State Department of Geology and Mineral Industries

1069 State Office Building
Portland 1, Oregon

SILVER PEAK MINES (Copper, gold, silver, zinc)

Riddle District
Douglas County

"The ore bodies have been explored on three principal levels. The lowest, the main level of the Umpqua Consolidated Mining Co., is a crosscut adit 600 feet long with two drifts aggregating about 600 feet. The main level of the Silver Peak Copper Co., 55 feet higher than the working mentioned and connected to it by a raise, is another crosscut adit about 480 feet long with 550 feet of drifts. The third level, known as No. 1, 195 feet above the Umpqua level, is an adit 170 feet long driven near the dividing line of the properties. There are in addition several shallow workings including a 30-foot shaft at a point 75 feet higher than level 1 and 270 feet above the main level of the Umpqua Consolidated Mining Co. Comfortable camps have been built on both properties, and at the Silver Peak Copper Co's mine a No. 10 Ingersoll-Rand compressor and a Fairbanks-Morse 120-horsepower engine, both new, were installed in 1930.

"Ore-bodies: The ore minerals occur as massive tabular bodies and disseminated in highly foliated schist. The two principal workings expose a zone of mineralized schist more than 100 feet wide. Across most of this zone sulphide minerals are rather sparsely distributed, but in at least two places bodies of nearly solid sulphide ore occur. One of these, in the main crosscut of the Silver Peak Copper Co., the "northwest band", is about 15 feet wide and another, the "southeast band", is over 20 feet wide. Both pinch out to the northeast, one within a distance of 200 feet and the other within 60 feet. Two sulphide bodies are exposed also on the main level of the Umpqua Consolidated mine, but there the northwest body is only about 10 inches wide, whereas the southeast body is about 10 feet wide. Normally the massive ore grades into schist with disseminated sulphides, but in some places, especially where the massive ore pinches, one or both walls are slickensided fault surfaces commonly lined with several inches of gouge.

"The massive sulphide ore is distinctly banded, probably in part because the ore minerals have replaced schistose rocks and in part because the minerals were introduced along parallel fractures in the rock. The sulphides include pyrite, sphalerite, chalcopyrite, bornite, galena, tennantite, chalcocite, and covellite, named in the relative order of their abundance. The last four mentioned occur in relatively small amounts. In addition the occurrence of native copper is reported by Mr. Reeves. The gangue minerals are principally quartz, barite, and sericite. Epidote was seen in one thin section of the ore.

Reference: Quoted from "Copper deposits in the Squaw Creek and Silver Peak districts and at the Almeda mine, southwestern Oregon, with notes on the Pennell & Farmer and Banfield prospects: U. S. Geol. Survey Circ. 2, by P. J. Shenon, 1933.

BLANK B—ANNUAL REPORT

This report must be properly executed and filed with the Corporation Commissioner on or before July 1, 1933, in order to entitle a corporation mining for any of the precious metals, coal, or prospecting or operating for oil, or operating an oil well, to pay a license fee of only $10. If not so filed, such corporation must pay the same license fees as are required to be paid by other corporations for gain.—Section 25-244, Oregon Code 1930.

ANNUAL REPORT TO THE CORPORATION DEPARTMENT

FOR THE YEAR ENDING JUNE 30, ~~1933~~ 1937

Of SILVER PEAK MINES CO.
(Give legal name in full)

a corporation organized and existing under and pursuant to the laws of the State of Oregon.

The location of its principal office is at No. .... *Street,*

in the city of Portland, *in the state of* Oregon

The names and addresses of principal officers, with the postoffice address of each are as follows:

NAMES	OFFICE	BUSINESS ADDRESS
Dr. Wm. Cavanagh	President	Medical Arts Bldg., Portland
C. L. Chandler	Secretary	Milwaukie, Ore. R.12 Box 398
do	Treasurer	do

The date of the annual election of officers is 3d Saturday of January

The date of the annual election of directors is do

	Common With Par Value	Common No Par Value	Preferred
Amount of authorized capital stock	$ 600,000	Shares	$
Number of shares of authorized capital stock	600,000		
Par value of each share	$ 1.00	xxxxxx	$
Amount of capital stock subscribed	$ 600,000	Shares	$
Amount of capital stock issued	$ 600,000	Shares	$
Amount of capital stock paid up	$ 600,000	Shares	$
Price at which no par value stock issued	xxxxxx	$	xxxxxx

State amount of capital, represented by stock of no par value, with which the corporation began business . . . . $

Total amount of its properties in Oregon (name of claims, lodes, or placers) Silver Peak Extension #1, Silver Peak Extension #2, Silver Peak Extension #1 Lower west, Silver Peak #2 Lower West, Silver Peak Extension "#1 Base, Silver Peak Extension No. 1 West, Silver Peak Extension #2 west, Silver Peak Extension #2 Base, Silver Peak Extension #2 East base, Silver Peak No. 2 East, Silver Peak Extension #1 East Base, Silver Peak Extension No. 1 east.

The location of its properties Douglas County

The amount of work done thereon and improvements made thereon since the time of filing last report assessment work

The amount of output or products of the mines or wells of such corporation from January 1, 193~~2~~6, to December 31, 193~~2~~6, inclusive, none

The value of output or products of the mines or wells of such corporation from January 1, 193~~2~~6, to December 31, 193~~2~~6, $ none

IN WITNESS WHEREOF, I, C. L. Chandler, Treasurer

of said corporation, have signed this report, this 21st *day of* June, *A. D.* 1937

[CORPORATE SEAL]

(signed) C. L. Chandler

STATE OF OREGON, }
County of .... } *ss.*

BLANK B—ANNUAL REPORT

This report must be properly executed and filed with the Corporation Commissioner on or before July 1, 1933, in order to entitle a corporation mining for any of the precious metals, coal, or prospecting or operating for oil, or operating an oil well, to pay a license fee of only $10. If not so filed, such corporation must pay the same license fees as are required to be paid by other corporations for gain.—Section 25-244, Oregon Code 1930.

ANNUAL REPORT TO THE CORPORATION DEPARTMENT

FOR THE YEAR ENDING JUNE 30, 19~~33~~ 1937

Of OREGON EXPLORATION COMPANY
(Give legal name in full)

a corporation organized and existing under and pursuant to the laws of the State of Oregon.

The location of its principal office is at No. .... *Street,*

in the city of Portland, *in the state of* Oregon

The names and addresses of principal officers, with the postoffice address of each are as follows:

NAMES	OFFICE	BUSINESS ADDRESS
Dr. Wm. Cavanagh	President	Medical Arts Bldg., Portland, Ore.
F. O. Howland	Secretary	Beaverton, Ore. Rte. 1
do	Treasurer	do

The date of the annual election of officers is 3rd Saturday of January

The date of the annual election of directors is do

	Common With Par Value	Common No Par Value	Preferred
Amount of authorized capital stock	$500,000.00	Shares	$
Number of shares of authorized capital stock	500,000.00		
Par value of each share	$ 1.00	xxxxxx	$
Amount of capital stock subscribed	$500,000.00	Shares	$
Amount of capital stock issued	$500,000.00	Shares	$
Amount of capital stock paid up	$500,000.00	Shares	$
Price at which no par value stock issued	xxxxxx	$	xxxxxx

State amount of capital, represented by stock of no par value, with which the corporation began business $

Total amount of its properties in Oregon (name of claims, lodes, or placers)

Section 26 Fraction No. 1. Fraction No. 2 - Silver Peak No. 2, Silver Peak No. 1, Helen Lode, Silver Peak Fraction, Silver Peak Fraction No. 3, Lower Silver Peak, Silver Peak Base, Silver Peak No. Base, Lower Silver Peak No. Base

The location of its properties Douglas County, Oregon

The amount of work done thereon and improvements made thereon since the time of filing last report Assessment work

The amount of output or products of the mines or wells of such corporation from January 1, 19~~32~~36, to December 31, 193~~2~~6, inclusive, none

The value of output or products of the mines or wells of such corporation from January 1, 193~~2~~6, to December 31, 193~~2~~6, $ none

IN WITNESS WHEREOF, I, F. O. Howland, Treasurer *of said corporation, have signed this report, this* 21st *day of* June, *A. D. 193*7

[CORPORATE SEAL]

(signed) F. O. Howland

STATE OF OREGON, } *ss.*
County of ....

FORMOSA
RESOURCES
CORPORATION
400 - 355 Burrard Street
Vancouver, B.C., Canada
V6C 2G8
(604) 682-3300
Fax: (604) 681-1073

NEWS RELEASE

FOR IMMEDIATE RELEASE

Date: November 28, 1988

SECURITIES & EXCHANGE
COMMISSION REGISTRATION NO. 82-1367

FORMOSA RESOURCES CORPORATION

Dr. Kuang I. Lu, President of Formosa Resources Corporation, is pleased to release the results of current exploration at its Formosa/Silver Butte project in Douglas County, Oregon. The exploration work to date has outlined five sulphide bodies in the main zone area with approximately 460,000 tons reserve grading 0.043 oz/Ton gold, 1.380 oz/Ton silver, 3.40% copper, 2.83% zinc.

Further assay results of ore intersections from three more holes are pending, which it is anticipated will increase the ore reserve.

Three drilling machines are actively working on this property, and one of the drills will pursue new geophysical targets located by current VLF-Mag survey results which coincide with previous geochemical anomalies.

The company has decided to take further steps to do a preliminary evaluation on the property consisting of environmental and metallurgical studies.

Excellent potential for additional ore occurs both down-dip and along-strike from existing zones and testing continues.

-30-

Lu Kuang

Dr. Kuang I. Lu, President

Refer:
Dr. Kuang I. Lu
Formosa Resources Corporation
400 - 355 Burrard Street
Vancouver, B.C. V6C 2G8
Phone: (604) 682-3300

J. Min. Coll. Akita Univ., Ser. A, Vol. Ⅶ, No. 2, pp. 99-123, March, 1989
(With 15 Figures)

GEOLOGY OF THE SILVER PEAK MINE, A KUROKO-TYPE DEPOSIT IN JURASSIC VOLCANIC ROCKS, OREGON, U.S.A.

By

Robert E. DERKEY* and Hiroharu MATSUEDA**

Contribution from the Institute of Mining Geology, Mining College,
Akita University, No. 279

(Received 17 Jan., 1989)

Abstract

Kuroko-type massive sulfide mineralization occurs in subaqueously deposited, Jurassic-age pyroclastic rocks at the Silver Peak mine. The stratigraphic sequence from the base upwards is : (1) basaltic flows and tuffs, (2) dacite dome and tuff, (3) foliated tuff and tuff breccia, and (4) bedded tuff. The mineralized sequence occurs in the foliated tuff unit and is separated into the following interbeds : (1) quartz-sericite-pyrite foliated tuff, (2) silicified foliated tuff, (3) massive sulfide, and (4) sulfide-lapilli tuff. Zones or beds in the massive sulfide include : (1) friable yellow ore, (2) yellow ore, (3) black ore, and (4) barite ore. Ferruginous chert fragments occur in silicified foliated tuff.

Massive sulfide interbeds consist of varying amounts of subrounded pyrite grains in a matrix of chalcopyrite, bornite, tennantite, and sphalerite. The pyrite grains contain blebs of various sulfides.

The foliated tuff unit, the host to mineralization, is thinnest over the underlying dacite dome and thickens on the flanks of the dome. The foliated tuff is an ash-flow tuff that is compacted and altered. Locally well-deloped foliation and flattened pumice suggest the unit may have been welded in the subaqueously deposited state. Mineralization at the Silver Peak mine occurs on the flanks of the dome. Graded bedding, flame structures, and related sedimentary structures indicate that the foliated tuff and enclosed massive sulfide is subaqueous in origin.

Contents

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** Dept. Geology and Mineralogy, Fac. Science, Hokkaido Univ., Sapporo, 060 Japan

I. INTRODUCTION

The Silver Peak mine, a Kuroko-type volcanogenic massive sulfide deposit, is located in Jurassic metavolcanic rocks at the northern end of the Klamath Mountains of southwestern Oregon, U.S.A. (Fig. 1). The Klamath Mountains consist of four major belts (Fig. 2) of tectonically accreted Paleozoic and Mesozoic oceanic-crust and island-arc complexes. The accreted belts consist of

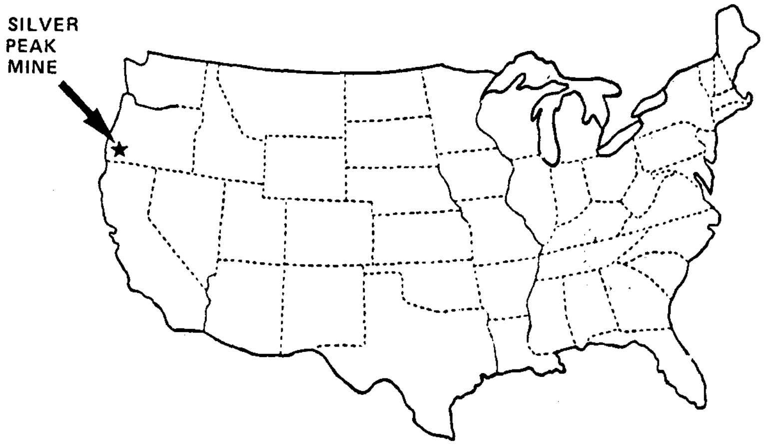


Fig. 1. The Silver Peak mine is located approximately 100 kilometers north of the California border in southwestern Oregon.

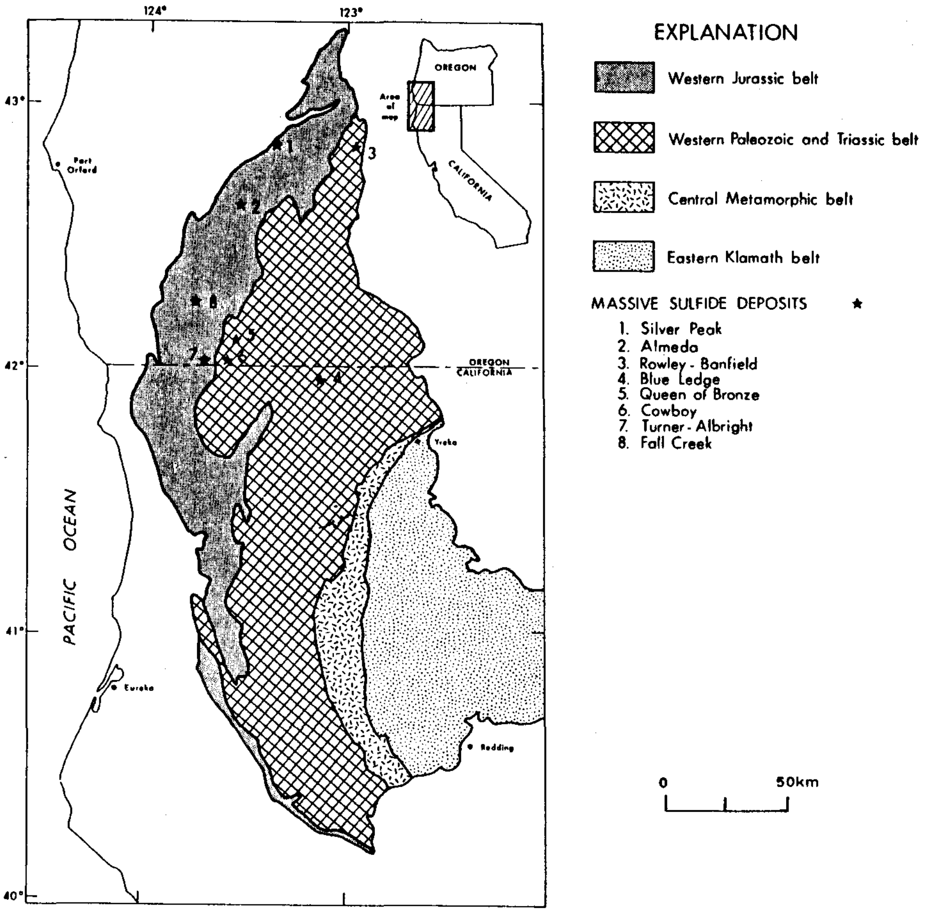


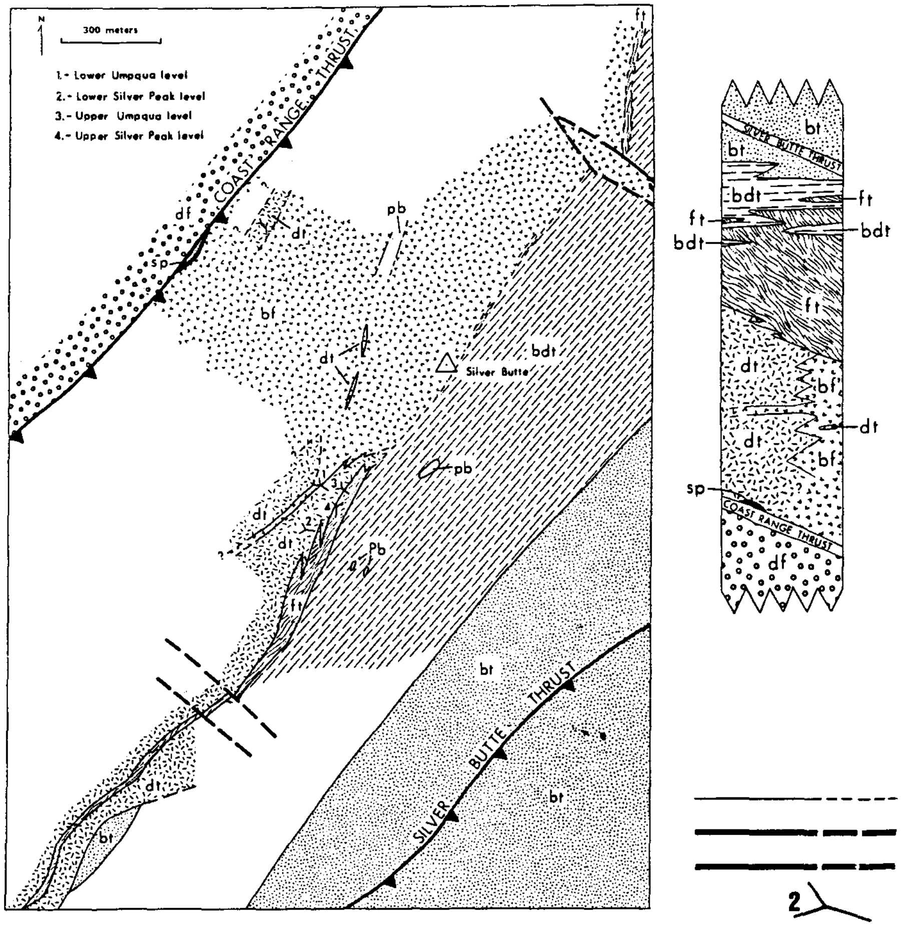
Fig. 2. Map showing general distribution of accreted terranes and massive sulfide deposits of the Klamath Mountains of California and Oregon (adapted from IRWIN, 1972, p. C-103).

fragments of island-arcs, ophiolitic sequences, and large areas of melange (IRWIN, 1972) that host an equally complex variety of mineral deposits (KOSKI and DERKEY, 1981). Two of the four belts exposed in southwestern Oregon, the western Paleozoic and Triassic belt and the western Jurassic belt, host a number of massive sulfide deposits. The Silver Peak mine is in the western Jurassic belt (Fig. 2).

The Silver Peak mine produced a total of 6,000 metric tons of ore during the years 1926, 1928 to 1931, and 1936 to 1937. The ore yielded 334,000 kg of copper, 750,000g of silver and 16,800 g of gold (RAMP, 1972). Records for zinc recovered are incomplete for early production, but for the last 3,000 tons of ore, the grade averaged 6.25 percent zinc.

II. STRATIGRAPHY AND CHEMISTRY OF THE ROCKS AT SILVER PEAK

The stratigraphic sequence of Jurassic volcanic rock units at Silver Peak from the base at the Coast Range thrust fault upwards (Fig. 3) is : (1) basaltic flows and tuffs (bf), (2) dacite tuff (dt), (3) foliated tuff (ft), (4) bedded tuff (bdt), and (5) basaltic tuff (bt).



DESCRIPTION OF MAP UNITS

BEDDED UNITS

df DOTHAN FORMATION

Massive to thick-bedded graywacke sandstone with thin interbeds of dark siltstone (equivalent to Franciscan Formation of California).

bt BASALTIC TUFF

Mafic tuff unit overlying the bedded tuff and the mineralized sequence.

bdt BEDDED TUFF

Consists of fine sand- to silt sized groups of 1- to 3-cm thick beds, massive bedded tuff, and tuffaceous sandstone. Locally contains well indurated, porcelaneous tuff. This unit is interfingered with the underlying foliated tuff (ft).

ft FOLIATED TUFF AND TUFF BRECCIA

Subaqueous deposited ash-flow tuff consisting of locally occurring breccia fragments in a fine-grained, foliated, tuffaceous matrix. Contains interbeds of the mineralized sequence; sulfide-lapilli tuff (slt), massive sulfide (ms), silicified foliated tuff (sft), and quartz-sericite-pyrite foliated tuff (qft).

dt DACITE DOME AND DACITE TUFF

Consists of subaqueously deposited, often autobrecciated, dacite dome with flanking fine-grained tuff. Contains numerous clots and veinlets of quartz, and numerous accidental basalt blocks (bb) in the tuffaceous portions. Appears to grade upward into foliated tuff and tuff breccia (ft).

bf BASALTIC FLOWS AND TUFFS

Consists of vesicular and amygdaloidal flows and interbedded mafic tuff. Also contains small lenses of dacite (dt).

INTRUSIVE UNITS

pb PORPHYRITIC BASALT

Small porphyritic basalt bodies of unknown age that intrude the bedded volcanic units.

sp SERPENTINITE

Tectonically emplaced bodies of sepentinized ultramafic rocks especially prevalent along thrust faults.

EXPLANATION

Contact, dashed where approximately located

Fault, dashed where approximately located

Thrust fault, sawteeth on upper plate, dashed where approximately located

Approximate location of Silver Peak mine workings, levels 1 through 4

Fig. 3. Geology of the Silver Peak mine area. Column shows correlation of map units of the area.

A. Chemical Classification

A combination of intense weathering, hydrothermal alteration-sea water metasomatism, and low-grade greenschist facies metamorphism make distinguishing some of the basalts and dacites at Silver Peak difficult. The basalt in outcrop is usually dark gray to dark green but when altered resembles

Table 1. Whole rock analyses of typical samples from each stratigraphic unit at Silver Butte. Analysis No. 1 was done by the U.S. Geological Survey rapid rock method. All other analyses were done by XRF method on a Phillips XRF instrument at Washington State University. The samples for XRF analysis were prepared by fusion with lithium tetraborate. Fe_2O_3 and FeO were calculated by the method of IRVINE and BARAGAR (1971).

	1	2	3	4	5	6
	Basalt Flow (bf)	Dacite Tuff (dt)	Pumiceous Tuff (ft)	Foliated Tuff (ft)	Porcelaneous Tuff (bdt)	Basaltic Tuff (bt)
SiO_2	48.80	62.98	68.16	72.14	63.20	49.92
Al_2O_3	17.50	17.35	15.09	13.76	15.87	18.32
Fe_2O_3	3.90	2.38	2.42	1.91	2.41	2.17
FeO	6.40	3.28	2.47	0.49	4.64	7.89
MgO	4.60	1.54	1.55	3.03	1.88	4.97
CaO	10.80	3.75	2.89	1.39	6.53	10.44
Na_2O	1.70	4.80	3.31	4.18	1.79	2.52
K_2O	0.65	0.88	1.55	0.35	2.16	0.23
H_2O	3.48					
TiO_2	0.81	0.88	0.92	0.41	0.91	0.67
P_2O_5	0.15	0.22	0.26	0.08	0.24	0.10
MnO	0.19	0.16	0.30	0.29	0.11	0.18
CO_2	0.07					
TOTAL	99.05	98.22	98.92	98.03	99.74	97.41

Sample Descriptions:

1. Basalt flow, north face of Silver Butte (SB-87)
2. Fine-grained, porphyritic dacite flow, diamond drill sample, Silver Butte (SP-4-817-79)
3. Partially flattened, chloritic pumiceous tuff, diamond drill sample, Silver Butte (SP-2-178-79)
4. Foliated, sericitic-chloritic tuff, Lower Umpqua portal cross-cut, Silver Peak mine (273)
5. Massive, fine-grained, porcelaneous tuff, north face of Silver Butte (SB-18)
6. Medium- to fine-grained, basaltic tuff, diamond drill sample, South Fork prospect, southeast of the Silver Butte thrust (SF-14-233)

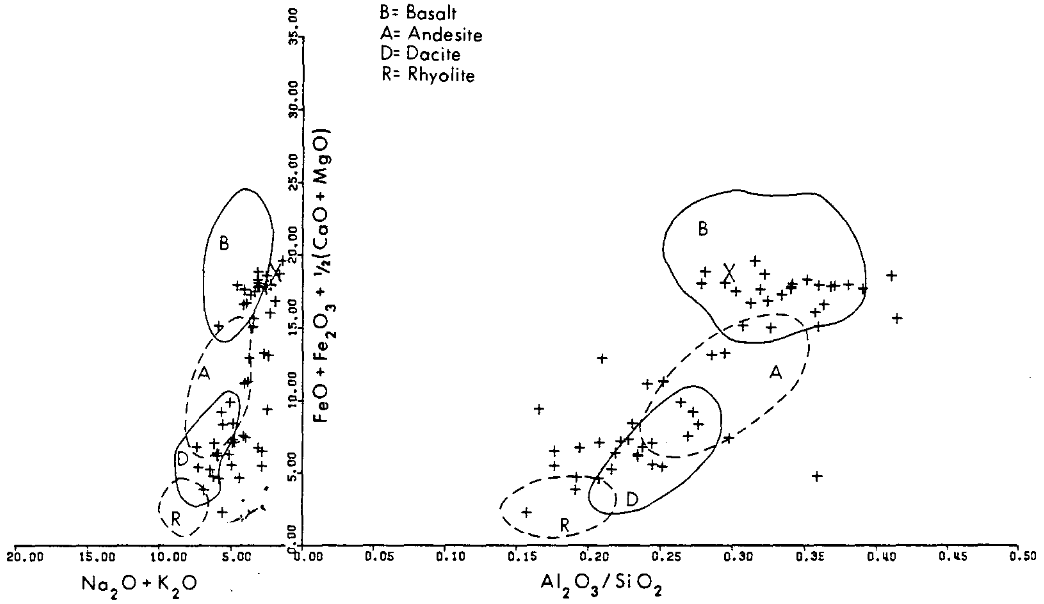


Fig. 4. Triaxial orthogonal plot of whole-rock analyses from the Silver Peak mine area. Fields for basalt, andesite, dacite, and rhyolite were determined by CHURCH (1975).

the dacite which is light gray, light green, or light brown to tan. Whole rock analyses assisted the identification process.

Fifty-eight samples were analyzed from mine workings, drill core, and surface outcrops. Table 1 lists representative chemical analyses for each unit. Triaxial orthogonal plots for weight percent of Na_2O+K_2O versus $FeO+Fe_2O_3 + 1/2(MgO+CaO)$ versus Al_2O_3/SiO_2 (CHURCH, 1975) were used to classify Silver Peak rocks from their chemistry (Fig. 4). The analyses fall into two separate or bimodal populations of basalt and dacite (Fig. 4). All samples with compositions other than basalt or dacite are altered, unrelated intrusive rocks, or tuffs that are mixtures of the two main rock types.

B. Description of Units

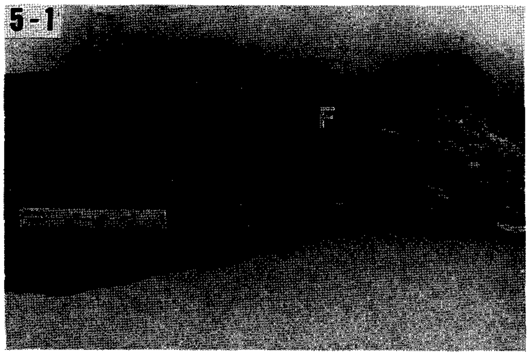
1. *Basalt Flows and Tuffs* (bf)

Basalt flows and tuffs (bf) is the basal unit of upper Jurassic volcanic rocks in contact with the Coast Range thrust at Silver Peak (Fig. 3). A small lens of serpentinite is exposed along the thrust just north of the mine. A basalt flow occurs at the portal to the lowermost adit of the mine. The basalt (analysis 1, Table 1) contains large (up to 2 mm) augite phenocrysts in a groundmass of altered plagioclase. Alteration minerals in the groundmass include albite, chlorite, and epidote. Vesicles occur locally in this and several other basalt flows of the Silver Peak area.

Basaltic tuff in the basalt flows and tuffs (bf) unit is typically medium to light green and is exposed in several roadcuts northeast of the mine.

