THE 1978 REPORT ON THE

KEYSTONE AND ROVER PROJECTS

GEOLOGY, GEOCHEMISTRY, GEOPHYSICS AND DIAMOND DRILLING

Coquihalla Area, B.C.
Nicola Mining Division
($49^{0}41'N$, $121^{0}01'W$)
N.T.S. 92H/11E

Survey Dates: June 1st - November 30th, 1978

by

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For

Rover and Keystone Joint-Venture
Western Mines Limited
Amax Minerals Exploration

FEBRUARY 1979

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SUMMARY AND RECOMMENDATIONS

The Keystone and Rover Project areas are located in the Nicola Mining Division (92H/11E) approximately 64 kilometres southwest of Merritt, B.C. The property consists of 15 claims totalling 114 units (2,850 hectares). The area has historically undergone an active period of base metal exploration.

The project areas fall within the Intermontane Tectonic Belt where Eagle intrusions (L. Cretaceous) have been bisected by Tertiary calc-alkalic bodies and intrusive breccias. Base metal and molybdenite mineralization have accompanied these events.

On the Keystone Project area, the main geologic feature is an elliptical-shaped breccia complex that intrudes a quartz diorite body, the Keystone stock. The geologic events such as brecciation, stock and dyke emplacement, alteration and mineralization are coaxial and related to oscillatory magmatic activity within a deep seated intrusive.

The breccia complex, occupying the southern portion of the Keystone stock, is a steeply-plunging,pipe-like feature with an outer zones containing remnant crackle-brecciation and an inner zone containing pipe-brecciation. Two phases of pipe-breccia have developed: a first phase, Quartz Breccia with silica matrix and a last phase, Pebble Breccia with sericite matrix. Quartz Breccia occurs only as fragments in Pebble Breccia. During brecciation, clasts of phyllic and silica altered rock along with pyrite, molybdenite, and sphalerite-galena-chalcopyrite were incorporated. The hydrothermal activity continued after brecciation with the dispersion of Fe-Zn-Mn-SiO_2-Pb-Ba-Cu. During readjustment, the breccia complex, underwent diagenesis where by metallic sulphides were partially remobilized into carbonates and oxides. The rock geochemical results reflect this phenomenon.

Molybdenum mineralization was deposited prior to Pebble Breccia but after Quartz Breccia. Ribbon-like molybdenite occurs with quartz and pyrite (pyrrhotite) as pebbles randomly distributed throughout the Pebble Breccia. Several events of heavy pyrite-silica flooding have occurred. Zinc-rich mineralization had a prolonged period of emplacement. A significant portion of the sulphide system is still preserved at depth as indicated by the annular I.P. response peripheral to the breccia complex.

An envelope of propylitic alteration and Cu-Mo mineralization flanks the northwest end of the Keystone stock. The hydrothermal activity is probably related to the events centred in the breccia complex but occurred prior to the intrusion of the Keystone stock. The mineralization is sporadic, I.P. response is not sulphide related and geochemical Cu-Mo soil anomalies are low order. It is doubtful that economic concentrations of Cu-Mo accompanied this activity.

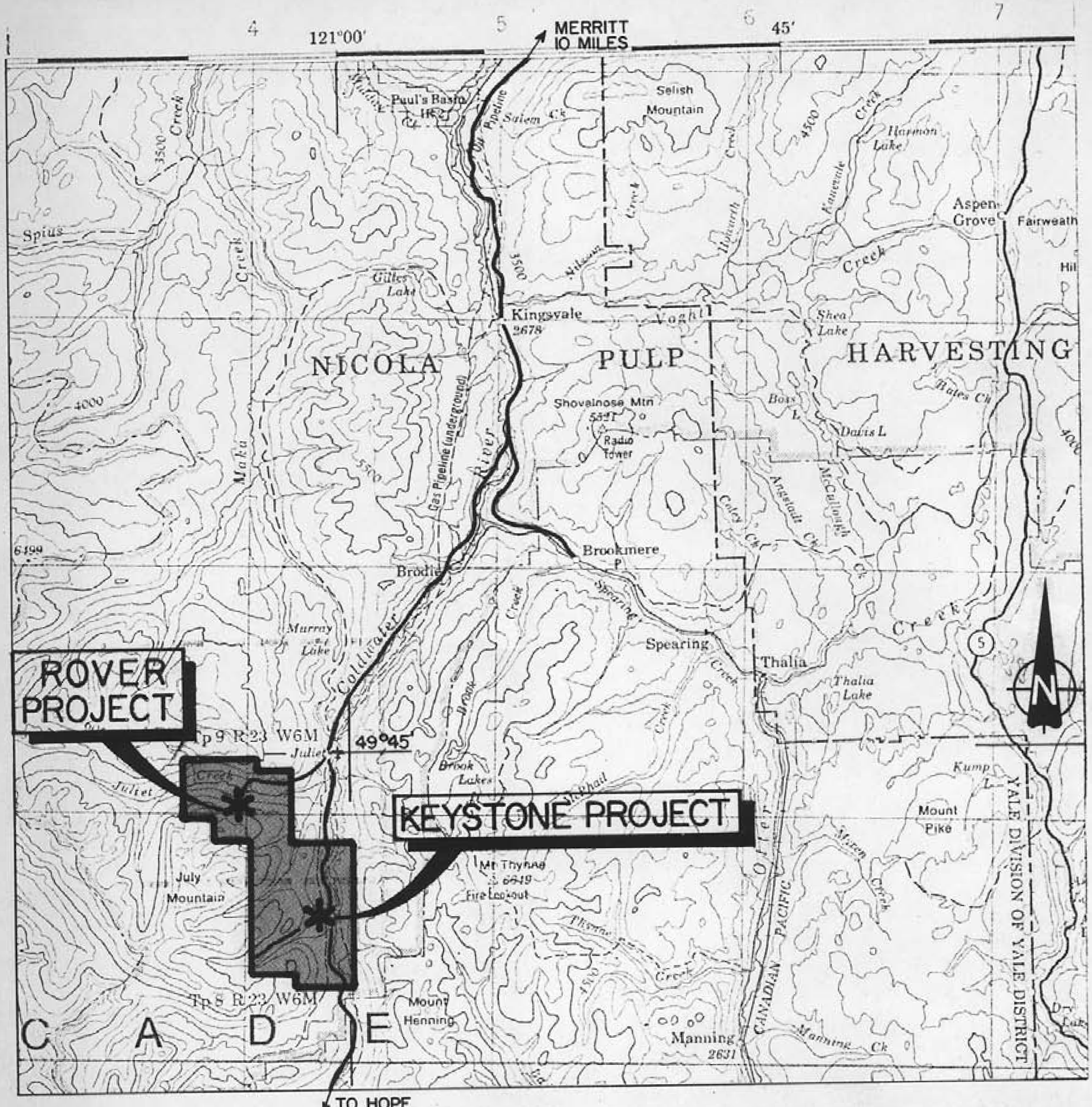
Continued exploration of the northwest area (El Paso - Blue Gold) is not recommended since suitable targets were not developed. The geologic events that are associated with the deep seated magmatic activity centred on the breccia complex require additional testing. The molybdenite mineralization encountered as pebbles in the Pebble Breccia gives impetus to ongoing exploration. Deep drilling peripheral to the Pebble Breccia is recommended.

The Rover Project area is centred on a relatively small breccia-intrusive complex consisting of an annealed rock breccia of Eagle granodiorite intruded by bodies of quartz diorite and quartz-eye porphyry.

Crosscutting these rocks is a lenticular, finger-like body of vuggy quartz veins referred to as Quartz Stockwork breccia. The complex emcompasses a propylitic zone of alteration containing quartz veins of molybdenite and chalcopyrite-molybdenite. Detailed prospecting, geochemical soil Mo-Cu sampling and deep penetrating I.P. surveying failed to locate suitable exploration targets. Further work is not recommended.

Respectfully submitted,

L. W. Saleken, B.Sc.



WESTERN MINES LIMITED

LOCATION MAP

ROVER - KEYSTONE JOINT VENTURE

4 0 4 8 MILES

SCALE 1: 250,000

DRAWN BY: L.W.S.

DATE: JAN. 1, 1979

FIGURE 1

INTRODUCTION

During the summer and fall of 1978, an exploration program of geologic mapping, geochemical and I.P. surveying and diamond drilling was carried out to evaluate the economic potential of molybdenum mineralization on the Rover and Keystone Project areas. Sufficient encouragement was obtained from the 1977 field work conducted by W.K. Livingstone to warrant further work as recommended.

The 1978 field work was conducted by L. W. Saleken, Project Geologist and B. Downing, Assistant, Western Mines Limited, on behalf of the Rover and Keystone Joint-Venture. The Joint-Venture is managed by Western Mines Limited and includes Amax Minerals Exploration, a division of Amax Potash Limited as partner.

The following report summarizes the past exploration activities on the claims and documents the work of the 1978 field season.

LOCATION, ACCESS AND PHYSIOGRAPHY

The Rover-Keystone Project areas are located 64 kilometres southwest of Merritt, in the Nicola Mining Division (92H/11E). The claims are situated 6 kilometres north of the Coquihalla Lakes along the west side of the Coldwater River at an elevation of 1060 to 1670 metres A.S.L. The claims stretch for 10 kilometres in a northwest direction from the west-bend of Coldwater River to Juliet Creek (Figure 1).

Access to the property is either from Hope (53 kilometres), or from Merritt by good gravel road. The main access is from Merritt. Roads suitable for all wheel driven vehicles provide access to various parts of the claims. A railroad (C.P.R. - Kettle Valley Line) is situated 15 kilometres to the north and the claims are crossed by Trans Canada and West Coast Transmission oil and gas pipelines. An emergency airstrip is close-by.

The claims are heavily timbered with fir, spruce, pine and cedar with the timber rights held by Nicola Valley Sawmills (Balco Industries). Parts of the claims are being actively logged. Water in ample supply for drilling and future mining and milling requirements is available throughout the year from Juliet Creek and its tributaries, Dry Creek and Coldwater River. Relief on the property is moderated but extreme along the creek drainages. Outcrop on the claims varies from total exposure along the creeks and bluffs to nil in timbered and valley-fill areas. The network of old and new logging roads on the claims has unearthed addition rock.

PROPERTY AND CLAIM STATUS

The property consists of 114 contiguous units (15 claims) totalling 2850 hectares (see Figure 2) that are held by Western Mines Limited, Vancouver, B.C. on behalf of the Joint-Venture partners. The units are subdivided, as determined by agreement, into the Rover and Keystone Project areas. The status of these units is summarized on the accompanying table with the current expiry dates indicated on Figure 2.

ROVER-KEYSTONE CLAIMS

A. ROVER PROJECT AREA

Claim Name	Units	Record No.	Record Date
Rover	6	301	July 29, 1977
Cover	8	302	July 29, 1977
Burn	6	303	July 29, 1977
Ridge	6	340	Sept. 26, 1977
Falls	9	338	Sept. 26, 1977
Wet	12	494	August 9, 1978
Hot	12	495	August 9, 1978
Total Units	59		
Hectares	1475		

B. KEYSTONE PROJECT AREA

Claim Name	Units	Record No.	Record Date
Keystone	6	341	Sept. 26, 1977
Midnite	2	342	Sept. 26, 1977
Comstock	1	339	Sept. 26, 1977
Bonanza Lode	8	314	August 5, 1977
River Queen #1	8	311	August 5, 1977
River Queen #2	6	312	August 5, 1977
River Queen #3	6	313	August 5, 1977
Dry #1	18	487	July 26, 1978
Total Units	55		
Hectares	1375		

Total Units	114
Total Hectares	2580

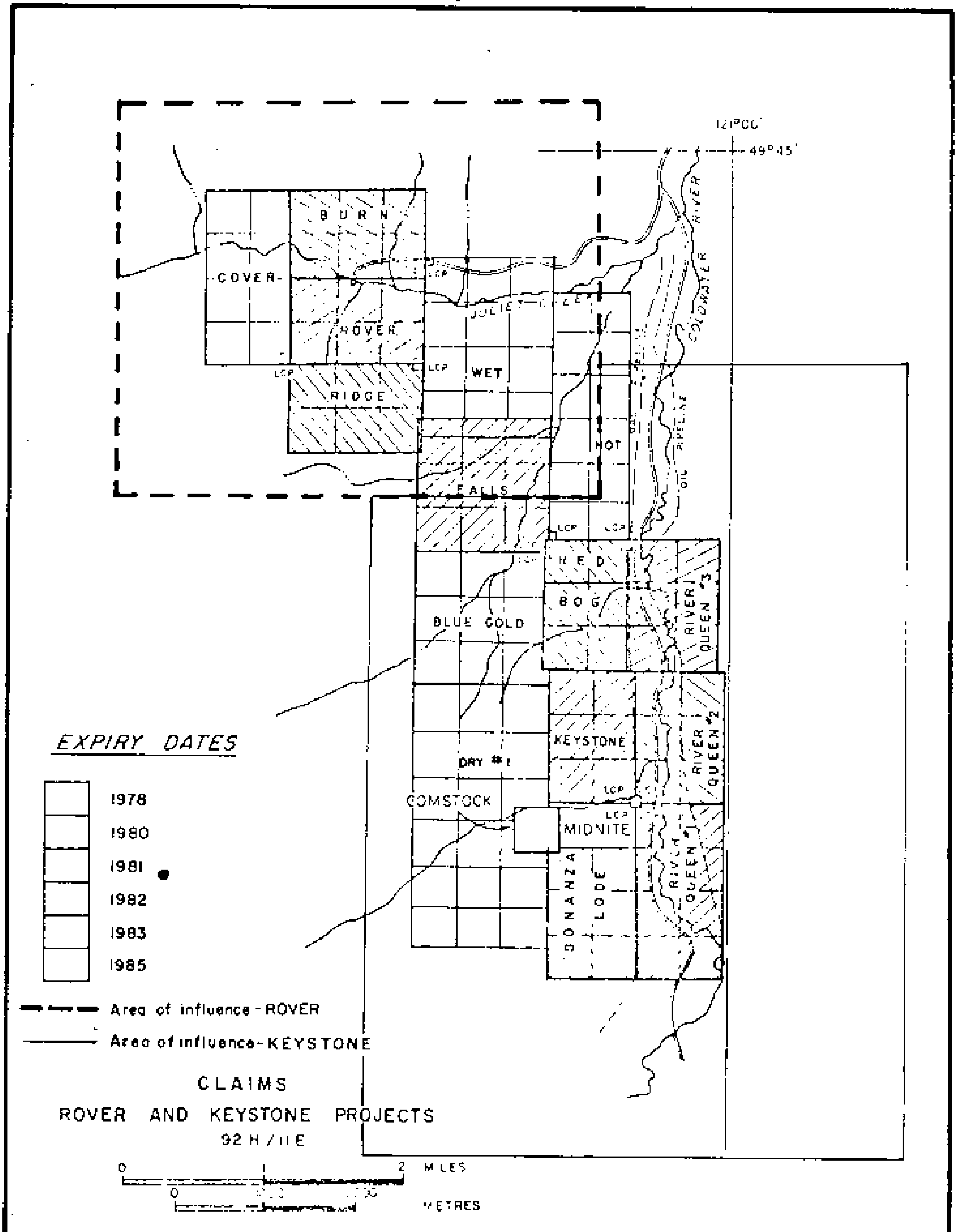


FIGURE 2

L.W.S. 1/1/79

HISTORY AND PREVIOUS WORK

MINE CREEK AREA

The Coquihalla area has been active since the early 1900's for precious and base metals. The Independence group located to the south-east of the Keystone project area has the first recorded activity commencing with its discovery in 1901. First reference to exploration activity at Mine Creek (Dry Creek) is found in B.C.M.M. report 1936, where the property is referred to as the Coldwater. During that year, the Keystone vein (040^{0} @ 070^{0}N.W.) was explored by three short adits and some surface stripping. The government geologist describes the vein as follows:

> "The vein is a mineralized shear-zone between gouge-planes within faintly altered granodiorite walls. It varies in width between 2 inches and 12 inches and averages 6 inches. Sulphides include pyrite, galena, honey-coloured sphalerite, tetrahedrite, and, rarely, chalcophyrite; the gangue material consists of quartz and carbonate and,locally, of rock. The ore is frequently banded, and crustification and drusy cavities are common; quartz is finely crystalline to chalcedonic and the carbonate includes some rhodochrosite. The wall-rock contains pyrite in seams and scattered grains to a distance of several inches from the vein. Samples taken in the adit returned:-
>
> (1.) Vein, 6½ inches wide, 25 per cent. gouge: Gold, 0.06 oz. per ton; silver, 19.2 oz. per ton; lead, 2.8 per cent.; zinc, 7.7 per cent.
>
> (2.) Vein, 12 inches wide, 10 per cent. gouge; Gold, 0.06 oz. per ton; silver, 22.6 oz. per ton; lead, 2.1 per cent.; zinc, 4.9 per cent.

(3.) Vein, 7½ inches wide, 75 per cent. sulphides: Gold, 0.16 oz. per ton; silver, 16.8 oz. per ton; lead, 2.6 per cent.; zinc, 10.9 per cent.

(4.) Vein, 5½ inches wide, 90 per cent. sulphide: Gold, 0.08 oz. per ton; silver, 23.8 oz. per ton; lead, 6.5 per cent.; zinc, 14 per cent.

The vein is traceable as a narrow oxidized zone 750 feet north-east of the adit and is reported to extend a comparable distance to the south-west."

Reference to additional exploration on the Keystone vein appears in Dr. J.T. Mandy's report on the Keystone group in 1951. During 1954-1955, the Golden Ledge Syndicate acquired the ground and commenced development of the Keystone vein and in 1955, 89 tons of crude oil were shipped.

Another vein system located south of the Keystone, the Stonewall was sporadically explored by adits and trenching from 1946 to 1954. Mr. K.C. Fahrni reports (1954) that sulphides of lead and zinc are contained in a vein averaging 5 feet wide but containing low and erratic assay values. The Stonewall vein is probably a south-west extension of the Keystone vein.

The Mine Creek area again became active in 1965 when Dorian Mines Limited acquired claims to the south of the creek and discovered the Julie showing. Dorian Mines Ltd. located a zinc soil anomaly 300 metres by 180 metres that was subsequently stripped and 32 diamond drill holes, totalling 2018 metres were drilled. A mineralized pyrite-hematite zone containing sphalerite, chalcopyrite, galena, magnetite and rhodochrosite was delineated. The Julie showing represents an area 24 metres wide, 60 metres long and 24 metres deep containing 96,765 metric tonnes of an estimated 0.1% Cu, 0.6% Zn and 8.5 grams per tonne Ag. The zinc proved subeconomic and work by Dorian was suspended. Anaconda, exploring to the north of Mine Creek in 1965, remapped the Keystone adit and conducted an I.P. survey, surface geologic mapping and soil geochemistry (Zn, Pb, Cu, Mo) in the vicinity of the old adits. In 1966, 14 trenches totalling 580 metres were bulldozed over a highly brecciated pyritic zone containing anomalous soil zinc values. In 1969, Noranda optioned several claims south of Mine Creek and during that year, six holes were drilled totalling 911 metres. The drilling concentrated on a pyritic zone bordering the intrusive-breccia contact. These options were allowed to lapse and in 1970 Corval Resources Ltd. gained control of the properties.

Under Corval's management, the Mine Creek area in 1972 - 1973 was systematically grid mapped and an I.P., magnetic and soil (Zn, Pb, Ag) surveys were conducted. Mr. G. Gutrath, Corval's geologist, during the course of his mapping, recognized a highly altered mineralized host rock which he tentatively identified as an intrusive breccia along Mine Creek. The I.P. survey detected an annular pattern of anomalous changeability along the breccia - intrusive contact. Noranda Mines and Denision Mines subsequently optioned the property and in 1973 drilled 11 holes totalling 1044 metres with the deepest hole to 150 metres. The results were not encouraging and the option was dropped.

Attracted by the exploration activity of the area, Mr. M. Morrision, geologist, for El Paso Mining and Milling Company, staked several claims to the northwest of the Keystone workings. The staking was based on some weakly anomalous Cu-Mo values in silts. During 1973 - 1974, the company conducted grid mapping, Cu-Mo soil geochemistry and trenching of soil anomalies. The trenching uncovered sporadic, weakly pyritic veins and fractures with chalcopyrite and molybdenite that appear to be peripheral to an intrusive contact between foliated granodiorite and non-foliated quartz diorite. The results were not encouraging to warrant further work and these claims were allowed to lapse.

In 1977, the Mine Creek area and the El Paso ground was acquired by K.W. Livingstone for Western Mines and designated as the Keystone Project area. During that year, mapping, rock geochemistry, soil-silt geochemistry and relogging of old core was completed. A road to Blue Gold Creek and several bulldozer trenches were constructed.

JULIET CREEK AREA

Juliet Creek is located 6.0 kilometres northwest of Mine Creek. The first recorded activity was in 1969 when K.W. Livingstone and J. Christie staked the J. M. claims over anomalous Cu-Mo silt values. During 1970, a grid magnetometer and Cu-Mo soil survey were completed followed by trenching. Minor amounts of copper and molybdenum sulphides were uncovered associated with quartz veining and brecciation. The property was allowed to lapse and was restaked in 1977 by K.W. Livingstone and the claims optioned to Western Mines. During 1977, geological mapping and rock geochemistry were initiated. THe present area of interest has been designated the Rover Project area.

EXPLORATION PROCEDURE - 1978

BASE MAPS

Two sets of metric base maps were prepared by Pacific Survey Corporation, Vancouver, from B.C. air photos flown in 1976; scales 1:5,000 and 1:10,000, 20 metre contours.

CLAIM STAKING

A total of 42 units were staked to cover potentially favorable ground: Dry #1 (18 units), Wet (12 units) and Hot (12 units).

GRID

A metric (I.P. standard) grid was established over the two project areas for survey control by Amex Exploration Services Ltd., Kamloops, B.C.

The grid (22 kilometres) had stations every 50 metres and consists of two base lines and three cross lines. The grid connects the Rover and Keystone Project areas.

I.P. SURVEY

The induced polarization survey was carried out using a pulse system (Mark III unit) manufactured by Huntec Limited, Toronto, by Peter E. Walcott & Associates Ltd., Vancouver. The first to fifth separation measurements (N-1 to N-5) of apparent chargeability and resistivity were made using the "Pole-dipole" method of surveying with a 300 metre dipole and 150 metre station interval. The I.P. report has been submitted under separate cover.

GEOLOGICAL MAPPING

Mapping was conducted on a scale 1:5,000 over the Rover and Keystone areas using the grid for control. The mapping was a continuation of K.W. Livingstone's work in 1978. The geology maps, Figures 3, 4, 5 and 6 are in the pocket. A data compilation map of all available data and source appears as Figure 7. A Sample Location map, Figure 9, has the locations of rock geochemistry and petrographic samples.

PETROGRAPHIC STUDIES

Both thin sections and polished sections were studied. The work was conducted by Vancouver Petrographic Limited. The thin sections were read by Ms. Jo Anne Nelson, geologist and Lee Pigage, geologist. Polished sections were interpreted by Jim Mortensen, geologist. Rocks from surface as well as individual pebbles from the Pebble Breccia were looked at. The samples were stained for k-spar and carbonates. The reports are in Appendix C.

GEOCHEMICAL SURVEY

An area silt program was conducted over the claims to detect targets for detail prospecting. The sample locations and results are on Figure 9. On the Rover, 4 lines of soil samples were collected, samples and the results are on Figure 10. The analysis was done by Min-En Laboratories Limited, Vancouver, and the results are in Appendix B.

DIAMOND DRILLING

A 859 metre NQ-BQ vertical diamond drill hole (W-78-1) was drilled by D. W. Coates Enterprises Limited. The hole is located on the Keystone claim at L 0+00, 0+50E. The hole was tested at 459 metres by a Sperry-Sun magentic single-shot unit and a dip test at 859 metres indicating a slight flattening (3^{o}) and deflection in N 3^{o} E direction.

DDH GEOLOGY AND GEOCHEMISTRY

The drill log is on Figure 8 in schematic form along with the corresponding geochemical values. Samples of about 5 pounds over 10 metre intervals were taken resulting in a continuous rock geochemical record of the hole. Samples were analyzed for Mo, Cu, Pb, Zn, Ag, Mn, Fe, F, and W. The drill log records for the previous work are in Appendix D.

REGIONAL GEOLOGIC SETTING

The Eagle Granodiorite, which contains the Rover and Keystone prospects, is one of several Upper Turrassic - Lower Cretaoeous plutons forming the Coast Range Batholith. This pluton is within the Intermontane Tectonic regime of the Canadian Cordillera which Monger (1970) refers to as the Eastern Plutonic Belt. The Eagle Granodiorite intrudes Upper Triassic Nicola Group volcanic rocks in the map area. The Eagle has been intruded by younger calc-alkalic bodies, breccias and dykes. The younger stocks are possible satellites to the Needle Peak Pluton (Miocene) that is located off to the west. The intrusive breccias crosscut both older and younger rocks.

The Rover and Keystone molybdenum prospects are situated on a well defined northwesterly trending east margin of the Eagle Granodiorite which hosts several other Cu-Mo and Pb-Zn showings (Spius, Indepenance, Laws Creek). A number of them including the Rover and Keystone are associated with regional magnetic depressions that fraternize intrusive centers. The sulphide mineralization tends to be coaxial to these intrusions. The Keystone complex is the largest known system in the map area.

KEYSTONE PROJECT AREA

INTRODUCTION

The Keystone Project area covers 1375 hectares and includes the Keystone workings, Stonewall adit, Julie showing, Noranda, Anaconda and El Paso trenches and Blue Gold showing (Figure 6).

The main geologic feature is an elliptical, fluidized breccia complex that intrudes a Tertiary quartz diorite stock. The breccia is a multi-phase system. Alteration is propylitic peripheral to the breccia and is phyllic to high silica within the breccia fragments. Post breccia alteration is diagenetic. Ribbon-like molybdenite occurs with quartz-pyrite as breccia fragments. Sphalerite, pyrite, galena, chalcopyrite, rhodochrosite and barite veins cut the breccia and occur as grains within the breccia complex.

The geology of the Keystone area is on Figures 3, 4 and 6. The drill hole geology of DDH W-78-1 is illustrated on Figure 8.

CLAIM GEOLOGY

ROCK UNITS

Nicolia Group volcanics (NV) are found on the northeastern edge of the claims. They are dark green, schistose, locally massive andesitic flows with associate basic to intermediate tuffs. The units strike approximately 340° and dip steeply to the northeast.

Eagle Granodiorite (Egd) constitutes the major rock type both in outcrop and in drill core. It is characteristicly foliated, biotite-rich, leucocratic, hypidiomorphic granular rock containing irregular inclusions of paragneiss and pegmatites. Its composition ranges from quartz diorite to granodiorite (Rice 1947):

Quartz :	15-30
Plagiochase:	60-80
Orthoclase :	0-2
Biotite :	7-10
Hornblende :	3-5
Accessories:	magnetitie, apatite, zircon

Texturally, the Eagle has generally uniform grain size but varies from a fine-grained migmatite to a blotchy-looking, porphyritic biotite-rock. Foliations trends 320° to 340° and is steeply dipping. The Eagle has undergone retrograde regional metamorphism. The relative age of the Eagle has been dated at 104 m.y. (Roddick and Farrar, 1971).

Keystone Quartz Diorite (Kqd) outcrops along Keystone base line from 15S to 20S and 6N to 18N and along the bluffs northwest of the Keystone workings. The Kqd is not exposed along the valley floor but has been intersected in drill holes DDH-1-73, DDH-4-73 and NC-6-69. The quartz diorite also occurs as fragments and matrix in the breccia.

The intrusive body is an irregularly shaped, elongate stock, sub-parallelling the Eagle foliation, 4 km long and 1.5 km wide (maximum). The Kqd has been bisected by the breccia complex. Contacts with the Eagle are gradiational within 10 to 20 metres.

The rock is typically non-foliated, fresh, coarse-grained equigranular (2-3 mm) quartz diorite having a "salt and pepper" appearance. Compositionally, it ranges from a quartz diorite to a k-spar poor granodiorite (TSOCK 3,4, 20-7):

Mode

Plagioclase:	50-60
Quartz :	15
Biotite :	10
Hornblende :	5
Accessories:	sphere, apatite, zircon, magnetite, pyrite, siderite, sphalerite

The rock is mostly unaltered except near its brecciated edge where albite, sericite, chlorite, epidote and pyrite replacement has occured.

Dykes on the property account for 5% or less of the outcrop. Dyke fragments are common in the breccia. Andesite and dacite dykes cut the breccia complex. The andesites are the most abundant.

Andesites (1) are dark green, massive, often trachytic or porphyritic, continuous dykes that generally conform to the regional foliation and dip steeply. They usually occur in swarms and have an average width of one metre or less.

Felsite dykes (2) are less common but do occur around the Noranda and Anaconda trenches, Stonewall adit, Julie showing and in breccia. They are white-grey, microcrystalline, siliceous rocks that contain disseminated pyrite and sericite. The dykes tend to be dacite in composition as apposed to rhyolite (TSOCK 21-3, WK 30,32). Occassionally, they have phenocrysts of feldspars (plagioclase) and quartz, exhibit banding and flow textures. The dykes are commonly discordant, strike northeasterly, dip steeply and are one metre or less in width.

Biotite feldspar porphyries (3) are dacitic in composition with euhedral to rounded phenocrysts of quartz, plagioclase and biotite set in a dark grey quartz, sericite, chlorite and clay matrix (TSOCK 21-3). They occur mainly peripheral to the Keystone quartz diorite. Dacite porphyry with quartz-eyes occurs north of the Keystone adit and was interrsected in DDH W-78-1.

Diorite dykes (4) appear to be a fine grained, high mafic equivalents of the Keystone quartz diorite. A few have been noted in the Noranda trenches occurring in Kqd. A north trending diorite dyke cutting Eagle is exposed in the El Paso trenches.

Aplites and pegmatites (5) occur mainly in Eagle granodiorite as narrow dykes and veins and are common in the breccia. The rocks are pink to grey, microcrystalline to porphyritic in texture and are quite prominant along Blue Gold Creek. A larger mass of aplite occurs along the Keystone baseline, 18+50N in close prominity to the Keystone quartz diorite.

Pebble dykes occur west of the Stonewall adit along Mine Creek but are not located on Figure 3. The pebble dykes are irregularly shaped, one metre or less wide, discordant bodies intruding Eagle granodiorite and Eagle Breccia. The dykes display a milled texture similar to the Pebble Breccia.

Keystone Intrusive Breccia Complex: Intruding the Eagle granodiorite and Keystone quartz diorite in elliptical-shaped breccia complex. The complex has a north-south orientation and encompasses a surface area 1300 metres to 2100 metres (175 hectares). The breccia body is a steeply-plunging, pipe-like feature that extends vertically beyond 859 metres. The complex consists of homogenous outer zone characterized by fractured and poorly sorted, semi-rotated "boulder" size fragments and a heterogenous, inner zone characterized by well sorted, laminated, "sand" to "pebble" size fragments. The complex is cut by zinc-rich veins, pyrite fractures, manganese fractures, andesite and dacite dykes. Breccia dykes occur as outliers to the main complex.

At least, three phases of breccia are recognized: Eagle Breccia (outer zone), sub-rounded Eagle granodiorite fragements in comminuted green sericite matrix: Pebble Breccia (inner zone), rounded fragments, laminated in a white sericite-clay-carbonate matrix and Quartz Breccia (pre-Pebble Breccia, inner zone), quartz diorite fragments in a comminuted grey silica matrix.

Eagle Breccia (Ebx) is peripheral to the Pebble Breccia in an irregular zone of up to 250 metres wide. Angular to sub-round fragments of Eagle granodiorite are set in a green, sericitic matrix of the same composition. Sorting is poor with clasts ranging from microscopic to several metres but averaging 20 centimetres. Boundaries between matrix and fragments are sharp. Matrix comprises 5 percent or less of the rock. The Ebx tends to be altered to sericite-chlorite-epidote and moderately silicified and pyritized. Contacts with the Eagle granodiorite are distinct but irregular and gradational with the Pebble Breccia. The Eagle Breccia represents the first phase of brecciation to occur within the complex.

Pebble Breccia (Pbx) constitutes 85 percent of the breccia complex and is composed of a heterogeneous mix of igneous rocks. The breccia is layered with alternating sub-paralleling beds of fine (microscopic to 2 mm grain size) and coarse (sand to pebble size - 2-4 cm) material. The layering dips at 20° to 50° and probably represents differential velocity levels during the milling process. Fragments are angular to rounded, generally well sorted and embedded in a chaulky white, porous, sericite-carbonate matrix. The distribution of rock types in the coarse faction is: 40% quartz diorite or equivalent; 35% Eagle granodiorite; 10% Quartz Breccia; 15% quartz, dacite, dacite porphyries, felsites, aplites and andesite; 1% mineralized clasts of pyrite, sphalerite, galena, chalcopyrite, hematite, molybdenite and sulphosalts. A significant percentage of the granitic fragments contain quartz-pyrite veining and flooding. The degree of quartz-sericite-pyrite alteration varies strongly between clasts. Contacts beteen matrix and fragments are sharp and distinct. Matrix is a mixture of comminuted fragments and rock flour consisting of sericite, carbonate,quartz, albite, clay, pyrite and chlorite. The breccia is cemented with carbonates of iron, magnesium, zinc and lead.

