

WESTMIN RESOURCES LIMITED

PREMIER GOLD PROJECT
GEOLOGICAL SETTING AND MINERALIZATION OF THE
SILBAK PREMIER AND BIG MISSOURI DEPOSITS

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INTRODUCTION

The Silbak Premier and Big Missouri gold/silver deposits are located 21 km north of Stewart within Hazelton volcanics of the Stewart gold-silver camp (Figure 1).

The Premier Gold Project will develop separate open pit gold/silver mines on the near surface portions of the famous Silbak Premier underground gold/silver mine which operated from 1918 to 1968 and several deposits on the Big Missouri property. Initial production emphasis will be on the higher grade portion of the Silbak Premier pit. Production, at a rate of 2,000 tonnes per day, is scheduled to begin in early 1989. Final feasibility studies indicate an annual output of approximately 77,000 ounces of gold and 890,000 ounces silver over the first four years of operation. Currently, defined (September 1987) open pit mineable reserves include 5.9 million tonnes at Silbak Premier, grading 2.16 g/tonne gold and 80.23 g/tonne silver and 1.8 million tonnes at Big Missouri, grading 3.60 g/tonne gold and 29.49 g/tonne silver, sufficient for 10.5 years production.

Silbak Premier reserves are based on single pit surrounding the upper part of the old mine workings and include some caved stope fill as well as in situ material. Reserves at Big Missouri are situated in four small pits ranging in size from 300,000 tonnes to greater than one million tonnes (Figure 2).

The emphasis of ongoing exploration at Silbak Premier is to define underground mineable reserves surrounding previously stoped areas and to extend the known deposits to depth, beyond areas explored during past operations. At Big Missouri emphasis is still on open-pittable reserves as there are numerous surface showings which have had only minimal exploration.

Past production from Premier included 4.7 million tons grading 0.384 oz/ton gold and 8.03 oz/ton silver over a period of 46 years, starting in 1918 and operating continuously to 1954 and intermittently to 1968. In contrast, mining at Big Missouri took place for a short period between 1938 and 1943, producing 822,000 tons grading .077 oz/ton gold including less than 1.00 oz/ton silver.

REGIONAL GEOLOGICAL SETTING

Stratigraphy and genesis of both Silbak Premier and Big Missouri deposits continues to generate controversy both within Westmin and with other geological groups working in the area.

The regional stratigraphy consists of Hazelton Group volcanic rocks, are unconformably overlain by Bowser Group sedimentary rocks present to the east, and grade into a sedimentary sequence to the west. Within Westmin we believe the regional stratigraphy is shallow (Big Missouri) to moderate (Silbak Premier) westerly dipping. This observation is based on limited evidence of primary layering in flow banded and fragmental rocks and interpretation of the genesis of "cherty-tuff" horizons which suggest interflow volcanic exhalative beds or sub-seafloor replacement of interflow tuff horizons.

Regionally a potential stratigraphic marker has been identified, called the "Ground Hog Marker", which is indicated to extend from Big Missouri to Silbak Premier. There is considerable warping of these rocks due to folding and/or thrust and block faulting which is particularly evident on the west side of the property where the volcanic rocks grade into predominantly sedimentary rocks.

Recent mapping of the volcanic stratigraphy in the Silbak area has differentiated andesites and dacites, however, the distinction is subtle and often based visually on slight differences in color. In general, it appears however that the dacites are concentrated mainly to the north and west of Silbak Premier (Figure 3). Recent fresh rock exposures in road cuts have shown a greater abundance of fragmental rocks than was previously thought. This is due to subtle differences between fragments and matrix. These fragmentals tend to rapid facies variations and are often discontinuous over short distances and hence have proven difficult to use for developing stratigraphy. Hence, mapping and correlations have generally been on the basis of rock type rather than time-stratigraphic units.

Based on extensive regional mapping particularly along the west side of the properties and along the Granduc Road, Aldrick (1986) has suggested a steep easterly dip to the stratigraphy and a synclinal structural whose axis bounds the east side of the Big Missouri property.

SILBAK PREMIER - GEOLOGICAL SETTING AND MINERALIZATION

The Silbak Premier deposit is situated within generally massive, fine-grained green andesites, locally with monolithic fragmental zones. These andesites are moderately to intensely foliated with an attitude subparallel to the apparent original layering (N-S strike with approximate 40° westerly dip).

The andesite is intruded by very irregular bodies of K-feldspar megacrystic, plagioclase-amphibole porphyritic rock of dacite composition called Premier Porphyry. Although considered intrusive, many porphyry-andesite contacts are very indistinct suggesting emplacement close to the time the andesites were laid down. Both andesite and porphyry are partially overlain by a flow unit which looks compositionally and texturally similar to the intrusive porphyry.

Mineralization consists of silica-K-feldspar-carbonate-sulphide vein and breccia zones, footwall stockwork veining and occasional crustiform banded veins. Some lenses of semi-massive sulphides consisting of pyrite with lesser sphalerite and galena. The main gold bearing mineral is electrum while silver occurs primarily within tetrahedrite and polybasite.

Precious metal mineralization is generally centred within intense silica-K-feldspar alteration zones which are flanked by pyrite-sericite-carbonate alteration. Mineralization appears both concordant and discordant to andesite-porphyry stratigraphy. Siliceous breccia zones, around which the more intense alteration is focused, tend to host the most extensive, precious metal bearing zones although gold and silver mineralization is not uniformly distributed within these bodies. Higher silver ratio mineralization is generally hosted in stockwork veining.

