1790

REPORT ON GEOLOGICAL SURVEY OF THE

CHATAWAY EXPLORATION CO. LTD. (N.P.L.) PROPERTY

Chataway Lake, B.C.
Nicola and Kamloops Mining Divisions

Under Option to and Work Done by or on Behalf of
KING RESOURCES COMPANY

by
W.Meyer, B.Sc.

Supervised by
Dr. M. C. Robinson, P.Eng.

December, 1968

Claims:
418 Claims contained within the following groups:
Ant, In, Jay, Len, North, N.W., Rex, Rob, Sho, South, South East, T.D.M., Wiz - Dot

Location: Lat. 50°22'N. Long. 120°55'W.

Chataway Lake, B.C.
50° 120° S.W.

Dates: April 15th - December 31st, 1968

TABLE OF CONTENTS

APPENDIX:

1. Claims
2. Petrology Chataway Prepared for King Resources Company by George A. Wilson, Geological Consultants Ltd.
3. Bibliography
4. Cost of Surveys
5. Affidavits re Cost of Surveys
6. Qualifications of Personnel

MAPS:

Fig. 1	Location Plan	(Page 2(a))
Fig. 2a & 2b	Geology - Chataway Option	(in pocket)
Fig. 3a & 3b	Topography - Chataway Option	(in pocket)

INTRODUCTION:

The following report is concerned primarily with the bedrock geology of the Chataway Exploration Co. Ltd. block of some 462 mineral claims which are situated approximately 20 miles northwest of Merritt in the Kamloops and Nicola Mining Divisions of south western British Columbia (Fig. 1).

The subject property is owned by Chataway Exploration Co. Ltd. and is presently under option to King Resources Company of Calgary, Alberta.

The work upon which the report is based was conducted by consultants to King Resources Company during the period April 15, 1968 through December 31, 1968.

Initially, the emphasis in the programme was on mapping of the 462 claim area with the object of developing a knowledge and feeling for the regional geological setting and the relationship of the known mineral occurrences in that environment.

As the programme and the exploration philosophy evolved it was concluded that the best chances for a

successful search for a porphyry copper type mineral occurrence lay in the northwest section of the claim area. Follow-up programmes of detailed geology, geochemical and induced polarization surveys were initiated in this area.

The programme on behalf of King Resources Company was carried out under the direction and general supervision of Dr. M.C. Robinson, P.Eng., of M.C.R. Explorations Ltd. Geological field staff was provided by M.C.R. Explorations Ltd. Field supervision on behalf of M.C.R. was supplied by the writer of Western Geological Services Ltd. Assistants, surveyors, draftsmen, general labour and equipment were supplied by Versatile Mining Services Ltd. The silt sampling programme was supervised by F. Forgeron, Ph.D. of Bondar Clegg and Company Ltd., and the I.P. programme by W. Kowalski of Chapman, Wood and Griswold Ltd. Related petrographic work was carried out by G.A. Wilson of George A. Wilson Geological Consultants Ltd.

Previous exploration by Chataway Exploration

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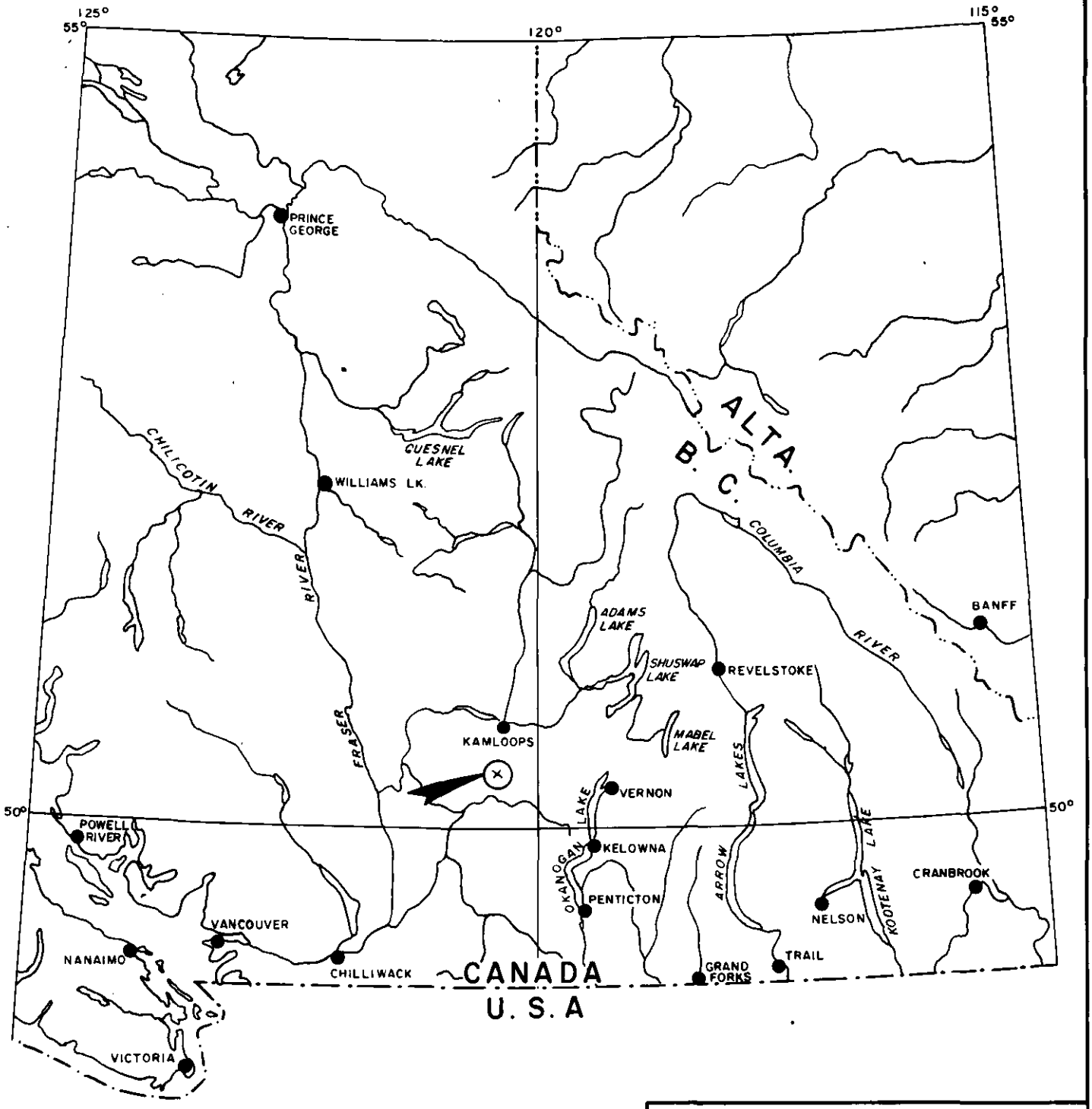

KING RESOURCES COMPANY		
LOCATION PLAN CHATAWAY EXPLORATION PROPERTY		
DATE	SCALE 1" = 64 Miles	FIGURE No. 1

Co. Ltd. and Bralorne Pioneer Mines Ltd. had concentrated on the development of some of the high grade showings in the south central part of the claim group. Bralorne and Chataway made several estimates of the grade and reserves of the "Zone 4" deposit which varied depending on width and cut-off grade used (Fig. 2b). These estimates ranged from 342,000 tons grading 2.5% copper to 1,232,000 tons grading 0.866% Cu.

PHYSICAL FEATURES:

The claim area lies east of the Cascade Mountains in the Interior Plateau of British Columbia. The property lies south of the Highland Valley which traverses the central part of the Guichon Creek Batholith. The area is bounded on the south by the Skuhun-Broom Creek valleys and on the east by Guichon Creek.

The relief on the property is moderate with elevation varying from 3,200 feet in the south to 5,000 feet in the north. The area is characterized by large swampy areas, rounded drumlins and occasionally precipitous regions such as Gypsum Mountain, Broom Creek Canyon and the Antler Lake drainage. Thick stands of lodge-pole pine

cover the area. A thick mantle of overburden, the result of recent glaciation, obscures much of the bedrock geology as well as the bedrock topography.

The two principal lakes on the claim area are Dot and Chataway Lakes. The well equipped base camp of Chataway Exploration Co. Ltd. is located on the south end of Dot Lake. The Chataway Lodge offers fishing and hunting in the area with facilities on Chataway Lake and the north end of Dot Lake.

The incidence of outcrop in the area as a whole is in the order of 5%. At the outset of the project, a helicopter was used to help spot outcrops and outcrop areas. In the course of the programme every effort was made to visit all outcrops in the claim area.

LOCATION & ACCESS:

Chataway Exploration Co. Ltd. is the holder of 462 contiguous mineral claims and fractions in the Highland Valley area of south western British Columbia. The group covers an area of approximately 6 miles by 8 miles stradling the Nicola and Kamloops Mining Divisions.

Access to the property is by 5 miles of paved road from Merritt to Lower Nicola on Highway No. 8, 3 miles of paved road from Lower Nicola on the Craigmont road, 8 miles of good gravel road to the Aberdeen Mine and then 7 miles by rough jeep road to the base camp at Dot Lake.

An alternate route is via 18 miles of rough gravel road from Mile 14 on the Spences Bridge - Merritt Highway.

From the base camp at Dot Lake, a number of Jeep roads and cat trails provide access to most of the showings and to a good part of the claim group.

CLAIMS:

A complete list of the 418 claims and fractions on which work is being applied is tabulated in Appendix I attached to this report. The following is a summary of the groups:

Group	Kamloops M.D.	Nicola M.D.	Total
Ant		32	32
In		26	26
Jay	40		40
Len	28	12	40
North		40	40
N.W.	40		40
Rex		19	19
Rob	27	12	39
Sho	39	1	40
South		10	10
South East		40	40
T.D.M.		18	18
Wiz - Dot	2	32	34
Totals	176	242	418

HISTORY & PREVIOUS TECHNICAL WORK:

Records of the early development of the showings on the present claim area are vague. About 60 years ago, 2 short adits were driven on small shear zones on Claim Moon #3, on Roscoe Creek approximately 1,500 feet north of the south west end of Chataway Lake (Fig. 2a). The north adit was driven on a 3 foot sericitized and mineralized shear zone which apparently lenses out to the east. A second short adit was unsuccessfully driven to intersect the same shear.

The Upper Vimy showing, on the Wiz 99 claim has seen intermittent activity since the turn of the century (Fig. 2b). A shaft (now caved) has been sunk 155 feet with a crosscut at the bottom to intersect a mineralized shear zone. Mineralization consisting of chalcopyrite, bornite and hematite was reported to be erratic and discontinuous. In 1956 and 1957 Northwest Explorations Limited tested by drilling and stripping the main showings and possible extensions without notable success. The property has been worked by others before and since with the same result.

The "Lower Vimy" on claim Wiz 99 has been developed over the years by stripping, drilling and 2 short adits (Fig. 2b). The adits were driven on small high grade lenses of chalcopyrite, bornite and copper carbonates in narrow shears with discouraging results.

In 1956, interest developed in the area as a result of activities on the Bethlehem property to the north. At this time, the first members of the Chataway Mining Syndicate acquired by staking, a block of claims centered around the old workings on Roscoe Creek. As exploration

on the claims proceeded, more of the adjacent ground was staked.

In 1962, Chataway Exploration Co. Ltd. (N.P.L.) was incorporated to acquire the mining interests of the Syndicate. Chataway, under the direction of S.W. Wright carried out an active exploration programme which included prospecting, geophysical and geochemical surveys, stripping and diamond drilling. In the spring of 1965, significant copper mineralization in shear zones was exposed by bull-dozer trenching south of Gypsum Lake (Fig. 2b). This area known a "Zone 4" was the subject of considerable exploration effort during the following two years.

The south east part of the Chataway claim block was optioned in late 1965 by Bralorne Pioneer Mines Ltd., which company undertook the exploration of the mineral zone referred to as "Zone 4". During 1966 and early 1967 Bralorne, by stripping and drilling, outlined a low tonnage, high grade mineral occurrence which was not economic under prevailing conditions.

To date work on the claims by the vendor company

and Bralorne Pioneer Mines Ltd. included approximately 20,000 feet of diamond and percussion drilling, extensive bulldozer stripping, induced polarization, electro magnetic, magnetometer and geochemical surveys.

The progress on the claim group since being acquired by Chataway is summarized in the Bibliography set forth in Appendix 3.

CURRENT PROGRAMME:

General Statement

Work carried out during the period April 15, 1968 to December 31, 1968 by King Resources Company included:

1. Compilation of previous data.
2. Geological mapping of the claim area.
3. Detailed mapping and sampling in selected areas.
4. Tape and compass surveys of claim lines, drill holes, trenches etc.
5. Transit surveys of base lines, some posts and drill holes.
6. Geochemical and I.P. Surveys in selected areas.
7. Infra red photography and photo interpretation.

8. Limited hand trenching, blasting and sampling.

9. Preparation of 1" = 1,000' base maps.

10. Compilation of past work on base maps.

11. Preparation of current data on base maps

12. Preparation of present geological report.

The emphasis of the programme was on geological mapping and it is for this part of the programme that work credits are being applied.