Quartz Breccia occurs as angular to sub-rounded fragments, ranging in size from a few mm to several centimetres, within the Pebble Breccia. They have a grey-cherty appearance and represent 10 percent or more of the coarse component of the Pebble Breccia. A full description of the Quartz Breccia is limited but details as to mode of origin and breccia content have been obtained through petrographic studies (TS 26, 31, 37, 59).

The Quartz Breccia is a milled breccia with a history and source area similar to the Pebble Breccia. Angular to sub-angular sericitized fragments of quartz diorite,quartz, aplite and dacite are set in an indurated quartz-pyrite matrix. Contact between matrix and fragments is sharp and distinct. Quartz-pyrite veining has occurred after breccia development. After consolidation, the Quartz Breccia was incorporated into the Pebble Breccia.

ALTERATION

A noticeable feature about the rocks on surface at Keystone is the lack of hydrothermal alteration. The Eagle granodiorite is relatively fresh except for regional metamorphism and except for a weak alteration envelope north of the Keystone stock. The Keystone quartz diorite as a whole is unaltered. Strong alteration occurs peripheral to the breccia complex. Intense alteration is exhibited in the fragments of the Pebble Breccia and Quartz Breccia. Mild, pore-controlled alteration has occurred in the breccia complex after deposition.

Four alteration stages can be distinguished: propylitic phyllic, silica and diagenetic. Two ages of alteration events are recognized: an older event associated with the emplacement of the Keystone stock and a younger event occurring prior to the intrusion of the breccia complex. The surface distribution of alteration is shown on Figure 7.

The alteration assemblage is summarized as follows :

Older

Propylitic : fracture, pervasive: chlorite, sericite, epidote, albite, pyrite, clay; magnetite, fe-oxides, carbonate.

Younger

Propylitic : as above.

Phyllic : pervasive: sericite (50-70%), pyrite (5-15%), quartz (5-10%);

Silica : pervasive: quartz (50-70%), pyrite (5-25%), sericite (10-20%),
vein: quartz-pyrite.

Diagenetic : pervasive, pore-controlled: carbonates, calcite, siderite, Pb-Zn oxides and carbonates.

Two ages of propylitic alteration are present. An older event associated with the Keystone stock occurs as a broad, weak envelope within Eagle granodiorite (Figure 7). The zone (550 metres by 1000 metres) conforms to the regional foliation and is overprinted by cross-cutting mylonitic zones of chlorite-hematite. Minor copper-molybdenite mineralization occurs within the zone in the El Paso trenches and Blue Gold showing. A much younger stronger, pervasive event occurred with the breccia complex. The prophylitic phase occurs as a remnant in Eagle granodiorite and Keystone quartz diorite peripheral to the complex and as Eagle Breccia.

Phyllic and silica stages are incorporated as matrix and fragments of the inner zone breccias. Phyllic fragments occur both in Pebble Breccia and Quartz Breccia. Silica stage is only present as Quartz Breccia. Silica veining cuts both phyllic fragments and Quartz Breccia fragements indicating two stages of quartz-pyrite veining: one prior to Quartz Breccia development and one after the formation of the Quartz Breccia pipe. The odd Eagle granodiorite fragment in Pebble Breccia contains partial potassic replacement and probably represent a fourth stage of metasomatism. Both the Pebble Breccia and Quartz Breccia have been affected by diagenesis with the formation of carbonate and carbonates and oxides of Fe, Pb, Zn, Mn and Mg.

MINERALIZATION

Sulphide mineralization is not wide spread on the Keystone. Concentrations of sulphides occur peripheral and within the breccia complex and peripheral to the Keystone stock (Figure 7) which suggests two ages of mineralization. The sequence of mineralization is summarized as follows :

Older

Pre Keystone Stock	:	quartz-pyrite (± k-spar) veins with chalcopyrite, molybdenite.

Younger

Pre & Post Breccia Complex	:	Sphalerite veins with pyrite galena, chalcopyrite, rhodechrosite, barite, calcite, hematite, quartz. Barren pyrite - quartz veins.
Pre Pebble Breccia	:	quartz-pyrite (± pyrrhotite) with molybdenite.
Post Pebble Breccia	:	carbonate Pb, Zn, Fe, Mn, Mg.

The mineral assemblages that are recognized are summarized as follows :

Barren pyrite

Chalcopyrite-molybdenum

Molybdenite

Zinc-rich

Carbonates-Oxides

Figures 6, 7, 8 and 9 show mineralization relationships as well as sample locations, showings and geochemical results. Detailed descriptions of mineralized breccia fragments are with the polish section report in Appendix C.

Older mineralization that occurs peripheral to the Keystone stock is contained in propylitic Eagle granodiorite. Barren pyrite and chalcopyrite-molybdenite occur along fractures and with quartz ($\pm$ k-spar) veins. The mineralization appears to be a weak, sulphide-poor event associated with the Keystone stock.

Blue Gold Showing (K19-6,7) consists of several 1 cm to 5 cm quartz-pyrite veins containing visible pyrite, chalcopyrite and molybdenite with geochemical concentration of W (7-15 ppm) and Ag (1.5-4.3 ppm). They contain no appreciable geochemical values in Pb, Zn, Mn or F. The veins strike 300^{0} to 340^{0} and dip 090^{0}. Pegmatitic veins are present within the zone of mineralization. The mineralized veins are offset by northeast chlorite-hematite shearing (040^{0}). Mineralization is not extensive. A similar showing occurs upstream at sample sight K19-5. Mineralization around the El Paso trenches is similar to Blue Gold but less abundant. The trench area contains numerous barren quartz veins and aplites with disseminated pyrite (K21-2,8). A narrow

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.: 1042
Hole No.: NQ #5
Sheet No.: 1

Lat. 9035 N	Elev.	Dip -45°	Collared Nov. 23, 1969	Core Size BQ
Dep. 9150E	Depth 302'	Bearing south	Completed Nov. 24, 1969	Logged by: W.J. Nelson

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Ft.	Assays Au		Ag	
0-10		Casing - No core									
10-20	100%	gray breccia kaolinized		rare f.g. py. & hematite rusty band		M9309	10	Tr		Tr	
20-30	100%	gray breccia weakly kaolinized		f.g. py. - hematite rusty bands		M9310	10	Tr		0.1	
30-40	100%	gray breccia weakly kaolinized		rusty band disseminated f.g. hematite		M9311	10	Tr		0.1	good long core
40-50	100%	same as above		rare disseminated f.g. hematite		M9312	10	Tr		Tr	same
50-60	100%	same as above		same as above		M9313	10	Tr		Tr	same
60-70	100%	same as above		61-63 3% disseminated hematite f.g. disseminated hematite else- where		M9314	10	Tr		Tr	same
70-80	100%	same as above		hematite & fracts. at 75-76½ hematite		M9315	10	Tr		0.1	

NORANDA EXPLORATION CO. LTD. Property: COQUIHALLA
Project No.:

Hole No. NC #5
Sheet No. 2

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Cross Ft.	Assays Au		Ag	
80-90	100%	gray breccia kaolinized		hematite qtz. concentration		M9316	10	Tr		Tr	
90-100	100%	same as above		qtz. vein ankerite - hematite vein rusty fractures		M9317	10	Tr		0.2	
100-110	100%	same as above		f.g. disseminated hematite rusty fract.		M9318	10	Tr		0.2	
110-120	100%	same as above		rusty rare f.g. hematite		M9319	10	Tr		0.1	
120-130	100%	same as above		disseminated f.g. hematite rusty		M9320	10	Tr		0.1	
130-140	100%	same as above grantic frags.		rare disseminated hematite		M9321	10	Tr		0.3	good long core
140-150	100%	gray breccia kaolinized		rusty fracts.		M9322	10	Tr		0.2	
150-160	100%	same as above		disseminated hematite		M9323	10	Tr		0.2	

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No. NC #5
Sheet No. 3

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crost Ft	Assays Au		Ag	
split 160-170	100%	gray breccia partly kaolinized		disseminated hematite 1% hematite		M9324	10	Tr		0.2	good long core
170-180	100%	gray breccia chert fragments (sil) kaolinized		ankerite vein qtz. fragments bright green min. at 177		M9325	10	Tr		0.2	
180-190	100%	gray breccia kaolinized chert frags.		ankerite vein weak shear ankerite vein & sphalerite		M9326	10	Tr		0.2	
190-200	100%	gray breccia kaolinized some dark fragments		ankerite vein - vugs sphalerite ? rusty fract. disseminated hematite		M9327	10	Tr		0.5	
200-210	100%	gray breccia weakly kaolinized		disseminated hematite dark frags. 205 & vugs qtz. blobs		M9328	10	Tr		0.5	
210-220	100%	gray breccia kaolinized		rusty fract. disseminated hematite 215 qtz. blob		M9329	10	Tr		0.3	
220-230	100%	same as above		disseminated hematite ankerite vein		M9330	10	Tr		0.3	
230-240	100%	same as above		rusty fract.		M9331	10	Tr		0.3	

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Property: COQUIHALLA
Project No.:

Hole No. NC #5
Sheet No. 4

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Assays Ft.	Au		Ag	
240-250	100%	gray breccia greenish- kaolinized		hematite in fract. disseminated py. qtz. - ankerite veins. Shear hematite green min. at 248		M9332	10	Tr		0.7	
250-260	100%	gray breccia partly kaolinized		numerous fracts. 252-260 mostly qtz. dio.		M9333	10	Tr		0.2	
260-270	100%	qtz. dio.		fractures qtz. vein qtz. vein 268		M9334	10	Tr		0.3	magnetic
270-280	80%	gray breccia darker color weakly kaolinized in part		disseminated hematite		M9335	10	Tr		Tr	
280-290	100%	qtz. dio. gray-green alt. weakly kaolinized				M9336	10	Tr		Tr	magnetic
290-300	100%	qtz. dio. kaolinized bands green alt.		fracts. ankerite vein		M9337	10	Tr		Tr	
300-310	100%	gray breccia slightly kaolinized		qtz. vein		M9338	10	Tr		Tr	
310-320	100%	gray breccia		sphalerite in vugs at 315 f.g. py. more kaolinized		M9339	10	Tr		0.3	

NORANDA EXPLORATION CO. LTD. Property: COQUIHALLA Project No.:

Hole No. NC #5 Sheet No. 5

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Assays Crest Ft.	Au		Ag	
320-330	100%	gray breccia f.g. coarser grain after 324 kaolinized		ankerite vein - vugs f.g. py.		M9340	10	Tr		Tr	
330-340	90%	greenish gray breccia few diorite frags which are partly kaolinized		vugs - qtz. frags. - ankerite at 335-336 337-338 kaolinized		M9341	10	Tr		Tr	
340-350	98%	mostly dark qtz. dio. bands hard gray f.g.		qtz. hematite on fracts. qtz. vein w. vugs		M9342	10	Tr		Tr	numerous fracts at 70°
350-356	100%	qtz. dio. to 354 gray breccia 354-356		qtz rich band breccia - kaolinized		M9343	6	Tr		Tr	
		END OF HOLE									

NORANDA EXPLORATION CO. LTD. Property: COQUIHALLA Project No.: 1042

Hole No.	NC #6
Sheet No.	1

Lat. 87N	Elev.	Dip $-45\frac{1}{2}^{o}$	Collared Nov. 25, 1969	Core Size BQ
Dep. 100+83E	Depth 500'	Bearing East	Completed Nov. 28, 1969	Logged by: W.I. Nelson

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Chest Ft.	Assays Au	Ag	Cu	
0-29	0	Casing - no core									logged after splitting
29-40	95%	qtz. dio. slightly kaolinized		disseminated py.	1-2%	M9344	11	Tr	Tr		
40-50	98%	qtz. dio. kaolinized 48-49		little disseminated py.	< 1%	M9345	10	Tr	Tr		
50-60	98%	qtz. dio.		rusty fract.	1%	M9346	10	Tr	Tr		
60-70	100%	qtz. dio. more dark min.		rusty fracts.	? 1%	M9347	10	Tr	Tr		magnetic
70-80	100%	qtz. dio. kaolinized 70-72		rusty fracts, py.	1%	M9348	10	Tr	Tr		
80-90	98%	qtz. dio. partly kaolinized		little disseminated py. sphene py. strs. trace cpy. shear	1%	M9349	10	Tr	0.5	0.06	
90-100	100%	qtz. dio. kaolinized		py. vein sphalerite shear	1%	M9350	10	Tr	0.2	0.02	

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Property: COQUIHALLA
Project No.:

Hole No.	NC 6
Sheet No.	3

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Cross Ft.	Assays Au	Ag		
180-190	100%	qtz. dio. 186-188 light color			>1%						
190-200	100%	qtz. dio. porphyritic		py. on fracts. nearly parallel to core sphene	>1%	M9359	10	Tr	Tr		
200-210	100%	qtz. dio.		rusty fract. py. on fract. rusty fract.	1%	M9360	10	Tr	Tr		
210-220	100%	same as above		qtz. py. vein 1/8"	>1%	M9361	10	Tr	0.1		magnetic
220-230	100%	same as above		py. - sphalerite vein - qtz.	>1%	M9362	10	Tr	0.1		
230-240	100%	same as above		qtz. - cal. - py. rusty fracts sphene 4th kaolinized zone 234½	>1%	M9363	10	Tr	0.1		
240-250	100%	same as above		py. rusty fract.	>1%	M9364	10	Tr	0.1		bottle green mineral
250-260	100%	same as above				M9365	10	Tr	0.1		same

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No.	NC 6
Sheet No.	4

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Cross Assays Ft	Au	Ag		
260-270	100%	same to 268 268-270 basic dyke dark green f.g.		py. disseminated sharp contact dyke py. veinlets - 1/32"	>1%	M9366	10	Tr	0.1		same
270-280	100%	basic dyke		fracts. py. veinlets py. disseminated & around calcite crystals	2%	M9367	10	Tr	Tr		magnetic short & broken core
280-290	100%	same as above		same rusty fracts.	2%	M9368	10	Tr	Tr		same
290-300	100%	basic dyke to 295 qtz. dio. 295-300 kaolinized 296-300		finer grain border on dyke sharp contact rusty fracts.		M9369	10	Tr	0.1		
300-310	100%	qtz. dio. 300-303½ light color 308 gray alteration & py.									
310-340	100%	qtz. dio. porphyritic									318 alteration on fract. at 45° good long core
340-350	100%	qtz. dio.		qtz. - py. vein 1/8"							
350-360	100%	qtz. dio. fracts. & gray alteration at 356		ankeritic & gray alteration sphalerite vein 1/16"	Tr						

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Property: COQUIHALLA				Hole No. NC 6
Project No.:				Sheet No. 5
Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crost Ft.	Assays Au	Ag	
360-370	100%	qtz. dio.		f.g. disseminated py. sphene chlorite on fracts.	> 1%	M9370	10	Tr	0.3	
370-380	100%	qtz. dio.		weak slip. Possible sphalerite sphene						
380-390	100%	qtz. dio.		6" wide gray alteration py. - sphalerite veins 1/16"						
390-400	100%	qtz. dio.		slip						
400-410	100%	qtz. dio. 407-410 lighter color		basic dyke						
410-420	100%	light alteration slightly kaolinized qtz. dio.		py. strs.	> 1%					
420-430	100%	qtz. dio. little kaolinization		py. & gray alteration						
430-440	100%	qtz. dio. gray-green alteration bands		sphene						

NORANDA EXPLORATION CO. LTD. Property: COQUIHALLA
Project No.:

Hole No. NC 6
Sheet No. 6

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Ft.	Assays Au	Ag		
440-450	100%	qtz. dio. porphyritic									
450-460	100%	qtz. dio. gray green alteration in bands		slip rusty							
460-470	100%	qtz. dio.		basic dyke rusty fract.							
470-480	100%	qtz. dio.& dyke		basic dyke basic dyke							
480-490	100%	basic dyke & qtz. dio.		Q.d. 1% py. in dyke dyke		M9371	10	Tr	0.2		484-494 split
490-500	100%	qtz. dio.		f.g. disseminated py. sphene	>1%						
		END									

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Property Coquihalla (Denison Option) | Project No. 53 | N.T.S. 92H/11 E | Sheet No. 1 | Hole No. NC-1-73 | Core Size: BQ

16 + 70 S	Elev. 3500	Dip -90°	Collared Aug. 23/73
20 + 50 E	Depth 200'	Bearing	Completed Aug. 24/73

Logged by: D. PEGG

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Lt.	Au.	Ag.	Cu.
0 - 12		Overburden								
12 - 25	100	Green Grey, Porphyritic Altered Granite. Mottled Slight Kaolinite, Chlorite		Occ. speck py in chlic strg. or sil. vein	<0.1					
25 - 26	×	× Increase qtz with few fine purple slips (Fluorite)		Specks pyrite - slight increase Few fractures - slips @ 40°	70.1					
26 42.5		Grey green altered porphyritic granite Moderate Kaol. Seric.		1/2 inch pyrite well mineralized @ 130 in. Fluorite (?) veinlet						
183		Fine grained green andesite few fine fractures with calcite fluorite		Fine scattered pyrite one inch with well min. pyrite sphalerite @ 163	<.05					
83 - CO		Granite Porphyry Moderate Kaol. Chl. Seric		Slight fine pyrite (cubes)	<1%					
		End of hole casing pulled								

NORANDA EXPLORATION CO. LTD.

Property: Coquihalla (Dennison Option) | Sheet No. 1 | Hole No. NC-2-73

Project No. 53 | N.T.S. 92H/11E | Core Size: BQ

Lat. 31 + 50 S	Elev. 3500'	Dip -90°	Collared Aug.25/73
Dep. 14 + 00 E	Depth 200'	Bearing	Completed Aug.27/73

Logged by: D. PEGG

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Lt.	ASSAYS Au.	Ag.	Cu.	Zn.	
0 - 125		Casing Sand clay boulders										
125 - 133		Grey green porphyry fine grained slight sericite		occasional pyrite specks								
133 - 180		Grey green granite porphyry (mottled with coarse porphyroblasts) moderate kaolinite, sericite		scattered pyrite specks occasional band of 3% pyrite. Light shears @ 30°	3.0 ±	P1476	5'	trace	trace	trace	0.01	135-1
180 - 181		Chloritic zone		min. pyrite	<1.0							
181 - 200		Grey green granite porphyry (mottled) coarse moderate Kaol. Seric.		scattered pyrite	3.0 ±							
		End of hole casing pulled										

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Property Coquihalla (Dennison Option)

Project No. 53 N.T.S.

Sheet No. 1 Hole No. NC-3-73

Core Size: BX

Lat. 11 + 00 E	Elev. 3500'	Dip -90°	Collared Aug.29/73	Logged by: D. PEGG
Dep. 23 + 00 S	Depth 200'	Bearing	Completed Aug.30/73	

Footage	Rec'y	Rock Type/Alteration	Graphic Log		Mineralization/Structure	% Sulfides	Sample No.	Lt.	Au.	Ag.	Cu.	Zn.	
									ASSAYS				
0 - 114		Overburden Sand, gravel, clay, silt, boulders											
114 - 200		Grey volcanics with fragmentals (up to 3" long)			scattered specks pyrite (cubes)	1.0 ±	P1477		trace	trace	0.01	0.03	145-150
							P.1478		trace	0.1	0.01	0.03	180-185
		Casing pulled											

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Property: Coquihalla (Donnison Option)
Sheet No. 1 | Hole No. NO-4-73

Project No. 53 | N.T.S. 92H/11E | Core Size: BQ

Lat. 5 + 00 S	Elev. 3500'	Dip -90°	Collared Aug.30/73
Dep. 17 + 40 E	Depth 230'	Bearing	Completed Sept.1/73

Logged by: D. PEGG

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Lt.	ASSAYS Au.	Ag.	Cu	Zn.	
0 - 162		Casing Overburden Extensive boulders										
162 - 230		Volcanic fragmental		scattered fine pyrite	2.0±	P1479		trace	0.01	0.01	0.02	190-195
		End of hole casing pulled										

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Property: Coquihalla (Dennison Option)
Project No. 53 N.T.S. 92H/11E

Sheet No. 1 Hole No. NC-5-73
Core Size: BQ
Logged by: D. PEGG

Lat. 4 + 80 S	Elev. 3600'	Dip -90°	Collared Sept. 1/73
Dep. 6 + 00 E	Depth 240'	Bearing	Completed Sept. 3/73

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Lt.	Au.	Ag.	Cu.	Zn.	
0 - 190		Casing Overburden		Sand Gravel Boulders								
190 - 242		Frag. Volcanic		Banding in core @ 60°		P.1480		trace	trace	0.01	0.03	195-200
		End of hole Casing pulled										

NORANDA EXPLORATION CO. LTD.

Property: Coquihalla (Dennison Option)
Project No. 53 N.T.S. 92H/11E

Sheet No. 1 Hole No. NC-6-73
Core Size: BQ

Lat. 8 + 00 N	Elev. 3600'	Dip -90°	Collared Sept.4/73	Logged by: D. PEGG	
Dep. 8 + 20 E	Depth 200 2	Bearing	Completed Sept.5/73	ASSAYS	

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Lt.	Au.	Ag.	Cu.	Zn.	
0 - 98		Casing - - Overburden sand, gravel boulders		@ 60' - 90'								
98 - 103	100	Fine grained andesite with biotite granite inclusions and fragmental volcanic inclusions		No significant sulfides								
103 - 179	100	Fragmental volcanics frequent brown weathered seams		Pyrite in fragments and some dissem.	2 ±	P.1481	5'	trace	0.01	trace	0.04	110-115
		Ditto		1/4" qtz. vn. with py. sphal. @ 122' @ 20° to core manganese fract. @ 136, 7, 9, 144, 145		P.1482	5'	trace	0.2	0.01	0.05	122-127
179 - 200		Grey porphyry, sl. foliated moderate seric., chl.		Poor pyrite Brown manganese fract. @ 185, 7, 191, 3, 6, 200 Dark chl. shear @ 190 5	<1.0	P.1483	5'	trace	trace	trace	0.01	195-200
200.0 - 200 2		Grey fragmental volcanics										
		Hole Complete Casing pulled										

NORANDA EXPLORATION CO. LTD.

Property Coquihalla (Dennison Option) | Project No. 53 | N.T.S. 92H/11E

Sheet No. 1 | Hole No NC-7-73 | Core Size: BQ | Logged by: D. PEGG

Lat. 5 + 20 N	Elev. 3500'	Dip -90°	Collared Sept. 6/73
Dep. 20 + 70 E	Depth 200'	Bearing	Completed Sept. 7/73

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Lt.	Au.	Ag.	Cu.	Zn	
0 - 115		Overburden Sand - gravel (Boulders 60' ⟶)										
115 - 127	100	Grey Porphyry Kaol. Seric. Minor chl. Sl. foliated		Pyrite as finely dissem. and few veinlets	2.0±	P.1484	5	trace	0.2	trace	0.01	120-125
127 - 132	"	Grey Porphyry - coarse Bx parts Kaol. Seric.		" "	"							
132 - 142	"	Coarse Breccia - Grey brown, Poor Kaol. Seric. Sl. more siliceous		Pyrite. Fine diss. and veinlets	5 ±	P.1485	10	trace	0.1	0.01	0.02	132-142
142 - 200.	"	Grey Porphyry. Sl. Foliated Good seric. 190-200 Caving @ 191'		"	5 ±	P.1486	10	trace	trace	trace	0.01	142-152
		"		"	5 ±	P.1487	5	trace	0.1	trace	0.01	192-197
		Hole finished. Casing pulled.										

quartz vein with visible chalcopyrite (K21-4) strikes 230° @ 080° contains geochemical Mo (62 ppm). Soil Cu-Mo anomalies (Figure 7) that occur around the El Paso trenches and extend over to the Blue Gold showing confirm the wide sporadic extent of sub-surface mineralization.

Younger mineralization is centered around the breccia complex. Barren pyrite and zinc-rich mineralization occur in Eagle granodiorite, Keystone quartz diorite and breccia complex. Molybdenite occurs as remnants in the Pebble Breccia. Sulphides have been partially re-mobilized into carbonates and oxides within the breccia compex.

Zinc-rich mineralization occurs as veins, fractures, disseminations and grains of sphalerite, galena, rhodochrosite, pyrite, chalcopyrite, barite, quartz and specularite. The Keystone vein contains botryoidal-banded sulphides. Julie showing is stockwork quartz-carbonate-sphalerite-hematite mineralization in Eagle rocks and Pebble Breccia. Disseminated sphalerite occurs in Keystone quartz diorite at the Noranda trenches. The Pebble Breccia is cut by and contains grains of zinc-rich mineralization.

Pyrite is pervasive within the present alteration limits and occurs as fine, anhedral to euhedral single grains and grain aggregates. It occurs as barren-pyrite-silica veins (1 mm to 10 mm wide) and disseminations (5-10%) and with Zn-Pb-Cu and molybdenite. There appears to be several barren stages of pyritization with voluminous introductions during phyllic and silica alteration. Barren pyrite veins cut fragements with Quartz Breccia, Quartz Breccia fragments, fragments within Pebble Breccia as well as the breccia complex.

Molybdenite occurs only as pebbles in the Pebble Breccia. Mineralized pebbles up to 1 cm occur irregularly throughout DDH W-78-I with noted concentrations with the coarse bands. Molybdenite occurs as narrow laths(ribbon-like) and irregular masses (0.1 mm to 1.2 mm in diameter) within a silica matrix containing pyrite with pyrrhotite inclusions (PS 77.79.114). Molybdenite mineralization obviously occurred pre Pebble Breccia and contemporoeus with silicification and pyritization.

Carbonate and oxide minerals formed during diagenesis at the expense of sulphides (Fe, Zn, Pb, etc.). Porosity of the Pebble Breccia affected their formation and mobilization away from sulphide concentrations. The secondary minerals have a direct affet on the rock geochemistry of the Pebble Breccia.

STRUCTURE

The region fabric (320^0 to 340^0) controls most of the bodies penetrating the Eagle granodiorite including the Keystone stock, dykes, barren quartz veins and mineralization at the Blue Gold and El Paso trenches. The breccia complex which includes non-foliated rocks is the most significant structural feature. The complex has a north-south elongation. Zn-Pb-Cu veins peripheral to and cutting the breccia complex predominately strike 040^0 and dip vertically. Dacite, felsite and pebble dykes that are peripheral to the breccia complex are arranged in a crude concentrict pattern. Regional implications are that the breccia complex occupies a conjunctive zone between northwest trending foliation and a major northeast 040^0 break.

The breccia complex is a breccia pipe system with at least three stages of breccia development :

Eagle Breccia, pre fluidization, as the initial crackle-zone stage of breccia pipe development.

Quartz Breccia, pre Pebble Breccia, a first generation fluidized breccia incorporating milled Ebx, Eqd, Kqd fragments that have been silicified and pyritized. Quartz Breccia only occurs as fragments and is not presently exposed on surface.

Pebble Breccia is the last stage of breccia pipe development that possibly vented during formation. The graded rythmic nature of the coarse and fine beds depicts different energy levels during milling. The present dips of the beds (20^{0} to 50^{0}) is probably a setting feature and does not reflect the shape of the overall breccia complex.

GEOCHEMISTRY

PREVIOUS SURVEYS

The results of previous surveys are compiled on Figure 7 with the data source and survey area outlines. Soils have been sampled for Mo, Cu, Pb, Zn and Ag on several occasions. Rocks have been tested for the above elements as well as Mn, F, W, Fe.

A coincidental Cu (+ 100 ppm) - Mo (+ 20 ppm) soil anomaly was detected by El Paso peripheral to the northwest portion of the Keystone stock. The anomaly has been confirmed by the occurrence of weakly mineralized quartz veins of molybdenite, chalcopyrite and pyrite.

Soil sampling around the breccia complex is hampered by deep, overburden of outwash material. Sporadic high values of Zn, Pb, Cu, Ag have been detected. Mo results are low (2-4 ppm) and considered background. A crude 1000 ppm Mn and 400 ppm Zn limit occurs along the north edge of the breccia complex. The geochemical values are predictable in view of the known mineralization. It should be noted that the geochemical and dispersion pattern associated with the breccia complex is restricted to a narrow peripheral zone.

ROCK GEOCHEMISTRY

A good statistic base for rock geochemistry has been compiled. Livingstone (1977) sampled numerous outcrops and previous drill core for Mo, Zn, Pb, Mn, F and W. During 1978, mineralized veins and dykes were sampled and analyzed for Mo, Cu, Pb, Zn, Ag, F, W for the purpose of acquiring element data for comparing and classifying mineralization. The results of this survey are on Tables 1a and 1b (p. 49-50) and the samples locations are on Figure 9. This data was not statistically treated but compares favourably with statistical levels developed from the 1978 drill core data.

The 1978 drill core was systematically sampled and analyzed for Ag, Cu, F, Fe, Mn, Mo, Pb, W and Zn. The results were statistically treated using the cummulative frequency method on probability-log paper. The results are summarized on Table 2 (p. 30) with details on Tables 3a, 3b and 3c (p. 31-33). A graphic representation is on Figure 8. Several correlation diagrams for various elements were done but not documented.

The rock geochemical distribution in drill hole W-78-1 is summarized as follows :

Mo: Molybdenite fragments occur in the Pbx. The three peaks between 230-239, 712-721 and 758-767 metres coincide with coarse fragment bands and suggest selective milling of a molybdenite-quartz rich zone. Mo has no correlation with other metals except pyrite.

Cu: Chalcopyrite occurs with Zn-Pb and distributed as cross-cutting veins and grains in the Pbx. Its elemental abundance is low (26 ppm background) and corresponds to its visible count. The peak at 703-712 metres is probably a vein.

Pb: Galena is visible with sphalerite. The anomalous zone from 403-539 metres occurs in porous, carbonate-rich Pbx. The anomalous zone is a zone of enrichment due to the formation of Pb carbonates during diagenesis. The sharp dropoff below 539 reflects Pb normal mobility away from source (veins and grains).

Zn: Abundant with veins and has grains. Zn is anomalous from 403-859 metres. Two distinct populations are present (Figure 3c) one as sulphide and the other as carbonate and oxide. The anomalous zone reflects enrichment and mobiliation with carbonates during diagenesis.

Fe: (Sulphide) Visible as pyrite and Fe stain throughout the Pbx with total-count (percent) decrease down hole from 3-1%. The sharp decrease at 403 metres from high background to low background levels reflects the development of carbonate Fe (siderite, $FeCo_3$-Mg, Mn) at the expense of sulphide Fe.