The Glory Hole deposit is centred on the richest part of the old Premier Mine workings. It consists of two zones, the Main and West zones, that intersect roughly perpendicular. The West zone has been chopped into several segments which have been offset by right-lateral faulting resulting in an apparent accurate shape to the deposit. The Northern Lights deposit occurs in the hanging wall of the Main deposit in the Glory Hole and demonstrates two distinct zone orientations similar to the main deposit (Figure 4).

Ore lenses within the Glory Hole deposit vary in width from a few tenths of metres in the footwall stringer zone to 20 metres wide in the hanging wall area. Overall strike length of the Main plus West zones is 1800 metres and dip length is over 500 metres. The Main zone dips about 60° north near the top and flattens to about 30° near 6 Level, whereas the West zone is vertical to steeply north dipping throughout its vertical extent.

BIG MISSOURI - GEOLOGICAL SETTING AND MINERALIZATION

The Big Missouri property is underlain by a southwest-facing, moderately dipping sequence of volcanic and volcanoclastic rocks of the Hazelton Group (Figure 5, 6).

Green andesite flows, tuff and agglomerate form a thick upper sequence that hosts the mineralized zones on the property. They are generally feldspar and amphibole porphyritic with a weak to moderate foliation. Thin (up to 5 m) cherty tuff horizons of exhalative origin separate the individual flows, tuff and agglomerate units. These cherty tuff horizons are silica-rich beds containing sericite and silicified (bleached) andesite fragments, occasional

rounded cherty fragments, carbonate and sulphide mineralization. The footwall andesite usually is brecciated and filled with quartz and/or carbonate, while the hanging-wall andesite is generally a light grey bleached colour, due to silica-sericite alteration.

Cretaceous granitic dykes of the Portland Canal dyke swarm, Tertiary andesite dykes and abundant quartz, quartz-carbonate and carbonate veins cut the volcanic sequence.

Three regionally extensive horizons of cherty tuff and altered andesite are recognized. In the Lower Horizon, the cherty tuff bands within the andesite sequence generally are 8-10 m apart and contain abundant carbon; bands occurring in the Middle Horizon are generally 25-30 m apart and have abundant carbonate; those in the Upper Horizon are thickest and characterized by intense silica-sericite alteration.

In the lower part of the andesite sequence, irregular-shaped intrusions of Premier porphyry can be locally identified. Such intrusions are varied in texture and consist of quartz, plagioclase, amphibole and large potassium feldspar phenocrysts in a fine to medium, dark green andesitic matrix.

In general, semi-massive to massive lenses, pods and stringer zones of pyrite, sphalerite, galena and chalcopyrite occur within and at the contact of thin, cherty tuff horizons. Andesite in the footwall to these zones is bleached from green to grey with abundant sericite and fine, disseminated pyrite. Pyrite commonly replaces altered amphibole phenocrysts. Altered andesite is pervasively silicified and cut by numerous quartz-sulphide veins with or without chlorite and/or carbonate. Andesite tuffs overlying the cherty tuff are similarly bleached and altered, but silicification is more intense. In the immediate hanging wall, abundant sphalerite and galena with appreciable amounts of gold and silver are present in well-developed quartz stringer zones. Further up in the hanging wall, bleaching and disseminated pyrite are less intense, with only minor sphalerite and galena. The altered porphyritic andesite may correspond to what was previously termed "Premier Porphyry" and the cherty zones to what were referred to as quartz veins or breccia zones.

Three stratabound mineralized horizons have been recognized based on geological correlation of the host units. The Lower Horizon hosts the Terminus, Golden Crown, Calcite Cuts, S-1, Unity-Unicorn and Martha Ellen zones and, finally, the Upper Horizon hosts the Province, Buena Vista, Northstar-Lindeberg and Rambler zones.

SUMMARY OF MINERALIZATION TYPES, ORE CONTROLS AND MODELS FOR ORE GENESIS AT SILBAK PREMIER AND BIG MISSOURI

At a district scale the ore zones occur in green andesite at similar stratigraphic levels, although there are significant facies differences between the two properties.

The geometry, distribution and textural features of the ores at Big Missouri suggests the ores to be stratabound and syngenetic. The ore zones occur at several stratigraphic levels with deposits at different stratigraphic levels having distinctive features. Use of a stratigraphic model has given good exploration success.

The timing of emplacement of Premier porphyry is controversial; some evidence suggests that at least part of the Premier porphyry is extrusive. Mineralization is hosted in porphyry, and Premier porphyry may intrude earlier mineralized andesite. Within the Glory Hole the contacts of andesite and Premier porphyry are favourable for high-grade ore. Elsewhere, the relationship of mineralization to Porphyry is less clear. Discordant stockwork vein and silica-breccia mineralization at Premier occur within and adjacent Premier porphyry. The intensity of silica-sericite-K-feldspar alteration is greatest in the Glory Hole area and decreases laterally to the West zone and at depth where alteration is mainly silica-chlorite-K-feldspar with little bleaching due to sericite.