Field Procedure:

The mapping was carried out by geologists Messrs. A.L. DeBriske, M.Sanguinetti, R.Bullis and the writer of M.C.R. Explorations Ltd., and assistants supplied by Versatile Mining Services Ltd. The programme was carried out under the direction of Dr. M.C. Robinson, P.Eng., and field supervision was supplied by the writer.

Control for the survey was provided by 1" = 1/4 mi. air photos and 1" = 1,000' topographic maps. Outcrops in the field were plotted directly onto photo overlays indicating date of traverse, outcrop number and observer. A description of the outcrop was made in a separate note book and represen-

tative rock specimens of the traverse were collected. The rock specimens were numbered with a code corresponding to the numbers on the photo overlays. The field data was plotted on mylar overlays of the topographic map. The geological map of the claim area was prepared on a scale of 1" = 1,000' (Fig. 2a & 2b).

Additional control was provided by chain and compass mapping of the claim lines, tying in by means of transit surveys, previously cut grid systems and renumbering of grid systems relative to a common origin. Outcrops were mapped in relation to these control points where possible.

Access to the mapping area for the most part was by 4-wheel drive vehicle. A helicopter was used for a period of one week to provide reasonable access to the area in the north eastern part of the claims.

GEOLOGY:

(1.) General Statement

The Highland Valley area is underlain by rocks of Guichon batholithic complex. The Batholith is eliptical in plan, with the long axis approximately 40 miles, oriented north-south and extending from near Lower Nicola

to Ashcroft. The minor axis is approximately 16 miles long.

The batholith intrudes rocks of Permian (Cache Creek) and Upper Triassic age (Nicola) and is overlain unconformably by sediments of middle and Upper Jurassic age. The Batholith is therefore Lower Jurassic in age. This is also supported by geochronological studies made by Dr. K.E. Northcote (Geology & Geochronology of the Guichon Creek Batholith).

The Batholith consists of a number of concentric phases, making up mappable units which in a general way decrease in grain size and increase in mafic content from the central core to the margins. The Batholith can be further subdivided into the older and younger complex.

The rocks commonly referred to as the Guichon and Chataway granodiorite make up the prevailing country rock of the batholith. Near the margins of the "Guichon" unit, a "gabbroic" phase occurs locally and is probably the result of contamination by rocks of the intruded Nicola volcanics.

The Guichon granodiorite is intruded by a

younger complex making up the central core of the batholith. The complex consists of a coarse, porphyritic acid phase referred to as the Bethsaida granodiorite and quartz monzonite and a successive phase of the Bethlehem granodiorite. Both phases are intruded by quartz porphyry and aplite dykes.

Host rocks for the principal copper deposits in the Guichon Batholith are the rocks of the younger complex or their contact areas.

The difficulty of mapping the structures and the various phases of the Guichon complex is increased by the large amount of glacial debris covering the area.

The Chataway claims are entirely underlain by rocks of the Guichon Batholithic complex. During the period May 15th to November 10th, 1968, King Resources Company undertook a reconnaissance mapping programme on the Chataway claims with the object of delineating structural and petrographic units which might be used as a guide to mineralization.

(2.) Lithology

General Statement

On the basis of subtle differences in colour,

texture and percent mineral constituents; 5 major phases of the Guichon Batholithic complex and 4 varieties of related dykes were mapped. One Tertiary Volcanic unit was mapped. 19 thin sections of representative samples of each major phase were prepared and examined by G.A. Wilson of Calgary, Alberta. Mr. Wilson's report is attached as an appendix to this report.

The rock units are listed below in increasing order of age. Presumed regional correlation is also presented.

Table of Lithic Units

Map Unit	Presumed regional correlation
Tertiary Volcanics	Kamloops group
Basic dykes	
Aplite dykes	
Quartz porphyry dykes	P-3 dykes (Bethlehem property), Bethsaida dykes
Crowded porphyry dyke	
Bethsaida granodiorite	Bethsaida granodiorite
Western Granodiorite	Bethlehem or Skeena granodiorite
Dot Granodiorite	Witches Brook granodiorite
Chataway Granodiorite	Guichon granodiorite
Rex	
"Gabbroic"phase	Hybrid phase, marginal phase

Description of Units

Specific local descriptions are presented in the paragraphs which follow:

Tertiary Volcanics

Two small areas of volcanic rocks of the Kamloops Group overlie unconformably the Guichon Batholith on and near Gypsum Mountain. On the claim area, the Kamloops Group consists of dark green to dark brown vesicular basalt. Light rusty weathering is characteristic of all the surface exposures. This unit was only superficially examined.

Basic Dykes

A few basic dykes varying in thickness from a few inches to a few feet, have been observed in a few localities on the property.

South of Gypsum Lake, a narrow mica - lamprophyre dyke has been exposed by a bulldozer cut.

A dark green andesite dyke was noted in drill core on the Vimy occurrence and similar dykes are reported to occur near the Stellako showings at the south end of Roscoe Lake.

Aplite Dykes

Fine grained pink aplite of 1" to 4" in thickness occurs as small dykes and stringers in most rock units mapped. These dykes occur randomly, appear to have no preferred orientation and do not appear to be spatially related to mineralization although locally trace amounts of copper minerals have been noted in them.

The Stellako showing is reported to occur in a wide (300' plus) aplitic dyke but this dyke is probably genetically related to, and the fine grained equivalent of the quartz porphyry described below.

Quartz Porphyry and Quartz Feldspar Porphyry Dykes

Quartz Porphyry and Quartz Feldspar Porphyry dykes occur in the north west part of the claim area. These dykes intrude both Bethsaida and Western Granodiorite phases and are similar in composition to the Bethsaida granodiorite. The dykes vary in size from a foot or two to several hundred feet. They decrease in dimensions, frequency and grain size to the east although this observation is based on a limited number of exposures. Where attitudes could be measured the dykes strike north to north east and dip steeply.

The rocks are characteristically fine to medium grained and porphyritic. Anhedral, irregular phenocrysts of quartz and in the coarser varieties, euhedral plagioclase phenocrysts are set in a buff to light pink, fine grained ground mass. Scattered mafics are predominantly biotite as euhedral books. In the exposures on the Chataway claims the dykes are commonly extensively altered to sericite, kaolinite, chlorite and carbonate.

"Crowded Porphyry"Dyke

A dyke of 'crowded porphyry' has been exposed in a number of bulldozer cuts and a drill hole south of Dot Lake. The dyke contains plagioclase phenocysts to 1/2 c.m. in a fine grained matrix of feldspar, pyroxene and quartz. The alignment of the exposures suggests a possible off set by a northerly tending fault through Gypsum Lake. The dyke has a chilled margin against both Chataway and Dot granodiorite.

It is not thought to have any important relationship to mineralization in the area although some low copper values were encountered in one drill hole (WS-2).

Bethsaida Granodiorite & Quartz Monzonite

The relatively coarse grained Bethsaida granodiorite which occupies the core of the batholith, outcrops in a few scattered exposures in creek beds and bulldozer cuts on the western margin of the claim group. The outcrops form distinctive weathering surfaces as a result of preferential weathering that gives the rock an appearance of quartz porphyry.

The Bethsaida phase in the map area typically contains 35% quartz in anhedral crystals to 6 mm., 30% plagioclase, and 20% orthoclase (in part secondary ?). The ratio of biotite to hornblende is approximately 2 : 1, the total mafics aggregating 10 - 15% of the rock.

The rocks on the west margin of the claim area are commonly light to moderately altered forming sericite, kaolinite and chlorite.

Western Granodiorite

The rocks of the Western Granodiorite occur in a north south band in the western part of the claim area where they are in contact with the Bethsaida phase

on the west and the Chataway phase on the east. In hand specimen, this phase is characterized by medium grain and irregular distribution of hornblende, some of which has included euhedral plagioclase. Near the Bethsaida contact this phase has a porphyritic texture. Both contacts appear to be gradational although outcrop is scarce.

Western Granodiorite is on the average made up to 15-30% quartz as irregular anhedral grains, 35% plagioclase, 15-25% orthoclase (primary ?) 15-20% mafics with hornblende predominating.

This rock unit may be equivalent to the Skeena or Bethlehem phase mapped to the north.

Dot Granodiorite and Quartz Monzonite

This relatively fine grained rock occurs in separate but related stocks in the central and eastern part of the claim area. An abrupt contact with the Chataway granodiorite was mapped east of Dot Lake. Elsewhere on the claims, particularly west of the main mass of Dot granodiorite the Chataway rocks are intruded by irregular dykes of texturally similar material. The frequency of the dyke material increases near the contact of Dot and Chataway

Granodiorite. In thin section, the composition and texture is similar to that of the Western Granodiorite and may be a fine grained equivalent. Clusters of mafic minerals are characteristic of the unit.

In the south central claim area, two varieties of Dot intrusion are shown (Fig. 1b). The quartz monzonite shown differs in a slight increase in grain size and lighter in colour.

Chataway Granodiorite

The Chataway Quartz Diorite occupies the central part of the claim group in a broad north-south band. This variety has some variation in composition and texture through the unit, although the variations have not been mapped separately. In hand specimen, the largest variations occur in the ratio of hornblende to biotite, varying locally from 5 : 1 to 1: 5. On the average uniformally distributed hornblende is slightly greater than biotite, and combined make up 15 - 20% of the rock. A typical sample contains 20 - 25% anhedral, irregular quartz, 35% euhedral plagioclase, 15 - 25% irregular grains of orthoclase.

Near the western contact of the Chataway

phase with the Western phase, the Chataway rocks are coarser in grain and contain a uniform distribution of stubby hornblende crystals. Due to the lack of outcrop, the contact relationships are not clear but are thought to be gradational between medium and coarse varieties and also with the Western phase.

Alteration of the mafics to chlorite and replacement by fine grains of magnetite is common throughout the unit.

Rex Granodiorite

The Rex phase underlies the S.E. corner of the claim area east of the Dot granodiorite. This is probably a medium grained hybrid variety of the Chataway granodiorite which is characterized by a high mafic content (25 - 35%) with hornblende usually dominant and preferred orientation of tabular plagioclase feldspar. The mafics in the Rex phase, where mapped, are typically altered to chlorite and replaced by fine grains of magnetite. The outcrops commonly are limonitic on the weathered surface. This unit may be limited to the contact area.

"Gabbroic" Phase

The "Gabbroic" phase (Quartz Diorite in composition) underlies the east and north east claim area. In relation to the Guichon batholith, this phase represents the outer marginal phase.

The rocks of this unit are Chataway granodiorites which have been contaminated by roof or wall stoping of the intruded Nicola volcanics. The Chataway unit in the north east grades into granodiorite containing scattered zenoliths of fine to medium grained quartz diorite, rich in mafics. The Xenoliths are holocrystaline with indistinct margins. Nearer the contact (and the eastern claim boundary) dark, fine to medium grained quartz diorite predominates.

(3.) Structures:

Contact Relationships

Major contacts between phases of the Guichon are generally gradational and on the Chataway claims are oriented north-south. A sharp intrusive contact between major phases was mapped in only one place. Dykes of Dot granodiorite in the central claim area generally have

distinct contacts and in places have chilled margins. The "Crowded Porphyry" or "Gypsum Lake" dyke has chilled margins against both Dot and Chataway phases.

Foliation

Primary foliation of mafic minerals was not noted during the mapping programme. Preferred orientation of plagioclase was observed in thin sections of specimens of the Rex and "Gabbroic" phases.

Joint Patterns

Joint sets on the claim area are variable. Consistent sets in one area do not necessarily persist into another. In the LeRoy Lake area, the strongest joint sets strike N. to N.10°E. with steep dip and show some shearing. Secondary sets have attitudes of east-west with steep dip and north-east with variable dip. No major fault structures were mapped.

Along Broom Creek Canyon, the most consistent joint sets strike N.40° - 60°W. and are steeply dipping. Locally, the widely spaced joints are coated with copper sulphides.

Faults

In the southern half of the claim area a number of important fault zones occur with associated mineralization. In the Zone 4, centering around Wiz #30 claim, a strong north-south striking shear dipping 65° west, is well mineralized (see "Mineralization") along a strike length of 1,790'. Up to 10' of clay gouge is developed along the shear which has had more than 1 stage of movement. The zone is cut off on the north by the Gypsum Lake fault, a steeply dipping north-west striking fault. The Gypsum Lake Fault, itself weakly mineralized, appears to have been offset by the "Zone 4" shear. Blebs of ground sulphides in the gouge of the "Zone 4" shear indicate post mineral movement.

On the Vimy occurrence of Wiz #99 claim, a wide intensely shattered zone has been developed as a result of faulting in the north and northwest directions.

On the Sho #11 claim, high grade copper mineralization in carbonates occurs in 4 parallel, narrow shears with attitude N. 50° W. 90° . The shears are cut off on the west by a strong but apparently unmineralized fault zone parallel to Twin Dot Creek.

In the west and northwest part of the claim area large quartz porphyry and quartz feldspar porphyry dykes have been intruded along fault zones and crushed zones in the younger complex. Where attitudes of the dykes could be measured they strike north to north 30° east with steep dip. Post dyke faults, where observed, strike north east. On claim Tom #4, the continuity of a number of small dykes has been interrupted by east-west faulting.