ROCK GEOCHEMISTRY OF PEBBLE BRECCIA

SUMMARY OF CUMULATIVE FREQUENCY DISTRIBUTION

for Ag, Cu, F, Fe, Mn, Mo, Pb, W, Zn

ELEMENT	N	R	b	s'	s	s"	t
Ag	89	0.6-2.7	1.3	1.31	0.11	8.46	2
Cu	89	5-158	26	1.65	0.22	0.85	74
F	89	260-780	470	1.19	0.07	0.01	660
Fe	89	3950-17750	13000	1.15	0.06	0.0005	17500
Mn	89	1020-7900	4000	1.30	0.11	0.003	6600
Mo	89	2-48	9	1.55	0.18	2.0	18
Pb	89	12-715	54	2.77	0.44	0.81	150
W	89	2-20	4	1.75	0.24	6.0	8
Zn	89	65-1450	240	1.54	0.18	0.07	420

N - population

R - range of values (ppm)

b - background (ppm)

s'- geometric deviation (absolute deviation)

s - coefficient of deviation

s"- relative deviation or coefficient of variation

t - threshold (ppm)

b = ppm at 50%

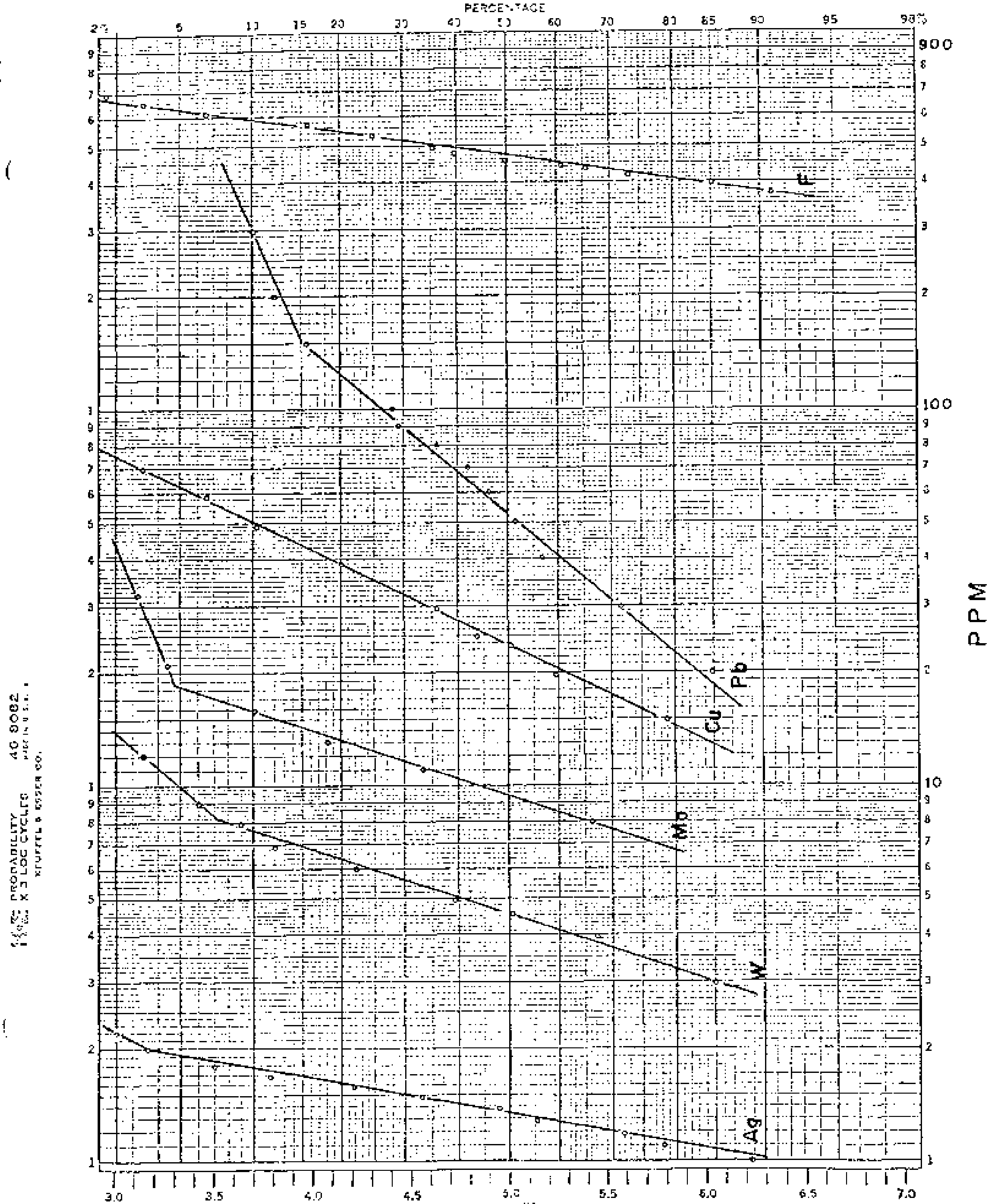
s = logs'

$s' = \frac{A}{b}$ A = value at 16%

$s'' = 100 \frac{s}{b}$

$t = b \times s'^2$ or value @ 2.5%

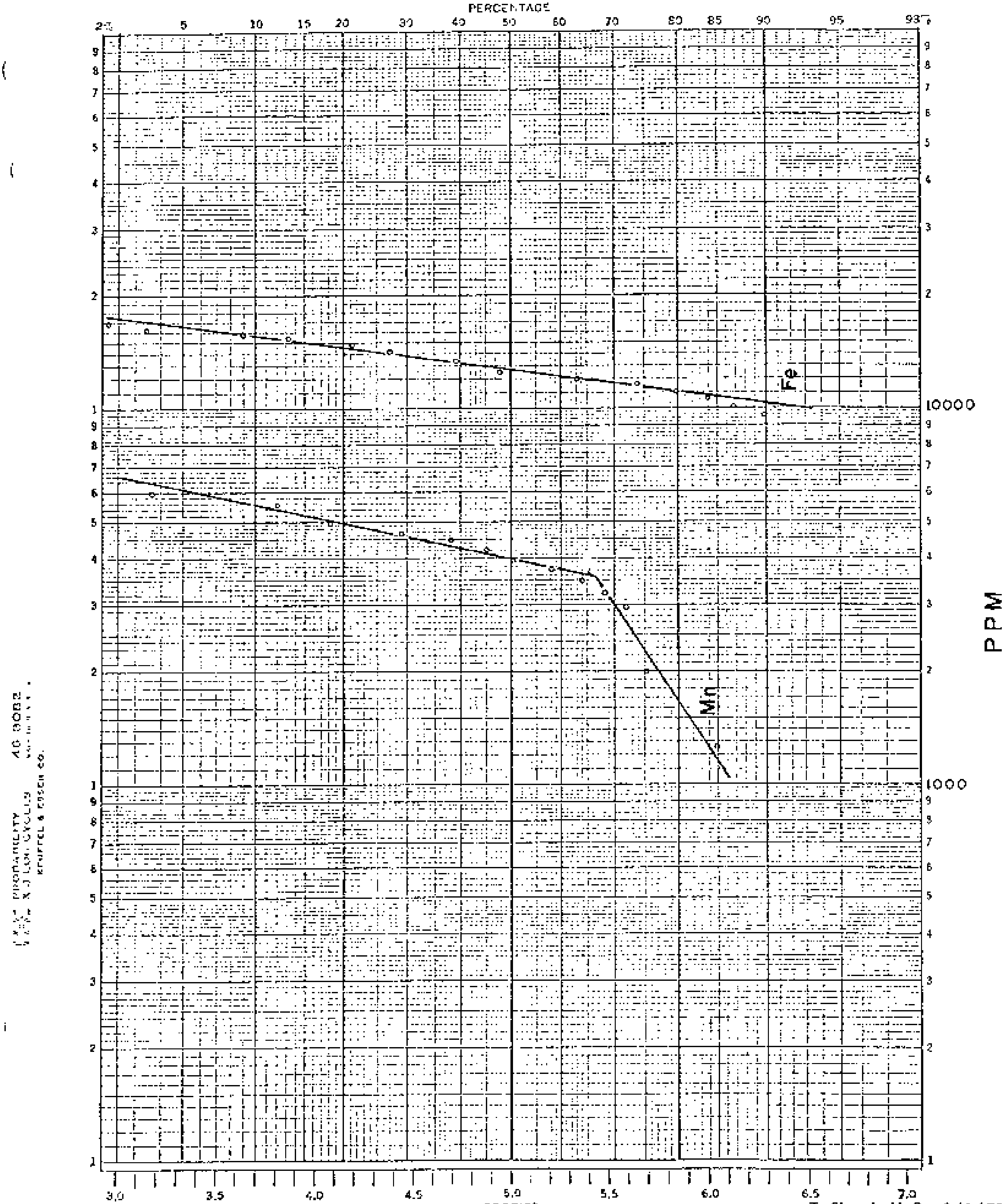
T-2
L.W.S 1/1/79



T-3a L.W.S 1/1/79

ROCK GEOCHEMISTRY OF PEBBLE BRECCIA

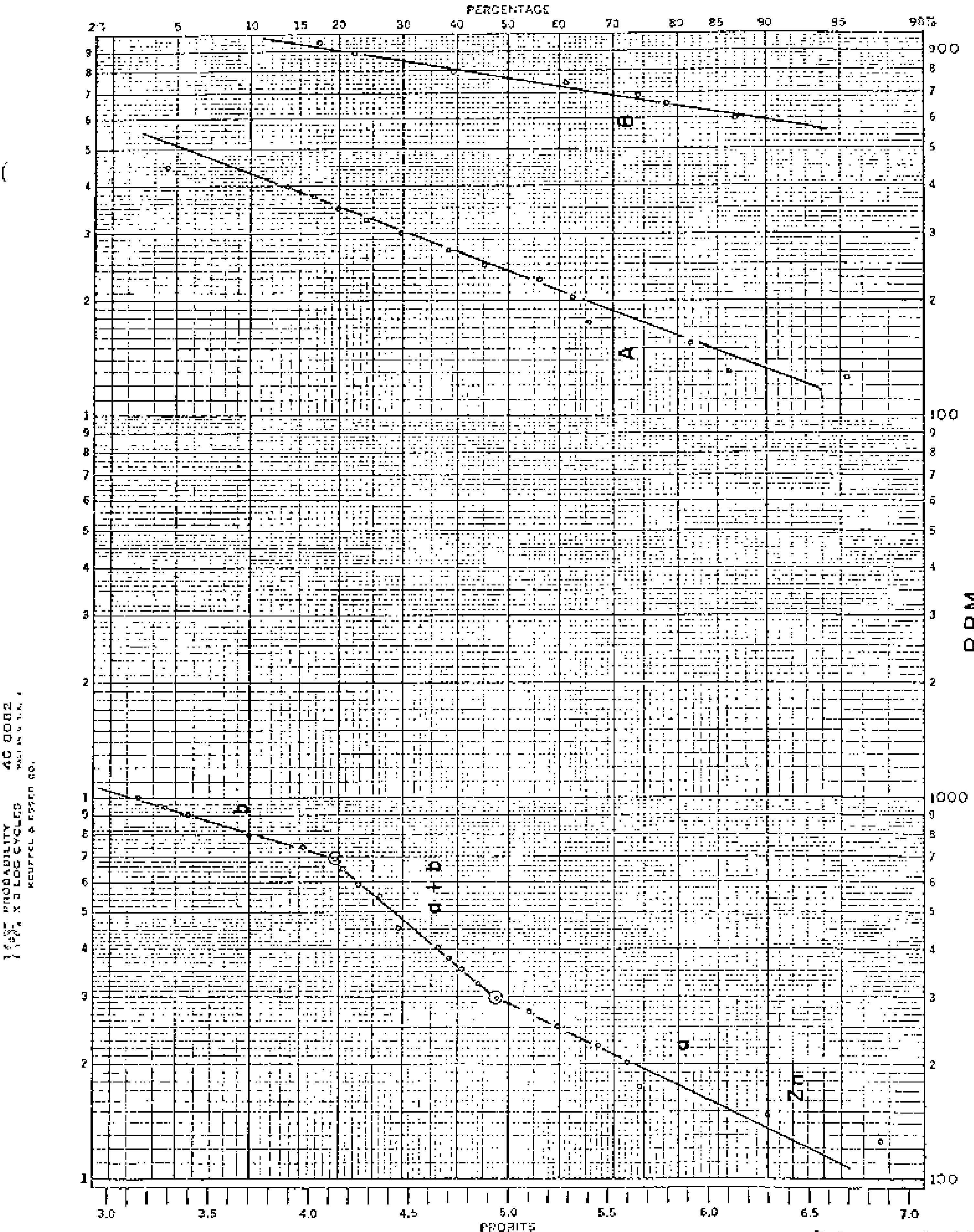
CUMULATIVE FREQUENCY DISTRIBUTION Ag, W, Mo, Cu, Pb, F, In Drill Hole W-78-1



T-3b L.W.S. 1/1/79

ROCK GEOCHEMISTRY OF PEELE BRECCIA

CUMULATIVE FREQUENCY DISTRIBUTION Mn, Fe In Drill Hole W-78-1



T-3c L.W.S. 1/1/79

ROCK GEOCHEMISTRY OF PEBBLE BRECCIA
CUMULATIVE FREQUENCY DISTRIBUTION Zn In Drill Hole M-78-1

F: Not detected visibly, geochemically ranges from 470-800 ppm in the hole. The increase from 530 metres to above background levels indicates a receptiveness of the rock environment to accept fluorine.

Mn: Rhodochrosite, Mn oxide visible. The broad increase above background from 317-712 metres, peaking at 494 metres coincides with Pb-Zn increase and Fe decrease. The pattern reflects mobility and carbonate affiliation of Mn during diagenesis.

W: Not detected in core, very low levels 2-20 ppm. The peak at 721-739 metres correlates with Mo peak. W is associated with molybdenite-quartz elsewhere on the property.

Ag: Sphalerite-galena vein associated, no particular pattern.

GEOPHYSICS

A compilation of the previous magnetic and I.P. surveys as well as the 1978 I.P. survey are on Figure 7. The 1978 I.P. extended beyond the geologic limits of the breccia complex and included the El Paso trenches and Blue Gold showing. The I.P./resistivity survey was designated to detect a target at depth. Refer to the I.P. report (separate cover) for details.

The 1978 results over the breccia complex correspond with the previous shallow I.P./resistivity results. The annular chargeability anomaly that occurs within and peripheral to the breccia complex indicates a sulphide (pyrite) envelope that extends for some depth. There was no anomalous I.P. response over the El Paso and Blue Gold areas suggesting that the weak sulphide mineralization at surface has no continuity with depth.

DISCUSSION OF RESULTS

The Keystone Project area is host to a calc-alkalic suite of rocks ranging in composition from granodiorite to quartz diorite. These rocks are younger than Eagle granodiorite and are believed to be late Tertiary, possibly Miocene or younger. The Keystone stock, main body, has been intruded by a breccia complex. The breccia complex exhibits fluidization and at least two phases of breccia pipe development. Hydrothermal activity accompanied both stock and breccia development.

The northern flank of the Keystone stock is enveloped by a zone of propylitic alteration and Cu-Mo mineralization. The mineralization is sporadic, geochemical Cu-Mo soil anomalies are low order and the I.P./resistivity effects are not sulphide responsive. The hydrothermal signiture reflects a weak single-stage event and it is doubtful that economic concentrations of Cu-Mo mineralization accompanied this activity.

The southern portion of the Keystone stock is occupied by the Keystone breccia complex. The breccia complex is a composite of crackle-breccia and pipe-breccias that have fragmented a hydrothermal system coaxial to a subterranean multi-phase intrusion. During brecciation, clasts of phyllic and silica altered rock along with molybdenite and sphalerite-galena-chalcopyrite mineralization were incorporated. A remnant of propylitic alteration remains peripheral to the complex. A prolonged period of hydrothermal activity after brecciation occurred with the dispersion of Fe-Zn-Pb-Mn-Ba-Cu-SiO_2. During readjustment, the breccia underwent diagenesis where by sulphides were partially redistributed as carbonates and oxides.

Of the pipe-breccias, Pebble Breccia outcrops while Quartz Breccia is present only as fragments in Pebble Breccia. The strong multi-phase alteration and the intense pyrite-silica flooding prevails only in the pipe-breccias. Molybdenite neither outcrops nor occurs in the Quartz Breccia thus, as presently interpreted, ensued Quartz Breccia. The extent and location of the molybdenum zone is not known but constitutes an attractive exploration target in view of the hydrothermal and geologic events that evolved prior to brecciation.

ROVER PROJECT AREA

INTRODUCTION

The Rover Project area covers 1475 hectares and includes the area south of Juliet Creek and north of Blue Gold Creek. (Figure 6). Outcrop on the claims is poor with the best exposure along logging roads and creeks. The Rover and Keystone Project areas are connected by a common grid.

The prominant geologic feature is a breccia-intrusive complex containing an annealed rock breccia and intrusive bodies that have been telescoped by quartz stockwork. The zone is encompassed by propylitic alteration. Molybdenite occurs with quartz-sericite veins within the complex and with chalcopyrite in the quartz stockworks.

The geology of the Rover area is on Figures 5 and 6.

CLAIM GEOLOGY

ROCK UNITS

Nicola Group (NV) volcanics outcrop along the eastern edge of the claims. The rocks are mainly dark green, schistose andesite flow and tuffs. Southeast of Blue Gold Creek, the units strike 330-340^{o} and dip 60^{o}-80^{o} easterly. Northwest of the creek, the units strike 350^{o}-360^{o} and dip 20^{o}-80^{o} westerly.

Eagle Granodiorite (Egd) is the major unit and is similar to the outcrops on the Keystone.

Rover quartz diorite (Rqd) outcrops in two areas (Figure 5) but may represent an original, irregularly shaped body approximately 400 metres by 700 metres. Rqd intrudes Egd as well as Ebx. Contacts with the other rock units are obscured by overburden. The rock is a greenish, blotchy-looking, non-foliated, coarse grained (2-3 mm) quartz diorite displaying prominant myrmekite (TSR1-10, R6-6):

Mode	
K-spar :	1-4
Plagioclase:	60
Quartz :	20
Biotite :	3-5
Hornblende :	1-3
Accessories:	pyrite, apatite, magnetite

The quartz diorite is usually altered to chlorite, sericite, epidote and calcite. Disseminated pyrite (1-2%) is not uncommon.

Quartz-eye porphyry (QP) occurs as dykes and as a small plug on the east end of the complex. It outcrops at the end of the logging road and along L5S, 8E to 11+50E. Q.P. intrudes Egd, Ebx and Rqd. Round quartz phenocryst (2-3 mm) are set in a pinkish-white aplitic matrix (k-spar and sericite) with large phenocryst and clusters of plagioclase as well as fine laths of biotite (TSR1-7). The rock has been sericitized (white-pale green mica). Pyrite (1%) is common as fine disseminations. Quartz veins with mica envelops cut the Q.P.

Dykes of andesite (1), quartz-eye porphyry (QP) dacite porphyry (3), ryhodacite (4) and aplite (5) occur at the Rover. Compositionally and texturally, they are similar to those at Keystone. Andesites are the most abundant. The dacite porphyries are more hornblende-rich than those at Keystone (TSR1-9). Aplite swarms occur at the Wet Showing and along Blue Gold Creek near the Egd-NV contact. The dykes intrude all rock types except the Quartz stockwork Breccia.

Rover Breccias: Two phases of breccia are recognized on the Rover. They include: Eagle Breccia with a communated dark matrix and Quartz Stockwork Breccia with a quartz matrix.

Eagle Breccia (Ebx) is an irregular mass of brecciated Eagle granodiorite occupying about 50% of the Rover complex. Rock fragments of various sizes and rounding are set in an annealed, dark green, fine-grained matrix of quartz, feldspar, biotite, hornblende, sericite, chlorite and epidote (TSR1-3). Round grains of pyrite are common. Although the breccia is compositionaly similar to the one at Keystone, the matrix componant is higher (30%) and the breccia has not undergone extensive pervasive propylitic alteration. Contacts with the Eagle granodiorite are highly irregular and not always distinct.

Quartz Stockwork Breccia (QSbx) is named because of the reticulate massive-vuggy quartz veins that compose the matrix. In outcrop, the breccia forms a resistive nobby ridge and cuts all rock units. The breccia is a lenticular, finger-like body, 200 metres by 800 metres, that trends at 320°. Fragments are semi to non-rotated and not far removed from their original implacement as evidenced by the distribution of rock unit fragments. Matrix is vuggy bull-quartz with carbonate, chlorite, epidote. Massive blebs of pyrite and chalcopyrite are present. Coarse molybdenite lining a quartz vug was located at 6+50S, 7+50E. The degree of alteration varies with fragments but is propylitic.

ALTERATION

The area of the breccia-intrusive complex outlines a zone of general pervasive propylitic alteration. Outside the zone, the Eagle granodiorite is fresh with minor, chlorite-epidote replacement of mafics. Quartz-sericite veins occur but are not extensive. The degree of chlorite-epidote-sericite-carbonate replacement is not intense. Flacky white mica both as narrow envelopes and as dissemination is common with the Quartz-eye porphyry. Total sulphides in the alteration zone do not exceed 2%.

MINERALIZATION

Surface mineralization is confined to the breccia-intrusive complex and is neither widespread nor concentrated. Three types of molybdenite assemblages are recognized:

- I quartz-sericite veins with molybdenite, pyrite
- II quartz-veins with chalcopyrite, pyrite ($\pm$ molybdenite)
- III quartz-veins with molybdenite, pyrite (Pb, Ag, W-ppm values).

The age relationships of the molybdenite is not clearly understood. The reported Pb-Zn occurrence around Anomaly Creek was not lcoated.

Type I mineralization occurs as single 10-15 cm quartz veins with 2-4 cm sericite envelopes. These veins are usually heavily oxidized and leached on surface. Sample locations R1-2, R7-1, R5-3 and R5-4 are typical (Figure 9). The veins have two prominent directions: 020° @ 080° NW and 120° @ 10°-80° S.W.

Type II mineralization is associated with Quartz Stockwork Breccia and the Wet Showing. An assemblage of pyrite, chalcopyrite with chlorite, epidote, carbonate occupy fractures and vugs of the QSbx in an irregular fashion. Coarse molybdenite lining a quartz vug with carbonate-chlorite has been noted. At the Wet Showing molybdenite with chalcopyrite-pyrite occurs in a brecciated quartz vein. The vein (or veins) are part of a narrow fault breccia that strikes 360^{0} and dips 045^{0}E. Fragments of this breccia, upon weathering, have the appearance of Pebble Breccia.

Type III mineralization occurs along fractures and with narrow quartz-pyrite-sericite veins at the Rover Showing along Anomaly Creek (Sample R4-2). The molybdenite is fine grained (paint) and is accompanied by geochemically anomalous Pb and Ag values. Shearing occurs as well as some pyrite and silica flooding. The mineralized veins strike 140^{0} and dip 050^{0}-080^{0} NE. A similar showing was located along a creek at L5S, 12E; 50 metres down-stream.

STRUCTURE

The major structure element is the Rover complex. The package appears to tend at 110^{0} parallel to Juliet Creek. The QSbx is a linear feature in plan with a 320^{0} alinement coincidental to a magnetic feature. The complex is truncated both on the east and west by north-south shears.

Quartz veining is more prominent then at the Keystone and is especially associated with the Quartz Porphyry. Three sets of molybdenite veins have been mapped. Fracturing coincides with regional fabric with an 040^{0} cross pattern.

GEOCHEMISTRY

A soil survey was conducted in 1970 for Cu-Mo over the Rover complex. The results were discouraging. In 1978, 4 lines of "B" horizon soils were taken across the complex to re-check the previous results. The sample locations and Cu-Mo results are plotted on Figure 10 with a geology underlay Figure 11. Values +20 ppm Mo and +100 ppm Cu were considered anomalous. The anomalies are low order and reflect known mineralization. Coincident Cu-Mo anomalies depict the chalcopyrite-molybdenite associated with the QSbx. The Mo anomaly at the west edge of the complex is over the Rover showing and other known molybdenite quartz veins. The Rover complex is geochemically higher in Cu-Mo than the Eagle granodiorite as noted by the sharp drop off in values along L8+00S.

GEOPHYSICS

The 1978 I.P. results over the Rover complex show a small chargeability anomaly caused by a shallow limited source (Figure 7). The anomaly coincides with the Rover quartz diorite that is generally pyritic (2%) and moderately altered. Since the vertical orientation of the Rover complex is unknown, further interpretation would be strictly speculative.

DISCUSSION OF RESULTS

1. The Rover Project area is centered in a relatively small breccia - intrusive complex containing a suite of calc-alkalic rocks and a quartz-eye porphyry. The history of the complex is as follows :

- Eagle breccia formed within Eagle granodiorite probably along a fracture system paralleling Juliet Creek.

- Intrusion of Rover quartz diorite plus development of propylitic alteration. The initial sub-allignment of mafics occurred in Eagle breccia at this time.

- Intrusion of Quartz-eye porphyry into Rqd, Ebx and Egd with associated weak sericite-chlorite alteration. Type I Mo mineralization probably occurred at this time.

- Emplacement of Quartz stockworks breccia along a prominent northwest (320^{o}) break with accompanying porphylitic-carbonate alteration and Type II Mo mineralization.

- Further activity along zones of weakness (North-South) to overprint Type I mineralization.

2. Geochemical investigations failed to locate any Mo or Cu-Mo anomalies that would indicate zones of sulphide concentration.

3. The I.P./resistivity survey, although locating a shallow, limited-source chargeability anomaly, did not delineate a strong sulphide target. The I.P. response coincides to Rover quartz diorite.

CONCLUSIONS AND RECOMMENDATIONS

KEYSTONE PROJECT AREA

1. The occurrence of molybdenite pebbles as well as fragments of strongly altered rock heavy with silica and pyrite within the breccia complex gives impetus to further exploration on the Keystone. Deep drilling is recommended.

2. The El Paso trench and Blue Gold showing area have been adequately explored. The results do not warrant further exploration.

ROVER PROJECT AREA

1. Suitable molybdenite targets of sufficient size or depth potential were not delineated on the Rover Project area. Further exploration is not recommended.

Respectfully submitted,

L. W. SALEKEN

L. W. Saleken, B.Sc.

CERTIFICATE OF QUALIFICATIONS

I, Leonard W. Saleken, B. Sc., Geology, of 6976 Laburnum Street, Vancouver, B. C., V6P 5M9, state as follows :

1. That I graduated from the University of British Columbia in 1968 with a Bachelor of Science Degree in Geology.

2. That I have prospected and actively pursued geology prior to my graduation and have practiced my profession since 1963.

3. That I am a member of the Canadian Institute of Mining and Metallurgy and the Geological Association of Canada (Fellow).

4. That I am presently employed as a Project Geologist with Western Mines Limited, 1103 Three Bentall Centre, 595 Burrard Street, Vancouver, B.C., V7X 1C4.

DATED at Vancouver, British Columbia this 28th day of February, 1979.

L. W. Saleken

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TABLES

SURFACE ROCK GEOCHEMISTRY

T-1a, 1b, 1c

KEYSTONE ROCK GEOCHEMISTRY

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Au ppb	F ppm	W ppm	COMMENTS
K19-9	17	21	9	12	0.6	220		40	<2	PV: 130@080E
10	6	8	3	10	0.4	150		25	<2	A: Sc, 120@090
11	37	17	10	50	0.2	600		65	4	PD: py, Sc
12	6	54	30	74	1.9	1200		535	2	FD: Sc, Av, 140@090
K19-13	4	9	3	33	0.4	700		120	<2	PD: py, Sc, 250@070N
K20-2	3	5	2	12	0.3	150		15	3	PD: 070@045N
K21-2	12	43	2	11	0.3	130		80	<2	A: py, 320@090*
3	9	37	4	52	0.4	200		510	2	BFP: py, Sc*
4	62	710	6	16	1.1	260		50	3	QV: py, Mo, Cu, 230@080S
K21-8	16	6	3	38	0.6	410		18	<2	Aplite, Dyke*
K22-4	205	305	14	81	1.5	460		50	5	QV: bx,py,Mo, 360@045E**
7	3	41	13	42	0.6	470		79	<2	PD: py, Sc, 310@090
K23-4	1	16	42	1200	4.0	10800		120	<2	A: py, Sc, Mn, 350@080E
5	4	58	14	260	3.8	1800		122	<2	FD: py, Mn
K23-6	3	740	520	770	57.5	11200	12	76	4	QV: py,Pb,Zn,Cu,Mn, 090** (040%)

Sample Locations on Sample Location Map (1:10,000)

FD - Felsite Dyke
H - Hematite
Mn - Manganese
py - Pyrite
Sc - Sericite

A - Aplite
P - Pegmatite (V, vein; D, Dyke)

* El Paso Trenches
** Wet Showing
*** Keystone Vein Extension

T-Ia
LWS 1/1/79

KEYSTONE ROCK GEOCHEMISTRY

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Au ppb	F ppm	W ppm	COMMENTS
OCK4-R	5	18	69	310	15	870		480	<2	Pyritic f.g. qtz diorite
11-5	4	106	250	380	99	200		550	5	FD: py, spec. hematite
11-6	10	240	530	440	440	420		650	3	FD: py, Sc
11-8	5	42	210	290	63	330		410	2	FD: py, Sc
14-2	3	21	129	600	21	4100		360	3	FD: py, Sc, 310@090
14-4	4	59	88	520	27	1900		810	2	FD: py, Mn, 300@080E
15-4	2	6	18	110	10	900		640	4	FD: py, Sc, 305@090
17-1	2	62	290	5800	28	17000		1000	9	Fbx: H, qtz, Mn, Zn
17-2	3	154	1330	710	103	450		460	3	FD: py
17-3	3	92	580	3100	176	8800		280	3	FD: py, qtz, Mn
17-7	6	30	145	1150	24	9400		780	<2	FD: py, Sc, 310@070NE
18-1	5	17	168	3150	26	8600		1900	2	FD: py, Sc, Zn
18-2	4	120	118	4100	19	3100		2250	<2	Fbx: py, Sc, Zn
17-4	4	290	610	4550	50	11200		420	7	FD: py, Mn, H, 240@090
K-19-3	4	17	18	16	08	145		36	<2	A: py, 220@080S*
K19-4	5	32	12	22	12	190		110	<2	A: py, 220@080S*
5	260	590	14	48	15	270		200	8	QV: py, Sc, 160@090*
6	305	1900	15	56	27	200		155	7	QV: py, Sc, Mo, 300@090*
7	590	1340	26	40	43	55		260	15	QV: py, Mo, Cu, 300@090*

*Blue Gold Showing

T-1b
LWS 1/1/79

ROVER ROCK GEOCHEMISTRY

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Au ppb	F ppm	W ppm	COMMENTS
R1-1	2	38	19	70	11	430		620	<2	Trachytic andesite: py
2	510	9	14	16	1.0	45		255	<2	QV: py, Mo, 200@080NW
7	14	18	29	10	1.8	90		145	2	QP: py, qtz vns, Sc
9	5	20	14	68	0.8	410		410	<2	BFP: sericite
12	19	10	16	28	0.4	140		155	<2	QP: py, Sc
R1-13	8	7	3	24	0.3	150		100	2	QV: py, Sc, 130@040E
R2-2	4	19	6	53	0.4	380		170	<2	Shear: py, Sc,360@080E
R4-2	450	15	139	25	17.3	50		645	11	QV: py, Mo, 140@050E
R5-3	470	84	32	72	1.5	250		660	6	QV: py,Mo,Sc,120@010SW
4	118	72	19	51	1.4	70		620	7	QV: py,Mo,Sc,120@080SW
R7-1	280	30	6	29	0.7	40		395	9	QV: py,Mo,Sc,220@080N

Sample Locations on Sample Location Map (1:10,000)

QV - Quartz Vein
QP - Quartz-eye Porphyry
BFP - Biotite Feldspar Porphyry (Dacite)
py - Pyrite
Mo - Molybdenite
Sc - Sericite
* - Rover Showing

T-1c
L.W.S 1/1/79

APPENDIX A

STATEMENT OF EXPENDITURE

i. Keystone Project - 1978

ii. Rover Project - 1978

STATEMENT OF EXPENDITURES

KEYSTONE PROJECT AREA
(June 1, 1978 to December 31, 1978)

PERSONNEL	DATES		
L.W. Saleken Geologist	Jun. 1-Dec. 31, 1978	$ 7,154	
D. Downing Assistant	Jun. 1-Aug. 31, 1978	2,563	
Senior Supervision	Jun. 1-Dec. 31, 1978	974	
		10,691	$10,691
Administration Fee			4,540
Food and Accommodation (Jun. 1-Dec. 31, 1978)			1,432
Equipment Rental and Maintenance			1,096
Transporation (Jun. 1-Nov. 30, 1978) 4/4 Ford, Rental, Fuel, Repairs			2,497
Assay and Geochmical Rock analysis for Mo, Cu, Pb, Zn, Ag, Mn, Fe, F, W			1,898
Supplies Flagging, topofil, bags etc.			236
Report Preparation Drafting, Printing, Reproduction			2,508
Line Cutting (Jul.8-23, 1978) 14 kilometres, I.P. Standard			6,168
I.P. Survey (Jul. 21-Aug. 14, 1978) 14 kilometres of survey			12,788
Diamond Drilling (overall contract charges) 859 metres (Oct. 23-Nov. 9, 1979)			56,577
TOTAL EXPENDITURE			$100,429

STATEMENT OF EXPENDITURES

ROVER PROJECT AREA
(June 1, 1978 to December 31, 1978)

PERSONNEL	DATES		
L.W. Saleken Geologist	Jun. 1-Dec. 31, 1978	$4,036	
B. Downing Assistant	Jun. 1-May 31, 1978	1,000	
B. Botel Geologist	Sept. 4-8, 1978	625	
Senior Supervision	Jun. 1-Dec. 31, 1978	544	
		6,205	$ 6,205
Administration Fee			2,382
Food and Accommodation (Jun. 1-Dec. 31, 1978)			1,079
Equipment Rental & Maintenance			219
Transportation 4/4 Ford, Gas, Rental, Repair			1,218
Assay and Geochemical Rock, Soil for Cu, Mo, Pb, Zn, Ag, W, F, Mn			1,196
Supplies Flagging, topofil, bags, etc.			329
Report Preparation Drafting, Printing and Reproduction			1,640
Line Cutting (Jul. 8-23, 1978) 8 kilometres, I.P. Standard			3,330
I.P. Survey (Jul. 21-Aug. 14, 1978) 8 kilometres of Survey			8,129
	TOTAL EXPENDITURE		$25,727

APPENDIX B

CERTIFICATES OF ASSAY

1. Analytical Report

ii. Rock Geochemistry: Rover-Keystone
File No.: 8-339, 8-412

iii. Rock Geochemistry: DDH W-78-1
File No.: 8-550, 8-556

iv. Silts: Rover-Keystone ("L" series)
File No.: 8-262, 8-412

v. Soils: Rover
File No.: 8-452, 8-496

MIN-EN Laboratories Ltd.

705 WEST 15th STREET,
NORTH VANCOUVER, B.C., CANADA V7M 1T2
TELEPHONE (604) 980-5814

ANALYTICAL REPORT

Project .... Date of report Sept. 7/78.

File No. 8-412 Date samples received Sept. 7/78.