2. *Dacite Dome and Tuff* (dt)

A dacite dome occurs in crosscuts on the two lowermost levels of the mine. Thickness increases to the southwest of the mine and the overlying foliated tuff (ft) is thinner over this thickened portion of the dome. Dacite in the dome is subaqueously deposited and is autobrecciated forming textures and structures similar to many of the subaqueously emplaced domes of Kuroko deposits of the



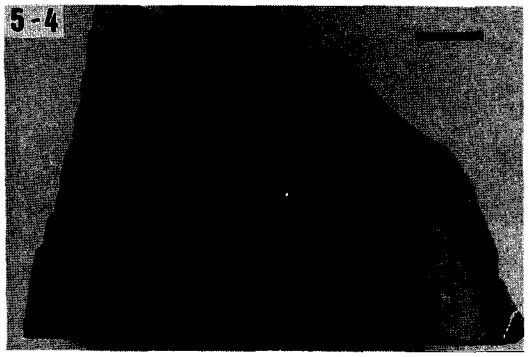


Fig. 5-1. Polished surface of basalt fragment (F) suspended in fine-grained foliated tuff (ft) from the Silver Peak mine. Note well developed foliation in the matrix wraps around the basalt fragment.

Fig. 5-2. Mine exposure showing rip-up clast (arrow points to clast) of massive sulfide. Bar for scale in upper right corner represents 5 cm.

Fig. 5-3. Photograph of thin section in polarized light showing crenulation cleavage in foliated tuff (ft). Bar for scale in lower right corner represents 0.5 cm.

Fig. 5-4. Polished slab showing manganese dendrites penetrating through the rock fabric of bedded tuff (bdt). Bar for scale in upper right corner represents 2 cm.

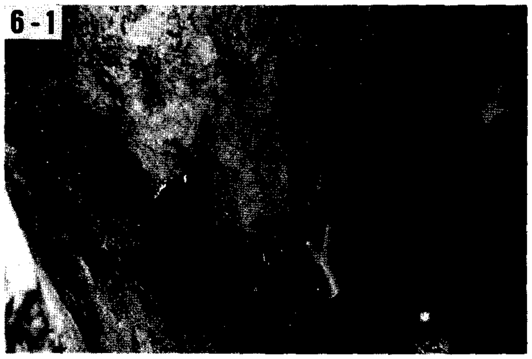
Hokuroku district, Japan.

Dacite (dt, analysis 2, Table 1) from surface exposures is typically light gray to tan. Mine and drill core samples are typically pale green to light gray. The rock consists of approximately 5 percent partially altered plagioclase phenocrysts in a groundmass of fine-grained, submicroscopic quartz, epidote, chlorite, and possibly albite. Numerous clots and veinlets of secondary quartz occur in dacite at the mine. Sparse disseminated pyrite occurs in one of the dacite exposures north of the mine, but it is not related to mineralization at the mine. Basalt is interbedded with dacite in the immediate vicinity of the Silver Peak mine and at several places north of the mine (Fig. 3).

3. *Foliated Tuff* (ft)

Foliated tuff (ft) consists of numerous subaqueously deposited, ash-flow tuff beds and related tuff breccia. The unit hosts massive sulfide mineralization at the Silver Peak mine. Lithologically, foliated tuff (ft) is a heterogeneous mixture of block- to lapilli-size volcanic rock fragments and sparse feldspar crystals in a medium- to fine-grained tuffaceous matrix. X-ray diffraction analysis of the

6-1



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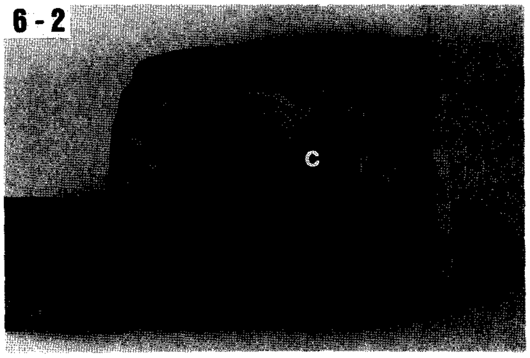

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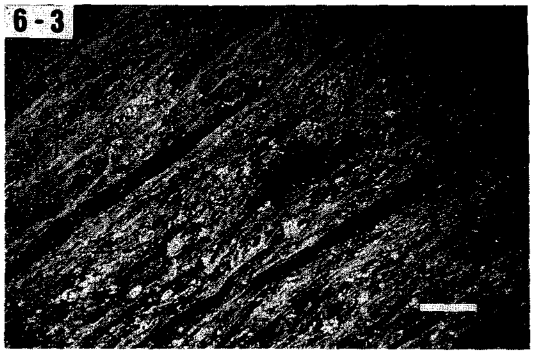


6-4

Fig. 6-1. Large basalt block (bb) in foliated tuff (ft) of the Silver Peak mine (person has his hand on the block). Note lens shape of block.

Fig. 6-2. Cut and polished surface showing chlorite (C), epidote (E), and quartz (Q) alteration that typically occurs along the margin of basalt blocks (bb) in foliated tuff (ft).

Fig. 6-3. Thin section of foliated tuff (ft) under plane polarized light showing stretched and flattened pumice (dark colored) suggestive of welding. Bar for scale in lower right corner (in white) represents 2 cm.

Fig. 6-4. Polished slab of quartz-sericite-pyrite foliated tuff (qft) from the Silver Peak mine photographed with polarized light. Dark wavy foliation bands are predominantly sericite with some pyrite. Arrow points to pumice fragment. Bar for scale in lower right corner represents 3 cm.

tuff matrix indicates it consists largely of chlorite, albite, quartz, and epidote. Weakly altered tuff matrix of foliated tuff (ft) in the Silver Peak mine retains its light green to purple color, but mineralogically it sometimes contains a high portion of sericite. Sericite, quartz, and pyrite predominate in intensely altered portions of the tuff, especially in close proximity to mineralization. Analyses of the unit reflect increased silica content due to hydrothermal alteration (analyses 3 and 4, Table 1). Foliated tuff (ft) differs from the underlying dacite unit by the presence of intense foliation, presence of both basalt and dacite fragments, presence of pumice, and varicolored green and maroon bands. The foliated tuff thins over the top of the dacite dome and thickens on the flanks of the dome.

A distinct feature of foliated tuff (ft) is a foliation parallel to bedding that resembles eutaxitic texture, perhaps emphasized by compaction and alteration. The foliation wraps around accidental rock fragments (Fig. 5-1); although, where accidental fragments predominate, the tuff generally is not foliated. Accidental fragments, which are present in almost all parts of the unit, consist of clasts of basalt (Fig. 5-1), dacite, and massive sulfide (Fig. 5-2). The fragments occur suspended (matrix supported) in the fine-grained tuff.

An irregular foliation also occurs in some areas of foliated tuff (ft). This foliation or cleavage (Fig. 5-3) is called crenulation cleavage. The crenulations occur only in fragments in some areas. This crenulation cleavage developed in the ash-flow tuff that was deposited on the flanks of the dacite dome. Crenulations in fragments represent pieces that broke loose and rolled down the flanks of the dome.

4. *Bedded Tuff* (bdt)

Three types of pale gray to light green and light brown bedded tuff overly and intertongue with foliated tuff (ft). The three types include (1) thin-bedded tuff consisting of repeated 1- to 3-cm-thick beds of silt to fine sand-sized material, (2) massive-bedded tuff consisting of silt to fine sand-sized material, and (3) tuffaceous sandstone consisting of 1- to 5- meter thick bedded, medium- to coarse-grained epiclastic material that occurs as interbeds in the thin-bedded tuff. Most occurrences of bedded tuff (bdt) are soft, weakly indurated, but portions are well indurated and porcelaneous. Normal grading and clastic dikes in the thin-bedded tuff indicate the unit is upright.

Bedded tuff immediately above the mine is soft and weakly indurated. Porcelaneous tuff, a dense, indurated equivalent of soft bedded tuff (JOHNSON and PAGE, 1979), is prevalent in outcrops immediately northeast of the mine. Porcelaneous tuff grades laterally into the soft bedded tuff. Irregular cone shaped pods of porcelaneous tuff in the soft tuff suggest induration is a secondary, perhaps diagenetic phenomena.

Manganese dendrites (Fig. 5-4) penetrate through the fabric of portions of the porcelaneous tuff. The porcelaneous tuff also contains a trace to 2 percent finely disseminated pyrite. Locally, dendrites extend in a single direction from a bedding plane surface (Fig. 5-4). Porcelaneous tuff with manganese dendrites and fine-grained pyrite probably formed during continued hydrothermal activity following deposition of the bedded tuff (bdt). Chemical composition of porcelaneous tuff (sample 5, Table 1) without any visible manganese dendrites or disseminated pyrite, is similar in composition to the dacite (dt, sample 2, Table 1).

5. *Basaltic Tuff* (bt)

Basaltic tuff overlies bedded tuff and also crops out southeast of the Silver Butte thrust fault (Fig. 3). A unique lithology in parts of this unit is characterized by distinct milky white, saussuritized plagioclase crystals up to 1 cm long in a light to medium green matrix. Exposures of the basaltic tuff are extensively fractured, especially in close proximity to the Silver Butte thrust (Fig. 3).

6. *Basaltic Blocks* (bb)

Numerous basalt blcks (bb, Fig. 6-1) occur as accidental fragments (slump blocks) in daeite tuff on the flanks of the dacite dome and in foliated tuff (ft). A large block exposed in the mine is lens shaped with smooth, striated surface suggesting it slid into its current position (Fig. 6-1). Deposition of the basalt blocks (bb) occurred during or just after a tectonic event (rifting or caldera formation?) and following emplacement of the dacite dome. Accidental basalt blocks (bb) continued to slump into the basin during deposition of dacite tuff and foliated tuff (ft). Large basalt blocks (bb) that crop out on the surface at the contact between dacite dome and tuff (dt) unit and foliated tuff (ft) are extensively fractured and are believed to represent the period of most intense tectonic activity.

Basaltic blocks (bb) emplaced in dacite tuff (dt) show little to no alteration at their margins. Basaltic blocks in foliated tuff (ft) have 5- to 20-cm thick alterd margins consisting of quartz, chlorite, and epidote (Fig. 6-2). It is suggested that the foliated tuff (ft) was hot at the time the basalt blocks were emplaced and that the margins were altered to the quartz, chlorite and epidote suite of minerals.

C. Thickness of Units

Thicknesses of individual units are calculated assuming a regional dip of 50 degrees to the southeast. Thickness of the basalt flows and tuff (bf) above the Coast Range thrust ranges up to 600 meters. Maximum thickness of the dacite dome and tuff (dt) unit in the mine is about 60 meters, but greater thicknesses are indicated from drilling and from exposures southwest of Silver Peak. Foliated tuff (ft) reaches a maximum of 60 meters thick in the mine; however, southeast of the Silver Butte thrust (Fig. 3) and the Silver Peak mine the thickness of foliated tuff (ft) increases tremendously. If thrust faulting did not modify the thickness of this unit in the area, then the margins of the depositional basin for the foliated tuff (ft) appear to be northeast and updip (eroded) from the Silver Peak mine. At least 300 meters of bedded tuff (bdt) overlies the foliated tuff at Silver Peak. The top of the basaltic tuff (bt) unit was not located, but it is the thickest unit of the Silver Peak sequence.

D. Alteration and Metamorphism

Post-depositional alteration and metamorphism of rocks from the Silver Peak area, other than hydrothermal alteration that produced the Silver Peak deposit, include sea water metasomatism and lower greenschist facies metamorphism. Pyroxene phenocrysts (augite) within the Jurassic volcanic rocks are relatively fresh and show abundant twin lamellae, zoning, and well preserved euhedral shapes. Plagioclase phenocrysts are albitized (many are saussuritized) and contain inclusions of epidote-group minerals, chlorite, and clays. Chlorite, epidote, and clinozoisite are abundantly developed in the groundmass. Secondary calcite and quartz is common and original glass is completely devitrified (JOHNSON and PAGE, 1979).

Modification of whole rock chemistry of some rocks at Silver Peak due to sea water metasomatism, alteration, and metamorphism is apparent from the chemical classification diagram (Fig. 4). All unaltered to weakly altered volcanic rocks at Silver Peak plot in or near the basalt or dacite fields (Fig. 4). The one element showing significant variation is manganese, which is evident from a plot of MnO versus SiO_2 (Fig. 7). Anomalously high manganese is found in samples of accidental basaltic blocks in the foliated tuff (ft) sequence, especially where the enclosing rocks are hydrothermally altered.

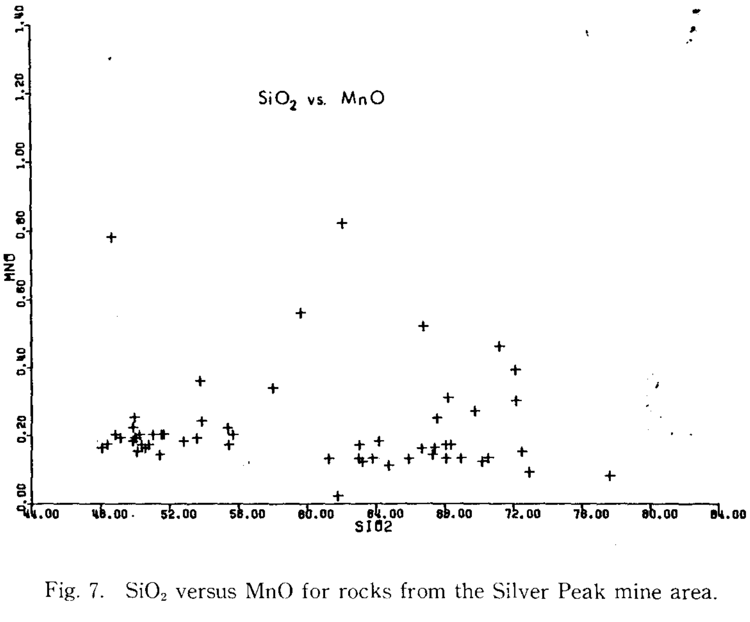
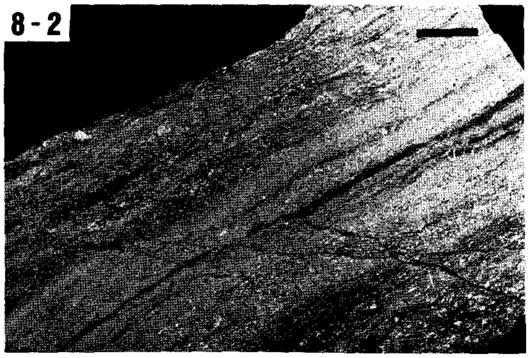


Fig. 7. SiO_2 versus MnO for rocks from the Silver Peak mine area.

8-1

8-2



8-3

8-4

Fig. 8-1. Polished slabs from drill core comparing flattened pumice fragments in foliated tuff (ft) from the Silver Peak mine. Matrix and wispy pumice fragments in the sample labeled 2-174 on the left are less compacted than the matrix and pumice fragments in the sample labeled 2-178 on the right. Sample 2-178 is from approximately 0.5 m stratigraphically below sample 2-174. Bar for scale in lower right corner represents 1 cm.

Fig. 8-2. Thin section from drill core, polarized light, showing well-developed lineation in well-indurated and compacted foliated tuff (ft) from the lower portion of a subaqueously deposited and welded(?) pyroclastic flow. Bar for scale in upper right corner represents 2 cm.

Fig. 8-3. Thin section from drill core, plane polarized light, showing flattened and elongate pumice fragments (dark) in foliated tuff (ft). Section is cut normal to bedding and to thin section of figure 8-4. Bar for scale in upper right corner represents 2 cm.

Fig. 8-4. Thin section from drill core, plane polarized light, showing flattened but not elongate pumice fragments (dark) in foliated tuff (ft). Section is cut normal to bedding and to thin section of figure 8-3. Bar for scale in upper right corner represents 2 cm.

Jurassic volcanic rocks of the Silver Peak area are chemically similar to calc-alkaline rock suites (JOHNSON, 1980). Rare-earth patterns are inconsistent in the sequence. Rocks of similar major element chemistry and lithology show divergent rare-earth patterns, and conversely, rocks of diverse chemistry and lithology show similar rare-earth patterns. Alteration related to sea water metasomatism, hydrothermal alteration, and metamorphism has apparently modified rare-earth element patterns.

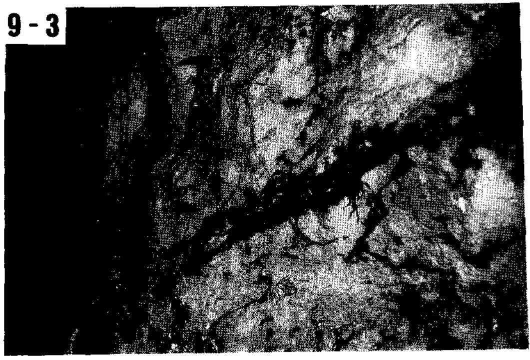
E. Structure of the Mine Area

Jurassic rocks of the Silver Peak mine area strike parallel to the northeast-trending Coast Range

9-1

9-2

9-3



9-4

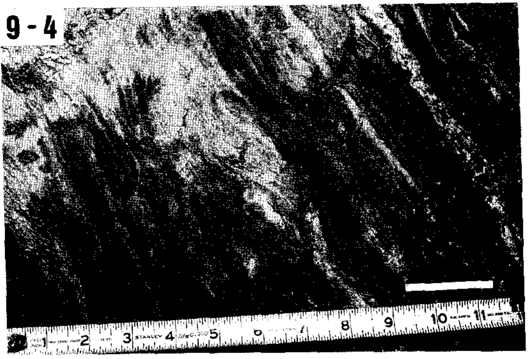


Fig. 9-1. Polished surface of drill core showing fragment (arrow) of yellow ore in sulfide-lapilli tuff (slt).

Fig. 9-2. Polished slab of siliceous ore (silicified foliated tuff, sft) showing disseminated pyrite, chalcopyrite, and bornite (light gray) in siliceous matrix (dark gray).

Fig. 9-3. Underground exposure at the Silver Peak mine with vein of pyrite (dark colored) in siliceous ore. Geologist pick for scale.

Fig. 9-4. Underground exposure of yellow ore at the Silver Peak mine. Granular pyrite (dark) and granular quartz (light). Bar for scale in lower right corner represents 5 cm.

and Silver Butte faults. Bedding planes dip about 50° southeast, but vary locally from 25° southeast to 70 northwest. Rapid facies changes and a lack of distinct marker horizons make identification of structures difficult at Silver Peak. Other than the northeast-trending Coast Range and Silver Butte thrusts, the only identified faults are northeast-trending faults (Fig. 3) that offset the mineralization zone.

III. WELDING AND FOLIATION IN FOLIATED TUFF

Foliated tuff (ft) at Silwer Peak is subaqueously-deposited, ash-flow tuff. Several examples of compacted pumice fragments were found on cut surfaces of foliated tuff (ft) from the mine (Figs. 6-3 and 6-4). Whether the pumice fragments were plastic and compacted-welded in a hot state or simply compacted due to burial could not be determined. Welding, if it occurred in the foliated tuff (ft) at Silver Peak, would mean presence of considerable internal heat when it was deposited. This is important in terms of potential for alteration following subaqueous deposition because both heat and water would be available. All basalt blocks (bb) that occur in foliated tuff (ft), as noted earlier, have altered margins, while basalt blocks occurring in dacite tuff with no obvious welding do not have altered margins.

Two pyroclastic flows, each about 2 meters thick, intercepted by diamond drilling in the hanging wall of foliated tuff (ft) unit are cited as examples of compacted and possibly welded foliated tuff (ft). The matrix is not as dense and wispy pumice fragments are not as compacted (Fig. 8-1, labeled 2-174 on the left) near the apparent top of one of the flows. Matrix and pumice fragments 0.5 meters lower in the flow (Fig. 8-1, labeled 2-178 on the right) are denser and more compacted. The lower part of the second pyroclastic flow (Fig. 8-2) resembles a welded tuff with eutaxitic texture. The features of these two pyroclastic flows correspond to the well-compacted base to poorly compacted top of the subaqueously deposited and welded flow described by FERNANDEZ (1969, as cited by FISHER, 1977).

Two thin sections cut at right angles to both bedding and to each other were made from drill core in order to compare the nature of compaction of pumice in three dimensions. Compaction and stretching of the fragments is greater in one direction (compare Figs. 8-3 and 8-4). This is believed to be due to deposition on a slope which resulted in a preferential direction of elongation during compaction. Alternatively, the pumice fragments may be aligned parallel to the flow direction of the ash-flow tuff.

Foliation within the foliated tuff (ft) varies from weak to intense. The foliation is possibly eutaxitic texture that was modified following deposition and compaction of the tuff. Internal heat, including possible welding, may also be an important process in development of the foliation. The foliation is more preminent where the lithic fragments content is low. Both weakly altered foliated tuff (ft) and foliated tuff (ft) altered to quartz-sericite-pyrite foliated tuff (qft) have locally well developed foliation (Figs. 5-1 and 6-4) indicating that development of the foliation is not dependent on the intensity of hydrothermal processes. Pronounced internal lineation noted by FERNANDEZ (1969, as cited by FISHER, 1977) may be comparable to the foliation at Silver Peak.

Glass shards were not identified in the ash-flow tuff at Silver Peak, and presumably, were destroyed during alteration and metamorphism. X-ray diffraction analysis indicates the fine-grained matrix in samples of densely compacted, foliated tuff (ft) is made up of chlorite, quartz, albite, and epidote while less compacted samples contain a more complex suite of minerals including montmorillonite and other clay and zeolite mineral species.

IV. GEOLOGY OF THE SILVER PEAK MINE

The stratigraphic sequence exposed in the Silver Peak mine from base to top is as follows: a basalt flow of the basaltic flows and tuffs (bf) unit; dacite and dacite tuff of the dacite dome and dacite tuff (dt) unit; and a complex sequence, including mineralization, of the foliated tuff (ft) unit. Bedded tuff (bdt) is not exposed in the mine but immediately overlies foliated tuff (ft) as indicated by diamond drilling. Table 2 lists the various units of the mine and their subdivisions as used in this paper. Maximum thickness of foliated tuff (ft) occurs on the flanks of the dome and is exposed on the lowermost level of the mine.

The mineralized sequence is divided into the following interbeds: (1) quartz-sericite-pyrite foliated tuff (qft), (2) silicified foliated tuff (sft), (3) massive sulfide (ms), and (4) sulfide-lapilli tuff (slt). This stratigraphic succession (Table 2) is similar to that of the Kuroko deposits of Japan (MATSUKUMA and HORIKOSHI, 1970). Relative position of the various interbeds in foliated tuff (ft) of the mine are schematically illustrated in Fig. 10.

Four lenses or interbeds of massive sulfide are exposed in the two main levels of the mine (Fig. 10). The two largest masses generally do not exceed 3 meters maximum thickness (an exception is 5 meters in one location) and a strike length of about 100 meters. Dimensions along the dip are

Table 2. Terminology used in this paper for the stratigraphy and subdivisions of stratigraphy at the Silver Peak mine.

UNITS	INTERBEDS	BEDS OR ZONES
Basaltic Tuff (bt)	Sulfide Lapilli Tuff (slt)	Barite Ore
Bedded Tuff (bdt)		Black Ore
Foliated Tuff (ft)	Massive Sulfide (ms)	Yellow Ore
Dacite Dome and Tuff (dt)	Silicified Foliated Tuff (sft)	Friable Yellow Ore
Basalt Flows and Tuffs (bf)	Quartz-Sericite-Pyrite Foliated Tuff (qft)	

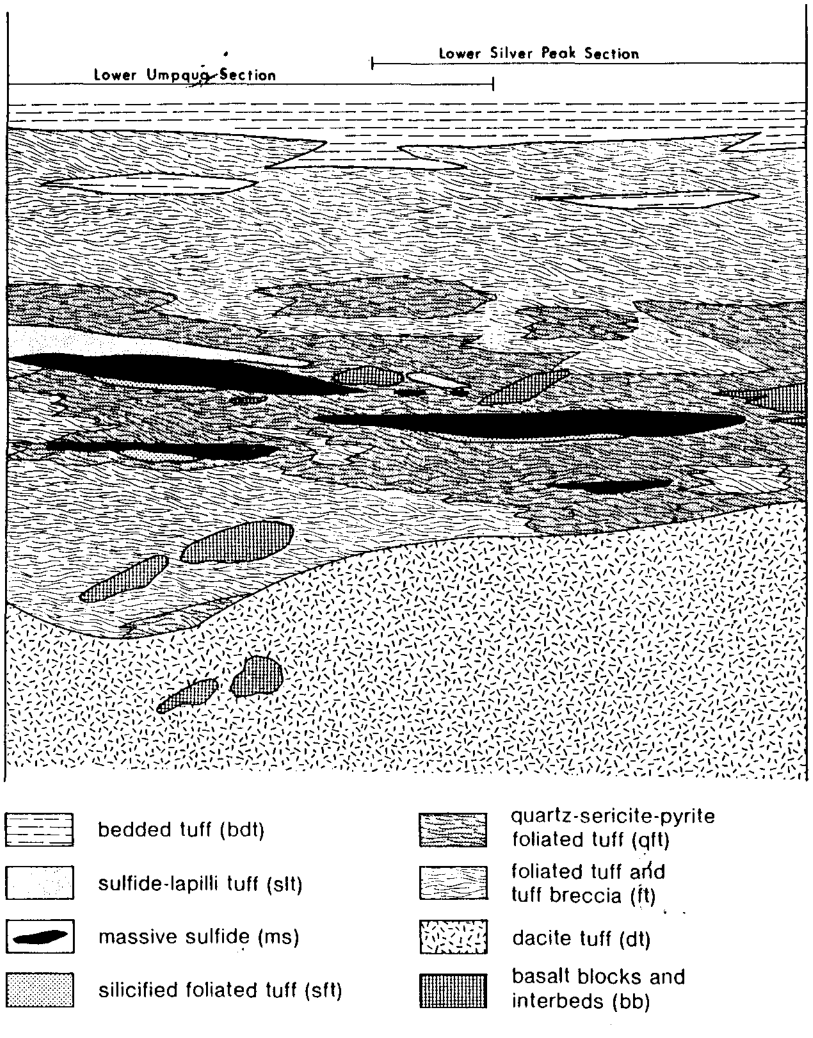


Fig. 10. Schematic, longitudinal cross section through the Silver Peak mine showing relationships between the various interbeds.

difficult to determine, but from the extent of mining it is estimated at about 30 meters. The succession or zoning described here is of the interbed from the lowermost level of the mine supplemented by observations from other levels.

A. Quartz-Sericite-Pyrite Foliated Tuff (qft)

Quartz-sericite-pyrite foliated tuff (qft, Fig. 6-4) is white to cream colored, intensely altered and bleached, and consists of varying amounts of platy sericite grains up to 2 mm in diameter and sand-size grains of pyrite and quartz. It is the most extensive interbed of the mineralized sequence. Approximately 40 meters of weakly altered foliated tuff (ft) underlies quartz-sericite-pyrite foliated tuff (qft) on the lowermost level of the mine. The foliated tuff (ft) does not occur on the next major level 20 meters higher in elevation and 90 meters away. Quartz-sericite-pyrite foliated tuff (qft) is in direct contact with dacite. Quartz-sericite-pyrite foliated tuff (qft) is approximately 10 meters thick on the lowest mine level, but the thickness is quite variable in the mine. The sharp contact between quartz-sericite-pyrite foliated tuff (qft) and underlying foliated tuff (ft) resembles a fault, but it is a depositional contact. Quartz-sericite-pyrite foliated tuff (qft) is overlain by silicified foliated tuff (sft).

Fragments on slabbed surfaces of quartz-sericite-pyrite foliated tuff (qft) include flattened pumice fragments (Fig. 6-4), pieces of massive sulfide (Figs. 5-2 and 9-1), volcanic rock fragments (Fig. 5-1), and pieces of forruginous quartz. A 20-cm diameter clast of pyrite on one level of the mine appears to be a rolled-up aggregate of pyrite grains. Numerous unidentifiable fragments probably are also pumice. Vesicles are no longer identifiable because of compaction (welding?) and alteration related to mineralization.

B. Silicified Foliated Tuff (sft)

The siliceous ore zone (Keiko zone) at Silver Peak is silicified and mineralized quartz-sericite-pyrite foliated tuff (qft). Lenses of siliceous ore occur in various parts of hanging wall and footwall quartz-sericite-pyrite foliated tuff (qft), but it is best developed immediately beneath the central portions of the two largest massive sulfide bodies. Siliceous ore consists of disseminations and small veinlets of pyrite, chalcopyrite, bornite, and sphalerite and discontinuous veins (Fig. 9-2) and pods of predominantly pyrite (Fig. 9-3). Thickness of siliceous ore, where it underlies massive sulfide, varies between 1- and 5-meters and extends for about 45 meters along the drift which is about one-half of the exposed strike length of the massive sulfide. Contacts between siliceous ore and quartz-sericite-pyrite foliated tuff (qft) are diffuse and irregular.