On claim Moss #4, large quartz lenses fill a fault zone striking east-west and dipping 90° .

(4.) Mineralization and Alteration

General

Mineralization on the Chataway claims appears to be related to 2 lithic units and associated shears and fracture zones. Copper mineralization occurs in shear zones and widely spaced veins and fracture fillings on the margins of the Dot granodiorite stocks in the eastern claim area and related dykes in the central claim area. One important mineral occurence (Zone 4) has been located within the Dot phase. In the north west area mineralization is related to the intrusion of late acid dykes in the younger complex.

Some of the principal occurrences are briefly described.

Description of Showings

"Zone 4" (Fig. 2b)

Chalcopyrite, bornite, chalcocite and a host of secondary copper minerals occur in a north-south shear zone and adjacent tension fractures in an area centering around Wiz #30 claim. Blebs and knots of isolated copper sulphides occur in light green to gray clay gouge in the shear. Intense alteration to kaolinite, sericite and chlorite is restricted to the sheared Dot quartz monzonite. Adjacent wall rocks exhibit minor alteration of plagioclase to sericite and kaolin.

"Zone 4" has been explored by numerous bulldozer cuts, 20 percussion drill holes and 10 diamond drill holes. Previous operators have estimated the grade and reserves in this zone to be 320,000 tons having an average grade of 2.5% Cu.

"Sho 11" (Fig. 2b)

On claim Sho #11, heavy malachite lenses in a white sericite gouge occur along narrow northwest shears in coarse Chataway granodiorite near the margin of

narrow dykes of Dot granodiorite. Irregular Dot phase dykes are intruded along a wide crushed zone parallel to Twin Dot Creek. Alteration consists of minor limonite and hematite stain, extensive kaolin, sericite and chlorite alteration.

One 10' section in a mineralized area of approximately 100 feet by 20 feet assayed 5.4% copper. The showings are developed by bulldozer cuts and 6 diamond drill holes. Diamond drilling, with generally poor recovery, intersected narrow sections of erratic malachite and chalcocite mineralization in sericitized and chloritized coarse grained Chataway granodiorite.

Upper Vimy Showing (Fig. 2B)

On Wiz #99 claim, hematite, chalcopyrite, bornite, chalcocite and copper carbonates cement fragments of Rex granodiorite in an intensely shattered zone. The shattering occurs at the intersection of two steeply dipping fault sets striking north and north west. Alteration consists of extreme alteration of feldspars to sericite, kaolinite, chlorite and carbonate. Mafics have been completely altered to chlorite. Much of the surface

rock is stained red from the alteration of hematite.

North West Area (Fig. 2a)

In the north west claim area 2 important zones of alteration occur in the younger complex. Along the contact of the Western phase and the coarse Chataway phase moderate to extreme propylitic alteration occurs in a broad north-south zone in both phases in a number of exposures and drill holes between the 3 Creeks area and the north boundary. Sparse copper mineralization consisting of chalcopyrite and malachite locally occurs on fractures and replacing altered mafics. On claim Sky #7, a drill hole intersected 1-1/2 feet of massive chalcocite at the margin of a zone of propylitic alteration. On claim Moss #4, Quartz veins containing disseminated blebs of primary chalcocite intrude granodiorite with similar alteration.

Near the Bethsaida - Western contact extreme alteration, where bedrock has been exposed, appears to be limited to the wide quartz porphyry dykes. Alteration varies from moderate to complete alteration forming sericite, kaolin, chlorite and carbonate. Mineralization in surface cuts consists of sparse amounts of malachite and secondary chalcocite. Two grab samples containing

minor malachite and secondary chalcocite from the cuts on claim Jay #11 assayed 0.14% and 0.60% copper.

A diamond drill hole (A-2) completed in 1965 tested 401 feet of dyke material on claim Bob #6. The entire hole was in well altered rocks mineralized with disseminations and fracture fillings of hematite, minor chalcocite pseudomorphic after chalcopyrite, trace bornite and traces molybdenite.

CONCLUSIONS:

The Chataway claims are underlain by at least 5 major phases of the Guichon Batholithic complex as well as 4 varieties of related dykes. Known mineralization is related to shear zones which intersect the Dot phase in the central claim area and to the intrusion of late acid dykes into the Bethsaida and Western phases in the west claim area.

In and around the margins of the Dot phase stocks and dykes, mineralization and intense alteration, where exposed, is restricted to shear zones and vein type occurrences. Although high grade, the mineralization is lensy and discontinuous.

In the younger complex (Bethsaida and Western phases) mineralization occurs in and adjacent to porphyry dykes. The sparse mineralization in the low density of bedrock exposures and drill holes occurs as fine disseminations and fracture fillings in rocks which have undergone moderate to extreme hydrothermal alteration.

None of the presently known mineral occurrences are economic in their present state of development.

The most favorable area for the occurrence of a "porphyry copper type" orebody is in the younger complex in the western claim area.

Physical work in the form of bulldozer trenching and diamond drilling will be necessary to:

1. Expose bedrock in areas of alteration to determine its extent and its association with the dykes.
2. Expose bedrock in the areas of geochemical and I.P. anomalies.
3. Test, by drilling, mineral occurrences exposed in areas of extensive hydrothermal alteration.

Wm Meyer

W. Meyer, B.Sc.

M.C. Robinson

M.C.Robinson, Ph.D., P.Eng.

Appendix 1

APPENDIX 1

Claims

Group	Claim Name	Record No.	Mining Division	Title
Ant	Ant # 1	22265	Nicola	Chataway
"	" 2	22266	"	"
"	" 3	22267	"	"
"	" 4	22268	"	"
"	" 5	22269	"	"
"	" 6	22270	"	"
"	" 7	22271	"	"
"	" 8	22272	"	"
"	Gav # 1	22273	"	"
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"	" 4	22276	"	"
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"	" 6	22278	"	"
"	" 7	22279	"	"
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"	" 13	22285	"	"
"	" 14	22286	"	"
"	" 15	22287	"	"
"	" 16	22288	"	"
"	" 17	22289	"	"
"	" 18	22290	"	"
"	" 19	22291	"	"
"	" 20	22292	"	"
"	TDM #29	37146	"	"
"	" 30	37147	"	"
"	" 31	37148	"	"
"	" 32 Fr.	37149	"	"
In	Ins # 1	23695	"	"
"	" 3	23697	"	"
"	Wiz #20	21899	"	"
"	" 24	23299	"	"
"	" 25	23300	"	"
"	" 28	21905	"	"
"	" 30	21907	"	"
"	" 40	21915	"	"
"	" 41	21916	"	"

Group	Claim Name	Record No.	Mining Division	Title
In	Wiz #42	23290	Nicola	Chataway
"	" 43	23291	"	"
"	" 49	23297	"	"
"	" 50	23298	"	"
"	" 80	23490	"	"
"	" 81	23491	"	"
"	" 82	23492	"	"
"	" 83	23493	"	"
"	" 84	23494	"	"
"	" 85	23495	"	"
"	" 86	23496	"	"
"	" 87	23497	"	"
"	" 88	23498	"	"
"	" 89	23499	"	"
"	" 90	23500	"	"
"	" 91	23501	"	"
"	" 123 Fr.	36967	"	"
Jay	Jay # 1	25395	Kamloops	"
"	" 2	25396	"	"
"	" 3	25397	"	"
"	" 4	25398	"	"
"	" 5	25399	"	"
"	" 6	25400	"	"
"	Cap # 1 Fr.	47577	"	"
"	" 2 "	47578	"	"
"	" 3 "	47579	"	"
"	" 4 "	47580	"	"
"	Mab # 6 Fr.	47694	"	"
"	" 7 "	47695	"	"
"	Val # 1	25325	"	"
"	" 2	25326	"	"
"	" 3	25327	"	"
"	" 4	25328	"	"
"	" 5	38802	"	"
"	" 6	65791	"	"
"	" 7	38804	"	"
"	" 8	38805	"	"
"	Moss #1	38777	"	"
"	" 2	38778	"	"
"	" 3	40456	"	"

Group	Claim Name	Record No.	Mining Division	Title
Jay	Moss 4	40457	Kamloops	Chataway
"	" 5	40458	"	"
"	" 6	40459	"	"
"	" 6 Fr.	66625	"	"
"	" 7	40460	"	"
"	" 8	40461	"	"
"	" 8 Fr.	66626	"	"
"	Cat # 1	25371	"	"
"	" 2	25372	"	"
"	" 3	25373	"	"
"	" 4	25374	"	"
"	Stad #1	38806	"	"
"	" 2	38807	"	"
"	" 3	38808	"	"
"	" 4	38809	"	"
"	" 6	38811	"	"
"	DJ # 16	70199	"	"
Len	Len # 1	38773	Kamloops	"
"	" 2	38774	"	"
"	" 3	38775	"	"
"	" 4	38776	"	"
"	" 5	63035	"	"
"	" 6	63036	"	"
"	" 7	63037	"	"
"	" 8	63038	"	"
"	" 9	21943	Nicola	"
"	" 10	21944	"	"
"	" 11	21945	"	"
"	" 12	21946	"	"
"	" 13	21947	"	"
"	" 14	15816	"	"
"	" 15	15817	"	"
"	" 16	15818	"	"
"	Rum # 1	38766	Kamloops	"
"	" 2	38767	"	
"	" 3	38768	"	"
"	" 4	38769	"	"
"	" 5	38770	"	"
"	Cece 1 Fr.	61891	"	"
"	" 2 Fr.	61892	"	"

Group	Claim Name	Record No.	Mining Division	Title
Len	Cece 2 Fr.	61892	Kamloops	Chataway
"	Chat 5 Fr.	47582	"	"
"	Sky # 1	25411	"	"
"	" 2	25412	"	"
"	" 3	25413	"	"
"	" 4	25414	"	"
"	" 5	25415	"	"
"	" 6	25416	"	"
"	" 7	25417	"	"
"	" 8	25418	"	"
"	Sun # 1	25429	"	"
"	" 2	25430	"	"
"	Coe # 8 Fr.	63532	"	"
"	Hor # 5	15807	Nicola	"
"	" 6	15808	"	"
"	" 7	15809	"	"
"	" 8	15810	"	"
"	TBM 24 Fr.	69620	Kamloops	"
North	Wiz 34	21909	Nicola	"
"	" 35	21910	"	"
"	" 36	21911	"	"
"	" 37	21912	"	"
"	" 38	21913	"	"
"	" 39	21914	"	"
"	" 72	23339	"	"
"	" 73	23340	"	"
"	" 74	23341	"	"
"	" 75	23342	"	"
"	" 76	23343	"	"
"	" 77	23344	"	"
"	" 78	23345	"	"
"	" 79	23346	"	"
"	" 112 Fr.	23482	"	"
"	Dot # 7	21927	"	"
"	" 8	21928	"	"
"	" 9	21929	"	"
"	" 10	21930	"	"
"	" 11	21931	"	"
"	" 12	21932	"	"
"	" 13	21933	"	"

Group	Claim Name	Record No.	Mining Division	Title
North	Dot #14	21934	Nicola	Chataway
"	" 15	21935	"	"
"	" 16	21936	"	"
"	" 17	21937	"	"
"	" 18	21938	"	"
"	" 19	21939	"	"
"	" 20	21940	"	"
"	" 21	21941	"	"
"	" 22	21942	"	"
"	" 23	23556	"	"
"	" 24	23557	"	"
"	" 25	23558	"	"
"	" 26	23559	"	"
"	Rose 1	26178	"	"
"	" 2	26178	"	"
"	Ins #12	23486	"	"
"	" 14	23488	"	"
"	" 15	23489	"	"
Rex	Rex # 1 *	35080	Nicola	"
"	" 2 *	35081	"	"
"	" 3 *	35082	"	"
"	" 4 *	35083	"	"
"	" 5 *	35084	"	"
"	" 6 *	35085	"	"
"	" 7 *	35086	"	"
"	" 8 *	35087	"	"
"	" 9 *	35088	"	"
"	" 10 *	35089	"	"
"	Wiz 26	21903	"	"
"	" 27	21904	"	"
"	" 29	21906	"	"
"	" 31	21908	"	"
"	" 44	23292	"	"
"	" 45	23293	"	"
"	" 92	23502	"	"
"	" 93 *	23503	"	"
"	" 94	23504	"	"
"	" 95	23505	"	"
"	" 109 Fr.	23479	"	"
"	" 111 Fr.	23481	"	"

Group	Claim Name	Record No.	Mining Division	Title
Rex	Wiz 120 Fr.	23560	Nicola	Chataway
"	" 121 Fr.	23561	"	"
"	" 123 Fr.	36967	"	"
"	Ins A Fr.	23699	"	"
"	" B Fr.	23700	"	"
"	" 2	23696	"	"
"	" 10	23484	"	"
"	" 11	23485	"	"
Rob	Rob # 1	25421	Kamloops	"
"	" 2	25422	"	"
"	" 3	25423	"	"
"	" 4	25424	"	"
"	" 5	25425	"	"
"	" 6	25426	"	"
"	" 7	25427	"	"
"	" 8	25428	"	"
Rob	Russ 7	25409	"	"
"	" 8	25410	"	"
"	B 1	25576	Kamloops	"
"	B 2	25445	"	"
"	B 3	25525	"	"
"	B 4	25526	"	"
"	Chat 1 Fr.	42996	"	"
"	" 2 Fr.	42997	"	"
"	" 3 Fr.	42998	"	"
"	" 4 Fr.	47581	"	"
"	Moon # 1	25349	"	"
"	" 2	25350	"	"
"	" 3	25351	"	"
"	" 4	25352	"	"
"	" 5	25353	"	"
"	" 6	25354	"	"
"	" 7	25419	"	"
"	" 8	25420	"	"
"	HOR # 1	15803	Nicola	"
"	" 2	15804	"	"
"	" 3	15805	"	"
"	" 4	15806	"	"
"	Mar. # 5	15799	"	"
"	" 6	15800	"	"

