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GEOLOGY REPORT

FOR

SEMCO MINING CORPORATION

ON THE

ERICKSON-ASHBY CLAIMS
TAKU RIVER AREA
ATLIN MINING DIVISION

MAP 104K/11W
58°36'N, 133°30'W

BY

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SEPTEMBER,
1979.

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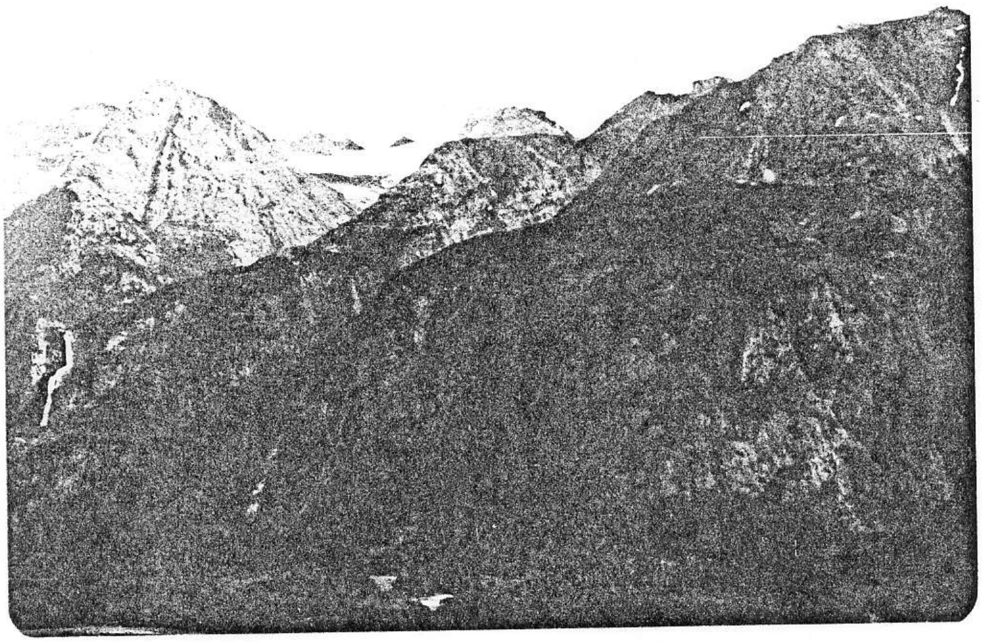

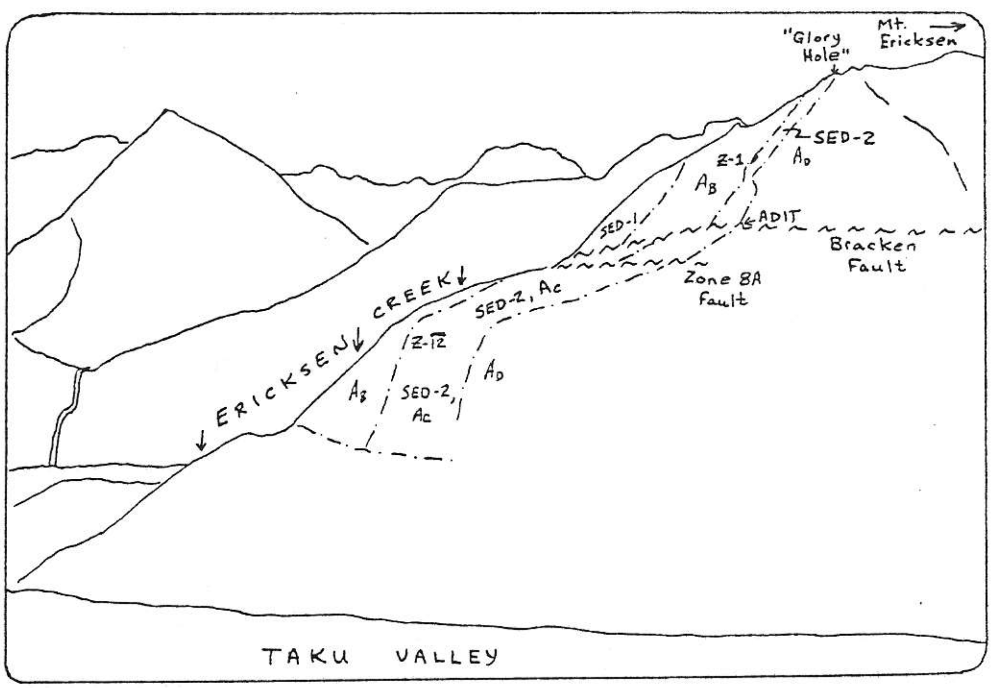

Frontispiece: View of Ericksen-Ashby Property from helicopter over the Taku Valley; major stratigraphic units shown on sketch.

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GEOLOGIC SUMMARY.

1. The Ericksen-Ashby property occurs in Permian to Upper Triassic rocks. The deposits may be related in age and origin to the volcanogenic massive sulfide deposits of Upper Triassic age north of the Taku River at Big Bull and Tulsequah Chief. These occur in altered rhyolite of the Stuhini group.

2. At Ericksen-Ashby, the stratigraphic section contains four major andesitic volcanic units, and two interlayered "sedimentary" units of chert, limestone, and minor rhyolite. All deposits of economic interest are in the upper sedimentary section (SED.2).

3. Rocks are moderately deformed;regional studies indicate at least two major periods of uplift and deformation. The regional trend of units strikes northwest and dips moderately to steeply southwest. Local deformation is complex, with abundant minor folds and faults with no recognizable regional symmetry.

4. In SED-2, massive sulfides, containing high values in Zn,Pb, and Ag, occur with a thin discontinuous rhyolite along the footwall. The rhyolite probably originated near a topographic high flanked by two basins in the underlying topography; these basins are loci for accumulation of massive sulfides. To the northwest at the same stratigraphic level, but separated from the rhyolite by an original topographic high is a thick wedge of barren chert.

5. The middle of SED-2 section is mainly limestone with abundant thin andesite flows and subsurface intrusions and pyroclastic debris. Local patches consist of chert, skarn, and locally massive sulfide; these are products of exhalative activity at small scattered centers.

6. The upper part of the SED-2 section contains abundant chert, chert breccia and skarn with lesser limestone. Chert formed from exhalative solutions by replacement of limestone in vent areas and by precipitation from solution at the seawater interface. Chert breccia was formed during slightly later tectonic activity. During continued exhalative activity, sphalerite and galena were deposited in fractured and local replacement patches in the chert breccia, and elsewhere chert and chert breccia were replaced by skarn. Skarn is predominantly rhodonite with lesser pyrrhotite, and locally amphiboles, pyroxenes, and garnet. Sphalerite and galena occur as minor components of most skarns, and locally are abundant.

7. Further work is recommended to test the massive sulfide zone in the topographic basins adjacent to the source of the footwall rhyolite. The next stage of this work should be a 1000 foot extension of the existing adit, and drilling of horizontal and 45°-up holes on 200-foot centers along this extension.

ERICKSEN-ASHBY PROPERTY

INTRODUCTION

The purpose of this study is to evaluate the Ericksen-Ashby property, and to develop a geological model or models, which might be useful in predicting the location of potential mineralized zones of economic interest.

Previous reports are not consistent; most describe the deposits as being replacements of limestone, although detailed reports and drill logs indicate that limestone is a poor host, and that the sulfides occur in chert.

The property was mapped by the author between August 11 and August 21, 1979. This report contains the results of that study, and outlines a new geological model which fits the data well, and which suggests targets with economic potential.

Location and Access (see Fig. 1)

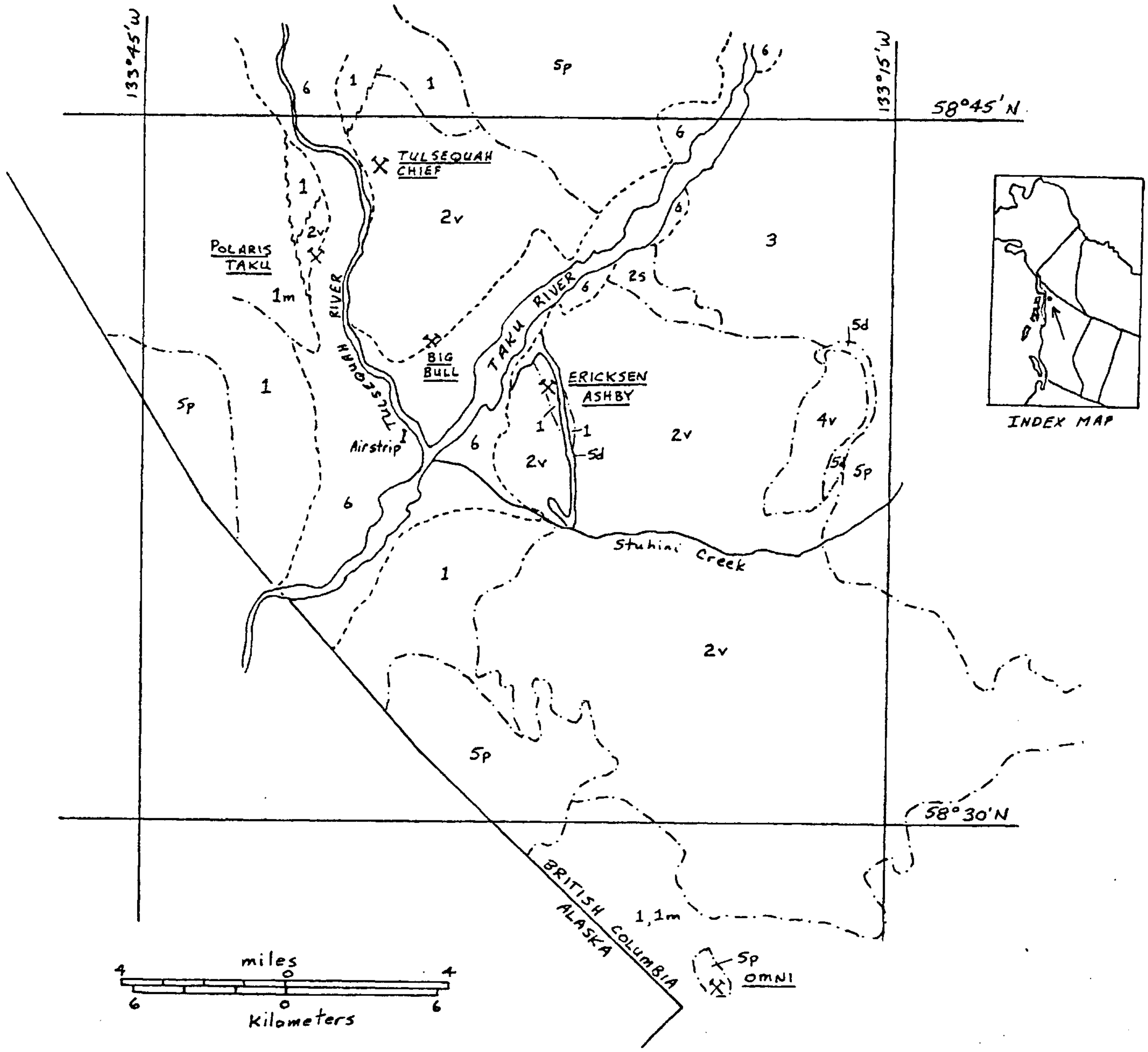
The property is at N58°36', W133°30' on the north end of Ericksen Mt. at an elevation between 1800 and 4600 feet (550 and 1400 meters). It lies on the south side of the Taku River 81 mi (130 km) south of Atlin, and 40 mi (64 km.) east of Juneau, Alaska.

Access is as follows:

1) From Whitehorse or Atlin by airplane to the gravel airstrip near the junction of the Taku and Tulsequah Rivers (possibly dangerous or inaccessible at unpredictable times in mid-summer because of flash flooding as Tulsequah Lake drains rapidly after its confining ice dam (Tulsequah Glacier) is melted); from the airstrip to the camp at 3070' (940m) elevation by helicopter.

2) Same as 1 but using a float plane which would land on the Taku River, and then to the property by helicopter.

3) By helicopter from Atlin to the campsite.



LEGEND

6	Pleistocene & Recent: fluvial gravels
5	Late Cretaceous, Early Tertiary:
	5p - plutonic rocks: granodiorite, quartz monzonite
	5d - dikes: felsite, felsite porphyry
4	Late Cretaceous, Early Tertiary:
	4v - Sloco Group: dacitic volcanic rocks
3	Middle Jurassic: Takwahini fm. coarse to fine clastic sediments
2	Upper Triassic:
	2v - Stuhini Gp. andesite, locally rhyolite volcanic rocks
	2s - King Salmon fm: coarse to fine clastic sediments
1	Pre-Upper Triassic (mainly Triassic and Permian)
	andesitic volcanic rocks, clastic sediments, limestone, chert
	1m - metamorphosed equivalents of 1 (Amphibolite Facies)

Figure 1. Location Map and Regional Geology (after Souther, 1971)

Topography and Climate

The upper (southern) half of the property is mainly outcrop, almost all of which is accessible by foot. The only exception is a steep to nearly vertical cliff on the east side of the mountain. The lower (northern) half is along a gently sloping ridge covered by trees and bushes, with relatively limited exposure, especially in regions of economic interest. It terminates against a steep north-facing cliff (see frontispiece).

The area receives abundant snowfall which covers most of the region until early May; in August, 1979 only four small snow patches remained on the property. (Surface drilling in the upper half of the property would have to be done before the end of July to ensure an adequate water supply from melt runoff.)

Previous Work (data from old reports, may be incomplete)

1929	claims staked by Ericksen and Ashby, surface prospecting, several sulfide zones located, small adit started on Zone 1.
1930 - 1950	annual assessment work.
1951	property optioned by Cominco (operating Big Bull and Tulsequah Chief mines on the north side of the Taku River), surface geology and trenching.
1952	Drill program initiated but only one hole drilled below Glory Hole area; it was abandoned when a rock avalanche destroyed the drill platform and supplies.
1953 - 1962	annual assessment work.
1963	Ericksen-Ashby Mining Co. formed, surface exploration, trenching in Zone 8.
1964	underground adit driven and 9 holes drilled from a station at the end of the adit; a sulfide-rich skarn zone was intersected in the adit and in drill holes; program ended because of lack of water for drilling.
1965	trenching in zones 5,8,8A,10,11 and 12 in the northern half of the property. Self-potential survey outlined several small anomalies between zones 8 and 11.
1966 - 1975	no record of work; ground lapsed from owner's estate.
1976	property restaked by Gerry Rayner.
1979	map and report compiled by Lacana Mining Corporation. property optioned by Semco Mining Corporation.

Claims (see fig. 2)

The claims comprise two blocks, E-A 1 (151) with four claims and E-A-2 (671) with eight claims.

Economic History of the Region (see fig. 1)

On the north side of the Taku River are the Big Bull and Tulsequah Chief mines; these were operated between 1951 and 1957 by Cominco, during which time their combined production was as follows:

1.03×10^6 tons grading 0.08 oz. Au, 3.3 oz. Ag, 1.32% Cu, 1.46% Pb, 6.05% Zn.

At Tulsequah Chief mineralization consists of "massive, fine grained pyrite-chalcopyrite in lenses, and spalerite-pyrite-galena in a dense gangue of quartz-carbonate-barite .... in shear zones in altered Stuhini volcanic rocks, the alteration being associated with large felsic dikes and northeast trending faults." (Souther, 1971).