Syngenetic Model

The apparent stratabound character of mineralization at Big Missouri is interpreted as an indication that the mineralization was formed essentially at the same time as the enclosing host andesites. Recent work on massive

sulphide deposits in offshore spreading ridges indicates mineralization forming both on the seafloor and in porous zones immediately beneath the seafloor, giving rise to evidence for both syngenetic and epigenetic styles of mineralization both of which are interpreted to occur at Big Missouri.

Semi-massive sulphide deposits found at Premier with associated sulphide-matrix breccias and fine cherty silica deposits demonstrate features of synvolcanic deposition. Relationship of mineralization to stratigraphy at Silbak Premier is less clear, however, where stratigraphy is known the deposits appear to occur over specific stratigraphic intervals and to be grossly stratabound.

Vein Replacement Model

The massive silica-K-feldspar alteration with attendant silica-breccias and peripheral stockwork veining and pyrite-sericite-carbonate alteration, particularly evident at Premier, suggest the mineralization has developed within an epithermal system. Structural control appears to dominate and several pulses of mineralization may be interpreted from the overprinting of numerous vein types.

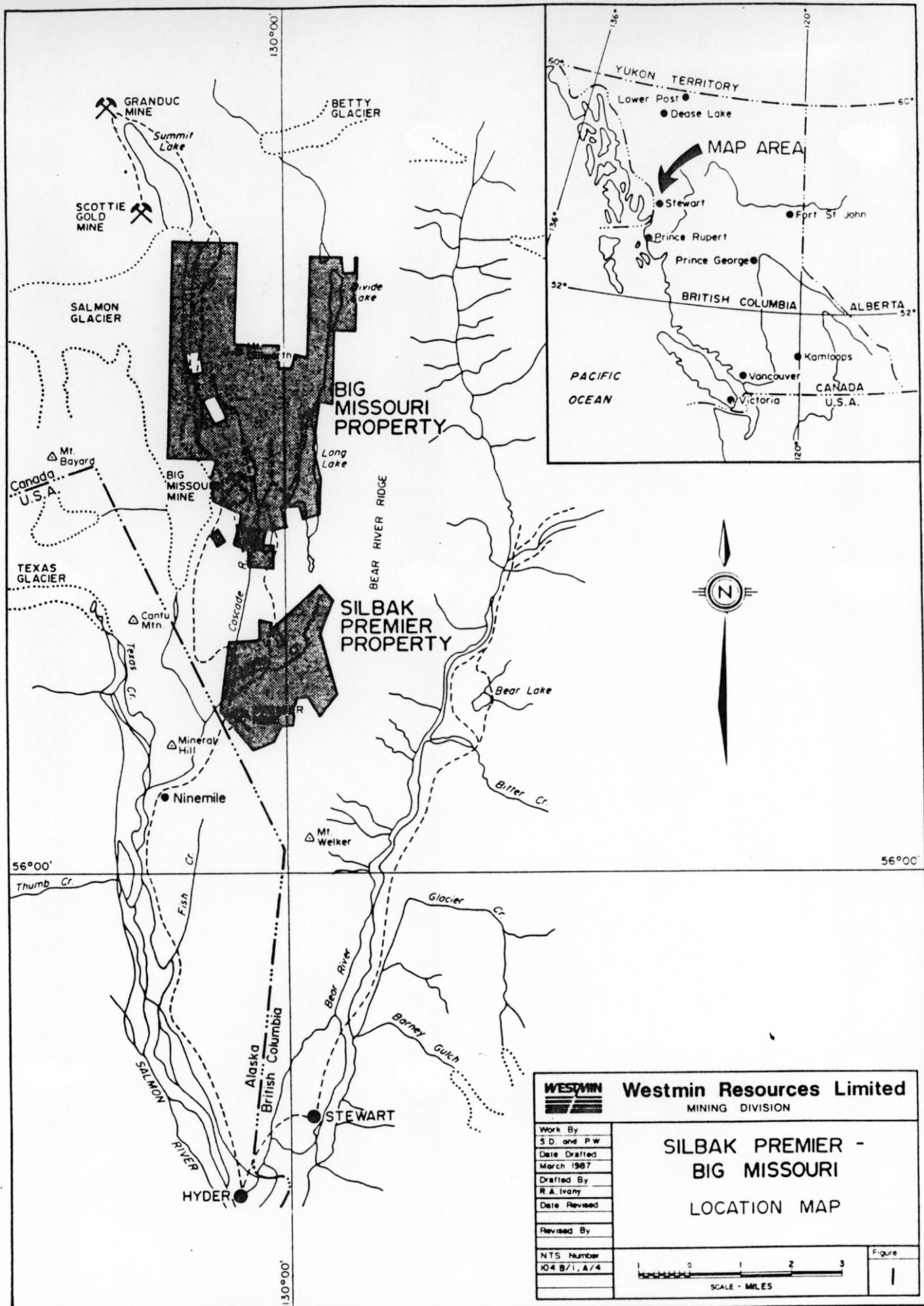
The zoning of Ag and Au abundance at Premier is complex. A generalized model of high Ag:Au ratios at surface, decreasing to low Ag:Au ratios at depth is misleading and is the reverse of zoning in most epithermal vein systems.