Group	Claim Name	Record No.	Mining Division	Title
Rob	Mar # 7	15801	Nicola	Chataway
"	" 8	15802	"	"
"	Lake 1 Fr.	15952	"	"
"	" 2 Fr.	33141	"	"
"	" 3 Fr.	33142	"	"
"	" 4 Fr.	33143	"	"
"	Mab 2 Fr.	31282	Kamloops	"
Sho	Trish 1	25333	Kamloops	"
"	" 2	25334	"	"
"	" 3	25335	"	"
"	" 4	25336	"	"
"	" 5	25337	"	"
"	" 6	25338	"	"
"	" 7	25339	"	"
"	" 8	25340	"	"
"	Cat 5	25375	"	"
"	" 6	25376	"	"
"	" 7	25377	"	"
"	" 8	25378	"	"
"	Stad 5	38810	"	"
"	" 7	38812	"	"
"	" 8	38813	"	"
"	" 9 Fr.	40367	"	"
"	Wis 9 Fr.	18724	Nicola	"
"	Mab 3 Fr.	31283	Kamloops	"
"	" 4 Fr.	31284	"	"
"	" 5 Fr.	31285	"	"
"	Sho 1	34912	"	"
"	" 2	34913	"	"
"	" 9 Fr.	34916	"	"
"	" 10	34917	"	"
"	" 11	34918	"	"
"	" 12	34919	"	"
"	" 13	34920	"	"
"	" 14	38728	"	"
"	" 15	38729	"	"
"	" 16	38730	"	"
"	" 17	38731	"	"
"	" 18	38732	"	"
"	" 19	38733	"	"
"	" 20	38734	"	"

Group	Claim Name		Record No.	Mining Division	Title
Sho	Shoo	23	63975	Kamloops	Chataway
"	"	24	63976	"	"
"	"	25	63977	"	"
"	"	26	63978	"	"
"	"	27	63979	"	"
"	Tam	3	69950	"	"
South	Pal	1	27088	Nicola	"
"	"	2	27089	"	"
"	"	3	27090	"	"
"	"	4	27091	"	"
"	"	6	27093	"	"
"	"	7	27094	"	"
"	"	8	27095	"	"
"	"	9	27096	"	"
"	"	11	27098	"	"
"	"	12	27099	"	"
South East	Wiz	46	23294	Nicola	"
"	"	47	23295	"	"
"	"	48	23296	"	"
"	"	51	23347	"	"
"	"	52	23348	"	"
"	"	53	23349	"	"
"	"	54	23350	"	"
"	"	55	23351	"	"
"	"	56	23352	"	"
"	"	57	23353	"	"
"	"	58	23354	"	"
"	"	59	23355	"	"
"	"	60	23356	"	"
"	"	61	23357	"	"
"	"	62	23358	"	"
"	"	63	23359	"	"
"	"	64	23360	"	"
"	"	65	23361	"	"
"	"	66	23362	"	"
"	"	67	23363	"	"
"	"	68	23364	"	"
"	"	69	23365	"	"
"	"	70	23366	"	"

Group	Claim Name			Record No.	Mining Division	Title
South East	Wiz	71		23367	Nicola	Chataway
"	"	96		23506	"	"
"	"	97		23507	"	"
"	"	98		23508	"	"
"	"	99		23509	"	"
"	"	100		23548	"	"
"	"	101		23549	"	"
"	"	102		23550	"	"
"	"	103		23551	"	"
"	"	104		23552	"	"
"	"	105		23553	"	"
"	"	106		23554	"	"
"	"	107		23555	"	"
"	"	108	Fr.	23478	"	"
"	"	110	Fr.	23480	"	"
"	Sho	7		20595	"	"
"	"	8		20596	"	"
T.D.M.	TDM	1		37128	Nicola	"
"	"	2		37129	"	"
"	"	3		37130	"	"
"	"	4		37131	"	"
"	"	5		37132	"	"
"	"	6		37133	"	"
"	"	7		37134	"	"
"	"	8		37135	"	"
"	"	9		37136	"	"
"	"	10		37137	"	"
"	"	11		37138	"	"
"	"	12		37139	"	"
"	"	21	Fr.	37140	"	"
"	"	22		37141	"	"
"	"	25		37142	"	"
"	"	26		37143	"	"
"	"	27	Fr.	37144	"	"
"	"	28	Fr.	37145	"	"
Wiz-Dot	Pro	1		17329	Nicola	"
"	"	2		17330	"	"
"	"	3		17331	"	"
"	"	4		17332	"	"

Group	Claim Name	Record No.	Mining Division	Title
Wiz-Dot	Sho 3	34914	Kamloops	Chataway
"	" 4	34915	"	"
"	" 5	20593	Nicola	"
"	" 6	20594	"	"
"	Mar 1	16760	"	"
"	" 2	16761	"	"
"	" 3	16762	"	"
"	" 4	16763	"	"
"	Dot 1 *	21537	"	"
"	" 2 *	21538	"	"
"	" 3 *	21539	"	"
"	" 4 *	21540	"	"
"	" 5 *	21541	"	"
"	" 6 *	21542	"	"
"	Wiz 1	10669	"	"
"	" 2	10670	"	"
"	" 3	10671	"	"
"	" 4	10672	"	"
"	" 5	10673	"	"
"	" 6	10674	"	"
"	" 10	20585	"	"
"	" 11	20586	"	"
"	" 12	20587	"	"
"	" 13	20588	"	"
"	" 14	20589	"	"
"	" 15	20590	"	"
"	" 16	20591	"	"
"	" 17	20592	"	"
"	" 18	20783	"	"
"	" 19	20784	"	"
"	" 21	21900	"	"
"	" 22A	24342	"	"
"	" 23A	24343	"	"
"	" 113 Fr.	23483	"	"
"	Wis 7	18722	"	"
"	" 8	18723	"	"

Appendix 2

APPENDIX 2

The following is a Petrographic Report on 19 specimens from the Chataway claims submitted to George A. Wilson Geological Consultants Ltd.

The following table shows the field identification for each sample and its general location.

KING RESOURCES - CHATAWAY PROJECT

PETROGRAPHIC DESCRIPTION

OF NINETEEN SPECIMENS

for

KING RESOURCES COMPANY

1300 ELVEDEN HOUSE

CALGARY, ALBERTA

by

GEORGE A. WILSON GEOLOGICAL

CONSULTANTS LTD.

George A. Wilson

KING RESOURCES - CHATAWAY PROJECT

The following petrographic report was prepared at the request of King Resources Company, 1300 Elveden House, Calgary. It is based on the examination of nineteen thin specimens numbered from 1 to 12 and 16 to 21.

The work was done in two phases. During the first phase attention was concentrated on secondary minerals. During the second phase the primary minerals were identified and their mutual relation studied. Alteration in specimens 1, 10, 11 and 22 (Plate IV, A,B) was too severe to permit identification of primary feldspars. In all others bisectrix figures of fair to good quality were used. In the #21 specimen, an indistinct bisectrix figure gave similar results to a determination based on extinction angles in the zone perpendicular to (010).

The listed mineral proportions are estimated by visual inspection. This is reasonably accurate in fine grained homogeneous rocks or with the finer components in rocks with a range of grain size. It is inaccurate in specimens in which minerals, or some of them, are large or unevenly distributed.

Table 1 demonstrates the similarity of some of the specimens to one another and the differences in some of the groups. For example, specimens 3 and 4 lack hornblende but are otherwise similar to 2, 5 and 6, except for the feldspar of 4.

Feldspar proportion and type in specimen 4 are different from all of the others in the collection. The plagioclase is quite sodic and it is extensively replaced by potash feldspar (Plate I, B). No other specimen includes this type of hydrothermal replacement.

Specimens 16, 18, 19 and 20 closely resemble one another. Specimens 21 and 22, which are both much altered, may belong to the same suite as 16, 18, 19 and 20. The dominant characteristic of 16, 18, 19 and 20 is the order of crystallization which produced euhedral plagioclase and mafic minerals with adularia and finally quartz filling the interstices. In all of them as well as in most of the other specimens in the collection, potash feldspar has reacted with plagioclase to produce minor replacement along the rims of plagioclase crystals.

In specimen 16, and probably in 18 and 19, small euhedral plagioclase grains or their altered analogous are enclosed in pyroxene (Plate II, B). This indicates that the earlier minerals were plagioclase followed by hornblende and then by orthoclase and quartz.

Both gradational and abrupt zoning are present in plagioclase. Zoning is generally continuous from relatively more anorthitic core

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TABLE 1

Specimen	Quartz	Feldspars		Mafic		Accessories
		Orthoclase[4]	Plagioclase	Mica	Hornblende	
1	5	30 not identified			2[2]	60[3]
2	35	20	25;An_{31-33}	10	5	3M;2S
3	25	15	45;An_{35-22}	10		5M
4	30	40	20;An_{7}	5		2M;A
5	20	25	30;An_{32-18}	10	13	2M
6	30	15*	30;An_{28-23}	10	13	2M;S;R
7	25	5	35;An_{21}	15	10[2]	3M
8	35	10*	30;An_{29-16}	12	8	5M;5S;Cpy
9	15	10	40;An_{35-22}	8	25	2M
10	30	40 not identified		10	20	
11	60	30 not identified		10		Cpy;Bo
12	15	20	45;An_{36-23}	10	10	2M
16	15	25	35;An_{34}	8	15	2M
17	35		45;An_{5}	20		S
18	15	25	35;An_{28}	10	15	A;S;M
19	15	30	35;An_{36-27}	5	15	2M;A;S
20	25	5	50;An_{29-25}	10	8	2M;S;A
21	25	?	?	?	?	
22	25	60		15		

1. A-apatite; M-magnetite; R-rutile; S-sphene; Cpy-chalcopyrite;Bo-bornite.
2. Pyroxene not hornblende.
3. Very fine altered cryptocrystalline matrix (see description).
4. Adularia except where *, which denotes microcline.

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to less anorthitic rim with only minor reversals. Several specimens have smooth zoning for the inner sixty to seventy per cent of the grain. This inner part is bounded by a solution surface outside of which is a rim which is zoned through a narrow range. The solution surface is a distinct hiatus in zoning. Evidently the composition of the cooling magma changed, or the last fluids were expelled and their place taken by different fluids. A study of this character may assist in determining periods of intrusion of crystalline bodies related to the main batholith.

Nearly all of the suite except specimen 1 are characterized by irregular quartz and orthoclase grains and clusters of grains which are not phenocrysts (Plate II, A and B).

The quartz in specimen 1 which appears to be from the chilled zone of a dyke has a distinctive character. It appears to have been partly dissolved so that it has a rounded irregular shape (Plate I, A) with reentrants. This characteristic would probably be recognized in coarser phases of the same rock as a zone in a quartz crystal or as a distinctive grain in a cluster of quartz crystals. None were seen in the coarser rocks and so it is assumed that this rock is not a finer-grained phase of other coarser granitic rocks in the specimens provided.

Specimen 17 which by its field relation is known to be hydrothermal alteration (Meyer, W., personal communication) can be used as a guide to establish the type of alteration present in other specimens although additional calibration is required. It is safe to conclude that alteration which involves replacement of quartz and feldspar by carbonate is hydrothermal (Plate III, A and B).

Hydrothermal alteration followed by surface alteration is probably evident in specimen 22. Coarse sericite perpendicular to the walls of a fracture extends as a zone through much finer randomly oriented sericite after feldspar (Plate IV, A). It is concluded that the coarser sericite was deposited by hydrothermal processes in a vein and that the random fine sericite is due to surface weathering of feldspar.

Calcite replaced quartz in the same fracture where the fracture crosses quartz. This is considered to be additional evidence that the original deposition is a replacement of primary minerals.

Specimen 22 has a relict texture which bears a vague resemblance to the texture of 16, 18 and 19 (Plate IV, B). In it, quartz in irregular shapes and frequently with linear boundaries, is in a matrix of sericite after feldspar. The linear boundaries of the quartz are not quartz crystal faces. They can only be crystal faces of plagioclase which is entirely replaced by sericite.

SPECIMEN 1 Quartz Porphyry dyke

MACROSCOPIC: Phenocrysts 60%

50% Zoned Plagioclase 1 mm to 5 mm

7% Pyroxene 15 mm to 0.4 mm

3% Quartz rounded

Matrix 40%+. Dark brownish grey to mauve grey, micrograined.