At Big Bull the deposits were described as "replacements of sheared and highly altered Stuhini volcanic rocks, related to dikes and northerly trending faults." Souther, 1971).

Brief examination of both deposits indicate that they are volcanogenic massive and disseminated sulfide bodies, associated with rhyolites which are altered to the assemblage quartz-sericite-pyrite and which contain abundant massive pyrite lenses. Some massive sulfides are well bedded. Coarse felsic volcanic breccias with fragments up to 15 cm across comprise a thick section west of the Tulsequah Chief mine, and suggest proximity to a volcanic vent.

The Polaris-Taku deposit on the west side of the Tulsequah River was in operation from 1937 to 1951. The deposit occurs in "massive andesite and silicified tuffs (=rhyolite?, J.P.) with interlayered phyllite and schist (=volcanogenic metasediments?, J.P.). Veins occur along contacts of the schist and greenstone and in the greenstone; the largest veins are along the contact. Veins contain arsenopyrite, pyrite, stibnite, and minor pyrrhotite in a quartz-carbonate gangue. Gold (averaging 0.25 - 0.60 oz/T) occurs with arsenopyrite and fuschite in silicified Stuhini volcanic rocks." (Kerr, 1948).

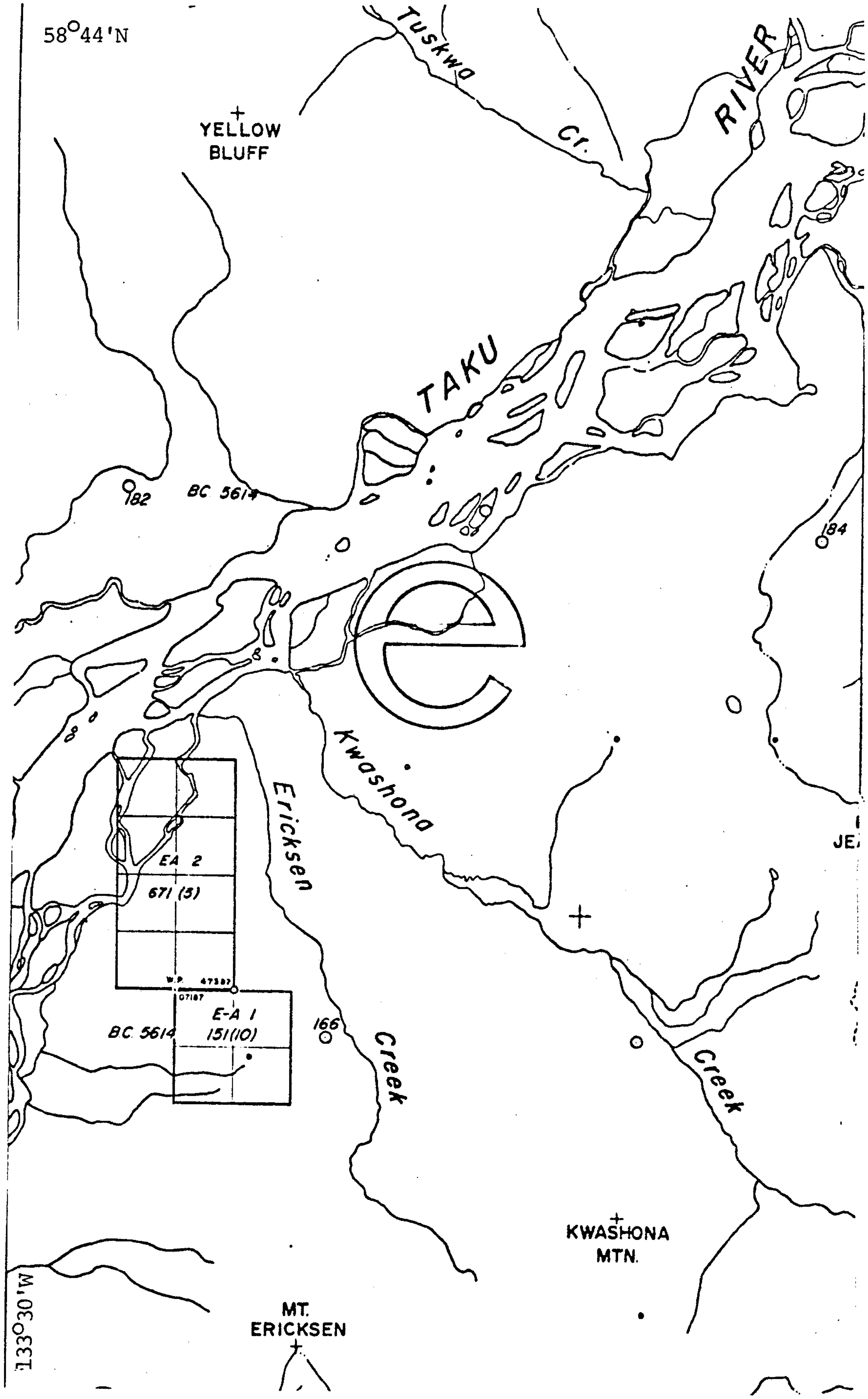


Figure 2. Claim Location Map

MAP 104K/11W

GEOLOGY

Regional Geology (modified from Souther, 1971, see Fig. 1)

In late Permian, carbonates were deposited on a stable, slowly subsiding shelf. Bioclastic textures suggest reefs or coasts exposed to wave action. A gradual change to fine clastic sediments accompanied by thin cherts reflects the beginning of uplift in the west and encroachment of river-derived sediments onto the carbonate platform. The sudden and widespread appearance of chert indicates the commencement of submarine volcanism, which subsequently produced thick piles of andesitic volcanic rocks.

Tectonic activity continued into Mid-Triassic with uplift, folding and metamorphism of the Tahltanian Orogeny; in much of the region this marks a major hiatus between the Upper Triassic and older strata. Uplift was greatest in the west in what would later become the Coast Plutonic Complex.

In the Upper Triassic, extensive, predominantly andesitic volcanism produced flows and volcanoclastic rocks of the Stuhini group. Economically significant rhyolite and associated massive sulfides occur locally. The andesites grade upwards into silts and muds, marking the end of the volcanic episode and the beginning of erosion. To the east, an intraformational wedge of coarse to fine clastic sediments is subdivided as the King Salmon formation.

In the Early Jurassic, the Coast Mountains were rapidly uplifted and eroded, with deposition of coarse clastic sediments (Takwahini formation) to the east. Much of the region around Ericksen-Ashby was emergent from this time onwards. In mid-Jurassic, rocks were uplifted and deeply eroded, and deformed into open folds with WNW trends.

In Late Cretaceous to Early Tertiary, igneous activity produced the volcanic rocks of the Sloco group and related sub-volcanic dikes, and deeper-seated intrusions of granodiorite and quartz monzonite; some of the latter contain molybdenum (Omni).

It is difficult to determine exactly where the Ericksen-Ashby rocks fit in the regional framework. Souther suggests that the limestones are Permian or pre-Upper Triassic, and occupy the core of an anticline, with younger Stuhini volcanic rocks on either side. Kerr (1948) suggest that the rocks are monoclinally dipping, with pre-Late Permian sedimentary and volcanic rocks to the east and Stuhini volcanic rocks to the west. I concluded that the rocks at Ericksen-Ashby form a monoclinally dipping sequence with older rocks to the east and younger rocks to the west. The major quartz-feldspar porphyry dike at Ericksen-Ashby is part of the Late Cretaceous-Early Tertiary igneous activity.

Property Geology

A. STRATIGRAPHY (see fig. 3)

The stratigraphic section consists of two major sedimentary units interlayered with predominantly andesitic volcanic units. Rhyolite occurs locally in the upper sedimentary unit (SED-2); it is economically significant because most massive sulfide deposits are spatially and (in my model) genetically related to it.

The section appears to be non-repetitive, but regional mapping was not done to test this. Data supporting a monoclinally dipping west-facing section include the following:

1) Each major unit has certain unique lithologic and/or stratigraphic features, some of which indicate that the top of the section is to the west.

   a) amygdaloidal andesites in Andesite B occur only along the western edge of that unit: amygdaloidal rocks commonly occur at the top of a volcanic sequence, indicating higher gas content and/or viscosity, and amygdaloidal rocks are characteristic of tops of flows.

   b) massive sulfides occur mainly along the western contact of rhyolite in SED-2. In the volcanogenic sulfide model, massive sulfides commonly occur at the upper contact of rhyolite.

2) The contact between SED-2 and Andesite D above the adit is in part unconformable, with rocks to the west truncating bedding and alteration features in rocks to the east. Reconstruction of the original stratigraphic section (see fig. 5) suggest that SED-2 was in part eroded before deposition of Andesite D. It is possible that this unconformity is that described by Souther between Upper Triassic volcanic rocks and pre-Upper Triassic rocks. If this were true, it would mean that the Ericksen-Ashby deposits are not genetically related to those at Big Bull and Tulsequah Chief.

Following is a brief description of the stratigraphic section from east (base) to west (top). Detailed distribution of units are shown in Fig. 4 (inside back cover). Units are divided on the basis of lithology in Fig. 4; these lithologic units are indicated by number and letter in the description below.

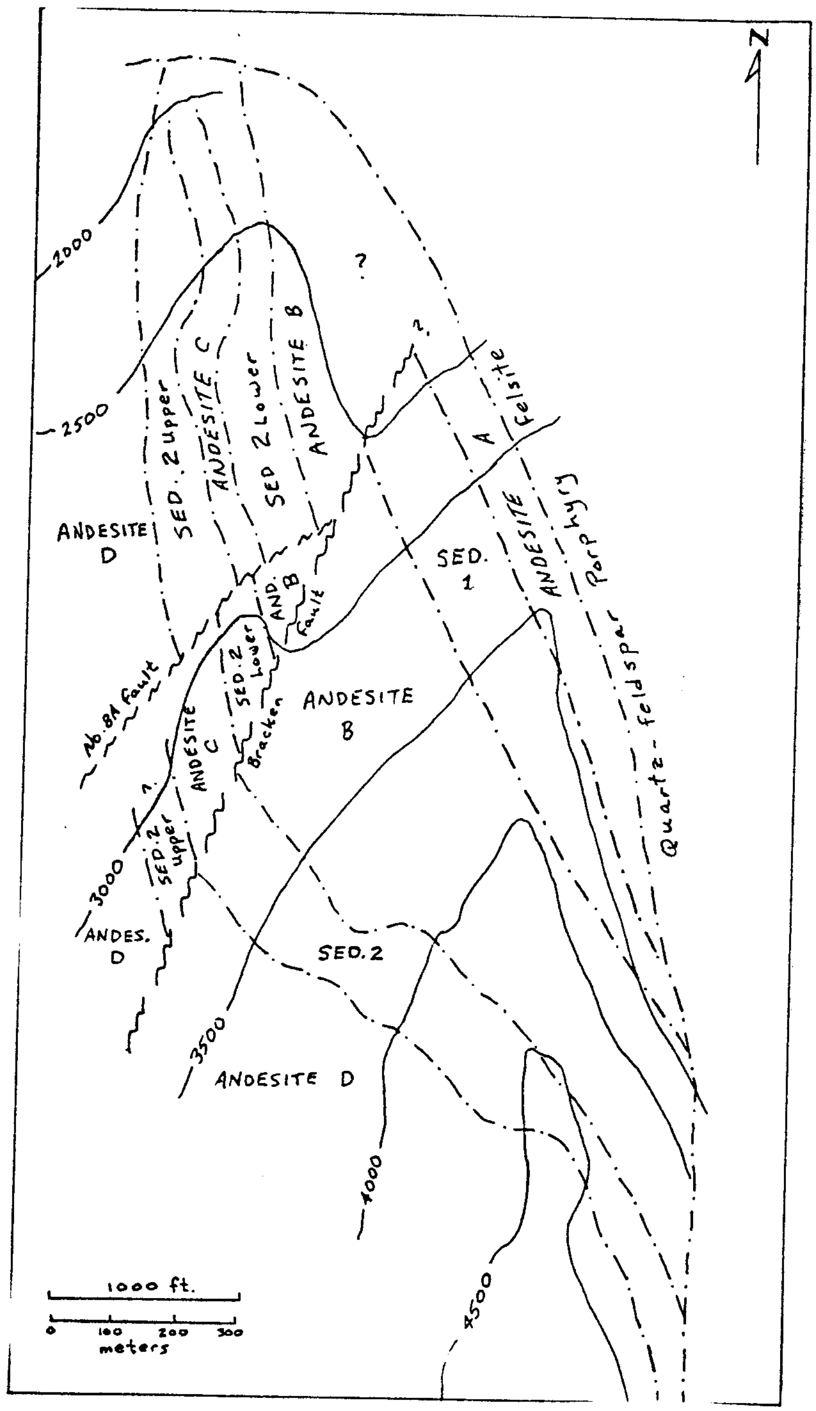


Figure 3. Major Stratigraphic Units, Ericksen Mountain, Taku River.

1. Andesite A: unmapped

2. SED-1: briefly mapped

Lower half to 1/3 of section

Irregularly bedded siliceous sediments (Unit 1), thinly banded, alternating thicker, light grey, cherty bands and thinner, dark gray to black seams in discontinuous layers; contains one persistent limestone bed near the center of the section; grades upwards into unbedded or faintly bedded chert of Unit 4; locally contains fine to medium clastic andesitic sediments in the outcrops at the highest elevation mapped in this unit.

Upper half to 2/3 of section

Chert and cherty sediments (Unit 4), poorly bedded, locally with abundant fine disseminated pyrite and/or pyrrhotite (4py) producing a prominent limonite stain (Zone 7); contains thin discontinuous interlayers of limestone (Unit 2), some with abundant poorly preserved fossils including crinoid stems (2F).

3. Andesite B: briefly mapped

The unit is predominantly very fine to fine grained, dark green to black massive andesite flows with little apparent internal structure. At the base is a discontinuous zone of breccia composed of rounded to very angular fragments of andesite in a medium to coarse grained groundmass of an unknown sand-coloured mineral and minor calcite. Locally overlying the breccia is a thinly bedded unit of andesitic siltstones.

Near the top of the section are scattered lenses and patches of breccia with fragments of andesite in a sparse to locally abundant groundmass of limestone. Commonly at the top of the section is amygdaloidal andesite, with abundant amygdules, averaging 1-2 mm across, filled with calcite and epidote. Locally at the top of the section near the major rhyolite of the overlying unit is an aphanitic black andesite sediment or tuff containing abundant lenses of limestone up to a few meters long.

4. SED-2: mapped in detail (Ericksen formation in some early reports)

This is the major sulfide host and is described in detail in the next section. It consists of limestone with abundant thin andesite flows and locally abundant, irregular andesitic pyroclastic debris; thick wedges of chert and chert breccia; and discontinuous rhyolite flows, tuff, and breccia, mainly near the base of the section at the south end of the property.

5. Andesite C: mapped in detail but limited exposure

In the northern half of the property a major andesite unit occurs in the center of the SED-2 section. It consists of dark green to medium green massive andesite and amygdaloidal andesite.

6. Andesite D: mapped only along the contact with SED-2

The unit consists of andesite and dacitic andesite flows, tuffs, and locally breccias or coarse tuffs. Epidote is abundant, especially near the contact of SED-2. Along the contact of SED-2 commonly is a zone up to 2 m thick containing abundant very fine disseminated pyrite, which yields a limonite stain on the weathered surface. Just above the adit, the pyritic zone thickens to 30 m; no explanation of this thickening is offered.

