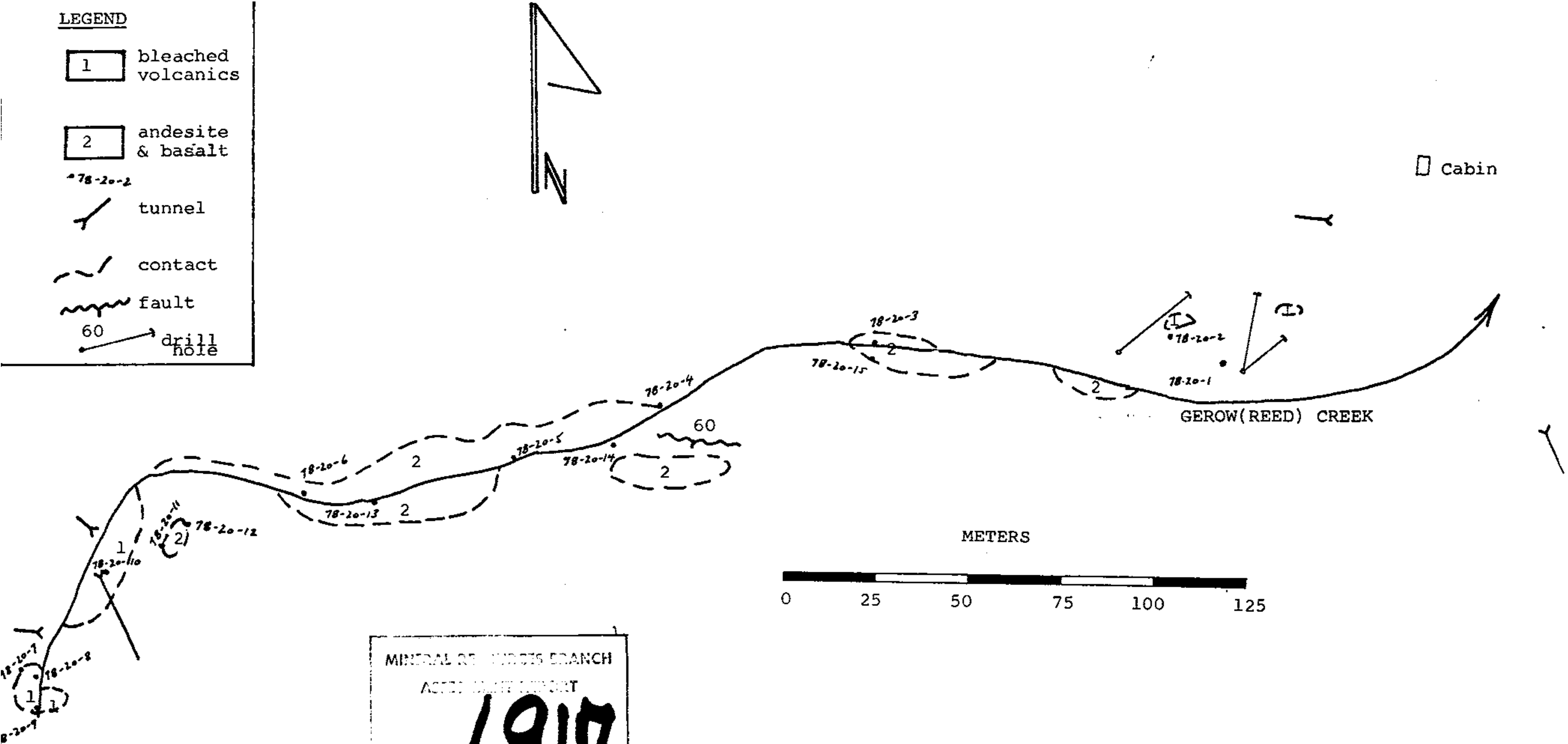

FIGURE 4: GENERAL GEOLOGY AND SAMPLE LOCATIONS

DECK 1 Claim Montgomery Consultants Ltd. October 17, 1978.

10.0 BIBLIOGRAPHY

1. Armstrong, J.E. (1965) - "Fort St. James Map area, Cassiar and Coast Districts, British Columbia"; G.S.C. Mem. 252.

2. Church, B.N. (1970) - "S.G. (Sam Goosly)"; Geology, Exploration and Mining in British Columbia, pp. 126-128.

3. Church, B.N. (1972) - "Geology of the Brick Creek Area"; Geology, Exploration and Mining in British Columbia pp. 352-363.