Samples submitted by: L.W. Saleken

Company: Western Mines

Report on: 34 soils, 31 rock Geochem samples

Assay samples

Copies sent to:

1. Western Mines, Vancouver, B.C.
2.
3.

Samples: Sieved to mesh -80 soil Ground to mesh -80 rock

Prepared samples stored [X] discarded [ ]

rejects stored [ ] discarded [X]

Methods of analysis: Mo,Cu,Pb,Zn,Ag,Mn-nitric,perchloric digestion. A.A. Analysis. F-Fusion-Specific Ion Meters. W-Fusion-Colorimetric.

Remarks:

Sample K19-3 was extra.

COMP. Western Mines

PROJECT No.

ATTENTION: L.W. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

No. 8-412

DATE: Sept. 7, 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	F ppm	W ppm	
R1-1	2	38	19	70			1.1				430		620	<2	
2	510	9	14	16			1.0				45		255	<2	
7	14	18	29	10			1.8				90		145	2	
9	5	20	14	68			0.8				410		410	<2	
12	19	10	16	28			0.4				140		155	<2	
R1-13	8	7	3	24			0.3				150		100	2	
R2-2	4	19	6	53			0.4				380		170	<2	
R4-2	450	15	139	25			17.3				50		645	11	
R5-3	470	84	32	72			1.5				250		660	6	
4	118	72	19	51			1.4				70		620	7	
R7-1	280	30	6	29			0.7				40		395	9	
K19-4	5	32	12	22			1.2				190		110	<2	
5	260	590	14	48			1.5				270		200	8	
6	305	1900	15	56			2.7				200		155	7	
7	590	1340	26	40			4.3				55		260	15	
9	17	21	9	12			0.6				220		40	<2	
10	6	8	3	10			0.4				150		25	<2	
11	37	17	10	50			0.2				600		65	4	
12	6	54	30	74			1.9				1200		535	2	
K19-13	4	9	3	33			0.4				700		120	<2	
K20-2	3	5	2	12			0.3				150		15	3	
K21-2	12	43	2	11			0.3				130		80	<2	
3	9	37	4	52			0.4				200		510	2	
4	62	710	6	16			1.1				260		50	3	
K21-8	16	6	3	38			0.6				410		18	<2	
K22-4	205	305	14	81			1.5				460		50	5	
7	3	41	13	42			0.6				470		79	<2	
K23-4	1	16	42	1200			4.0				10800		120	<2	
5	4	58	14	260			3.8				1800		122	<2	
K23-6	3	740	520	770			57.5				11200		76	4	

COMPANY: Western Mines

PROJECT No.:

ATTENTION: L. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

No. 8-339

DATE: Aug. 11, 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	F ppm	W ppm	
OCK4	5	18	69	310			15				870		480	<2	
11-5	4	106	250	380			99				200		550	5	
11-6	10	240	530	440			440				420		650	3	
11-8	5	42	210	290			63				330		410	2	
14-2	3	21	129	600			21				4100		360	3	
14-4	4	59	88	520			27				1900		810	2	
15-4	2	6	18	110			10				900		640	4	
17-1	2	62	290	5800			28				17000		1000	9	
17-2	3	154	1330	710			103				450		460	3	
17-3	3	92	580	3100			176				8800		280	3	
17-7	6	30	145	1150			24				9400		780	<2	
18-1	5	17	168	3150			26				8600		1900	2	
18-2	4	120	118	4100			19				3100		2250	<2	
17-4	4	290	610	4550			50				11200		420	7	

COMP: Western Mines

PROJECT No.:

ATTENTION: L.W. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

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

PHONE (604) 980-5814

No. 8-412

DATE: Sept. 7, 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	F ppm	W ppm	
K-19-3	4	17	18	16			0.8				145		36	<2	

COMPANY: Western Mines

PROJECT No.:

ATTENTION: L. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

No. 8-566

DATE: Nov. 16, 1978.

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	W ppm	Mn ppm	Au ppb	F ppm	Footage
W78-1047	8	23	315	275			1.0	11000		2	4750		465	1570-1600
48	6	15	74	95			1.1	11500		4	4500		435	1600-1630
49	8	16	176	170			1.4	11000		5	7900		435	1630-1660
50	10	31	515	1380			2.0	8500		4	5550		420	1660-1690
51	5	20	61	250			1.0	10000		2	4000		415	1690-1720
52	4	30	153	345			1.4	12000		4	5000		480	1720-1750
53	10	36	88	365			1.4	10000		3	4600		465	1750-1780
54	8	15	38	380			1.0	11500		4	4400		565	1780-1810
55	11	27	32	185			0.9	13000		3	4775		580	1810-1840
56	6	31	40	250			0.8	11500		4	4950		510	1840-1870
57	12	18	26	200			1.1	12500		6	5000		450	1870-1900
58	20	22	18	340			1.2	12000		8	4600		465	1900-1930
59	10	29	17	175			1.1	11500		4	4550		580	1930-1960
60	8	21	14	205			1.2	12000		3	4550		460	1960-1990
61	14	40	26	65			1.2	10500		3	4500		510	1990-2020
62	6	26	68	300			1.4	12000		3	4800		660	2020-2050
63	6	74	102	445			1.2	12500		2	5800		555	2050-2080
64	12	42	141	620			1.6	11500		3	5100		500	2080-2110
65	24	31	82	230			0.9	12000		6	4775		580	2110-2140
66	16	29	57	210			1.5	11500		4	4975		470	2140-2170
67	17	13	36	150			0.8	12500		7	5500		600	2170-2200
68	12	50	74	905			1.5	12500		9	4775		485	2200-2230
69	8	30	69	740			1.2	12000		6	4750		435	2230-2260
70	5	48	87	660			1.5	10500		8	4300		555	2260-2290
71	11	55	29	950			1.4	12000		5	4150		780	2290-2320
72	8	158	22	1450			1.4	13500		5	4250		540	2320-2350
73	37	23	16	740			1.1	12000		7	3300		600	2350-2380
74	6	16	18	440			1.0	11000		12	3600		475	2380-2410
75	8	17	18	420			0.7	12000		20	3150		470	2410-2440
76	12	36	22	770			0.6	11500		5	3650		580	2440-2470

COMP. Western Mines

PROJECT No:

ATTENTION: L. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

No. 8-566

DATE: Nov.16 1978.

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	W ppm	Mn ppm	Au ppb	F ppm	Footage
W78-1-077	10	30	21	715			0.9	11500		2	3800		450	2470-2500
78	45	25	18	465			1.1	12000		4	3400		410	2500-2530
79	5	40	12	310			1.0	12000		2	4000		430	2530-2560
80	2	33	19	475			1.0	12000		3	3750		465	2560-2590
81	7	23	22	170			1.0	11000		6	3850		555	2590-2620
82	6	61	18	565			0.9	11500		4	3650		520	2620-2650
83	3	46	26	605			1.2	10500		4	3500		540	2650-2680
84	3	60	24	780			1.3	10000		5	3475		630	2680-2710
85	6	59	18	755			1.0	11500		6	3500		625	2710-2740
86	2	65	12	430			0.8	11000		4	3850		580	2740-2770
87	12	36	24	565			1.6	10500		3	3925		640	2770-2800
88	7	24	12	455			1.6	9500		4	4100		700	2800-2836

COMPANY: Western Mines

PROJECT No.:

ATTENTION: L.W. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

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

PHONE (604) 980-5814

No. 8-550

DATE: Nov. 7, 1978.

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	F ppm	Mn ppm	Au ppb	W ppm	Footage
W78-1:030A	8	27	33	148			1.2	14500		460	3750		4	1060-1090
31	6	34	107	155			1.2	16000		460	5500		2	1090-1120
32	6	14	135	128			1.4	15750		475	5800		2	1120-1150
33	8	37	230	276			1.6	15250		555	4950		5	1150-1180
34	7	20	100	153			1.4	16750		395	4500		5	1180-1210
35	9	23	94	322			1.7	13500		340	4850		3	1210-1240
36	14	11	69	155			1.4	13750		385	5700		2	1240-1270
37	13	8	49	84			1.6	13750		405	5950		6	1270-1300
38	5	10	118	139			1.3	13750		405	6200		4	1300-1330
39	8	39	690	1000			1.8	7900		415	5650		4	1330-1360
40	6	20	515	810			1.2	5000		385	5450		5	1360-1390
41	5	33	435	770			1.6	4500		450	4350		4	1390-1420
42	5	8	715	815			1.8	6600		385	4050		6	1420-1450
43	6	45	610	765			2.7	5300		430	5200		3	1450-1480
44	7	7	715	820			1.8	3950		450	5600		5	1480-1510
45	7	5	335	370			1.0	5150		535	4550		5	1510-1540
W78-1:046	8	46	123	845			0.9	7200		455	4300		4	1540-1570

COMPANY: Western Mines

PROJECT No.:

ATTENTION: L.W. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

No. 8-550

DATE: Nov. 7, 1978.

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	~~x~~ F ppm	Mn ppm	Au ppb	W ppm	Footage
W78-1:001	9	20	36	270			1.7	13750		365	1250		3	161-190
02	9	15	54	248			1.6	14750		335	1120		2	190-220
03	8	12	30	158			1.5	15000		455	1020		4	220-248
04	17	13	24	260			1.4	15500		500	1020		9	250.5-280
05	14	16	22	147			1.6	15250		415	1085		4	280-310
06	9	12	36	218			1.5	14750		535	1125		5	310-340
07	8	16	32	232			1.6	16000		310	1275		12	340-370
08	3	41	124	168			1.7	13750		350	1180		6	370-400
09	6	12	54	148			1.2	12750		415	1015		4	400-430
10	14	17	37	226			1.2	15500		440	1110		5	430-460
11	18	10	39	164			1.2	15250		405	1105		3	460-490
12	18	20	36	130			1.3	16250		450	1190		4	490-520
13	10	12	106	150			1.5	15250		385	1290		4	520-550
14	9	17	78	298			1.2	13750		355	1155		3	550-580
15	11	17	52	264			1.5	17250		450	1615		2	580-610
16	11	16	129	390			1.3	9500		260	1235		5	610-640
17	8	13	53	290			1.2	14500		345	1430		6	640-670
18	11	12	71	326			1.3	14250		400	1215		5	670-700
19	15	14	88	280			1.3	16000		430	1400		8	700-730
20	12	10	46	171			1.5	13750		425	1235		3	730-760
21	48	13	75	230			1.7	17750		500	1315		4	760-790
22	12	15	83	248			1.5	15250		450	1425		2	790-820
23	8	20	101	400			1.4	16000		415	2400		2	820-850
24	5	25	31	170			1.2	15500		495	2800		3	850-880
25	8	19	32	172			1.2	14000		600	3000		2	880-910
26	9	74	222	236			2.2	14750		405	3100		4	910-940
27	8	49	151	552			1.6	12750		505	4400		7	940-970
28	9	22	49	282			1.4	13250		550	3000		5	970-1000
29	11	16	87	160			1.4	12250		480	3750		4	1000-1030
W78-1:030	12	19	42	425			1.4	15000		430	3550		3	1030-1060

COMPANY: Western Mines

PROJECT No:

ATTENTION: L.W. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

No. 8-412

DATE: Sept. 7, 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		
R3-1L	4	24	8	41			0.9				380			
2L	2	36	13	66			0.9				560			
4L	4	33	12	50			0.8				470			
5L	9	35	15	68			1.3				760			
7L	10	40	12	56			1.4				490			
R3-8L	68	62	26	126			1.5				720			
R4-1L	90	66	24	112			1.6				760			
7L	1	24	10	60			1.0				510			
9L	19	36	17	113			1.1				560			
R4-10L	64	57	26	152			1.7				740			
R5-5L	10	44	12	87			1.5				600			
1L	31	116	18	110			1.4				890			
R6-1L	11	390	19	156			1.6				700			
3L	7	35	15	74			1.5				920			
4L	12	70	18	82			1.9				630			
R6-7L	15	174	15	178			1.7				680			
R7-2L	2	48	17	76			0.8				540			
R1-15L	1	30	11	79			1.0				660			
K17-11L	3	25	24	146			0.9				740			
12L	2	23	16	106			1.0				800			
13L	4	27	29	178			0.9				840			
K17-14L	4	20	16	80			0.9				760		40 mesh	
K19-1L	27	81	15	60			1.1				1040			
14L	6	33	14	73			1.2				580			
15L	3	20	12	59			0.9				520			
16L	10	39	13	70			1.2				500			
17L	3	24	16	66			1.2				600			
18L	12	59	22	83			1.5				470			
K19-19L	2	21	12	61			0.9				520			
K20-3L	15	14	14	46			1.1				4000			

COMP. Western Mines

PROJECT No.

ATTENTION: L.W. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

File No. 8-412

DATE: Sept. 7, 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
K20-4L	2	16	26	81			1.1				640	
5L	3	14	24	66			1.2				590	
K22-1L	2	21	20	63			1.1				600	
K23-7L	1	30	21	54			0.9				660	

COMPANY: Western Mines

PROJECT No.:

ATTENTION: L. Salaken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

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

PHONE (604) 980-5814

No. 8-262

DATE: July 20 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
LWSK1L	13	130	24	111							790	
2L	5	28	26	89							605	
4L	4	22	21	80							700	
LWSK5L	12	30	458	94							775	
LWSR1L	2	28	22	68							785	
2L	1	16	18	50							395	
LWSR3L	2	19	14	46							435	
LWSK3R	2	33	25	69							465	
LWSR4R	2	34	13	39							320	

CERTIFIED BY [signature]

COMPANY: Western Mines

PROJECT No: Rover

ATTENTION: L. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN-EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

No. 8-452

DATE: Sept. 19 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
4S0+50E	7	28										
1+00E	13	35										
1+50E	7	40										
2+00E	9	33										
2+50E	14	99										
3+00E	8	36										
3+50E	48	575										
4+00E	27	1490										
4+50E	9	54										
5+00E	12	315										
5+50E	9	121										
6+00E	8	137										
6+50E	6	114										
7+00E	4	81										
7+50E	16	835										
8+00E	1	28										
8+50E	5	43										
9+00E	90	1360										
9+50E	19	129										
10+00E	36	64										
10+50E	15	99										
4S1 1+20E	3	25										
4S3W	7	34										
0+50W	5	20										
1+00W	5	24										
1+50W	4	27										
2+00W	8	28										
4S2+50W	8	27										
EP448N 106E	43	55										
EP448N 107E	62	107										

COMPANY: Western Mines

PROJECT No.:

ATTENTION: L. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN-EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

No. 8-496

DATE: Oct.6, 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			
5S6+00E	6	158													
7+00E	7	66													
8+00E	7	115													
9+00E	12	345													
10+00E	2	43													
5S0+50E	94	132													
1+50E	25	64													
1+80E	8	22													
2+50E	11	31													
3+50E	20	149													
4+50E	10	91													
5+50E	10	39													
6+50E	10	166													
7+50E	32	855													
8+50E	9	40													
9+50E	10	230													
5S10+50E	14	62													
5S11E	9	25													
5S12E	9	32													
5S13E	4	28													
5S14E	4	16													
5S15E	8	16													
5S16E	7	22													
5S17E	2	25													
5S18E	6	17													
5S19E	7	37													
5S20E	6	21													
5S21E	5	23													
5S22E	4	21													
5S23E	9	22													

CERTIFIED BY: [signature]

COMPANY: Western Mines

PROJECT No.:

ATTENTION: L. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN-EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

No. 8-496

DATE: Oct. 6, 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			
6+50S 0+50E	76	65													
1+50E	10	39													
2+50E	8	22													
3+50E	9	31													
4+50E	42	138													
5+50E	22	32													
6+50E	20	56													
7+50E	14	145													
8+30E	26	705													
8+50E	8	68													
9+50E	16	118													
10+50E	7	33													
11+50E	9	95													
6+50S 0+00	11	38													
1+00E	27	59													
2+00E	6	21													
3+00E	220	200													
4+00E	29	64													
5+00E	26	61													
6+00E	15	109													
7+00E	10	69													
9+00E	6	50													
10+00E	14	88													
11+00E	5	18													
12+00E	8	16													
5S0+00	25	29													
1+00E	26	79													
3+00E	62	131													
4+00E	23	134													
5S5+00E	13	51													

COMPANY: Western Mines

PROJECT No.

ATTENTION: L. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

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

PHONE (604) 980-5814

No. 8-496

DATE: Oct. 6, 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			
5100S	5S 11+50E	4	16					.								
	12+50E	2	36					.								
	13+50E	7	33					.								
	14+50E	2	36					.								
	15+50E	1	20					.								
	16+50E	6	20					.								
	17+50E	3	19					.								
	18+50E	4	12					.								
	19+50E	2	15					.								
	20+50E	1	13					.								
	21+50E	1	16					.								
	5S 22+50E	2	13					.								
8100S.	8S0E	13	39					.								
	8S1E	8	23					.								
	8S2E	6	42					.								
	8S3E	3	19					.								
	8S4E	10	15					.								
	8S5E	8	45					.								
	8S6E	11	30					.								
	8S7E	8	31					.								
	8S8E	5	63					.								
	8S9E	10	12					.								
	8S10E	4	34					.								
	8S11E	6	41					.								
	8S12E	4	82					.								
	8S0+50E	3	21					.								
	1+50E	5	26					.								
	2+50E	8	23					.								
	3+50E	6	25					.								
	8S4+50E	3	58					.								

COMPANY Western Mines

PROJECT No.

ATTENTION: L. Saleken

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

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

PHONE (604) 980-5814

No. 8-496

DATE: Oct.6, 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			
8S5+50E	4	19													
8S6+50E	7	53													
8S7+50E	8	56													
8S8+50E	6	32													
8S9+50E	7	21													
8S10+50E	5	53													
8S11+50E	6	37													
8S12+50E	5	36													

Certified by [signature]

APPENDIX C

PETROGRAPHIC REPORTS

1. Keystone Surface Rocks (Figure 9)

   Number T.S.: OCK 3-1, OCK 4, OCK 9-3, OCK 11-8, OCK 20-7, OCK 21-3

2. Keystone DDH: W-78-1 (Figure 8)

   Number T.S.: 4, 26, WK 29, 30, 31, WK 32, 37, 43, 51, 68A, 69, 110, 111

   Number P.S.: 50, 77, 79, 108, 111, 114

3. Rover Surface Rocks (Figure 9)

   Number T.S.: OCKR 1-3, OCKR 1-7, R 1-9, R 1-10, R 4-8, R 6-6

Vancouver Petrographics Ltd.

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph.D. Geologist

P.O. BOX 39
8887 NASH STREET
FORT LANGLEY, B.C.
V0X 1J0

PHONE (604) 533-1155

4 February 1979

Mr. Len Saleken
Western Mines Ltd.
1103 - 595 Burrard St.
Vancouver, B.C.

Dear Mr. Saleken:

Enclosed please find petrographic descriptions for the suite of 16 thin and polished sections sent to us for examination on January 28. The following summary, persuant to our conversation last Friday, refers only to the thin sections; Jim Mortensen has dealt with the polished sections separately.

Original clast lithologies are fairly consistent between samples. They are as follows:

1) Angular to subrounded coarse quartz and plagioclase as crystals and fragments. These reflect a plutonic source. As not all plagioclases have been sericitized (although all have been albitized) the breccia has sampled unaltered as well as highly altered sources.

2) Porphyritic aplite : intrusive into Eagle?

3) Deformed plutonics, and polycrystalline quartz with deformation-induced sutured borders, of Eagle affinity.

4) Clean to heavily sericitized undeformed plutonics, from post-Eagle intrusions.

5) Volcanic and/or hypabyssal dacites

6) Silicified breccias and igneous rocks.

There seems to be little correlation between degree of alteration and original lithology. In general, however, the isolated albite crystals are not as sericitized as those in plutonic clasts. If they had been sericitized they would not have survived transport. The presence of subrounded quartz and the quartz salients in plutonic clasts (e.g. 51) are indicative of milling during emplacement of the breccia.

Alteration minerals include sericite, quartz, albite, siderite, calcite, pyrite, rutile and minor chlorite. Strong Ca-leaching is indicated for all the samples.

The degree of alteration varies strongly between clasts in any given sample. This is taken to indicate that much alteration preceded their incorporation in the present breccia. A number of them contain veins which terminate at their edges, again indicating earlier mineralization. The veins contain pyrite, quartz and minor barite. Some clasts were silicified prior to their incorporation in the breccia, for instance 26, 51 and 31.

The clasts in 26 and 51 are themselves breccias which were silicified and pyritized after brecciation but prior to inclusion in the present matrix. Is it coincidence that the breccia clasts are silicified, or are they a sample of an earlier hydrothermal system?

Less pronounced alteration has affected the present breccia, including interstitial sericite, pyrite and siderite. In some samples, e.g. 110, pyrite concentrates in the matrix rather than in the clasts. The confinement of sericite to interstices (albite clasts persist in many cases) is suggestive of mild, pore-controlled alteration as opposed to the pervasive sericitization found in many clasts.

The history evidenced by these samples can be summarized as follows:

1) Deformation of Eagle granodiorite
2) Emplacement of younger intrusives and dikes (plus flows?)
3) Uneven alteration (sericite, pyrite, etc)
   In some places brecciation and silicification (multiepisodic?)
4) Quartz-pyrite veining
5) Formation of present breccia
6) Mild alteration.

If you have further questions, please contact me at 228-6993 or 734-3147. Best of luck on your program.

Sincerely yours,

J. Nelson

JoAnne Nelson

P.S. The sections, reject blocks and bill will be sent to you separately.

Vancouver Petrographics Ltd.

JAMES VINNELL, [illegible]
JOHN G. PAYNE [illegible]

P.O. BOX 39
8887 NASH STREET
FORT LANGLEY, B.C.
VOX 1JO

PHONE (604) 888-1323

February 19, 1979

Job LCP-1-79

Mr. L.W. Saleken
Project Geologist
Western Mines Ltd
1103 - 595 Burrard St
Vancouver, B.C. V7X 1C4

Dear Mr. Saleken:

Enclosed are the petrographic descriptions for the two thin sections submitted for description Thursday, February 15. These descriptions generally confirm the verbal report of Friday, February 16. In the written description of the breccia (OCKR 1-3) I have distinguished two types of biotite. Fragmental biotite is oriented(as are all the fragments) and is partly to completely altered to chlorite and epidote. In contrast the fine matrix biotite is unoriented and appears to be stable.

If you have any questions concerning these more detailed descriptions please call me at 228-6993.

The billing for the descriptions will be through Jim Vinnell.

Sincerely,

Lee C. Pigage

Vancouver Petrographics Ltd.

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph.D. Geologist

P.O. BOX 39
8887 NASH STREET
FORT LANGLEY, B.C.
V0X 1J0

PHONE (604) 888-1323

Report for: Mr. L.W.Saleken
Project Geologist
Western Mines Ltd.
1103-595 Burrard St.
Vancouver, B.C.
V7X 1C4

RECEIVED
DEC 18 1978
WESTERN MINES LTD.
(HEAD OFFICE)

Date: 14 Dec. 1978

By: J.Nelson 731-5147 or 228-6495

SUMMARY

Pre-alteration lithologies: The classification used is after Moorehouse, 1959, Study of Rocks in Thin Section. Relevant categories are:

quartz ≥ 5% felsic minerals ≥ 60%	intermediate plagioclase ≥ 95% feldspar	INTRUSIVE Quartz diorite EXTRUSIVE Dacite
	≤ 95% ≥ 67%	INTRUSIVE Granodiorite EXTRUSIVE Rhyodacite

The original plutonic rocks were all quartz diorites with the exception of Ock-20-7, which is a Kspar-poor granodiorite. Similarly the porphyries and the aplite, with the exception of Ock-4-8 (rhyodacite), are poor in Kspar. It is not clear whether the porphyritic rocks were dikes or of volcanic origin. They lack amygdules and cryptocrystalline groundmasses.

Alteration patterns:

Plagioclase- sericite, clay/Fe-oxide dust, saussurite rare : albitized
Kspar- clay
Hornblende- chlorite, epidote, sphene, Fe-oxides, pyrite
Biotite- chlorite, white mica, magnetite, pyrite, Fe-oxides, carbonate

The degree of alteration varies from minor (Ocr-1-10, Ock-20-7) to almost complete (c.f. Ock R6-6). Except in Ock 11-8 where sericite invades quartz, secondary products are confined to their hosts: sericite occurs in plagioclase, chlorite occurs in biotite. This shows that local chemical control was not "swamped out" by hydrothermal processes. Sulfides occur in two samples, Ocr R6-6 and Ock-4. The latter contains traces of sphalerite, is veined, and contains siderite.

The amount of original biotite can be estimated from the amount of chlorite present.

OCKR 1-3 Biotite quartz diorite inclusions within biotite-quartz-plagioclase intrusive breccia

The thin section contains inclusions of coarse-grained (2-4 mm) biotite quartz diorite in a fine-grained intrusive breccia(0.2-1 mm). Approximate modes of the two rock types are listed below.

Mode

quartz diorite	breccia	
60	50	plagioclase
20	30	quartz
20	15	biotite
tr	tr	epidote
tr	tr	chlorite
tr	5	muscovite
	local	opaques

The quartz diorite is hypidiomorphic granular. Plagioclase compositions range from An(25)-An(30) (Michel-Levy method). Biotite pleochroism is dark brown to pale brown. Biotite is locally altered to green chlorite and greenish yellow epidote.

The breccia surrounding the quartz diorite consists of angular fragments of quartz, plagioclase, and biotite in a fine-grained matrix containing quartz, plagioclase, muscovite, and biotite. The fragments are larger near one edge of the thin section. Fragments generally consist of single crystals rather than aggregates of grains.

The coarse biotite fragments are partly to completely altered to chlorite and epidote. Often these fragments are warped or kinked. In contrast to these fragments the fine biotite in the matrix is not altered. These small biotite grains have a deep brown to green pleochroism (slightly different than the pleochroism for the quartz diorite biotites). These matrix grains do not appear to be oriented.

The fragments in the breccia define a crude foliation that is not parallel to the edges of the quartz diorite inclusions. Plagioclase in the breccia contains a light sericite dusting. Sericite alteration in the quartz diorite is more extensive near the enclosing breccia. Large opaque aggregates are confined to the breccia.

OCKR 1-7 Quartz-plagioclase aplite

This sample contains subhedral to eihedral quartz and plagioclase phenocrysts (2 mm across) in a fine-grained matrix consisting of quartz, plagioclase, and muscovite. Plagioclase phenocrysts commonly are glomeroporphyric. Grains in the matrix are anhedral with an aplitic texture. The slide contains one small quartz veinlet; muscovite rosettes are associated with the quartz in the veinlet.

Mode

quartz	50
plagioclase	40
muscovite	10
zircon	tr
opaques	tr

Plagioclase phenocrysts show abundant twinning. Plagioclase compositions range from An(20) to An(30) (Michel-Levy method). Typically the plagioclase phenocrysts have a heavy to light sericite dusting. Plagioclase in the matrix also contains sericite(although to a lesser extent than the phenocrysts). Phenocryst margins are irregular and appear to be embayed by quartz. One plagioclase phenocryst is "broken" and slightly displaced by the quartz veinlet.

Coarse muscovite in the matrix is associated with opaques and zircon; it may represent alteration of earlier biotite. Muscovite in the matrix is randomly oriented.

Quartz phenocrysts are subhedral to euhedral. They have irregular margins with overgrowth rims which have included small grains of the matrix. One phenocryst appears to be continuous across the small quartz-muscovite veinlet.

R 1-9 : Dacite

This rock is seriate porphyritic with large, partly sericitized/clay altered plagioclase and rounded quartz phenocrysts. Smaller phenocrysts include plagioclase, Kspar, hornblende, sphene, and allanite.

Mode

Plagioclase	70	- 5% sericitized
Quartz	10	
Hornblende	5	
Chlorite	6	
Epidote	2	
Sphene	1	
Opaques	1	
Allanite	<1	
Apatite	<1	
Kspar	5	

Plagioclase phenocrysts are euhedral to rounded. Glomeroporphyritic clumps are common. All except those which have been albitized show oscillatory zoning. Compositions vary from An 37 to albite. Alteration includes sericite(minor) and dusting with clay and fine Fe-oxides.
Kspar forms small dusty phenocrysts and occurs in the matrix intergrown with plagioclase and quartz.
Rounded quartz phenocrysts show wormy edges due to intergrowth with their surroundings. Quartz is also present in the matrix.
Hornblende forms dark to pale green euhedral phenocrysts, partly altered to chlorite and epidote.
Chlorite occurs as patches in the matrix as well as after hornblende.
Large idiomorphic epidote crystals mimic original hornblende phenocrysts.
Coarse anhedral epidote grows with sphene and chlorite inside relict hornblendes.
Opaques, probably magnetite/ilmenite, are finely disseminated in the matrix.
Euhedral, twinned brown allanite phenocrysts appear fresh.
Sparse apatite needles are present.

R 1-10 : Quartz diorite

This rock is relatively fresh: mafics are partially chloritized but plagioclase is only weakly clay-altered at the edges. It is coarse grained, with an average grainsize of 3 mm. Grainsize is somewhat variable as is the percent of mafic minerals. The plagioclase differs from that in more typical plutonics e.g. Ock 20-7. It does not show oscillatory zoning and inclusions of quartz show that it continued to crystallize until a late stage of cooling.

Mode	
Kspar	1
Plagioclase	59
Quartz	20
Biotite	5
Hornblende	1
Chlorite	5
Sericite	5
Opaques	3
Epidote	1
Apatite	<1

Plagioclase (An35) crystals, slightly normal zoned, are subhedral to anhedral. Some contain rounded quartz inclusions. One interdigitates with biotite. Minor strain effects include subgrains (coarse) and bent albite twins.
Quartz, with undulatory extinction, is mostly interstitial.
Kspar is also interstitial.
Brown biotite forms clumps and sheaves.
One large hornblende grain grows around small biotite plates at its edges.
Chlorite invades biotite along the 001 cleavage. It is bright green with purple anomalous extinction.
Sericite as well as clay concentrate around the edges of plagioclase grains. Coarse white mica accompanies chlorite in a few biotite replacements.
Opaques, magnetite and/or ilmenite, occur as rounded grains interstitial to and more rarely inside plagioclase. These are primary. Secondary opaques are finely disseminated inside chlorite.
Epidote in large grains and grain aggregates grows with chlorite. Most are yellow green; a few are clear.
Stubby apatite prisms tend to concentrate in biotite.

Ock 3-1 : Quartz diorite

This rock originally was a quartz diorite with no Kspar. It has a coarse grained equigranular texture, average grainsize 2 mm, with scattered larger biotite and hornblende crystals. Plagioclase has been albitized, sericitized, and clay-altered. Iron oxide and chlorite replace the mafics. Other secondary phases are epidote and siderite.

Mode

Albite	50
Sericite	20
Quartz	15
Chlorite	10
Fe-oxides	3
Opaques	2
Apatite	<1
Zircon	<1
Epidote	<1
Siderite	<1

Albite crystals are euhedral to subhedral. A few perhaps originally Na-rich rims are relatively clear; these are myrmekitic. Synneusis was observed in a few places. (Indicative of melt not solid-state origin.) The interiors of the grains are obscured by heavy sericite/clay.
Coarse white mica accompanies chlorite in biotite pseudomorphs.
Quartz as a primary phase occurs interstitial to plagioclase.
Polycrystalline quartz blebs lie along the 001 direction in coarse chlorite which has replaced biotite.
Chlorite, restricted to biotite pseudomorphs, has anomalous blue-purple extinction.
Iron oxides form pseudomorphs of prismatic hornblende.
Opaques, magnetite and/or ilmenite, form rounded scattered grains and fine ragged clumps inside chlorite.
Apatite in euhedral prisms tends to cluster with primary mafics.
A few clear zircon grains were noted.
Epidote forms small ragged grains in chlorite.
Irregular patches of siderite grow in some chlorites.

Vancouver Petrographics Ltd.

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph.D. Geologist

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4 Quartz diorite clast in breccia matrix

This clast, like WK 29, is coarse grained equigranular and preserves its original plutonic textures. It is assumed to be a quartz diorite, although the lack of euhedral feldspar outlines may indicate the presence of original Kspar. It contains biotite and horhblende pseudomorphs.

Mode (clast)

Sericite	65
Quartz	25
Pyrite	7
Rutile	2
Apatite,siderite	1

Microcrystalline sericite masses replace the original feldspar. In places coarser radiating white mica has developed. Large white mica plates crammed with opaques and rutile pseudomorph biotite.
Quartz forms an interlocking nearly eutectoid fabric with plagioclase outlines. Fingers of sericite advance into it.
Pyrite shows anhedral outlines. Elongate pyrite aggregates fill veins along with quartz and minor siderite. There are no veins in the breccia matrix.
Clusters of fine granular rutile define prismatic hornblende pseudomorphs. Fine acicular apatite occurs in biotite pseudomorphs.

Finer clasts and breccia matrix:

Clasts- 1) Plutonics, polycrystalline quartz and euhedral tabular plagioclase
2) Porphyritic aplite
3) Quartz, plagioclase, angular

Matrix- sericite, interstitial siderite aggregates.