Near the contact with SED-2 is a well bedded coarse tuff or breccia unit containing andesite and dacitic andesite fragments up to a few cm across (averaging less than 1 cm) in a sparse to locally abundant limy matrix. Locally associated with this unit are thin limestone lenses.

The contact with SED-2 is irregular in outline, partly as a result of deformation and topography (the west slope of the mountain is in part subparallel to bedding), but partly because bedding in SED-2 limestone and chert, and stratiform? alteration zones in pyritic andesite are truncated along an angular unconformity by overlying andesite flows. Locally this contact may be the locus of a minor fault, because bedding in limestone and chert is warped sharply within a few cm of the contract.

B. DETAILED STRATIGRAPHY OF SED-2

The distribution of litholigic units is best seen in Fig. 4. The following main lithologic units are distinguished:

i) Rhyolite (Unit R)

Near the base of the section is a thin discontinuous layer composed mainly of altered rhyolite with quartz-sericite-pyrite alteration (Rpy) and local lenses of massive pyrite. In Zone 2, Trench 1 is exposed a 5-meter section of rhyolite breccia containing abundant cherty fragments up to a few cm across in a pyritic, siliceous groundmass. A similar rhyolite breccia occurs locally in Zone 2, Trench 3. Associated with rhyolite are lenses and patches of massive sulfide, chert, and chert breccia. Most massive sulfides are on the west side of the rhyolite unit, and in some trenches are zoned, with sphalerite and galena more abundant towards the top (west) and pyrite more abundant to the bottom (east). (All rocks designated "massive sulfide" contain abundant quartz intergrown with sulfides. Hereafter the presence of quartz will be assumed in the name, massive sulfide.)

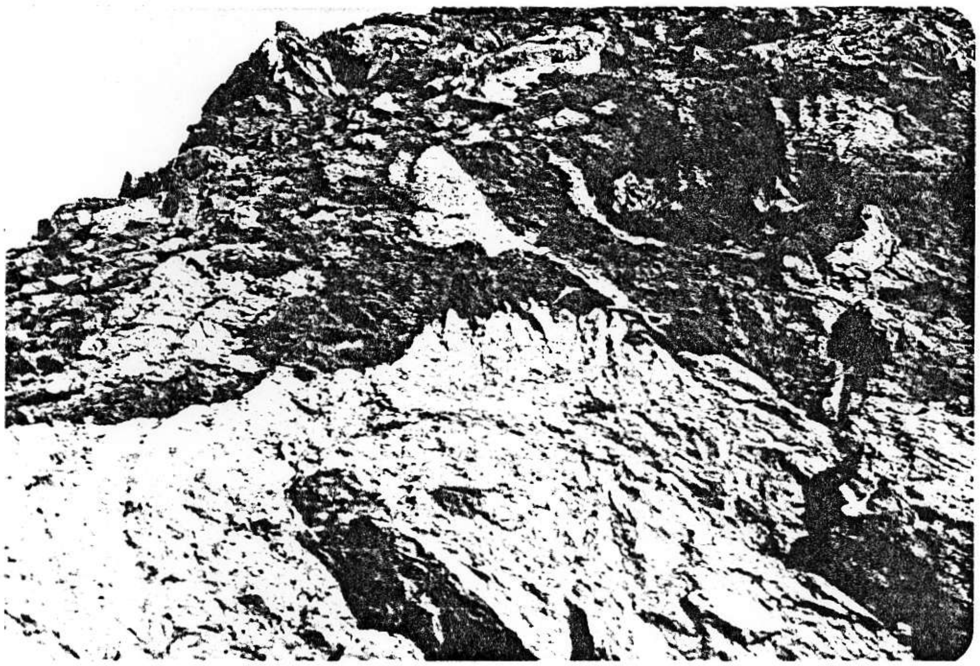
In the upper third of the section, rhyolite locally forms thinly bedded tuffs or banded flows associated with chert and chert breccia. A distinctive massive greenish rhyolite? occurs in trenches 5-2, 5-4 and 10-2; it contains patches of chert breccia, and disseminated and patchy sphalerite and galena.

ii) Limestone (Unit 2)

This forms much of the central part of the section of SED-2. It shows a wide variety of texture and structure.

Near the basal rhyolite, it commonly contains abundant irregular to rounded fragments of andesite up to several meters across, and irregular pyroclastic? andesite debris (Unit 2A) (see Plate 1). In the Glory Hole region fragments of chert are common as well. Many of the inclusions in limestone, especially near the rhyolite, are coated with dark grey to black manganese oxides.

Plate 1. Unit 2A. Andesite inclusions (rounded fragments and irregular debris) in limestone. (near Zone 2N)



1 m.

Elsewhere the limestone contains many thin layers and a few crosscutting dikes? of fine grained andesite, identical to that in the fragments in Unit 2A; a few discontinuous layers of andesitic clastic sediments are present.

Many limestone beds contain poorly preserved fossils; some of these beds can be traced along strike for several hundred meters. Commonly the fossiliferous units appear to be breccias; in these, fossils have been completely replaced and their texture destroyed, and the replaced fossils have been more strongly weathered than the surrounding matrix.

In some areas the section consists of thin interbeds of limestone and chert (Unit 3). Where limestone predominates the unit is designated 3a, and where chert predominates, 3b. Where bedding is not present or poorly preserved, e.g. limestone with irregular lenses of chert, the unit is designated $2^{+}_{-}4$ or $4^{+}_{-}2$ depending on which lithology predominates.

iii) Chert (Unit 4)

Chert forms major wedges and layers in the section. Near the base of the section in the northern 2/3 of the property is a wedge of massive, light grey chert. It is separated from the major rhyolite unit by an original topographic high in the underlying Andesite B. The wedge contains no appreciable sulfide or "skarn" mineralization, except possibly Zone 8A at its upper contact with limestone.

A second major chert zone is in the upper part of the section; this extends from just northwest of the Glory Hole to the north end of the property. In the southern half it is composed mainly of bluish grey chert with locally abundant light grey chert and limestone, in the northern half, mainly of light grey chert with limestone patches and lenses. The unit contains abundant chert breccia, and replacement bodies of "skarn".

Some of the chert probably formed by replacement of limestone; it has a weathering texture characteristic of some of the limestones, but contains no carbonate or only minor carbonate along fractures. The thicknesses of chert units vary rapidly, especially in the northern half of the property, and bodies of chert, chert breccia, and "skarn" commonly cut sharply and irregularly across bedding in limestone.

C. STRUCTURE

Structural features which were mapped include 1) bedding (S_o), 2) minor folds ($F_?$), probably of two or more ages, 3) warps in the contact of SED-2 with Andesite B and Andesite D, 4) minor intraformational faults, and 5) major faults.

No prominent metamorphic foliation or lineation was observed, despite the obvious indications of moderate regional deformation. The general trend of S_o strikes NW and dips moderately to steeply SW. However, complex structural relations in many outcrops indicate that the deformation is more complex than a simple rotation of S_o. The following observations illustrate the complexity of deformation.

i) Local open to isoclinal folds in S_o with periods up to a decameter are recognized in many outcrops, but the folds cannot be traced for more than a few decameters along the fold axis, even in areas of excellent exposure. Several of these folds have a fold axis plunging 60^o-70^o NW.

ii) One outcrop shows a small anticline with steeply dipping limbs in thin bedded limestone (Plate 2a); one meter along the fold axis is an open syncline (Plage 2b); axes of both types of folds plunge about 20° SE.

iii) The contacts between SED-2 and Andesites B and D are generally steeply dipping; at irregular intervals along strike, the contacts suddenly are warped to a gentle SW dip for a distance of 3-10 meters then are warped back to their regional orientation. The warps may be drag folds on the limb or a major fold; if so, the attitudes of those on the Andesite B-SED 2 contact suggest a major antiform closure to the east.

(iv) Abundant minor faults are recognized in outcrops of limestone and interbedded limestone and chert, but most cannot be traced for more than a few decameters. Attitudes vary widely, but commonly dips are moderate to gentle to the south. Faults are marked by zones up to 15 cm across composed of irregularly fractured and recrystallized limestone in which bedding has been destroyed. It was impossible to determine offset on many of these, even in areas of complete outcrop. Most offsets which could be determined are of the order of 1 to 2 meters, with both right and left-lateral senses of movement.

(v) Locally, limestone containes a moderately developed fracture cleavage which dips SW at a more gentle angle than S_o, averaging about 45°. Interlayered chert does not show this cleavage.

(vi) An unusual breccia occurs in the end of the adit, where coars recrystalized white marble is broken into fragments ranging in size from a few centimeters to a meter; the groundmass is fine grained, dark grey to black and contains minor to moderate magnetite.

These features suggest that deformation in the rocks was moderately intense, with tight folds developed locally, especially in limestone, and with moderate flowage and recrystallization of some limestone units. This more-plastic style of folding was followed by a more-brittle period of deformation during which minor faults the marble breccia and the fracture cleavage in limestone were formed.

The property is divided into two structural blocks by a major fault named in previous reports, Bracken Fault. This may be part of a late major fault system described by Kerr, 1948, which strikes subparallel to the Taku River Valley. SE of the fault SED-2 is about 350' thick, while NW of the fault SED-2 is split into two subunits, each about 200' thick, separated by Andesite C which here is 300-400' thick. The contact between SED-2 and underlying Andesite B shows an apparent right-lateral offset of about 400', while the contact between SED-2 and overlying Andesite D shows a minor left-lateral offset. However, interpretation is hampered by the paucity of outcrop along and northwest of the fault, especially in the upper part of SED-2 (see Fig.3).

A small subsidiary fault occurs just NW of Bracken Fault; it has a right-lateral component of motion of a few meters. Bedding in limstone and chert is strongly warped just north of the fault in a manner supporting a right-lateral offset.

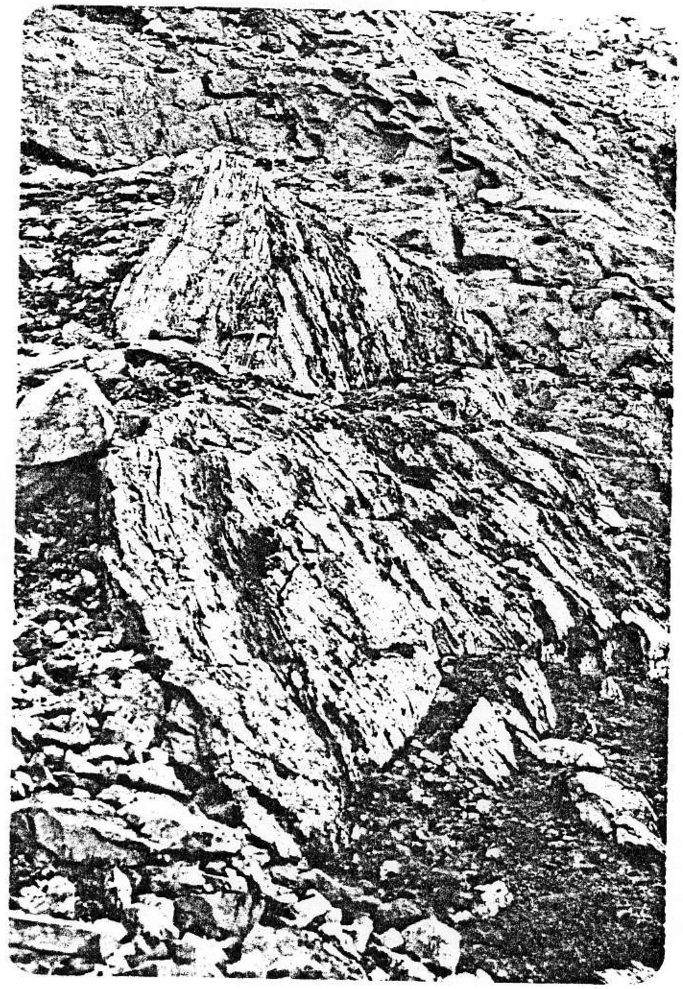
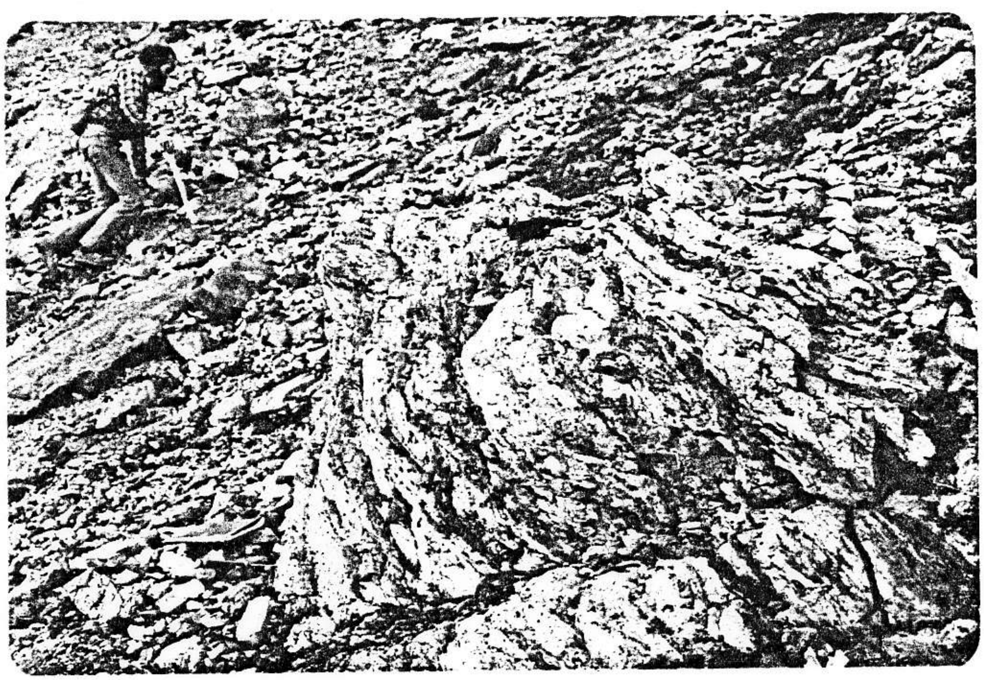


Plate 2. Complex Folding in Limestone below Zone 13-1.

Plate 2a. View SW perpendicular to fold axis; tight antiform. (shallow synform is along the fold axis just behind the top of the outcrop (see Plate 2b).

Plate 2b. View E parallel to fold axis; shallow synform is at right, the face showing the tight antiform (Plate 2a) is just to the right of the red folder.



Another major fault, herein designated Zone 8A Fault, is just north of Zone 8A. It also appears to have a major vertical component of motion, because thicknesses of units and litholgic units do not correlate across it. The apparent horizontal component of offset is 200' right-lateral based on the SED-2 (lower) - Andesite B contact and 400' right-lateral based on SED-2 (lower) - Andesite C contact. Interpretation of offset on this fault is hampered by complex geology near Zone 8A.

D. PALEOENVIRONMENT RECONSTRUCTION (see Fig. 5)

The region of the Ericksen-Ashby property alternated between being a locus of andesitic volcanism producing flows and subordinate volcanoclastic rocks, and a shallow platform on which limestone and siliceous, generally cherty, sediments were formed. Clastic sediments are rare, except where noted below.