4. Seraphim, R.H. (1968) - "Report on Ker Copper, Decker Lake, B.C."; Engineer's Report.

5. Schmidt, A.J. (1973) - "Report for Assessment on Mineral Claims MO 1-10, GRE 43-44, DE 1-22, HRS 19-22, LARK 1-20, BEE 3-14, Omineca Mining Division", Assess. Report 4849.

6. Gutrath, G.C. & Nielsen, P.P. (1971) - "Geophysical Report Gerow Creek Property, Omineca Mining Division," Assess. Report 3065.

APPENDIX I

8.0 PETROLOGY

8.1 Introduction

A suite of eleven rocks and thin sections, collected from the DECK claim, was examined in order to determine the classification and petrological history of the rocks typical of this property.

Eight of the rocks have a pyroclastic origin and could be called andesitic crystal tuffs. The remaining rocks are probably of volcanic flow origin possibly from later dykes. Two specimens were called dacites while the other was an altered rhyolite.

All of the rocks have undergone hydrothermal alteration. The intensity of alteration varies from rock to rock, but the types of alteration are common: saussuritization of feldspars, propylitization of ferromagnesian minerals, silicification and pyritization.

Mineralization in the form of sulphides has been introduced through alteration and later as open space filling.

8.2 Description of Rocks and Thin Sections

8.21 Specimen #78-20-1 (Rock Type: ALTERED RHYOLITE)

8.210 Macroscopic Description

The hand specimen has phenocrysts less than 4 mm. in diameter set in a fine-grained pinkish matrix. Quartz and carbonate veinlets containing pyrite fill small fractures. The weathered surface is stained with orange-yellow iron oxide.

8.211 Microscopic Description

The major minerals present consist of feldspar, quartz and carbonate in a matrix of quartz, carbonate, feldspar and devitrified glass. Feldspar crystals are almost completely altered to sericite and carbonates. There remain some remnants of albite twinning but the original composition could not be determined. Quartz is present, both in veinlets and in the matrix. A carbonate, probably calcite, with extreme birefringence, cleavage of 75° and symmetrical extinction fills fractures along with quartz and is also disseminated through the matrix.

Accessory minerals include pyrite, leucoxene and iron oxide. Tabular crystals of leucoxene have been formed from alteration of ilmenite and appear disseminated through the matrix.

8.212 Texture

The texture is porphyritic with a microcrystalline matrix. Calcite and quartz have filled fractures.

8.213 Alteration

Feldspar is completely altered to sericite, carbonate and clay minerals. Any ferromagnesian minerals that were once present have been completely altered to carbonate and pyrite. Ilmenite has been altered to leucoxene and pyrite has been altered to iron oxides.

8.214 History

The high percentage of silica and alkalies and lower percentage of magnesium and iron, with the intergrown crystal texture indicate that this rock was a rhyolite. Intense alteration has changed feldspars to clay minerals and sericite. Any ferromagnesian minerals once present have been destroyed. A high percentage of calcite has been introduced to fill fractures and cavities along with secondary quartz. Pyrite is found both disseminated and in fractures.

8.22 Specimen #78-20-2 (Rock Name: ALTERED ANDESITIC CRYSTAL TUFF)

8.220 Macroscopic Description

Reddish-brown crystals up to 0.6 mm. in diameter are enclosed in a dark, fine-grained matrix. Pyrite is disseminated through the rock, and abundant vugs and cavities are present.

8.221 Microscopic Description

The majority of crystals are feldspar laths which have been severely altered to sericite and carbonate. Some albite and carlsbad-albite twinning is still evident. The relief of the feldspar is greater than balsam, which would indicate a composition for the plagioclase of at least andesine.

The mafic minerals have been completely altered to chlorite and pyrite.

The matrix consists of fine-grained feldspar, quartz, chlorite and pyrite.

Minor minerals include quartz, and iron oxide coats some pyrite crystals.

8.222 Texture

The feldspar crystals are broken and angular, and set in a fine-grained matrix.

8.223 Alteration

Feldspar crystals have altered to sericite and carbonate, mafic minerals have altered to chlorite and pyrite and pyrite has oxidized to iron oxide.