There are no major veins suggestive of a feeder zone at Silver Peak; however, siliceous ore may represent the peripheral parts of a feeder system. Disrupted and discontinuous bedding and unusual thicknesses of the massive sulfide suggest the exposed massive sulfide slumped from its original deposition site and is displaced from its feeder vent area. Distance from the feeder system is unknown, but is believed to be relatively small.

C. Massive Sulfide (ms)

The Silver Peak mine workings expose at least 4 different massive sulfide interbeds which consist of predominantly silica-cemented pyrite and lesser amounts of copper, zinc, and silver and minor lead and gold. The zoning sequence at Silver Peak, within a typical massive sulfide interbed, from the base upwards is: (1) friable yellow ore, (2) yellow ore, (3) black ore and (4) barite ore. Numerous exceptions to this zoning sequence exist and include massive barite underlying yellow ore. The two largest interbeds of massive sulfide also are laterally zoned with yellow ore more abundant to the southwest and black ore and barite more abundant to the northeast. Maximum exposed thickness of massive sulfide in the mine is 5 meters. Where mining has removed the massive sulfide, thicknesses ranged from 1.5 to 3 meters.

1. *Friable Yellow Ore*

Friable yellow ore is a loosely bound aggregate of subrounded, sand-size pyrite grains. Friable yellow ore most often occurs as a separate bed, but in some cases, it occurs at the base of a massive sulfide bed. Friable yellow ore grades upward or laterally into dense yellow ore and siliceous ore. Loosely bound, sand-size pyrite grains in quartz-sericite-pyrite foliated tuff (qft) form friable yellow ore when quartz and sericite are distinctly subordinate to pyrite. Many pyrite rip-up clasts (Fig. 5-2) in quartz-sericite-pyrite foliated tuff (qft) are friable yellow ore. Copper and zinc sulfides are present only in trace amounts in friable yellow ore.

Bands or beds of granular pyrite alternate with bands or beds of granular quartz (Fig. 9-4). These are interpreted as transitional between quartz-sericite-pyrite foliated tuff (qft) and massive sulfide (ms). The banding in some areas consists of repeated groups of alternating sharp quartz-pyrite contacts and diffuse pyrite-quartz contacts. This is similar to a group of graded beds at the Matsumine deposit as illustrated by ITO *et al.* (1974, p. 125).

2. *Yellow ore*

Yellow ore (Oko zone) is also made up of subrounded, sand-size pyrite grains. Compared to friable yellow ore, yellow ore is dense or well-indurated. Chalcopyrite frequently occurs in irregularly distributed clots within the yellow ore (Fig. 11-1), especially in the central to upper portions of the yellow ore zone. These clots usually occur in rip-up clasts which slid or rolled down the slope into the massive sulfide interbed, in channel structures and in areas of disturbed bedding (Fig. 11-2). Clasts (Fig. 11-1) deformed the underlying pyritic layers when they were deposited. Other clasts in yellow ore include quartz, lithic fragments, and barite-massive sulfide.

3. *Black Ore*

Two types of black ore (Kuroko zone) occur at Silver Peak. The first type consists of subrounded pyrite grains surrounded by bornite, tennantite, sphalerite, and only minor amounts of chalcopyrite (Fig. 11-3). The second type is made up largely of barite, sphalerite, and quartz, and small amounts of pyrite, bornite, and tennantite (Fig. 11-4).

The most pronounced syndepositional deformation features within massive sulfide occur in the black ore zone. Matrix-supported clasts of massive barite (Fig. 12-1) and folded and contorted beds (Fig. 12-2) are common.

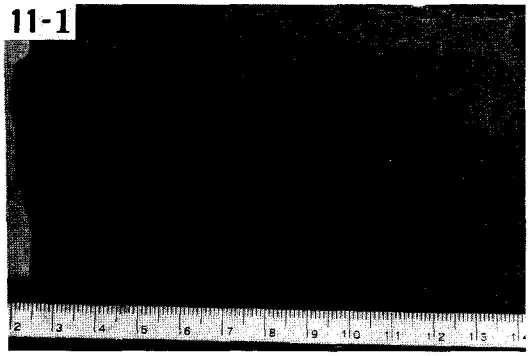
4. *Barite Ore*

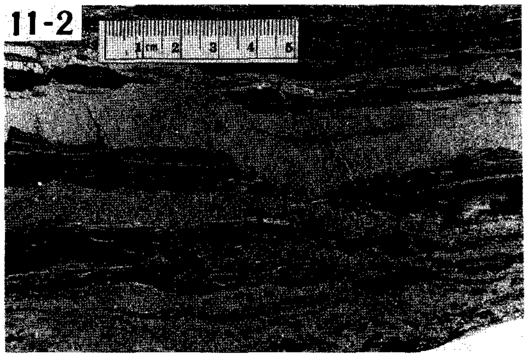
Barite in massive white barite interbeds at Silver Peak consists of interlocking, sand-size grains. The barite interbeds are in contact with massive sulfide in only two places in the mine. It underlies yellow ore in one of the main massive sulfide interbeds and overlies black ore on the other main drift. Where it overlies black ore, it is 0.3 meters thick and has a strike length of approximately 15 meters.

Lenses and fragments of massive barite occur in massive sulfide (Figs. 12-1, 12-2, and 12-3) and in quartz-sericite-pyrite foliated tuff (qft, Fig. 12-4). Maximum length of the barite lenses is only 1.5 meters. It appears that massive barite was deposited either continuously or at repeated intervals during deposition of massive sulfide at Silver Peak.

D. Sulfide-Lapilli Tuff (slt)

The ferruginous chert zone at Silver Peak is represented by sulfide-lapilli tuff (slt, Fig. 10), a white to cream colored tuff containing scattered, lapilli-size ferruginous chert fragments (Fig. 13-1). Sulfide-lapilli tuff (slt) forms the hanging wall rocks to the massive sulfide interbed on the northeast end of both of the main drifts. Sulfide grains and sulfide lapilli (up to 10 percent) occur in a fine-grained, will-indurated tuff matrix. Ferruginous chert (quartz) fragments make up less than 1 percent of the rock volume and were observed only in slabbed samples of sulfide-lapilli tuff. Ferruginous chert (quartz) fragments (Fig. 13-2) consist of an aggregate of submicroscopic quartz





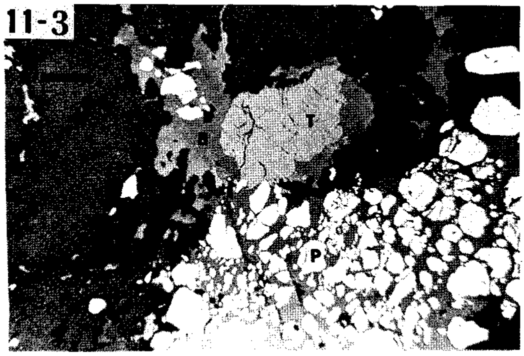


Fig. 11-1. Polished slab of massive yellow ore from the Silver Peak mine. Quartz (dark), pyrite, and chalcopyrite clast in left portion of figure was deposited in unconsolidated pyrite indicated by the downwarped bedding planes in the pyrite beneath the fragment. Scale at bottom of figure is in centimeters.

Fig. 11-2. Polished slab of banded yellow ore from the Silver Peak mine. Light gray bands (P) are pyrite, medium to dark gray bands (Q) are quartz, and varicolored bands (I) are interbedded pyrite and quartz.

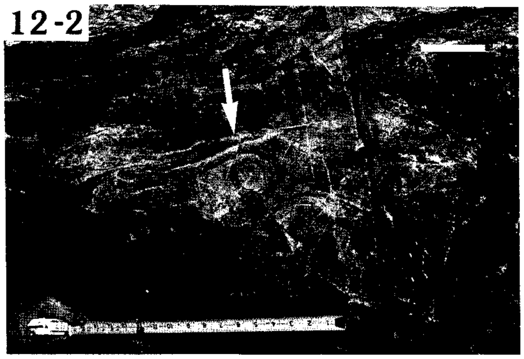
Fig. 11-3. Photograph of polished thin section from the Silver Peak mine using both reflected and transmitted light. Black ore consisting of pyrite grains (P, white) surrounded by sphalerite (S), bornite (B), and tennantite (T). Bar for scale in upper left corner reprsents 0.4 mm.

Fig. 11-4. Photograph of polished thin section from the Silver Peak mine using both reflected and transmitted light. Black ore consisting of twinned barite (light gray) and sphalerite (dark gray). Bar for scale in upper left corner represents 1.0 mm.

grains containing a very fine, evenly distributed dusting of hematitic material. Sulfide lapilli consist of rounded to subrounded grains or grain aggregates of pyrite, chalcopyrite, tennantite, and sphalerite. Some of the lapilli-size sulfide fragments are cubes of pyrite (Fig. 13-2) which probably formed following deposition of the bed. Other sulfide grains occur within lens-shaped aggregates of quartz (Fig. 13-2). The lenses shaped aggregates of quartz probably are compacted pumice fragments, and the associated sulfide grains probably formed following deposition of the tuff. The fine tuff matrix wraps around the sulfide lapilli and ferruginous chert (quartz) fragments (Fig. 13-2). A large sulfide fragment (Fig. 9-1) and ferruginous chert fragments are the only larger than lapilli-sized fragments found in the interbed.

12-1

12-2



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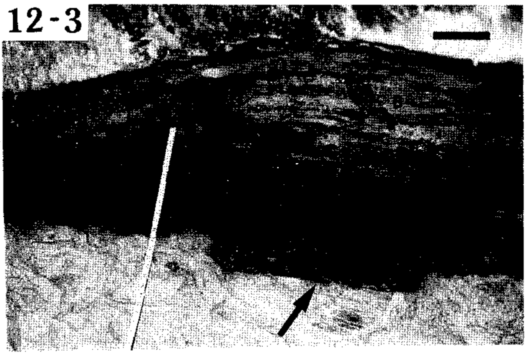

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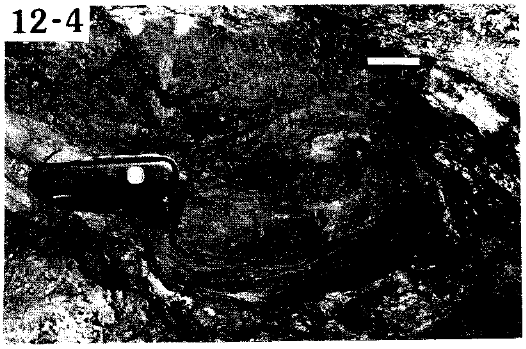


Fig. 12-1. Barite fragments (arrwos) suspended in massive black ore of a 1 meter thick bed of massive sulfide from the Silver Peak mine. Bar for scale in upper right corner represents 5 cm.

Fig. 12-2. Contorted barite bed (arrow) in bedded black ore (dark color) from the Silver Peak mine. Bar for scale (white) in upper right corner represents 10 cm.

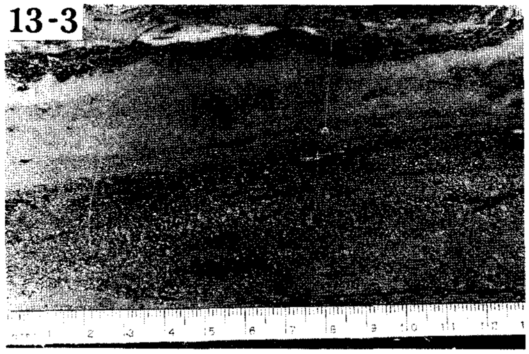
Fig. 12-3. Underground exposure of lenses of barite (B) in massive black ore from the Silver Peak mine. Light colored rocks of hanging and footwall are quartz-sericite-pyrite foliated tuff (qft). Irregularity in massive sulfide-footwall contact (arrow) is interpreted as a load cast. Bar for scale in upper right corner represents 15 cm.

Fig. 12-4. Folded lens of massive barite in quartz-sericite-pyrite foliated tuff (qft) from the Silver Peak mine. Bar for scale (in white) in upper right corner represents 3 cm.

Bedding in sulfide-lapilli tuff (slt) is distinct on slabbed surfaces (Fig. 13-1). The interbed possesses bedding but not a foliation similar to fpliated tuff (ft) and quartz-sericite-pyrite foliated tuff (qft) interbeds (compare Figs. 6-4 and 13-1). In the mine, the lowermost 0.2 to 0.5 meters of sulfide-lapilli tuff in contact with massive sulfide is bleached light to medium gray. The sulfide-rich, light to medium gray portions of this interbed (slt) grade upward into dark brown lapilli tuff containing lithic lapilli and only sparse sulfide lapilli. Drill core from the hanging wall sequence indicates there are additional interbeds of sulfide-lapilli tuff which are not exposed in the mine.

E. Hydrothermal Alteration

Extent of hydrothermal alteration related to Kuroko-type mineralization is unknown because of possible sea water metasomatism and regional low-grade, greenschist facies metamorphism. Chlorite, epidote, and albite could be produced during any of these events. Because of the fine



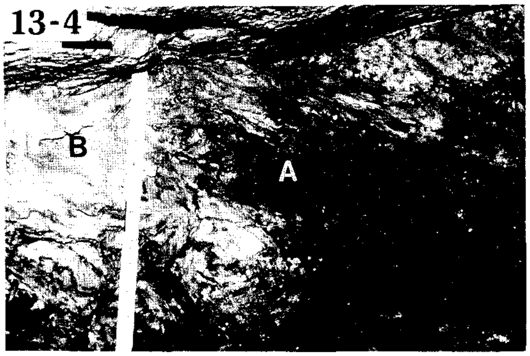


Fig. 13-1. Polished slab showing ferruginous chert fragment (arrow) in sulfide-lapilli tuff (slt) from the Silver Peak mine. Bright grains are pyrite and chalcopyrite. Note also the color grading of apparent individual beds from medium gray at the base to light gray at the top. Bar for scale in lower right corner represents 2 cm.

Fig. 13-2. Polished thin section of sulfide-lapilli tuff (slt) under polarized, transmitted light from the Silver Peak mine. Pyrite (P) and ferruginous chert (H) in a light gray matrix of quartz and minor amounts of sericite. Bar for scale in lower right corner represents 2 mm.

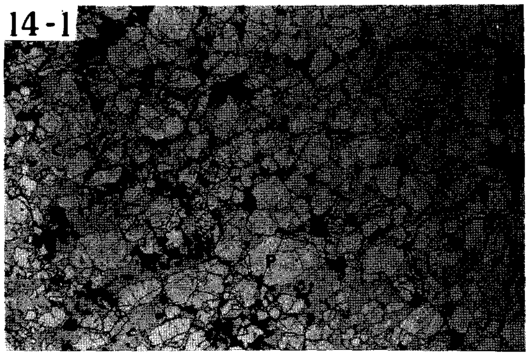
Fig. 18-3. Graded bedding in pyrite from a polished slab of yellow ore of the Silver Peak mine.

Fig. 13-4. Flame structure consisting of sulfide (dark colored area labeled A) from the underlying massive sulfide (ms) projecting upward into overlying quartz-sericite-pyrite foliated tuff (qft, the light colored area labeled B) of the Silver Peak mine. Bar for scale in upper left corner represents 5 cm.

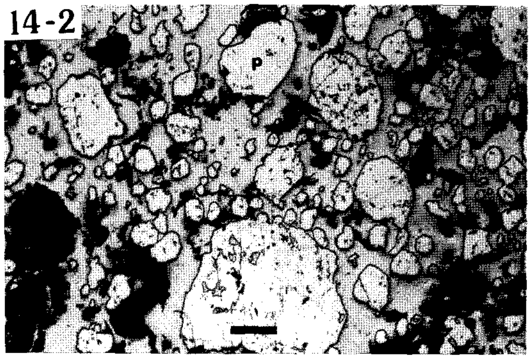
grained nature of the alteration minerals, it was impossible to determine which event produced them. Quartz, sericite, and pyrite in quartz-sericite-pyrite foliated tuff (qft) represents alteration related to the massive sulfide mineralization. Silicified foliated tuff (sft) which also contains discontinuous veins and veinlets and disseminated sulfides, is silicified and mineralized foliated tuff (ft).

Originally the quartz-sericite-pyrite foliated tuff (qft) was interpreted as foliated tuff (ft) that was altered during epigenetic mineralization associated with deposition of the massive sulfide. Examination of numerous samples, contact relations, and other features suggests that the alteration to produce quartz-sericite-pyrite foliated tuff (qft) was a combination of: (1) alteration of the tuffs before emplacement, (2) alteration by residual heat following emplacement, and (3) alteration of already emplaced tuffs associated with sea-floor sulfide venting.

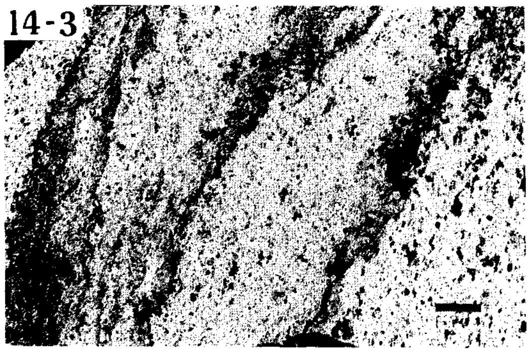
14-1



14-2



14-3



14-4

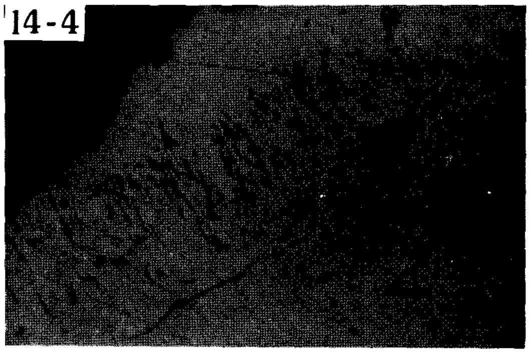


Fig. 14-1. Polished section of massive sulfide from the flame structure shown in Figure 13-4. Pyrite grains (P) are fractured and surrounded by chalcopyrite (C) and minor sphalerite (S). Black is quartz. Bar for scale in upper right corner represents 0.4 mm.

Fig. 14-2. Reflected light photograph, polished thin section of yellow ore from the Silver Peak mine showing pyrite grains (P) containing numerous blebs of chalcopyrite and bornite. Medium gray material surrounding pyrite grains is chalcopyrite. Bar for scale at lower center represents 0.2 mm.

Fig. 14-3. Transmitted light photograph of polished thin section of quartz-sericite-pyrite foliated tuff (qft) showing thin bands and scattered grains of pyrite, chalcopyrite, sphalerite, and tennantite (all black) in a quartz-sericite matrix. Bar for scale in lower right corner represents 1.0 cm.

Fig. 14-4. Reflected light photograph, polished thin section of yellow ore from the Silver Peak mine showing small blebs of chalcopyrite, bornite, tennantite, and sphalerite aligned perpendicular to the margin of a large pyrite grain. Bar for scale in lower right corner represents 0.1 mm.

V. SEDIMENTARY STRUCTURES

Sedimentary structures at Silver Peak include graded bedding, flame structures, channel and scour structures, load structures, and clastic dikes. Syndepositional features include soft sediment deformation, disturbed and disrupted bedding, floating (matrix supported) clasts, rip-up clasts, and poorly sorted volcaniclastic debris. These features developed during deposition and early diagenesis of the massive sulfide (ms) and quartz-sericite-pyrite foliated tuff (qft) interbeds. Similar features were noted at Texasgulf's Kidd Creek massive sulfide deposit in Canada (WALKER *et al.*, 1975, p. 87) where sulfide sediments are considered both clatic and chemical in origin.

These structures and features occur in the massive sulfide beds as well as at the footwall and hanging wall contacts between massive sulfide and quartz-sericite-pyrite foliated tuff (qft), in foliated tuff (ft), and in the bedded tuff overlying quartz-sericite-pyrite foliated tuff (qft): they indicate subaqueous deposition of all units at Silver Peak.

A. Structures in Massive Sulfide

Graded bedding was first observed in the bedded tuff overlying quartz-sericite-pyrite foliated tuff (qft) and indicated the section was upright. Graded bedding was also observed in massive sulfide beds (Fig. 13-3). The graded bedding suggests a mass deposition (debris flow) origin for both the massive sulfide and bedded tuff.

Compositional graded bedding is suggested for parts of the quartz-sericite-pyrite foliated tuff (qft). Individual beds contain abundant detrital pyrite at the base but grade upward into a pyrite-poor, quartz-rich portion. ITO *et al.* (1974, p. 125) describe similar grading at the Matsumine deposit.

The sulfide-lapilli tuff (slt) immediately overlying massive sulfide in part of the Silver Peak deposit contains groups of thin beds (Fig. 13-1) that are color graded. The individual 5- to 8-cm thick beds grade from dark to light gray (Fig. 13-1). Other than sulfide and ferruginous chert fragments, there were no other clasts to indicate any other type of grading in sulfide-lapilli tuff (slt).

The hanging wall contact between massive sulfide and quartz-sericite-pyrite foliated tuff (qft) is planar and generally sharp. An exception is the occurrence of a flame structure where massive sulfide projects upward into the overlying quartz-sericite-pyrite foliated tuff (Fig. 13-4). Pyrite grains in a polished thin section of the flame structure are fractured (Fig. 14-1). The flame structure probably originated when the overlying tuff was rapidly deposited as a debris flow or turbidity current as suggested by the apparent left to right direction of the flame-like portion of the structure. It also indicates that the massive sulfide was an unconsolidated mass of sulfide grains when the overlying tuff was deposited.

Load structures at Silver Peak occur at the footwall contact of massive sulfide with quartz-sericite-pyrite foliated tuff (qft). The massive sulfide appears to have settled into the underlying tuff (Fig. 12-3). ITO *et al.* (1974, p. 121-122) show several examples from the Matsumine deposit which resemble load structures, especially where sulfide overlies and settles into gypsum.

The hanging wall contact of the massive sulfide, as noted above, is relatively sharp and planar over distances of several meters. The contact in one locality at Silver Peak has a distinct depression which is interpreted as a channel scour structure. Small fractures occur in the massive sulfide beneath the scour. The tuff filling the scour is a different, fine-grained, non-foliated variety rather than quartz-sericite-pyrite foliated tuff (qft) found beyond the margins of the scour.

Clastic dikes occur in bedded tuff overlying the quartz-sericite-pyrite foliated tuff-massive sulfide sequence. An example in massive sulfide from the mine consists of chalcopyrite extending upward into pyritic yellow ore could be interpreted as a clastic dike. Alternatively, the chalcopyrite may be a later veinlet produced during continued hydrothermal activity or low-grade metamorphism.

Lenses and matrix-supported frafments of massive barite occur in many areas of the two main massive sulfide bodies (Figs. 12-1, 12-2, and 12-3). Some of the lenses and matrix-supported fragments in the black ore can be traced to a nearby source. The barite lenses were subjected to soft-sediment deformation (Figs. 12-2 and 12-4) related to submarine slumping and were folded prior to lithification. The barite lenses in Fig. 12-4 occur 1 to 4 meters beneath an overturned massive sulfide bed. The overturned massive sulfide interbed appears to have slumped into its current position when the sediments were soft, deforming the underlying quartz-sericite-pyrite foliated tuff (qft) and barite lenses.

B. Structure of Massive Sulfide Beds

The Silver Peak massive sulfide was deposited in multiple horizons on an irregular, slopping surface. Slumping was an important process and occurred repeatedly throughout the depositional cycle. Various kinds of slumping include unconsolidated masses that developed into debris flows, various coherent cobble to boulder sized masses that rolled downslope, and individual beds of massive sulfide that remained as a coherent mass and slid downslope. Abrupt or rapid change in thickness and breaks in continuity support these theories. Also, large slump blocks of basalt are common in the quartz-sericite-pyrite foliated tuff (qft) which hosts the massive sulfide.

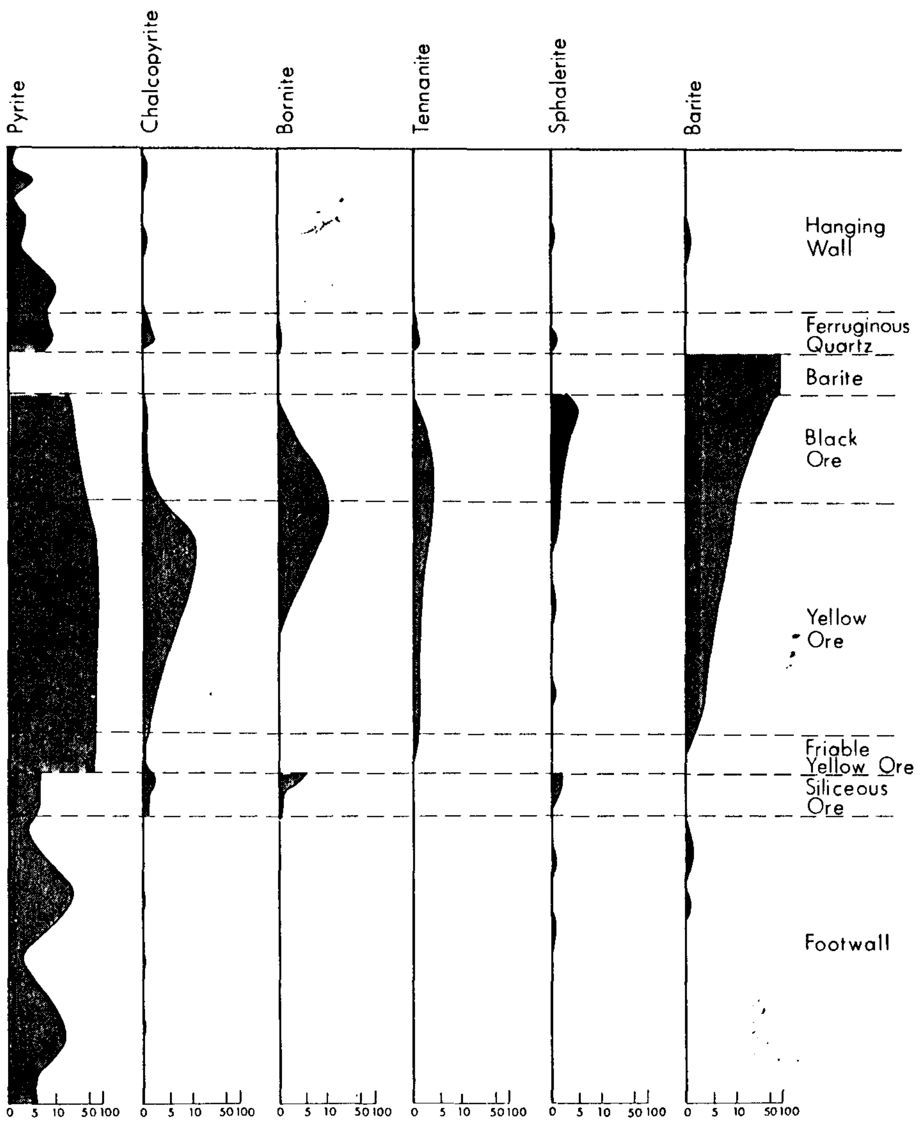


Fig. 15. Relative mineralogical distribution of sulfides and barite within the quartz-sericite-pyrite foliated tuff (qft), massive sulfide (ms), and sulfide-lapilli tuff (slt) at the Silver Peak mine.

VI. SULFIDE MINERALS, TEXTURES, AND DISTRIBUTION

A generalized succession of ore minerals in yellow and blck ore at Silver Peak is as follows: pyrite with chalcopyrite grading upward into pyrite with chalcopyrite and bornite (yellow ore) followed by pyrite with bornite and tennantite grading upward into barite, sphalerite. and trace amounts of galena (black ore). Pyrite, chalcopyrite, bornite, tennantite, and sphalerite from Silver Peak were identified optically. Zinc content of ores at Silver Peak cannot be approximated from amount of sphalerite alone. Tennantite contains 6 to 8 weight percent zinc as determined by electron microprobe microanalysis.

A. Subrounded Pyrite Grains

Pyrite is the most abundant sulfide mineral in almost all ore zones as well as in the footwall and hanging wall quartz-sericite-pyrite foliated tuff (qft) unit (Fig. 15). Exceptions are the barite and parts of the upper black ore zones where sphalerite, barite, and quartz predominate. Pyrite in the hanging wall and footwall quartz-sericite-pyrite foliated tuff (qft) and in the massive sulfide interbeds at Silver Peak most commonly occurs as sand-sized, angular to subrounded, detrital grains (Fig. 14-2). Pyrite grains are only locally abundant and are surrounded by quartz and sericite in hanging wall and footwall volcanic rocks (Fig. 14-3); in massive sulfide, pyrite grains are surrounded (cemented) by variable amounts of copper and zinc sulfides, quartz, barite, and minor sericite (Figs. 11-4 and 14-2). Individual pyrite grains in massive sulfide are touching in grain-supported massive sulfide, and are completely surrounded and supported by copper and zinc sulfides in matrix-supported massive sulfide. Pyrite veinlets and disseminated grains and veinlets of bornite, chalcopyrite, and sphalerite are the principal sulfides in siliceous ore (Figs. 9-2 and 9-3).