After an early stage of andesite volcanism (Andesite A), deposition of siliceous sediments with interlayered limestone occurred (SED-1). Early formed cherty sediments show discontinuous layering suggestive of current or wave action, and possibly slumping. These sediments grade upwards into unbedded cherts with local zones of iron sulfides, probably of exhalative origin. Part of the cherty nature of the lower rocks of Unit 1 may have been produced by silicification during later exhalative activity. Interbedded fossiliferous limestone is probably of bioclastic origin, supporting Souther's hypothesis of wave action during formation.

Andesitic volcanism resumed suddenly (Andesite B), initiated by a brief period of pyroclastic activity followed shortly by abundant flows. Near the end of the andesitic activity, volcanism became sporadic, and thin lenses of limestone formed between flows and as a sparse matrix of coarse breccias. The final volcanic pulse produced abundant amygdaloidal flows.

Limestone began to form in basins in topography, associated with minor andesitic activity which produced sporadic thin flows and coarse to fine pyroclastic debris. A burst of rhyolitic volcanism produced a discontinuous flow, tuff, and breccia unit; its source was probably along an original topographic high in the region of the Glory Hole. (see Fig. 5a). A late stage of the rhyolitic event was the formation of massive sulfides and minor chert from exhalative solutions. The solutions may have originated along the topographic high, and they may have carried metals down its flanks to precipitate them in adjacent basins. One problem with this model is that almost all massive sulfides are adjacent to rhyolite, suggesting an even closer genetic affinity than proposed above. Whether this rhyolitic activity is related to the much more abundant acidic volcanism north of the Taku River at the Big Bull and Tulsequah Chief mines is unknown; however, similarities in lithology, sulfide abundances and general proximity in space suggest that it would be a reasonable model. The low Cu-values at Ericksen-Ashby might suggest that a main center of volcanism was north of the Taku, and that Ericksen-Ashby is a minor center well away from the main volcanic center.

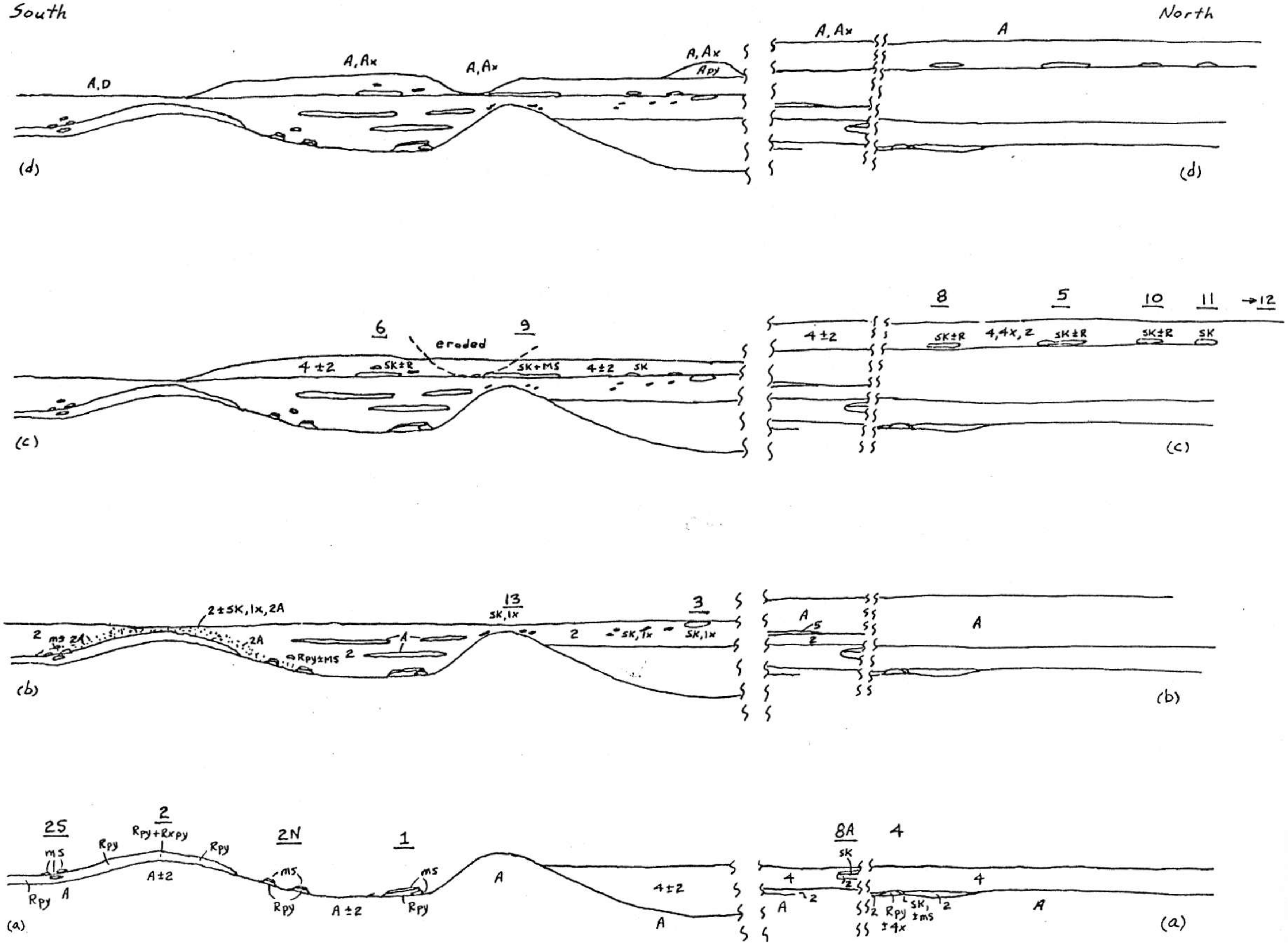


Figure 5. Paleoenvironment Reconstruction

To the north of the original topographic high in Andesite B exhalative activity produced abundant massive chert containing very little sulfides. Minor rhyolite occurs at Zone 4.

Sedimentation of limestone continued throughout the region, and basins in the andesitic surface were filled, producing a platform of low relief (Fig. 5b). Sporadic andesitic volcanism produced thin flows and pyroclastic debris, and a few subsurface crosscutting dikes. Local exhalative activity produced small pockets of chert, chert breccia, and "skarn" in the limestone.

A second major exhalative period with minor associated rhyolite followed. Siliceous replacement of limestone, and cherty sediments (at or near the seawater interface) occurred in numerous small exhalative centers. (Fig. 5c)

A period of uplift, folding, and erosion followed, producing an irregular surface on which Andesite D was deposited unconformably. Early activity consisted of tuffs and breccias of andesite and dacitic andesite; this was followed by a thick sequence of andesite flows. (Fig. 5d).

E. MASSIVE SULFIDE & SKARN MINERALIZATION IN RELATION TO PALEOENVIRONMENT.

Massive sulfide and skarn mineralization occur in two major, related types of environment in SED-2.

1. Related to the Footwall Rhyolite.

At the south end of the property, Zones 2S, 2, 2N, and 1 are spatially and genetically related to the major footwall rhyolite. Zone 2 (Glory Hole) is near an original topographic high marking a small rhyolitic center, this also may be a source for the later exhalite solutions from which the massive sulfide bodies were formed. Massive sulfides occur on the topographic high at the top of the rhyolite, but are more abundant on the flanks. Also in basins on the flanks of the topographic high are the largest massive sulfide bodies, these occur as pods in the interior of the rhyolite, and probably were formed by replacement of rhyolite.

A typical stratigraphic section consists of a lower zone of rhyolite and pyritic rhyolite, overlain by more-pyritic rhyolite with lenses of massive pyrite and of magnetite, which in turn is overlain by massive sulfides. Sphalerite and galena commonly are concentrated towards the top of the massive sulfide section. Silver minerals reported in earlier studies are argentite, freibergite, and argentiferous galena. Rhodonite and magnetite are abundant in small skarns near the rhyolite and massive sulfides.

Just northwest of the Zone 8A fault, Zone 4 occurs along the contact of a small body of pyritic rhyolite and limestone. Mineralization is mainly rhodonite-magnetite skarn, with local patches up to a few cm across of galena and/or sphalerite.

2. Related to Chert, Chert Breccia.

a) in limestone in the center of the SED-2 section.

A few large skarns, some with minor rhyolite, and many small skarns without rhyolite occur in the central limestone unit. Most are unconformable to bedding in the host. They probably were formed at scattered exhalative centers during a period of relatively minor exhalative activity. In many deposits it is impossible to determine whether the skarn formed by replacement of limestone or chert. Zone 3 and possibly Zone 8A formed at this time. A large number of small skarns between Zones 1 and 3 are grouped as Zone 13; they may represent an exhalative center which migrated northwest with time.

b) In the Upper Chert.

Abundant skarn and chert-breccia deposits occur near the base of the upper chert unit. They were formed mainly in chert which was precipated from solution at the sea-water interface or which replaced limestone in the vent area. Contacts of skarn and chert-breccia commonly cut irregularly across bedding in limestone. Brecciation of chert occurred shortly after the rock was formed, and during continued exhalative activity, sphalerite and galena were deposited in breccia fractures. Most skarns were formed by replacement of chert and chert breccia. They consist of pods and irregular vein-like zones composed of rhodonite, commonly abundant pyrrhotite, and locally abundant sphalerite, galena, magnetite, garnet, actinolite, hornblende, diopside and tremolite (in siliceous altered limestones). Stibnite locally forms acicular grains up to 2 mm long.

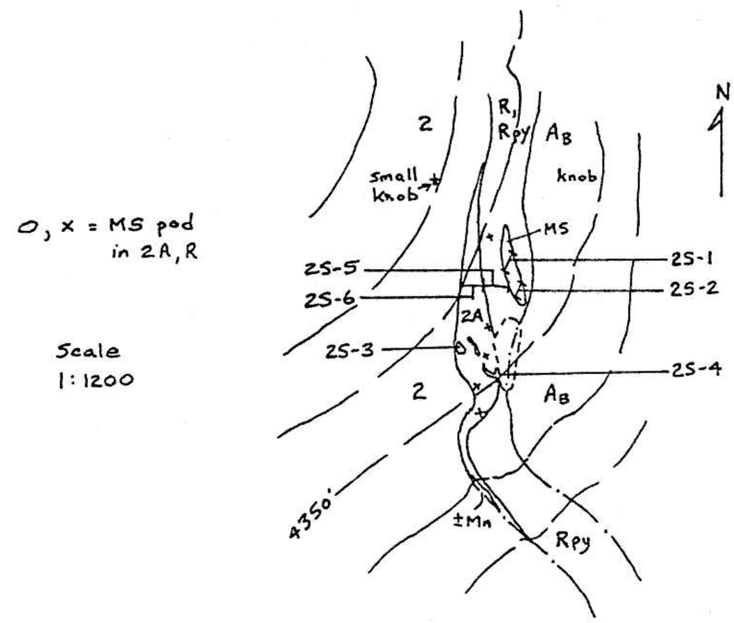
F. DETAILED GEOLOGY AND ASSAYS OF ZONES

The detailed geology of most zones in the northern half of the property is presented on maps on the scale 1:600; these maps were made by remapping trenches whose locations were taken from old maps, and modified where original data seemed to be in error. Some other zones are shown here on the scale of 1:1200; data for these is from Fig. 4. Assays are mainly from previous reports by Cominco, Ericksen-Ashby, and Lacana. In this study a few trenches were resampled and Zone 2S and 13-1 were sampled for the first time. Earlier assay data were compared with geology in the trenches; in most cases agreement is good, but in several assays appeared much too high. Assays which appear inconsistent with geology are denoted by a question mark (?) in the following tables. Assay sections in trenches are listed from hangingwall (southwest) to footwall (northeast). Values are in oz/T for Au and Ag, and in percentage for other elements.

1) Zones related to Footwall Rhyolite

Zone 2S

This zone was not previously mapped, partly because of difficult accessibility. Rhyolite and overlying limestone contain several lenses and pods of massive sulfide and lesser skarn. Massive sulfide consists mainly of pyrrhotite and sphalerite with lesser galena. The largest lens has a surface exposure of 10 x 3 meters. Rhyolite contains abundant pyrite, and in part is weathered to a gossan.

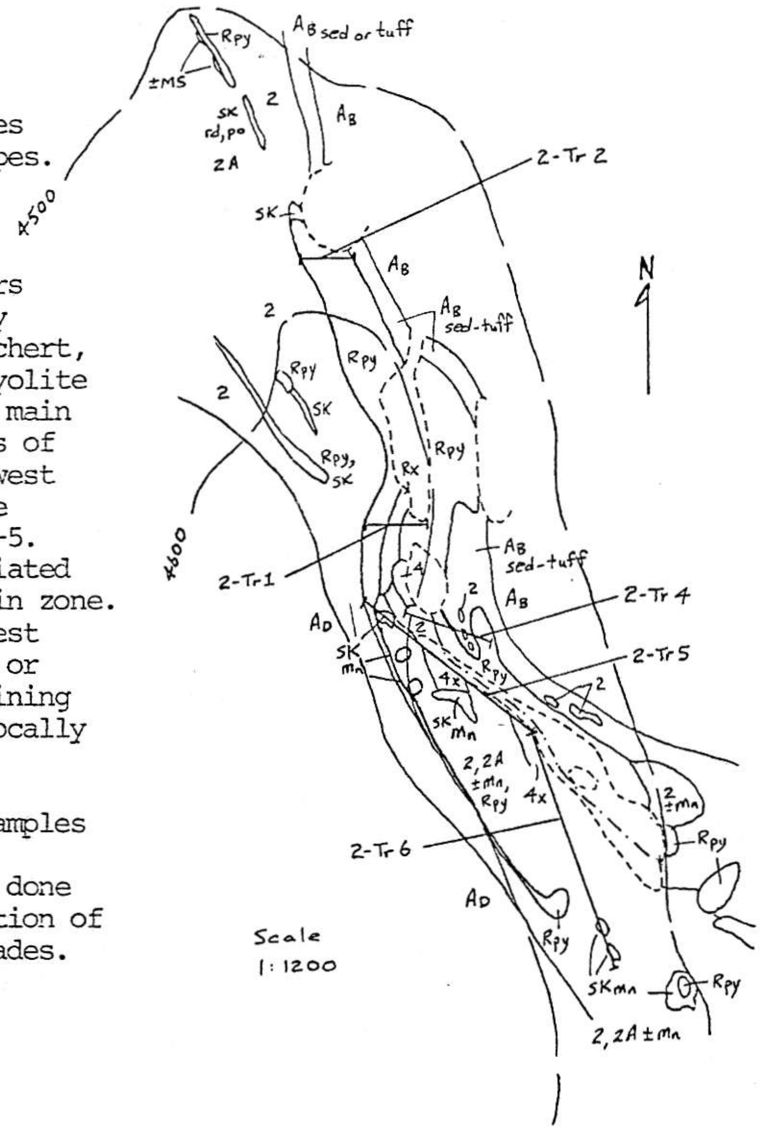


sample no.	width(ft)	Au	Ag	Pb	Zn	Sb	Description	Source
2S-1	9	0.002	2.11	0.55	6.20	0.04	MS lens in Rpy	Semco
2S-2	6	0.005	6.45	1.60	9.53	0.24	MS lens in Rpy	Semco
2S-3	3	0.005	2.09	2.32	7.20	0.03	MS pod in 2A	Semco
2S-4	3	0.010	5.26	1.38	11.0	0.29	MS pod in 2A	Semco
2S-5	12	0.005	4.14	1.47	1.02	0.32	Rpy	Semco
2S-6	8	0.005	3.66	0.70	0.63	0.15	2A, Sk	Semco

Zone 2 (Glory Hole)

This is a very complex zone with lenses and pods of a wide variety of rock types. The rhyolite varies in thickness and texture, with a lens of breccia in Tr-1, and abundant chert and chert breccia south of Tr-1. Limestone occurs mainly above the rhyolite, but locally below; it commonly has inclusions of chert, Mn-rich skarn and andesite. A thin rhyolite lens up to 2 m thick occurs above the main limestone unit which hosts the patches of skarn. Massive sulfide occurs at the west end of Tr-2, and sulfide-rich rhyolite occurs at the west end of Tr-1 and Tr-5. A few small pods of rhyolite and associated skarn occur in limestone above the main zone. The main zone thins out to the northwest into a narrow lens of either rhyolite or skarn associated with limestone containing very abundant andesitic debris, and locally chert fragments.