MICROSCOPIC

Primary

Quartz: 5%; 0.05 to 4 mm. Most average 1 to 4 mm. Quartz below 0.1 mm is subhedral to euhedral, larger quartz phenocrysts are rounded to bulbous with re-entrants filled with microcrystalline groundmass. Quartz is clear and has set of sub parallel fractures similarly oriented from grain to grain. (Plate I, A)

Feldspar: 30%. Not determined. See below for alteration products. 1 to 3 mm euhedral.

Pyroxene: 2%. Entirely altered. (For products see below). 0.5 to 2 mm, euhedral.

Magnetite: 3%; 0.1 to 1 mm, smaller grains euhedral to subhedral, larger grains bulbous.

Matrix: 60%; (10% magnetite, euhedral to subhedral <0.005 mm.
(30%± Feldspar, < 0.01 mm.
(60%± Glass? altered.

Secondary

Alteration Products.

Feldspars: 30-60% converted to sericite in radiating clusters, subparallel plates, or in random clusters 0.060 mm long. Kaolin moderate in some grains, extensive in others.

Pyroxene: chlorite pleochroic green to pale green. Length fast. Kaolin nearly colourless, $y^1 = z^1$ = green, interference colour brown grey $-2V = 10^o - 15^o$
Mg-Fe carbonate
Iron oxides

Matrix - abundant kaolinitic alteration, minor chlorite.

Probably hydrothermal alteration, with surface weathering.

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SPECIMEN 2

MACROSCOPIC: Medium grained Granite: feldspars, orthoclase and plagioclase, quartz, hornblende, magnetite, kaolin.

MICROSCOPIC

Primary

Quartz: 35%. Large anhedral crystals to 6 mm. Random rod shaped inclusions with faint red tint. Subhedral only to magnetite, strain extinction throughout, accompanied by subparallel fractures with clay minerals?

Feldspar:

Plagioclase: 25%; $A_{n31 \rightarrow 23}$, 1-3 mm, euhedral to subhedral, zoning sharp, and with reversals.
Subhedral to euhedral. For alteration see below.

Adularia: 20%; anhedral, partly matrix to plagioclase, large irregular grains, less altered than plagioclase. Later than plagioclase, has replaced plagioclase to slight extent along mutual boundaries.

Perthite, traces, along some ortho-plagioclase boundaries.

Mica: 10%, almost entirely altered to epidote-chlorite, x = pale yellow-brown, y = z = brown.

Hornblende: 5%±, -2V large, x^1 = pale green; y^1 = brown-green, z^1 ?; traces of replacement by quartz and orthoclase.

Sphene: 2%± to 1 x 2 mm.

Magnetite: 3%, subhedral blebs 0.1 mm to irregular patches 1.5 mm, includes subhedral quartz.

Secondary

Plagioclase extensively sericitized, especially in some zones, to random masses 0.050 mm. Other grains nearly unaltered.
Kaolin, sparse to extensive.
No carbonate.
Gibbsite? on some grains.

Biotite. Partly to extensively altered to chlorite nearly colourless to brown green to green with epidote (yellow green) and quartz. Traces carbonate. Some chlorite more brown than green.

Quartz - no replacement.

Hornblende - chloritized, but relatively unaltered.

This is probably hydrothermal alteration but surface weathering is superposed on hydrothermal alteration.

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SPECIMEN 3 (This rock is not porphyritic)

MACROSCOPIC: Granite; orthoclase, plagioclase, quartz, mica; kaolinized.

MICROSCOPIC

Primary This specimen is similar in texture to #2 except for absence of hornblende.

Quartz: 25%, 0.5 to 2 mm, anhedral, clear, sparse rod and platy inclusions, strain extinction.

Feldspar:

Plagioclase; 45%; A_{n35} core → A_{n22} rim; subhedral grains to 2 mm x 5 mm, abundant twinning according to several laws but especially albite and carlsbad, clear; mildly sericitized. Zoning mostly sharp, partly gradational and includes reversals.

Adularia; 15%. Small anhedral grains < 2 mm probably all later than plagioclase.

Biotite; 10%, subhedral to 8 mm. x^1 = pale brown, y^1 = brown. Includes subhedral slightly altered plagioclase and quartz.

Magnetite: 5%; 0.1 to 1 mm on anhedral to subhedral.

Pyrrhotite; traces. Minute blebs in some magnetite.

Secondary

Feldspars - sericitization mild in most grains, extensive in a few.

Gibbsite?. Very fine, extensive in feldspar grains which were probably orthoclase. A mineral similar to Gibbsite has been deposited in fine fractures.
Kaolin occurs with Gibbsite.
Iron oxides in fractures.
Chlorite deposition in some grains.

Micas - most grains, particularly the larger, are fresh. The smaller grains are extensively altered to chlorite.

This specimen is probably from a point near the base of the weathering zone.

SPECIMEN 4

MACROSCOPIC: Granite with hematite veins and malachite stain. Kaolin odour, calcium carbonate, sparse.

MICROSCOPIC

Primary

Quartz: 30%, 1 mm equant, strained, sparse rod and platy inclusions, somewhat fractured and with traces of mortar structure. Replaced plagioclase on margins.

Feldspar:

Plagioclase: 20% fair determination. $A_{n7} \pm_5$, subhedral to euhedral, unzoned considerably altered. Much plagioclase is perthetic, probably replacement because proportion of adularia variable from grain to grain (0.3 x 0.4 to 0.4 x 1) mm.

Adularia: anhedral to 0.5 x 1.2 mm, subhedral to a few quartz grains. Clearly replaced plagioclase, see Fig. 2. 40%

Mica: 5% represented by chlorite pseudomorphs.

Magnetite; 2%, traces small grains, < 0.5 mm subhedral.

Hematite and maghemite: plates and equant grains in veins and crush zones to 1 cm wide.

Apatite?: prisms and very fine needles in quartz mostly, partly in plagioclase.

Secondary

Feldspar alteration: abundant coarse (0.1 to 0.18 mm) sericite in a network of thin fractures.
Fine (0.03 mm) sericite in feldspar grains. Most feldspar much altered to kaolin.
Some grains with abundant chlorite.
Calcium carbonate replaced some feldspar.
Iron hydroxide stain in fractures and in altered feldspars.

Mica?: Replaced by chlorite, pleochroic yellow to green, with brown interference colour.

Alteration in 2 stages:

1. Hydrothermal.
2. Alteration by weathering agencies.

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SPECIMEN 5

MACROSCOPIC: Granite medium grained; orthoclase, plagioclase, quartz, hornblende, mica.
Moderate odour of kaolinite.

MICROSCOPIC

Primary

Quartz: 20%, irregular anhedral grains, interstitial to feldspar, clear, strained and fractured.

Feldspar:
Plagioclase: 30%, 0.5 to 2 mm subhedral to euhedral, rectangular grains. Unzoned to zoned, $A_{n32} \rightarrow A_{n18}$; mildly altered, Replaced by adularia.
Adularia: 25% large irregular grains, matrix to plagioclase.

Mica: 10% brown, x^1= pale yellow, y^1 = brown, z^1 = dark brown, absorption $x^1 < y^1 = z^1$.

Hornblende: 13%, $Z^1 \wedge c = 24^o$.

Magnetite: 2%, equant grains and clusters of equant grains 0.5 mm D, mostly in biotite hornblende clusters.

Secondary

In Feldspars: moderate alteration to sericite 0.02 mm long generally oriented in random fashion but partly parallel with cleavages.

Extensive kaolin alteration in parts of some grains especially in sericitized parts.

Plagioclase is more altered than orthoclase.

Biotite: extensively altered to chlorite with brown interference colour.

In Hornblende - nil.

Mild hydrothermal with moderate to severe surface weathering.

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SPECIMEN 6

MACROSCOPIC: Granite: orthoclase, plagioclase, quartz, mica (biotite), hornblende; kaolin odour.

MICROSCOPIC

Primary

Quartz: 30%, irregular to rectangular 1.3 mm clear, strained, interstitial to all other minerals.

Feldspar:

Plagioclase: 30%, $A_{n28 \rightarrow 23}$; sharply zoned, gradational zoning to unzoned, rectangular, anhedral to subhedral, much altered to sericite and kaolin.

Microcline?: 15% large, irregular anhedral grains to 2.6 mm, interstitial to and later than plagioclase which it includes. Traces very fine grid twinning. Myrmikitic in some late small grains.

Biotite; 10%, 0.5 mm anhedral very irregular grains, 2V very small, x^1 = pale yellow, y^1 = brown, z^1 = brown, absorption $x << y = z$.

Hornblende: 13%, $Z^1 \wedge c = 20^\circ$, x^1 = pale yellowish green, y^1 = green, z^1 = green.

Magnetite: 2%, 0.5 mm equant grains.

Sphene; traces.

Rutile: inclusions in biotite.

Secondary

In plagioclase: extensive kaolin alteration in nearly all plagioclase, accompanied by minor sericite or Gibbsite with traces fine quartz(?). Was biotite source of potash?

In orthoclase: minor kaolin.

In Biotite: mild to extensive; chlorite-epidote pseudomorphs. Chlorite - pale green to green with brown interference color. Epidote, clear to lemon yellow color.

In Hornblende: very slight chlorite alteration.

Depositional minerals: Epidote in very thin fractures in quartz with replacement of quartz.

Hydrothermal alteration mild.

Surface weathering - extensive.

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SPECIMEN 7

MACROSCOPIC: Quartz Diorite, plagioclase, pyroxene.
Faint odour of kaolin.

MICROSCOPIC

Primary

Quartz: 25% - Maximum 2 mm, irregular, anhedral, interstitial to feldspars, clear, slightly strained. Replaces plagioclase.

Feldspar:
Plagioclase: 35%; A_{n21}, rectangular, subhedral to euhedral, 1.5 x 2.6 mm. Zoned mostly gradational partly seriate and includes a marked hiatus. Partly altered. Unaltered parts have abundant tetragonal inclusions. Some grains considerably bent.
Adularia: 5%±, slightly clearer than plagioclase.

Pyroxene: 10%, abundant inclusions, pale brown, $^{+}2V = 60^{o}\pm$. Augite subhedral, partly chloritized, intergrown with plagioclase most of which it postdates.

Biotite: 15%, x^1 = pale yellow; y^1 = red brown; z^1 = brown red, absorption $X < Y < Z$. 70% altered to chlorite-sericite-mica intergrowth.

Magnetite: 3% equant blebs < 0.5 mm.

Secondary

In plagioclase: part to complete alteration to masses of random to subparallel sericite chlorite and kaolinite.

In Biotite: part to complete alteration to green pleochroic chlorite, minor epidote and traces rutile.

In Hornblende: slight to moderate alteration to pleochroic green chlorite.

Deposition: Gibbsite? deposited in thin fractures in and replacement of plagioclase.

Hydrothermal alteration: mild.

Surface weathering alteration extensive.

SPECIMEN 8

MACROSCOPIC: Quartz Diorite: plagioclase, mica, hornblende, quartz, magnetite, pyrite.
Faint odour of kaolin.
Pyrite has rim of iron oxides.

MICROSCOPIC

Primary

Quartz: 35%, irregular equant grains to 1 mm, clear, slight strain extinction. Boundaries with microcline are convex to microcline.

Feldspar:

Plagioclase: 30%; $A_{n29 \to 48 \to 21 \to 25 \to 16}$, tabular euhedral to subhedral grains to 1.5 x 4 mm. Distinct preferred orientation of plagioclase, zoned with reversals, partly to considerably altered to sericite. Included apatite.

Quartz: Microcline 10%. Irregular grains to 1 mm, later than plagioclase, clearer than plagioclase.

Mica: 12%, brown, 0.6 mm plates x^1 = pale yellow brown, y^1 = green-brown, z^1 = green-brown, absorption $X < Y \; Z$.

Hornblende: 8%, small anhedral grains to 0.5 mm. $Z^1 \wedge c$ = 29°, x^1 = pale green-yellow, y^1 = green-brown, z^1 = green.

Sphene: 5%, 0.35 x 1 mm, pleochroic colourless to pale brown.

Magnetite: 5%, equant grains, 0.1 to 0.4 mm.

Chalcopyrite: traces, blebs < 0.1 mm in hairline fractures.

Secondary

In plagioclase: mild to almost complete kaolin accompanied by minor sericite and other clay minerals.

Traces clinochlore.

In Mica: very slight chlorite alteration.

In Amphibole: negligible.

Hydrothermal alteration: very slight.

Surface alteration moderate to extensive.

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SPECIMEN 9

MACROSCOPIC: Granite: orthoclase, plagioclase, quartz, hornblende, magnetite, strong odour of kaolin.

MICROSCOPIC

Primary

Quartz: 15% rounded equant grains to 0.5 mm, some in clusters, clear, slightly strained.

Feldspar:

Plagioclase: 40%, A_{n35-22}. Tabular grains to 1.2 x 2.7 mm. Distinct preferred orientation, considerably altered.

Adularia: 10%, small irregular grains 0.75 mm interstitial to plagioclase and hornblende.

Hornblende: 25%, subhedral grains to 1.5 mm, $Z^1 \wedge c = 22°$. x^1 = pale yellow; y^1 = brownish-green; z^1 = bluish green.

Mica: 8%, 1 mm subhedral, x^1 = pale yellow, y^1 = brown, z^1 = brown, absorption $X << Y = Z$.