AWR/pf

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WESTMIN Westmin Resources Limited MINING DIVISION	
Work By S.D. and P.W. Date Drafted March 1987 Drafted By R.A. Ivany Date Revised Revised By	SILBAK PREMIER - BIG MISSOURI LOCATION MAP
NTS Number 104 B/1, A/4	Figure 1

 OPEN PIT AREAS

LOCATION MAP

280 640 0 1280 2560 3840 metres

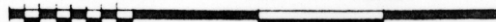
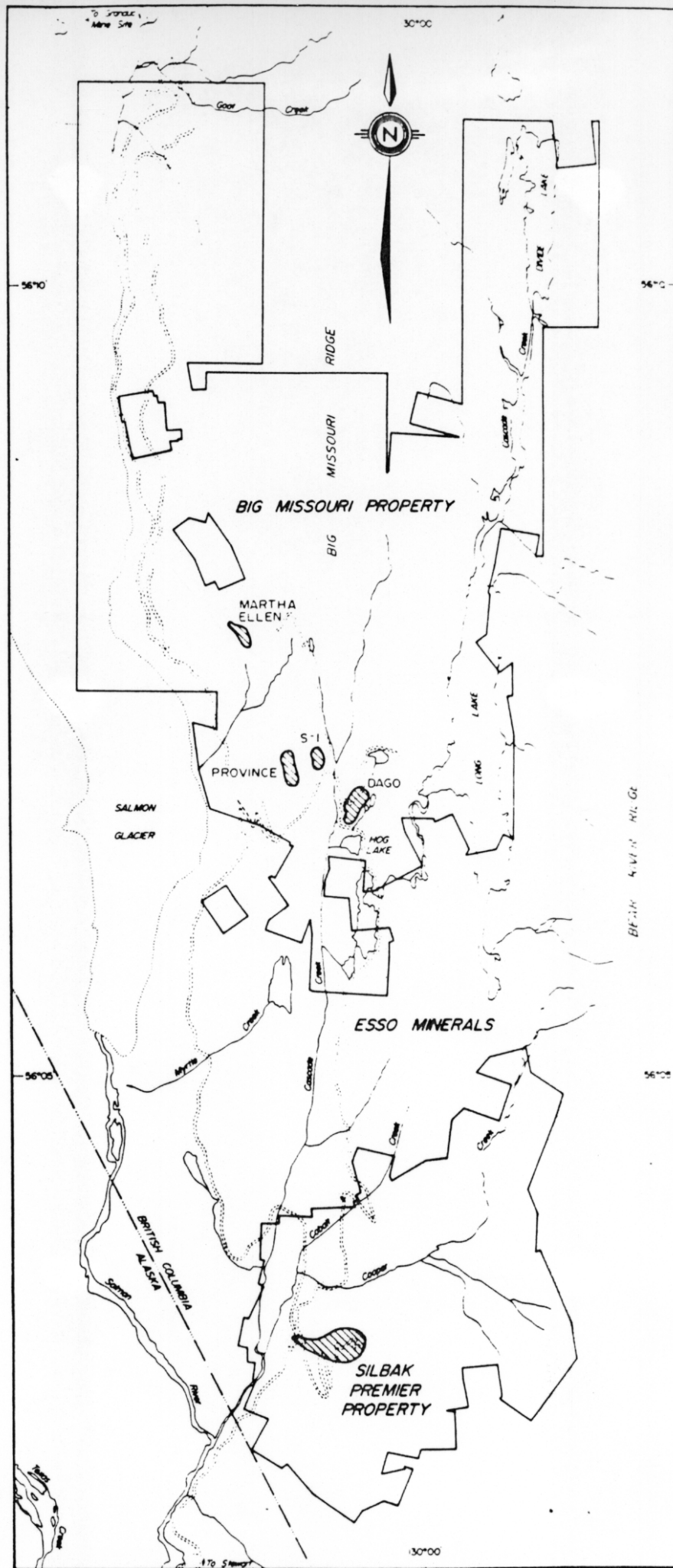
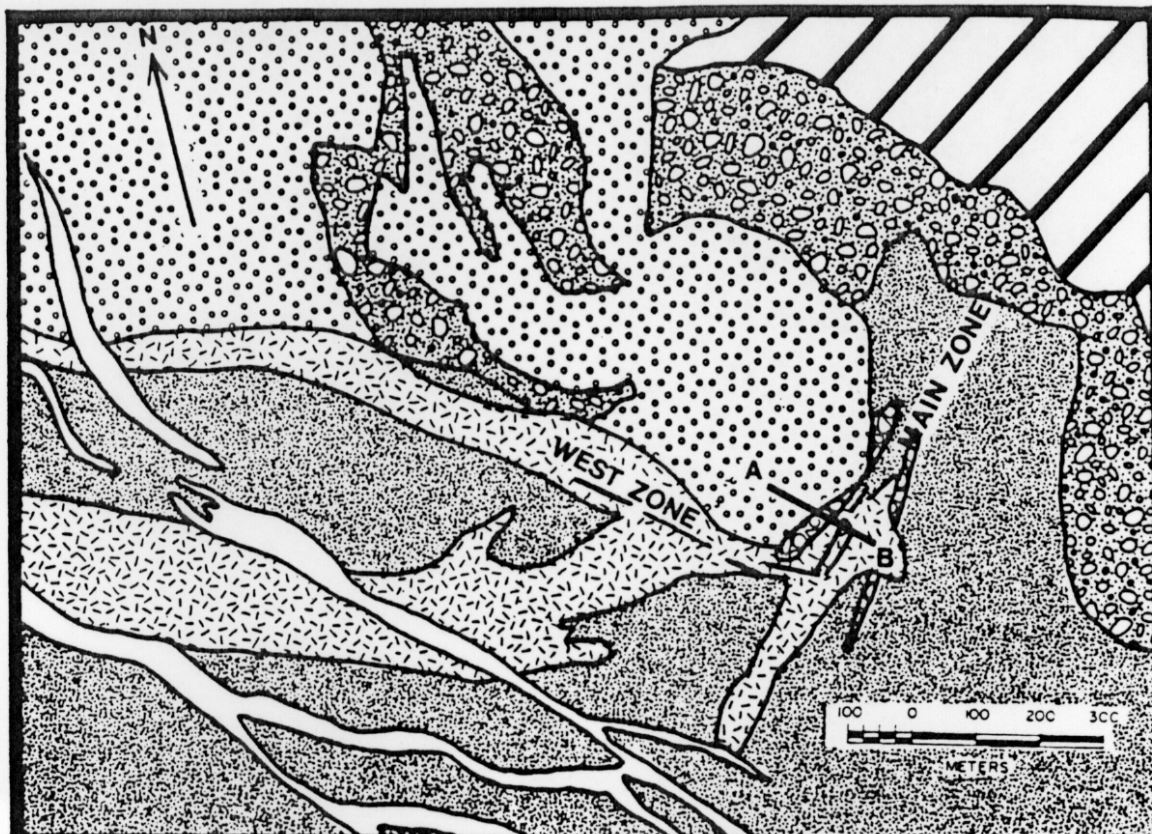