Pyrite grains are most abundant in the friable yellow ore and yellow ore zones. The grains are surrounded or cemented by silica in the lower part of the yellow ore zone and by chalcopyrite, bornite, and silica in the mid to upper part of the yellow ore zone. Most pyrite grains in massive sulfide from Silver Peak range from less than 0.1 mm to 0.5 mm in diameter. Grains greater than 0.1 mm in diameter are subrounded while the few observed grains less than 0.1 mm are angular; some are small cubes. The subrounding is due to two possible actions during transport: (1) abrasion in a black smoker vent or (2) abrasion during transport in a debris flow. The smaller, angular grains and cubes apparently acted as part of the fluid matrix and were not abraded during transport of the pyrite.

Sphalerite is most abundant in the black ore zone and often is associated with barite. Sphalerite in two doubly polished thin sections, one from a disturbed bedding sequence and the other from a normally bedded sequence, did not show any zoned or growth structures similar to sphalerite in Kuroko deposits of Japan (BARTON, 1978, p. 293). The sphalerite from the disrupted bedding sequence is recrystallized and twinned (visible because of a faint anisotropy). Sphalerite from normally bedded massive sulfide is fine grained with no apparent recrystallization or twinning. Barite in black ore that was deformed as a soft sediment is also recrystallized and twinned (Fig. 11-4).

B. Copper and Zinc Sulfide Blebs

Small blebs of chalcopyrite, bornite, tennantite, and sphalerite are abundant in subrounded pyrite grains (DERKEY, 1981). The blebs are predominantly oval, but some are angular, and others are elongate. Locally, the blebs can form up to 25 percent of the volume of a single pyrite grain. The largest individual bleb is less than one-tenth of the size of the enclosing pyrite grain. One unusually large pyrite grain (10 mm in diameter) contains blebs of diverse shape and composition. Near the margin of this large grain are small, elongate chalcopyrite, bornite, tennantite, and sphalerite blebs aligned perpendicular to the margin of the grain (Fig. 14-4). Numerous other blebs in the same pyrite grain are irregular in distribution and consist of chalcopyrite and minor bornite. Some of the chalcopyrite and bornite blebs in this large pyrite grain appear to be thin fracture fillings, but examination of the blebs under higher magnification indicates that they are actually trains of smaller blebs within the pyrite. These trains of small blebs may have formed in a manner analogous to the trapping of primary fluid inclusions (ROEDER, 1981) or by replacement along imperfections in the pyrite structure.

Identical small copper and zinc sulfide blebs occur in pyrite grains in a polished section of yellow ore recovered from diamond drilling 2.5 kilometers southwest of the Silver Peak mine. The massive sulfide bed is 5.5 meters thick with assay values for copper less than 5000 ppm and for zinc less than 400 ppm. The polished section, from 1.4 meters below the hanging wall contact, shows the massive sulfide consists of surounded to angular pyrite grains which contain small blebs of chalcopyrite, bornite, tennantite, and sphalerite. The matrix is quartz with minor chalcopyrite and traces of sphalerite.

Mineralogically, blebs in pyrite grains from the Silver Peak mine are usually the same mineralogy as the sulfide that encloses or cements the pyrite grains. Occasionally, the blebs are a different mineralogy than the enclosing sulfide matrix. The pyrite grains containing the blebs may have formed in another area (for example in a black smoker) and were transported to their current position (DERKEY, 1981), or alternatively, may have formed from continued hydrothermal activity following deposition. The pyrite grains were cemented following deposition by various sulfide minerals and silica (DERKEY, 1981).

Copper and zinc sulfides, including the small blebs in pyrite, are rare at the base of yellow ore in the two largest massive sulfide bodies at Silver Peak. The concentration of copper and zinc blebs and matrix sulfides increases upward from the base and reaches a maximum in chalcopyrite–and bornite-rich yellow ore and in bornite-tennantite-sphalerite black ore.

VII. SUMMARY AND CONCLUSIONS

Massive sulfide deposits in Jurassic volcanic rocks of the Silver Peak mine have many features identical to Kuroko deposits of the Hokuroku district. They possess a similar zoning sequence that includes siliceous ore, yellow ore, black ore, barite, and ferruginous chert zones. The volcanic sequence is bimodal consisting of basalt flows and tuffs and a dacite dome and tuff sequence at Silver Peak. Host volcanic rocks for both are subaqueously deposited tuff and mineralization occurs near or on the flanks of the dacite dome. A major difference is the distinctly compacted nature of the tuffs at Silver Peak. Textures suggest that the subaqueously deposited host tuff at Silver Peak may be welded. Because mineralization is similar to its Japanese counterparts, a genetic model involving possible welding is not essential to formation of Kuroko-type deposits. Basalt blocks which slumped into the tuffs at Silver Peak suggest an active tectonic environment possibly similar to calderas that are postulated for the Hokuroku district.

Sedimentary structures in the Kuroko deposits of Japan and the deposit at Silver Peak possess many examples of clastic sulfide deposition. Graded bedding, flame structures, load structures, channel scour structures, clastic dikes, and rip-up clasts and slump structures at Silver Peak all indicate the massive sulfide bed was deposited as a clastic sediment. The extent of modification due to continued hydrothermal activity following deposition is unknown. The origin of the small copper and zinc sulfide blebs in pyrite grains is unknown at this time. They may have been trapped in the pyrite as they were formed in a black smoker or in the feeder system, or they may have formed by later replacement along imperfections in the crystal structure of the pyrite. Copper and zinc sulfides seldom occur as individual grains at Silver Peak, rather they occur as blebs in pyrite grains and as a cement surrounding the pyrite grains.

ACKNOWLEDGEMENTS

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memorandum: To F.W.Libbey from J.E.Allen.

SILVER PEAK MINES (Copper, zinc, gold, silver) Riddle District
Douglas County

The best-developed properties in the district consist of the adjacent and connected Silver Peak and Umpqua Consolidated mines, ~~properties,~~ located 9½ miles south of the railroad at Riddle, and reached ~~byxfarxxkxxroadx~~ by steep forest road. The workings consist of three levels at about ~~3000xfeetxtoxxxxx~~ to 3500 to 3600~~fx~~ feet elevation, with the vein developed through long crosscuts for a total distance of about 800 feet on the lower levels. The property is in sections 23 and 26, T. 31 S., R. 6 W.

The vein lies in Dothan (Jurassic) schist and argillite, which near the mine has been thoroughly altered to a quartz-sericite schist. Both the schist and nearbye argillite contains disseminated sulphides. Greenstones associated with the Dothan metamorphosed sediments ~~xixxxxxxxxxxxhyxx~~ are more or less completely altered near the mine to epidote, quartz, and chlorite.

The ore-bodies consist of (a) massive sulphides in tabular bodies from 3 to 15 feet wide, and averaging about 8 feet in the bodies developed; and (b) mineralized schist in the footwall up to ~~xa~~ 100 feet wide with disseminated sulphides. These bodies strike ~~xhxxkx~~ northeasterly and dip from 45 to 70 degrees to the southeast. Minerals include pyrite, chalcopyrite, sphalerite, with lesser amounts of bornite, galena, tennantite, chalcocite, and covellite in the enriched zones on the upper levels. Gangue consists of quartz and barite. All the minerals are very fine grained in the massive ore. Two samples of massive sulphide (a) taken by the U.S.Geol. Survey were assayed as follows:

Across	Silver(oz.)	Gold(Oz.)	Copper(%)	Zinc(%)
5.5'	.59	.09	4.05	5.5
7.0'	4.58	.03	5.13	7.5

One sample was taken in the zone of disseminated sulphides (b):

9.0'	.30	.01	.90	.9

Between 1926 and 1937 a total of 6,623 tons of ore was shipped to the smelter, and the average values in this shipped ore ~~was~~ were as follows:

Gold (oz)	Silver (oz)	Copper (%)	Zinc(%)
.095	3.77	5.61	6.00

Measured ore has been calculated at about 60,000 tons; with an additional 40,000 tons of indicated ore, calcuated on the basis of continuations of the developed lenses of massive sulphide. Other lenses may be found with further exploration, and inferred ore may be as much as 300,000 tons.

The above summary has been abstracted from reports by the U.S.Geological Survey (Shenon, 1933) and from reports by the Department of Geology and Mineral Industries.

Respectfully submitted,

John Eliot Allen
14 November 1946

SILVER PEAK DISTRICT SMELTER RETURNS

Date	Dry Weight	Au	Ag	Cu	Zn
September 16, 1936	82,289	.12	4.44	6.14	3.2
September 21, 1936	100,966	.11	5.50	7.79	3.9
September 30, 1936	126,924	.12	8.21	6.50	5.4
October 8, 1936	152,538	.30	7.84	7.08	7.50
October 20, 1936	110,793	.11	4.44	7.33	7.4
October 20, 1936	110,869	.11	3.89	6.97	7.0
October 23, 1936	111,078	.10	3.93	6.75	7.0
October 30, 1936	108,285	.12	4.15	6.73	6.5
November 9, 1936	107,173	.10	2.35	4.98	4.2
November 12, 1936	138,275	.09	3.03	5.96	3.4
November 19, 1936	104,901	.14	4.24	6.23	4.6
November 20, 1936	103,157	.13	3.88	6.13	4.4
December 1, 1936	104,286	.26	4.06	6.28	5.3
December 2, 1936	108,095	.07	3.93	5.86	5.9
December 5, 1936	103,500	.28	5.65	6.43	4.5
December 11, 1936	107,323	.08	2.57	4.62	5.0
December 11, 1936	111,286	.02	2.03	3.89	2.1
December 18, 1936	112,056	.06	2.00	3.59	5.1
	2,003,789	2.32	76.17	109.26	92.4
	Tons 1,001	.128	4.23	6.07	5.13%
January 12, 1937	92,834	.10	2.77	5.71	7.5
March 31, 1937	110,036	.07	2.69	4.14	5.8
April 9, 1937	111,135	.06	3.96	5.09	6.7
April 20, 1937	118,226	.07	2.74	5.04	5.8
May 12, 1937	122,107	.04	2.21	6.30	5.8
May 21, 1937	98,436	.10	2.62	4.73	7.2

Date	Dry Weight	Au	Ag	Cu	Zn
May 21, 1937	117,117	.04	2.84	5.41	6.3
June 15, 1937	115,275	.08	2.92	4.56	6.5
June 16, 1937	110,833	.07	1.96	4.20	5.9
June 16, 1937	113,305	.08	2.94	3.94	5.6
June 24, 1937	122,202	.04	2.56	4.87	6.7
July 9, 1937	109,532	.06	2.66	5.55	7.2
July 14, 1937	107,128	.05	3.22	4.53	6.5
July 15, 1937	109,859	.05	3.31	5.02	7.5
July 19, 1937	138,213	.04	2.48	5.51	7.2
July 23, 1937	146,559	.06	2.25	4.32	6.3
July 28, 1937	136,976	.07	2.66	5.00	7.3
August 2, 1937	108,390	.05	2.01	3.43	5.9
August 10, 1937	120,514	.07	1.75	3.18	.75
August 16, 1937	120,142	.06	1.95	3.38	7.1
August 20, 1937	98,953	.04	1.73	3.15	8.4
August 24, 1937	101,538	.04	2.03	4.12	7.3
September 2, 1937	108,684	.07	2.11	4.22	8.2
September 10, 1937	116,132	.06	2.69	6.23	9.8
September 11, 1937	147,218	.09	2.86	7.48	7.7
September 25, 1937	115,337	.08	2.54	6.67	7.2
September 25, 1937	106,431	.05	2.40	7.75	6.30
October 1, 1937	116,643	.05	2.33	7.53	5.5
October 7, 1937	107,055	.04	2.66	7.09	7.9
October 7, 1937	112,172	.04	2.16	5.80	8.3
October 19, 1937	124,437	.05	2.15	6.07	7.4
October 27, 1937	109,680	.04	1.87	4.44	9.1

Date	Dry Weight	Au	Ag	Cu	Zn
October 29, 1937	108,795	.06	2.11	5.97	5.0
November 5, 1937	102,506	.19	2.02	5.01	5.8
November 5, 1937	104,610	.03	1.91	5.15	6.9
November 10, 1937	106,233	.06	1.98	5.14	8.0
November 15, 1937	105,008	.04	1.93	5.00	7.8
November 23, 1937	107,094	.05	1.79	5.10	8.1
December 1, 1937	107,200	0.04	1.88	4.55	7.9
December 1, 1937	107,620	0.06	2.56	5.24	6.3
December 9, 1937	107,370	.06	2.25	4.92	6.20
Totals	4,648,535	2.38	95.92	210.54	282.1
Averages		.058	2.339	5.134	6.88

Tons 2328
1001
3329 Tons

2

(COPY)

TACOMA SMELTER

American Smelting & Refining Company - Tacoma, Washington

TACOMA, WASHINGTON Sept. 16, 1936

BOUGHT OF R. W. Wiley

Riddle, Oregon MATERIAL Ore

SMELTER LOT 3643 MINE LOT DATE RECEIVED August 28, 1936

CAR OR VESSEL 54157 ENTRY NO. DATED

Gold Quot.	Silver Quot.	Foreign Copper Quot. Domestic		
DATE	DATE	DATE 8/28		DATE
$ per oz.	less	9.525 less 2.75	6.775	less

PB.	ZN.	AS.	SB.	NI.	BI.	SN.	FE.	SiO_2	CaO.	S.	CL.
--	3.2	--	--	--							

Lot No.	No. sacks	Wet weight	H2O	Dry weight	Assays AU	AG	CU	Contents Gold Ozs.	Silver Oz.	Cop.
643		83,020	.88	82,289	.12	4.44	6.14	4.937	183	5,053
					Less ½ oz. silver				21	
					Less 15 lbs. copper					617
								4.937	162	4,436

Gold @ $31.8166	157.08		
Silver @ 77¢	124.74		
Copper @ 6.775	300.54		$582.36
Base Charge $3.25		133.72	
Freight (100,000) lbs. @ $3.35		167.50	301.22
			281.14

To be paid upon receipt by us of properly executed affidavit which will qualify the Silver content of this shipment for sale to the U. S. Government.
Ounces 183 - 21 @ 77 - 44-3/4 = 32-1/4 .... 52.25

$228.89

PULP ASSAYS	AU.	AG.	CU.
	.12	4.44	6.14

File

COPY

Seattle, Washingto
December 6, 1928

Mr. H. A. Guess
120 Broadway
New York City

Silver Peak Mining and Milling Co. Riddle, Oregon

Dear Sir:

A complete sampling of this property has revealed a few conditions not noted at the time of my first visit in August.

The ore body has been cross-cut at one place only with two drifts north and south on the best of the ore for a length of 100 ft. The maximum width is seventy feet, the detail value of which is reflected by samples 1 to 9, inclusive.

Sample No. 1 is practically barren massive pyrite on the footwall of the deposit. No. 2 is the next four-foot section and is composed of barren pyritized schist. These have been omitted from the estimates, although further prospecting might show the fifteen foot section represented by samples 1 and 2 to contain values at some other place along the lode. I do not believe the values or absence of values will be continuous, although the lode is fairly continuous.

The deposit is a replacement type in greenstone schist, containing lenses of massive pyrite, pyrrhotite, and chalcopyrite irregularly distributed through a pyritized shear zone of forty to seventy feet wide and traceable on the surface by exposures indicating a possible length of a thousand feet. Insufficient work has been done to determine the size, frequency, or recurrence of the massive sulphide lenses.

The sixty foot section from sample 2 to the hanging wall, sample 9, and the samples from the 2 drifts and stope average Gold .05 oz., Silver 1.64 oz., Copper 3.33%. This average includes samples 4,5, and 6, 28 feet of pyritized schist in the center, that assays Gold, .01 oz., Silver 0.22oz., Copper 0.36% and might represent as much as 47% by volume of the entire ore body. The present development, however, is insufficient to warrant any such statement.

Excluding samples 4,5, and 6, the average is Gold .06 oz., Silver 1.91 oz., Copper 3.91%. The higher cost of selective mining and the chance of missing better values elsewhere along this zone does not justify excluding this area in a preliminary estimate if the property is to be considered as straight milling operation. On this basis, the present development has defined an area sixty feet wide by one hundred feet long, 47% of which averages Au. .01 oz., Ag 0.22 oz., Cu 0.63% and 53% Au 0.06 oz., Ag 1.91 oz., Cu 3.91%. This would develop six hundred tons per foot of depth of an average grade of Au .036 oz., Ag 1.12 oz., Cu 2.26%.

The property is good prospect, and the type of the dep
and amount of mineralization indicate that possibly quite a tonna
grade of ore might be developed. On the other hand, if the propert
considered purely as a source of crude sulphide ore for Tacoma, se.
mining will produce a grade of ore containing Au .08 oz., Ag 2.54 oz.
Cu 5.09%, Fe 28.1%, S 34.06%, Insoluble 24.2%. This can be benefited sorting to average 6.6% copper, as per the shipping records. About 11 tons per foot of depth can be expected within the limits of the prestnt elopment. If the cross-section of the ore now exposed in the tunnel extends to the surface, and indications are favorable that it does, this block of ground alone will take care of Tacoma's minimum requirements for this class of ore for a year, or possibly two years.

The development now shows a hanging wall massive sulphide body 12' x 50' and a footwall massive sulphide body 4.67' x 60' at a depth of three hundred feet. This ore will average eight cubic feet per ton, and the two present bodies should produce on the above dimensions 30,000 tons of ore between the tunnel level and the surface. If this ore is mined during the development of the property, the outcome will be about as follows:

30,000 tons @ Au. .08 oz., Ag 2.54 oz., Cu 5.09%		
Copper @ 15¢ and silver @ 56¢		
Pay for copper 5.09% - 101.80# 0 15¢		$15.27
Less 20# @ 15¢ - $3.00		
81.8# @ 2-3/4¢ - $2.25		5.25
Pay for copper		$10.02
95% of gold @ 20.00		1.52
95% of silver @ 56¢		1.42
Pay for Au., Ag., and Cu		$12.96
Less smelter treatment	$2.50	
R. R. Freight	4.50	
Truck haul	2.50	
Mining	3.00	$12.50
Operating profit		$ .46 per ton

This grade of ore raised to 6.6% Cu, as per shipping record, would return:

Copper 6.6%	132# @ 15¢		$19.80
Less 20# @ 15¢		$3.00	
112# @ 2-3/4		3.08	6.08
Pay for Cu			$13.72
Pay for Au and Ag			3.72
			$17.44

For Au, Ag, and Cu,		
Less costs	$12.50	
Sorting	.50	$13.00
Operating profit		$ 4.44

22,000 tons less 25% account of insufficient development - 16,500 tons - $67,260 on 16¢ copper this calculated operating profit would be $95,000.

It is to be emphasized that the above figures are not intended to be a reliable forecast of the ore in the block of ground under consideration but as a possible outwome to compare with the investment.

For a moderate scale operation, I believe the property will develop sufficient tonnage to justify a fairly good capacity sized mill, or it can be considered as a shipper of crude sulphide ore for Tacoma. However, all that can at this time be said is that it has these possibilities and warrants a good sized systematic development.

At least five hundred or six hundred feet of drifting and a few raises with intermediate levels should be run. The type of the deposit calls for frequent exploratory cross-cuts.

The deposit is traversed by many slips that have a tendency to terminate ore; on the other side of the slip, there is sometimes ore and sometimes only pyritized schist. I believe the ore will not be continuous for any great length, but there will be a recurrence of bodies along a fairly continuous zone for a thousand feet. A few scattered surface exposures indicate this.

The present equipment on the property is of little value, as it has already served its purpose. A new camp and equipment will have to be provided sufficient to do, say, 1,200 feet of drifts and cross-cuts @ $25.00 per foot, or $30,000, and seven hundred feet of raises @ $30.00 per foot, or $21,000. To this must be added cost of camp, road, and equipment, divided as follows: $5,000.for road work, $4,000. on camp and improvement of bunkers and sorting facilities, $2,500 for drills and steel; $8,000. for compressor and engine, and $500. for small tools. Also, $10,000 required by owners for account of their indebtedness, or a total initial investment will be $55,000 with a possibility of spending $80,000 distributed over about one year.

During this time probably 16,000 tons of crude ore would be shipped and would nt. an equal amount to the investment. In addition, the property has an excellent speculative possibility.

If the proposed development, on the present level, is satisfactory, some diamond drilling should be done preparatory to driving a deeper tunnel from the opposite or east side of the mountain. A tunnel approximately 1,800 ft. long will gain 1,000 feet depth (no measurement of this was made, however), as the vein dips towards the portal of the proposed tunnel. This tunnel will be about four miles from the railroad and rail connection can be made at this point.

The following is a complete list of samples taken and estimates used in this report:

Sample No.	Width Ft.	Au oz.	Ag. oz.	Cu %	Character	Location	
1	11	Tr	.22	.38	Pyrite	F.W. Main	X-C
2	4	.01	.26	.52	Schist	"	"
3	9	.01	.40	3.77	Pyrite	"	"
4	13	.01	.28	.06	Schist	"	"
5	10	.01	.15	.43	Quartz	"	"
6	5	.015	.21	1.00	Fe & Qtz.	"	"
7	7	.05	.69	1.87	"	"	"
8	8	.09	1.59	2.43	Pyrite	"	"
9	8	1.02	1.92	3.45	"	H.W.	"
10	5	.01	.16	.07	Schist	So.Face No.2	Drift
11	6	.02	.63	1.42	Pyrite	So.Face No.2	Drift
12	5	.015	.94	1.94	"	"	"
13	3	.01	.43	1.33	"	"	"
14	5	.01	.90	1.49	"	"	"
15	3	.02	.71	1.38	"	"	"
16	8	.03	.71	1.22	"	"	"
17	8	.01	.69	1.65	"	"	"
18	5	.02	.29	.12	Schist	W.Half No.2	Drift
19	3	.02	1.34	2.56	Pyrite	E	"
20	6	.03	1.00	2.58	"	"	"
21	6	.02	1.18	2.93	"	"	"
22	6	.02	1.74	3.23	"	"	"
23	5	.04	1.55	4.51	"	"	"
24	1.5	.09	8.02	21.26	"	Face No. 1	Drift
25	1.8	.251	16.39	14.04	"	"	"
26	3	.04	13.80	13.48	"	"	"
27	4	.01	2.19	5.28	"	Stope	
28	4	.025	.64	4.51	"	"	
29	5.5	.02	.69	4.92	"	"	
30	5.5	.01	.69	2.39	"	"	
31	3	.02	.74	3.86	"	"	
32	3	.02	.47	2.39	"	"	
33	3.5	.02	9.94	14.14	"	"	
34	3	.16	7.63	10.86	"	"	
35	4	.03	2.45	8.68	"	"	

Samples included in estimate, shipping crude sulphide

No.	Width Ft.	Au	Ag	Cu	Location
19	3	.06	4.02	7.68	H.W. ore body
20	6	.18	6.00	15.48	"
21	6	.12	7.08	17.58	"
22	6	.12	10.44	18.78	"
23	5	.20	7.75	22.55	"
8	8	.72	12.72	19.44	"
9	8	.16	15.36	27.60	"
24	1.5	.135	12.03	31.89	F.W. ore body
25	1.5	3.765	24.58	21.06	"
26	3	.12	41.40	40.44	"
3	9	.09	3.60	33.93	"
27	4	.04	8.76	21.12	"
28	4	.10	2.56	18.04	"
29	5.5	.11	3.80	27.06	"
30	5.5	.05	3.80	13.14	"
31	3	.06	2.22	11.58	"
32	3	.06	1.41	6.87	"
33	5.5	.560	34.79	49.59	"
34	3	.63	22.89	32.58	"
35	4	.12	9.80	34.72	"

The average of both ore bodies: .08 oz. Au.; 2.54 oz. Ag; 5.09% Cu.

Ore shipments as per Tacoma smelter returns

Date	Amt. Dry Tons	Au	Ag	Cu
Aug. Nov. Incl. 1928	880	0.04 oz.	2.51 oz.	6.60% per ton

Ore shipped from North end of property, ground contested by adjoining claim.

Date	Amt. Dry Tons	Au	Ag	Cu
July - Nov. 1926	290	.16 oz.	10 oz.	8% average ton

This better grade probably due to closer sorting. It is undoubtedly from same vein, and 400-500 feet north os section that produced ore shipped August to November of this year.

Litigation: The property of the Silver Peak Mining and Milling Company consists of the NW¼ of Sec. 26, T 31 S., R 6 W. This is patented timber land, not covered by any mineral location. The Silver Peak lode strikes northeasterly across this patented timber land. The present workings of the Silver Peak mining and Milling Company, measured along the strike of the lode, are 450' Southeast of the East-West line between Sec. 23 and Sec.26. The lode dips southeast about 65° to 70°. The lode, after it passes into Sec.23, apexes and is covered by lode locations. It will, therefore, be seen that the portion of the vein or veins that apex in the south half of the Southwest ¼ of Sec. 23 passes into the North ½ of the NW¼ of Sec. 26 on this dip; also that the law of "extra-lateral rights" grants the right to follow the vein on its dip limited in strike or length by the vertical projection of the end lines of the claims.

I have secured the accompanying photostat from the claim owners (Oregon Exploration Co,), who are trying to establish their righs under the patented timber land (Silver Peak Mining & Milling Co.). This map has been used in the law-suit. It will be noted that Silver Peak Lode No. 2 is so located that the area within the projection of its end lines includes the ore body or vein developed by Silver Peak Mining & Milling Co.; also, the area within the projection of the end lines of Silver Peak Lode No. 1 includes the ore body developed and mined by Oregon Exploration Co. in the NE¼ of the NW¼ of sec.26 (the patented timber land owned by the Silver Peak Mining and Milling Company).

In the County Court at Roseburg,Oregon,the Silver Peak Mining & Milling Co. was awarded the case; i.e., that vertical projection of an end line of the patented timber land hold; and it was held that the Oregon Exploration Co. had no extra-lateral rights in this case.

On November 14th, the case was heard at the State Supreme Court, Salem,Ore.,no decision has been given and none is expected before the first of the year. If the Oregon Exploration Co. lose, they are prepared to carry the case to the Supreme Court of the U.S. On the other hand, should they get a favorable decision, the property of the Silver Peak Mining & Milling Co. has little value as a mining property.

No extra-lateral rights were patented timber lands will mean an embarrassing condition of mining claim in the forest areas of Ore. & Wash.

Right now neither company can deliver clear title. The Silver Peak Mining & Milling Co. are willing to do business with us, but the Oregon Exploration Co. wishes to wait the outcome of the case.

I am in close touch with both parties concerned and will be given first opportunity to consider a deal.

Very truly yours,

L. A. Levansaler

SILVER PEAK DISTRICT, DOUGLAS COUNTY, OREGON

Four carefully cut samples taken at selected places serve to show the relative proportions of the metals to one another but do not necessarily illustrate the average metal content of the ore, which may be more closely determined from the production figures that follow. Analyses of the samples made in the chemical laboratory of the United States Geological Survey are given below:

Analyses of ores from the Silver Peak district, Oregon. E. T. Erickson, Analyst[1]

Sample No.	Silver Ounces per ton	Gold Ounces per ton	Copper Percent	Zinc Percent
8	0.59	0.09	4.05	5.5
9	.30	.01	.90	.9
10	4.58	.03	5.13	7.5
11	.46	.01	.93	.6

8. The Silver Peak Copper tunnel, northwest ore body. Sample taken in stope 33 feet above tunnel level across 5½ feet of massive sulphide ore.

9. Umpqua Consolidated tunnel, main crosscut immediately northwest of massive sulphide band. Sample taken across 9 feet of schist with disseminated sulphides.

10. Umpqua Consolidated tunnel. Sample taken across 7 feet of massive sulphide ore in stope along line A-A; plate 4.

11. Silver Peak Copper tunnel, 30 feet northwest of top of connecting raise. Sample taken across 6 feet of intensely silicified rock containing some visible sulphides.

The results show that copper and zinc increase and decrease together, but indicate no similar relations between those metals and gold and silver or between the gold and silver themselves.

Smelter shipments

Total tons shipped 1936-37

3325 with average (not weighted) of 6.35% zinc.

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[1] Taken from U. S. Department of the Interior Circular 2, Geological Survey Copper Deposits in the Squaw Creek and Silver Peak Districts and at the Almeda Mine, Southwestern Oregon, by P. J. Shenon, Washington, 1933, page 20.