8.224 History

The broken and angular feldspar crystals indicate a pyroclastic origin. Since maximum particle size is less than 4 mm. in diameter, this rock could be called a crystal tuff. Alteration of the mafics and groudmass has formed chlorite and pyrite, giving the rock an overall dark appearance. Alteration of feldspar has formed carbonate and white mica. The vugs are surrounded, for the most part, by carbonate and are probably the result of chemical weathering of carbonate.

8.23 Specimen #78-20-3(Rock Name: DACITE)

8.230 Macroscopic Description

The rock consists of grey to reddish-brown crystals, less than 4 mm. in diameter, set in a dark, fine-grained matrix. Small veinlets of carbonate cut the rock in irregular patterns. Finely disseminated pyrite is scattered through the matrix.

8.231 Microscopic Description

The dominant minerals are feldspar and quartz, which occur as intergrown crystals of varying size. The feldspar, mostly plagioclase, has relief greater than quartz, and both albite and carlsbad-albite twinning were observed. Most of the feldspar crystals are altered to sericite and carbonate. Anhedral quartz crystals make up more than 10% of the composition of the rock. Accessory minerals present include chlorite, pyrite, magnetite, calcite and biotite. Chlorite, pyrite and magnetite have replaced mafic minerals. Calcite occurs in thin veinlets and in blebs. Minor biotite, pleochroic brown with parallel extinction is still present. Carbonate and magnetite form possible pseudomorphs after olivine.

8.232 Texture

Intergrown anhedral crystals occur, ranging from fine-grained to 2 mm. in diameter. Sulphides replace mafics but are also found disseminated through the groundmass and the feldspars.

8.233 Alteration

Feldspars have altered to sericite and carbonate. Mafic minerals have altered to chlorite, pyrite and magnetite. Olivine crystals have altered to carbonate and magnetite.

8.234 History

From the shape of the crystals and gradation of crystal sizes this rock is thought to be formed from a volcanic flow. The quartz content, plus the fact that the quartz occurs in phenocrysts as well as in the matrix, would make this rock a dacite. The rock has then undergone propylitization with chlorite, carbonate, pyrite and magnetite replacing the original minerals. Fracturing and fracture-filling with carbonate occurred later.

8.24 Specimen #78-20-6 (Rock Name: CRYSTAL TUFF)

8.240 Macroscopic Description

The rock has a fine-grained grey-green matrix with some crystals less than 4 mm. in diameter. Pyrite occurs disseminated and along fractures. Pyrite was also visible surrounding blebs of carbonate. The weathered surfaces are coated with iron oxides.

8.241 Microscopic Description

Broken and angular feldspar laths make up the majority of the crystals present. The feldspar has been severely altered to sericite and carbonate. Pyrite, along with chlorite and carbonate, have replaced the mafic minerals. Pyrite is also disseminated through both feldspars and groundmass alike. Pyrite, carbonate and quartz have also filled open spaces, both cavities and fractures. The groundmass contains a high proportion of volcanic glass.

8.242 Texture

Broken and angular crystal fragments set in a fine-grained matrix high in volcanic glass occur in this rock. Pyrite occurs both disseminated and replacing mafic minerals.

8.243 Alteration

Feldspar has been altered to sericite and carbonates. Mafic minerals have altered to chlorite, carbonate and pyrite.

8.244 History

The broken, angular fragments set in the fine-grained glassy matrix indicate a pyroclastic origin. Later alteration has obliterated the feldspar and mafic minerals. Pyrite formed through alteration was introduced throughout the rock. Later, pyrite along with carbonate and quartz has filled open spaces. The pyrite has then been oxidized on weathered surfaces.

8.25 Specimen #78-20-7(Rock Name: CRYSTAL TUFF)

8.250 Macroscopic Description

The rock consists of white and pink phenocrysts less than 2 mm. in diameter set in a pinkish, fine-grained matrix. Open vugs and fractures are common near the yellowish, clay-like weathered surface. Iron oxide is present both on the surface and within the rock.

8.251 Microscopic Description

Broken and angular feldspar laths form the majority of the phenocrysts. Some albite twinning and a relief greater than balsam suggest plagioclase of at least andesine composition. The matrix is composed largely of devitrified glass with quartz and feldspar. The feldspars are altered to sericite and minor carbonate. Mafic crystals, possibly pyroxenes, with parallel extinction have been altered to minor chlorite and pyrite. Quartz occurs as open space fillings. Leocoxene, as disseminated tabular crystals, has formed through alteration of illmenite. Iron oxide has stained many crystals as a result of oxidation of pyrite. Iron oxide also occurs along walls of open fractures and in thin veinlets.