Figure 2





modified from Brown (1987), Payne & Sisson (1987)


SILBAK-PREMIER


A

SECTION 2245 N

B

LEGEND


 GRANODIORITE DYKES


 STOCKWORK VEINING
AND BRECCIA

JURASSIC

 K-FELDSPAR PORPH.
DACITE

 MAROON PORPH. DACITE

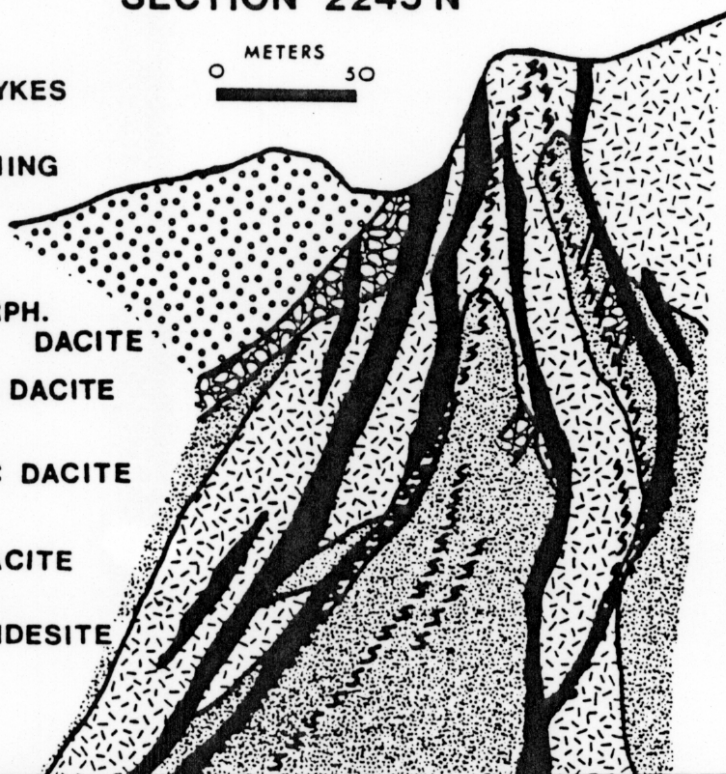
 VOLCANICLASTIC DACITE

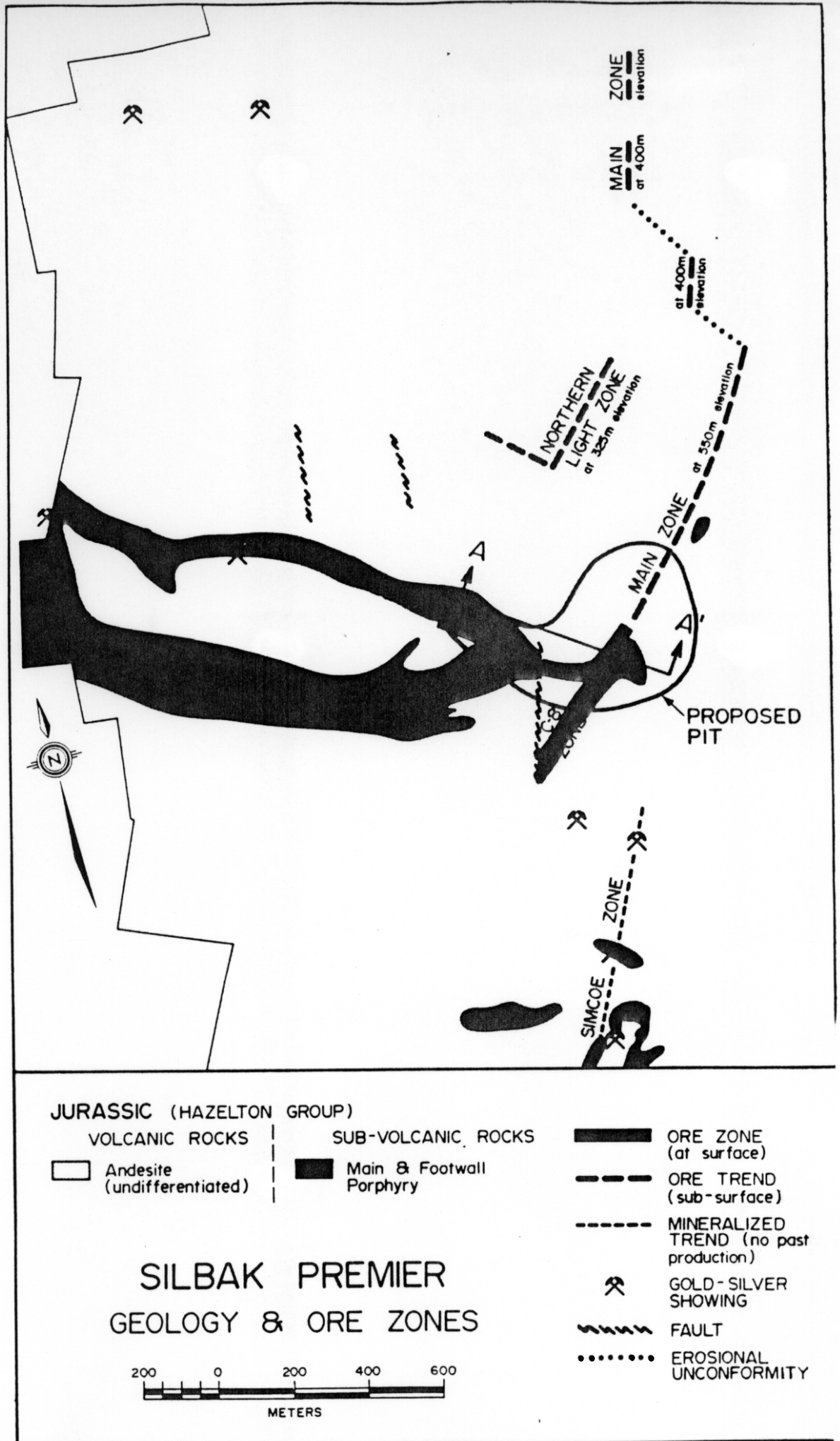
 PORPHYRITIC DACITE

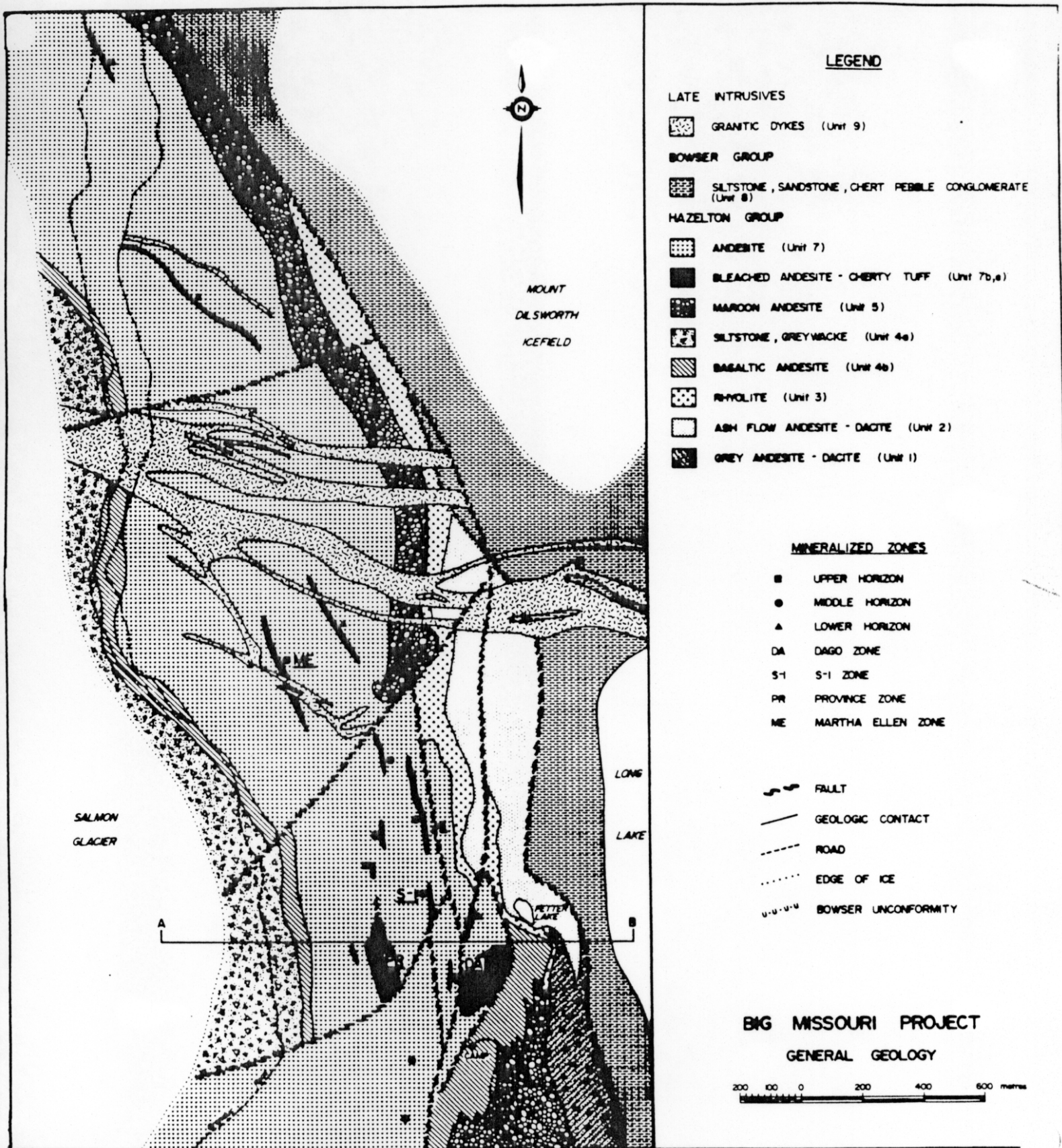
 FRAGMENTAL ANDESITE

 ANDESITE

0 METERS 50







**SEG NORTHERN CORDILLERAN PRECIOUS METAL DEPOSITS
FIELD TRIP STOPS - SEPTEMBER 25, 1988
SILBAK PREMIER - BIG MISSOURI AREA**

Stop 1 - Granduc Road, km-20 (note km-0 at Granduc Millsite).

Overview of Salmon Glacier and west side of Big Missouri Ridge. If weather co-operates, the following can be observed.

- a) Position of the Big Missouri relative to Scottie Gold, Granduc, Silver Butte and Outland Silver Bar properties.
- b) Location of the old Big Missouri underground mill and workings (1938-1942) and the Province and Martha Ellen mineralized zone.
- c) Examples of the structurally deformed sediments exposed on the west side of the Big Missouri Ridge.

Stop 2 - Granduc Road km-8 - Troy Canyon

Troy Canyon contains the northern continuation of the Cascade Creek Fault zone. To the north lie the strongly deformed middle to late Jurassic Bowser sediments. Although not observed in outcrop, boulders of chert pebble conglomerate which mark the base of the Bowser may be found.