SILVER PEAK MINE DOUGLAS COUNTY

See:
Circular 2, Copper Deposits in the Squaw Creek and Silver Peak Districts and at the Almeda Mine, Southwestern Oregon, with Notes on the Pennell & Farmer and Banfield Prospects, issued by U. S. Dept. of the Interior, by Philip J. Shenon, Washington 1933.

Averages on each sheet

SILVER PEAK DISTRICT SMELTER RETURNS

Date	Dry Weight	Au	Ag	Cu	Zn
September 16, 1936	82,289	.12	4.44	6.14	3.2
September 21, 1936	100,966	.11	5.50	7.79	3.9
September 30, 1936	126,924	.12	8.21	6.50	5.4
October 8, 1936	152,538	.30	7.84	7.08	7.50
October 20, 1936	110,793	.11	4.44	7.33	7.4
October 20, 1936	110,869	.11	3.89	6.97	7.0
October23, 1936	111,078	.10	3.93	6.75	7.0
October 30, 1936	108,285	.12	4.15	6.73	6.5
November 9, 1936	107,173	.10	2.35	4.98	4.2
November 12, 1936	138,275	.09	3.03	5.96	3.4
November 19, 1936	104,901	.14	4.24	6.23	4.6
November 20, 1936	103,157	.13	3.88	6.13	4.4
December 1, 1936	104,286	.26	4.06	6.28	5.3
December 2, 1936	108,095	.07	3.93	5.86	5.9
December 5, 1936	103,500	.28	5.65	6.43	4.5
December 11, 1936	107,323	.08	2.57	4.62	5.0
December 11, 1936	111,286	.02	2.03	3.89	2.1
December 18, 1936	112,056	.06	2.00	3.59	5.1
	2,003,789	2.32	76.17	109.26	92.4
Tons	1,001	.128	4.23	6.07	5.13%
January 12, 1937	92,834	.10	2.77	5.71	7.5
March 31, 1937	110,036	.07	2.69	4.14	5.8
April 9, 1937	111,135	.06	3.96	5.09	6.7
April 20, 1937	118,226	.07	2.74	5.04	5.8
May 12, 1937	122,107	.04	2.21	6.30	5.8
May 21, 1937	98,436	.10	2.62	4.73	7.2

18

Date	Dry Weight	Au	Ag	Cu	Zn
May 21, 1937	117,117	.04	2.84	5.41	6.3
June 15, 1937	115,275	.08	2.92	4.56	6.5
June 16, 1937	110,833	.07	1.96	4.20	5.9
June 16, 1937	113,305	.08	2.94	3.94	5.6
June 24, 1937	122,202	.04	2.56	4.87	6.7
July 9, 1937	109,532	.06	2.66	5.55	7.2
July 14, 1937	107,128	.05	3.22	4.53	6.5
July 15, 1937	109,859	.05	3.31	5.02	7.5
July 19, 1937	138,213	.04	2.48	5.51	7.2
July 23, 1937	146,559	.06	2.25	4.32	6.3
July 28, 1937	136,976	.07	2.66	5.00	7.3
August 2, 1937	108,390	.05	2.01	3.43	5.9
August 10, 1937	120,514	.07	1.75	3.18	.75
August 16, 1937	120,142	.06	1.96	3.38	7.1
August 20, 1937	98,953	.04	1.73	3.15	8.4
August 24, 1937	101,538	.04	2.03	4.12	7.3
September 2, 1937	108,684	.07	2.11	4.22	8.2
September 10, 1937	116,132	.06	2.69	6.23	9.8
September 11, 1937	147,218	.09	2.86	7.48	7.7
September 25, 1937	115,337	.08	2.54	6.67	7.2
September 25, 1937	106,431	.05	2.40	7.75	6.30
October 1, 1937	116,643	.05	2.33	7.53	5.5
October 7, 1937	107,055	.04	2.66	7.09	7.9
October 7, 1937	112,172	.04	2.16	5.80	8.3
October 19, 1937	124,437	.05	2.15	6.07	7.4
October 27, 1937	109,680	.04	1.87	4.44	9.1

Date	Dry Weight	Au	Ag	Cu	Zn
October 29, 1937	108,795	.06	2.11	5.97	5.0
November 5, 1937	102,506	.19	2.02	5.01	5.8
November 5, 1937	104,610	.03	1.91	5.15	6.9
November 10, 1937	106,233	.06	1.98	5.14	8.0
November 15, 1937	105,008	.04	1.93	5.00	7.8
November 23, 1937	107,094	.05	1.79	5.10	8.1
December 1, 1937	107,200	0.04	1.88	4.55	7.9
December 1, 1937	107,620	0.06	2.56	5.24	6.3
December 9, 1937	107,370	.06	2.25	4.92	6.20
	4,648,535	2.38 .058	95.92 2.339	210.59 5.134	282.1 6.98 6.88

41

Tons 2328
1001
3329

		Au	Ag	Cu	Zn
1936	1001	.128	4.23	6.07	5.13
1937	2328	.058	2.34	5.13	6.88
	3329	.093	3.28	5.60	6.00

(COPY)

TACOMA SMELTER

American Smelting & Refining Company - Tacoma, Washington

TACOMA, WASHINGTON Sept. 16 19 36

BOUGHT OF R. W. Wiley

Riddle, Oregon

MATERIAL Ore

SMELTER LOT 3643 MINE LOT DATE RECEIVED August 28, 1936

CAR OR VESSEL 54157 ENTRY NO. DATED

Gold Quot.		Silver Quot.		Foreign Copper Quot. Domestic			
DATE		DATE		DATE 8/28		DATE	
$	per oz.		less	9.525 less 2.75	6.775		less

PB.	ZN.	AS.	SB.	NI.	Bl.	SN.	FE.	SiO2	CaO.	S.	CL.
—	3.2	—	—	—							

Lot No.	No. sacks	Wet weight	H_2O	Dry weight	Assays AU	Assays AG	Assays CU	Contents Gold Ozs.	Contents Silver Oz.	Contents Cop.
3643		83,020	.88	82,289	.12	4.44	6.14	4.937	183	5,053
					Less ½ oz. silver				21	
					Less 15 lbs. copper					617
								4.937	162	4,436

Gold @ $31.8166	157.08		
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Copper @ 6.775	300.54		$582.36
Base Charge $3.25		133.72	
Freight (100,000) lbs. @ $3.35		167.50	301.22
			281.14

To be paid upon receipt by us of properly executed affidavit which will qualify the Silver content of this shipment for sale to the U. S. Government.

Ounces 183 - 21 @ 77 - 44-3/4 = 32-1/4 .... 52.25

$228.89

PULP ASSAYS	AU.	AG.	CU.
	.12	4.44	6.14

SWEETBRIER PROSPECT (gold) RIDDLE DISTRICT

Owner: James McAdams, Langlois, Oregon; William E. Craine and W. E. Best, Bandon, Oregon.

Location: secs. 5, 7, 8, T. 31 S., R. 5 W., near head of East Fork of Ash Cr., two miles from Pfaff property.

Area: Five claims; Sweetbrier, Sweetbrier Ext., Sugar Pine, Chinquapin, and Chinquapin Ext.

Development: One open cut on Sweetbrier; 10 ft. adit on Chinquapin, and 40 ft. tunnel on Chinquapin Ext.; others, location and assessment work.

Equipment: 1000 ft. of $\frac{3}{4}$ inch pipe line to cook house; Bunk house for six, Cook house and wood shed. Portable stamp mill and a rock crusher. No ore milled.

Geology: Schist, porphyry and greenstone

J. E. M. 9/12/39

Douglas Silver Peak Mine

Wallace, Idaho
May 24, 1954

FILE MEMORANDUM

OREGON, DOUGLAS COUNTY
PACIFIC MINERALS, INC.
SILVER PEAK MINE
Cu, Zn, Ag, Au

I obtained some data from Frank Taft regarding the Silver Peak mine. The material includes agreements between Homer Morris of Portland, Oregon and the Oregon Exploration Company and the Silver Butte Mining & Milling Company, application for a government loan by Pacific Minerals, Inc., copies of geologic reports by Shenon, Levensaler, Alex Smith and F. Cushing Moore, and geological and assay maps prepared by Pacific Minerals, Inc. Copies of all the material have been made for our files.

When Major Waite lost control of the property, officers of Pacific Minerals, Inc. learned the news promptly through friends in the area. Agreements were made with the owners of the properties in June, 1953. The terms are modest when compared with Waite's demands. After 18 months examination, $3000 per year would be spent on the Oregon Exploration Company ground and $5000 per year would be spent on the Silver Butte Mining and Milling Company ground. Each owner would receive 10% N.S.R. The Oregon Exploration Company would deliver title on receiving $75,000 but no upset price was stipulated for ground owned by Silver Butte. Homer Morris would be liable for assessment work and taxes; owners would be required to deliver free and clear title. Silver Butte retained ownership of saw logs over 16" D.B.H., but Morris was given right to purchase them at going rates in 4th year of tenancy if they had not been logged. After that Silver Butte could sell to anyone. The agreements contained standard clauses about right of assignment, forfeiture, right to discontinue, passing of title, etc. If Morris or assignees were to claim new areas, the lessors would have no right to them.

No assignment of the leases from Morris to Pacific Minerals, Inc. was in the data loaned.

An application by Pacific Minerals was made for government assistance in the spring of 1953. The loan was not granted, according to Frank Taft, because the government examiner decided the ore was a "metallurgical impossibility". Pacific Minerals pumped part of the winze out and got some very good samples. A crosscut, 110 feet long, was driven by them for a diamond drill station. The workings were thoroughly sampled so that Pacific Minerals estimates ore reserves above No. 4 level now as follows:

15,000 tons, 2.57% Cu 4.22% Zn 1.60 oz. Ag 0.15 oz. Au.
$29/ton gross heads $435,000 total

Pacific Minerals requested a government loan for drilling which would total $50,702.55. The work is for two areas. They would extend the No. 4 level main crosscut 150 feet into the hanging wall for a station from which they would get intercepts through the ore zone from 60 to 230 feet below the level. They would drill horizontal holes from the No. 4 level through the down-dip extension of the ore zones in the No. 3 adit. If indicated, down holes would be drilled from the same place, and the last step would be another hanging wall crosscut for deeper drilling.

Pacific Minerals, Inc. officers are:

President	Wayne A. Brainard	P. O. Box 838, Kellogg, Idaho
Vice-President	D. Williams	
Secretary	C. Whalen	
Director	Wendell R. Brainard	

Its officers are the same as Associated Engineers in Kellogg, and it is one of the string of companies serviced by the same staff and by Mr. Lester Harrison, Kellogg attorney. The various persons are engaged in other mining pursuits and nothing is planned for the Silver Peak property at present.

I was given to understand by Mr. Taft that Pacific Minerals is not in a position to continue work at present and that they would welcome the interest of a reputable mining company. The grade of ore remaining above the No. 4 level is not good, of course, but one must remember that this is what was left after mining 6900 tons of 0.114 oz. Au, 17.23 oz. Ag, 7.41% Cu ore. Only some 3000 tons of that production was sampled for zinc - an average content of 6.25% Zn is reported. Of course, zinc is valueless at present, but there is a possibility that a fair tonnage of fair grade ore can be developed on the property.

Respectfully submitted,

Dick Williamson

D. R. WILLIAMSON

Wallace, Idaho

November 10, 1947

OREGON, DOUGLAS COUNTY
RIDDLES DISTRICT
SILVER PEAK & UMPQUA
CONSOLIDATED MINES

MEMORANDUM FOR MR. KEITH WHITING:

We have received answers to our inquiries from Dr. P. T. Meaney, representing the Umpqua Consolidated Mining Company and the Oregon Exploration Company, owners of part of the property that comprises the Silver Peak and Umpqua Mine.

Dr. Meaney has not mentioned terms but has stated that he is willing to enter into an exploration agreement, allowing free examination and no payments for a reasonable exploration period. I have not tried to pin him down more closely.

The other owner, represented by Mr. George Hermans, is the Silver Peak Mining Company. Mr. Hermans states that they value their property at $75,000 and will allow a reasonable time for examination and exploration before any payments come due.

I have advised Dr. Meaney and will advise Mr. Hermans that we will discuss the matter further with them during the winter and, if agreement is reached, will undertake an examination next season when the snows have gone from the mine.

MWC:mb

MANNING W. COX

ADDENDUM TO REPORT ON SILVER PEAK MINE

Calculations of outcome as direct shipping ore and as a milling ore making a copper and a zinc concentrate have the following results:

DIRECT SHIPMENT TO TACOMA; (4% Cu, 4% Zn, 2 ozs. Ag, .08 ozs. Au)

Payments: - 4% Cu - (80# - 20#)(22½¢ - 2½¢) = $12.00
2 ozs.Ag- 95% X 2 ozs. X 90¢ = 1.63
.08 ozs.Au- .08 ozs. X $33.48 = 2.68
Gross Value $16.31
Deductions: - Base Charge (no penalty) $5.50
Freight,Riddle-Tacoma(estimate) 5.00 10.50
N.S.V. Fob Riddle $ 5.81
Truck to Riddle 1.10
N.S.V. Fob Mine $ 4.71

These figures show that even at present metal prices the expectable grade does not give sufficient margin to permit mining at a profit.

MILLING:

Outcome Making a Cu and a Zn Concentrate
Assuming Following Mill Report

	Cu	Zn	Ag	Au
Recovery	80%	75%	75%	80%
Heads	4%	4%	2 ozs.	.08 ozs.
100 Tons	8000#	8000#	200 ozs.	8 ozs.
Cu Concentrate, 8:1	25.6%	5%	4 ozs.	.46 ozs.
12.5 Tons	6400#	1250#	50 ozs.	5.8 ozs.
Zn Concentrate, 17:1	4%	50%	18.6 ozs.	.10 ozs.
5.8 Tons	450#	5800#	108 ozs.	.58 ozs.
Tails	1.4%	.5%	.5 ozs.	.02 ozs.
81.7 Tons	1150#	950#	41 ozs.	1.6 ozs.

. . . .

ADDENDUM TO REPORT ON SILVER PEAK MINE (2)

Copper Concentrate:

(a) 6400# Cu less 20# = 6380# X(22.5¢ -2.5¢)or 20¢ =		$1,276.00	[illegible]
(b) No Zinc penalty			
(c) 50 ozs. Ag X 95% = 47.5 ozs. X 90¢ =		42.75	
(d) 5.8 ozs. Au X 100% X $33.46 =		194.07	1137.32
		$1,512.82	
Deduct: Base Charge $5.50 X 12.5 Tons =	$ 68.75		
Rail Freight @ $10 X 12.5 " =	125.00	193.75	[illegible]
Gross Net Smelter Val.		$1,319.07	
Fob Riddle value per ton crude ore		$ 13.19	

Zinc Concentrate:

(a) Zn:80% X 5800# X 10.5¢ =		$ 487.20	
(b) Ag:80% X 108 ozs. X 90¢ =		77.60	
(c) Au:.58 ozs. X 75% X $35 =		15.20	
		$ 580.00	
Deduct: Base Charge $30 X 5.8 Tons	$ 174.00		
Penalties, iron (estimated) 10% X 50¢ X 5.8 Tons	29.00		
Rail Freight @ $13 X 5.8 Tons	75.40	278.40	
Gross Net Smelter Value		$ 301.60	
Fob Riddle value per ton crude ore		$ 3.02	

GROSS VALUE PER TON CRUDE $ 16.21

Although these date are based on assumed recovery and grade and are therefore only approximations, they serve to show that these ores could probably return a profit if sufficient tonnage were developed to warrant milling. Preliminary work at the property must be directed to expanding the known ore zone.

P Y

H. G. W

APR 17 1944

The Mammoth Lode
Jackson County, Oregon

- Copper -

Summary

The Mammoth Lode, situated in Secs. 28 and 29, T.32 S., R. 2 W., Jackson County, Oregon, is a relatively new discovery. Development consists of an adit level which comprises about 200 feet of drifting, raising and crosscutting, and a shaft about 35 feet deep. Low grade chalcopyrite ore occurs in a mineralized shear zone, figure 1. This zone bears N. 50° E. and dips to the south east at an angle of about 46° from the horizontal. Three five foot samples across this zone where it is crosscut on the adit level, assayed from 0.25 percent to 2.05 percent in copper. The shaft is caved and inaccessible; ore is reported in the bottom but only scattered showings of sulphide are visible near the collar.

Further development by the owners is justified, but the showings are believed insufficient to justify a project by the Bureau of Mines at this time. If further development produces favorable results, the property should be given further consideration.

Introduction

The property was examined on May 24, 1943, R. C. Treasher, of the Oregon State Department of Geology and Mineral Industries, and A. M. Dixon, of the War Production Board, assisted in making the examination. Mr. Treasher had previously surveyed the mine and worked out the local geology. The map, figure 1, showing the workings and the geology of the deposit, was furnished by Mr. Treasher.

History, Ownership

Very little information is available concerning the history of the property. It is owned jointly by Fred Walther and Daniel G. Poppa of Trail, Oregon, and Dr. Alfred B. Peacock of Marshfield, Oregon.

Situation, Accessibility

The property is situated in the N.W. 1/4 Sec. 28 and the N.E. 1/4 Sec. 29, T. 32 S., R. 2.W., in Jackson County, Oregon. It is accessible over 24 miles of hard surfaced road northward from Medford, Oregon, to Trail, 21 miles of graveled road from Trail, northward to Drew Post Office, 10 miles of Forest Service road from Drew Post Office southward to Divide Guard Station and about 7 miles of mountain road south and southeast to the mine.

Topography and Geology

The mine is near the summit of the range between the Umpqua River and the Rogue River. The altitude is nearly 4,000 feet. Snow generally accumulates to a depth of 4 feet or more during the winter months. The roads to the mine are seldom passable before the latter part of May.

The mine workings are on a relatively steep hillside that slopes to the southwest into the headwaters of Evans Creek. The strike of the ore bearing zone is approximately parallel with the slope of the hill.

it is therefore possible to carry on mining and development operations through relatively short drift adits.

The country rock consists principally of May Creek Schist. Diorite is exposed to the west of the workings. A pegmatite dike that strikes approximately N. 34° E. and dips 40° to the southeast cuts across the adit about 30 feet from the portal. This dike is only a foot to eighteen inches thick.

The ore occurs as chalcopyrite in a shear zone that bears N. 50° E. and dips about 46° to the southeast. A part of the zone is cut diagonally by the adit drift at a distance of 55 to 80 feet from the portal and also by a crosscut at a distance of about 125 feet from the portal, figure 1. The best ore occurs in the footwall which is well defined. The hangingwall is not well defined and may not even be exposed in any part of the adit level. The showings of ore in the drift are not impressive, but in the crosscut is 15 feet of ore that ranges in grade from 0.25 to 2.65 percent in copper. Three samples along the northeast side of the crosscut assayed as follows:

No. 188 - 5 feet wide - 2.65% copper in footwall
" 189 - 5 feet wide - 0.25% copper in center
" 190 - 5 feet wide - 0.72% copper in hangingwall

Ore is also exposed in a short raise that was run from the drift just to the northwest of where the shear zone is exposed in the crosscut. The top of this raise, vertical sections, figure 1, is in the footwall of the shear zone. Ore is reported in the bottom of the incline shaft from the surface above the adit. This shaft however is caved; only scattered showings of sulphides can be found at the collar.

The shear zone is known to extend for a considerable distance to the northeast and also to the southwest of the mine workings. Only a very small part of the total length of the zone has been explored.

Development

Development consists of an adit level that comprises about 200 feet of drifts, raises and crosscuts, and a shaft 35 feet deep. The workings of the adit level are mostly along, or close to, the shear zone. The collar of the shaft is about 64 feet above the adit level. It is probably in or near the footwall of the shear zone.

Equipment

Equipment consists of a small crusher, a 2 by 2 1/2 foot ball mill, a small concentrating table, and a Fahrenwold air cell. This equipment is powered by a Chrysler automobile motor.

Suggestions for Future Development by the Owners

The lack of favorable showings where the drift of the adit cuts diagonally across the shear zone would seem to indicate that the orebody is not continuous for great distances along the strike of the zone. The property, however, should not be condemned because of this lack. Additional development work by the owners is justified on the basis of the showings in the crosscut near the end of the adit.

Drifting to the northeast along the footwall of the shear zone where it is cut by this crosscut would seem to be the most logical procedure. The reasons for this are obvious; they are (1) the drift would be started in the most favorable showing, and (2) depth would be gained very rapidly as the drifting progressed.

Other development work such as surface trenching, crosscutting to the hangingwall of the shear zone, and sinking of a winz on the footwall of the shear zone, might be considered sometime in the future. It is believed, however, that drifting as suggested should be the only development work to be considered in the immediate future.

No work by the Bureau of Mines is suggested at this time.

Conclusions

Copper ore occurs in a shear zone of considerable lateral extent. Only a very minor part of this shear zone has been explored. Showings in one part of an adit level indicate ore over a width of 15 feet. This ore ranges in grade from 0.25 to 2.65 percent copper. The property is insufficiently developed to prove the potentialities of the ore bearing zone. Further development by the company is justified. No work by the Bureau of Mines is suggested at this time, but further consideration is suggested if future development by the company proves favorable.

Location and access

The copper deposits of the Silver Peak district lie in the southern part of Douglas County, Oreg., in secs. 23 and 26, T. 31 S., R. 6 W. By air line the mines are about 7 miles directly south of Riddle, a shipping point on the Southern Pacific Railroad, but by road the distance is about 9½ miles. The road is steep and narrow but except during stormy periods is readily passable.

Topography

The surface of the Silver Peak district is made up chiefly of the steeply sloping sides of many valleys and intervening narrow ridges with fairly flat tops. Altitudes range from 4,000 feet on Silver Peak to less than 2,000 feet in some of the valleys slightly more than a mile distant. Silver Peak is the highest point in the immediate region, and from it a splendid view can be had of the surrounding country. The valley slopes are generally covered with dense growths of timber and underbrush, and hence most of the trails and roads tend to follow the wider valleys or ridge tops.

The three principal streams that rise on the slopes of Silver Peak--the West Fork of Canyon Creek, Middle Creek, and Russell Creek--flow respectively eastward, westward, and northward. This radial drainage pattern is of small extent, however, because all three streams join the Umpqua River. The streams have dissected the region to a stage in which the canyon areas prevail over the rather narrow divides, and the topography of the region can therefore be described as mature.

General Geology

The rocks in the vicinity of Silver Peak belong principally to the Dothan formation, described by Diller, 12/ and to a group of highly altered igneous rocks of several types which are termed greenstones because of their prevailing green color. The contact between the Dothan rocks and the greenstones is irregular but in general strikes northeast and, in the vicinity of Silver Peak, dips at steep angles to the southeast. No quartz diorite or related intrusive rocks are known to crop out in the immediate region.

Dothan Formation

The Dothan formation, of Jurassic age, in the Riddle quadrangle consists predominantly of sandstone but includes also shale, conglomerate, and chert. The strata are usually thin-bedded, yet in places beds about 100 feet thick are found. Some of the rocks have a schistose structure and many of them contain veinlets of quartz parallel to the schistosity. The sandstone is gray and weathers to a yellowish brown and where not strongly metamorphosed breaks with a somewhat rough surface. The shale is usually gray to dark gray and is distinctly slaty. The conglomerate, which occurs in thin beds, contains pebbles that are predominantly siliceous. The chert forms small lentils.

12/ Diller, J.S., U.S. Geol. Survey Geol. Atlas, Riddle folio (no. 218), p. 3, 1924.

Near the Silver Peak mines the Dothan formation is composed principally of dark-gray to almost black thin-bedded schist and highly altered fine-grained argillite. Many of the Dothan rocks are so completely altered that it is difficult to differentiate them in the field from the altered greenstones. Near the ore bodies the schist is bleached to light gray or almost white and, because of the abundance of sericite, has a talcose appearance. In addition, the ore-bearing schist commonly contains considerable quartz, barite, and disseminated sulphides. Strike faults are numerous, some of which agree with the dip of the formation and some do not. The schist lies between dark-gray rocks that are shown by the microscope to be very fine grained, highly altered argillites composed largely of small rounded quartz grains in a fibrous groundmass of sericite and chlorite. The quartz grains are small, on an average about 0.135 millimeter across, and many are partly recrystallized. In the argillite near the ore bodies there are numerous grains of disseminated sulphides.

Greenstones

Irregular bodies of greenstone are widely distributed in the Riddle quadrangle. According to Diller[13] they include altered gabbro, diorite, and diabase and finer-grained altered basaltic rocks, all of which show evidence of crushing and veining.

The greenstones in the immediate vicinity of the Silver Peak mines are prevailingly fine-grained, although some are porphyritic. All contain abundant epidote, fine-grained quartz, chlorite, zoisite, saussurite, and other alteration products. Some retain a suggestion of igneous texture, but others are entirely changed to rocks composed essentially of epidote and quartz. Ore was not observed in greenstone in the Silver Peak district, although elsewhere in southwestern Oregon ore is generally associated with that rock.

Ore deposits

Geographic distribution

Three mines have been worked in the vicinity of Silver Peak. Two of these, belonging to the Silver Peak Copper Co. and the Umpqua Consolidated Mining Co., lie south of Silver Peak. They include portions of the same ore body and for convenience are described together. The third, the Golden Gate mine, lies about half a mile to the north.

Deposits south of Silver Peak

History and development

The mines of the Silver Peak Copper Co. and the Umpqua Consolidated Mining Co. [illegible] on a steep slope south and slightly west of Silver Peak, at a mean altitude of about 3,300 feet. The property of the Silver Peak Copper Co. is in sec. 26, T. 31 S., R. 6 W., and that of the Umpqua Consolidated Mining Co., which adjoins it on the north, is in sec. 23[14]. Ore was first discovered here in 1910 by Robert [illegible], on what is now Silver Peak Copper Co.'s ground.[15] In 1912 J. E. Reeves purchased a patented timber claim which included a large portion of the ore that has

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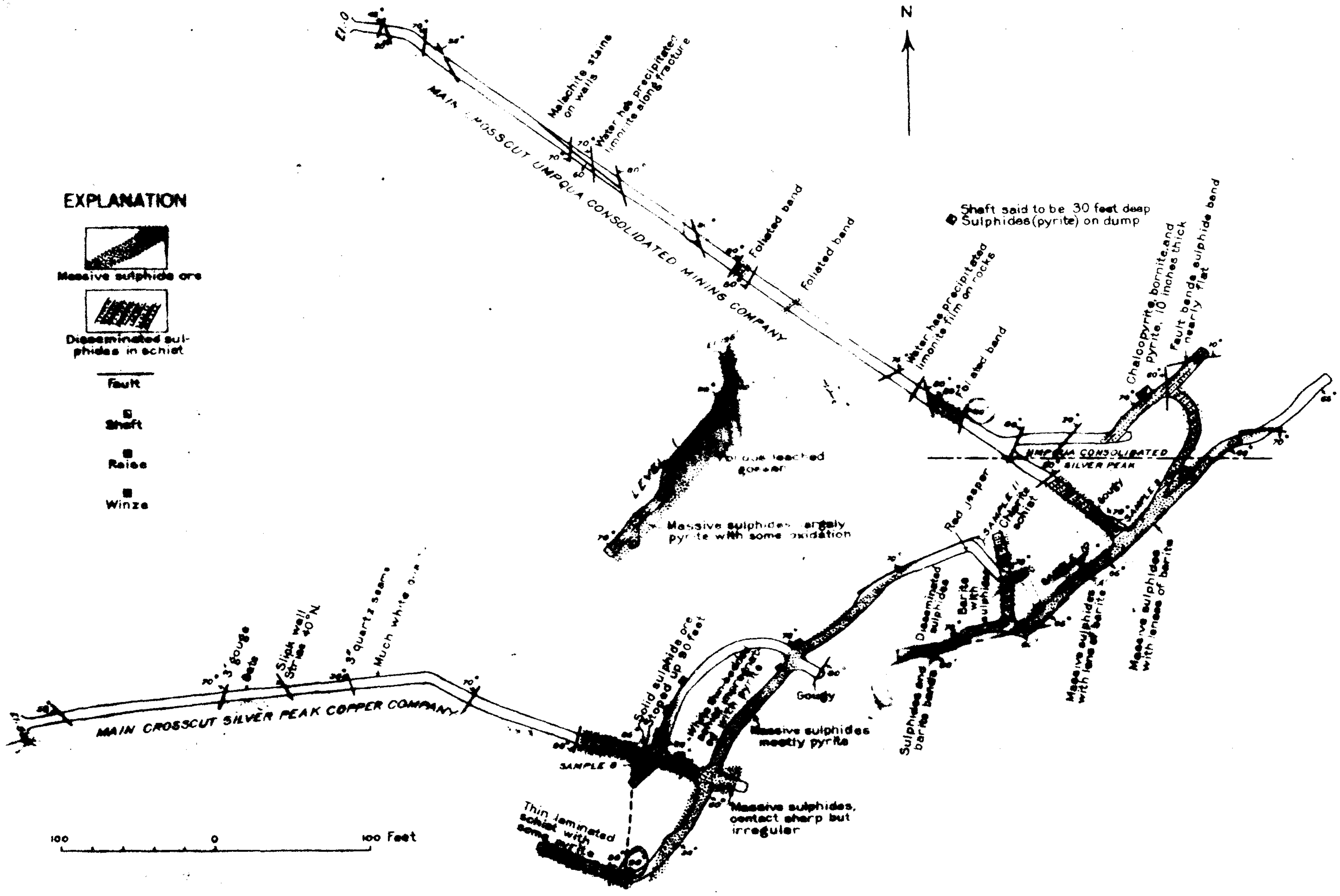
[13] Diller, J. S., op. cit. (Riddle folio), pp. 4-5.