Ock-4 : Quartz diorite

Like Ock 3-1, this rock was originally a coarse grained equigranular quartz diorite lacking Kspar. Plagioclase has been albitized, sericitized, and altered to clay. Chlorite, pyrite, iron oxides and white mica replace the original mafics. Other secondary minerals include siderite and minor sphalerite. Small shear zones now occupied by sericite, pyrite and siderite slice plagioclase crystals.

Mode

Albite	35
Sericite/white mica	28
Quartz	20
Pyrite	9
Fe-oxides	1
Chlorite	1
Apatite	<1
Hornblende	<1
Zircon	<1
Sphalerite	<1
Siderite	5

Albite crystals are euhedral to subhedral. Patterns of sericite and clay distribution hint at original oscillatory zoning.
Coarse white mica plates, possibly original, are kinked and in the process of conversion to fine grained aggregates. Opaques and siderite grow within them, particularily along cleavages.
Primary quartz is interstitial to plagioclase.
Pyrite stringers follow cleavages and grain boundaries of albite and cleavages and fractures of chlorite in biotite pseudomorphs. Pyrite accompanies siderite and sericite in aggregates which have developed at the expense of quartz-albite.
In shears, elongate pyrite aggregates have cuspate/lobate grain boundaries.
Iron oxides form large prismatic pseudomorphs of hornblende.
Chlorite, with sericite and siderite, replaces biotite plates.
Apatite forms prisms to .5 mm long. Clusters of anhedral grains with pyrite may be secondary.
A few anhedral hornblende grains are preserved within quartz.
Anhedral irregular grey sphalerite grains grow with and near pyrite and siderite.
A few zircons were noted.

R4-8 : Rhyodacite (fine-grained intrusive?)

The average grainsize of this rock, mm, is intermediate between plutonic and extrusive. It is probably a small intrusive. It contains a few larger original plagioclase phenocrysts. The white mica, if primary, suggests elevated water pressure at the time of crystallization.

Mode

Albite	54
Kspar	25
Quartz	5
Muscovite	7
Chlorite	5
Magnetite	3
Fe-oxides	1
Epidote	3
Apatite	1
Calcite	1
Sphene	<1

Albite crystals are euhedral (phenocrysts) to subhedral (matrix). Overgrowths on euhedral prisms are myrmekitic. All plagioclase is heavily altered to beige clay.

Kspar is interstitial to plagioclase and, like it, heavily dusted with clay.

Quartz is clear and interstitial.

Coarse muscovite plates interstitial to plagioclase appear to be original.

Radiating fine white mica and mica within mafic pseudomorphs is secondary.

Epidote occurs as coarse scattered saussurite and as aggregates, in one case of unusually long columns, inside quartz.

Magnetite grains, some of them cubic, are scattered throughout the section.

Ragged iron oxide patches occur with chlorite and white mica in pseudomorphs of original mafic minerals.

Long apatite rods, possibly secondary, occur inside plagioclase.

Ragged calcite grains and grain aggregates are generally interstitial to plagioclase.

Sphene and epidote in aggregates of fine grains accompany chlorite in pseudomorphs. A few pseudomorphs containing carbonate, chlorite and white mica are bounded by opaques.

R6-6 : Quartz Diorite

This rock was originally a quartz diorite displaying prominent myrmekite. Average grain size is 2 mm. Plagioclase is about 2/3 albite, the rest sericite and clay. Mafics have altered to coarse chlorite/ epidote aggregates. Large isolated pyrite grains are rimmed with iron oxide.

Mode

Albite	40
Kspar (microcline)	4
Quartz	20
Sericite	7
Epidote	5
Calcite	3
Chlorite	20
Pyrite	1
Apatite	<1

Albite crystals are subhedral to euhedral with striking myrmekitic overgrowths. They are all heavily altered to Fe-oxides and clay. Sericite tends to be irregularily distributed and concentrates in the cores of crystals, which then take a strong yellow stain.
Quartz is interstitial to plagioclase and intergrows with it in the myrmekite.
Epidote is coarse and euhedral; with chlorite, it mimics original hornblendes. Some chlorite is probably after biotite. It also grows in small clumps across plagioclases.
Pyrite grain aggregates are sparse but large. Iron oxides rim them and invade them along fractures.
Long apatite rods are probably secondary or very late as they cross grain boundaries.

Ock 9-3 : Quartz diorite

This rock was originally a coarse grained equigranular quartz diorite (average grain size 2 mm). Plagioclase has been clay altered and sericitized and albitized. Chlorite, white mica, pyrite and opaque minerals (magnetite-ilmenite?) replace the original mafics. Iron oxides pseudomorph hornblende.
Mode

Albite	54
Sericite	10
Quartz	15
Chlorite	10
Fe-oxides	9
Pyrite	1
Opaques	<1
Epidote	<1
Apatite	<1
Zircon	<1
Biotite	<1
Hornblende	<1
Carbonate	<1
Kspar	1

Albite crystals are euhedral to subhedral. They are heavily altered to clay, with subsidiary sericite. The rims tend to be clearer than the cores. Sericite aggregates are more abundant in the cores of albite crystals than at their rims. Some albites are heavily sericitized while others contain only a few flecks. Coarse white mica accompanies chlorite in some biotite pseudomorphs.
Quartz is interstitial to plagioclase, as is Kspar.
Chlorite occurs after biotite.
Iron oxides spot albite and occur inside chlorite. They replace pyrite in fractures. Prismatic patches are probably hornblende pseudomorphs.
Pyrite, heavily corroded and rimmed by iron oxides, occurs with chlorite and in fractures.
Black opaques, probably magnetite-ilmenite, occur as discrete disseminated grains and clusters interstitial to plagioclase, surrounded by white mica. Small ragged opaques accompany chlorite.
Minor biotite and hornblende remain, the latter preserved within quartz. Textures indicate that biotite crystallized after plagioclase but before quartz.
Apatite forms clusters of dusty grains with biotite.
A few zircon grains were observed.
Epidote in ragged grains occurs inside chlorite in a few places.
One grain of carbonate grows within otherwise pristine biotite enclosed in quartz

Ock 11-8 : Contact between sericitized felsic intrusive and aplite

This section contains two types of textures: an aplitic portion, and a coarse-grained intrusive portion. In the latter grainsize decreases towards the aplite dike and primary feldspar becomes less euhedral, verging towards textural equality with quartz. The aplite is clearly intrusive, as shown by a stringer of fine grained material invading the coarser side. The feldspar has been almost completely replaced by sericite aggregates. No original Kspar is evident. Only a few ghosts of original mafics remain.

Mode

Quartz	45
Sericite/white mica	45
Fe-oxides	5
Albite	5

Original plagioclase in the aplitic portion was anhedral and intergrown with quartz. In the coarsest portion it was subhedral to euhedral with quartz strictly interstitial. A transition occurs towards the aplite.
All but a minor remnant is now an aggregate of plates of white mica. The sericite has even begun to invade the borders of neighboring quartz grains.
In one case coarse white mica mimics an original biotite grain.
Iron oxides form prismatic pseudomorphs which were probably hornblende.
They also fill fractures and form random(?) concentrations, now largely plucked out in sectioning.

Ock 20-7 : Granodiorite

This is one of the freshest samples and the most Kspar-rich. It is coarse-grained equigranular (average grainsize ≥ mm) with a few larger mafics. Minor sericitization and clay alteration affect the feldspars; some chlorite and epidote invade biotite.

The section contains one clump of relatively fine-grained mafics which may be a "restite" inclusion.

Mode

Plagioclase	58
Quartz	15
Kspar(orthoclase)	7
Biotite	7
Hornblende	5
Sphene	2
Chlorite	3
Opaques	3
Siderite	<1
Apatite	<1
Epidote	<1

Plagioclase crystals are euhedral to subhedral with minor myrmekitic rims. They are oscillatory zoned An 40 to An 0; relatively sodic corroded cores are common. Sericitization/clay alteration has been slight.
Quartz is interstitial to plagioclase.
Orthoclase occurs interstitially and is dustier than plagioclase.
Brown biotite includes apatite, opaques, white mica, and carbonate (all minor). It is interstitial to plagioclase but idiomorphic against quartz and orthoclase.
Green hornblende includes biotite, plagioclase, and opaques. It includes as well as intergrows with sphene. It is generally euhedral.
Large euhedral primary sphene is intergrown with biotite or hornblende; or it occurs as isolated grains. Some is interstitial to plagioclase, although plagioclase inclusions were also observed. A reaction rim of sphene forms in one case between chlorite (after biotite) and opaques.
Chlorite penetrates along the 001 cleavage in biotite, in some cases replacing it totally.
Opaques, magnetite and/or ilmenite, occur as rounded grains concentrated with the mafics.
Clusters of euhedral apatite prisms also show an affinity for biotite/ hornblende.
Epidote and siderite are very minor secondary phases.
Sericite occurs along cleavages in one large hornblende crystal.

Ock 21-3 : Dacite

The original rock probably was a dacite porphyry: relict phenocrysts include plagioclase, hornblende with plagioclase inclusions, and biotite. Staining failed to show the presence of kspar.

Chlorite replaces hornblende; chlorite-white mica-opaque pseudomorphs represent original biotite. Plagioclase has completely altered to albite-sericite. Other secondary phases are calcite, siderite and iron oxides.

Mode

Albite	40
Sericite	20
Quartz	15
Chlorite	10
Opaques	5
Calcite/siderite	7
Fe-oxides	2
Apatite	1
Sphene	<1

Albite phenocrysts are stubby euhedral prisms, often clumped. Anhedral albite also intergrows with quartz in the matrix.
Sericite as flecks and small plates concentrates in albite phenocrysts, but also occurs in the matrix. White mica interfingers with chlorite in biotite pseudomorphs, both mimicking the orientation of the original mineral.
Clear anhedral quartz appears only in the matrix, not as phencrysts. It seems to be primary rather than the product of silicification.
Coarse chlorite occurs within relict mafic phenocrysts. Disseminated small chlorite plates in the matrix may either mimic small original mafics or involve redistribution of constituents to new sites of crystallization.
Opaques, magnetite and/or ilmenite, form clumps after original mafics in a few cases. They occur as scattered rounded to euhedral grains elsewhere. Small ragged opaque grains accompany chlorite pseudomorphs.
Siderite is distinguished from calcite by its high relief. Both grow in discontinuous veinlets, as ragged isolated patches, and rarely in pseudomorphs of mafic phenocrysts.
Iron oxides occur along cleavage fractures in albite phenocrysts and as irregular patches and fracture fillings throughout the rock.
Euhedral apatite grains to .3 mm long are distributed in the matrix, tending to accompany mafics.
A few small ragged sphene grains were noted within chlorite.

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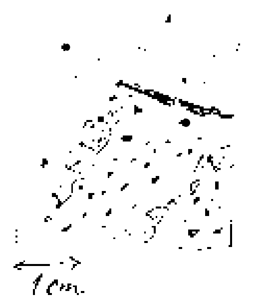
26 Breccia with silicified breccia clast

The large clast in this breccia contains the clear outlines of angular clasts and tabular plagioclases in plane light. Under crossed nicols these are seen to consist of interlocking quartz aggregates. Its general texture under crossed nicols is of granular quartz separated by sericite with a slight parallel fabric. This breccia in turn is cut by finer breccia zones which contain angular quartz clasts larger than the quartz in the surrounding rock: thus they must have been transported in, signifying an early mobilization event. Quartz-pyrite veins cut both phases of brecciation. One vein defines an edge of the clast. It was a plane of mechanical weakness during rebrecciation.

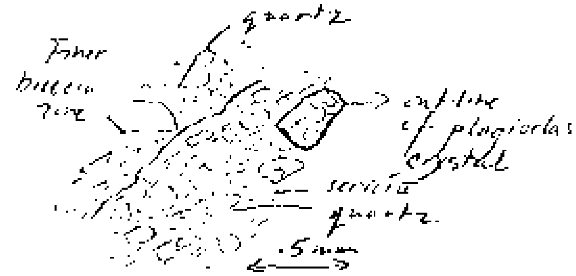
The breccia clast shows a complicated history:
1) brecciation 2) silicification 3) rebrecciation, incorporation into foreign matrix 4) quartz-pyrite veining 5) incorporation into present breccia

Mode (clast)

Quartz	60
Sericite	32
Pyrite	7
Rutile	1
Sphalerite	tr
Zircon	tr



1. Distribution of finer breccia zones in clast



2. Detail showing breccia and silicification textures

Finer clasts and breccia matrix:

Clasts- 1) Coarse plutonics, tabular plagioclase with interstitial quartz
2) Plutonics, polycrystalline quartz with sutured borders
3) Quartz, both monocrystalline and polycrystalline aggregates with sutured borders
4) Plagioclase crystals and fragments, some fractured with twins displaced
5) Siderite clumps, some with quartz. One has a tabular outline, possibly a plagioclase pseudomorph.
6) Sericitized dacite(?)- Matrix consists of a matte of fine plagioclase laths.
7) Rutile as isolated grains as well as in fragments.

Matrix- sericite, Pyrite rare, strongly concentrated in fragment.

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WK 29 Breccia with coarse grained quartz diorite clast

This clast resembles surface rocks of the post-Eagle intrusions e.g. OCR6-6 as well as many smaller clasts in the breccias. It is coarse grained equigranular (average grain size 2 mm) with original igneous textures preserved despite the pervasive sericitization of the plagioclase. It originally contained about 5% biotite, 3% hornblende.

Mode (clast)

Sericite	70
Quartz	25
Pyrite	3
Rutile	2
Biotite, apatite, zircon	tr

Microcrystalline sericite aggregates showing some crystallographic orientation replace original tabular to subhedral plagioclases. Coarse white mica plates after biotite are crammed with opaques and rutile.
Quartz forms coarse anhedral grains interstitial to original plagioclase.
Fine grained quartz aggregates may be the onset of silicification.
Small rounded pyrite grains (average .1 mm) are more concentrated in some areas than others. They also occur in veins.
Clusters of fine granular rutile define prismatic hornblende pseudomorphs.
A few grains of original biotite are preserved inside quartz.

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30 Breccia with dacite clasts

Clast 1: This contains large green-stained sericitized plagioclase phenocrysts, originally clumped, in a highly altered matrix which consisted of microcrystalline quartz and lath-shaped plagioclase. Siderite occurs in pseudomorphed phenocrysts and in the matrix. A few discontinuous veinlike siderite trains have developed. Sericite forms dense aggregates as well as fine seams in both matrix and phenocrysts. Many of the scattered pyrite grains are euhedral.

Mode:	Sericite	45
	Albite	27
	Siderite	15
	Quartz	10
	Pyrite	3

Clast 2: This is one of the porphyritic aplites, consisting of 50% clumped euhedral plagioclase phenocrysts from .5 to 4 mm long in a fine grained interlocking aplitic matrix. Apatite prisms range up to .5 mm long. The plagioclases are albitized and flecked with sericite, clay and siderite. The degree of alteration is mild compared to Clast 1.

Mode:	Albite	60
	Sericite	24
	Quartz	10
	Siderite	3
	Pyrite	2
	Apatite	1

Finer clasts:

1) Deformed plutonics - plagioclase twins bent, quartz with sutured borders
2) Undeformed plutonics with radiating secondary white mica
3) Quartz, subangular to subrounded, some polycrystalline with sutured borders
4) Porphyritic aplite
5) plagioclase

Matrix:

Sericite, siderite, patches of chlorite rosettes

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31 Breccia with silicified clast

The original lithology of the clast is not as obvious as in 26. It may have either been a breccia or a porphyry. Outlines of tabular plagioclase phenocrysts in plane light are seen under crossed nicols to be aggregates of quartz. Its general texture is of equant quartz grains (average .2 mm diameter) separated by fine sericite masses. Sparse white mica plates and rutile clusters may be pseudomorphs of biotite and hornblende respectively: this suggests an igneous origin as biotite and hornblende are rare as isolated clasts in breccias of this suite. A set of parallel quartz-pyrite veins cuts it.

Mode (clast)

Sericite	60
Quartz	35
Pyrite	5
Zircon, apatite	tr
Rutile	tr

Finer clasts and breccia matrix:

Clasts- 1) Kinked plutonic of Eagle affinity, kink defined by polygonal interdigitating quartz
2) Plagioclase, degree of sericitization variable
3) Aplite
4) Coarse plutonics, some with coarse white mica; sutured borders on quartz
5) Angular to subrounded quartz

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WK 32 Breccia with coarse dacite porphyry clast

The large clast in this sample is a dacite porphyry containing abundant plagioclase phenocrysts up to 10 mm across and brownish dusty hornblende pseudomorphs in a matrix dominated by euhedral to subhedral plagioclase laths.

Mode (clast)

Sericite+clay	50
Albite	34
Siderite	10
Quartz	3
Pyrite	2
Rutile	1
Sphalerite	tr
Apatite	tr

Primary plagioclase has been albitized and heavily dusted with sericite and clay.
Siderite in some cases pseudomorphs plagioclase. Irregular siderite grains are also scattered throughout the matrix of the dacite. Some clear clusters may have been vesicles(?).
Quartz is confined to the matrix of the dacite: there are no quartz phenocrysts. It occurs as equant interstitial grains.
Very fine disseminated pyrite occurs in the dacite.
Rutile needles in biotite pseudomorphs show orientations along crystallographic planes at 60°. Rutile occurs as raggedly terminated grains throughout the dacite, ranging down to submicroscopic size.
Sphalerite is confined to the dacite clast. Rare xenoblastic sphalerite grains are surrounded by clear siderite and in one case by euhedral quartz and small pockets containing chlorite rosettes.
Scattered apatite prisms range up to 1 mm long.

Smaller clasts and breccia matrix:

Clasts-
1) Angular, rarely subangular quartz
2) Polycrystalline quartz with sutured borders
3) Plutonics, quartz partly recrystallized to finer aggregates
4) Plutonics, igneous quartz, plagioclase lightly to moderately sericitized
5) Angular pieces, crystals of plagioclase (albite, unsericitized)
6) Aplitic dacite

Matrix- Interstitial sericite, pyrite growing over clast-matrix borders, siderite.

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37 Breccia with irregular porphyritic aplite fragments

The large clasts in this sample appear grey and cherty in hand sample with scattered large plagioclase phenocrysts. Their matrix consists of very fine grained interlocking felsics, heavily dusted with sericite and clay. The matrix has a fabric defined by alternations in dense sericite and fine-grained angular quartz masses; and by parallel orientation of sericite platelets. It is swirled and inconsistent. Veinlets cut both fragments and matrix. They are discontinuous, in response to different fracturing characteristics or chemical compositions.

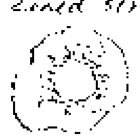
Mode (whole sample)

Sericite	50
Quartz(+albite?)	42
Pyrite	5
Siderite	3
Barite	tr

Sericite completely replaces the plagioclase phenocrysts in the clast.
Finer clasts in the breccia matrix with tabular to angular outlines are replaced by quartz aggregates, indicative of silicification.
Pyrite occurs in veins and also disseminated. It concentrates in the matrix rather than in the clasts.
Siderite as small ragged grains is scattered in the sericitic portions of the matrix. It also accompanies sericite in pseudomorphs of plagioclase in the clasts.
Barite is confined to veins.
A few large white mica clasts in the matrix are partly converted to finer sericite.
One quartz clast in the matrix has a texture suggestive of open-space filling.

The history of this sample has involved 1) brecciation of the aplite 2) incorporation in foreign matrix, emplacement accompanied by fluidization as shown by fabric of matrix and 3) silicification in matrix, veining.

Quartz crystal with zoned [illegible] inclusions



(clast in breccia)

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43 Breccia with Quartz diorite clast

The clast in this sample is a coarse-grained (average 2 mm grain size) equigranular plutonic. Although the feldspar in it has been completely converted to fine sericite, it is designated a quartz diorite by analogy with unaltered surface rocks of similar texture such as OCR6-6. It contains about 4% biotite pseudomorphs. It resembles the large clast in WK29 and other smaller clasts. A set of quartz-pyrite-barite-white mica veins cuts across it.

Mode (clast)

Sericite	56
Quartz	25
Siderite	10
Pyrite	5
Barite	2
Rutile	2
Zircon, apatite	tr

Sericite aggregates are dusty due to admixed clays. Sericite has three modes of occurrence: as very fine dense aggregates, as seams following crystallographic directions in original feldspar, and as coarser sprays. Coarse white mica plates replace biotite.
Most quartz exhibits original plutonic morphologies, interstitial to plagioclase. Quartz in veins has recrystallized to finer polygonal aggregates.
Siderite occurs inside to sericitized feldspars as discrete ragged grains surrounded by sericite.
Pyrite concentrates strongly along veins. Elsewhere,small pyrite grains are disseminated in the clast and occur in biotite pseudomorphs.
Columnar barite grows in the veins perpendicular to their margins.
Clusters of fine granular rutile have outlines suggestive of original hornblendes.
Apatite clusters preferentially with biotite and hornblende pseudomorphs. This is a typical plutonic habit.
One zircon prism was noted.

Smaller clasts and breccia matrix:

Clasts- 1) Plagioclase, tend to be single crystals, some partly sericitized, some flecked with siderite; some angular fragments
2) Angular, rarely subrounded quartz
3) Clumps of siderite with even boundaries : clasts?

Matrix- interstitial sericite

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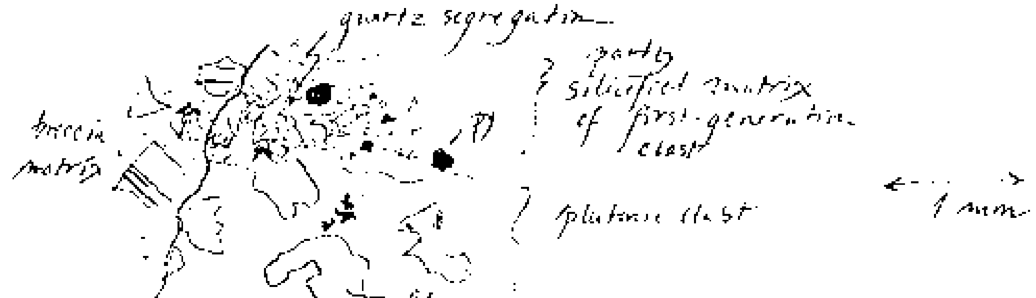
51 Medium grained quartz diorite enclosed in silicified breccia; rebrecciated and enclosed in unsilicified breccia

The textures in this sample show two episodes of brecciation separated by a silicification event which developed patches of coarse quartz in the matrix of the first generation clast. The first generation breccia clast contains more pyrite, sericite and clay than the matrix, additional evidence for alteration prior to its refragmentation and incorporation in the present breccia matrix.

<u>Plutonic clasts within first-generation clast</u>: These are medium-grained quartz diorites with remnant plutonic quartz, sericitized plagioclase, and biotite pseudomorphed by coarse white mica. Tabular plagioclase outlines are still visible in places. They contain clustered apatite. The two clasts are texturally identical, although they stain differently. They are separated along a matrix-filled crack.

<u>Matrix of first generation clast:</u> Besides the plutonics described above, the clast contains polycrystalline quartz with sutured borders (Eagle), single grains of quartz ranging down to microcrystalline in size, plutonics in which the quartz is partly recrystallized to fine grained aggregates, scattered euhedral to anhedral pyrite, and one zircon prism. Its matrix includes fine-grained sericitic interlocking quartz as well as dense sericite. Quartz segregations have developed in places. The clast as a whole is angular, as are the fragments it contains. In detail its margins are irregular with quartz grains slightly protruding: this results from abrasion during transport.

<u>Second generation breccia</u>: Smaller clasts include angular to subangular quartz and albite(n.b. not sericitized), single clear grains and rounded clumps of siderite, minor calcite, porphyritic aplite, polycrystalline quartz with sutured borders, and plutonics with sericitized plagioclase and white mica after biotite. Trains of fine quartz in one of these last may be a silicification feature. Pyrite is not as common here as in the first generation clast. Its matrix is sericite; there is no indication of silicification.



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68A Glassy dacite in breccia matrix

The large fragment in this sample was originally a glassy to holocrystalline volcanic or hypabyssal rock. The glassy part contains relict spherulites. They as well as the matrix are now heavily sideritized.

Mode (clast)

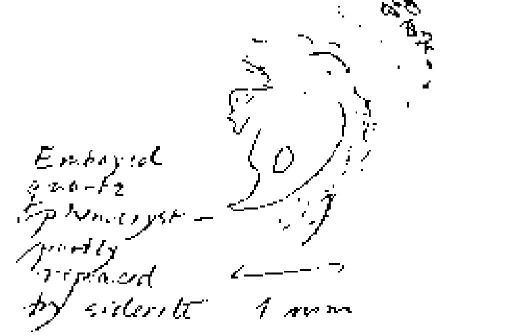
Siderite	78
Sericite	20
Quartz	1
Pyrite	1
Sphalerite	tr
Chlorite	tr

Most siderite is dusty, partly altered to Fe-oxides. It forms an interlocking mass replacing the clast. Single clear grains replace rounded spherulites. The shapes of some siderite aggregates in the clast suggest fragments or broken phenocrysts.
Sericite forms microcrystalline aggregates intergrown with siderite; in the holocrystalline part it pseudomorphs plagioclase laths.
Quartz phenocrysts are rounded and embayed. Siderite encroaches on them.
A vein with diffuse edges cuts the clast. Fine pyrite concentrates in the vein selvages as well as at the edges of the clast, both in it and in the breccia matrix. Scattered anhedral pyrite grains in the matrix range from .2 to .5 mm diameter.
Sphalerite in the clast forms xenoblastic grains and aggregates rimmed with opaque. They associate with siderite and are most common at and near the edge of the clast, both in it and in the breccia matrix.
A few patches of chlorite rosettes occur in the clast.

Finer clasts and breccia matrix:

Clasts- 1) Angular quartz, plagioclase
2) Aplite
3) Coarse radiating sericite
4) Polycrystalline quartz
5) Muscovite (one)

Matrix- sericite; post-formation pyrite



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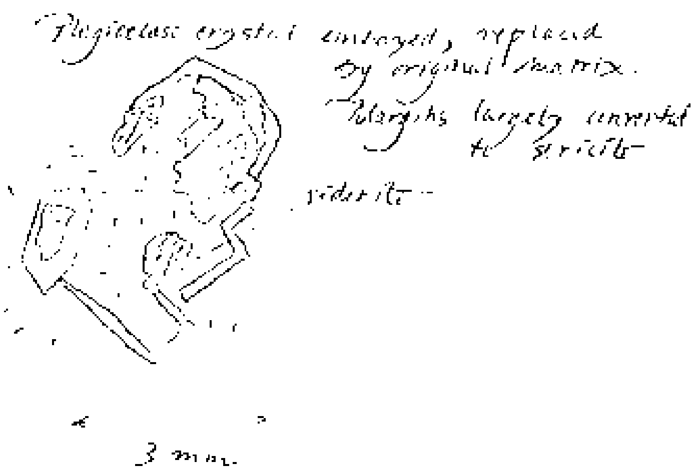
69 Dacite(?)

This sample contains rounded clumped quartz phenocrysts and sericitized plagioclase(?) pseudomorphs. Original biotite phenocrysts are partly replaced by carbonate; some white mica plates may also be after biotite. Irregular rounded structures may be amygdules; they are now dusty siderite aggregates. One large siderite structure is believed to be a xenolith. Alteration is heavy, involving both siderite and sericite.

Mode

Sericite(+coarse white mica)	37
Carbonate	30
Albite	15
Pyrite	10
Biotite,chlorite	5
Quartz	3

Sericite is a dominant constituent of the matrix, replacing plagioclase laths which are still visible in outline. Coarse white mica plates are considered to be biotite pseudomorphs. Fractures in quartz phenocrysts are infilled with white mica.
Carbonate includes both siderite (dominant) and calcite. It replaces plagioclase, both phenocrysts and matrix, and rims and apparently replaces quartz phenocrysts.
Albite crystals in the matrix are lath-shaped and average .2 mm in length.
Anhedral pyrite, averaging .05 mm in diameter, are scattered in the matrix.
Biotite, partly altered to chlorite, occurs interstitially in the matrix. It may be either green or brown.
Quartz only occurs as phenocrysts, unstable and altering to carbonate. Silicification has not affected this sample.



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110 Breccia with seriate porphyritic dacite clast

Plagioclase phenocrysts in the dacite clast have tabular outlines. Many of them have been completely replaced by sericite and siderite. Relict hornblende phenocrysts consist of siderite and sericite with scattered rutile; a few have clusters of chlorite rosettes in their cores. The matrix originally was dominated by plagioclase laths averaging .1 mm long. This resembles the large clast in WK 32 more than any other sample in the suite.

Mode

Albite	73
Sericite	20
Siderite	5
Rutile	2
Apatite	tr
Pyrite	tr

This is one of the less altered of the clasts, as is reflected in its high remaining albite content. Original plagioclase phenocrysts ranged from .5 to 2 mm long. Sericite(+clay) are dusted throughout them, but only in some constitute pervasive alteration.
Siderite replaces phenocrysts, mostly those of hornblende. Original hornblende phenocrysts constituted about 8% of the rock.
Scattered fine granular rutile occupies hornblende pseudomorphs.
Scattered apatite prisms range up to .3 mm long.
Rare very fine grained pyrite occurs as anhedra and cubes. This contrasts with a higher pyrite content(3%) in the matrix. Pyritisation probably affected to breccia matrix after its formation; the higher concentration in matrix than clasts would be the result of higher permeability in the former.

<u>Finer clasts and breccia matrix:</u>

Clasts- 1) Silicified breccia, clear clasts replaced by quartz and pyrite
2) porphyritic aplite
3) Plutonics- tabular plagioclase with interstitial quartz, sideritized plagioclase with recrystallized quartz and quartz veins, sericitized plagioclase with large secondary white mica
4) Quartz, angular, rarely subrounded
5) Plagioclase crystals and fragments

Matrix- sericite. Secondary pyrite. Clasts range down to .05 mm.

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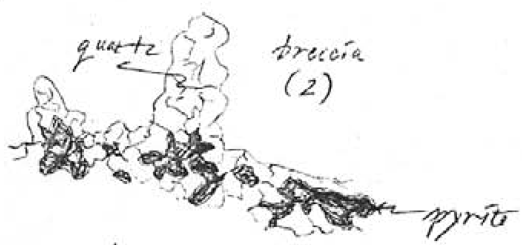
the contact between the quartz vein and (1) is straight and sharp with angular breaks.

The vein and the lower portion of the section together constitute a fragment of an earlier breccia which, prior to incorporation in the present matrix, was silicified, sericitized, and veined. Most of the mineralization also occurred during this earlier alteration episode, although some pyrite is scattered in (1), the later matrix.

The history of the clast is comparable to that of 26 and 51.



Against (2)

DETAILS OF VEIN CONTACTS

1 mm

X nicols

Against (1)

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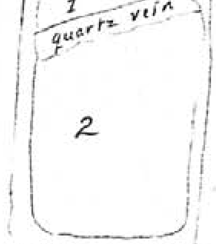
111. Breccia with breccia clast (Thin section description)

This section consists of two parts separated by a 3.4 mm wide vein filled with coxcomb quartz. The upper part, designated (1) in the sketch, is a fine breccia comparable to the breccia matrix in many of the other samples (e.g. W.K. 32). In it, a sericitic matrix surrounds clasts of angular to subangular quartz, angular albite, and sparse aplite and polycrystalline quartz.



The lower portion, labelled (2) in the sketch, is a highly sericitized, silicified breccia. The only identifiable clasts are quartz and polycrystalline quartz with sutured borders and fine grained aplite. The abundance of these two lithologies suggests that 1) the Eagle "granodiorite" was the dominant source rock and 2) feldspars were destroyed during pervasive sericitization.

Pyrite strongly concentrates in the lower portion, which is also cut by several open-space-filling type veinlets. These contain euhedral quartz as well as quartz aggregates; radiating white mica plates; and pyrite cores in places. This was the only instance of open space textures seen in the suite.

The lower portion has a faint foliation defined by alignment of sparse coarser white micas.

The contact between the large quartz vein and (2) is irregular with evidence of intergrowth. By contrast,

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Polished Section Examination:- Summary

At least two and probably three distinct types of sulphide mineralization are evident in the sections examined. One of these consists of coarse irregular intergrowths of sphalerite, pyrite, galena, and minor chalcopyrite, with the chalcopyrite typically occurring as anhedral exsolutions in the sphalerite. The second type of mineralization consists of coarse-grained pyrite grains and grain aggregates with minor molybdenite. A third type consists only of pyrite, intergrown with various silicates.

The first two types of mineralization are found within breccia fragments; the third occurs as a selvage along quartz-feldspar stringers that cross-cut breccia material containing the first type of mineralization (as in polished section 111).

Due to the finely comminuted nature of the breccia material, it is impossible to work out the complete paragenetic sequence for the mineralization. Examination of samples containing coarser-grained fragments would permit a better understanding of genesis of the sulphides.