The roadcuts on the southside of the canyon expose typical examples of the mixed Dacite - Rhyodacite clastic unit of the Dillworth Rhyolite (map unit 3) in contact with the maroon and green volcanoclastic (map unit 5).

Stop 3 - Granduc Road km-12 - The "Summit"

An excellent example of the Groundhog Marker (map unit 5d) crosscut by a Premier porphyry dyke is exposed in the roadcut. The Groundhog exhibits the strong east-west elongation of the fragments perpendicular to the major stratigraphic contacts.

Stop 3-4- Granduc Road km-12 to km-16

Continuing south along the Granduc Road it should be possible to observe:

- a) The fault controlled repetition of units within the lower part of the stratigraphy. This is especially evident by the repetition of a coarse fragmental to pyroclastic andesite to Dacite unit exhibiting large angular, chloritic fragments contained in a lighter, sericitic and more siliceous matrix.
- b) The Cretaceous-Tertiary Portland canal dyke swarm.
- c) The contorted, highly fissile, locally bedded argillaceous sediments.

Stop 4 - Granduc Road km-16 - Big Missouri Turnoff

Exposed in the roadcuts are examples of the argillaceous sediments intruded by irregular bodies of Premier Porphyry. Looking to the south, the large gossaneous cliffs of the Silver Butte property currently being explored by Tenajon Silver Ltd. may be seen.

Stop 5 - Dago Open-Pit

The Dago is the first pit being mined at Big Missouri. In the pit it should be possible to see the mineralized cherty tuff horizons in relation to the strongly altered host andesite units and the numerous barren cross-cutting quartz and quartz-carbonate veins. Depending on the progress of mining, the main high grade "D" horizon should be exposed.