[14] The broken line shown on plate 4 as dividing the two properties was pointed out [illegible] as the boundary line.

[15] Historical data furnished by J. E. Reeves.



MAP OF THE UNDERGROUND WORKINGS OF THE SILVER PEAK MINING CO. AND UMPQUA CONSOLIDATED MINING CO.

since been developed. Little work was done until 1920, when the Oregon Exploration Co. located mineral claims over part of the timber claim. From 1922 to 1929 the property was in litigation, but during this period and in the following year 3,258 tons of ore was shipped from workings now owned by the Silver Peak Copper Co.18/ In 1929 the Oregon Exploration Co. was reorganized as the Umpqua Consolidated Mining Co. This company shipped one car of ore (38 tons) in 1930. Both mines were idle at the time the writer visited them in September 1930. The gross value of the ore shipped, not including zinc, is estimated at $73,000.

The ore bodies have been explored on three principal levels. The lowest, the main level of the Umpqua Consolidated Mining Co., is a cross-cut adit 800 feet long with two drifts aggregating about 600 feet. The main level of the Silver Peak Copper Co., 55 feet higher than the working mentioned and connected to it by a raise, is another crosscut adit about 480 feet long with 550 feet of drifts. The third level, known as No. 1, 195 feet above the Umpqua level, is an adit 170 feet long driven near the dividing line of the properties. There are in addition several shallow workings including a 30-foot shaft at a point 75 feet higher than level 1 and 270 feet above the main level of the Umpqua Consolidated Mining Co. Comfortable camps have been built on both properties, and at the Silver Peak Copper Co.'s mine a No. 10 Ingersoll-Rand compressor and a Fairbanks-Morse 120-horsepower engine, both new, were installed in 1930.

Ore bodies

The ore minerals occur as massive tabular bodies and disseminated in highly foliated schist. The two principal workings expose a zone of mineralized schist more than 100 feet wide. Across most of this zone sulphide minerals are rather sparsely distributed, but in at least two places bodies of nearly solid sulphide ore occur. One of these, in the main crosscut of the Silver Peak Copper Co., the "northwest band," is about 15 feet wide and another, the "southeast band," is over 20 feet wide. (See pl. 41) Both pinch out to the northeast, one within a distance of 200 feet and the other within 60 feet. Two sulphide bodies are exposed also on the main level of the Umpqua Consolidated mine, but there the northwest body is only about 10 inches wide, whereas the southeast body is about 10 feet wide. Normally the massive ore grades into schist with disseminated sulphides, but in some places, especially where the massive ore pinches, one or both walls are slickensided fault surfaces commonly lined with several inches of gouge.

The massive sulphide ore is distinctly banded, probably in part because the ore minerals have replaced schistose rocks and in part because the minerals were introduced along parallel fractures in the rock. The sulphides include pyrite, sphalerite, chalcopyrite, bornite, galena, tennantite, chalcocite, and covellite, named in the relative order of their abundance. The last four mentioned occur in relatively small amounts. In addition the occurrence of native copper is reported by Mr. Reeves. The gangue minerals are principally quartz, barite, and sericite. Epidote was seen in one thin section of the ore.

18/ Production data furnished by Victor C. Heikes, of the U. S. Bureau of Mines.

At the surface oxidation is almost complete. Level 1, for example, follows a porous, iron-stained, and greatly leached gossan in which no sulphides are visible. A short distance from the portal sulphides become visible and are abundant near the face. Sulphides were struck also in the 30-foot shaft on the Umpqua Consolidated property. Traces of oxidation extend as deep as the lower levels, as shown by thin films of oxide minerals along fractures.

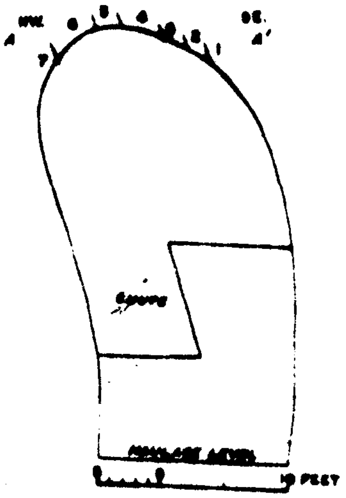


Figure 2.-Cross section through stope along line A-A, plate 4, Umpqua Consolidated level.

1. Massive sulphide band; mostly pyrite with a little visible bornite and other sulphides.
2. Massive barite with sulphide stringers.
3. Massive sulphide band; pyrite with considerable bornite and chalcopyrite and lesser amounts of other sulphides.
4. Massive sulphide band, largely pyrite.
5. Sulphide band with barite stringers.
6. Massive sulphide band, pyrite with considerable bornite; some chalcopyrite, and small amounts of other sulphides.
7. Massive sulphide with some small stringers of barite; this band itself consists of banded sulphides. Pyrite prevails in some bands, sphalerite in others. Bornite and chalcopyrite and small amounts of other sulphides occur with them.

Quartz was the first gangue mineral to be deposited. It is everywhere fine-grained but tends to be coarser in the fractures along which it was introduced. Barite was introduced next, then fracturing occurred, and pyrite was deposited. After a second fracturing sphalerite, tennantite, chalcopyrite, bornite, galena, and chalcocite were deposited as an overlapping series and probably in the order named, although the relation of galena and chalcocite was not well established. (See fig. 3.)

The mineral composition differs in the different ore bodies and within the layers of a single ore body, as shown, for example, by the northwest and southeast ore bodies in the Umpqua Consolidated mine. The sulphides of the northwest ore body are associated with abundant quartz but very little barite, whereas the southeast ore body contains much barite and smaller amounts of quartz. The southeast body in the stopes above the level consists of nearly solid sulphides with some layers of barite. The barite is lenticular in outline, and any one layer does not persist very far. The sulphides are distinctly banded. One stope shows seven distinct bands with parallel structure. (fig. 2). The composition of the northwest ore body resembles that of layers 3 and 6 of the southeast ore body as shown in the illustration. The ore exposed on the Silver Peak Copper level more nearly resembles the ore of the southeast ore body of the Umpqua Consolidated level. However, in some places -- for example, near the top of the connecting raise -- the copper sulphides are less abundant and the proportion of barite is greater than normal. At the turn in the drift, 30 feet northwest of the raise, the rocks are largely replaced by very fine grained silica that has irregular red jasperlike streaks.

Four carefully cut samples taken at selected places serve to show the relative proportions of the metals to one another but do not necessarily illustrate the average metal content of the ore, which may be more closely determined from the production figures that follow. Analyses of the samples made in the chemical laboratory of the United States Geological Survey are given below:

Analyses of ores from the Silver Peak district, Oreg.
[E. T. Erickson, analyst]

Sample no.	Silver (ounces per ton)	Gold (ounces per ton)	Copper (percent)	Zinc (percent)
8.......	0.59	0.09	4.08	6.5
9.......	.30	.01	.90	.9
10.......	4.58	.03	5.13	7.5
11.......	.45	.01	.93	.6

8. Silver Peak Copper tunnel, northwest ore body. Sample taken in stope 33 feet above tunnel level across 5½ feet of massive sulphide ore.

9. Umpqua Consolidated tunnel, main crosscut immediately northwest of massive sulphide band. Sample taken across 9 feet of schist with disseminated sulphides.

10. Umpqua Consolidated tunnel. Sample taken across 7 feet of massive sulphide ore in stope along line A-A; plate 4.

11. Silver Peak Copper tunnel, 30 feet northwest of top of connecting raise. Sample taken across 6 feet of intensely silicified rock containing some visible sulphides.

The results show that copper and zinc increase and decrease together, but indicate no similar relations between those metals and gold and silver or between the gold and silver themselves.

The following table is based on the production figures furnished by V. C. Heikes, of the United States Bureau of Mines:

Average metal content of ore from Silver Peak and ~~Umpqua~~ Consolidated mines

Year	Ore produced (tons)	Gold (ounces per ton)	Silver (ounces per ton)	Copper (percent)
Silver Peak				
1926	389	0.12	7.3	6.0
1928	937	.044	2.7	6.7
1929	1666	.07	3.6	5.6
1930	264	.057	3.0	4.4
Umpqua Consolidated				
1930	38	[illegible]	2.2	3.9

3294 .082 5.42

Origin of the ore

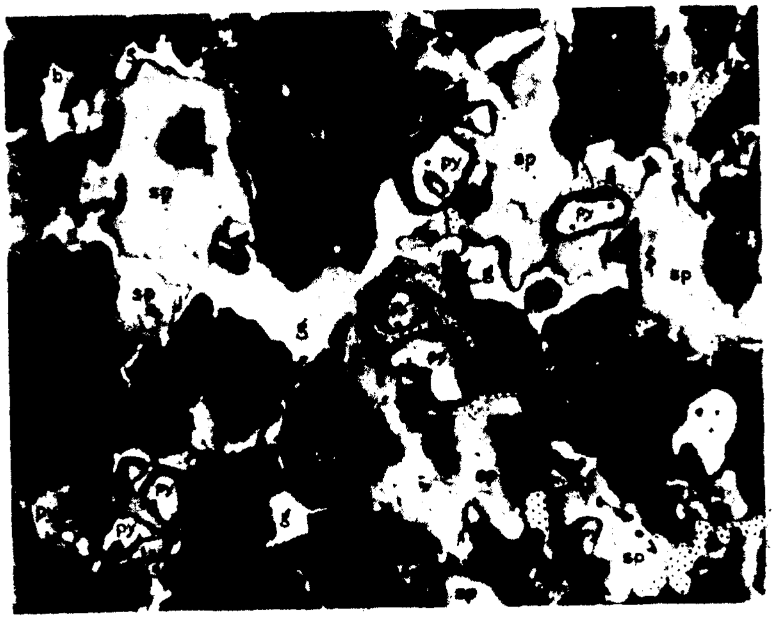
The mineralogy of the ores described above is evidence of their hypogene (deep-seated) origin -- that is, the mineral assemblage as shown by the careful observations of many geologists belongs to Lindgren's mesothermal type, deposited at moderate depths by hot solutions. The source of the solutions is not evident from the geology in the immediate vicinity of the deposit, but quartz diorite and related rocks, which are believed to be the sources of many ore deposits in southwestern Oregon, are exposed a few miles distant and are probably not far below the surface at Silver Peak.

The ore-bearing solutions, whatever their source, deposited gangue and sulphide minerals as they moved through the schistose rocks. The solutions apparently rose along planes of schistosity and replaced the adjoining material. Certain beds in the schist were apparently either more susceptible to replacement or were more readily penetrated by the solution than others, because solid sulphides occur interbedded with schist in which sulphides are sparsely distributed. The composition of the ore-bearing solutions probably changed during the period of deposition, because minerals of different composition have been deposited in an overlapping succession. Movements occurred within the rocks during the mineralization, once after the gangue minerals were deposited and again after the deposition of the pyrite. The later sulphides were deposited as a continuous series. After the deposition of the sulphides, strains within the rocks were relieved along faults, some of which have displaced the ore. More recently the sulphides near the surface have been oxidized, and much of the metal content of the outcrops has been removed by leaching. Erosion has kept pace fairly well with the oxidation, for at no place in the vicinity are oxide minerals known in abundance very far beneath the surface.

Economic aspects

The ore bodies at the Silver Peak Copper and Umpqua Consolidated mines have not been sufficiently developed to permit exact tonnage estimates, nor has the ground in the immediate vicinity been sufficiently explored to indicate the probability of undiscovered ore bodies nearby, but enough work has been done to demonstrate that fairly large bodies of good-grade massive sulphide ore are present. Also sampling shows that there is a possibility, when metal prices recover, of mining and milling lower-grade disseminated ore along with the higher-grade material.

A. Bornite (bo) replacing pyrite (py). Reflected light, Enlarged 100 diameters.



B. Sulphide ore, illustrating intimete relations of minerals. ba, Barite; sp, sphalerite; g, galona; py, pyrite; b, bornite; stippled areas, chalcopyrite. Enlarged 100 diameters.

Figure 3. - Photomicrographs of ores, Silver Peak mine.

Only a very small percentage of the sulphides found on the lower levels are supergene (descended from above), and therefore it follows that there is not much likelihood of any material change in the metal content of the ore for some little distance below the present deepest level. However, owing to the fact that the outcrop has been almost entirely oxidized and much of the metallic content removed, more or less sulphide enrichment is to be expected immediately below the zone of oxidation.

The facts available permit some conclusions as to the probable vertical and horizontal extent of the ore. Foliated schists similar to those containing the ore are exposed at the surface for some distance north and south of the known ore bodies. In places they are mineralized—for example, at the Golden Gate mine, to the north, described below. Some mineralization was also noted in a schist of similar appearance about half a mile to the southwest. Underground the ore has been followed along the strike for a total distance of over 450 feet, and in at least two places it continues beyond the present workings. Both bodies of solid sulphide ore were sheared off in the northeast drifts of the Silver Peak Copper Co.'s main level but continue into the walls to the southwest of the present workings. The southeast ore body on the Umpqua Consolidated level appears to turn into the southeast wall of the drift about 50 feet from the face. It appears also to have undergone shearing, and further work may prove that it is displaced. At the south end of the same drift the ore appears to end against an east-west, southward-dipping fault. Sulphide ore interlayered with barite is exposed on one side of this drift about [illegible] feet from the face, and it seems likely that the ore body may continue southwestward from this point. Thus the evidence underground does not suggest that the horizontal limits of the ore bodies have been reached. Even where the ore is sheared off by faulting there is no known reason why the segments may not be recovered. Outcrops of partly oxidized sulphide ore occur 140 and 270 feet above the ore bodies found on the two main levels. No raises have been driven through to the surface to prospect the ground between these outcrops, although at one place ore has been stoped above the Silver Peak Copper Co.'s level for a vertical distance of about 90 feet. It seems reasonable, however, to expect the ore to continue to the surface, though not necessarily as one continuous body, because of the possibility of fault displacement. It is generally recognized that there is usually a relationship between the horizontal extent of an ore body and its downward extension, and as the ore bodies under discussion are exposed on the lower levels over a horizontal distance of 450 feet without having ended, they can reasonably be expected to extend for some distance below the present workings.

Deposits north of Silver Peak

Most of the mining on the north side of Silver Peak has been done by N. A. Bradfield on the Golden Gate property. He located seven claims in 1919, and although lessees have since worked the property, he still retains the ownership. According to Mr. Bradfield[1] two cars of ore have been shipped. One car containing [illegible] tons gave gross smelter returns of $1,000, mostly in gold, and another car shipped by lessees is reported to have returned $1.76 a ton.

---

[1] Personal communication.

In all, about 600 feet of underground development work has been done. Most of the work has been concentrated on the claims near the road in the vicinity of the Bradfield cabin; the remainder on claims about half a mile to the east.

The production has come chiefly from an open cut and some shallow workings close to the Silver Butte road. The ore occurring here is a dark grayish-green chlorite schist striking N. 30°- 60° E. and dipping 50°- 70° SE. A layer in the schist contains pyrite cubes and some stringers of chalcopyrite, and according to Mr. Bradfield free gold can be panned from some of the rock. The pyrite cubes range in size from those that are barely visible to some with faces over half an inch across. The cubes cut across the schistosity of the enclosing rock, thus indicating that they were formed later.

Two tunnels have been driven on a mineralized bed in foliated schist at a point several hundred feet east of the workings just described. The two tunnels, which differ in altitude by 90 feet, have explored the mineralized bed for a total distance of about 170 feet. The schist is similar to that containing the disseminated ore at the Silver Peak Copper and Umpqua Consolidated mines and probably was mineralized under similar conditions and at the same time. In contrast, however, very little quartz or barite was noted in the deposit at the Golden Gate mine.

Almeda mine

Location and access. - The Almeda mine is on the north bank of the Rogue River in the SE¼ sec. 13, T. 34 S., R. 8 W. Willamette meridian, 26 miles below Grants Pass and 4 miles from Galice. Merlin, on the main line of the Southern Pacific Railroad 19 miles to the southwest, is the nearest accessible shipping point. A road to connect the mine with Leland, also on the Southern Pacific Railroad but only 10 miles distant, was started but never completed. High water carried away the bridge that once connected the mine with the Merlin road, and at present to reach the mine it is necessary to cross the Rogue River on an aerial tram or by boat.

History and production. - The Almeda mine has been known for many years because of the great extent of the mineralization and because some fairly large masses within the mineralized zone contain enough gold and other metals to attract notice. Consequently, a small smelter was built in 1908, but no production was reported until 1911. From 1911 to 1916, 16,619 tons of ore that yielded 1,[illegible].87 ounces of gold, 46,387 ounces of silver, and 269,800 pounds of copper was produced. A total of 7,197 pounds of lead was also reported as produced from 6,189 tons of ore during 1913, 1915, and 1916. No lead was reported in 1911, 1912, or 1914. The gross value of the ore produced, on the basis of these figures, is, in round numbers, $108,000.

Development. - The Almeda mine is one of the most extensively developed mines in southwestern Oregon. A mineralized zone has been prospected for more than 1,000 feet along its strike and for about 900 feet vertically. Five adits have been driven, and a shaft with levels at intervals of 100 feet was sunk to a depth of about 450 feet below the Rogue River (pl. 5). The shaft is no longer accessible, but most of the workings above the river are open.

ESTIMATION OF RESERVES

Definition of Terms: ~~In any estimate of ore reserves, certain basic assumptions must be established. When an ore-body is outlined on three or four sides it may be regarded as fairly well proven in extent.and is classified as "proven" ore.~~ For the purposes of this report, one drift of ore in a hillside, together with a fairly well-exposed outcrop, will establish "proven" ore in the included vein when vertical distances are less than 100 feet. "Probable" ore is here regarded as ore that is outlined by development on only one or two sides. "Possible" ore is that ore that may possibly be mined before the entire ore-reserves of the mine are exhausted. Calculations of these "possible" reserves, the continuity of the known ore-bodies, the type of ore, and the structural conditions, are all factors which have been ~~must be~~ taken into account

Development: On the Silver Peak--Umpqua Consolidated Property--development has been insufficient,as can be seen on the accompanying map,to block out the ore-bodies. However, certain estimations can be made with the above assumptions well in mind.

The two levels are over 200 feet below the outcrop, and the upper is 50 feet above the lower. The aggregate length of the ore exposed on both levels is nearly 700 feet with thicknesses varying from one to two feet up to over 15 feet. At the junction of the upper crosscut with the two ore-bodies, the total thickness of both lenses is over 25 feet of solid sulphide; but usually the thickness is between 5 and 10 feet.

Correlation even between the two developed levels is very difficult since although the ore-bodies are similar in strike and dip, they are offset both along their length and across their strike. ~~Probably each fingers or pinches out rapidly, and determination of tonnage reserves without further development is risky.~~

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

2033 First Street
Baker, Oregon

1069 State Office Building
Portland 1, Oregon

239 S.E. "H" Street
Grants Pass, Oregon

P-28672

REQUEST FOR SAMPLE INFORMATION

The State law governing analysis of samples by the State assay laboratory is given on the back of this blank. Please supply the information requested herein fully and submit this blank filled out along with the sample.

Your name in full **Harry Lester Shippen**

Street or P.O. Box **Box 497** City & State **Canyonville, Oregon**

Are you a citizen of Oregon? **Yes** Date on which sample is sent **August 9, 1963**

Name (or names) of owners of the property **Harry L. Shippen**

Are you hiring labor? **No** Are you milling or shipping ore? **No**

Name of claim sample obtained from **White Mule**

Location of property or source of sample (If legal description is not known, give location with reference to known geographical point.)

County **Douglas** Mining District **Silver Butte**

Township **31 S.** Range ~~5 W.~~ 6W Section **13** Quarter section **NW¼**

How far from passable road? **On road** Name of road **Russell Creek**

	Channel (length)	Grab	Assay for	Description
Sample no. 1	7 ft. wide ledge	X	Au, Cu	Quartz - sulphide
Sample no. 2				

(Samples for assay should be at least 1 pound in weight)

(Signed) **Harry L. Shippen**

DO NOT WRITE BELOW THIS LINE - FOR OFFICE USE ONLY - USE OTHER SIDE IF DESIRED

Sample Description **Chalcopyrite in quartz.**

Sample number	GOLD		SILVER		COPPER			
	oz./T.	Value	oz./T.	Value	Cu			
P-28672	0.02	$0.70	1.60	$1.45	3.10%	- - -	- - -	- - -

Report issued ________ Card filed ________ Report mailed **8-21-63** Called for ________

SIR-

FAX (604) 683-5306

NO.229(1988)
NOVEMBER 28, 1988

George Cross News Letter
"Reliable Reporting"

WESTERN CANADIAN INVESTMENTS

BLACK SWAN GOLD MINES LTD. (BSW-V,AUSTRALIA)

SIX MONTHS ENDED SEPTEMBER 30, 1988	
Share of Production oz.gold	4,800
Revenues	$2,613,000
Operating Expenses	1,534,000
Operating Profit	1,079,000
Other Expenses	260,000
Income Taxes	287,000
Cash Flow	1,012,000
Net Earnings	532,000
Per Share	3¢

SIX MONTH REPORT Arthur T. Fisher, president reported the six month financials for Black Swan Gold Mines Ltd. Black Swan owns 25% of the Gabanintha gold mine in Western Australia. Since Sept.30, 1988, production from the Gabanintha gold mine has continued to improve to an annualized rate of about 48,000 ounces, of which about 12,000 ounces would be for the account of Black Swan. The average direct cost of production is about AUS $324 per ounce of gold.

FORMOSA RESOURCES CORPORATION (FSA-V)

RESERVES REPORTED - Dr. Kuang I. Lu, president of Formosa Resources Corporation reported the results of current exploraton at its 100% owned Formosa/Silver Butte project 48 km north of Grants Pass, Douglas county, Oregon. Exploration work to date has outlined five sulphide bodies in the main zone area with reserves of about 460,000 tons grading 0.043 oz.gold/ton, 1.380 oz.silver/t, 3.40% copper, and 2.83% zinc. Assay results are pending for three more holes, which could increase reserves further. Potential for additional ore occurs both down dip and along stike, and testing continues.

Three drilling machines are working on the property, and one of the drills will pursue new geophysical targets located by current VLF-Mag survey results that coincide with previous geochemical anomalies. Environmental and metallurgical studies will also be done as part of a preliminary evaluation of the property.

CUSAC INDUSTRIES LTD. (CQC-V)
GULF TITANIUM LTD. (GUT-V)

CRUSE/BELMONT UPDATE - Gulf Titanium Ltd. and Cusac Industries Ltd. report that work is progressing well at the Cruse/Belmont 50/50 joint venture near Marysville, Montana. Positive cash flow is being generated by limited production now underway. Increased production is expected shortly pending the negotiation of a custom milling contract with a facility near Helena, Montana.

A crew of 15 men, under the supervision of Martin Sadd, project manager, and Giles Walker, project geologist, are preparing the underground mine for increased production, which should begin by late February or early March 1989, at a rate of 100 tons per day. Under the custom milling arrangement a minimum of 1500 oz.gold per month is anticipated from operations.

The 200 ton per day modular mill scheduled for installation in the fall of 1988 at the mine site has not been completed. The anticipated bank financing for the project was not finalized. However, Gulf Titanium, operator of the project will continue to pursue the construction of its own mill throughout 1989. Management

reserves (proved, probabl
1988 including 5,167 tor
84,347 tons, contining ar
162,779 oz. silver. Pr
2,334 tons averaging an
1.59 oz.silver/t". Guilf
Gulf Titanium believes
additional 150,000 tons i

Total Energold Corpo
appeal the $2,700,000 j
reported in GCNL NO.22
confident the judgement w

GOLDEN PRINCESS MI
ALBAN EXPLORA

NEVADA PROPERTY LEASED -

Corporation and Alban E
agreed, on a 50/50 basis,
agreement with John Torok
the 1,500 acre Golconda g
located 180 miles northea
regulatory approval.

Golden Princess and
property over the next 20
annual royalty payments o
a 5% net smeltery return
Alban will also issue 50,
upon approval of the ag
Alban may re-purchase 3%
the vendor will retain a

The Golconda propert
Pinson Mining Co.'s Prebl
southern extension of th
several major gold deposi

Recent geological e
by the company geologi
geologists, Vic Holliste
P.Eng. have indicated gol
and silicified carbonaceo

Since this project
company intends to proc
geological and geochemica

TERRA MINES LTD.

9 MONTHS ENDED 30 SEPT
Revenues
Net Loss
Loss Per Share

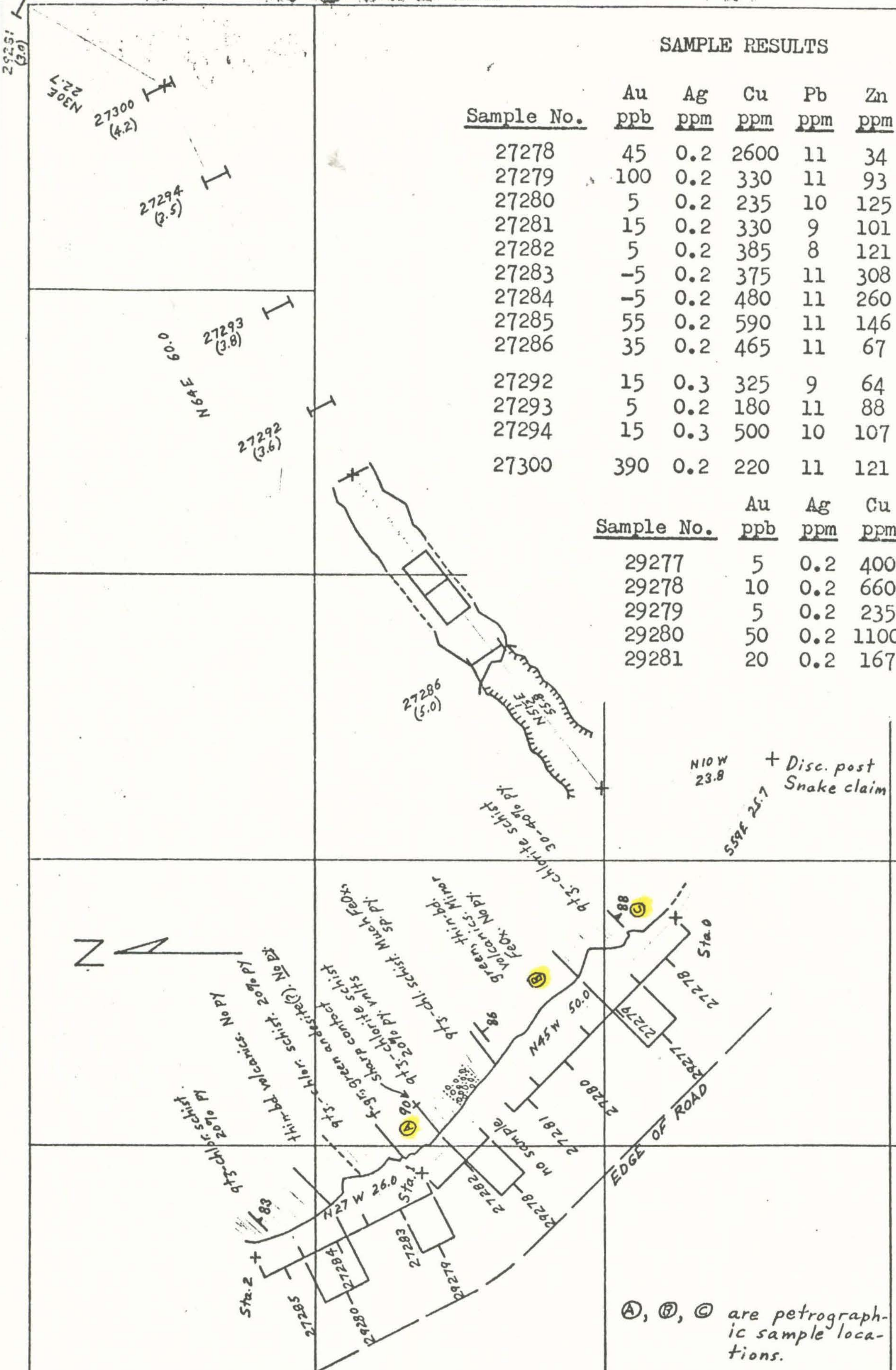
Results for 1987
from Terra Mines Ltd.'s
project, which was termi
1988 arises from contrac
on cash balances.