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50 (polished section)

Mode (%):-		
	pyrite	4-5
	sphalerite	1-2
	galena	1-2
	chalcopyrite	trace

Sulphides occur within breccia fragments that reach a maximum size of 1.2 cm, and average about 1.0 mm in diameter.
Pyrite forms subhedral to euhedral grains and grain aggregates. Grain size ranges from 0.01 mm to 2.0 mm, and grain aggregates reach 1.0 cm in diameter. Rare anhedral inclusions of chalcopyrite to 0.02 mm are present in some of the larger grains. Pyrite grains in the fine-grained matrix of the sample are generally euhedral and unfractured in outline.
Galena forms irregular anhedral masses to 6.0 mm diameter. It is also present filling interstices between euhedral pyrite and silicate grains. It forms mutual boundaries with sphalerite, and locally appears to be replaced by it.
Sphalerite forms irregular anhedral masses to 5.0 mm in diameter. Fine anhedral chalcopyrite inclusions to 0.01 mm diameter are distributed randomly throughout the sphalerite. Mutual boundaries are also formed with galena and coarser-grained chalcopyrite. The sphalerite shows a relatively weak brownish internal reflection, indicating a low iron-content.

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79 (polished section)

Mode (%):-	pyrite	2
	molybdenite	trace - 1
	sphalerite	trace
	pyrrhotite	trace

Sulphides occur as isolated grains and as portions of locked particles in breccia fragments.
Two distinct types of mineralization are present. In the bulk of the section, irregular anhedral sphalerite grains to 0.5 mm form locked particles with silicate grains, and anhedral to euhedral pyrite grains and grain aggregates to 1.5 mm diameter occur as isolated grains and as locked particles with silicates. Neither the pyrtie nor the sphalerite appear to be fractured.
A single large fragment (>1.0 cm in diameter) contains abundant molybdenite, occurring as narrow laths and irregular masses to 0.1 mm diameter. Rounded to euhedral pyrite grains and grain aggregates to 1.2 mm diameter are also present. Rare rounded pyrrhotite inclusions are present in some of the pyrite grains.

VPL

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<u>108</u> (polished section)

Mode (%):-	sphalerite	2-3
	pyrite	1
	chalcopyrite	trace

Sulphides occur within breccia fragments that range in size from < 0.1 mm to 8.0 mm, and average < 1.0 mm in diameter.
Sphalerite forms irregular masses to 0.8 mm in diameter, and as fine-grained irregular intergrowths with silicates. It rarely forms mutual boundaries with pyrite. Anhedral inclusions of chalcopyrite to 0.01 mm diameter are randomly distributed throughout the sphalerite. The pale brown internal reflection indicates a low iron-content.
Pyrite forms subhedral to euhedral grains to 0.45 mm in diameter, either as isolated single grains within the breccia matrix, or as locked particles with silicates or, more rarely, with sphalerite. Contacts between pyrite and sphalerite are relatively straight, with local embayments.

<u>111</u> (polished thin section)

Mode (%):-	pyrite	4-5
	sphalerite	trace

Sulphides occur disseminated throughout a breccia, and as a selvage along a narrow quartz-feldspar stringer that cuts the section.
The disseminated pyrite forms anhedral to subhedral rounded grains and grain aggregates to 1.5 mm diameter that occur as isolated grains and as portions of locked particles (with silicates) within the breccia matrix. Average grain size of the pyrite is 0.2 mm.
A quartz-K-feldspar stringer 3.4 mm wide that crosscuts the rock has a discontinuous pyrite selvage along both edges. This selvage is approximately 0.3 mm thick.
Traces of sphalerite occur as fine irregular intergrowths with silicates in several of the fragments.

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114 (polished section)

Mode (%):-	pyrite	1
	sphalerite	trace
	molybdenite	trace

Sulphides occur within breccia fragments that reach a maximum diameter of 1.2 mm, but that average 0.1 mm in diameter.
Pyrite occurs as anhedral to euhedral single grains and grain aggregates, and as locked particles with silicates.
Sphalerite forms very fine irregular intergrowths with silicates.
Molybdenite occurs as fine laths and irregular masses to 0.8 mm in diameter.
It is only seen associated with pyrite, never with sphalerite.
Two types of mineralization are present:-

1) sphalerite ± pyrite intergrown with silicates
2) molybdenite + pyrite disseminated in silicates

The two types occur in separate fragments; the molybdenite + pyrite bearing fragments are generally larger.

77 (polished section)

Mode (%):-	pyrite	30-35
	sphalerite	trace
	molybdenite	trace

Mineralization is similar to that in 114, ie. two types of mineralization in separate fragments. In the single large molybdenite-bearing fragment, pyrite forms a coarse-grained elongate aggregate approximately 2.0 mm wide with average grain size of 0.8 mm. No molybdenite is associated with this pyrite aggregate.

APPENDIX D

PREVIOUS DRILL LOGS

1969 - original

1973 - original

1978 - relogging

DRILL SAMPLE RECORD

Hole No. DDH 73-1 Page No. 1/1

Property Keystone

District Nicola

Commenced

Completed

Length 0-10-489'

Bearing

Dip V

Lat.

Dip

Elev.

Drill Type VERTICAL

Hole Size DQ

Contractor DENISON

Logged by M. LIVINGSTON

Approved by Date 1978

Sample No.	Footage From	To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe		Rock Description and Notes		Recovery	
KC-1	22	32			2		50	443		755	3	3900			Med. grained qtz monz. with minor dissem	Box 1		
KC-2	203	273			1		17	65		680	N.S.	325			MoS_2 and pyrite <1% mainly perv. ser. mafics	10-25		
KC-3	323	333			<1		60	1000		755	<3	6450			Structures: 45° vuggy qtz-sphal.			
KC-4	378	388			<1		200	1550		910		16000			20° qtz-Mo-py			
KC-5	423	438			<1		7	64		770	<3	390			45° qtz-gypsum 70° qtz-Mo-py			
KC-6	473	483			<1		31	103		690		1000						
															Crowded f-spar porphyritic quartz monzonite	Box 9		
															dissem py. 1% structures: qtz-py 20°	203-273		
															10° fract. pyrite			
															sim. to Box 9 perv. ser. mafics abundant qtz-	Box 13		
															gypsum 20°	319-344		
															368-418 dominantly pervasive sericite	Box 15		
															418-489 local zone of perv. sericite but	16,17,18,19		
															mainly biotite qtz monz. dissem. py up to 1%	367-489		
															in sericite zone fracture pyrite <1%	EOH		
															383' structures: (1) 30° qtz veins cut by			
															(2) 80° qtz veins cut by			
															(3) 20° qtz. gypsum			
															~~qtz- gypsum p 10-20°~~			

DRILL SAMPLE RECORD

Hole No. DDH 73-2 Page No. 1/2

Property Keystone
District Nicola
Commenced
Completed

Length 0-81-500'
Bearing
Dip V

Lat.
Dip
Elev.

Drill Type VERTICAL
Hole Size BQ
Contractor DENISON

Logged by W. Livingstone
Approved by
Date 1978

Sample No.	Footage From	Footage To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe		Rock Description and Notes		
NC-74	88	98			16		6	250		480	3	1920			Pebble Breccia	Box 1-18	
NC-75	138	148			22		28	60		480	-	2900			local layers to 5' with coarse subrounded	81-500	
NC-76	208	218			8		400	540		450	-	5200			fragments but mainly fine grained (<5")		
NC-77	258	268			5		170	330		535	3	2900			fragments with scattered pebble size		
NC-78	308	318			11		260	425		570	-	2850			Core angles to 150' 10^{o}, 10^{o}, 7^{o}, 5^{o}, 8^{o}, 15^{o}		
NC-79	388	398			16		26	380		495	-	2100					
NC-80					11		62	240		515	3	1460			towards bottom of hole the breccia is un-		
															layered and mainly fine sand-size breccia with		
															scattered pebble-size fragments.		
															370-370 feldspar porphyrite andesite similar		
															to top of NC-73-6- chilled contacts with		
															core angles 17^{o} and 35^{o}		
															weak layering 15^{o} at 385'		

DRILL SAMPLE RECORD

Hole No. 73-2 Page No. 2/2

Property KEYSTONE

District

Commenced

Completed

Length

Bearing

Dip

Lat.

Dip

Elev.

Drill Type VERTICAL

Hole Size RO

Contractor DENISON

Logged by

Approved by Date 1978

SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe		ROCK DESCRIPTION AND NOTES		FOOTAGE	
															layering 478' 15°, 20°			
															dark grey andesite			
															413-437.5 dyke			
															below 400' fragments become coarser and more angular with several high pyrite silicious quartz monzonite fragments. A few fragments of pery. sericitized feldspar porphyritic quartz monz. and a few rhyolite dyke fragments.		500	TCM

DRILL SAMPLE RECORD

Hole No. DDH 73-1 Page No. 1/2

Property [illegible]
District Nicola
Commenced
Completed

Length 0-6-497'
Bearing 45° NW
Dip

Lat.
Dip
Elev.

Drill Type
Hole Size BQ
Contractor DENISON

Logged by N. Livingstone
Approved by Date 1978

Sample No.	Footage From	Footage To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe		Rock Description and Notes	[illegible]
KC-16	7	17			1		44	310		530	<3	1230			6'-217' mainly pervasively sericittized	Box 1-21
KC-17	17	27			5		19	124		--		310			Eagle breccia.	6-497
KC-18	27	37			<1		152	525		-		2100				
KC-19	37	47			2		400	2400		580		11400			41-43 fine grained pebble breccia	
KC-20	47	57			<1		29	210		-		1620				
KC-21	57	67			19		79	870		-		2000			70-81 mainly fragments of pyritic 3-4% MoS_2	
KC-22	67	77			200		54	300		540	<3	1230			mineralized rhyolitic banded dyke rock. This	
KC-23	77	87			4		28	112		-		1420			appears to be a brecciated dyke.	
KC-24	87	97			1		42	89		-		1880				
KC-25	97	107			<1		18	142		520		1430			100-108 sim. to above with 4% fract. py.	
KC-26	107	117			<1		66	190		-	3	3550				
KC-27	117	127			<1		97	310		-		5900			150' 6" silicious dyke with banding.	
KC-28	127	137			5		115	300		560		8800				
KC-29	137	147			7		28	125		-		3700			203-210' locally well mineralized py-sphal.	
KC-30	147	157			7		10	97		-		2000			veinlets	
KC-31	157	167			1		160	340		580		4000				
KC-32	167	177			<1		15	85		-		770			217-307 mainly brecciated quartz monzonite	
KC-33	177	187			<1		13	143		-		790			pervasive clay-sericite 1-2% dissem. py.	
KC-34	187	197			<1		18	100		450		1820				
KC-35	222	227			1		61	139		-	<3	1830				
KC-36	227	235.5			<1		87	330		-		2600				
KC-37	247	257			<1		86	860		520		3450				

DRILL SAMPLE RECORD

GRANITE ___ VOLCANIC ___ SEDIMENT ___ SCHIST ___

Hole No. 73-3 Page No. 2/2
Property KEYSTONE
District
Commenced
Completed

Length 0-497
Bearing
Dip V

Lat.
Dip
Elev.

Drill Type
Hole Size BQ
Contractor DENISON

Logged by N. Livingstone
Approved by ___ Date 1978

Sample No.	Footage From	Footage To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe	
KC-38	257	267			<1		73	640		-		3400		
KC-39	267	277			<1		79	6400		-		4500		
KC-40	277	287			<1		65	770		680		5800		
KC-41	297	307			<1		88	1200		-		5700		
KC-42	307	317			1		126	8100		-	<3	5800		
KC-43	317	327			2		188	5550		850		16400		
KC-44	327	337			<1		44	245				11200		
KC-45	337	347			<1		22	55				10000		
KC-46	347	357			<1		45	245		1027		11000		
KC-47	357	367			<1		39	28		-		7400		
KC-48	367	377			<1		43	99		-		10600		
KC-49	377	387			<1		250	315		950		11100		
KC-50	387	397			<1		100	350				25000		
KC-51	397	407			<1		78	430		950		5600		
KC-52	407	417			<1		63	330		-	5	4950		
KC-53	417	427			<1		72	1350		-		6200		
KC-54	427	437			<1		82	525		910		6900		
KC-55	437	447			<1		60	890		-		6400		
KC-56	447	457			<1		92	850		-		4850		
KC-57	457	467			<1		81	720		910		6000		
KC-58	467	477			2		163	1200		-		9900		
KC-59	477	487			<1		250	1150		-		11000		
KC-60	487	897			<1		80	695		820	3	6300		

ROCK DESCRIPTION AND NOTES

307-324 polymict pebble breccia with fract. sphalerite and up to 5% fract. pyrite loc. chalcopyrite in ½" qtz vein

324-497 mainly fine grained quartz monzonite locally brecciated and local brecciated rhyolitic dykes.

Comments: The alteration appears to change across the zone 300' to 325' from perv. ser. of the mafic minerals in the qtz monz. and clay altered feldspar to a dominant perv. sericitization of both mafics and feldspars. In the intense alteration zone the quartz monz. is grey qtz-ser. with buff cores of clay-qtz-ser. with easily distinguishable feldspars. Late Pb-Zn mineralization cuts this alteration.

SULPHIDES

Content	Type

DRILL SAMPLE RECORD

Hole No. 73-4 Page No. 1/1

Property [illegible]

District Nicola

Commenced

Completed

Length 0-59-486'

Bearing

Dip V

Lat.

Dip

Elev.

Drill Type VERTICAL

Hole Size BQ

Contractor DENISON

Logged by W. LIVINGSTONE

Approved by Date 1978

Sample No.	Footage From	Footage To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe
KC-15	68	78			<1		178	605		700		2400	
KC-14	118	128			<1		63	85		750		1600	
KC-13	168	178			5		8	360		750	<3	12900	
KC-12	218	228			1		123	1160		820		8000	
KC-11	273	283			8		12	700		755		4350	
KC-10	318	328			<1		460	620		730	<3	2000	
KC-9	368	378			<1		22	223		730		3000	
KC-8	418	428			<1		6	170		755		2000	
KC-7	468	478			<1		7	184		730	<3	1460	

Rock Description and Notes

Biotite qtz monzonite with sericite-chlorite envelopes on fractures — Box 3-20

qtz veins 45°

Dominantly perv. ser. to 110' then dominant perv. chl. of mafics

qtz veins 40-45°, dominant fract. 30°

179-208 dom. perv. sericite

208-366' dom. perv. chlorite with local ser.

226' ruggy qtz 80°, 252' ruggy qtz 60°

329-342 feldspar porphyry dyke

qtz vein 20° ser. envelope

qtz-py-sphal. 30°

326' ruggy qtz-galena-sphal. 40°

366-408 dominantly pervasive sericite with ruggy qtz-k-spar-sphalerite 50-60°

378' qtz veins 10° cut by chl-py 70°

390-408' abund. qtz veins 30°

443' qtz-py and qtz-gypsum 30°

480' gypsum 30°

DRILL SAMPLE RECORD

Hole No. [illegible] Page No. 1/1

Property [illegible]

District Nicola

Commenced

Completed

Length 0-112-200'

Bearing

Dip V

Lat.

Dip

Elev.

Drill Type VERTICAL

Hole Size BQ

Contractor NORANDA

Logged by W. Livingstone

Approved by

Date 1978

*REFER TO NORANDA LOGS

Sample No.	Footage (Feet) From	To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe	
KC-61	128	138			1		16	164		540	-	2260		
KC-62	182	192			1		20	315		420	<3	4200		

Rock Description and Notes	
Eagle granodiorite breccia dominantly pervasive chlorite of mafic with minor sericite at bottom.	Box 1 112-200 DDH
143-183' andesite dyke brecciated abundant calcite veinlets and local Eagle breccia	
183-200 brecciated Eagle pervasive sericite and minor chlorite	

DRILL SAMPLE RECORD

Hole No. KC-73-2 Page No. 1/1

Property [illegible]

District Nicola

Commenced

Completed

Length 0-125-202'

Bearing

Dip V

Lat.

Dip.

Elev.

Drill Type VERTICAL

Hole Size BQ

Contractor NORANDA

Logged by W. Livingstone

Approved by

Date 1978

*REFER TO NORANDA LOGS

Sample No.	Footage From	Footage To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe	
KC-65	125	128			<1		6	100		330	-	270		
KC-66	153	163			<1		10	57		370	-	370		
KC-67	188	196			<1		6	40		330	3	340		

Rock Description and Notes		
Mainly brecciated Eagle granodiorite with perv. sericitization of the mafics + loc. perv. chl., 1-2% fract. py.	Box 1 125-202 [illegible]	
125-132' brecciated quartz porphyry dyke with broken feldspars minor dissem. py <½%		
150-155 quartz porphyry		
155-202 EOH Eagle breccia		
fragments ½"-1' but mainly 1-2"		

DRILL SAMPLE RECORD

☐ GRANITE		
☐ VOLCANIC		
☐ SEDIMENT		
☐ SCHIST		
☐		

Hole No. KC-73-3 Page No. 1/1

Property KEYSTONE

Length 0-114-200.9'

Lat.

Drill Type VERTICAL

Project Nicola

Bearing

Dip

Hole Size BQ

Commenced

Dip

Elev.

Contractor NORANDA

Logged by W. Livingstone

Completed

Approved by

Date 1978

*REFER TO NORANDA LOGS

SAMPLE NO.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	% RECOVERY	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe		ROCK DESCRIPTION AND NOTES		GRAPHIC LOG FOOTAGE	ROCK TYPE
KC-63	123	138			12		25	200		500	3	1250			Pebble breccia	Box 1,2,3		
KC-64	160	178			15		24	230		500	-	1210				4		
															layering prominent in top 10-15' but present	114-200.9		
															throughout			
															Core angles measured 16°, 29°, 31°, 30°, 36°			
															Pebbles up to 2"			
															Fragment types:			
															1. perv. ser. Eagle granodiorite			
															2. leucocratic granitoid (qtz monz.)			
															silicified and mineralized fragments up to			
															3/4"			
															Eagle fragments tend to be larger. Minor			
															scattered pink aplite fragments			

DRILL SAMPLE RECORD

Hole No. [illegible] Page No. 1/1

Property [illegible]

District Nicola

Commenced

Completed

Length 0-161-230'

Bearing

Dip V

Lat.

Dip

Elev.

Drill Type VERTICAL

Hole Size BQ

Contractor NORANDA

Logged by W. Livingstone

Approved by

Date 1978

*REFER TO NORANDA LOGS

Sample No.	Footage From	Footage To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe		Rock Description and Notes			
KC-68	178	188			12		26	187		520	3	1120			Pebble breccia			
															mainly fine grained (up to 1 cm) pebble	Box 1-3		
															breccia with local scattered fragments up	161-230		
															to 3/4"			
															fragments 50% Eagle g.d., 50% siliceous			
															granitoid with dissem. py. and qtz-py-MoS_2			
															veinlets			
															local zone much coarser breccia 175-210			
															layering core angles measured 30°, 40°, 31°,			
															32°			

DRILL SAMPLE RECORD

GRANITE		
VOLCANIC		
SEDIMENT		
SCHIST		

Hole No. KC-73-5 Page No. 1/1
Property [illegible]
District Nicola
Commenced
Completed

Length 0-174-242'
Bearing
Dip

Lat.
Dip
Elev.

Drill Type VERTICAL
Hole Size BQ
Contractor NORANDA

Logged by W. LIVINGSTONE
Approved by Date 1978

*REFER TO NORANDA LOGS

Sample No.	Footage From	Footage To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe		Rock Description and Notes		Graphic Log Footage	Rock Type
KC-71	218	228			30		24	97		480	3	1310			Pebble breccia	Box 1,2,3		
																174-242		
															fragments-30% high sulphide siliceous frag.			
															with many MoS_2 mineralized fragments			
															-minor qtz porphyry fragments			
															-minor pure sulphide fragments (up to 1 cm.)			
															-one fragment of qtz monzonite with two			
															stages of qtz-pyrite veinlets			
															layering with core angles: 18½°, 20°, 20°			
															Comments: The layering present in the core			
															is believed to be caused by fluidization of			
															the pebble breccia at the time of formation			

DRILL SAMPLE RECORD

Hole No. NC-73-6 Page No. 1/2

Property [illegible]

District Nicola

Commenced

Completed

Length 0-90-200 6'

Bearing

Dip V

Lat.

Dip

Elev.

Drill Type VERTICAL

Hole Size PQ

Contractor NORANDA

Logged by M. Livingstone

Approved by ________ Date 1978

*REFER TO NORANDA LOGS

Sample No.	Footage From	Footage To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe
NC-72	128	138			22		24	400		495	-	1750	
NC-73	148	158			17		12	280		480	3	1600	

Rock Description and Notes

98-103 dyke or flow with round inclusions of unaltered Eagle g.d. - sim. to dykes in other holes.
probably post-Mineral.

103-183 pebble breccia with subrng fragments
70% Eagle 20% silicified granodiorite
mineralized fragments 5-10% feldspar-bio (sericite) porphyry and minor quartz porphyry fragments.
local steep MnO_2 fractures

Layering is inconspicuous compared with other holes in pebble breccia and fragments more angular and caotic than other holes

Comments: This hole has the largest percentage of mineralized fragments than any other to date. Also the presence of qtz porphyry as a new rock-type fragment should be noted. Fragment size is generally coarser 1-2'' than other areas of the pebble breccia.

Box 1-4
90-200.6

DRILL SAMPLE RECORD

Hole No. NC-73-6 Page No. 2/2

Property KEYSTONE

District

Commenced

Completed

Length

Bearing

Dip

Lat.

Dip

Elev.

Drill Type

Hole Size

Contractor

Logged by

Approved by Date 1978

Sample No.	Footage From	Footage To	Sample Length	% Recovery	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe		Rock Description and Notes	Graphic Log Footage	Graphic Log

183-199 mainly Eagle g.d. breccia with sery. sericite and minor sery. chl.

199-200 pebble breccia

The presence of Eagle breccia may signify approaching the base of the breccia body in this area. Compare with Noranda logs of holes in the south part of the pebble breccia body.

DRILL SAMPLE RECORD

- [ ] GRANITE
- [ ] VOLCANIC
- [ ] SEDIMENT
- [ ] SCHIST
- [ ]

Hole No. KC-73-7 Page No. 1/1

Property KEYSTONE

District Nicola

Commenced

Completed

Length 0-137-200'

Bearing

Dip

Lat.

Dip

Elev.

Drill Type VERTICAL

Hole Size PQ

Contractor NORANDA

Logged by K. Livingstone

Approved by

Date 1978

*REFER TO NORANDA LOGS

SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	% RECOVERY	Mo	Cu	Pb	Zn	Ag	F	W	Mn	Fe		ROCK DESCRIPTION AND NOTES		FOOTAGE	TYPE
KC-69	160	170			1		27	120		400	-	1700						
KC-70	131	191			<1		23	145		450	<3	1090			Eagle granodiorite breccia with pervasive	Box 2,3,4		
															sericitized mafics 1-2% py dissem.	137-200		

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.: 1042

Hole No. KC #1
Sheet No. 1

Lat. 3612N	Elev.	Dip -45°	Collared Nov. 1, 1969	Core Size BQ	
Dep. 9706E	Depth 502	Bearing North	Completed Nov. 6, 1969	Logged by: Y.J. Nelson	

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Assays Ft.	%Au		Ag	
0-6	0	No core									
6-10	80%	dark breccia		short & broken core little limonite	none	M9156	4	Tr		Tr	qtz. feldspar separated by chlorite
10-20	98%	same as above		same as above gneissic	none	M9157	10	Tr		Tr	same as above
20-30	100%	same as above		one speck chalcopyrite little limonite	Tr	M9158	10	Tr		0.2	same as above
30-36	100%	same as above		little limonite 30-32 mostly white 32-36 60% greenish-gray	Tr	M9159	6	Tr		Tr	specks ga. ?
36-40	100%	greenish gray to light gray fine grain		Contact little limonite	none	M9160	4	Tr		0.2	
40-50	100%	light gray f.g. 44-45 breccia		speck cpy. few specks very f.g. py. Pyrolusite. 48-50 angular frags. not displace	Tr	M9161	10	Tr		0.1	
50-52	100%	same as above		greenish gray - trace py. contact at 52 cpy. assoc. with dark mineral	Tr	M9162	2	Tr		0.1	

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.: 1042

Hole No. NC #1
Sheet No. 2

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Assays Ft	Au		Ag	
52-62	100%	sericite breccia 60-62 gray f.g. - few fragments		feldspars separated by thin chlorite layers folding	none	M9163	10	Tr		0.1	good core
62-72	100%	f.g. breccia gray - sericite		fractures	none	M9164	10	Tr		0.1	
72-82	100%	f.g. gray breccia sericite			none	M9165	10	Tr		Tr	
82-92	100%	same as above		limonite on fractures	none	M9166	10	Tr		0.2	
92-102	100%	same as above		pyrolusite	none	M9167	10	Tr		0.2	
102-112	100%	same as above		little limonite on fractures	none	M9168	10	Tr		Tr	
112-122	100%	same as above		epi. - py. little limonite on fractures pyrolusite ? small specks	< 1%	M9169	10	Tr		Tr	117 limonite on fractures
122-132	100%	same as above		gouge at 124' pyrolusite	none	M9170	10	Tr		0.2	

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.: 1042
Hole No. NC #1
Sheet No. 3

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Assays Ft.	Au		Ag
132-142	100%	f.g. gray breccia sericite		pyrolusite	none	M9171	10	Tr		Tr
142-150	100%	same as above		one small crystal ga. pyrolusite	Tr	M9172	8	Tr		Tr
150-160	95%	same as above		pyrolusite limonite on fractures badly broken core probable fault at 157	none	M9173	10	Tr		Tr
160-170	100%	same as above		160-162 limonite on fract. 167½	none	M9174	10	Tr		Tr
170-180	100%	same as above		soft white alteration bright 174 & 179 green ½" frag. 178	none	M9175	10	Tr		0.1
180-190	100%	same as above		long core - few fracts. pink fragments green fragments	none	M9176	10	Tr		0.1
190-200	100%	same as above		various fragments some dark	none	M9177	10	Tr		0.1
200-210	100%	same as above little darker		mostly long core	none	M9178	10	Tr		0.1

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:
Hole No. NC #1
Sheet No. 4

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Assays Ft	Au		Ag	
210-220	100%	f.g. gray breccia larger fragments		soft white alt. very small py. crystals	> 1%	M9179	10	Tr		0.1	
220-230	90%	gray breccia slightly darker than before		1/16" fsp. - sulfide vein galena	Tr	M9180	10	Tr		0.3	225-230 softer-white alteration
230-240	100%	gray breccia		small py. crystals pyrolusite ?	> 1%	M9181	10	Tr		0.1	
240-250	100%	gray breccia		pyrolusite ? py. f.g. 241-241½ frags. cemented by black rock	> 1%	M9182	10	0.1		0.1	good long core
250-260	100%	gray breccia darker		258 cpy. ?? f.g. py. Black sulfide - not ga. Sphalerite qtz. - ga. vein ¼"	> 1%	M9183	10	0.1		0.1	good long core
260-270	100%	gray breccia		fragments 2 - 3" across sphalerite - cpy. at 263 py. vein	> 1%	M9184	10	0.1		0.2	good long core
270-280	100%	gray breccia		f.g. py. granitic fragments	> 1%	M9185	10	Tr		0.1	Zeolites ? aroun vugs.
280-290	100%	gray breccia ser		f.g. py.	Tr	M9186	10	Tr Tr		Tr [illegible]	good long core (NORANDA P.T.
290-300	100%	gray breccia		f.g. py.	Tr	M9187	10	0.08		0.2	
								Tr		[illegible]	

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA		Hole No. NC #1	
Project No.:		Sheet No. 5	
Lat.	Elev.	Dip	Collared
Dep.	Depth	Bearing	Completed
Core Size			
Logged by:			

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Assays Ft.	Au		Ag	
300-310	100%	gray breccia ser.		f.g. py. sphalerite	>1%	M9188	10	0.01 Tr		0.3 0.0[illegible]	(NORANDA P.Q.)
310-320	100%	same as above		small speck cpy. pyrolusite ? sphalerite	Tr	M9189	10	0.02 Tr		0.4 0.0[illegible]	"
320-330	100%	same as above		f.g. py.	Tr	M9190	10	Tr		Tr	good long core
330-340	100%	same as above		gray pink vein f.g. py.	Tr	M9191	10	Tr		0.1	
340-350	100%	same as above		bright green min. in frags.	none	M9192	10	Tr		Tr	
350-360	100%	same as above		f.g. py.	>1%	M9193	10	Tr		Tr	
360-370	100%	same as above		sphalerite crystals - cpy. 363½ f.g. py.	>1%	M9194	10	Tr		0.2	
370-380	100%	same as above		little f.g. py.	Tr	M9195	10	Tr		Tr	good long core

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No. NC #1
Sheet No. 6

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crost Assays Ft	Au		Ag	
380-390	100%	gray breccia sericite		rare f.g. py.	Tr	M9196	10	0.01		0.1	
390-400	100%	same as above		f.g. py.	Tr	M9197	10	0.01		0.1	
400-410	100%	same as above		same as above. sphalerite ?	Tr	M9198	10	Tr		Tr	
410-420	100%	same as above		rare py.	Tr	M9199	10	Tr		0.2	
420-430	100%	same as above		qtz. - ziolite vein 425 sph. ga. - cpy. 428	Tr	M9200	10	0.0. Tr		0.2 [illegible]	(NORANDA [illegible])
430-440	100%	same as above		pyrolusite ?	none	M9201	10	Tr		0.3	
440-450	100%	same as above sericite kaolinized		sphalerite - py. - cpy. veinlet at 449 veinlet f.g. py.	> 1%	M9202	10	Tr		Tr	
450-460	100%	same as above ser.		few sphalerite ? veinlets	Tr	M9203	10	Tr		Tr	

NORANDA EXPLORATION CO. LTD.	Property: COQUIHALLA	Hole No. NC #1
	Project No.:	Sheet No. 7

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Cores / Assays Ft	Au		Ag	
460-470	100%	gray breccia		sphalerite veinlets	>1%	M9204	10	Tr		Tr	
470-480	100%	sericite				M9205	10	Tr		Tr	
480-490	100%	same as above		veinlet sphalerite - cpy. veinlet 483		M9206	10	Tr		0.1	
490-500	100%	same as above		sphalerite	>1%	M9207	10	Tr		0.2	
500-502	100%	same as above		sphalerite	>1%	M9208	2	0.01 Tr		0.1 0.07	 (NORANDA P.Q.)
		END OF HOLE									

NORANDA EXPLORATION CO. LTD. Property: COQUIHALLA Project No.: 1042

Hole No. NC #2	Sheet No. 1			
Lat. 9302N	Elev.	Dip -45°	Collared Nov. 7, 1969	Core Size BQ
Dep. 9706E	Depth 500	Bearing South	Completed	Logged by: W.I. Nelson

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Cros t Assays Ft	Au		Ag	
0-4	0	Casing - no core									
4-40	98%	dark gray breccia granitic & fspathic frags. - in chlorite		foliation 60° to core no mineralization except spots pyrolusite ?	none						4-10 rusty short & broken core also 32-38
40-50	100%	same as above		rare specks cpy. & py.	Tr	M9209	10	0.01		0.1	
50-60	100%	same as above									good core
60-70	100%	same as above numerous fragments some 6" across									good core
70-80	100%	same as above		specks py., specks sphalerite ? 75-77 20% white fragments remainder chloritic							
80-90	100%	same as above		speck cpy.							
split 90-100	100%	same as above		pyrolusite ? weak shear		M9210	10	Tr		Tr	long core

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No. NC #2
Sheet No. 2

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Ft.	Assays Au		Ag	
100-110	100%	gray breccia									
110-120	100%	mostly chloritic possibly fault gouge		several weak shears							
120-130	98%	120-122 chloritic 122-126 gray breccia 126-127 chloritic 127-130 gray breccia		chl. chl.							
split 130-140	100%	gray breccia				M9211	10	Tr		Tr	
140-150	100%	gray breccia		80% white fragments av. size ½"							good long core
150-160	100%	gray breccia		pyrolusite ?							
160-170	100%	gray breccia after 162 lighter color possibly kaolinized									
split 170-180	100%	kaolinized along fract. at 170½		little f.g. py. pyrolusite ? weak shear		M9212	10	0.01		0.1	

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA				Hole No. NC #2
Project No.:				Sheet No. 3
Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Assays Ft	Au		Ag
180-190	100%	light gray breccia ? small frags. weakly kaolinized		rare f.g. py. pyrolusite		M9213	10	0.01		0.1
190-200	100%	same kaolinized				M9214	10	Tr		0.1
200-210	100%	same kaolinized		208 black sulfide veinlet pyrolusite sphalerite	Tr	M9215	10	Tr		0.1
210-220	100%	same kaolinized		210-210½ specks cpy. & sphalerite	>1%	M9216	10	Tr		0.1
220-230	100%	same kaolinized		same as above		M9217	10	0.0		0.1
230-240	100%	same kaolinized		same as above shear		M9218	10	Tr		0.1
240-250	100%	same weakly kaolinized		small specks cpy., sphalerite	>1%	M9219	10	0.0		0.1
250-260	100%	same as above				M9220	10	Tr		0.1

NORANDA EXPLORATION CO. LTD. Property: COQUIHALLA
Project No.:

Hole No. NC #2
Sheet No. 4

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Assays Ft	Au		Ag	
260-270	100%	light gray breccia weakly kaolinized		black mineral limonite fr. (f.g. py.) at 269	Tr	M9221	10	Tr		0.1	limonite on frac at 267
270-280	100%	same as above				M9222	10	Tr Tr		Tr 0.08	 (NORANDA P.Q.)
280-290	100%	same as above more kaolinized 287-290		sphalerite vein at 281 py. ga. ? zeolite - sphalerite shear at 288 parallel to core	>1%	M9223	10	Tr Tr		0.3 0.37	 "
290-300	100%	light gray breccia		290-292 kaolinized f.g. py. grain cpy. 299		M9224	10	Tr Tr		0.2 0.21	 "
300-310	100%	same as above		sphalerite	>1%	M9225	10	0.01 Tr		0.3 0.09	 "
310-320	100%	same as above		sphalerite, cpy. at 310½	>1%	M9226	10	Tr		0.2	
320-330	100%	same as above		sphalerite, cpy.	>1%	M9227	10	Tr		0.2	
330-340	100%	same as above		pyrolusite		M9228	10	Tr		0.1	

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No. NC #2
Sheet No. 5

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Assays Ft	Au		Ag	
340-350	100%	gray breccia		pyrolusite sphalerite		M9229	10	Tr		0.2	
350-355	100%	same as above		cpy. at 355	>1%	M9230	5	Tr		0.2	
355-360	100%	dio. ?		py. mostly along fractures 80° to core cpy.	2%	M9264	5	Tr		0.1	
360-370	100%	dio. dark f.g.		py.	2%	M9231	10	Tr		0.1	badly broken
370-380	98%	same as above		py.	2%	M9265	10	Tr		Tr	badly broken
380-395	100%	same as above		py. open space filling	3%	M9266 380-390	10	0.01		0.1	short & broken core
395-400	100%	light dio.		py.	2%						sharp contact at 395
400-410	100%	light dio.		py.	1%						

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No. NC #2
Sheet No. 6

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Ft	Au		Ag	
							Crest Assays				
410-420	100%	dio. or breccia									
420-430	100%	same		shear pyrolusite							
430-440	100%	same		pyrolusite		M9233	10	Tr		0.1	
440-450	100%	breccia definite fragments weakly kaolinized		little pyrolusite							granitic frags in chlorite
450-460	100%	breccia		little pyrolusite							
460-470	100%	breccia		sphalerite ?							
split 470-480	100%	breccia				M9232	10	0.01		0.2	
480-490	100%	breccia		hematite ? at 486, sphalerite ? py.							
490-500	100%	breccia		qtz. pyrolusite ? hematite? in qtz. vein							

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.: 1042

Hole No.: NC #3
Sheet No.: 1

Lat. 9516N	Elev.	Dip -45°	Collared Nov. 14, 1969	Core Size BQ
Dep. 9635E	Depth 502	Bearing North	Completed Nov. 17, 1969	Logged by: W.J. Nelson

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Assays Ft	Au		Ag	
0-12		Casing - no core									
12-20	98%	12-18 rusty gray breccia kaolinized		Pyrolusite on fracts. & fracts. pyrolusite 1-2" thick f.g. py.	>1%	M9234	8	Tr		0.2	
20-30	100%	grey breccia kaolinized		Rusty bands. py. f.g. sphalerite	1%	M9235	10	Tr		0.1	
30-40	100%	gray breccia kaolinized		black min. sphalerite ? f.g. py.	>1%	M9236	10	Tr		0.1	good long core
40-50	100%	gray breccia kaolinized		black min.	>1%	M9237	10	0.01		0.1	good long core
50-60	100%	gray breccia kaolinized		black min. f.g. py.	>1%	M9238	10	Tr		Tr	as above
60-70	100%	gray breccia kaolinized		cpy. black min.	>1%	M9239	10	Tr		Tr	as above
70-80	100%	as above		black min.	>1%	M9240	10	Tr		Tr	

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA

Project No.:

Hole No. NC #3

Sheet No. 2

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Ft.	Au		Ag	
							Cross Assays				
80-90	100%	gray breccia kaolinized		flurite ?? sphalerite sphalerite crystal in pink vein 86	>1%	M9241	10	Tr		0.1	good long core
90-100	100%	same as above		fragments of green banded rk. sphalerite in pink vein	>1%	M9242	10	0.01		0.5	95-100 more rounded green fragments
100-110	100%	gray breccia larger fragments kaolinized		black min. sphalerite	Tr	M9243	10	Tr		Tr	
110-120	100%	gray breccia kaolinized		Tr black min.	Tr	L9244	10	0.01		Tr	
120-130	100%	same as above		Tr black min.	Tr	M9245	10	Tr		Tr	
130-140	100%	same as above		Tr black min.	Tr	M9246	10	Tr		0.1	good long core
140-150	100%	same as above		Tr sphalerite ?	Tr	M9247	10	Tr		0.1	
150-160	100%	same as above		black min. 159-160	Tr	M9248	10	Tr		0.2	

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA	Project No.:	Hole No. NC #3	Sheet No. 3
Lat.	Elev.	Dip	Collared
Core Size	Dep.	Depth	Bearing
Completed	Logged by:		

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crost Assays Ft	Au		Ag	
160-170	100%	gray breccia weakly kaolinized		black mineral	Tr	M9249	10	Tr		0.1	165-166 f.g. green - possib dyke.
170-180	100%	gray breccia kaolinized		black mineral	Tr	M9250	10	Tr		0.1	
180-190	100%	same as above		same as above	Tr	M9251	10	0.0		0.2	
190-200	100%	same as above		Soft black sectile mineral Red streak at 195½	Tr	M9252	10	Tr		0.1	
200-210	100%	same as above		200½ soft black mineral Red streak.	Tr	M9253	10	Tr		0.1	
210-220	100%	same as above		black mineral - red streak hematite	Tr						
220-230	100%	same as above sericite		same as above	Tr						
230-240	100%	gray breccia		same as above	Tr						

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No. NC #3
Sheet No. 4

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Assays Ft.	Au		Ag	
240-250	100%	gray breccia		black mineral	Tr						
250-260	100%	gray breccia slightly kaolinized		same as above							
260-270	100%	same as above		rare black min.							
270-280	100%	same as above		rare black min.							
280-290	100%	same as above									
290-300	100%	same as above									shorter core
Split 300-310	100%	same as above		black mineral		M9254	10	0.0		0.1	shorter core
310-320	100%	same as above									more broken

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No. NC #3
Sheet No. 5

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log		Mineralization/Structure	% Sulfides	Sample No.	Assays				
320-330	100%	gray breccia										325-327 definit black & green fragments
330-340	100%	same as above			black mineral fractures							
340-350	100%	same as above kaolinized			little hematite ?							
350-360	100%	same as above			same as above							
360-370	100%	same as above			black mineral veinlets							
370-380	100%	same as above			muddy							
380-390	100%	same as above			mud seam little black mineral							
390-400	100%	same as above			little black mineral							good long core

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No. NC #5
Sheet No. 6

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Ft	Assays Au		Ag	
400-410	100%	gray breccia slightly kaolinized									
410-420	100%	gray breccia sericite kaolinized									
420-430	100%	gray breccia kaolinized		sphalerite chalcopyrite	Tr	M9255	10	Tr		Tr	
430-440	100%	gray breccia kaolinized		sphalerite	Tr						
440-450	100%	grey breccia distinct fragments kaolinized		black mineral							good long core
450-460	100%	same as above		same as above							granitic frags. 458-460
460-502	100%	greenish-gray breccia chlorite & feldspathic frags.		weak foliation pyrolusite							greenish 461-502 resembles rk, upper part NC 1 & NC 2
		END OF HOLE									

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.: #1042

Hole No. NC #4	Sheet No. 1	Core Size BQ	Logged by: W.I. Nelson
Lat. 9508N	Elev.	Dip -45°	Collared Nov. 18, 1969
Dep. 9435E	Depth 502'	Bearing South	Completed Nov. 20, 1969

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Assays Cross Ft.	Au		Ag	
0-9	0	Overburden - casing - No Core									
9-20	98%	gray Breccia some green fragments		f.g. py. sphalerite hematite ? frags. partly cemented by hematite	>1%	M9267	11	Tr		0.2	9-14 very rusty
split 20-30	100%	gray breccia kaolinized				M9256	10	Tr		Tr	
30-40	100%	Same as above		black mineral hematite ?		M9268	10	Tr		Tr	good core
40-50	100%	Same as above		hematite		M9269	10	Tr		Tr	
split 50-60	100%	greenish gray breccia small frags.		fracts. f.g. py. rare hematite	1%	M9257	10	Tr		Tr	
60-70	100%	same as above		rare f.g. py. rare hematite		M9270	10	Tr		0.1	
70-80	100%	same as above		rhodochrosite at 79' same		M9271	10	Tr		0.2	

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No. NC #4
Sheet No. 2

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by: W.I. Nelson

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Ft.	Assays Au		Ag	
80-90	100%	gray breccia		hematite vein & ankerite		M9272	10	Tr		0.1	
90-100	100%	same as above		hematite speck cpy. at 98½		M9273	10	Tr		0.2	
sp. 100-110	100%	same as above		hematite speck cpy. at 100½		M9258	10	Tr		Tr	
110-120	100%	same as above		hematite		M9274	10	Tr		0.1	
120-130	100%	same as above				M9275	10	Tr		0.1	
split 130-140	100%	130-139 breccia cemented by hematite ? 139-140 gray breccia zones of strong kaolinization		hematite ? cpy. sphalerite	>1%	M9260	10	Tr		0.1	Qtz. ankerite
140-150	100%	gray breccia. some ~~cemented by hematite ?~~ kaolinized		ga.		M9276	10	Tr		0.1	
150-160	100%	gray breccia kaolinized		qtz. vein 1/8" sphalerite ?	Tr	M9277	10	Tr		0.2	Qtz.

NORANDA EXPLORATION CO. LTD. Property: COQUIHALLA
Project No.:

Hole No. NC #4
Sheet No. 3

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crost Ft	Assays Au		Ag	
160-170	100%	gray breccia				M9278	10	Tr		0.2	
170-180	100%	gray breccia slightly kaolinized				M9279	10	0.01		0.2	
split 180-190	100%	same as above		speck cpy. ? 186 f.g. py. sphalerite ? ga. ? hematite	>1%	M9261	10	Tr		0.2	
190-200	100%	gray breccia slightly kaolinized		little pyrolusite ? on fracts. 196-200 large granitic fragments not kaolinized		M9280	10	Tr		0.1	
200-210	100%	gray breccia granitic fragments little sericite		hematite		M9281	10	Tr		Tr	
210-220	100%	same as above		hematite grains		M9282	10	Tr		0.2	mostly qtz. dio.
220-230	100%	same as above		hematite strs.		M9283	10	Tr		0.1	"
230-240	100%	same as above		hematite		M9284	10	Tr		Tr	mostly Q.D.

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA

Project No.:

Hole No. NC #4

Sheet No. 4

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crest Assays Ft.	Au	Ag	Cu	
240-250	100%	gray breccia 245-250 green f.g. fragments		hematite cpy. qtz. vein		M9285	10	Tr	Tr	0.01	
250-260	100%	gray breccia kaolinized		hematite 250-251½ granitic frags. 251½-260 light gray f.g.		M9286	10	Tr	Tr		
260-270	100%	gray breccia gray f.g. w. few granitic frags.				M9287	10	Tr	Tr		
270-280	100%	gray breccia Kaolinized		cream colored calcite ? veinlets irregular qtz. - ankerite veins		M9288	10	Tr	Tr		
280-290	100%	gray breccia 280-282 kaolinized 282-290 mostly granitic qtz. dio.		qtz. vein qtz. vein		M9289	10	Tr	0.1		magnetite in granitic frags.
290-300	100%	breccia mostly granitic some green f.g. at 299				M9290	10	Tr	0.1		
300-310	100%	gray breccia granitic fragments kaolinized				M9291	10	0.01	Tr		
310-320	100%	gray breccia kaolinized		dark gray dyke ? gray alteration both sides qtz.		M9292	10	Tr	0.1		

NORANDA EXPLORATION CO. LTD. Property: COQUIHALLA
Project No.:

Hole No.	NC #4
Sheet No.	5
Core Size	
Logged by:	

Lat.	Elev.	Dip	Collared
Dep.	Depth	Bearing	Completed

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Crost Assays Ft	Au		Ag	
320-330	100%	gray breccia kaolinized		cpy. w. calcite qtz. vein at 326 small vugs 328 calcite blobs	Tr	M9293	10	Tr		Tr	
330-340	90%	gray breccia kaolinized		qtz. granitic fragments 6" wide weakly kaolinized qtz. dio.		M9294	10	Tr		0.1	
340-350	95%	green breccia hard - 356-360 f.g. diorite		qtz. dio. fragments some broken core sphene in qtz. dio.		M9295	10	Tr		0.1	356-360 f.g. dio. magnetic
350-360	100%	f.g. qtz. dio.				M9296	10	0.02		0.1	magnetic
360-370	100%	360-365 f.g. dio. 365-370 gray breccia dio. frags.		fracts. w. hematite		M9297	10	Tr		Tr	magnetic
370-380	100%	gray breccia 370-373 mostly dio. 373-380 kaolinized		qtz. at 381 f.g. py. vugs 380½ green min. 377		M9298	10	Tr		0.1	magnetic
380-390	100%	gray breccia kaolinized		f.g. py. Qtz. at 390 vugs at 388		M9299	10	Tr		Tr	rhodonite 390
split 390-400	100%	gray breccia kaolinized		f.g. py. sphalerite calcite vugs 395	>1%	M9262	10	Tr		0.1	rhodonite 399

NORANDA EXPLORATION CO. LTD.

Property: COQUIHALLA
Project No.:

Hole No. NC #4
Sheet No. 6

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Structure	% Sulfides	Sample No.	Ft	Au		Ag	
400-410	100%	gray breccia partly kaolinized		py.	Tr	M9300	10	Tr		0.1	
split 410-420	100%	gray breccia 416-420 distinct angular frags. green-gray		sphalerite veins hematite cpy. vugs at 413		M9263	10	Tr		0.2	
420-430	100%	gray breccia slightly kaolinized dio. in part		hematite		M9301	10	Tr		0.1	
430-440	100%	mostly dio.		hematite py.	Tr	M9302	10	Tr		0.1	magnetic
440-450	100%	same as above		hematite py. at 447	Tr	M9303	10	0.01		0.1	magnetic
450-460	100%	dio. on breccia				M9304	10	Tr		0.1	
460-470	100%	dio. on breccia		magnetite veins & cpy.	Tr	M9305	10	Tr		0.1	1½" vein magneti at 462
470-480	100%	breccia ?		py. at 476	>1%	M9306	10	0.01		0.1	471-474 possible gray f.g. dyke vugs 474

NORANDA EXPLORATION CO. LTD. Property: COQUIHALLA

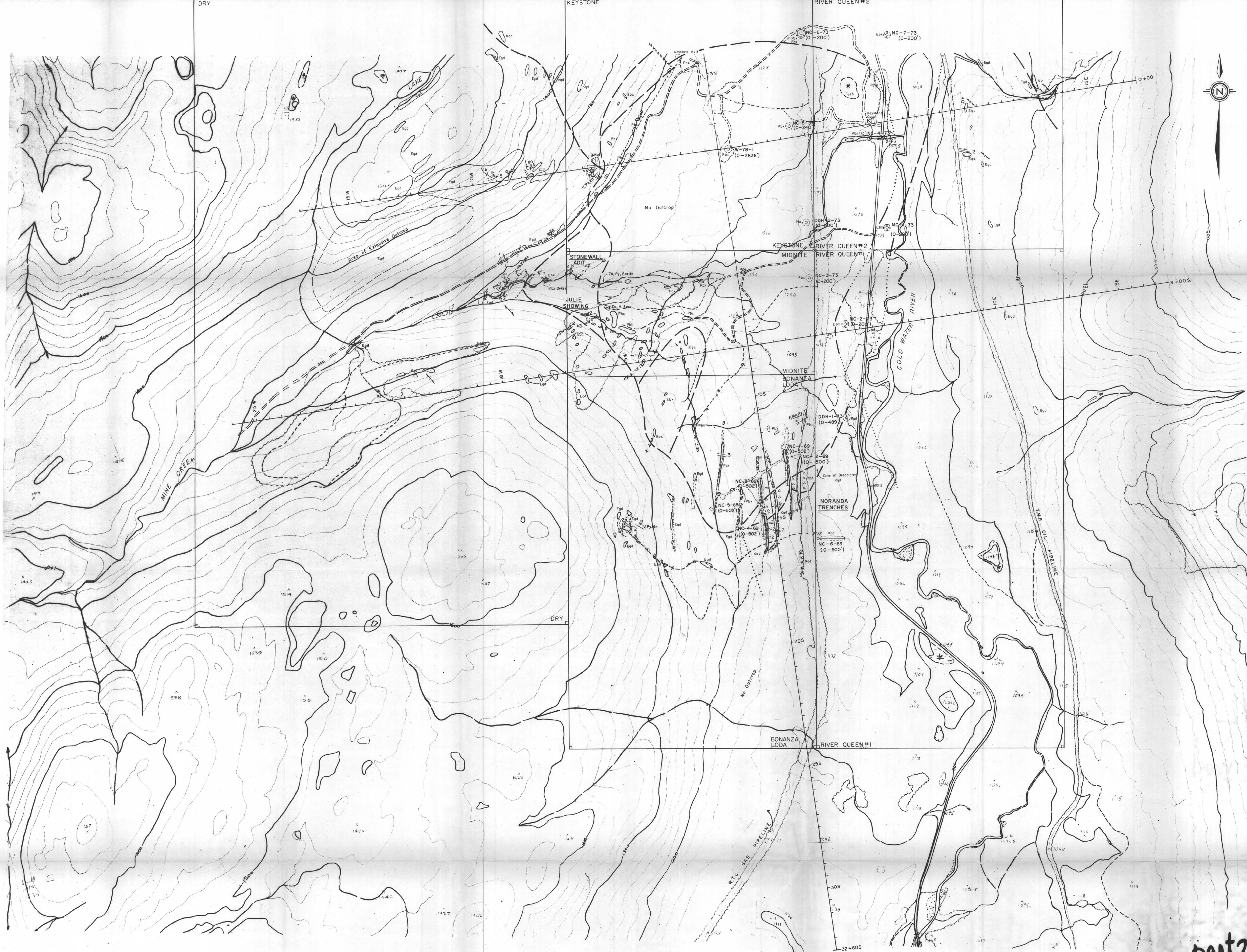
Project No.:

Hole No. NC #4

Sheet No. 7

Lat.	Elev.	Dip	Collared	Core Size
Dep.	Depth	Bearing	Completed	Logged by:

Footage	Rec'y	Rock Type/Alteration	Graphic Log	Mineralization/Stcucture	% Sulfides	Sample No.	Crest Assays Ft.	Au		Ag	
480-490	100%	gray breccia slightly kaolinized		hematite		M9307	10	Tr		Tr	
490-500	100%	gray breccia & dio.		py., sphalerite malachite'? in vein at 498 vein		M9308	10	Tr		Tr	hematite
500-502	100%	dio.									magnetic
		END OF HOLE									



LEGEND

Pbx	Pebble Breccia
Kqd	Keystone Quartz Diorite (non-foliated)
Ebx	Eagle Breccia and/or Brecciated Eagle Granodiorite
Egd	Eagle Granodiorite (foliated)
NV	Nicola Volcanics: Andesite Flows and Tuffs

DYKES

1	Andesite
2	Felsite
3	Biotite Feldspar Porphyry and/or Dacite
4	Diorite Dyke
5	Aplite and/or Pegmatite

SYMBOLS

- Outcrop
- Sparce Outcrop
- Geological Contacts (defined, assumed)
- Foliation
- Dominant Fracture (F), Quartz Vein (V) or Mineralized Structure (S) with Pyrite (Py), Manganese (Mn), Molybdenite (Mo), Chalcopyrite (Cp), Lead Zinc (Pb, Zn), Hematite (H), Barren (b)
- Dyke
- Fault or Shear Zone
- Brecciated
- Intense Shearing
- OCK-10-1 Sample Location
- DDH vertical
- DDH angled
- NC-1-73 (0-200') Drill Hole name, number, year drilled and depth
- Down Hole geology
- LCP
- Corner Post
- Claim Boundary
- Cabins
- Useable Roads
- Trails or old Roads
- Adit, Shaft

part2of2

7135

WESTERN MINES LIMITED

KEYSTONE-ROVER JOINT-VENTURE

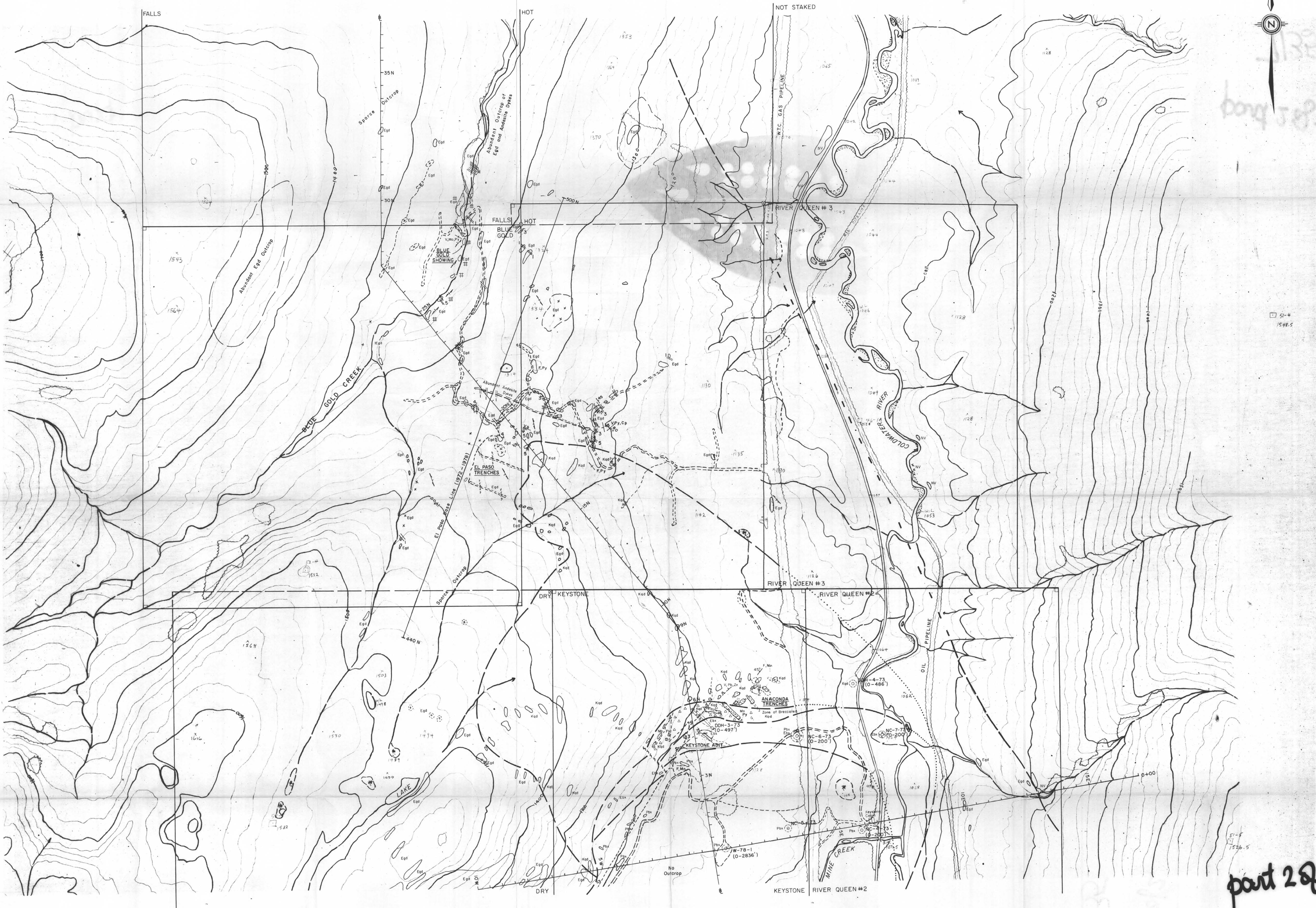
NICOLA MINING DIVISION, BRITISH COLUMBIA
COQUIHALLA LAKES AREA

GEOLOGY

METRES 100 50 0 50 100

Scale: 1:5000	Contour Interval: 20 m	Drawn by: L.W.S.	FIG. 3
Base: AIR PHOTO (B.C.) 1976	Mag. Decl.: 22° E	Date: 1/1/79	
		N.T.S. File: 92H/10 & 11	

To accompany report: The 1978 Report on the Keystone-Rover Project by L.W. Saleken.



LEGEND

Pbx	Pebble Breccia
Kqd	Keystone Quartz Diorite (non-foliated)
Ebx	Eagle Breccia and/or Brecciated Eagle Granodiorite
Egd	Eagle Granodiorite (foliated)
NV	Nicola Volcanics: Andesite Flows and Tuffs

DYKES

1	Andesite
2	Felsite
3	Biotite Feldspar Porphyry and/or Dacite
4	Diorite Dyke
5	Aplite and/or Pegmatite

SYMBOLS

- Outcrop
- Sparce Outcrop
- Geological Contacts (defined, assumed)
- Foliation
- Dominant Fracture (F), Quartz Vein (V) or Mineralized Structure (S) with Pyrite (Py), Manganese (Mn), Molybdenite (Mo), Chalcopyrite (Cp), Lead Zinc (Pb, Zn), Hematite, (H) Barren (b)
- Dyke
- Fault or Shear Zone
- Brecciated
- Intense Shearing
- OCK-10-1 • Sample Location
- DDH vertical
- DDH angled
- NC-1-73 (0-200') Drill Hole name, number, year drilled and depth
- Down Hole geology
- LCP
- Corner Post
- Claim Boundary
- Cabins
- Useable Roads
- Trails or old Roads
- Adit, Shaft

part 2 of 2

WESTERN MINES LIMITED

KEYSTONE - ROVER JOINT-VENTURE

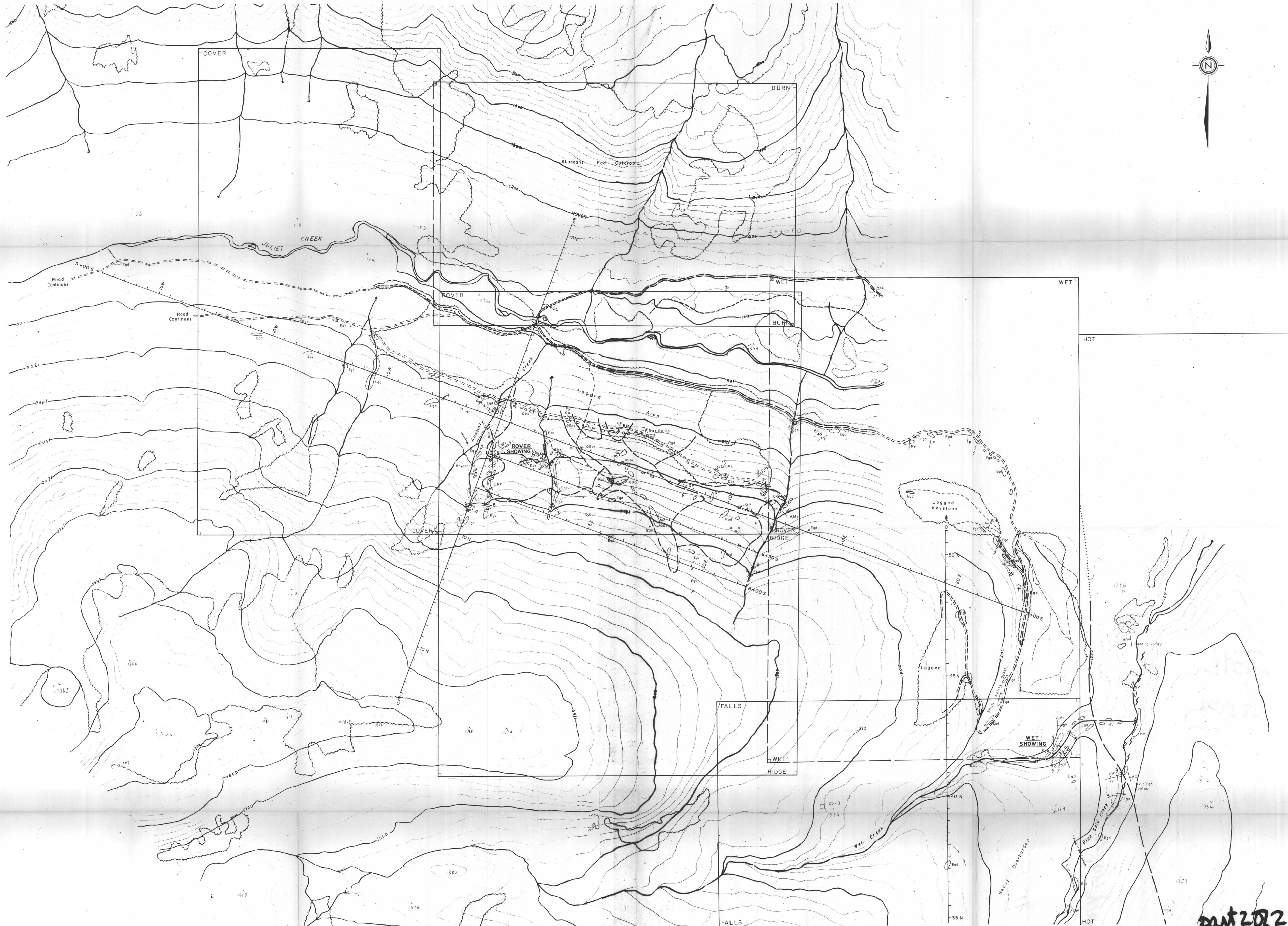
NICOLA MINING DIVISION, BRITISH COLUMBIA
COQUIHALLA LAKES AREA

GEOLOGY

METRES 100 50 0 50 100

Scale: 1:5000	Contour Interval: 20 m	Drawn by: L.W.S.	FIG. 4
Base: AIR PHOTO (B.C) 1976	Mag. Decl.: 22° E	Date: 1/1/79	
		N.T.S. File: 92 H / 10 & 11	

To accompany report: The 1978 Report on the Keystone - Rover Project by L.W. Saleken



LEGEND

QSbx	Quartz Stockwork Breccia
QP	Quartz-eye Porphyry
Rqd	Rover Quartz Diorite (non-foliated)
Ebx	Eagle Breccia
Egd	Eagle Granodiorite (foliated)
NV	Nicola Volcanics: Andesite Flows and Tuffs

DYKES

1	Andesite
2	Felsite
3	Biotite – Feldspar Porphyry and/or Dacite
4	Diorite Dyke
5	Aplite and/or Pegmatite

SYMBOLS

- Outcrop
- Sparce Outcrop
- Geological Contacts (defined, assumed)
- Foliation (60°)
- Dominant Fracture (F), Quartz Vein (V) or Mineralized Structure (S) with Pyrite (Py), Manganese (Mn), Molybdenite (Mo), Chalcopyrite (Cp), Lead Zinc (Pb, Zn), Hematite (H), Barren (b) (Vpy 85°)
- Dyke
- Fault or Shear Zone
- Brecciated
- Intense Shearing
- OCK-10-1 • Sample Location
- DDH vertical
- DDH angled
- NC-1-73 (0-200') Drill Hole name, number, year drilled and depth
- Down Hole geology
- LCP
- Corner Post
- Claim Boundary
- Cabins
- Useable Roads
- Trails or old Roads
- Adit, Shaft

5
4
3

part 2 of 2

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 7135

WESTERN MINES LIMITED

KEYSTONE - ROVER JOINT - VENTURE

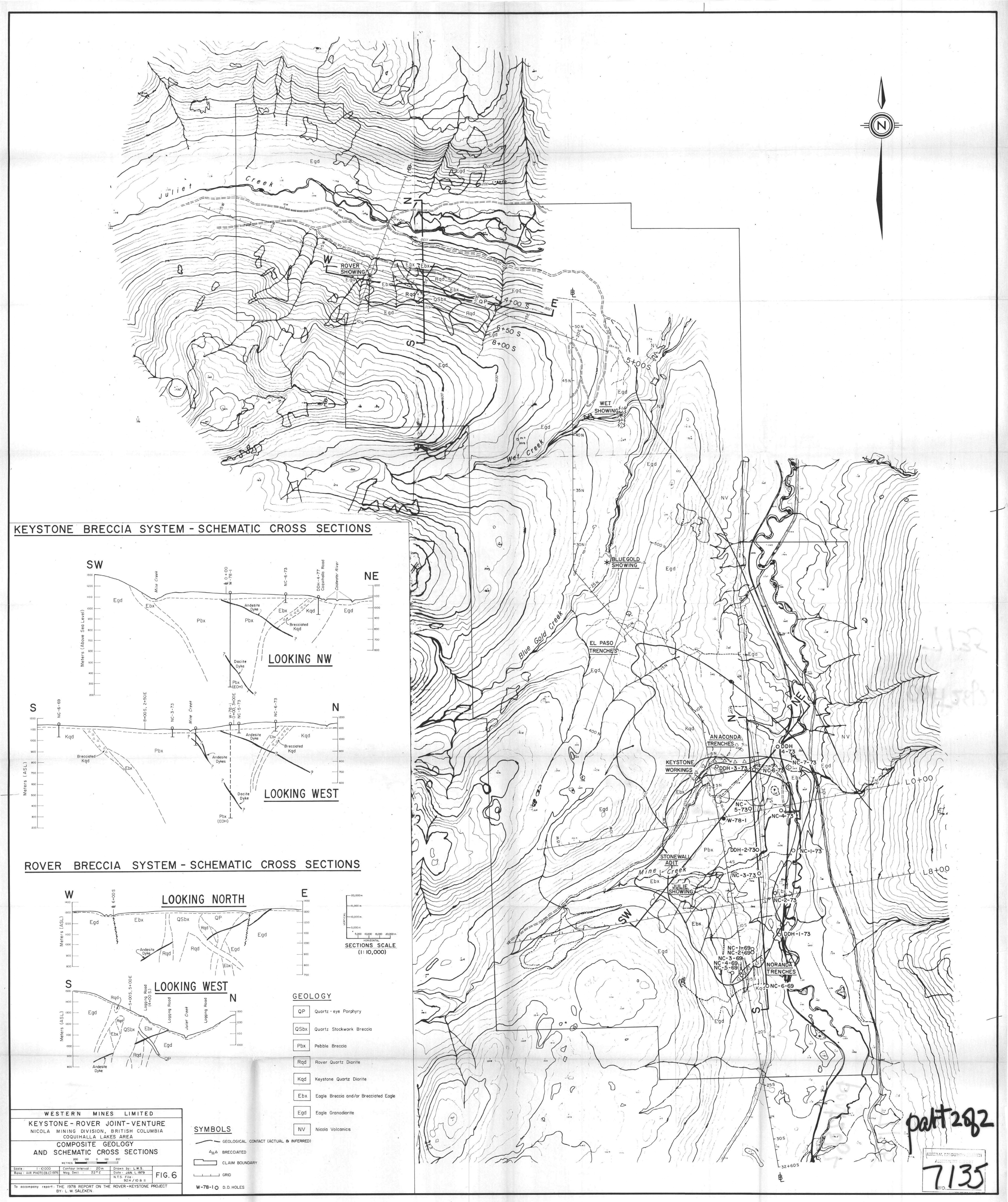
NICOLA MINING DIVISION, BRITISH COLUMBIA
COQUIHALLA LAKES AREA

GEOLOGY

METRES 100 50 0 50 100

Scale: 1:5000	Contour Interval: 20 m	Drawn by: L.W.S.	FIG. 5
Base: AIR PHOTO (B.C) 1976	Mag. Decl.: 22° E	Date: 1/1/79	
		N.T.S. File: 92 H /10 & 11	

To accompany report: The 1978 Report on the Keystone – Rover Project by L.W. Saleken.