Stop 6 - Big Missouri Powerhouse

Exposed alongside the powerhouse is an excellent example of the mixed maroon and green andesite-dacite volcanoclastic (map unit 5) showing felsic, jasperoidal and a wide variety of andesite-dacite fragments. This unit immediately underlies the Groundhog Marker. These outcrops are located on the south margin of the structurally controlled basin developed in the lower units 1 to 5.

Stop 7 - Pyrite Cube Showing

This outcropping with its distinctive pyrite cubes ranging up to 3 cm across is considered to be the same or equivalent to the mixed maroon and green andesite noted at the previous stop (Big Missouri Power House) and represents part of a possible link between the geology at Big Missouri and Premier.

Stop 8 - 2-Level Portal

Classic intrusive Premier Porphyry (snow flake porphyry) is exposed in the road cut adjacent the 2-Level Portal of the old Premier mine workings. Indistinct, irregular contact relationships with adjacent andesite may be noted.

Also present is a controversial pod of massive sulphides demonstrating characteristics of both epigenetic and syngenetic styles of mineralization for those of either leaning. Sulphide-matrix breccias, massive fine silicification, stockwork veining, banded massive pyrite with varying amounts of sphalerite galena, and some copper mineralization are present. Contact relations with adjacent volcanics and porphyry are unclear but appear to be faulted.