The company, thro
mining company, operates
Sonora, Mexico. The Ame
of preparation for pr
production levels are 25

SAMPLE RESULTS

Sample No.	Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Hg ppb	Interval
27278	45	0.2	2600	11	34	12	40	10 ft.
27279	100	0.2	330	11	93	16	30	10
27280	5	0.2	235	10	125	5	5	10
27281	15	0.2	330	9	101	5	15	5.0
27282	5	0.2	385	8	121	4	-5	10
27283	-5	0.2	375	11	308	5	10	10
27284	-5	0.2	480	11	260	5	5	10
27285	55	0.2	590	11	146	3	-5	6.0
27286	35	0.2	465	11	67	10	475	5.0
27292	15	0.3	325	9	64	6	3400	3.6
27293	5	0.2	180	11	88	10	3000	3.8
27294	15	0.3	500	10	107	6	2700	3.5
27300	390	0.2	220	11	121	4	280	4.2

Sample No.	Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Hg ppb	In
29277	5	0.2	400	14	44	8	5	5.
29278	10	0.2	660	11	156	6	20	4.
29279	5	0.2	235	12	200	5	10	5.
29280	50	0.2	1100	13	324	7	30	6.
29281	20	0.2	167	11	95	5	45	3.



Ⓐ, Ⓑ, Ⓒ are petrographic sample locations.

SILVER PEAK AREA
MINE *ROAD CUT IN NW¼ NE¼, 13-31-6*

LEVEL

NOTES BY *RCP*

SCALE *1" = 20'*

DATE *10/22/76*
11/5/76

~~West Fk of Canyon Ck. File (See pp. 75-6)~~ SILVER PEAK FIL

December 1950 Portland, Oregon

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Head Office: 702 Woodlark Building, Portland 5, Oregon

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REPORT OF RECONNAISSANCE OF THE AREA FROM PANTHER BUTTE TO TELLURIUM PEAK, DOUGLAS COUNTY, OREGON

By

D. J. White and H. D. Wolfe*

Introduction and abstract

During September 1950 twelve days were spent by the authors in a reconnaissance of the area from Panther Butte to the Silver Peak mine on Silver Butte, from the Silver Peak mine northeastward to the Gold Bluff mine on the north side of Tellurium Peak, and along the West Fork of Canyon Creek, southwestern Douglas County, Oregon. The area is roughly five miles wide and fourteen miles in length and consists of a greenstone belt bordered on the west by the Dothan sediments and on the east outside of the immediate area by the Galice formation. The greenstones contain numerous serpentine and rhyolite masses (see accompanying map).

Dole and Baldwin (1947:99) recommended a study of this area as a result of their reconnaissance of a larger area extending from the Almeda to the Silver Peak mines. This memorandum report is written as a supplement to their report, which should be consulted for background and bibliography of the geology of the region.

The purpose of this reconnaissance was to attempt to trace the mineralized zone of the Silver Peak mine southwestward to Panther Butte and northeastward beyond Silver Butte. Also, the search was continued for barite as diagnostic of mineralization since barite is one of the principal gangue minerals in the Silver Peak mine as well as at the Almeda mine. However, no additional occurrences of barite were found during this reconnaissance.

According to Shenon (1933) the contact between the Dothan formation and the greenstones in general strikes to the northeast, and in the vicinity of Silver Peak, dips steeply to the southeast. The schistosity and the zones of mineralization in this area conform with this trend. The ore bodies of the Silver Peak mine occur in a mineralized zone in schists, which Shenon considered as part of the Dothan formation. During this reconnaissance, mineralized zones in greenstone were observed on Canyon Creek to the east of the Silver Peak zone.

Northeast of the Silver Peak mine, mineralized shear zones in leached, silicified schists were noted in the workings of the following mines and prospects: the Golden Gate mine (east workings), about half a mile north of the Silver Peak mine, in sec. 23, T. 31 S., R. 6 W.; the Huckleberry mine in SE¼ sec. 7, T. 31 S., R. 5 W.; the Sweetbrier mine in SW¼ sec. 5, T. 31 S., R. 5 W.; and at an outcrop below the lower mine workings of the Gold Bluff mine.

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* Geologists, Oregon Department of Geology and Mineral Industries.

In general the sulphide minerals are rather sparsely distributed in the leached schists of the above mines, and massive sulphides were not observed in any of them. Southwest of the Silver Peak mine mineralized zones were observed in workings of the Silver Peak prospects located in sec. 27, T. 31 S., R. 6 W. It is doubtful that the mineralized zones of the Silver Peak prospects represent an actual continuation of the ore zones of the Silver Peak mine, but probably they are either individual zones along the same general trend or faulted parts of the Silver Peak zone.

Dole and Baldwin (1947:98) mention a prospect tunnel which was driven along a quartz stringer in greenstone on the south side of the South Fork of Middle Creek. This quartz stringer does not follow the trend of the shear zones, but apparently was formed in a cross fracture in the greenstone. Southwestward beyond this point along the west slope of Grayback Mountain and Panther Butte no mineralized zones were found other than along quartz stringers in serpentine masses.

A siliceous mineralized zone occurs along the West Fork of Canyon Creek and is exposed on the east bank of Canyon Creek along U.S. Highway 99 approximately 0.8 of a mile south of Bear Gulch. This zone of mineralization occurs in greenstone and trends northeastward paralleling the shear zone of the Silver Peak area.

Some mines and prospects in the area other than the Silver Peak and Umpqua Consolidated mines

Because Shenon (1933) discusses the Silver Peak and Umpqua Consolidated mines, a detailed review of ore deposits and developments at these mines is not included in this report. The mines and prospects visited during this reconnaissance are listed below. All elevations mentioned were determined with an altimeter and only a minor amount of control was available for checking and adjusting the readings of the instrument.

Gold Bluff mine (1)*

The Gold Bluff mine is located in the NE¼ sec. 5, T. 31 S., R. 5 W., in what appears to be foliated greenstone close to a small serpentine mass. Several tunnels have been driven in the serpentine in this general area. On a logging road at an altitude of 1,600 feet about 200 feet below what is believed to be the lower workings of the Gold Bluff mine is a 15-foot-wide iron-stained leached zone containing disseminated sulphides. This zone strikes N. 45° E. and dips steeply to the southeast. A grab sample (P-10389) from this zone assayed in the Department's laboratory contained no gold or silver.

Sweetbrier mine (2)

The Sweetbrier mine is located in SW¼ sec. 5, T. 31 S., R. 5 W., on the East Fork of Mitchell Creek. Buildings on the property are located at an altitude of 1,710 feet. Southeast of the buildings at an elevation of 1,820 feet are an open cut and a 35-foot drift on a northeastward-striking pale green to white schist with disseminated sulphides. Pyrite, some chalcopyrite, and a small amount of malachite were observed in one specimen obtained.

It is likely that this mine is the same as the Gold Ridge claim.**

Huckleberry mine (3)

The Huckleberry mine is located in the SE¼ sec. 7, T. 31 S., R. 5 W., on the north side of a southeast fork of Mitchell Creek. It is owned by E. B. Hart and F. J. Fahy. Equipment at the mine consists of a mill building with a small two-stamp mill and a concentrating table.

There are two tunnels on the property, a short lower tunnel at 1,800 feet in elevation and a larger upper tunnel at an altitude of 1,950 feet. An old tram 200 to 300 feet in

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*Numbers after mine names are the same as key numbers on accompanying map.

**Oregon Dept. Geology and Mineral Industries Bull. 14-C, vol. 1, p. 102, 1940.

length extends from the mill building to the upper workings. The portal of the upper tunnel is caved, but it appears to trend N. 50° E. The size of the dump indicates several hundred feet of workings. The material on the dump consists mainly of a light-green to gray schist with disseminated sulphides. The lower workings are in greenstone and chloritic schist. This tunnel extends N. 80° E. for 80 feet and then forks, one branch of which extends a short distance N. 25° E. and the other S. 60° E. About 2 feet of sheared material with a minor amount of pyrite is exposed a few feet from the face of the southeastward-trending branch. This zone strikes N. 40° E. and dips SE 75°.

Production and history of this mine is recorded* as follows:

> "Mineral was reportedly discovered in 1912 . . . and work has been carried on sporadically since that time. The record of production is as follows: 1912-1915, $2000; 1931, $400; 1932-1936, $4000 per year."

Beaver Springs mine (4)

This mine was not found but is reported** to be located in secs. 7 and 18, T. 31 S., R. 5 W. H. L. Shawver, now deceased, is said to have traced the Silver Peak mineralized zone in a northeasterly direction toward the Beaver Springs mine. From 1923 to 1928 a tunnel trending S. 35° E. was driven for over 1,000 feet. Its portal is now caved. Ore is reported to have shown pyrite, chalcopyrite, bornite, and sphalerite, and a sample of the ore is said to have assayed 12 percent copper, 1 ounce of gold, and 12 ounces of silver to the ton.

Golden Gate mine (5)

The main workings of the Golden Gate mine are located east of the Silver Butte road at an elevation of about 3,000 feet and consist of a shaft, an open cut, and several short tunnels. According to Shenon (1933:23-24):

> "Most of the mining on the north side of Silver Peak has been done by N. A. Bradfield on the Golden Gate property. He located seven claims in 1919, and although lessees have since worked the property, he still retains the ownership. According to Mr. Bradfield two cars of ore have been shipped. One car containing 36 tons gave gross smelter returns of $1,000, mostly in gold, and another car shipped by lessees is reported to have returned $1.76 a ton.
>
> "In all, about 600 feet of underground development work has been done. Most of the work has been concentrated on the claims near the road in the vicinity of the Bradfield cabin; the remainder on claims about half a mile to the east.
>
> "The production has come chiefly from an open cut and some shallow workings close to the Silver Butte road. The ore occurring here is a dark grayish-green chlorite schist striking N. 30° - 60° E. and dipping 50°-70° SE. A layer in the schist contains pyrite cubes and some stringers of chalcopyrite, and according to Mr. Bradfield free gold can be panned from some of the rock. The pyrite cubes range in size from those that are barely visible to some with faces over half an inch across. The cubes cut across the schistosity of the enclosing rock, thus indicating that they were formed later."

The mineralized zone in the chlorite schist at the main workings shows little similarity to that at the Silver Peak and Umpqua Consolidated mines.

Two tunnels several hundred feet east of these workings have been driven in gray to white, siliceous leached schist containing disseminated sulphides. The schist is similar

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*op. cit., page 105.

**op. cit., page 100.

to that at the Silver Peak and Umpqua Consolidated mines, but contains less quartz. A lower tunnel is at an altitude of about 2,925 feet and an upper tunnel is about 100 feet higher.

The upper tunnel consists of a crosscut tunnel running S. 50° E. for 65 feet. Thirty feet in from the portal, gray to white leached schist with disseminated sulphides is encountered and extends for about 20 feet. About 45 feet from the portal a drift turns S. 50° W. and follows the schist for 30 feet. The schist dips steeply to the SE. Greenstone is exposed at the face of the crosscut and faulting is indicated. A short distance east of the portal a prospect pit exposes the schist which appears to have been sheared off by faulting.

The lower crosscut is approximately 200 feet in length. A drift extending northeast and southwest from this crosscut exposes leached mineralized schist which has a maximum thickness of about 10 feet. The schist strikes N. 50° E. and dips 60° SE. and appears to pinch out at both ends of the drift.

Silver Peak prospects (6)

SE¼?

A short crosscut tunnel is located in sec. 27, T. 31 S., R. 6 W., on the east side of a new fire access road leading to the southwest from Silver Butte road at a point 0.4 mile from the saddle south of the Silver Peak mine. Elevation of the portal is 3,340 feet. The tunnel extends (S. 45° E.) (?) into the hill approximately 80 feet. At 70 feet along the crosscut a drift extends approximately 50 feet S. 50° W. Fifteen feet from the beginning of the drift another crosscut runs S. 40° E. for 20 feet. About 15 feet of leached siliceous schistose material with disseminated sulphides is exposed in this crosscut. The mineralized zone strikes N. 45° E. and dips 57° SE. This zone is bounded on the northwest by a fine-grained white chert.

NW?

Dole and Baldwin (1947:99) mention a tunnel on the Silver Peak property, located at the head of a small tributary of the South Fork of Middle Creek. This tunnel at about 3,200 feet in elevation trends N. 40° E. and parallels the schistosity. It was flooded and could not be entered. The leached schistose zone appears to be bounded on the southeast by greenstone and on the northwest by a fine-grained gray to white chert (?).

One hundred fifty feet lower and a short distance south of the tunnel at 3,200 feet in elevation is a tunnel which drifts on a schistose leached zone extending N. 40° E. approximately 50 feet, then turns N. 70° E. for 50 feet and then N. 60° E. for 150 feet. This drift follows a sheared mineralized zone ranging from 3 to 10 feet wide. The last 150 feet has a well-defined hanging wall which strikes N. 60° E. and dips 65° SE.

Prospects on Canyon Creek (7)

A mineralized zone consisting of siliceous material with disseminated sulphides is exposed in new road cuts along U.S. Highway 99 and along Canyon Creek about 0.8 mile south of Bear Gulch. The zone appears to strike to the northeast. More than 600 feet of this zone is estimated to be exposed in the east bank of Canyon Creek which cuts diagonally across the strike of the mineralized zone. A chip sample was taken from 200 feet of this zone exposed along the creek. The sample (P-10387) showed a trace of gold and no silver or copper. A short tunnel on the north side of a small tributary to the west of Canyon Creek penetrated about 20 feet of the zone before greenstone was encountered. A dump on the east side of Canyon Creek several hundred feet north of the locality where sample P-10387 was obtained shows similar siliceous material containing sulphides. The adit here was filled with water and was not examined.

Prospects along the West Fork of Canyon Creek (8)

In the SE¼ sec. 15, T. 31 S., R. 5 W., on the east side of the West Fork of Canyon Creek at an elevation of about 1,325 feet is an old prospect consisting of an open cut and an inclined shaft which explore a siliceous mineralized zone in greenstone. The prospect is 3.1 miles from U.S. Highway 99 via California-Oregon Power Company power line road that follows along the west side of the West Fork of Canyon Creek. A cabin is located on the east side of the road. The open cut trends N. 45° E. for about 40 feet along the strike of the mineralized zone which is 6 feet wide and contains disseminated sulphides, mainly pyrite and chalcopyrite. The zone as exposed in the inclined shaft, which is 20 feet deep, appears to contain more quartz than that part of it exposed in the cut and is heavier in sulphides which frequently are in massive bands. A grab sample (P-10386 B) from the dump at the shaft assayed as follows: a trace of gold, no silver, and 1.20 percent copper.

At a point 3.3 miles from U.S. Highway 99 along the power line road a 4-foot zone of leached, siliceous, iron-stained sericitic material crosses the road, and at 3.45 miles at an altitude of 1,340 feet leached, siliceous sericitic schist is exposed. Four miles along this road on the hillside to the west leached siliceous schist is exposed in a small cut. The schist as exposed in the cut strikes N. 40° E. and dips to the SE. and contains a minor amount of sulphides.

At a distance of 5.8 miles the power line road turns to the southwest following along a tributary of the West Fork of Canyon Creek. At 5.9 miles a prospect is located on the east side of this tributary. Development work consists of a crosscut and a shaft. Siliceous material containing abundant sulphides was found on the dump. Elevation of the crosscut is 1,625 feet and the shaft is at 1,700 feet. West of the main road along an access road to the power line, white schists are exposed.

An adit on the west side of St. Johns Creek in sec. 19, T. 31 S., R. 5 W., at an altitude of 1,800 feet exposes gray siliceous material with finely disseminated sulphides at its portal. No attitude could be determined.

Peavine-Panther creeks prospect (9)

At an approximate elevation of 3,000 feet on the ridge between Peavine Creek and Panther Creek several open pits and one tunnel running S. 55° W. are located in a small serpentine mass bounded by greenstone. No indication of a mineralized zone similar to that in the Silver Peak mine was found in this area.

Cook Creek-Ping Gulch prospects (10)

Several prospects were noted along Cook Creek northeastward to Ping Gulch on the west slope of Panther Butte. These prospects, both placer and lode, consist of workings in a serpentine mass along the western edge of the belt of greenstone. The serpentine contains numerous quartz stringers.

Bibliography

Dole, H. M. and Baldwin, E. M.
A reconnaissance between the Almeda and Silver Peak mines of southwestern Oregon: Oregon Dept. Geology and Min. Industries Ore.-Bin, vol. 9, no. 12, pp. 95-100, 1947.

Shenon, P. J.
Copper deposits in the Squaw Creek and Silver Peak districts and at the Almeda mine, Southwestern Oregon, with notes on the Pennell & Farmer and Banfield prospects: U.S. Geol. Survey Circ. 2, 1933.

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ALUMINA PLANT "CONSIDERED"

It is known that Harvey Machine Co. of Torrance, California, has been considering the possibility of putting a plant for the production of alumina from imported bauxite in the Portland, Ore., area to supply its proposed aluminum reduction plant at Kalispell, Mont. The project is still in a nebulous and exploratory stage with inquiries having been made as to potential plant sites and ore unloading and handling facilities. In spite of the vast aluminum reduction plants operating in the Pacific Northwest no alumina plants exist there with all alumina being brought in from southeastern United States.

(From Iron Age, West Coast Edition, San Francisco, November 23, 1950)

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[Bft] Basaltic Flows, Agglomerates and Tuffs

At its base this unit is in contact with the Coast Range Thrust. And at its upper contact this unit interfingers with [A-Df] and [Dt]. The majority of pyroclastic basalt is dark gray, aphanitic, with 10-20 vol. % light green irregular lenses and bands which may contain tiny chloritized fragments. A coarse agglomeratic or flow breccia texture with up to 20 vol. % clasts (3-8 cm across) is sometimes visible on the weathered surfaces of outcrops. Vesicles are often preserved, but somewhat flattened. A porphyritic basalt lava which contains large (up to 2 mm) augite phenocrysts in a groundmass of altered plagioclase is exposed at the Formosa No. 1 portal. Derkey (1982) reports that identifiable alteration minerals in the groundmass of this basalt flow include submicroscopic albite, chlorite, and epidote. The road cut between the Formosa No. 1 and Silver Butte No. 1 portals exposes a very fine grained basalt which sometimes contains small (1-5 mm) flattened vesicles.

[A-Df] Andesite, Silicified Andesite to Dacitic Flows

These flows are massive, pale to medium green, aphanitic, often vesicular and contain round quartz-filled amygdules. The rock is andesitic in appearance and the vesicles are often filled with quartz, suggesting either later silicification or a more dacitic original composition. It was sometimes difficult to distinguish whether visible quartz bits were vesicle fillings or phenocrysts.

[Dt] Dacitic Tuffs [15]

Dacitic tuff from surface outcrops is typically light gray to tan, while samples from mine and drill core are typically pale to medium green. Derkey (1982) reports that in thin section, this tuff consists of approximately 5% partially altered plagioclase phenocrysts in a groundmass of fine-grained, sub microscopic quartz, epidote, chlorite, and possibly albite.

Numerous clots and veinlets of white quartz with dark green chlorite occur in the dacite tuff exposed in the underground and drill core. In addition, inspection of drill core from holes F86S-5 and S-8 shows this unit can include so called "creme fragments". These are large (up to 30 cm across) very fine-grained, massive, light greenish-yellow, chucks of what may have been volcanic glass and is now altered into microfine-grained quartz and epidote. These creme fragments are particularly numerous in one of the hanging wall [fDt] units to be described below.

The estimated total thickness of all three of these intercalated units is about 650 m up from the Coast Range Thrust.

[fDt] Foliated Dacitic Tuffs [14], [13], [12], [7], [6], [3]

This is a complex sequence, approximately 100-150 m thick, of assorted green, purple and brown colored heterogeneous pyroclastics which often include lapilli-to-block size volcanic rock fragments (of basic to siliceous composition), flattered pumice, large feldspar crystals, and sometimes sulfide clasts, scattered in a wispy matrix of medium-to-fine grained tuff. Derkey (1982) reports that this unit is chemically similar to the [Dt] unit, and that x-ray diffraction analysis indicates the matrix to consist of chlorite, epidote, albite and quartz.

Foliation is expressed in the alignment of matrix minerals and flattened pumice and fragments. It is of variable intensity and locally results in fissility of the rock. Foliation is parallel to bedding and wraps around the clasts. The foliation is sometimes crenulated and is sometimes disrupted in a way which may be interpreted as due to soft-sediment deformation or slumping. A SE trending subhorizontal lineation is frequently visible on foliation surfaces.

Distinctions within this [fDt] rock unit are best recognized in the drill core and underground. The best surface exposure of this unit is in road cuts south of the Silver Butte No. 1 adit. These surface exposures look most like rock [3] seen in the drill core. In the approximate middle, stratigraphically, of this [fDt] unit is the [fRt] rock which hosts the massive sulfide lenses. The footwall units of [fDt], namely [14] and [13], and the hanging wall units [7], [6], [3], are described as follows.

[14] Foliated Green and Brown Lithic Tuffs

This unit is exposed only in the Formosa No. 1 and No. 2 levels and in F86S-1. It is mostly green but can include up to 3 vol. % pale brown wisps. It includes 0.1 to 3 cm laminated bands of usually bright red (but sometimes almost black), greasy material interpreted to be an Fe-clay, from 5 to 35 vol. % of the rock. In [14], this Fe-clay frequently has a hematitic sheen and sometimes includes visible specular hematite. The origin of Fe-clay was considered by Shimazaki (1986) and is discussed in "Mineralization" below.

[13] Foliated Purple and Green Lithic Tuffs

This unit is exposed in the Formosa No. 1 level and in F86S-1, 2, 3, 4, 6, 8. It includes 0.2 to 10 cm angular siliceous lithic fragments, from 40 to 80 vol. % of the rock. It also can include up to 7 vol. % red Fe-clay wisps as part of its matrix. At its top, the unit is in contact with the [10] unit of [fRt], and in the drill core exposures the upper portions of [13] are frequently interbedded with the lower portions of [10]. Away from its contacts with [10], unit [13] is all dark purple in color. Close to its contacts with [10], unit [13] gradually becomes green. First the matrix becomes green, with still purple lithic fragments. Then the lithic fragments also become green from their edges (and from fractures) inward. Finally, the last 20-80 cm in direct contact with [10] is completely green and fissile. This is interpreted as a chloritization due to hydrothermal alteration of the tuff near its contacts with the massive-sulfide hosting unit [10].

[12] <u>Very Fissile Green Tuff</u>
This is a pale green chlorite-(talc?)-sericite tuff that occurs only as an interbed within the [10] unit. It is exposed in the Formosa No. 1 and Silver Butte No. 1 levels and in drill holes F86S-2, 7, with poor exposures in holes F86U-1, 2, 3, 4 and 5. These exposures might in fact be interbeds of [13] which have been completely chloritized.

[7] <u>Sulfide Lapilli Tuff</u>
This unit occurs stratigraphically directly above the [10] or [8] units of [fRt], and is exposed in the Formosa No. 1, Formosa No. 2, and Silver Butte No.1 levels and in all drill holes. It is not observed in outcrop. The unit was named by Derky (1982) because of the presence of lapili-size sulfide grains, aggregates of grains, or massive sulfide fragments, which constitue up to 10 vol. % of the tuff near its basal contacts. Sulfides are predominately pyrite and chalcopyrite, with occasional traces of sphalerite. In addition, near its basal contacts, this unit is a dark purple-gray color and can contain lapilli-size "eyes" and fragments of pink to red ferruginous quartz (up to 3 vol. %), wisps of red Fe-clay (up to 20 vol. %), pink clay material on fracture surfaces, and 1 mm disseminated grains of magnetite (up to 3 vol. %). It also frequently has a 3-15 cm bleached and sulfide rich alteration halo directly in contact with [10] or [8]. And in at least one instance a small interbed of purplish [7] occurs within the upper part of the massive sulfide lens. The presence of ferruginous quartz eyes and fragments in [7], and its stratigraphic location directly above massive sulfide, led Derkey (1982) to consider [7] to be analogous to the ferrugenous chert (Tetsusekiei) zone of typical Kuroko stratigraphy (see "Mineralization" below).

In its stratigraphically higher portions, this unit grades in color from purplish gray to various green shades, with lapilli-size pale gray, pale green, or pale blue rounded quartz (up to 15 vol. %), lapilli-size, flattened feldspar fragments (up to 10 vol. %), and lapilli-size yellow epidote star shaped crystal agregates (up to 10 vol. %) all of which act as "eyes" in a foliated matrix of greenish "wisps" including up to 10% yellow epidote wisps. Sulfide lapilli and magnetite grains may or may not be present. Thus in the drill reports, this upper portion of [7] is sometimes called "Foliated Wisps-and-Eyes Tuff".

[6] Foliated Green Pumice Tuff

This unit is clearly exposed only in drill holes F86S-1, 2, 5, and F86U 1, 2, 3, 4, 5. It is pale to dark green and has a characteristic "torn veil" look. This unit includes purplish zones caused by the presence of dark to red (magnetic) Fe-clay wisps. In F86-1 and all the underground holes, [6] includes a 20 to 100 cm thick horizon which is paler and grayer than the rest of the unit and which in some cases contains 1% fine scattered grains and laminations of gray sulfides (sphalerite and/or galena) and a 2-10 mm bed of pink ferruginous quartz lapilli.

[3] Foliated Heterogeneous Green Tuff

This unit is exposed in all the surface drill holes but is not clearly differentiated on surface. It fits the general description of [fDt] given above, but is always greenish in color. This unit especially includes frequent (greater than 5 vol. %) "creme fragments", which were described above as they occurred in the [Dt] unit. Here the creme fragments are flattened parallel to foliation and include tension gashes perpendicular to foliation filled with milky quartz (and rare pyrite grains) which are also sometimes cut by a second generation of fine fractures. In addition this unit includes numerous clots of white quartz and dark green chlorite. Going down hole from about 45-65 m above the massive sulfide mineralization, this unit starts to include first pink ferruginous quartz fragments (greater than 1 vol. %) which become more numerous further down (up to 3 vol. %), and then bright red to almost black magnetic Fe-clay (up to 12 vol. %, including small zones with greater than 30 vol. %) sometimes with visible grains of magnetite. The presence of magnetite in the hanging wall units [3], [6], [7], as opposed to hematite in the footwall unit [14], was noted by Shimazaki (1986) and is discussed in "Mineralization" below.

There is another type of [fDt] which is present for 70 m in hole F86S-6, but in no other drill core, surface, or underground exposures. It is a foliated, greenish-gray quartz lapilli tuff which includes 10-25 vol. % pale oblong quartz lapilli (2-10 mm). In its approximate stratigraphic middle, this rock has a 14 m thick zone which includes [3] and [7], with a 1.35 m thick layer of gray colored quartz and fine grained pyrite (3 vol. %) in disseminated beds. The [3] and [7] do not have any Fe-clay or magnetite or hematite. The 1.35 m gray quartz and pyrite layer may be due to a very weak episode of hydrothermal activity similar to that which elsewhere produced the [fRt] unit which hosts the massive sulfide.

A similar gray quartz and pyrite zone, though only 3-5 cm thick, was exposed in F86S-1, 2 and 7, within unit [3], about 60 m stratigraphically above the massive sulfide mineralization.

Another siliceous rock occurring within [3] was exposed in F86S-1, 2, 8, and called [4]: Gray Siliceous Crystal Tuffs. This unit occurs as a 0.6 to 1 m bed of unfoliated, dark purplish to greenish gray quartz with 7 vol. % pale epidote and quartz subrounded crystals (less than 2 mm in size). It also occurs as a mixture with [3] in a 2.2 m thick zone which is composed of 40 vol. % large (1-4 cm) fragments of gray siliceous crystal tuff; this is exposed in F86-1.

[fRt] Foliated Rhyolitic Tuff

This unit occurs entirely within the [fDt] unit, and is exposed in all the drill holes (except F86S-6) with a thickness from 20 to 70 m. On surface, it is intermittently exposed for a strike length of approximately 1.7 km in the Formosa claims (southern end), Silver Butte patented land, and Riddle claims. In addition, there are very intermittent exposures over 400 m in the north end of the Formosa claims, exposures over 700 m of strike length south of the Riddle claims (South Fork Prospect), and an exposure west of the Formosa claims (Golden Gate mine). Underground and in the drill core, [fRt] can be subdivided into two units, [10] and [9], plus massive sulfide [8]. Surface exposures are usually gossans of porous, foliated quartz with strong limonitic or hematitic stain, and occasional clearly bedded massive sulfide which has survived weathering. Hole F86-8 intersected about 20 m of such gossanous remains from the weathering of [10] and [8].