Magnetite: 2%, 0.1 to 1 mm blebs.

Secondary

In plagioclase: moderate to extensive kaolin accompanied by 0.02 mm grain sericite, streaks iron stain.

In Hornblende: negligible.

In Mica: extensive to complete alteration to chlorite, and clay minerals, chlorite has purple interference colour.

Hydrothermal alteration negligible.

Surface weathering extensive.

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SPECIMEN 10

MACROSCOPIC: Granite: fine to medium grained, magnetitic, much altered, smells very strongly of kaolin, calcareous, with abundant hydroxides and oxides.

MICROSCOPIC

Primary

Quartz: 30%, angular grains mostly 0.5 mm diameter. Mutual boundaries tend to be mosaic. Trace strain extinction.

Feldspar: 40%, tabular to 1 mm x 2.5 mm, random orientation.

Biotite: 10%, entirely altered to iron oxides and clay minerals.

Amphibole: 20%, entirely altered to iron oxides and clay minerals.

Secondary

In Feldspars, entirely altered to mass of random plates 0.02 mm long of sericite with kaolin and calcite. Iron oxides and hydroxides occur as blebs and clusters of blebs in altered feldspars and as rims along grain boundaries. Fine cryptocrystalline fibrous quartz occurs in clusters 0.05 to 0.06 mm across.

Sparse coarse sericite to 0.6 mm is probably pseudomorphic after biotite.

Calcite: traces.

Minor replacement of quartz along grain boundaries.

Hydrothermal alteration: extensive.

Surface weathering: extensive.

SPECIMEN 11

MACROSCOPIC: Granite with abundant quartz but possibly quartz vein with vein of bornite-chalcopyrite. Extensively altered and weathered with abundant iron oxides and veinlets of azurite and malachite, very kaolinitic.

MICROSCOPIC

Primary

Quartz: 60%, mostly 1.5 mm mosaic but also includes streaks of smaller grains which may be mortar structure, some replacement of quartz by sericite and clay minerals.

Feldspars?: 30%, entirely replaced and represented by masses of clay minerals.

Mafic minerals: 10%, entirely replaced by clay minerals and iron oxides.

Bornite: large masses to 0.3 cm with linear margins in places suggestive of rhombic system. This shape may have been inherited from carbonates.

Chalcopyrite: small blebs in bornite.

Azurite: veinlets in quartz and bornite.

Malachite: veinlets in quartz and bornite. Malachite and azurite occupy different parts of same veins.

Calcite: common to abundant in clay minerals.

Secondary

There appear to be two stages of alteration:

1. Replacement of most of feldspars with masses of radiating or random interlocking grains of sericite 0.02 mm to 0.07 mm. This alteration appears to have produced no quartz. On the other hand, quartz is partly replaced. This type is probably due to mineralizing solutions.

2. Remaining feldspars which consisted of masses with cusp shaped margins are altered to masses of kaolin $\pm$ gibbsite? and limonite with calcium carbonate. This appears to have been accompanied by development of acicular quartz? and by deposition of azurite and malachite in fractures. It is probably later than 1. and is probably due to weathering effects.

SPECIMEN 12

MACROSCOPIC: Granite: quartz, plagioclase, orthoclase, mica, calcareous.

MICROSCOPIC

Primary

Quartz: 15%, 0.2 to 1.2 mm, smaller grains equant and square in cross-section, larger grains irregular, clear, strain extensive on larger grains, absent on smaller ones.

Feldspars:

Plagioclase: 45%; $A_{n36 \rightarrow 23}$. Tabular grains to 1 x 2 mm, zoned, gradational to sharp. Tendency to preferred orientation. Zoned grains frequently have euhedral core near A_{n36} and thin anhedral rim near A_{n23}.

Adularia: 20%, large anhedral, poikilitic very irregular grains interstitial to all other minerals and including finer equant quartz, clearer than plagioclase, sparse perthite lamellae of twinned plagioclase.

Mica: 10%, x^1 = pale yellow, $y^1 = z^1$ = green-brown, absorption $X \ll Y \square Z$. Much altered to quartzite.

Hornblende: 10%, $Z^1 \wedge c = 20^\circ$, x^1 = pale greenish yellow, y^1 = olive green, z^1 = green.

Magnetite: < 2%, blebs to 0.5 mm.

Calcite: trace.

Secondary

In plagioclase: mild to extensive alteration to sericite plates to 0.06 mm, partly random partly in cleavages and fractures. Kaolin and calcium carbonate mild and accompany sericite. Some plagioclase very clear.

In Biotite: mild alteration to green chlorite.

In Magnetite: traces red stain adjacent to some grains.

Hydrothermal alteration: very mild.

Surface weathering: very mild. This specimen is probably from a point near the base of the weathered zone or below it.

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SPECIMEN 16

MACROSCOPIC: Granite: plagioclase, mica, hornblende, quartz. Mild kaolin odour, greenish altered tint adjacent to joint surfaces and decreasing away from them.

MICROSCOPIC (strikingly similar to specimen 18)

Primary

Quartz: 15%, irregular anhedral grains to 2.5 mm, strain moderate to strong, includes euhedral plagioclase and subhedral hornblende.

Feldspar:

Plagioclase: 35%, A_{n34} euhedral grains to 0.7 mm x 3 mm. Moderate to slightly altered. Most grains enclosed in either quartz or orthoclase. Zoning is gradational and through narrow ranges of $\pm$3% An.

Orthoclase: 25%, large irregular equant grains to 4 mm with abundant included hornblende and plagioclase. Photo (68-18-9) slightly cloudier than quartz.

Hornblende: 15%, subhedral to euhedral, 0.75 to 1.7 mm, some crystals with included euhedral plagioclase, $Z^1 \wedge c = 24^o$, x^1 = pale yellow-green, y^1 = green, z^1 = green.

Biotite: 8%, 3 mm much altered to chlorite and epidote.

Magnetite: 2%, 0.25 to 0.5 mm blebs.

Order of crystallization: plagioclase-mica-hornblende-orthoclase-quartz.

Secondary

Feldspar alteration: degree varies systematically across slide. At outer edges (probably adjacent to joint planes) plagioclase is altered to kaolin and sericite (to 0.30 mm) decreasing away from joints? It is partly oriented parallel cleavages. Plagioclase much more altered than orthoclase which is fresh.

In Mica: Extensive alteration to chlorite, quartz, epidote. Epidote pleochroic, yellow to pale yellow, chlorite pale green with brown interference colour.

In Hornblende: light alteration to chlorite on a few grains otherwise nil.

Hydrothermal alteration probably nil.

Surface weathering: mild probably near base of leached zone.

SPECIMEN 17

MACROSCOPIC: Granite: quartz, orthoclase? plagioclase mafic mineral. Much altered to red-brown colour with strong odour of kaolin and trace of greenish alteration more the colour of chlorite than malachite.

MICROSCOPIC

Primary

Quartz: 35%, anhedral irregular grains to 3.5 mm. Forming parts of larger clusters, inclusions abundant, strain expressed both as undulating extinction and as parallel fractures. Clay minerals and/or iron oxides deposited along fractures.

Feldspar:

Plagioclase: originally 45%; $An_{5}\pm_{5}$, dusty much altered. Determination made on fragments at edges of altered grains. Could be oligoclase and not albite. Index recognition prevented by secondary mineral. Most plagioclase strained as shown by bending and fracturing.

Mafic: originally 20%±. Now completely altered to iron oxides, chlorite and sericite.

Trace sphene.

Texture resembles 16, 18, 19 to which it may be related.

Secondary

In Feldspars: most grains altered to randomly oriented 0.09 mm grains kaolin with calcium carbonate and sericite to 0.30 mm.

Iron hydroxides abundant along cleavages in some parts expecially near pseudomorphs after biotite. Some plagioclase, slightly kaolinized otherwise clear.

After Biotite: pseudomorphs of sericite, iron hydroxides and kaolin.

Depositional minerals: kaolin and calcium carbonate in fractures in quartz. Calcium carbonate is later.

Replacement minerals: quartz by calcium carbonate especially along fractures. Hydrothermal alteration: nil to slight.

Surface weathering: mild.

Hydrothermal alteration: extreme.

SPECIMEN 18

MACROSCOPIC: Grey granite: quartz, plagioclase, orthoclase, mica, hornblende, magnetite, yellow-green stain unlike malachite on weathered surface. Odour of kaolin, moderate.

MICROSCOPIC

Primary Note: This rock is similar to 16.

Quartz: 15%, irregular anhedral grains to 2.5 mm occupying interstices between other minerals.

Feldspar:

Plagioclase: 35%, $A_{n28}^{+}{}_{2}$. Partly rectangular mostly tabular to 1 mm x 3 mm long. Mostly euhedral, twinned, gradationally zoned through narrow range, generally clear, slightly kaolinitic.

Orthoclase: 25%, very irregular up to 2.5 cm across which include up to 60% euhedral plagioclase and hornblende, slightly kaolinized.

Hornblende: 15%, 2V large, $Z^1 \wedge c = 26^\circ$, x^1 = pale yellow-green, y^1 = brown, z^1 = brown-green, subhedral to euhedral, 1-2 mm.

Biotite: 10% subhedral to 2 mm. x^1 = pale yellow-brown; y^1 = brown, z^1 = brown, absorption $X \ll Y = Z$. 2V very small. x ⌒ c. Altered to chlorite.

Accessories: Apatite?; sphene to 0.5 mm, magnetite. Crystallization order, plagioclase = hornblende → orthoclase → quartz.

Secondary

In Feldspar: very fine kaolin mild to moderate. Sericite, 0.08 mm, moderate in some grains, potash feldspar, clear to slightly kaolinized.

In Mica: green pleochroic chlorite slight on some grains, 50% on others, partly intergrown with pleochroic yellow epidote.

In Hornblende: traces epidote. Secondary iron oxides, traces.

Hydrothermal alteration slight.

Surface weathering slight.

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SPECIMEN 19

MACROSCOPIC: Granite: quartz, plagioclase, orthoclase, mica, hornblende, magnetite. Traces yellow-green alteration (epidote?) mild, kaolin odour.

MICROSCOPIC

Primary

Quartz: 15%, irregular anhedral grains to 5 mm, interstitial to all other minerals, clear but strained, undulatory extinction and fracturing common. Some grains have small 2V.

Feldspar:

Plagioclase: 35%, A_{n36}→A_{n27}, euhedral to anhedral, tabular to nearly square grains to 1.5 x 3.5 mm. Mostly fairly clear with slight kaolin. A few grains extensively sericitized. Zoning on most grains through narrow range gradational, larger grains have core of $A_{n36\pm3}$ comprising most of the grains and outer rim of $A_{n27\pm2}$, which is myrmekitic on some grains.

Orthoclase: 30%, large anhedral very irregular grains to 5 mm, generally with much included euhedral plagioclase and hornblende clear to slightly kaolinized.

Hornblende: 15%, euhedral, to subhedral prismatic grains to 2 mm. $-2V = 80^{o}$, $Z^{1} \wedge c = 22^{o}$, x^{1} = yellow green, y^{1} = green, z^{1} = green.

Mica: 5% subhedral flakes to 3 mm, x = pale yellow, y = z = green, absorption $X \ll Y = Z$.

Magnetite: 2%.

Accessories: sphene to 1 mm, apatite; hexagonal, length slow, included in mica and hornblende.

Crystallization: hornblende, plagioclase, orthoclase, quartz.

Secondary

In Feldspars: kaolin mild to extensive, especially in some plagioclase zones. Sericite < 0.02 mm light to extensive.

In Mica: chlorite, pale green pleochroic, mild.

In Hornblende: epidote trace to mild.

Depositional effects: sericite and epidote in fractures in quartz and feldspar without replacement. Quartz fills some fractures where they cross feldspar.

Hydrothermal alteration?

Surface: extensive.

SPECIMEN 20

MACROSCOPIC: Quartz Monzonite: quartz, feldspar, hornblende, biotite, magnetite, mild kaolin odour.

MICROSCOPIC

Primary

Quartz: 25%, anhedral, equant grains to 2 mm. occasionally forming larger clusters. Strained. Less irregular than in specimens 16, 18, 19.

Feldspar:

Plagioclase: 50%, An_{29-25}, euhedral and subhedral grains to 2 x 3.5 mm, mildly kaolinized and light to severe sericitization.

Orthoclase: 5%, small anhedral grains, < 1.5 mm interstitial to plagioclase.

Hornblende: 8%, euhedral and subhedral, prismatic crystals, includes euhedral plagioclase, $Z^1 \wedge c = 23^o$, x^1 = pale yellow green, y^1 = olive green, z^1 = green.

Mica: 10% originally, now completely altered to chlorite and epidote (large 2V, faintly pleochroic in pale green).

Magnetite: 2%, small blebs to 1 mm.

Sphene: to 2 mm; apatite trace.

Crystallization, mica, plagioclase, hornblende, orthoclase, quartz.

Secondary

In Feldspar: pervasive kaolinization from moderate to extensive as very fine flakes.
Moderate sericitization 0.04 mm flakes.
Epidote sparse.
Chlorite sparse.

In Hornblende: epidote and chlorite extensive. Antigorite? mild, actinolite-tremolite? may be derived from hornblende.