8.252 Texture

Broken, angular fragments in a fine-grained glassy matrix occur in this specimen. Finely disseminated pyrite occurs in the rock crystals and throughout the groundmass. Coarser tabular crystals of leucoxene are disseminated throughout the rock.

8.253 Alteration

Feldspars have been altered to clay minerals, sericite and minor carbonate. Mafics, possibly pyroxenes, have altered to pyrite and chlorite. Silicification has produced open spaces filled with quartz. Ilmenite has been altered to leucoxene. Vugs have been formed by complete leaching of pyrite in both mafics and groundmass.

8.254 History

The broken anglur fragments and glassy matrix indicate a pyroclastic origin. Hydrothermal alteration has taken place. Ilmenite has formed leucoxene, and feldspar and mafics have been altered. Pyrite has been introduced as an alteration product of mafics and disseminated through all crystals, probably by hydrothermal activity. The pyrite has been completely leached out in some cases, causing vugs and open fractures which are coated with iron oxides.

8.26 Specimen #78-20-8(Rock Name: CRYSTAL TUFF)

8.260 Macroscopic Description

The rock contains dark phenocrysts less than 2 mm. in diameter set in a fine-grained, greenish-grey matrix. Pyrite is disseminated through the rock. Small fractures are filled with quartz and coated with iron oxide. Some vugs and cavities are also coated with iron oxide.

8.261 Microscopic Description

The majority of the crystals are broken angular feldspar laths. The feldspar is altered to sericite and carbonate and no determination of composition was possible. Quartz appears to have filled open spaces and is surrounded in some cases by pyrite. In some blebs, carbonate is intergrown with quartz, while in others, chlorite occurs with quartz and pyrite. Euhedral to anhedral mafic minerals, probably pyroxene(90^{o} cleavage) have been partially to completely altered to chlorite and pyrite. Some crystals are broken and quartz and pyrite have filled fractures. Tabular leucoxene crystals are disseminated through groundmass material. Iron oxide coats some pyrite crystals.

The matrix consists mostly of devitrified glass with some quartz and feldspar. Fine-grained pyrite is disseminated through the matrix.

8.262 Texture

Broken angular fragments in a fine-grained glassy matrix occur in this specimen. Pseudomorphs of chlorite, quartz, carbonate and pyrite occur after mafic minerals. Blebs of chlorite and quartz ringed by pyrite occur. Pyrite also replaces mafics along cleavage traces.

8.263 Alteration

Feldspar has altered to sericite and carbonate. Mafics have altered to chlorite, carbonate and pyrite. Ilmenite has altered to leucoxene and pyrite has altered to iron oxides.

8.264 History

The broken fragments and glassy matrix suggest a pyroclastic origin. Later alteration has changed feldspars to sericite and clayminerals, and mafics to chlorite, carbonate and pyrite. In some mafic grains the carbonate has been weathered out and the open spaces have been filled by secondary quartz and later by pyrite along the borders.

8.27 Specimen #78-20-10(Rock Name: ALTERED CRYSTAL TUFF)

8.270 Macroscopic Description

The rock contains phenocrysts up to 6 mm. in diameter in a dark, fine-grained grey matrix. Vugs and cavities are filled with quartz and pyrite. In some cases the pyrite has been oxidized out leaving iron oxides coating quartz. Pyrite is also disseminated through the matrix. The weathered surface of the rock is coated with iron oxides.

8.271 Microscopic Description

Feldspar crystals, broken and angular, are altered to sericite and carbonates. Quartz has filled cavities along with pyrite. Carbonates and pyrite, with minor quartz fill other cavities. Chlorite and pyrite are scattered through the matrix. Quartz veinlets cut through the rock. Ilmenite crystals partially and sometimes completely altered to leucoxene are disseminated through the groundmass. The matrix also contains devitrified glass.

8.272 Texture

Broken fragments, angular in nature, occur in the matrix. Open spaces are filled by quartz and pyrite. Some vugs occur with thin coatings of carbonate around the open space.