The location of some of the Cominco samples is uncertain; they are shown where it appears that sampling would have been done most logically, based on the distribution of outcrop, sample lengths, and assay grades.

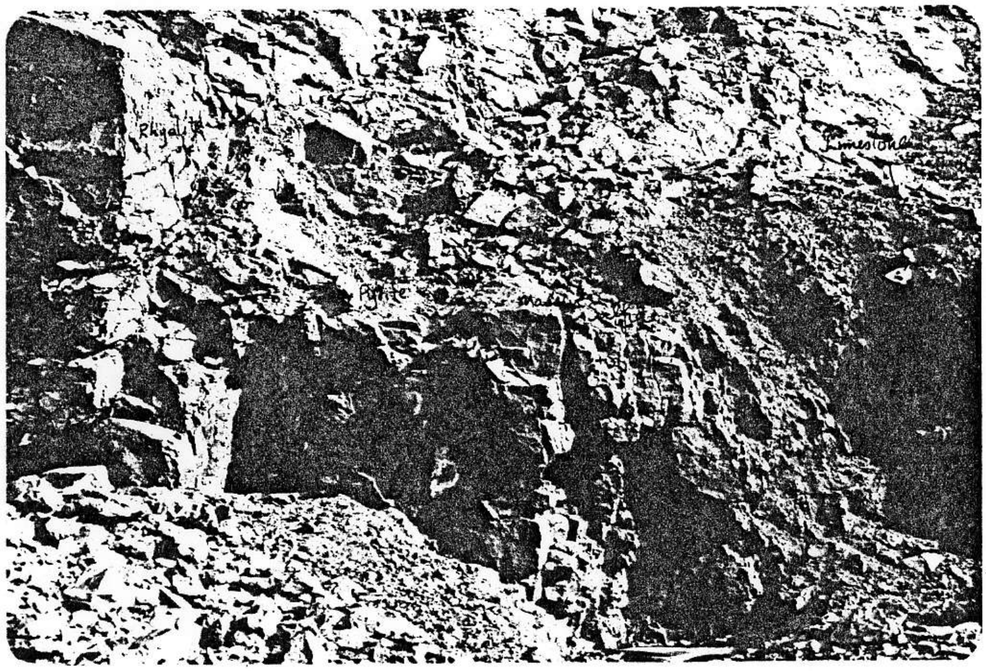


sample no.		width(ft)	Au	Ag	Pb	Zn	Description	Source
2-Tr1	(0-1)	1	0.005	0.80	0.4	0.9	Altered 2	E.A.
	(1-4)	3	0.015	3.5	1.6	4.6	Sulfide-rich R	
	(4-16)	12	0.015	1.6	0.5	2.7	Rpy	
	(16-21)	5	0.008	3.4	2.2	2.8	Rx	
	(21-37.5)	16.5	0.005	0.6	0.4	0.6	Rpy, Rx	
2-Tr2	(0-5)	5	0.013	4.3	2.5	10.0	MS, sulfide-rich R	E.A.
	(5-35)	30	0.01	0.9	0.2	3.0	R, cherty R, Rpy	
2-Tr4	(0-46)	46	0.02?	9.4?	1.9	2.0	2, Rpy, 4, A?	Cominco
2-Tr5	(0-35)	35	0.11?	15.6?	4.4	3.8	sulfide-rich R, Sk, 2	Cominco
	(35-110)	75	0.06?	10.0?	1.2	0.9	4x, 2, Sk, R?	
2-Tr6	(0-120)	120	0.02?	6.0?	1.0	0.6	4x, 2, 2A, Sk, R?	Cominco

Zone 2N (see Fig. 4)

Zone 2N comprises two major pods near the footwall of SED-2, and one minor pod 100 feet upsection; all have a thin zone of massive sulfide along their western edge. The massive sulfide is best developed in Zone 2N-N, and this is the only zone which was sampled. A section through the zone is shown in Plate 3. The zone is covered by talus at both ends, but within 5 m along strike no evidence of sulfides or rhyolite is present; there limestone is in contact with Andesite B.

Plate 3. Section through Zone 2N-N, view southeast, showing from left to right i) pyritic rhyolite, ii) very pyritic rhyolite and rhyolite breccia with lenses of massive pyrite, iii) massive sulfides with fragments of chert and rhyolite, iv) a minor fault zone, and v) limestone (in shadow).



Zone 2N-S consists of cherty rhyolite with less pyrite than in Zone 2N-N, with a thin zone of massive pyrite with minor sphalerite and galena along the west edge. Minor chert occurs at the base of the rhyolite pod, which is enclosed in limestone.

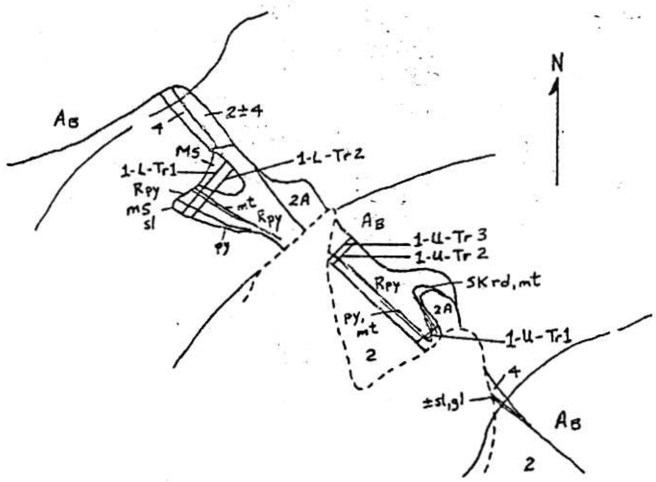
Zone 2N-W is similar in character to Zone 2N-S; the massive sulfide zone is only a few cm wide, and contains pyrite, sphalerite and galena. Minor associated skarn contains rhodonite and sulfides.

sample no.	width(ft)	Au	Ag	Pb	Zn	Description	Source
2N-N-Tr3 (0-1.5)	1.5	tr	1.02	0.03	0.81	2	E.A.
(1.5-6)	4.5	tr	8.0?	1.8	2.6	Fault (MS?,R?)	
(6-14)	8	0.005	3.3	3.5	7.7	MS	
(14-29)	15	tr	1.2	0.2	4.1	Rpy, MS?	

Zone 1

Zone 1 comprises two lenses of pyritic rhyolite along the lower contact of SED-2. The upper (in elevation) lens consists mainly of pyritic rhyolite with thin layers of massive sulfide (mainly pyritic) and lenses of magnetite-rich rock with strong Mn-stain near the upper stratigraphic contact. At the southeast end of the outcrop, rhyolite is folded against overlying? limestone; the contact in the fold nose is marked by abundant rhodonite-magnetite skarn, and just within the rhyolite are patches of massive pyrite. Southeast of this outcrop along strike, across a small patch of talus, is a thin wedge of chert along whose upper contact are a few discontinuous layers of sulfide-rich chert up to 1 cm thick.

The lower (in elevation) lens is similar to the upper, except that near its stratigraphic and topographic base it contains a large patch of massive sulfide rich in sphalerite, galena, and Ag. This patch has a sharp contact against limestone on its northwest end and against rhyolite on the other sides. Higher in the section is a thin relatively continuous layer of magnetite-rich rock, and at the top of the rhyolite is a thin massive sulfide zone. This grades from pyrite-rich at the southeast end to sphalerite-rich at the northwest end.



sample no.		width (ft)	Au	Ag	Pb	Zn	Description	Source
1-U-Tr1		8	na	61.6?	23.2?	3.6?	Rpy, MS (py) no visible sl or gl!	(Lacana) ***
1-U-Tr2		8	na	7.7?	5.5?	0.6	Rpy, MS (py), mt	Lacana
1-U-Tr3		10	na	7.8?	0.65	0.57	Rpy, MS (py), mt	Lacana
1-U-Tr4	(0-2.5)	2.5	0.015	4.0	0.03	0.5	Rmt, Sk?	E.A.
	(2.5-10)	7.5	0.01	8.7?	1.3	0.6	R (sulfide-rich)	
	(10-20)	10	0.003	0.4	0.02	0.5	Rpy?	
1-L-Tr1	(0-15)	15	0.015	11.7	2.6	4.4	MS (sl, py), Rpy, mt	E.A.
	(15-20)	5	tr	5.6	2.2	18.4	Rpy, MS (sl)	
	(20-35)	15	0.005	15.3	8.1	30.5	MS (sl, gl)	
	Average	35	0.005	11.6	4.9	17.6		
1-L-Tr2	0-34	34	na	7.8	4.3	16.2	MS, Rpy, mt	Lacana

na = no assay, tr = trace

location of 1-U-Tr4 is unknown (possibly same as 1-U-Tr1)

*** (All Lacana assays from high-grade grab samples).

Zone 4

Zone 4 occurs at the folded contact of rhyolite and limestone near or at the base of SED-2. The local structure is complex: the rhyolite overlies limestone along the northwest on a dip slope, with a zone up to 0.3 m thick along the contact consisting of black-weathering rhodonite-magnetite skarn with local patches up to a few cm across of spahalerite and/or galena. In a small trench at the top of the outcrop is exposed an irregular contact between rhyolite and limestone, with minor skarn and abundant limonite and Mn stains. The southeast contact of the rhyolite is against the Zone 8A fault, which here has been intruded by a late felsite porphyry dike. One sample from the trench yielded the following result over 4.5 feet:

Au: tr, Ag: 0.04 oz/T, Pb: 0.03%, Zn: 0.52% in Rpy and minor Sk

2) Related to Chert, Chert Breccia

a) in limestone in the center of the SED-2 section

Zone 13

Most skarns in Zone 13 are less than 3 m across, with the largest being up to about 10 m. Although they are discontinuous, several of them appear to outline a trend which cuts across stratigraphy, going from near the base of the limestone near Zone 1 (Zone 13-1) to near the top of the limestone near the "erosion filling" indentation of Andesite B. This suggests an exhalite center which was migrating towards the northwest with time. A cluster of small skarns occur in the steep valley just southeast of Zone 3.

Chert is common in most skarns, but does not extend beyond the borders of the skarn. Most skarns are siliceous with abundant rhondonite, scattered but fairly common magnetite, and scattered sulfides. Spahalerite and galena are very abundant in Zone 13-1, and form a few patches elsewhere in the skarns.

Zone 13-1 is a narrow replacement body consisting of massive sulfide and skarn in the eastern part and mainly of silica and sulfide-poor skarn in the west. Assays in this study are as follows:

sample no.	width (ft)	Au	Ag	Pb	Zn	Sb	Description	Source
13-1-1	14	0.010	6.72	3.80	13.90	0.14	MS, Sk	Semco
13-1-2	10	0.005	3.51	0.76	0.80	0.03	4,Sk,Q veins	Semco

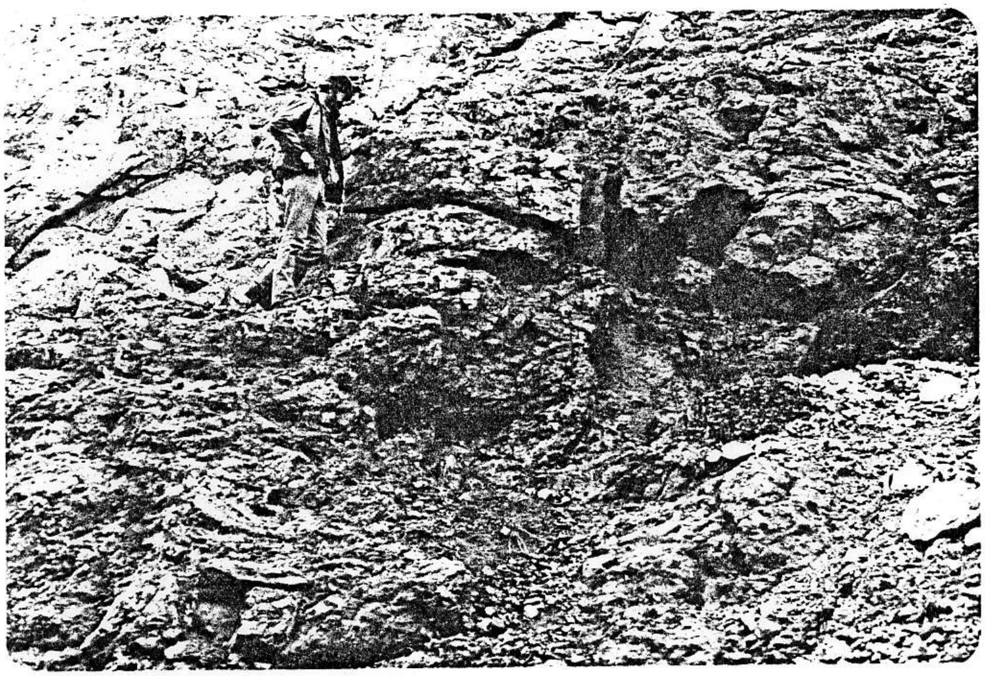
Other silicates occur in some skarns; the most common silicates are actinolite, diopside, and garnet.

Zone 3

Zone 3 contains fine to coarse rounded to subangular fragments of various types of skarn in a gossany groundmass, which (may have developed from the skarn) or which may have been a rhyolite tuff. Most fragments are less than 10 cm across, while the largest are up to 2 m. (Plate 4). Skarn contains a wide variety of mineral assemblages; some of the most common types are rhodonite, rhodonite-magnetite, and pyroxene-garnet-galena-pyrrhotite. Red-fluorescent calcite occurs with some pyroxene bearing assemblages. Sphalerite occurs locally as fine grained patches.

The lower contact of Zone 3 is irregular, with rhodonite-rich skarn in contact with limestone. Elsewhere contacts are more regular between skarn and limestone. The skarn contains some patches of chert and chert breccia, suggesting that the origin was by replacement of chert and chert breccia as well as of limestone.

Plate 4. Skarn fragments in gossany matrix, Zone 3 (upper part)

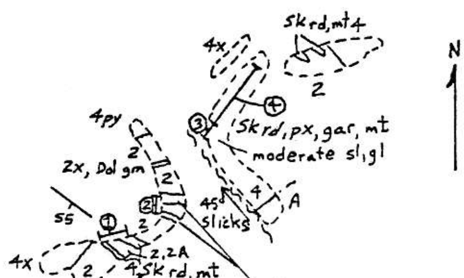


sample no.	width(ft)	Au	Ag	Pb	Zn	Sb	Description	Source
3-Tr1	15	na	35.1?	20.2?	23.2?	na	?	Lacana
3-Tr2	15	0.010	5.6	2.3	1.2	na	Sk, gossan	E.A.
3-Tr2	17	0.010	7.6	0.87	0.83	0.04	Sk, gossan	Semco
3-Tr3	8	0.003	2.3	0.4	0.7	na	Sk	E.A.

na = no assay

Zone 8A

Zone 8A occurs in a complexly folded region along a chert-limestone contact; because of limited outcrop, it was impossible to determine which contact the zone occurs in. The data suggests that it is along the upper contact of the lower chert unit.