Samples across this deposit returned 23.5 meters grading 0.462 oz/ton gold, 3.75 oz/ton silver, 2.7% lead and 2.4% zinc and included a zone of massive banded pyrite grading 0.785 oz/ton gold.

Stop 9 - Premier Open-Pit

- i) Footwall rocks - predominantly andesite.
- ii) Altered andesite and porphyry close to mineralized zones.
- iii) Ore zones - siliceous breccias
- iv) Hanging wall rocks
 - maroon and green volcanoclastics
 - Premier porphyry "extrusive" equivalent
- v) Major cross-cutting structures

Stop 10 - Drill Core (Summary Logs)

A. Premier

DDH86-94 Section through Premier deposit from HW to FW showing most geological units and siliceous breccia.

0-10'	<u>OVERBURDEN</u>
10-46.2'	<u>ANDESITE</u> - PPAN - possible flow banding?
46.2-177	<u>ANDESITE</u> - fragmental.
	46.2-69 - ALT.
	69.0-109 APLT (Maroon).
	109-177 ALT - medium to coarse euhedral py to 10%.
177-209'	<u>SIBX</u> - AFLW in-situ breccia overprinted by SIBX. Layercake quartz-vein at 148 with grey interbeds, could be interflow exhalative horizon.
209-253.5'	<u>AFLW</u> - 30% veining, also in-situ breccia.
	249.5-252.5 - <u>stope/working</u> - open.
253.5-269.5'	<u>AFLW</u>
269.5-478.5'	<u>PPX2</u> - Moderately to intensely altered, with local zones of extensive veining, approaching SIBX. Scattered veins with GL-SS especially in the interval 411-453.
478.5-497'	<u>ANDESITE</u> - mixed fragmental and flow interlayered.

ASSAY RESULTS

Interval (ft)	Length (ft)	Au oz/ton	Ag oz/ton
167.0 - 177.0	10	0.1185	1.270
177.0 - 181.0	4	2.860	228.56
181.0 - 187.0	6	0.084	14.870
187.0 - 209.0	22	0.0145	1.875
253.5 - 271.5	18	0.0758	3.890
271.5 - 325.0	53.5	0.0073	0.950
344.5 - 377.0	32.5	0.0178	10.914
467.0 - 472.0	5	0.038	2.28

B. Big Missouri

DDH 88-28	Section on immediate edge of the S-1 high grade core zone.
0.00 - 1.30m	<u>OVERBURDEN</u>
1.30 - 43.40m	<u>ANDESITE LAPILLI TUFF</u> - typical hangingwall andesite
MIDDLE HORIZON	
43.40 - 54.70m	<u>CHERTY TUFF</u> - Footwall stringer zone - well mineralized, pyrite dominant with sphalerite
54.70 - 71.90m	<u>ANDESITE TUFF</u> - porphyritic and weakly silicified.

ASSAY RESULTS

Interval (ft)	Length (ft)	Au oz/ton	Ag oz/ton
42.80 - 55.10	12.3	0.221	0.45
43.40 - 49.10	5.7	0.351	0.55

DDH 88-46	Stratigraphic hole drilled from immediate footwall to Province through the Andesite section and into the Footwall Argillite unit
0.0 - 1.30m	<u>OVERBURDEN</u>
1.30 - 15.6m	<u>ANDESITE</u> : chloritic, moderately altered
15.6 - 16.8m	<u>CHERTY TUFF</u> : sharp upper contact, well-developed footwall breccia
16.8 - 160.3m	<u>ANDESITE</u> : several faults and dykes, locally silicified
	151.2 - 153.6 underground working
MIDDLE HORIZON	
160.30 - 197.39m	<u>ANDESITE-CHERTY TUFF</u> : three cherty tuff beds with stringer zones weakly developed and mineralized
197.30 - 256.20m	<u>ANDESITE TUFF</u> : locally crudely bedded
LOWER HORIZON	
256.20 - 277.10m	<u>ANDESITE-CHERTY TUFF</u> : three cherty tuff beds, weakly mineralized
277.10 - 291.40m	<u>ARGILLACEOUS WACKE</u> : Note pyritic fragments, possibly represents debris flow.

Assays: not currently available

DDH 88-89	Section through sulphide rich core zone at Martha Ellen
0.00 - 4.90m	<u>OVERBURDEN</u>
4.90 - 46.60m	<u>ANDESITE</u> : chloritic cut by dioritic dykes
MIDDLE HORIZON	
56.60 - 63.20m	<u>ANDESITE-CHERTY TUFF</u> : weakly mineralized, patchy sulphides
63.20 - 72.40m	<u>ANDESITE LAPILLI TUFF</u> : sporadic patches of mineralization and weak stringers, chloritic
72.40 - 78.00m	<u>CHERTY TUFF-FOOTWALL BRECCIA</u> : heavy sulphide, well-developed breccia textures
78.00 - 118.2m	<u>ANDESITE LAPILLI TUFF</u> : shows typical fragmental texture with darker chloritic fragments in a lighter, more sericitic and siliceous matrix
118.20 - 120.40m	<u>GRANODIORITE DYKE</u> : Portland Canal

ASSAY RESULTS

INTERVAL (ft)	Length (ft)	Au oz/ton	Ag oz/ton
67.7 - 82.9	15.2	0.092	2.53 4% Zn
76.8 - 81.4	4.6	0.201	2.19 1.5% Pb 12.3% Zn

S88-34.rpt