8.273 Alteration

Feldspar has been severely altered to sericite and carbonate. Mafics have been completely altered to carbonate, pyrite and minor chlorite. The matrix has been altered to chlorite and pyrite. Illmenite has altered to leucoxene and pyrite has altered to iron oxides.

8.274 History

A pyroclastic origin is suggested by the shape of the crystal fragments. The rock has been subjected to severe alteration with feldspar being altered to sericite and carbonate. Mafics have been altered to carbonate, pyrite and chlorite. It appears that the carbonates have been weathered out in places, creating vugs and cavities. Later, quartz and pyrite have filled some of these cavities as well as thin fractures.

8.28 Specimen #78-20-11(Rock Name: ALTERED CRYSTAL TUFF)

8.281 Macroscopic Description

Crystals less than 4 mm. in diameter are set in a dark grey to cream-coloured matrix. Vugs and cavities have been filled with quartz and pyrite. Iron oxide coats pyrite on weathered surfaces throughout the rock.

8.282 Microscopic Description

Plagioclase feldspar, mostly altered to sericite and carbonate, occurs as broken angular laths in a glassy matrix. Quartz fills vugs and cavities. Minor carbonate also fills vugs and cavities. Mafic minerals, probably pyroxenes(extinction parallel to cleavage) are partially altered to chlorite and pyrite. Pyrite is also finely disseminated through the groundmass. The matrix is a combination of chlorite, pyrite, quartz, feldspar and volcanic glass. Veinlets once filled with pyrite have now been altered to red iron oxides. Tabular crystals of leucoxene have formed from ilmenite.

8.283 Texture

The rock consists of broken angular fragments in an altered glassy matrix. Open spaces such as vugs and fractures have been filled with quartz and pyrite.

8.284 Alteration

Feldspars have been altered to sericite and carbonate, with mafic minerals being altered to chlorite and pyrite. Iron oxides have replaced pyrite completely in the majority of crystals.

8.285 History

The texture suggests a pyroclastic origin for this rock. Intense alteration, probably hydrothermal, including saussuritization of the feldspars and propylitization of the ferromagnesian minerals has drastically changed the original mineral content. It appears as if carbonates, probably formed as alteration products, have been destroyed, creating vugs and cavities which have subsequently been filled with quartz and pyrite. The rock has undergone severe surface weathering with most of the pyrite being oxidized.

8.29 Specimen #78-20-12 (Rock Name: ALTERED ANDESITIC CRYSTAL TUFF)

8.290 Macroscopic Description

The rock is made up of phenocrysts less than 4 mm. in diameter in a very fine-grained black matrix. Pyrite is disseminated and also occurs along fractures and is altered to iron oxides in many places. The rock is slightly magnetic, indicating that minor magnetite may be present.

8.291 Microscopic Description

Broken angular fragments of feldspar laths comprise the majority of crystals. The feldspar is altered to sericite and carbonate. Mafic minerals have altered to chlorite, carbonate and pyrite, with some magnetite. Some cavities have been filled with quartz and pyrite. The matrix consists of chlorite, glass, feldspar and quartz with pyrite. The pyrite is disseminated through the quartz. Minor ilmenite altering to leucoxene is also disseminated through the groundmass.

8.292 Texture

Broken angular fragments occur in a fine-grained matrix. Open spaces are filled by quartz and pyrite.

8.293 Alteration

Feldspars have altered to sericite and carbonates. Propylitic alteration of mafics to chlorite, pyrite, magnetite and carbonate has occurred. Ilmenite has been partially altered to leucoxene and pyrite has been altered to iron oxides.

8.294 History

The broken angular crystal fragments set in a fine-grained matrix, with glass, indicate a pyroclastic origin for the rock. The rock has undergone saussuritization of feldspars and chloritization of ferromagnesian minerals. Quartz and pyrite have filled open spaces both in cavities and along fractures. Later weathering has caused pyrite to oxidize.

8.30 Specimen #78-20-13(Rock Name: ALTERED ANDESITIC CRYSTAL TUFF)

8.300 Macroscopic Description

The rock consists of crystals less than 4 mm. in diameter in a light grey matrix. Zones of darker material might be rock fragments. Pyrite altered to iron oxides coats fractures and the weathered surface.