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The west trench contains thinly bedded limestone with thin layers of chert and skarn parallel to bedding. Skarn consists mainly of rhodonite, pyroxene, and lesser magnetite, with local pockets of sphalerite and galena.
The east trench contains a wide skarn zone composed of rhodonite, pyroxene, garnet, lesser magnetite and pyrrhotite, with abundant sphalerite and galena at its west end. The zone is truncated by a small fault, which has slickensides plunging 45°N.
Just northwest and northeast of the trenches are outcrops of chert breccia and chert; these show very little skarn mineralization. Southeast of the main trench the zone of skarny chert breccia extends up to 40 m along the limestone-chert contact. Slightly further south the contact of limestone and chert is at 90° to the regional trend, suggesting a small fold; this fold could not be traced away from the outcrop showing the anomalous trend (see Fig.4).

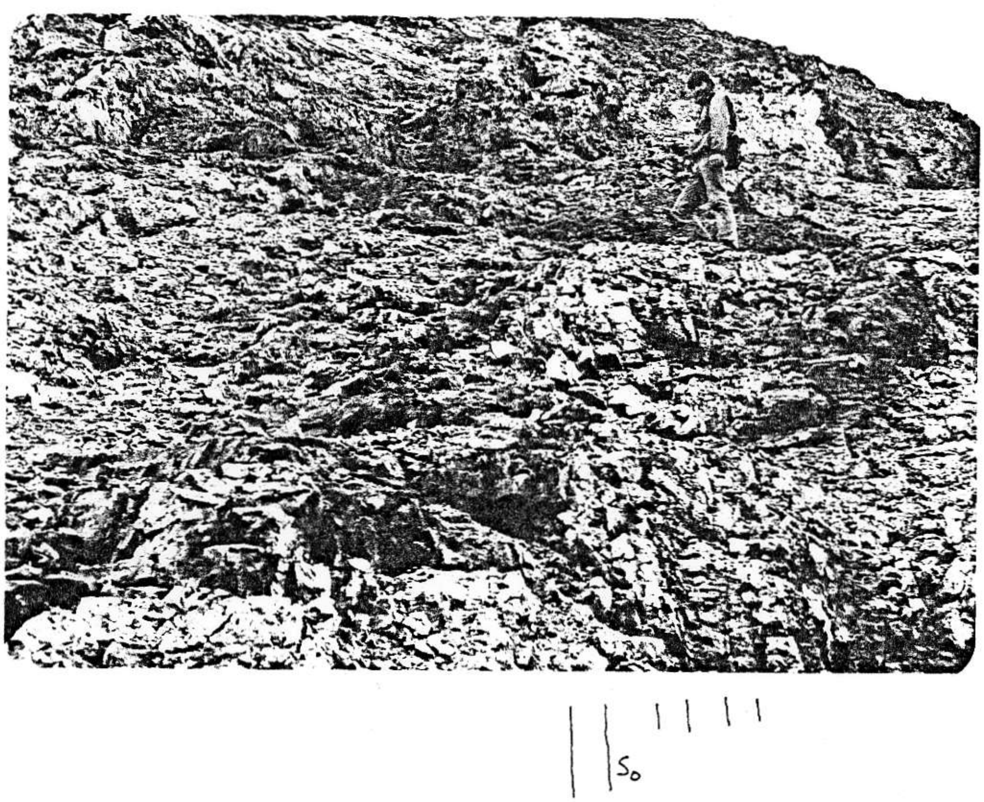
sample no.	width(ft)	Au	Ag	Pb	Zn	Description	Source
8A-1	6.1	0.02	19.2?	7.2?	2.8	Sk,4,2	E.A.
8A-2	4	0.008	1.7	0.9	2.1	Sk,2	E.A.
8A-3	5	0.047	37.2?	12.4?	5.4	Sk(gl,sl)	E.A.
8A-4	20	0.010	1.1	0.03	1.3	Sk	

b) in Upper Chert

Zone 6

Zone 6 consists of a major lens of chert, skarn, and minor rhyolite and several smaller lenses and patches. All cut across bedding, but most noticeable is the elongate lens in the hangingwall of the main lens (Plate 5).

Plate 5. Lens of Skarn-Chert cutting Bedding in Limestone, Chert



The skarn is composed mainly of quartz, rhodonite, and lesser pyrrhotite. Near the upper end of the main lens (in the trench) is a small zone containing a few patches of massive sulfide up to 0.3 m across. One patch consists mainly of light brown sphalerite, another of galena with lesser rhodonite and pyrrhotite.

sample no.	width(ft)	Au	Ag	Pb	Zn	Sb	Description	Source
6-Trl (0-5)	5	0.005	24.2?	11.8?	1.6	na	Sk,MS	E.A.
(0-7)	7	0.005	1.63	2.70	1.85	0.04	Sk,MS	Semco
(5-30)	25	0.005	1.1	0.5	1.6	na	Sk,4	E.A.
6-Trl (0-30)	30	Cd - 0.05% (E.A.)						

Zone 9 (Underground)

The adit intersected a blind zone of skarn up to 5 feet wide over a strike of 120 feet. The adit was examined in this study, but the walls were very dirty, and only an incomplete map could be made, based mainly on contacts which previous geologists had painted on the walls (Figure 6). A narrow end of the same zone was intersected in four drill holes from the station at the end of the adit. (Fig. 7).
The zone consists of skarn and chert breccia enclosed mainly in light grey to cream chert. Skarn consists mainly of rhodonite and pyrrhotite, with moderately abundant sphalerite and galena. Diopside, hornblende, and magnetite occur in some samples; mineralogy is very similar to that in Zone 3. Sphalerite and galena occur locally in fractures in brecciated chert, and form scattered pods and patches of high-grade mineralization in the breccia. The zone is unusual in that the assay values are relatively uniform over a long distance. A section through the entire SED-2 unit is provided by drill holes from the station at the end of the adit (Figure 8). This shows the great distance from surface to the adit level relative to the size of the mineralized zone, and the rapid changes in thicknesses of units. The major warp in the contact with Andesite B may be a reflection of the original topographic high in the andesite contact.

sample no.	width(Ft)	Au	Ag	Pb	Zn	Description	Source
adit samples (average 5' width)							
9 - 4+35		tr	1.9	0.2	1.3	Sk	E.A.
4+45		tr	2.1	0.2	1.5		
4+55		0.005	5.8	0.7	2.6		
5+05		0.005	3.5	0.6	3.3		
5+15		tr	1.5	tr	1.0		
5+25		0.005	3.2	0.7	3.0		
5+35		tr	3.8	1.2	3.2		
average	60 ?	tr	3.1	0.5	2.3		
9 - 7+00		0.005	4.5	1.2	3.3	Sk	E.A.
7+10		0.005	13.0	4.0	5.5		
7+20		0.005	12.7	5.7	3.5		
7+30		tr	6.9	2.3	5.4		
average	30	0.005	9.2	3.3	4.4		
samples from drill holes							
U-4 39.7-40.7	1	0.05	7.4	0.94	0.30	Sk	E.A.
U-3 16.1-16.8	0.7	0.1?	10.8	5.48	9.98	Sk in 4	
U-5 18.2-21.2	3.0	0.02	5.0	1.8	13.3	Sk(sl)	
U-6 38.8-42.6	3.8	0.02	28.1	12.63	21.2	Sk(sl,gl)	

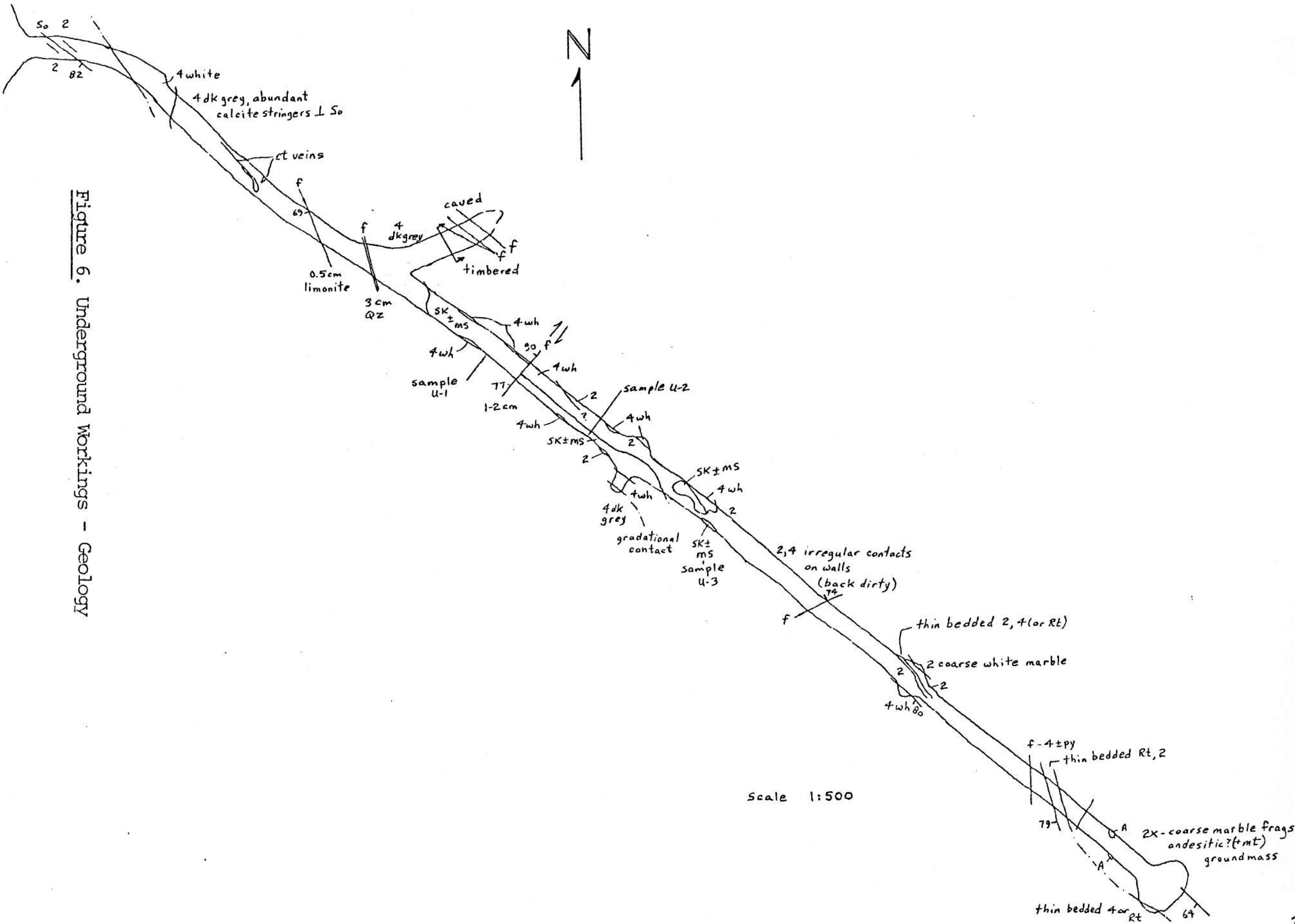


Figure 6. Underground Workings - Geology

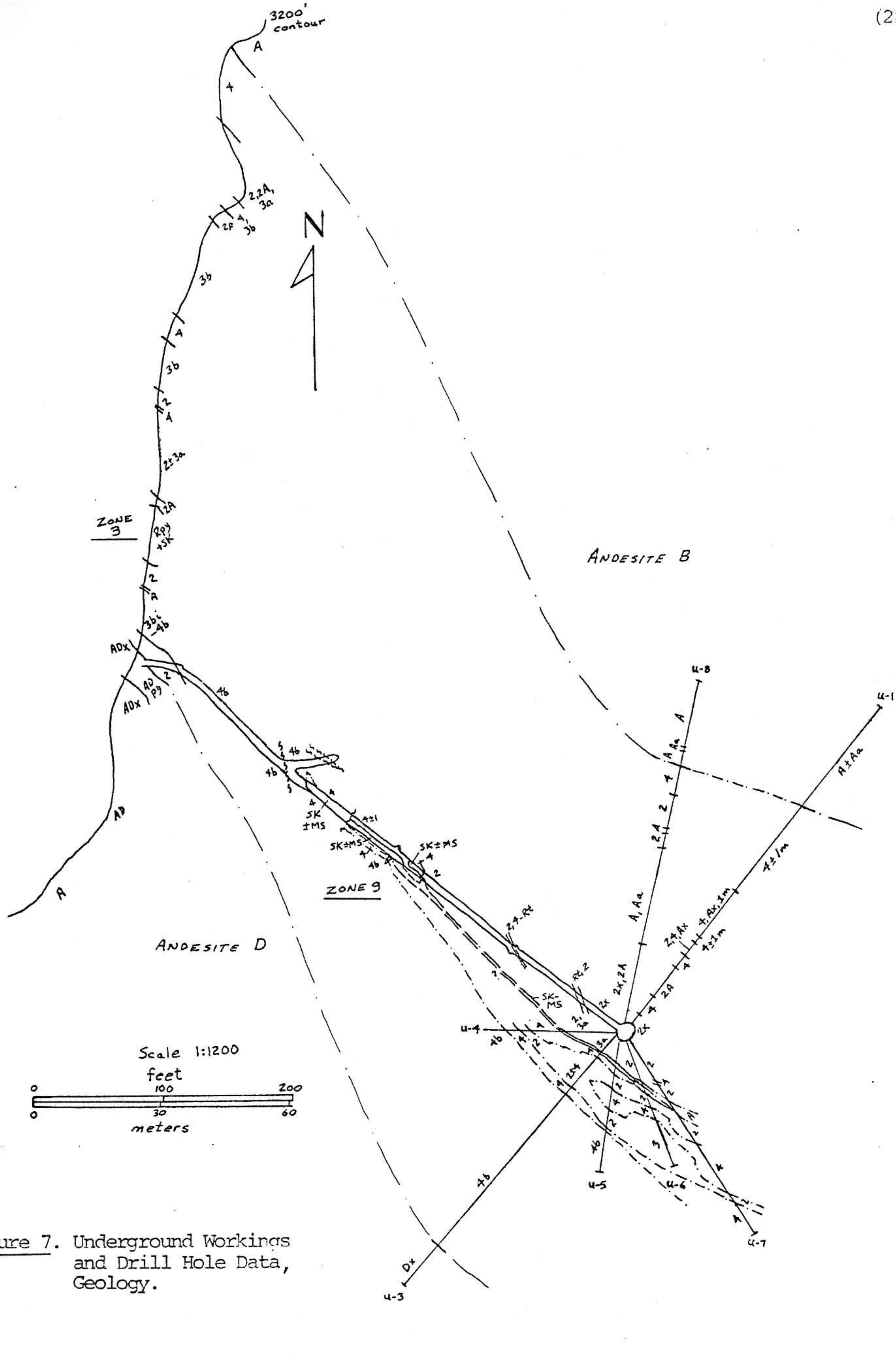


Figure 7. Underground Workings and Drill Hole Data, Geology.