In Mica: chlorite green to pale green pleochroic blue interference colour with epidote and traces iron oxides, extensive to complete.

In Magnetite: green chlorite along fractures, sphene around edges (sphene may be syngenetic).

Depositional minerals in fractures: thin zone of iron oxides along each border with deposit of clay mineral with low birefringence, cleavage and low negative relief.

SPECIMEN 21

MACROSCOPIC: Granite or quartz monzonite: plagioclase, quartz, orthoclase, mafic, kaolin odour strong, traces malachite(?) stain on some surfaces. Probably is unrelated to specimens 16, 18, 19. It may be related to specimen 20.

MICROSCOPIC

Primary

Quartz: 25%, anhedral grains to 2.5 mm. Much less irregular than 16, 18 and 19. Strain light.

Feldspar:

Plagioclase: A_{n36}, small tabular and subhedral to large 1.5 x 2.5 mm anhedral. Much altered to sericite and kaolin and partly replaced by dolomite and calcite.

Mafic minerals completely altered.

Secondary

In Feldspars: extensive sericitization (0.04 plates) accompanied by pervasive kaolinization, and replacement of plagioclase by calcite.

In Mafic minerals: if present now completely altered to kaolin and/or leucoxene and iron oxide.

Depositional minerals: calcite with replacement in feldspars. No noticeable effect where some fractures cross quartz.

Sericite walls in other fractures where they cross feldspar but not where they cross quartz. Iron oxides in fine fractures.

Hydrothermal alteration: extensive.

Surface alteration: mild?

SPECIMEN 22

MACROSCOPIC: Quartz diorite or monzonite, plagioclase, quartz, calcite, much altered to kaolin.

MICROSCOPIC

Primary

Quartz: 25%, irregular grains to 1 x 3.5 cm forming clusters of grains with serrated boundaries. Clusters 6 to 7 mm diameter. All quartz mildly strained with undulatory extinction. Fractures common.

Feldspar: 60%, euhedral to anhedral grains to 4 mm. Completely altered to sericite and partly replaced by calcite.

Mica: 1.5 mm, subhedral, completely altered to kaolin, sericite and possibly vermiculite.

Secondary

In Feldspars: almost complete alteration to fine sericite (< 0.03 mm), calcite, and kaolin with very fine quartz.

In Mafics (Mica): complete alteration to sericite, kaolin, leucoxene? iron oxides.

In iron oxides: sericite, chlorite.

Depositional: ghosts of old fractures contain sericite in feldspar. Fine quartz may represent quartz veins.

Hydrothermal: extensive.

Surface alteration: moderate?

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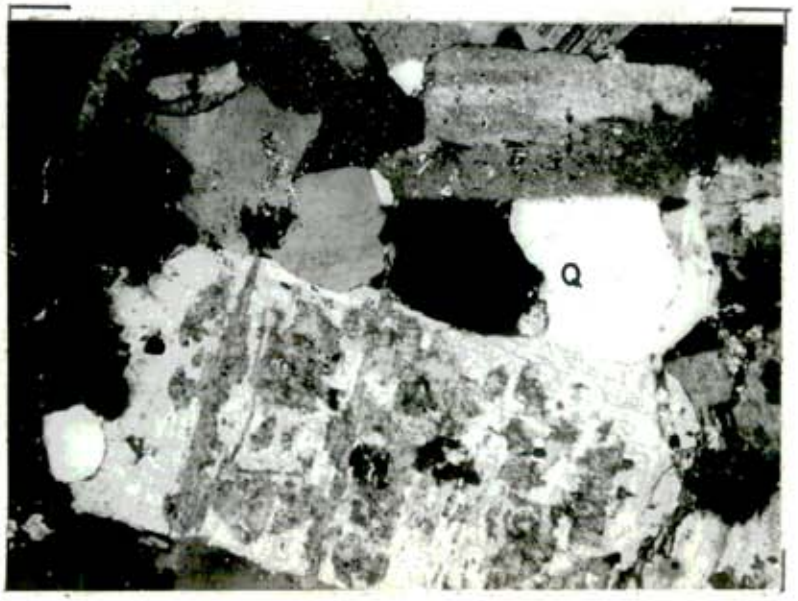
PLATE I

A

Specimen 1. Partly dissolved quartz phenocryst surrounded by fine groundmass which also includes plagioclase. 34x



B

Specimen 4. Adularia replacement of plagioclase. Note extension of adularia into the fracture in quartz center. 60x

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PLATE II

A

Specimen 3. Typical quartz-adularia relationship. Quartz appears to be later. 34x

B

Specimen 16. Large irregular orthoclase grain with included euhedral plagioclase. Plagioclase is replaced around edges. Dark patch left center, hornblende with included plagioclase. 34x

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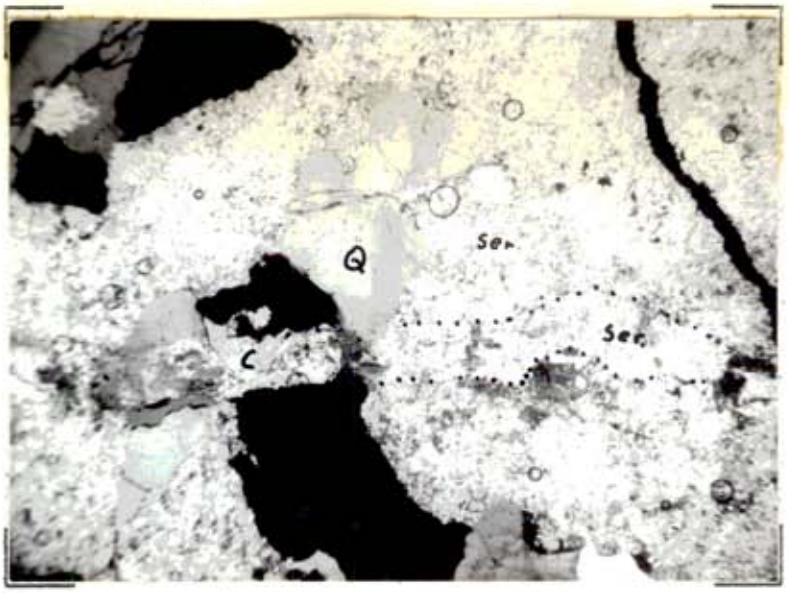
PLATE IV



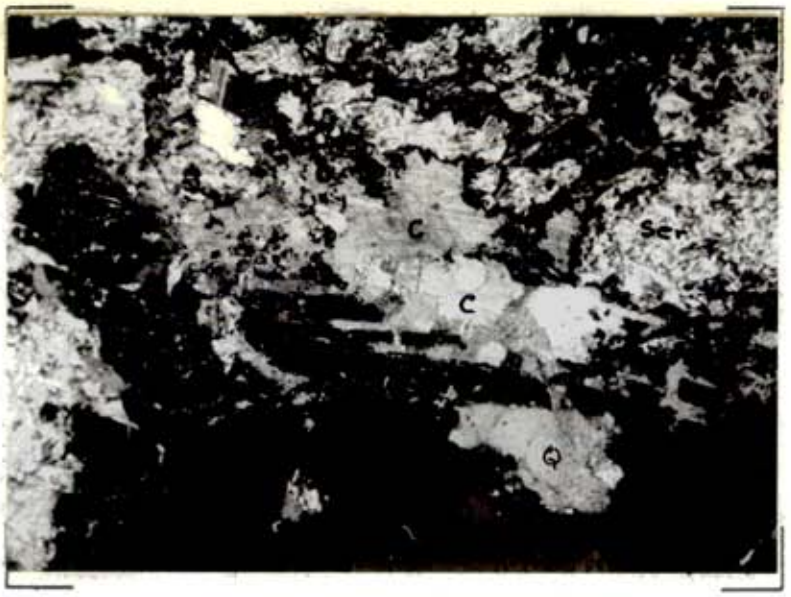
A

Specimen 22. Fracture with carbonate filling in quartz and coarse sericite filling in former feldspar. Sericite in fracture is subperpendicular to walls. Sericite after feldspar is random. 34x

B

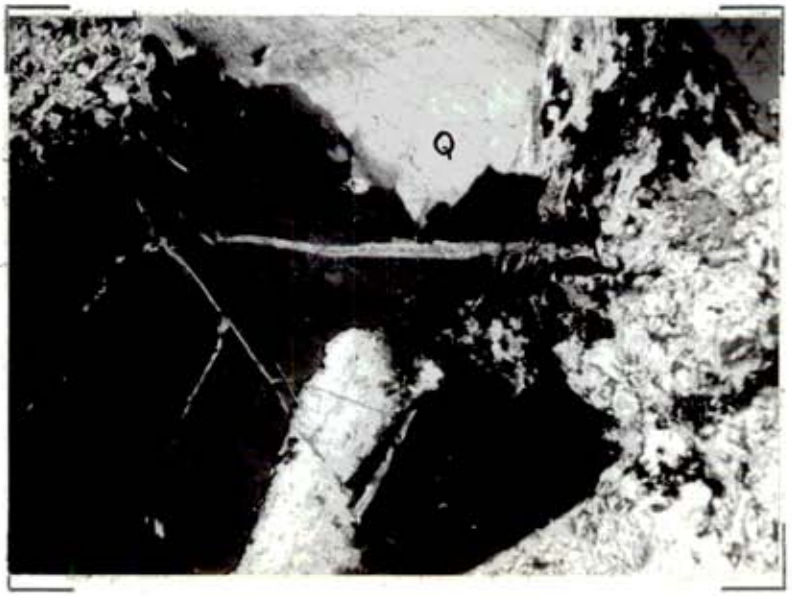
Specimen 22. Quartz originally crystallized against euhedral feldspar now surrounded by sericite-carbonate after feldspar. 34x

PLATE III



A

Specimen 17. Plagioclase partly replaced by carbonate, probably calcite. 60x



B

Specimen 17. Replacement of quartz by calcite. String of inclusions in calcite marks original position of fracture along which replacement took place. 60x

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Appendix 3

APPENDIX 3

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"Geophysical Report" - by Colbert B. Selmser - December 15, 1964

"Report on the Mineral Claims of Chataway Exploration Co. Ltd. (N.P.L.)"by H.L.Hill & Associates Ltd. - May 18, 1965

"Progress Report on Chataway Exploration Co. Ltd. (N.P.L.)" - by H.L.Hill & Associates - September 28, 1965

"Report on I.P. Survey - Chataway Property on behalf of Bralorne Pioneer Mines Ltd.," - by H. O. Seigel - March 25, 1966

"Report on Additional I.P. Surveys, Chataway Property, B.C., on behalf of Bralorne Pioneer Mines Ltd." - by H.O.Seigel - June 16, 1965

"Report on the I.P. Survey in the Highland Valley Area B.C. for Chataway Exploration Co. Ltd., by Canadian Aero Minerals Surveys Ltd." - by R.D.Falconer - July 24, 1966

"Report on the Chataway Group, Kamloops & Nicola M.D. for Chataway Explorations Co. Ltd.," - by M.K.Lorimer, for Hill, Manning & Associates - February 6, 1967

"Report on the I.P. Surveys on the Chataway Claim Group Highland Valley Area, B.C. on behalf of Chataway Exploration Co. Ltd. (N.P.L.) - by J.G.Baird for Seigel & Associates - July 20, 1967

A number of miscellaneous reports by Bralorne Pioneer Mines Ltd. include progress reports, summary reports and memos concerning exploration and evaluation of "Zone 4" mineralization.

Appendix 4

APPENDIX 4

COST OF SURVEY

The geological survey covered in this report was designed to obtain as a primary objective the best possible over-all coverage of Chataway ground in a minimum of time in order that satisfactory interpretations of all evidence of mineralization and/or bedrock alteration could be made in terms of general Highland Valley area exploration experience to date. As a secondary objective, the survey was to include examination of known and previously investigated showings on the property.

In order that the survey be as effective as possible, the following procedure was adopted:

(1) Compilation and interpretation of all previous work in advance of entry on to the ground.

(2) Mobilization of technical personnel and supporting crews, travel to and set-up on the property when snow conditions permitted.

(3) Helicopter traversing of the property in order to locate and plot on air photographs areas of outcrop so that ground traverses might be most effectively planned in this area of low incidence of outcrop.

(4) Coincident with (3), the establishment of accurate ground control to provide tie points for surface traverses and for locating areas of previous work.

(5) Traversing of the property at large in order to produce the required geologic map.

(6) Logging of past diamond drill core, especially in areas of overburden, in order to establish bedrock lithic types.

(7) Examination of areas of previous stripping, tunneling, drilling, etc.

(8) Trenching through overburden and drilling and blasting of bedrock in order to inspect showings of interest or of potential interest. (Note that the physical work involved has been or will be claimed separately , but that the technical supervision and inspection of such work is included herein.)

(9) Coincident with (5) - (8) above, the continuing establishment of ground control through transit, chain and compass and other surveys and of the drafting of reliable property maps.

(10) Sampling of showings of interest.

(11) Compilation of all available data and the preparation of this report and accompanying maps.