KEYSTONE BRECCIA SYSTEM - SCHEMATIC CROSS SECTIONS
SW
NE
LOOKING NW
S
N
LOOKING WEST
ROVER BRECCIA SYSTEM - SCHEMATIC CROSS SECTIONS
W
E
LOOKING NORTH
S
N
LOOKING WEST
Meters (Above Sea Level)
Meters (ASL)
Andesite Dyke
Dacite Dyke
Brecciated Kqd
Pbx (EOH)
Juliet Creek
Wet Creek
Blue Gold Creek
Mine Creek
ROVER SHOWING
WET SHOWING
BLUEGOLD SHOWING
EL PASO TRENCHES
ANACONDA TRENCHES
KEYSTONE WORKINGS
STONEWALL ADIT
JULIE SHOWING
NORANDA TRENCHES
DDH-4-73
NC-7-73
DDH-3-73
NC-6-73
NC-5-73
W-78-1
NC-4-73
DDH-2-73
NC-1-73
NC-3-73
NC-2-73
DDH-1-73
NC-1-69
NC-2-69
NC-3-69
NC-4-69
NC-5-69
NC-6-69
SECTIONS SCALE
(1: 10,000)
VERTICAL
HORIZONTAL
GEOLOGY
QP Quartz - eye Porphyry
QSbx Quartz Stockwork Breccia
Pbx Pebble Breccia
Rqd Rover Quartz Diorite
Kqd Keystone Quartz Diorite
Ebx Eagle Breccia and/or Brecciated Eagle
Egd Eagle Granodiorite
NV Nicola Volcanics
SYMBOLS
GEOLOGICAL CONTACT (ACTUAL & INFERRED)
BRECCIATED
CLAIM BOUNDARY
GRID
W-78-1 D.D. HOLES
WESTERN MINES LIMITED
KEYSTONE - ROVER JOINT - VENTURE
NICOLA MINING DIVISION, BRITISH COLUMBIA
COQUIHALLA LAKES AREA
COMPOSITE GEOLOGY
AND SCHEMATIC CROSS SECTIONS
METRES
Scale: 1:10000
Base: AIR PHOTO (B.C) 1976
Contour Interval: 20m
Mag. Decl.: 22° E
Drawn by: L.W.S.
Date: JAN. 1, 1979
N.T.S. File: 92H / 10 & 11
FIG. 6
To accompany report: THE 1978 REPORT ON THE ROVER-KEYSTONE PROJECT BY: L. W. SALEKEN.
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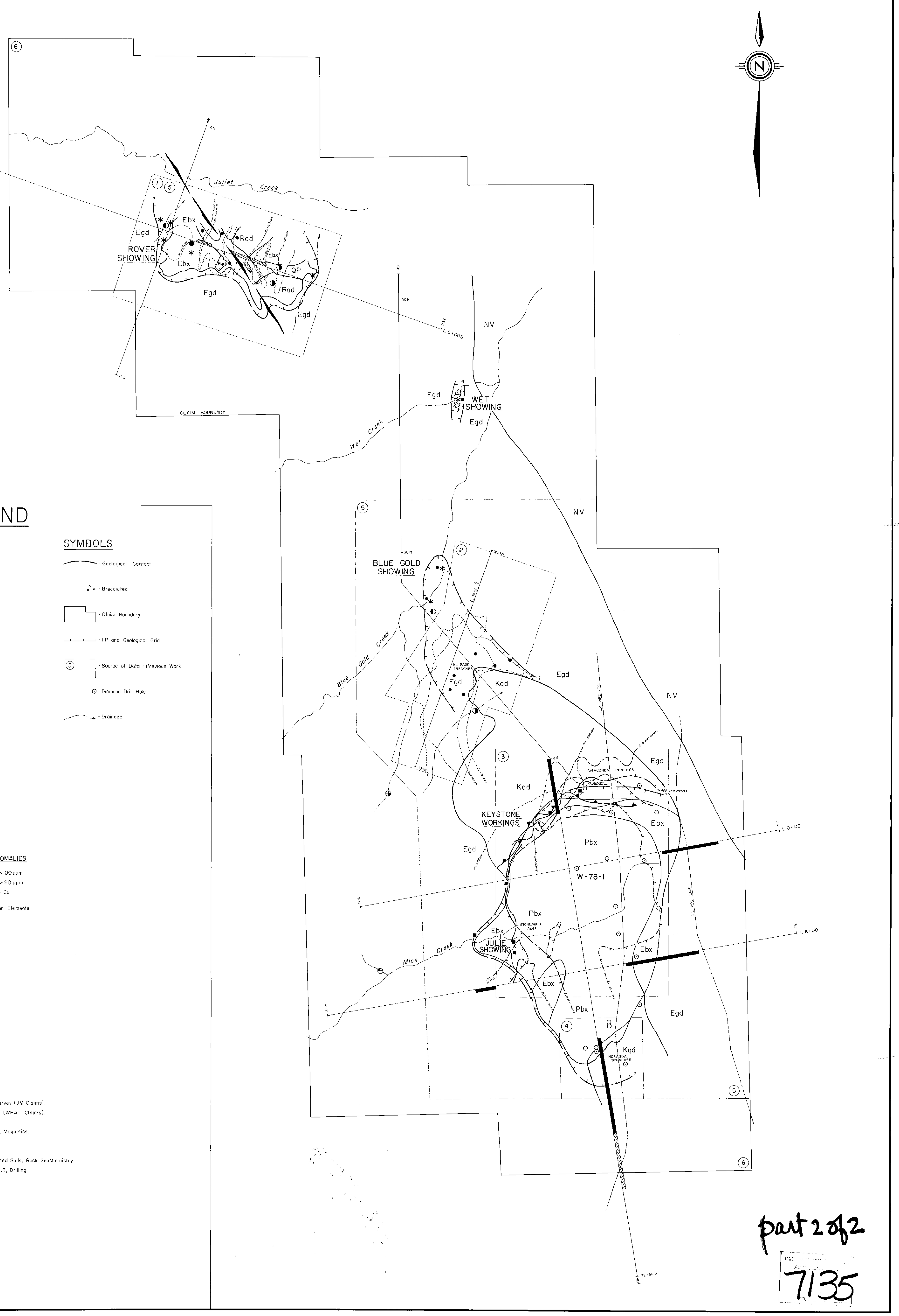


LEGEND

GEOLOGY

- QP Quartz - eye Porphyry
- QSbx Quartz Stockwork Breccia
- Pbx Pebble Breccia
- Rqd Rover Quartz Diorite
- Kqd Keystone Quartz Diorite
- Ebx Eagle Breccia and / or Brecciated Eagle
- Egd Eagle Granodiorite
- NV Nicola Volcanics

SYMBOLS

- Geological Contact
- Brecciated
- Claim Boundary
- I.P. and Geological Grid
- Source of Data - Previous Work
- Diamond Drill Hole
- Drainage

ALTERATION

Outcrop Limit of 1% pyrite and pervassive and / or fracture alteration (Propylitic type)

MINERALIZATION

- * - Molybdenite - Pyrite
- ● - Chalcopyrite - Pyrite (Malachite)
- ■ - Sphalerite (Galena, Pyrite, Hematite, Manganese)

GEOCHEMISTRY

SOIL ANOMALIES

- Cu >100 ppm
- Mo >20 ppm
- Zn >400 ppm
- Mn >1000 ppm

SILT ANOMALIES

- Cu >100 ppm
- Mo >20 ppm
- Mo - Cu
- Pb Zn Ag Mn - Other Elements

GEOPHYSICS

- I.P. - Anomalous and Possibly Anomalous Chargeability 1978 Survey (a = 300 m, n = 1 to n = 5)
- Chargeability Anomaly 1973 Survey (>25 m secs, a = 120m and 240m, n = 1)
- Resistivity 1973 Survey (>800 ohm meters, a = 120m, n = 1)

MAGNETICS

- HIGH / LOW - Area of Relative High and Low Magnetic Susceptibility
- Magnetic Lineament

DATA SOURCES

(1) – Assessment Report 2610 (1970): Magnenites, Soil Cu - Mo Survey (JM Claims).
(2) – EL Paso Mining (1973 - 1974): Geology, Soil Cu - Mo Survey (WHAT Claims).
(3) – Anaconda (1965, AR696): Soil Mo, Cu, Zn, Pb.
– Corval Resources (1972, 1973, AR 4173, 4516): Geology, I.P., Magnetics.
– Noranda and Denison Mines (1973): Drilling.
(4) – Noranda Mines (1969): Drilling and Geology.
(5) – Western Mines (1977): Work by W. Livingstone, Geology, Limited Soils, Rock Geochemistry.
(6) – Rover - Keystone Joint Venture (1978): Geology, Silts, Soils, I.P., Drilling.

WESTERN MINES LIMITED

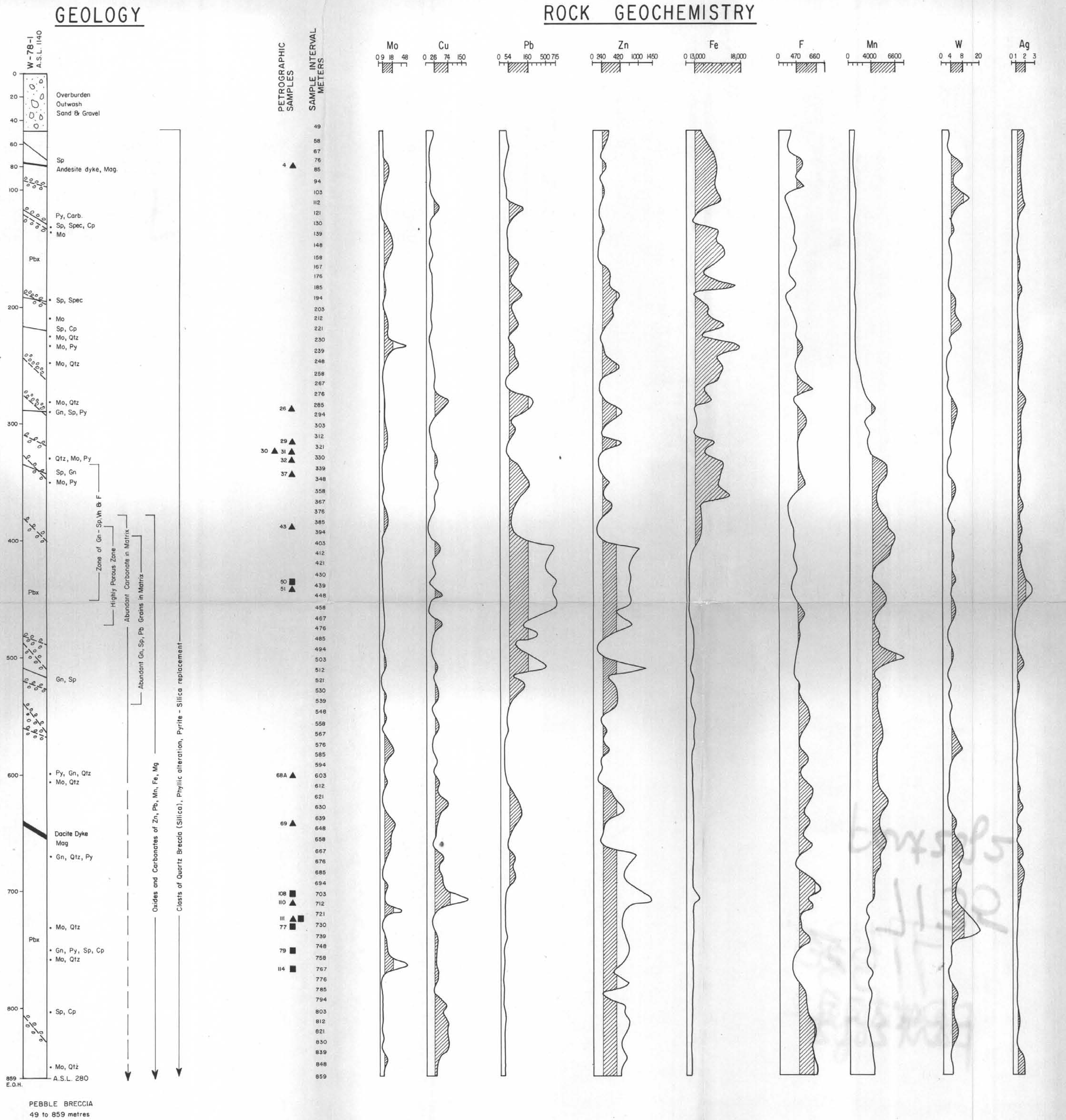
KEYSTONE - ROVER JOINT - VENTURE
NICOLA MINING DIVISION, BRITISH COLUMBIA
COQUIHALLA LAKES AREA

DATA COMPILATION MAP

METRES 200 100 0 100 200 METERS

Scale: 1:10 000	Contour interval:	Drawn by: L.W.S.	FIG. 7
Base: AIR PHOTO (B.C.) 1976	Mag. Decl.: 22°E	Date: JAN. 1, 1979	
		N.T.S. File: 92H/10 & 11	

To accompany report: THE 1978 REPORT ON THE ROVER - KEYSTONE PROJECT
BY: L. W. SALEKEN.



LEGEND & SYMBOLS

GEOLOGY

Mineralized veins, fractures

Bending in Pebble Breccia

Post Pebble Breccia dykes

· Mineralized fragments in Pbx

69 ▲ Thin Sections (Sample No.)

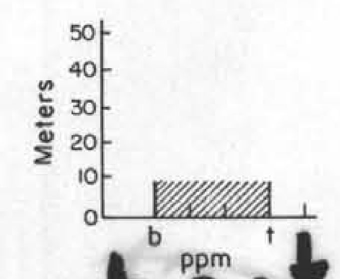
108 ■ Polish Sections (Sample No.)

- Py - Pyrite
- Sp - Sphalerite
- Gn - Galena
- Cp - Chalcopyrite
- Mo - Molybdenite
- Qtz - Quartz
- Mag - Magnetite

GEOCHEMISTRY

b - Background (ppm)

t - Threshold (ppm)



part 2 of 2

MINERAL RESOURCES BRANCH ASSESSMENT REPORT

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NO.

WESTERN MINES LIMITED

KEYSTONE - ROVER JOINT - VENTURE

NICOLA MINING DIVISION, BRITISH COLUMBIA

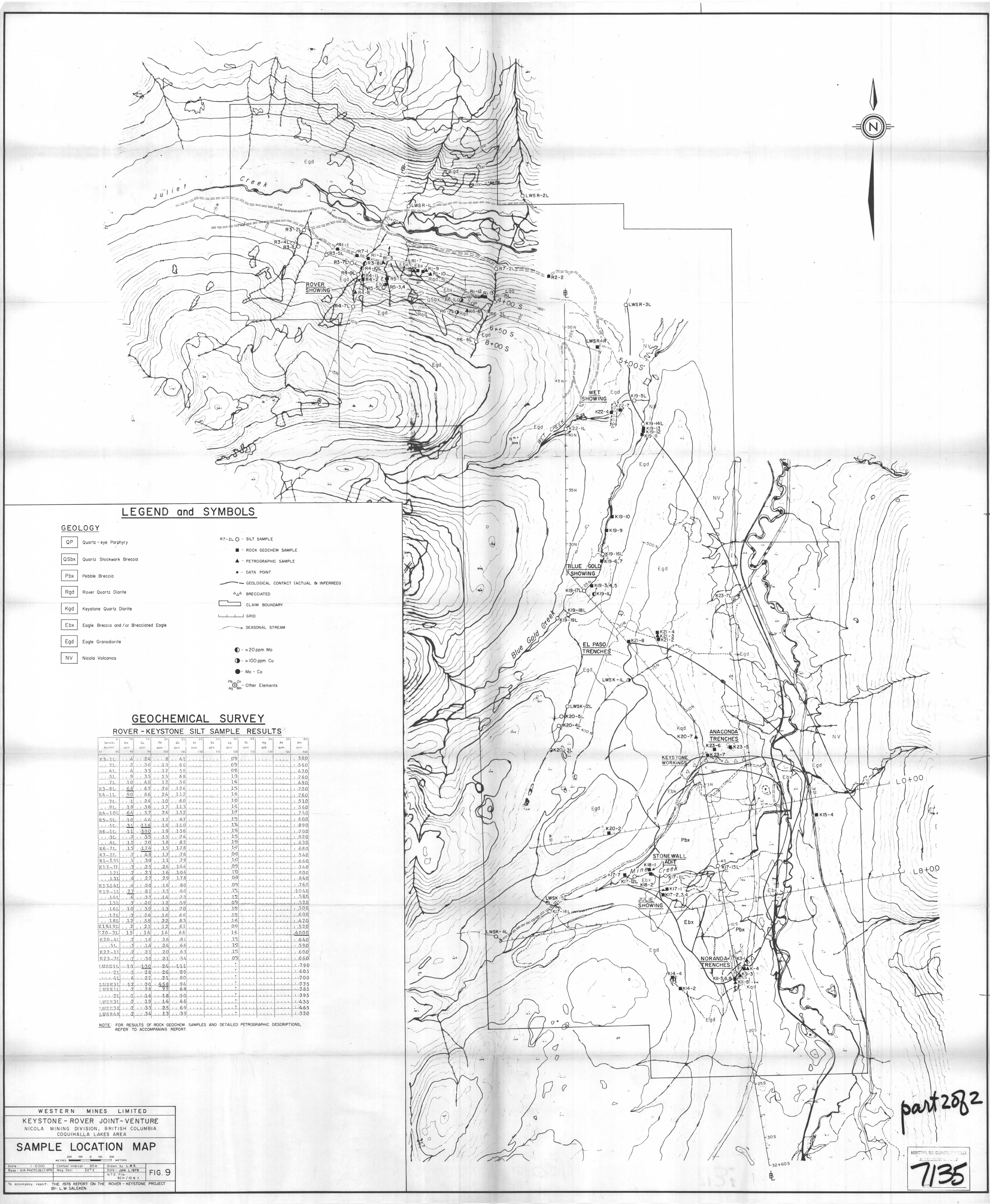
COQUIHALLA LAKES AREA

W-78-1 GEOLOGIC SECTION AND ROCK GEOCHEMISTRY

METRES 50 0 50

Scale: 1:2000	Contour Interval:	Drawn by: L.W.S.	FIG. 8
Base:	Mag. Decl.: 22° E	Date: January 1, 1979	
		N.T.S. File: 92H/10 & 11	

To accompany report: The 1978 Report on the Rover - Keystone Project by L.W. Saleken.



LEGEND and SYMBOLS

GEOLOGY

QP	Quartz - eye Porphyry
QSbx	Quartz Stockwork Breccia
Pbx	Pebble Breccia
Rgd	Rover Quartz Diorite
Kgd	Keystone Quartz Diorite
Ebx	Eagle Breccia and / or Brecciated Eagle
Egd	Eagle Granodiorite
NV	Nicola Volcanics

- R7-2L ○ - SILT SAMPLE
- ■ - ROCK GEOCHEM SAMPLE
- ▲ - PETROGRAPHIC SAMPLE
- ● - DATA POINT
- GEOLOGICAL CONTACT (ACTUAL & INFERRED)
- △△△ BRECCIATED
- CLAIM BOUNDARY
- GRID
- SEASONAL STREAM

- ◐ - > 20 ppm Mo
- ◑ - > 100 ppm Cu
- ● - Mo - Co
- Pb Zn Ag Mn ⊕ - Other Elements

GEOCHEMICAL SURVEY

ROVER - KEYSTONE SILT SAMPLE RESULTS

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	As ppm	Mn ppm
R3-1L	4	24	8	41			0.9				380
2L	2	36	13	66			0.9				560
4L	4	33	12	50			0.8				470
5L	9	35	15	68			1.3				760
7L	10	40	12	56			1.4				490
R3-8L	68	62	26	126			1.5				720
R4-1L	90	66	24	112			1.6				760
7L	1	24	10	60			1.0				510
9L	19	36	17	113			1.1				560
R4-10L	64	57	26	152			1.7				740
R5-5L	10	44	12	87			1.5				600
1L	31	116	18	110			1.4				890
R6-1L	11	390	19	156			1.6				700
3L	7	35	15	74			1.5				920
4L	12	70	18	82			1.9				630
R6-7L	15	174	15	178			1.7				680
R7-2L	2	48	17	76			0.8				540
R1-15L	1	30	11	79			1.0				660
K17-11L	3	25	24	146			0.9				740
12L	2	23	16	106			1.0				800
13L	4	27	29	178			0.9				840
K17-14L	4	20	16	80			0.9				760
K19-1L	27	81	15	60			1.1				1040
14L	6	33	14	73			1.2				580
15L	3	20	12	59			0.9				520
16L	10	39	13	70			1.2				500
17L	3	24	16	66			1.2				600
18L	12	59	22	83			1.5				470
K19-19L	2	21	12	61			0.9				520
K20-3L	15	14	14	46			1.1				4000
K20-4L	2	16	26	81			1.1				640
5L	3	14	24	66			1.2				590
K22-1L	2	21	20	63			1.1				600
K23-7L	1	30	21	54			0.9				660
LWSK1L	13	130	24	111			.				790
2L	5	28	26	89			.				605
4L	4	22	21	80			.				700
LWSK5L	12	30	458	94			.				775
LWSR1L	2	28	22	68			.				785
2L	1	16	18	50			.				395
LWSR3L	2	19	14	46			.				435
LWSK3R	2	33	25	69			.				465
LWSR4R	2	34	13	39			.				320

NOTE: FOR RESULTS OF ROCK GEOCHEM. SAMPLES AND DETAILED PETROGRAPHIC DESCRIPTIONS, REFER TO ACCOMPANING REPORT.

WESTERN MINES LIMITED

KEYSTONE - ROVER JOINT-VENTURE
NICOLA MINING DIVISION, BRITISH COLUMBIA
COQUIHALLA LAKES AREA

SAMPLE LOCATION MAP

200 100 0 100 200 METRES / METERS

Scale: 1:10 000	Contour Interval: 20 m	Drawn by: L.W.S.	FIG. 9
Base: AIR PHOTO (B.C) 1976	Mag. Decl.: 22° E	Date: JAN. 1, 1979	
		N.T.S. File: 92 H / 10 & 11	

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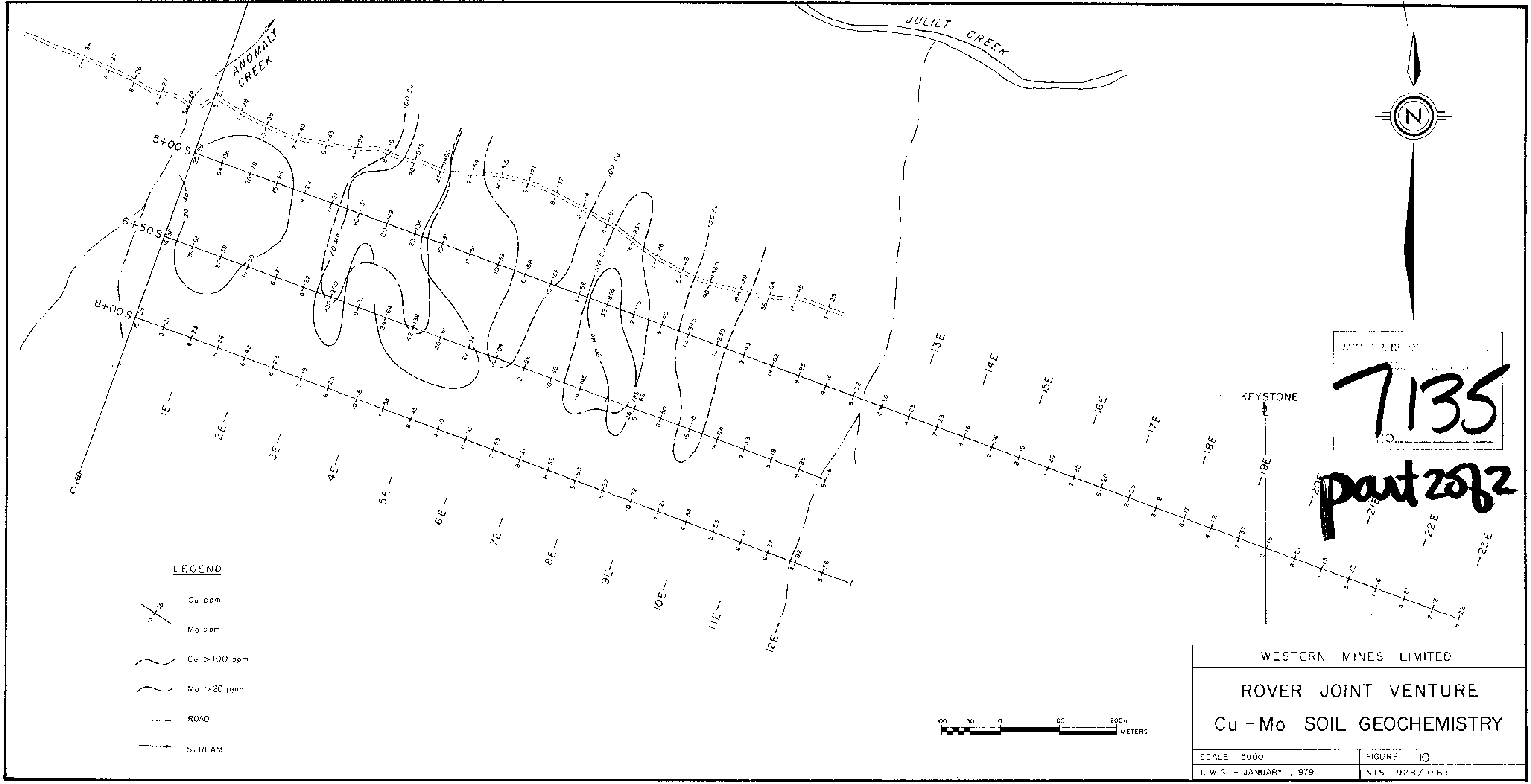
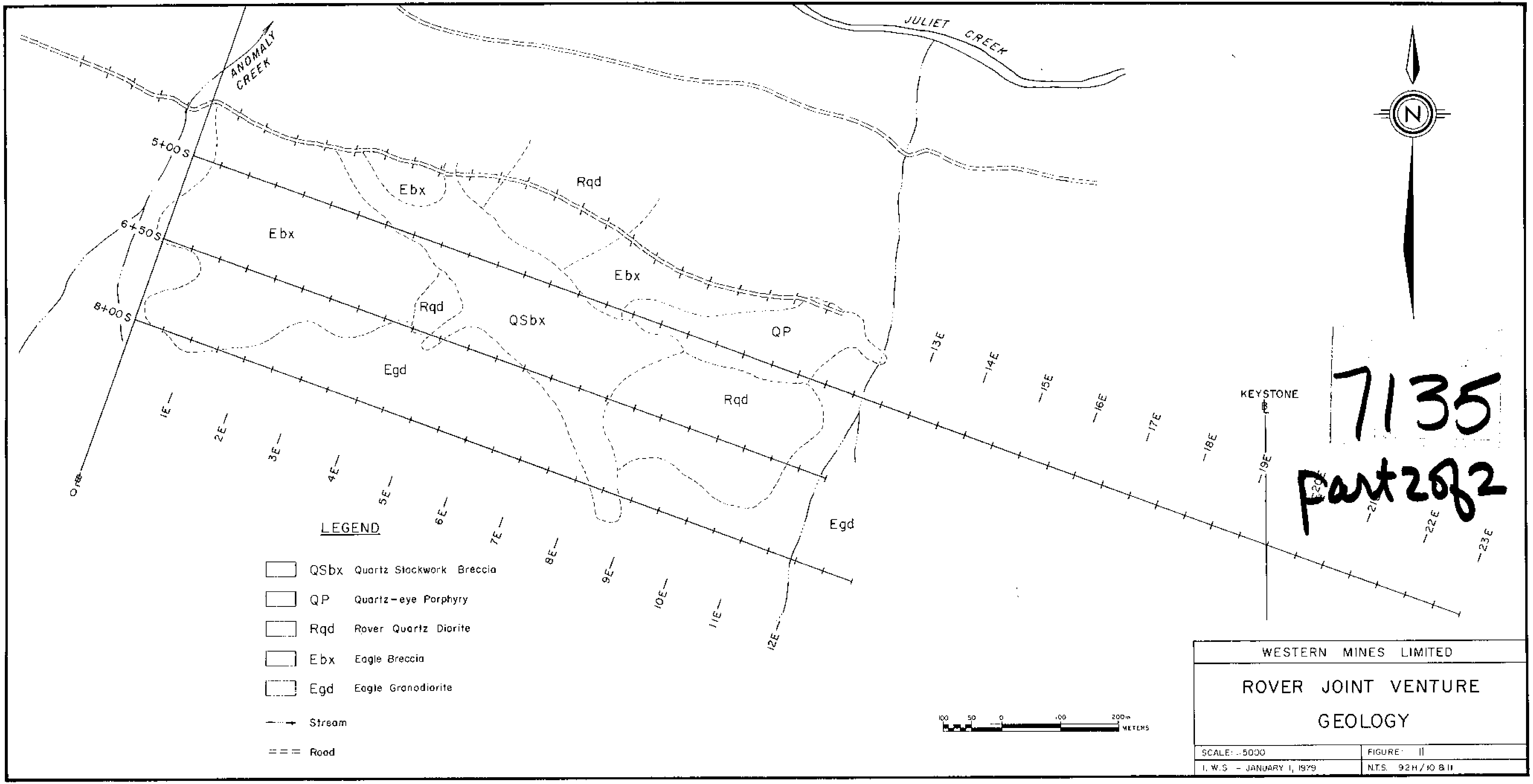


WESTERN MINES LIMITED
ROVER JOINT VENTURE
Cu - Mo SOIL GEOCHEMISTRY
SCALE: 1:5000
FIGURE: 10
I. W. S. - JANUARY 1, 1979
N.T.S. 92H/10 & 11
LEGEND
Cu ppm
Mo ppm
Cu > 100 ppm
Mo > 20 ppm
ROAD
STREAM
JULIET CREEK
ANOMALY CREEK
KEYSTONE
5+00 S
6+50 S
8+00 S
N
METERS
7135
part 2 of 2



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