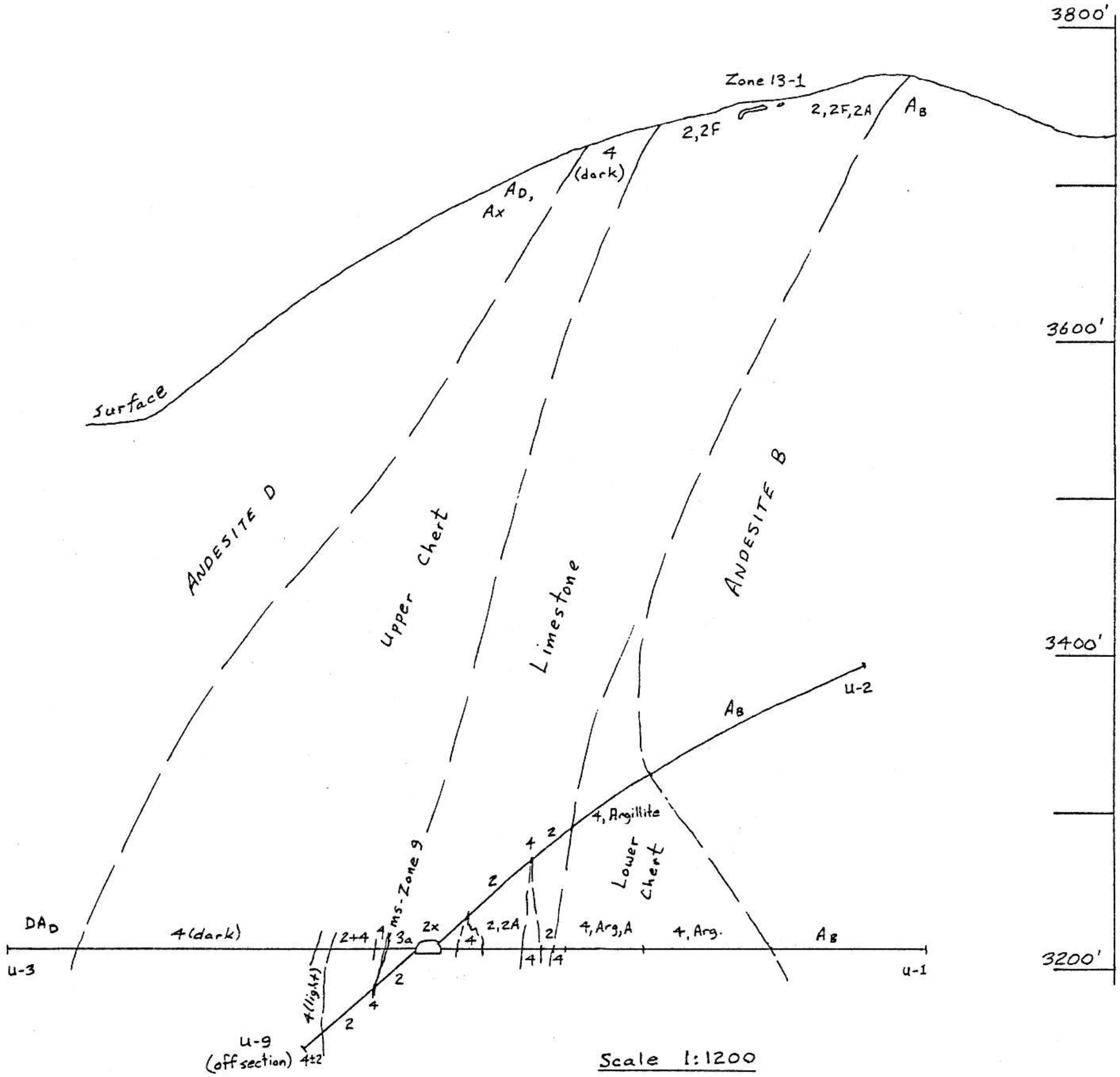
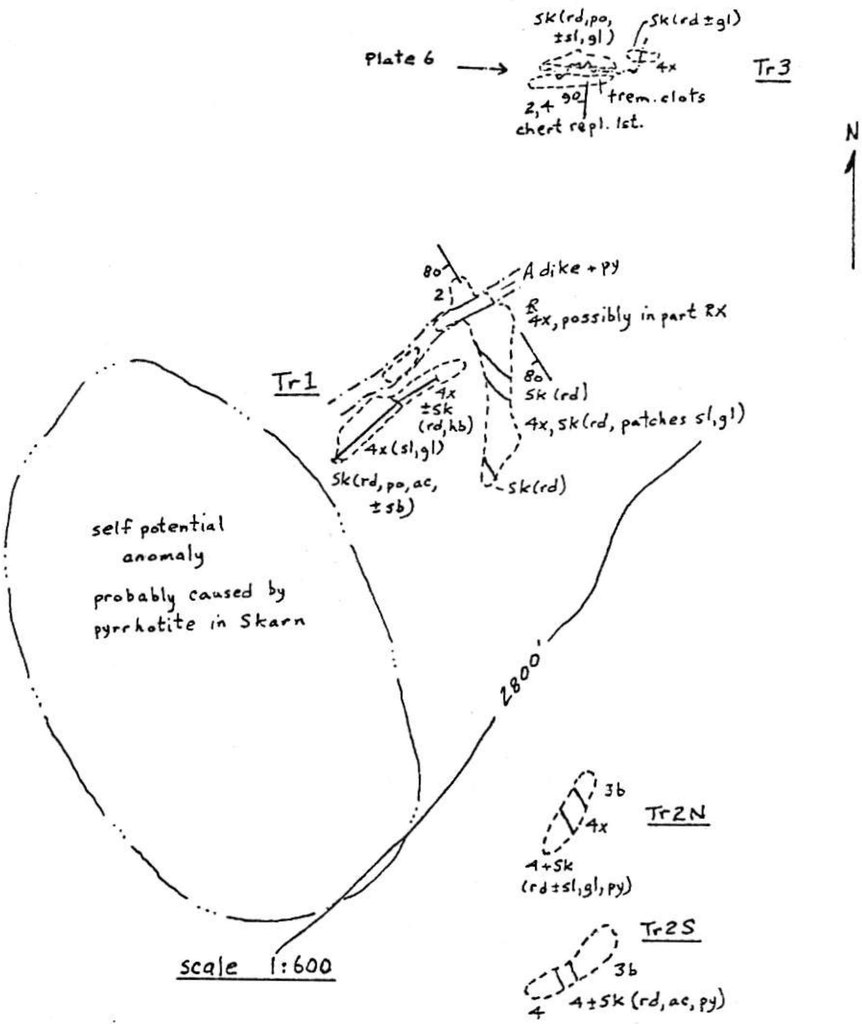


Figure 8. Vertical Section through U-1,U-2,U-3, Geology.

Zones 8,5,10,11,12?

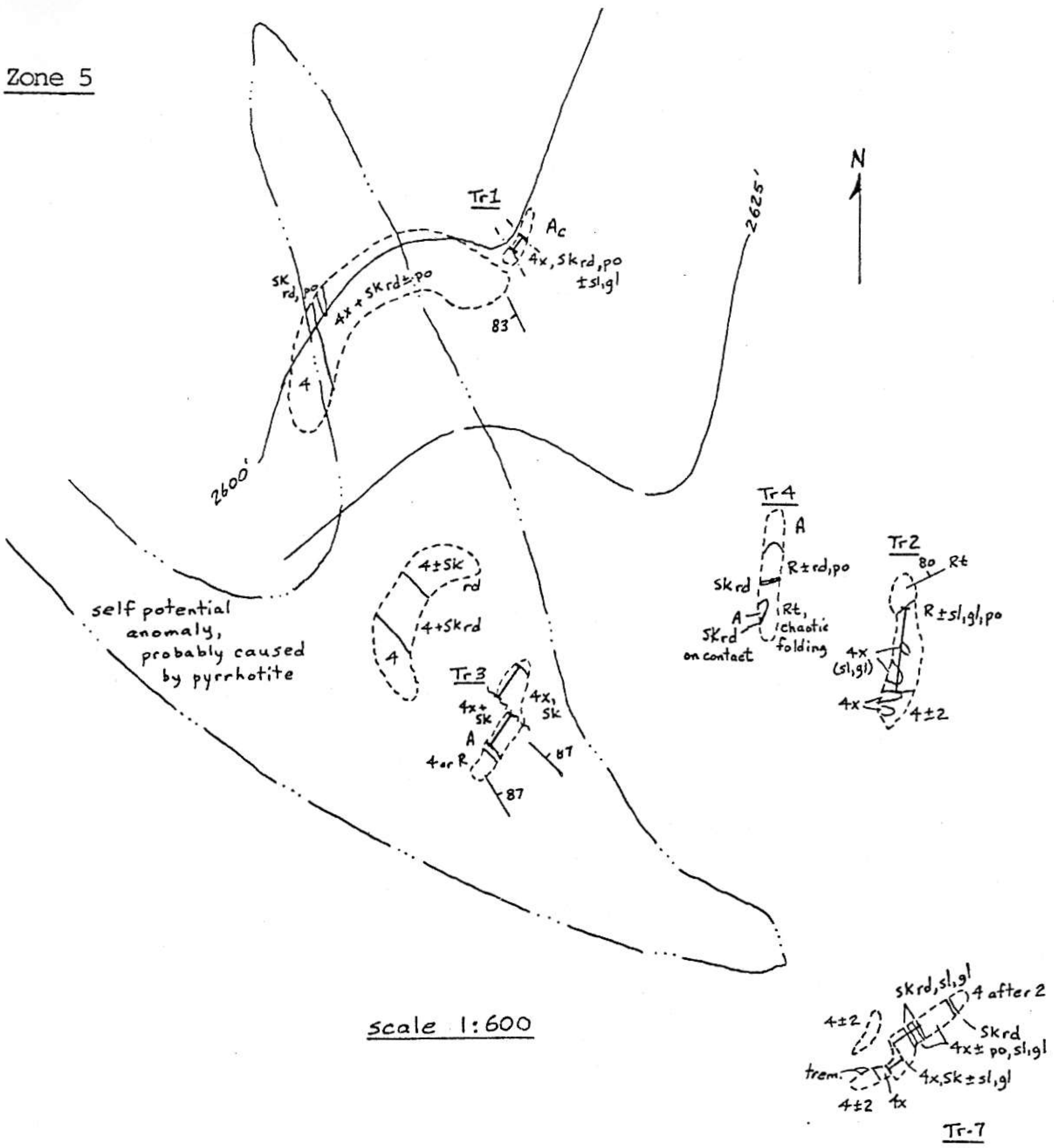
These zones occur near the lower contact of the upper chert unit in a region of poor outcrop and complex geology. Discontinuous bodies of chert, chert breccia, and skarn cut irregularly across the bedding of limestone. Rhyolite tuff and flow units occur locally; these have a different character from those in the footwall rhyolite zone as will be described below. The region is cut by several late andesite dikes. On the scale of any trench, most units are discontinuous.

Zone 8



As can be seen from the map, contacts are very irregular, and any attempt to extrapolate away from the trenches would be unwarranted. The contact in Tr3 is particularly striking; there skarn is developed very irregularly, with one side of the trench mainly skarn and the other mainly limestone and altered limestone (tremolitic), with different limestone beds being replaced over a larger distance along strike than others (Plate 6). The skarns contain patches of massive sulfide in Tr1 and Tr3, but the only samples are from the lower limb of Tr1. The lower limb of Tr1 contains strongly brecciated chert; in the upper half it is replaced by skarn containing rhodonite and hornblende, and in the lower half it is replaced along fractures and in pods by sphalerite and galena. At the base of the trench is a skarn zone 0.3 m thick containing rhodonite, pyrrhotite, and lesser actinolite, with minor stibnite needles up to 2 mm long.

Zone 5



In Tr7 skarn is developed in chert breccia and chert, which on the west side of the trench appears to have developed from limestone; the rock has the weathering texture of limestone, contains relic limestone lenses, and locally tremolite is abundant. Skarn is developed in the south wall of the trench, but is not present in the small chert outcrop at the north side of the trench. Skarn consists mainly of rhodonite with patches of massive sulfide bearing galena and sphalerite, and scattered pyrite crystals; other silicates probably include pyroxene and possibly actinolite.

Plate 6. Irregular Replacement of Limestone across Bedding by Skarn, Chert; Zone 8, Tr3. Bedding strikes perpendicular to the length of the trench and dips vertically.

In 1964 several short drill holes tested mineralization in the trenches; the location of these holes could not be determined exactly from old data, and no drill sites were identified in the field. The holes were probably to test the mineralization in Trl, and are included in the assay table below.

sample no.		width(ft)	Au	Ag	Pb	Zn	Sb	Description	Source
8-Trl	(0-22.5)	22.5	0.008	2.9	1.2	2.4	na	4x (sl,gl)	E.A.orig.
			0.005	6.1	2.7	5.9	na		resample
	(22.5-29.5)	7.0	0.005	0.8	tr	1.1	na	4x,Sk(rd,hb)	E.A.resample
	(27.9-33.5)	5.6	tr	0.44	tr	0.7	na	4x,Sk	
S-3	(0-5.3)	5.3	tr	12.0	5.5	8.1	na	4x,Sk(gl,sl)	E.A.
	(5.3-8.7)	3.4	tr	4.3	1.1	1.2	na	4x	
	(8.7-12)	3.3	tr	9.0	2.9	4.4	na	4x(sl,gl)	
	trench	?	0.03	9.2	2.27	3.09	0.27		
S-4	(0-7)	7.0	tr	41.1?	8.6	1.6	na	4x(sl,gl,rd)	E.A.
	(7-13)	6.0	0.02	6.3	1.1	4.3	na	4x	
	(13-20)	7.0	0.01	1.2	0.6	1.7	na	4	
S-5	(0-6.8)	6.8	0.01	6.0	2.0	3.3	na	4,Sk(po)	
	(9-13)	4.0	0.02	5.1	1.1	2.6	na	4x,Sk	
S-4	trench	?	0.01	6.8	2.53	5.24	0.11		

na = no assay, tr = trace

The trend containing Tr3 and Trl consists mainly of chert and chert breccia, with numerous irregular patches of skarn consisting mainly of medium grained rhodonite with pyrrhotite commonly abundant, especially to the west. The pyrrhotite-rich skarn is probably the cause of the self-potential anomaly along this trend. Sphalerite and galena occur locally in both trenches as scattered patches and fracture-fillings in the chert breccia and skarn.

An eastern belt of mineralization is exposed in Tr2 and Tr4. The host is a massive, medium green, fine grained rhyolite? containing abundant patches of chert breccia with abundant sphalerite and galena in pods and fractures in Tr2, and disseminated grains and pods in Tr4. The massive rhyolite? is associated with a thinly banded rhyolite tuff or banded flow.

sample no.	width(ft)	Au	Ag	Pb	Zn	Sb	Description	Source
5-7	11	0.010	3.03	0.79	0.86	0.01	4x,Sk(rd)	Semco
5-3	23.5	tr	1.7	0.5	1.5	na	4x,Sk	E.A.
5-1	13	0.005	1.0	0.1	0.9	na	4x,Sk(rd,po)	E.A.
5-2	25	0.005	2.5	2.3	2.2	na	R,4x(sl,gl)	E.A.
5-4	grab	tr	1.7	0.7	1.3	na	R	E.A.