8.301 Microscopic Description

Broken angular fragments of feldspar comprise the majority of crystals. Most feldspar is altered to sericite and carbonate. Secondary albite(relief lower than original feldspar) may also be an alteration product. The relief of the original feldspar is greater than quartz which would indicate a composition of feldspar at least andesine. Mafic minerals, possibly pyroxenes(extinction parallel to 90° cleavages), have been altered to chlorite and pyrite. Pyrite has formed along cleavage traces. Pyrite is also disseminated through both feldspar and matrix and fills fractures. The matrix is composed of devitrified glass, quartz and feldspar.

8.302 Texture

Broken angular fragments ranging in size up to 4 mm. in diameter are set in a glassy matrix. Pyrite has filled fractures and has been altered to iron oxide.

8.303 Alteration

Feldspars have altered to sericite, carbonate and albite. Mafic minerals have altered to chlorite and pyrite and pyrite has altered to iron oxides.

8.304 History

The texture indicates a pyroclastic origin for this rock. Alteration consisting of feldspars and propylitization of ferromagnesian minerals indicate hydrothermal activity. Pyrite has been introduced later as disseminations throughout the feldspars and the groundmass and along fractures. Surface weathering has altered some pyrite to iron oxides.

8.31 Specimen #78-20-14(Rock Name: DACITE)

8.310 Macroscopic Description

The rock consists of white, brown and black crystals less than 4 mm. in diameter set in a dark grey matrix. Thin quartz veinlets cut the rock. The weathered surface shows little iron oxide.

8.311 Microscopic Description

Feldspar laths have been severely altered to sericite and carbonate. Quartz crystals are intergrown with feldspar in the groundmass. Mafic minerals have been completely altered to chlorite, pyrite and magnetite. A carbonate, probably calcite, has filled cavities along with secondary quartz. Disseminated magnetite and/or ilmenite crystals appear in the groundmass.

8.312 Texture

Anhedral crystals of feldspar, quartz and pseudomorphs of mafic minerals are intergrown in varying sizes from 4 mm. on down. Pyrite in veinlets, possibly with magnetite and/or illmenite cut the rock.

8.313 Alteration

Feldspars have altered to carbonate and sericite. Mafic minerals have altered to chlorite, carbonate and pyrite and pyrite has altered to iron oxide.

8.314 History

The intergrown crystals of feldspar, quartz and mafic minerals in varying sizes indicate a volcanic flow origin for this rock. The mineralogy, and in particular the quartz content, make this rock a dacite. Hydrothermal alteration, consisting of saussuritization of feldspars and propylitization of ferromagnesian minerals has changed the appearance of the rock. Pyrite and other iron sulphides have been introduced, later filling fractures and being disseminated through the groundmass.

APPENDIX II

COMPA Montgomery Consultants

PROJECT No.: 78-20

ATTENTION:

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2

PHONE (604) 980-5814

No. 8-191

DATE: June 29 1978.

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	As ppm	Mn ppm	Au ppb			
RGE 78-20-1		56	53	1695			1.0								
2		18	73	1580			1.3								
3		25	59	515			1.1								
4		805	255	1825			1.5								
5		47	705	680			1.2								
6		55	800	1930			3.7								
7		15	82	75			3.4								
8		46	655	800			1.5								
9		115	310	390			1.8								
10		88	1110	810			3.8								
11		39	51	205			1.6								
12		43	32	375			1.3								
13		55	685	1420			3.3								
14		26	270	970			1.2								
15		37	155	1075			0.9								

CERTIFIED BY [signature]

APPENDIX III

9.0 CERTIFICATE

I, G.H. Giroux, of 2280 Dollarton Highway, North Vancouver, British Columbia, do hereby certify that:

1. I am a consulting geological engineer with an office at 211-850 West Hastings Street Vancouver, British Columbia.

2. I am a graduate of the University of British Columbia (1970) with a degree in Geological Engineering. (B.A.Sc.)

3 I have practiced my profession continuously since graduation.

4 I am a member in good standing of the Association of Professional Engineers of the Province of British Columbia.

5. I have no interest, either direct or indirect in the properties or securities of Commonwealth Minerals Ltd.; nor do I expect to receive any such interest.

PROFESSIONAL PROVINCE OF G. H. GIROUX BRITISH COLUMBIA ENGINEER

G.H. Giroux, P.Eng.
2280 Dollarton Highway
North Vancouver, B.C.
August 1978