The costs involved in the final product of the above endeavours have been varied and substantial. Those costs are summarized below. They amount to $100,109.25 and are well in excess of the $41,800.00 claimed on November 1, 1968, as work credits in connection with this report. It is presumed that a maximum of $30,000.00 will be claimed in the near future with respect to the report. This additional figure will bring the total claimed for to a sum which is also well below the total on-property costs associated with this report.

STATEMENT OF COSTS

Item		Amount
1.	Technical work (Consulting)	
	a. Compilation of previous data	$ 4,058.20
	b. Field mapping, logging of cores, etc.	28,867.90
	c. Compilation of field data and report preparation	5,246.60
	d. Assays	994.12
2.	Technical services (Contract)	
	a. Surveying and line cutting; field assistants	27,048.18
	b. Field drafting and reproduction	5,524.48
	c. Report drafting and reproduction	1,762.84
3.	Mobilization (Contract)	
	a. Move in	1,486.60
	b. Move out	1,204.61
4.	Transportation on property (Contract)	
	a. Helicopter	1,980.53
	b. Vehicular	1,944.52
5.	Supplies (On Property)	
	a. Food and materials	10,181.61
	b. Fuels and lubricants	1,759.87
6.	Camp operation	3,172.70
7.	Supervision (Consulting)	
	a. Time	4,500.00
	b. Expense	376.49
	TOTAL PROPERTY-RELATED COSTS	$100,109.25

NOTE: The above figures do not include any allowance for time, travel or other expense of personnel or for head office or administrative expense of King Resources Company or Chataway Exploration Company.

Appendix 5

DOMINION OF CANADA	)	IN THE MATTER OF COST OF GEOLOGICAL SURVEY OF THE CHATAWAY EXPLORATION COMPANY (N.P.L.) MINING PROPERTY, NICOLA AND KAMLOOPS MINING DIVISIONS, BRITISH COLUMBIA
PROVINCE OF BRITISH COLUMBIA	)	
TO WIT:	)	

I, MALCOLM CAMPBELL ROBINSON, Ph.D., P.Eng.,of 1486 Everall Street in the City of White Rock in the Province of British Columbia, DO SOLEMNLY DECLARE that a geological survey of 418 located mineral claims and fractional mineral claims owned by ~~Chatalway~~ "Chataway" Exploration Company of Vancouver, B.C. and under option to King Resources Company of Calgary, Alberta, was conducted during the field season of 1968 and was reported on in February, 1969, after technical compilation, review and description of the field data obtained at a total property-related cost to King Resources Company of $100,109.25;

AND I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act".

DECLARED before me at the City of White Rock in the Province of British Columbia this 20th day of February, A.D. 1969.

A Commissioner for taking Affidavits for British Columbia

M.C. Robinson

Appendix 6

CERTIFICATE

I, MALCOLM C. ROBINSON, of 1486 Everall Street, White Rock, British Columbia, DO CERTIFY THAT:

(1) I am a graduate of the University of British Columbia (B.A.Sc.), Queen's University (M.Sc.) and Princeton University (M.A., Ph.D.), and I have been practising in the fields of exploration geology, engineering and management over the past sixteen years.

(2) I am a member of the Associations of Professional Engineers of British Columbia and of Alberta.

(3) The field work an d program described on the foregoing pages together with the outline and preparation of the report and accompanying maps were designed and supervised by myself.

M. C. Robinson, P.Eng.

White Rock, B.C.
January 15, 1969

C E R T I F I C A T I O N

I, William Meyer, hereby state that:

1. I am a resident of British Columbia, residing at 555 Cochrane Ave., Coquitlam, B.C.

2. I received a B.Sc. degree from the University of British Columbia in Physics & Geology in 1962.

3. I was employed by Phelps Dodge Corporation of Canada Ltd. for three Summer seasons while attending university, and four years as a Staff Geologist since graduation.

   From 1966 to 1968 I was employed for one and one-half years as a Geologist for Gibralter Mines Ltd., six months as Project Supervisor for Associated Geological Services.

   From April 1968 to present I was employed by Western Geological Services Ltd.

W. Meyer

William Meyer, B.Sc.

Vancouver, B.C.,

December 31st, 1968.

50 000 N
45 000 N
40 000 N
35 000 N
30 000 N
25 000 N
20 000 N
5000 E
10 000 E
15 000 E
20 000 E
25 000 E
30 000 E
35 000 E

BOB 6 AREA
3 CREEKS AREA
MOSS 4 AREA
Chataway Lake
Dot Lake
Camp
Dot Creek
Chapman Creek
Twin Creek

LEGEND

I. PHYSICAL FEATURES
- DRAINAGE
  - MAJOR CREEK
  - SMALL CREEK
- SWAMP
- ROAD
- OUTCROP
- TRENCH
- ADIT
- BUILDING
- SHAFT
- DIAMOND DRILL HOLE

II. GEOLOGY
A. ROCK TYPE

FRESH / ALTERED
- CHATAWAY GRANODIORITE
- DOT VARIETY
- GRANODIORITE
- QUARTZ MONZONITE
- WESTERN GRANODIORITE
- BETHSAIDA GRANODIORITE
- QUARTZ PORPHYRY DYKES
- "GABBROIC PHASE" (QUARTZ DIORITE)
- REX GRANODIORITE
- CROWDED PORPHYRY
- TERTIARY VOLCANICS

B. STRUCTURE
- FAULT
  - DEFINITE
  - INDEFINITE
- SHEAR
- JOINT
- CONTACT
  - DEFINITE
  - PROBABLE
  - INFERRED

C. MINERALIZATION
- Bo BORNITE
- Cc CHALCOCITE
- Chalco CHALCOPYRITE
- Mal MALACHITE
- Lm LIMONITE
- S-24-6-1 SAMPLE NUMBER

To accompany assessment report by W. Meyer, P.Eng. re Chataway Claims, Hyacinth Group - Kamloops & Nicola Mining Divisions. December, 1968.

1790

W. Meyer

Fig. 2a

GEOLOGY

KING RESOURCES COMPANY
- CHATAWAY OPTION
MERRITT, B.C.

(1)

DRAWN BY	GEOLOGY BY	SCALE	DATE
VERSATILE MINING SERV.	M.C.R. EXPLORATIONS	1000' to 1"	JUNE 68

SHEET 1 OF 2 SHEETS

SPENCES BRIDGE 25 MI.

LEGEND

1. PHYSICAL FEATURES
   - DRAINAGE
     - MAJOR CREEK
     - SMALL CREEK
   - SWAMP
   - ROAD
   - OUTCROP
   - TRENCH
   - ADIT
   - BUILDING
   - SHAFT
   - DIAMOND DRILL HOLE

2. GEOLOGY

A. ROCK TYPE

FRESH	ALTERED	
		6 CHATAWAY GRANODIORITE
		DOT VARIETY
		5 GRANODIORITE
		4 QUARTZ MONZONITE
		3 WESTERN GRANODIORITE
		2 BETHSAIDA GRANODIORITE
		QUARTZ PORPHYRY DYKES
		"GABBROIC PHASE" (QUARTZ DIORITE)
		1 REX GRANODIORITE
		CROWDED PORPHYRY
		TERTIARY VOLCANICS

B. STRUCTURE
- FAULT
  - DEFINITE
  - INDEFINITE
- SHEAR
- JOINT
- CONTACT
  - DEFINITE
  - PROBABLE
  - INFERRED

C. MINERALIZATION

Bo	BORNITE
Cc	CHALCOCITE
Chalco	CHALCOPYRITE
Mal	MALACHITE
Lim	LIMONITE
5-24-6-1	SAMPLE NUMBER

To accompany geological report by W. Meyer, B.Sc. for Chataway Copper, Nicola Valley, Kamloops Mining Division, December 1968.

W. Meyer M.C. Robinson

Fig. 2b

1790

GEOLOGY

KING RESOURCES COMPANY

CHATAWAY OPTION

MERRITT, B.C. (2)

DRAWN BY	GEOLOGY BY	SCALE	DATE
VERSATILE MINING SERV.	M.C.R. EXPLORATIONS	1000' to 1"	JUNE 68

SHEET 2 OF 2 SHEETS

To accompany assessment report by W. Meyer, B.Sc. re Castaway Claims, Hamilton Group, Nicola Mining Division, December, 1968.

W. Meyer

1790

Fig. 3a

TOPOGRAPHY

KING RESOURCES COMPANY

CHATAWAY OPTION
MERRITT, B.C.

(3)

DRAWN BY	GEOLOGY BY	SCALE	DATE
VERSATILE MINING SERV.	M.C.R. EXPLORATIONS	1000' to 1"	JUNE 68

SHEET 1 OF 2 SHEETS

To accompany geological report by W. Meyer. BSc. on Chataway claims, Highland Valley- Kamloops & Nicola Mining Divisions. December, 1968.

W. Meyer

—— Claim Boundary

1790

M. C. Robinson

Fig. 3 b

TOPOGRAPHY

KING RESOURCES COMPANY

CHATAWAY OPTION
MERRITT, B.C.

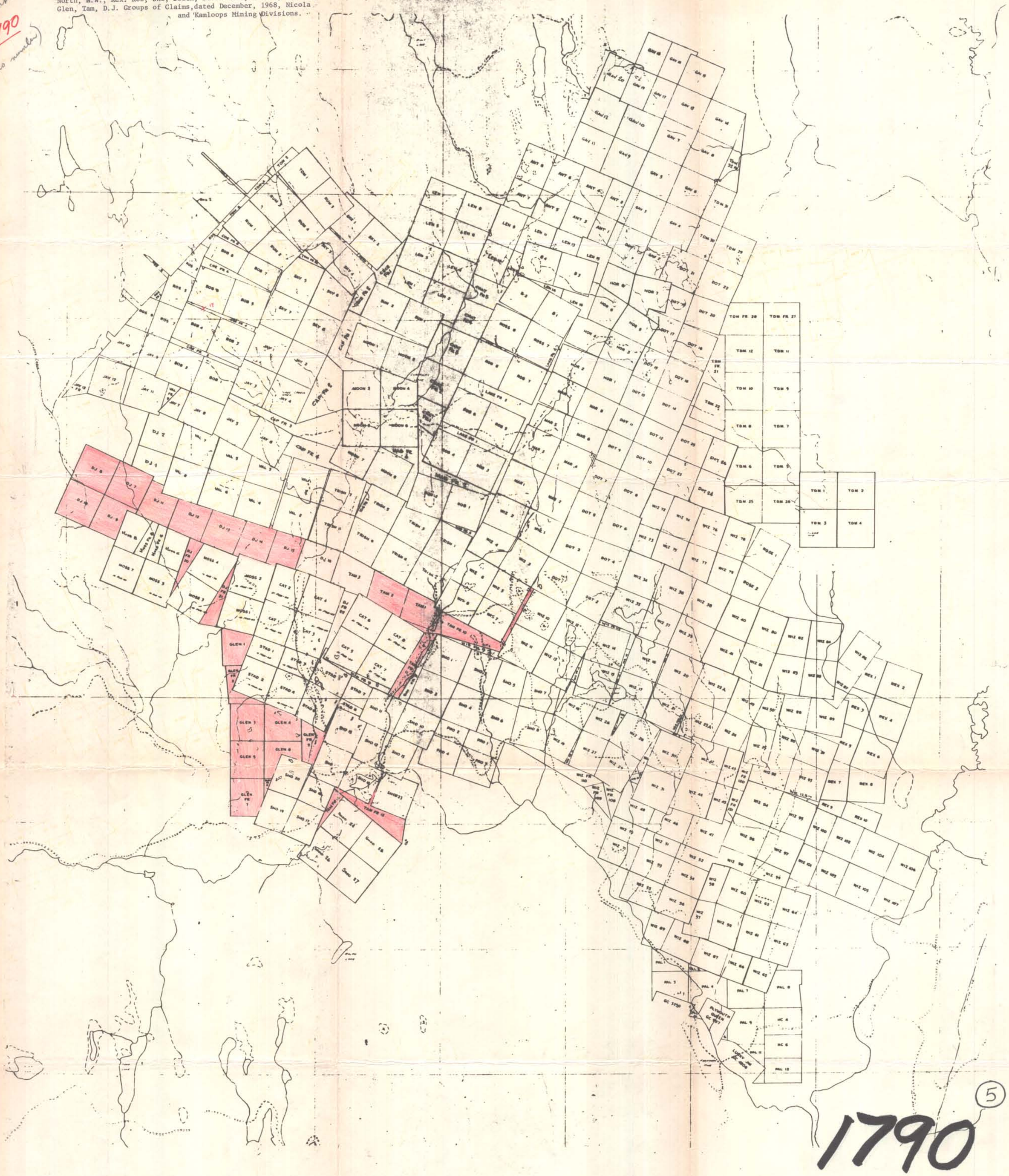
(4)

DRAWN BY	GEOLOGY BY	SCALE	DATE
VERSATILE MINING SERV.	M.C.R. EXPLORATIONS	1000' to 1"	JUNE 68

SHEET 2 OF 2 SHEETS

Report
1790
(no number)

To accompany Geological Report on Ant, In, Jay, Len, North, N.W., Rex. Rob, Sho, South, South East, T.D.M., Wiz-Dot, Glen, Tam, D.J. Groups of Claims, dated December, 1968, Nicola and Kamloops Mining Divisions.



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