Zone 10

Trl contains mainly chert breccia with irregular patches and veins of skarn, and a few crosscutting andesite dikes. Skarn consists mainly of rhodonite, with locally abundant pyrrhotite, and minor hornblende and sphalerite. One vein of rhodonite-pyrrhotite skarn about 20 cm wide cuts chert breccia and chert roughly perpendicular to bedding along a skarn-chert contact in the western part of the trench.

Tr2 contains massive green rhyolite? as in 5-Tr4 and 5-Tr2, with local patches of sphalerite and lesser galena. It is in contact with barren chert breccia to the west and an andesite dike (or Andesite C) to the east.

Tr3 was not found.

sample no.	width(ft)	Au	Ag	Pb	Zn	Description	Source
Trl (35-55)	20	0.01	0.24	0.04	1.48	Sk,4x	E.A.
(115-158)	43	0.005	0.33	0.04	0.60	Sk,4x	
Tr2 (0-32)	32	0.005	1.9	1.0	2.3	R	E.A.
(2 intervals)	7	0.005	2.8	2.3	3.3	R with pods of sl,gl	
Tr3 (0-10)	10	tr	0.22	0.04	1.0	4x?	

Zone 11 (see map next page)

Four trenches were cut in chert, chert breccia, and minor limestone and skarn; skarn zones are patchy and irregular in outline, some cutting sharply across bedding (Plate 7). Most skarn consists of rhodonite and lesser pyrrhotite, or just rhodonite, with minor sphalerite.

Zone 11

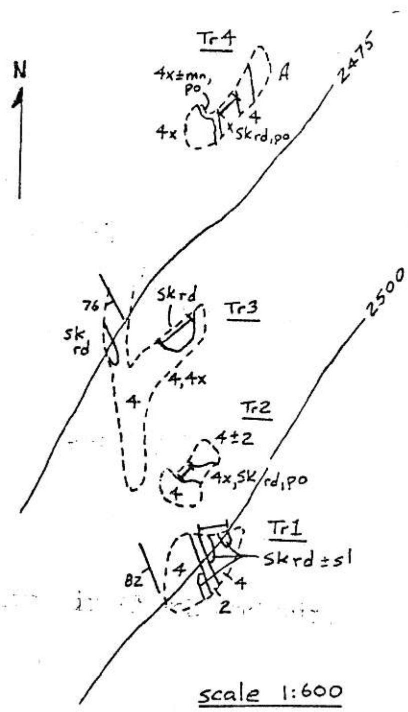
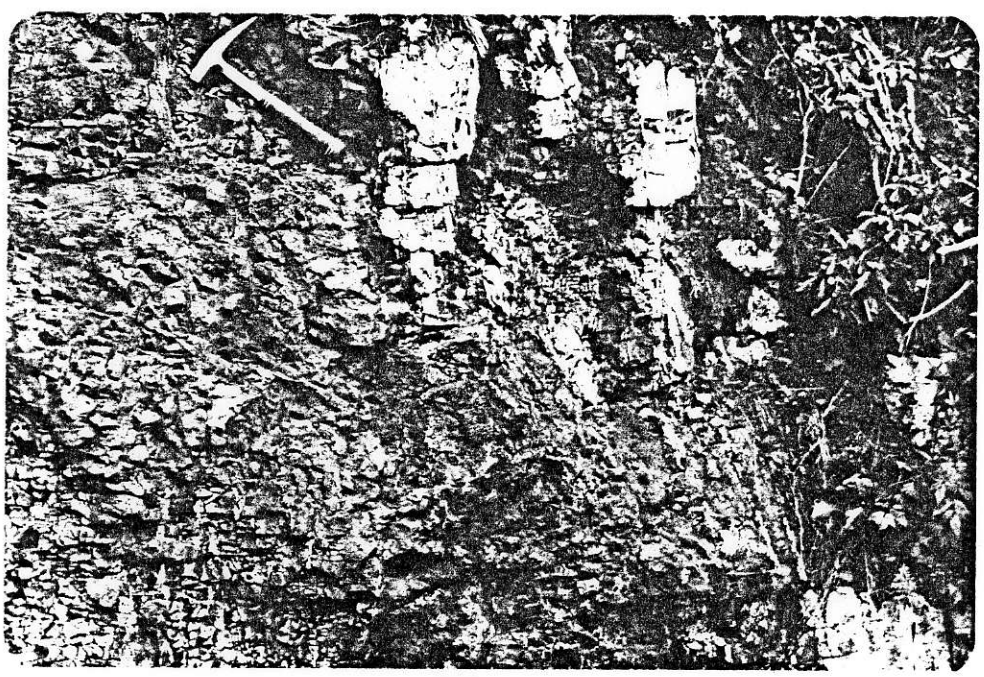


Plate 7. Skarn zone cutting across bedding in Chert and minor Limestone; Zone 11, Tr2.



Zone 11

sample no.	width (ft)	Au	Ag	Pb	Zn	Description	Source
Tr1 (0-3)	3	tr	4.8	2.0	2.3	Sk (rd, po)	E.A.
(3-5)	2	tr	1.3	0.5	0.6	4	
(5-9)	4	tr	2.0	0.9	1.4	Sk (rd, po)	
(assays of skarns are averages of two sets of Samples)							
Tr2	2.3	tr	1.0	0.4	1.2	Sk (rd, po)	
Tr3	9.5	tr	2.8	1.2	2.0	Sk (rd, po)	
Tr4	6.6	tr	0.7	0.5	0.4	Sk (rd, po)	

Zone 12

This zone was not examined in this study; it is at the top of a steep north-facing cliff. From old reports, geology appears similar to that in Zone 11, with scattered skarn zones in chert and chert breccia, and with thin interbeds of limestone. Sulfides are mainly pyrrhotite with local sphalerite and galena. Below Zone 12, the skarn zones extend down the face of the cliff for a few hundred feet.

sample no.	width (ft)	Au	Ag	Pb	Zn	Description	Source
Tr1	35	tr	0.4	0.2	1.0	Sk (rd), 4, 4x	E.A.

Other Assays

In the Lacana study, 14 assays are reported for the following elements: Au,Ag,Pb,Zn,Cd,Cu,As,Sb. The following general conclusions can be made from these as to metal ratios.

1. The Cd/Zn ratio is uniform at about 1/100
2. Au values do not correlate with any other metal.
3. Ag values correlate slightly with Pb+Zn.
4. Cu is very low, and is negatively correlated with Pb+Zn.
5. As and Sb range widely; they do not correlate with each other or with any other metal.

CONCLUSIONS & RECOMMENDATIONS.

Zones Related to the Footwall Rhyolite.

CONCLUSIONS.

1. Reconstruction of the original paleoenvironment suggests that the source of the footwall rhyolite was in a topographic high near Zone 2, and that this high was flanked by basins in the basement andesite topography.

2. Massive sulfides were formed from exhalite solutions related genetically to the rhyolite; most massive sulfides occur near the upper stratigraphic contact of the rhyolite and probably were formed by precipitation at the seawater interface. Several important lenses occur in the rhyolite, and probably were formed by replacement of the rhyolite.

3. In volcanic terrain, topographic depressions, commonly of tectonic origin, are loci of formation of numerous economic massive sulfide deposits e.g. some deposits in the Shasta district, California and deposits in Japan . Formation of some of these basins is contemporaneous with the exhalative event, producing a deepening basin into which a thick section of massive sulfides may be deposited. Despite the discontinuous nature of the massive sulfide deposits at Ericksen-Ashby, the nature of the environment is such that larger, more continuous bodies might be expected to occur in depressions in the original topographic basins .

4. The average grades of massive sulfides in Zones 2S, 2 and 2N, and those of the high-grade pods in Zones 1 and 13-1 are shown below:

Zone	average size	Au	Ag	Pb	Zn
2	5-6' x 15'	0.005	3.7	2.0	7.7
1	15' x 20'	0.005	15.3	8.1	30.5
13-1	14' x 2-3'	0.010	6.7	3.8	13.9

The grades of massive sulfide are sufficiently high to warrant exploration for a larger body in the zones described above.

RECOMMENDATIONS.

1. The target could be tested at the level of the adit (3210') by extension of the adit 1000 feet to the southeast, and by drilling of a series of seven horizontal and seven 45°-up holes to the northeast at 200-foot centers. The last pair of holes would be drilled from the end of the extended adit at 45° to its strike to intersect the down-dip projection of Zone 2S. The length of holes would be between 400 and 600 feet, giving a total length of drilling of 7000 feet.

B. Zones related to Chert, Chert Breccia.

CONCLUSIONS

1. Skarn and minor massive sulfide zones, containing locally high contents of Pb, Zn and Ag, are associated with chert, chert breccia, and minor limestone, with very little to no rhyolite. They are considered to have formed at or near exhalite centers on a relatively stable limestone platform. Silica-rich solutions replaced limestone irregularly near the vents, and formed massive to slightly bedded chert along the seawater interface. Continued tectonic activity produced brecciation of some chert in the vent areas. During later exhalative activity, sphalerite and galena were deposited in the brecciated chert along fractures and in small replacement patches, and in places chert and chert breccia, and lesser limestone were replaced by skarn, consisting mainly of rhodonite with commonly abundant pyrrhotite and generally minor sphalerite and galena.

2. Concentrations of sphalerite and galena are generally very small and discontinuous, and only the deposits in Zones 8 and possibly 8A are sufficiently large and of high enough grade to warrant further interest.

3. Although deposits in this type of environment are expected to be small, the possibility exists that a larger center might exist in this zone, or that a topographic basin occurs near an exhalative center into which a thicker accumulation of sulfides might be deposited.

RECOMMENDATIONS.

1. No further work is recommended in this environment at present, pending the outcome of work in the zone related to the footwall rhyolite, or continued increase in the market value of the metals, expecially Ag.

REFERENCES.

Gower, S.C. 1979. Unpublished report on Ericksen-Ashby property for Lacana Mining Corp.

Irvine, W.T.,et al, 1951-1953. Unpublished reports on Ericksen-Ashby property for Cominco.

Kemeny R., 1979, Preliminary Economic Assessment, Ericksen-Ashby property unpublished report for Stokes Exploration Management Co.Ltd.

Kerr,F.A., 1958. Taku River Map Area, British Columbia, Geol. Survey of Canada, Mem.248.

Russell, G.A.,et al, 1963-1965. Unpublished reports on Ericksen-Ashby property for Ericksen-Ashby Mining Corp.

Souther, J.G., 1971. Geology and Mineral Deposits of Tulsequah map area, British Columbia. Geol. Survey of Canada, Mem.362.

ENGINEER'S CERTIFICATION.

I, John G. Payne, PhD, of North Vancouver, B.C., do hereby state:

1. I am a consulting Geological Engineer. I graduated from Queens University, Kingston, Ontario in 1961 with a BSc degree in Geological Engineering. I received a PhD degree in Geochemistry from McMaster University in 1966.

2. My address is 877 Lillooet Road, North Vancouver, B.C. V7J 2H6.

3. I am under contract for this report to Stokes Exploration Management Co.Ltd., #713-744 West Hastings Street, Vancouver, B.C. V6C 1A5.

   I have practiced Geology since graduation for 13 years, mainly in the North American Cordillera.

4. My report is based on 11 days in the field on the ERICKSEN-ASHBY claims and 2 days in the lab examining samples.

5. I have no direct or indirect interest in the ERICKSEN-ASHBY claims or in Semco Mining Corporation.

6. This report was compiled for internal use, and was funded by Semco Mining Corporation.

Dated at Vancouver, British Columbia, the 24th day of September, 1979.

STOKES EXPLORATION MANAGEMENT CO.LTD.

John Payne

John G. Payne, PhD
Consulting Geological Engineer.

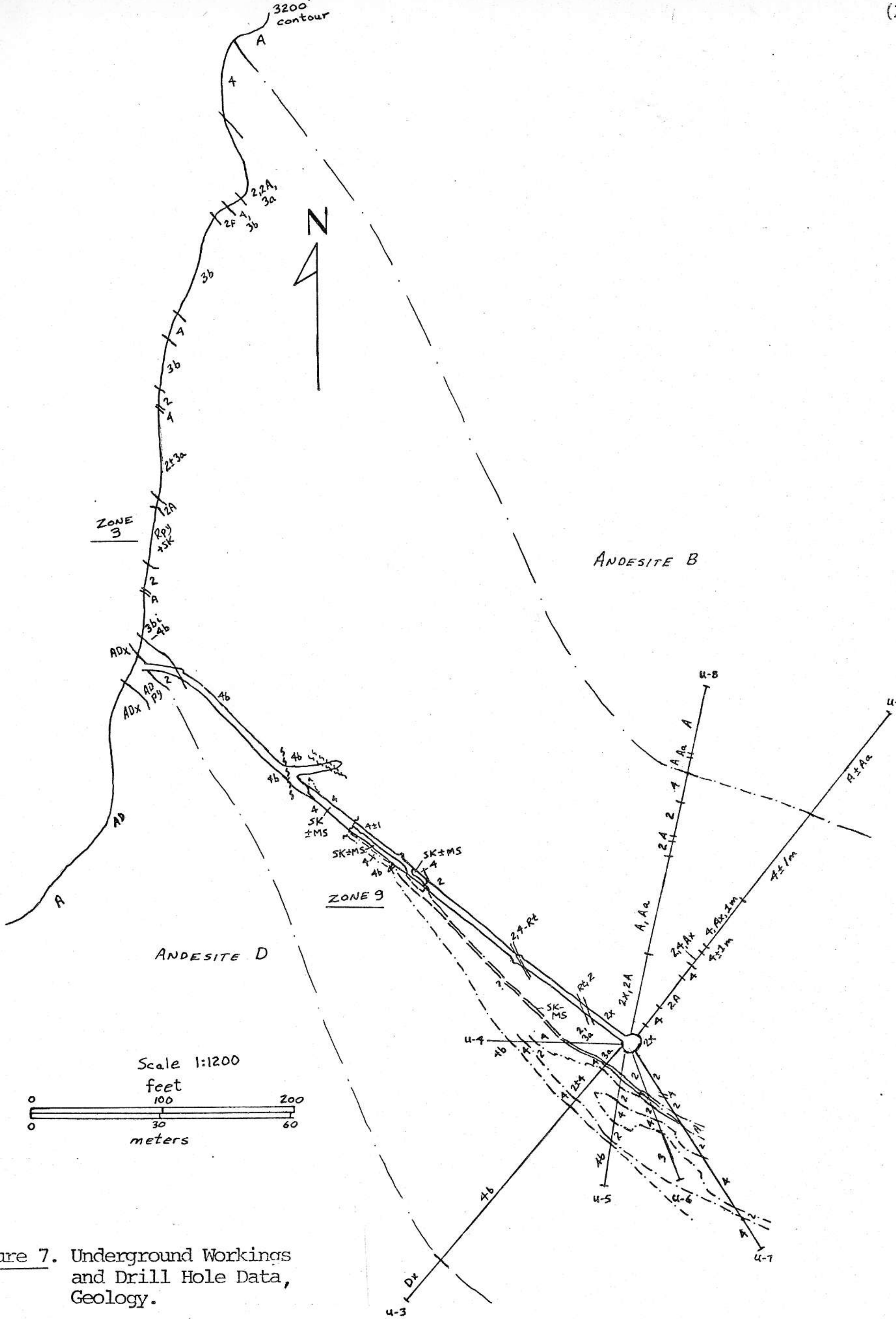


Figure 7. Underground Workings and Drill Hole Data, Geology.