The mineralized units [10], [9], and [8] will be discussed in "Mineralization" below.

[At] Andesitic Tuffs [2]

On surface this unit is seen in roadcuts between exposures of [fDt] and [bRt]. These tuffs are bedded, sometimes weakly foliated, and can contain up to 40 vol. % 1-2 mm feldspar crystals and fragments in a medium green, aphanitic matrix. A finely foliated clastic texture is commonly apparent only on weathered surfaces; fresh surfaces are massive. Bedding thickness varies from a few centimeters to several meters.

In the drill core, examples of [At] are exposed in holes F86S-1, 2, 3, 4, 5, 7, 8, and included under the numerical label [2]: Homogeneous Green Tuffs (not or weakly foliated). These tuffs occur as beds from 10 to 30 m thick, interbedded with [3] and [1]. These are fine to medium grained, medium to dark green in color, with no pumice, rock fragments, or Fe-clay. They do include the creme fragments and the clots of white quartz and dark chlorite described as occurring in [Dt] and [fDt], and they include randomly oriented wisps of pale epidote.

Some beds are weakly foliated with 10 vol. % fine (1 mm) feldspar grains, or with 5 vol. % fine dark chlorite grains. Other beds contain from 3 to 30 vol. % coarse (3-7 mm), sometimes rounded, epidotized feldspar crystal aggregates. These beds are labelled in the drill core as [2] but may in fact be andesite sills or dikes [As] rather than andesitic tuffs [At].

[bRt] Well-Bedded Porcelaneous to Medium-Grained Rhyodacite Tuff [1]

This approximately 500 m thick unit occurs along the crest and east flank of Silver Butte, overlying and intercalated with the [fDt] and [At] at its base. It is exposed in the drill core of holes F86S-1, 2, 5 and 7, and is labeled [1] Porcelaneous to Medium-Grained Bedded Tuffs. This is a pale greenish-gray silt to sand-sized (epiclastic) tuff which is commonly siliceous and indurated. It is also commonly laminated or very thinly bedded (1-3 cm beds), with some medium to thick beds (1-5 m) of tuffaceous sandstone occurring as interbeds. Occurrences of graded bedding indicate that this unit is upright.

[Bt] Basaltic Tuffs (with minor flow units)

[Btf] Basaltic Tuffs and Flows

These upper two stratigraphic units are described by Derkey (1982) and Johnson-Page (1979). See Fig. 9 above for their descriptions.

Besides the mineralization hosting unit [fRt], only the following rock units remain to be described:

[tH] Tectonized Harzburgite

[Sp] Serpentine and Greenschists

These ultramafic (and mafic) rocks are exposed sporadically along the Coast Range Thrust. The harzburgite in the NE of the area shown in Figure 10 is serpentinized and includes elongate porphyroclasts of orthopyroxene and chromium spinel, and so is tectonized.

[As] Andesite Sill (or Dike)

On surface this unit occurs in contact with every other stratigraphic unit. There are two predominant porphyritic textures, that of a fine-grained, dark green matrix with from 1 to 20 vol. % poorly defined white feldspar phenocrysts up to 5 mm in diameter, and that of a medium-grained, medium green matrix with 2-10 vol. % euhedral feldspar phenocryst clusters up to 7 mm in diameter. Non-porphyritic fine-grained andesite is also observed. However, exposures of [As] are sometimes difficult to distinguish from [At]. And in particular, drill core exposures of what may be [As] or [At] are indiscriminately labeled [2].

[5] Biotite-Dacite Dike

This unit cuts through [7], [6] and [3] in holes F86S-2, U-1, 2, 3, 4, and its occurrences vary in thickness from 2 to 11 m. This rock is weakly foliated, greenish gray, medium to coarse grained with approximately 40 vol. % quartz and feldspar, 50 vol. % darker minerals, less than 1 vol. % fine disseminated pyrite, and including up to 5 vol. % hornblende needles in holes S-2 and up to 5 vol. % biotite in the underground holes. Occurrences of [5] in the underground holes usually show chilled aphanitic margins and the adjacent rock shows margins of epidotization. Like the rocks in the [Dt], [fDt] and [At] categories, [5] includes clots of white quartz and dark chlorite, as well as the so-called "creme fragments" which include white quartz. The latter may be just due to epidotization of the rock around some of the places where white quartz developed.

Silicified Dacite

The bottom of hole F86S-2 exposes 12 m of another rock which is called silicified dacite. It is unfoliated, dense and siliceous, dark purplish gray in color, with about 7 vol. % randomly oriented subhedral feldspar laths (1 mm). It has one occurrence of hematitic red Fe-clay, one occurrence of a creme fragment with ferruginous quartz, and frequent occurrences of red Fe-clay and minor pyrite on fracture surfaces.

[11] Basalt Blocks

These are from 0.2 to 5 m thick and occur scattered in [fRt], and possibly [fDt]. They are exposed in many locations in the drill core and in the underground levels. They are medium to dark green unfoliated, massive, medium-coarse grained (1-4 mm), composed of about 50 vol. % dark-green chlorite and 50 vol. % pale epidote grains. Clots of white quartz and dark chlorite are often present. Randomly oriented wisps and zones of epidote are sometimes present. Sometimes up to 15 vol. % randomly oriented or weakly foliated feldspar grains (0.5 to 4 mm in size) are present. Sometimes the blocks include zones of foliated dark chlorite eyes, or foliated quartz eyes with chlorite rims. And blocks occurring in contact with [8], e.g., in F86S-1, 4, have 5-30 mm bleached and pyritized halos which include large 2-5 mm pyrite cubes.

STRUCTURE

The northeast-trending Coast Range thrust and the apparently related, subordinate and subparallel, Silver Butte thrust are the most obvious structures in the Silver Butte area. Both thrusts dip to the southeast. Though poorly exposed at Silver Butte, the Coast Range thrust is thought by Hotz (1969) to have a dip ranging from vertical to 40 degrees SE.

The strike of the rock units at Silver Butte parallels the trend of the Coast Range and Silver Butte thrust faults. Bedding dips about 60-70 degrees SE, but varies locally from 25-85 degrees SE. Graded bedding and cross bedding in [bRt] indicates the unit is upright with tops to the east. In the [fRt] unit, a small syncline observed in the southwest corner of the patented land and a parallel anticline observed in a road cut 300 m further southwest and also near the old workings in the middle of the Riddle claim block, are the only indication of folding on Silver Butte. This minor syncline-anticline pair may be the present expression of a monocline in the original beds that was higher to the southeast and then was tilted to dip southeast along with the other rocks.

Foliation, when present, is generally parallel to bedding. And especially in the [fRt] unit there is often a lineation visible on the foliation surfaces which plunges 20-30 degrees to the SE. Yanai (1986) notes that such foliated and lineated rocks are LS-tectonites which ideally form though "plane strain simple shear" which results in elongation (causing a lineation) in one direction compensated by flattening (causing foliation) at right angles to the direction of elongation. This type of deformation is typical of ductile shearing. In contrast, Derkey (1982) argues that the observed foliation is due to simple compaction (flattening) of subaqueous pyroclastic flows under the weight of later flows, and that the observed elongation is either due to the pyroclasics having been deposited and compacted on a slope, or else reflects an alignment during flowage prior to deposition

(Derkey, 1982). However, Yanai points out that the compaction associated with subaqueous pyroclastic flows should be local and small scale. Yet in the Silver Butte area the observed foliation, weakly or strongly developed, with or without lineation, is not limited to rocks which could be recognized as pyroclastic flows, but rather occurs in all the lithologic units except andesite sills and basalt blocks. So this deformation is better understood as a shearing deformation, which occurred in rocks which had been subject to local very intense hydrothermal alteration, to regional metamorphism to the lower greenschist facies, and then subject to regional and local tectonic stresses.

GEOLOGY OF THE SILVER PEAK MINE, A KUROKO-TYPE DEPOSIT IN JURASSIC VOLCANIC ROCKS, OREGON, U.S.A.

By

Robert E. DERKEY and Hiroharu MATSUEDA

THIS PROSPECTUS CONSTITUTES A PUBLIC OFFERING OF THESE SECURITIES ONLY IN THOSE JURISDICTIONS WHERE THEY MAY BE LAWFULLY OFFERED FOR SALE AND THEREIN ONLY BY PERSONS PERMITTED TO SELL SUCH SECURITIES.

NO SECURITIES COMMISSION OR SIMILAR AUTHORITY IN CANADA HAS IN ANY WAY PASSED UPON THE MERITS OF THE SECURITIES OFFERED HEREUNDER AND ANY REPRESENTATION TO THE CONTRARY IS AN OFFENCE.

PROSPECTUS DATED: FEBRUARY 28, 1986

RAND VENTURES INC.

(hereinafter called the "Company")
806-850 West Hastings Street
Vancouver, British Columbia

PUBLIC OFFERING - 600,000 Common Shares

Shares	Price to Public	Discount	Net Proceeds to be received by Company*
Per Share	$0.60	$0.06	$0.54
Total	$360,000	$ 36,000	$324,000

* Before deduction of costs of the issue estimated to be $20,000.

THERE IS NO MARKET FOR THE SECURITIES OF THE COMPANY.

A PURCHASE OF THE SECURITIES OFFERED BY THIS PROSPECTUS MUST BE CONSIDERED AS SPECULATION. ALL OF THE PROPERTIES IN WHICH THE COMPANY HAS AN INTEREST ARE IN THE EXPLORATION AND DEVELOPMENT STAGE ONLY AND ARE WITHOUT A KNOWN BODY OF COMMERCIAL ORE. NO SURVEY OF ANY PROPERTY OF THE COMPANY HAS BEEN MADE AND THEREFORE IN ACCORDANCE WITH THE LAWS OF THE JURISDICTION IN WHICH THE PROPERTIES ARE SITUATE, THEIR EXISTENCE AND AREA COULD BE IN DOUBT. SEE ALSO PARAGRAPH "RISK FACTORS" ON PAGE 20.

NO PERSON IS AUTHORIZED BY THE COMPANY TO PROVIDE ANY INFORMATION OR TO MAKE ANY REPRESENTATION OTHER THAN THOSE CONTAINED IN THIS PROSPECTUS IN CONNECTION WITH THE ISSUE AND SALE OF THE SECURITIES OFFERED BY THE COMPANY.

UPON COMPLETION OF THIS OFFERING, THIS ISSUE WILL REPRESENT 29.1% OF THE SHARES THEN OUTSTANDING AS COMPARED TO 48.01% THAT WILL THEN BE OWNED BY THE DIRECTORS AND SENIOR OFFICERS OF THE COMPANY AND ASSOCIATES OF THE UNDERWRITER. REFER TO THE HEADING "PRINCIPAL HOLDERS OF SECURITIES" ON PAGE 17 HEREIN FOR DETAILS OF SHARES HELD BY DIRECTORS AND SENIOR OFFICERS. ASSOCIATES OF THE UNDERWRITER HOLD SHARES OF THE ISSUER. FOR FURTHER DETAILS SEE "OTHER MATERIAL FACTS" ON PAGES 19-20.

ONE OR MORE OF THE DIRECTORS OF THE COMPANY HAS AN INTEREST, DIRECT OR INDIRECT, IN OTHER NATURAL RESOURCE COMPANIES. REFERENCE SHOULD BE MADE TO THE ITEM "DIRECTORS AND OFFICERS" ON PAGE 15 FOR A COMMENT AS TO THE RESOLUTION OF POSSIBLE CONFLICTS OF INTEREST.

THE VANCOUVER STOCK EXCHANGE HAS CONDITIONALLY LISTED THE SECURITIES BEING OFFERED PURSUANT TO THIS PROSPECTUS. LISTING IS SUBJECT TO THE COMPANY FULFILLING ALL THE LISTING REQUIREMENTS OF THE VANCOUVER STOCK EXCHANGE ON OR BEFORE OCTOBER 15, 1986, INCLUDING PRESCRIBED DISTRIBUTION AND FINANCIAL REQUIREMENTS.

WE, AS PRINCIPALS, CONDITIONALLY OFFER THESE SECURITIES SUBJECT TO PRIOR SALE, IF, AND AND WHEN ISSUED BY THE COMPANY AND ACCEPTED BY US IN ACCORDANCE WITH THE CONDITIONS CONTAINED IN THE UNDERWRITING AGREEMENT REFERRED TO UNDER "PLAN OF DISTRIBUTION" ON PAGE 1 OF THIS PROSPECTUS.

UNDERWRITER: C.M. OLIVER & COMPANY LIMITED
2nd Floor - 750 West Pender Street
Vancouver, British Columbia V6C 1B5

EFFECTIVE DATE: APRIL 18, 1986

RAND VENTURES INC.

PROSPECTUS

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APPENDICES

PLAN OF DISTRIBUTION

Offering and Appointment of Underwriters

By an agreement dated October 21, 1985, as amended by an agreement dated January 16, 1986 (collectively referred to as the "Underwriting Agreement"), C.M. Oliver & Company Ltd. of 200-750 West Pender Street, Vancouver, British Columbia ("Underwriter") has agreed to underwrite 600,000 shares ("Shares") of the Company and offer the Shares on a day, (the "Offering Day"), within 180 days from the date upon which the Shares of the Company are conditionally listed (the "Effective Date") on the Vancouver Stock Exchange (the "Exchange") through the facilities and in accordance with the rules and policies of the Exchange (the "Offering").

The Underwriter has agreed to purchase the Shares at the purchase price of $0.54 per Share payable within ten (10) business days of the Effective Date except as otherwise noted in "Rights of Termination" below. The Shares underwritten are for primary distribution to the public at the price of $0.60 per share.

The Underwriter reserves the right to offer selling group participation in the normal course of the brokerage business to selling groups of other licensed broker-dealers, brokers and investment dealers, who may or who may not be offered part of the commissions or bonuses derived from this Offering.

Rights of Termination

The obligations of the Underwriter under the Underwriting Agreement may be terminated prior to the Effective Date at the Underwriter's discretion on the basis of its assessment of the state of the financial markets and may also be terminated at any time upon the occurrence of certain stated events. The Underwriter may also terminate its obligations if, within ten (10) business days of the Effective Date, the Issuer has not satisfied the listing requirements of the Exchange and caused the Exchange to effect the unconditional listing of the Shares, provided that by such time the Underwriter has met all of its obligations to the Exchange in respect of listing of the Shares.

The Company has granted the Underwriter a right of first refusal to provide future public equity financing to the Company for a period of twelve (12) months from the Effective Date.

Those persons or companies holding an interest of not less than 5% of C.M. Oliver & Company Limited are Eagletree Estates Ltd. (controlled by Robert A. Chilcott), Robert A.

Chilcott, R.P.C. Holdings Ltd. (controlled by R. Page Chilcott), W. Ross Nursey and Kenzo Kawazoe.

There are no payments in cash, securities or other consideration being made, or to be made, to a promoter, finder or any other person or company in connection with the Offering.

The Exchange has conditionally listed the Shares being offered pursuant to this Prospectus. Listing is subject to the Company fulfilling all the listing requirements of the Exchange on or before October 15, 1986, including prescribed distribution and financial requirements.

THE COMPANY

The full name of the Company is Rand Ventures Inc. (the "Company") and its registered office and records office is 1700-750 West Pender Street, Vancouver, British Columbia, V6C 2B8. The Company will maintain its executive offices at Suite 806 - 860 West Hastings Street, Vancouver, British Columbia.

The Company was incorporated by Memorandum on the 4th day of May, 1984, under the British Columbia Company Act. The Company is in good standing with the Registrar of Companies for the Province of British Columbia. The Company is also registered in the State of Oregon and holds a Certificate of Authority issued by the Department of Commerce, State of Oregon, U.S.A.

USE OF NET PROCEEDS

The net proceeds to be derived by the Company from the sale of securities offered by this Prospectus are $324,000.00 which will be spent in priority as follows:

1.	To pay the costs of the issue (including Legal, Audit & Printing)	$ 20,000.00
2.	Reserve for the payment of Current Liabilities as at December 31, 1985	$ 37,470.00
3.	To carry out Phase II of the work program on the Silver Peak Property recommended by R.R. Culbert, Ph.D. P. Eng., in his report dated October, 1985	$ 32,500.00
4.	Reserve to carry out Phase III of the work program on the Silver Peak Property recommended by R.R. Culbert, Ph.D., P.Eng. in his report dated	

	October, 1985. (Contingent upon results of Phase II exploration.)	$155,000.00
5.	Reserve for payment of Convertible Promissory Note	$ 10,000.00
6.	To provide Working Capital for General Corporate purposes	$ 69,030.00
	TOTAL:	$324,000.00

The Company may, pursuant to the recommendation of a qualified engineer or geologist, abandon in whole or in part any of its present properties, or alter, as work progresses, the work programs recommended on its properties, or make arrangements for the performance of all or a portion of such work by other persons or companies. The Company may use any money so diverted for the purpose of conducting work on, or examining other properties acquired by the Company after the date of this Prospectus, but funds diverted from the proceeds of this Offering may not be so used without an engineering or geological report recommending such expenditure being first accepted for filing by the appropriate regulatory authorities. The Company has no present plans in that regard; however, if any such event occurs during the primary distribution of the securities referred to in this Prospectus, an amendment to this Prospectus will be filed with the appropriate regulatory authorities; and, if any such event occurs subsequent to completion of primary distribution, notice thereof will be given to all shareholders.

No part of the proceeds will be used to invest, underwrite or trade in securities other than those that qualify as investments in which trust funds may be invested under the laws of the jurisdiction in which securities offered by this Prospectus may be lawfully sold. Should the Company propose to acquire non-trustee type securities after initial distribution of the securities offered by this Prospectus, approval by the shareholders will first be obtained and prior disclosure will be made to the regulatory authorities having jurisdiction over the sale of the securities offered by this Prospectus.

The Company will not make commitments which require the expenditure of more than $50,000.00 on or for any project or venture without first obtaining the recommendation of a qualified engineer or geologist independent of the Vendor or Operator and, where required, the approval of the Exchange. The Company will arrange for engineering reports and contracts to be filed with the Exchange or the Superintendent of Brokers as the case may be as soon as practical after such commitments are made providing no allotment of shares of the Company is involved, in which case, prior approval of the regulatory authorities will be obtained.

In the event of any material change in the affairs of the Company during the primary distribution of the shares offered by this Prospectus, an amendment to this Prospectus will be filed. Following completion of the primary distribution of the shares offered by this Prospectus, shareholders will be notified of changes in the affairs of the Company in accordance with the requirements of the appropriate regulatory authorities.

SHARE CAPITAL STRUCTURE

Designation of Security	Amount Authorized	Amount outstanding as of the date of this Prospectus	Amount to be outstanding on completion of this Offering
SHARE CAPITAL			
Common Shares	10,000,000 without par value	1,462,001	2,062,001

PARTICULARS OF SHARES SOLD FOR CASH (PRIOR SALES)

1,462,001 common shares of the Company were sold on the dates and at the prices described below:

Date	Number of Shares	Price per Share	Commissions Paid Per Share Sold	Cash Received
May 4, 1984	1	$1.00	Nil	$ 1.00
July 31, 1984	210,000	$0.15	Nil	$31,500.00
August/84-June/85	302,000	$0.25	Nil	$75,500.00
July, 1985	200,000	$0.30	Nil	$60,000.00
July, 1985	750,000 (ESCROW)	$0.01	Nil	$ 7,500.00

INCENTIVE STOCK OPTIONS

Incentive stock options to purchase up to 103,000 shares in the capital of the Company were granted to Dr. K.I. Lu, as a Director, and options to purchase up to 50,000 shares in the capital of the Company were granted to Grant W. Lang, as an Employee, such options being exercisable at $0.60 per share within 5 years from the Effective Date being April 17, 1991, 1985. The incentive stock options granted to Dr. K.I. Lu may not be exercised until they have been ratified by the shareholders of the Company.

DESCRIPTION OF BUSINESS AND PROPERTY OF THE COMPANY

THE BUSINESS

The Company is engaged in the acquisition, exploration and development of mineral properties and other resource properties.

Subject to a net smelter interest described below, the Company owns a 100% interest in three unpatented lode mining claim groups, known as the Formosa, Lioso and Riddle claims, which together total 66 claims. The Company also has acquired a lease and option to purchase 120 acres of patented fee lands with mineral rights contiguous to the Formosa and Riddle claim group known as the Silver Butte Claims. Collectively, the Company refers to all these claim groups as the Silver Peak Property.

The Company intends to seek and acquire additional properties worthy of exploration and development.

THE SILVER PEAK PROPERTY

The Silver Peak Property (consisting of the Formosa 1-44, Riddle 1-10 and Lioso 1-12 unpatented lode mineral claims and the patented fee Silver Butte claims described below in paragraphs I. and II. respectively) is located in Douglas County, Southwestern Oregon about 48 km north of the City of Grants Pass. The Silver Peak property may be reached from the town of Riddle, Oregon by 13 kilometres of paved road. A labyrinth of logging roads access all parts of the property. Five major adits are contained in the property and constitute the main workings. There is no plant or equipment on the property.

The Company acquired the mineral rights to the area known as the Silver Peak Property as follows:

I. Subject to regulatory approval, the Company entered into an agreement dated May 14, 1984 with Dr. K.I. Lu ("Dr. Lu") of 215 8th Street, North Vancouver, B.C. (the "Agreement") pursuant to which the Company acquired from Dr. Lu a 100% interest in 21 lode mining claims, known as the Formosa 1-13 and Riddle 1-8 claims in consideration of the payment to Dr. Lu of $20,233.00 (consisting of reimbursement of out of pocket expenses of $2,983, and a cash payment of $17,250) and granting to Dr. Lu a 2% net smelter return royalty (as defined in the Agreement) on the aforementioned claims and any additional claims or interests therein (within an 8 kilometer radius from the boundaries of the Formosa 1-13 and Riddle 1-8 claims) which the Company might acquire by staking, purchase or otherwise after the date of the Agreement up to and including May 14, 2004. Finally, the Company agreed to make Dr. Lu a director of the Company in consideration for vending these claims and, in addition, Dr. Lu agreed to assist the Company in identifying and acquiring additional properties in the area.

Under the direction of Dr. Lu the Formosa 1-13 and Riddle 1-8 claims were staked by Beaty Geological Inc. ("Beaty") in February of 1984. Beaty is a wholly owned United States subsidiary of Beaty Geological Ltd., a non-reporting company incorporated under the British Columbia Company Act and owned 100% by Ross J. Beaty of 208-2786 West 16th Avenue, Vancouver, B.C.

Pursuant to the Agreement, in June of 1984 the Company, under the direction of Dr. Lu, hired Beaty to stake an additional 14 unpatented lode mining claims consisting of the Lioso 1-12 and Riddle 9-10 claims for and on behalf of the Company. These claims were located by Beaty under the direction of Dr. Lu. These claims, together with the Formosa 1-13 and Riddle 1-8 claims were, pursuant to the Agreement, transferred to the Company from Beaty by Quit Claim Deed dated October 31, 1984 .

In November 1984, again under the direction of Dr. Lu, the Company hired Beaty to stake the Formosa 14-25 claims for and on behalf of the Company. These claims were transferred from Beaty to the Company by Quit Claim Deed dated March 13, 1985 for $1.00.

In November 1985, the Company staked and recorded in its own name an additional 19 mineral claims consisting of the Formosa 26-44 claims, which claims are adjacent to other claims in the Formosa group.

Particulars of the claims including legal description, date of location and interest owned are as set forth below.

LEGAL DESCRIPTION OF UNPATENTED CLAIMS

NAME AND NUMBER OF CLAIM LOCATED IN DOUGLAS COUNTY, OREGON, U.S.A.

Name & Number		¼ Section	Section	Township	Range	Meridian	BLM Serial Number
Formosa	1	S.E.	23	31S	6W	Williamette	ORMC074194
Formosa	2	S.W.	23	31S	6W	Williamette	ORMC074195
Formosa	3	S.E.	23	31S	6W	Williamette	ORMC074196
Formosa	4	S.W.	23	31S	6W	Williamette	ORMC074197
Formosa	5	N.E.	23	31S	6W	Williamette	ORMC074198
Formosa	6	N.W.	23	31S	6W	Williamette	ORMC074199
Formosa	7	N.E.	23	31S	6W	Williamette	ORMC074200
Formosa	8	N.W.	23	31S	6W	Williamette	ORMC074201
Formosa	9	S.W.	23	31S	6W	Williamette	ORMC074202
Formosa	10	S.W.	23	31S	6W	Williamette	ORMC074203
Formosa	11	S.W.	23	31S	6W	Williamette	ORMC074204
Formosa	12	S.W.	23	31S	6W	Williamette	ORMC074205
Formosa	13	S.W.	23	31S	6W	Williamette	ORMC074206
Formosa	14	N.E.	23	31S	6W	Williamette	ORMC079596
Formosa	15	N.E.	23	31S	6W	Williamette	ORMC079597
Formosa	16	N.E.	23	31S	6W	Williamette	ORMC079598
Formosa	17	N.E.	23	31S	6W	Williamette	ORMC079599
Formosa	18	N.E.	23	31S	6W	Williamette	ORMC079600
Formosa	19	N.E.	23	31S	6W	Williamette	ORMC079601
Formosa	20	N.E.	23	31S	6W	Williamette	ORMC079602
Formosa	21	N.E.	23	31S	6W	Williamette	ORMC079603
Formosa	22	S.W.	13	31S	6W	Williamette	ORMC079604
Formosa	23	S.W.	13	31S	6W	Williamette	ORMC079605
Formosa	24	S.W.	13	31S	6W	Williamette	ORMC079606
Formosa	25	S.W.	13	31S	6W	Williamette	ORMC079607
Formosa	26	S.W.	13	31S	6W	Williamette	ORMC0085133
Formosa	27	S.½.	13	31S	6W	Williamette	ORMC0085134
Formosa	28	S.W.	13	31S	6W	Williamette	ORMC0085135
Formosa	29	S.½.	13	31S	6W	Williamette	ORMC0085136
Formosa	30	N.W.	13	31S	6W	Williamette	ORMC0085137
Formosa	31	N.E.	13	31S	6W	Williamette	ORMC0085138
Formosa	32	N.½.	13	31S	6W	Williamette	ORMC0085139
Formosa	33	N.E.	13	31S	6W	Williamette	ORMC0085140
Formosa	34	N.½.	13	31S	6W	Williamette	ORMC0085141
Formosa	35	N.E.	13	31S	6W	Williamette	ORMC0085142
Formosa	36	N.½.	13	31S	6W	Williamette	ORMC0085143
Formosa	37	N.E.	13	31S	6W	Williamette	ORMC0085144
Formosa	38	S.E.	13	31S	6W	Williamette	ORMC0085145
Formosa	39	S.E.	13	31S	6W	Williamette	ORMC0085146
Formosa	40	S.E.	13	31S	6W	Williamette	ORMC0085147
Formosa	41	S.E.	13	31S	6W	Williamette	ORMC0085148
Formosa	42	S.E.	13	31S	6W	Williamette	ORMC0085149
Formosa	43	S.E.	13	31S	6W	Williamette	ORMC0085150
Formosa	44	S.E.	13	31S	6W	Williamette	ORMC0085151
Riddle	1	S.E.	27	31S	6W	Williamette	ORMC074207

NAME AND NUMBER OF CLAIM LOCATED IN DOUGLAS COUNTY, OREGON, U.S.A.

Name & Number		¼ Section	Section	Township	Range	Meridian	BLM Serial Number
Riddle	2	S.E.	27	31S	6W	Williamette	ORMC074208
Riddle	3	S.E.	27	31S	6W	Williamette	ORMC074209
Riddle	4	S.E.	27	31S	6W	Williamette	ORMC074210
Riddle	5	S.E.	27	31S	6W	Williamette	ORMC074211
Riddle	6	S.E.	27	31S	6W	Williamette	ORMC074212
Riddle	7	S.E.	27	31S	6W	Williamette	ORMC074213
Riddle	8	S.E.	27	31S	6W	Williamette	ORMC074214
Riddle	9	S.E.	27	31S	6W	Williamette	ORMC075519
Riddle	10	S.E.	27	31S	6W	Williamette	ORMC075520
Lioso	1	S.W.	5	32S	6W	Williamette	ORMC075507
Lioso	2	S.W.	5	32S	6W	Williamette	ORMC075508
Lioso	3	S.W.	5	32S	6W	Williamette	ORMC075509
Lioso	4	S.W.	5	32S	6W	Williamette	ORMC075510
Lioso	5	S.W.	5	32S	6W	Williamette	ORMC075511
Lioso	6	S.W.	5	32S	6W	Williamette	ORMC075512
Lioso	7	S.W.	5	32S	6W	Williamette	ORMC075513
Lioso	8	S.W.	5	32S	6W	Williamette	ORMC075514
Lioso	9	N.W.	8	32S	6W	Williamette	ORMC075515
Lioso	10	N.W.	8	32S	6W	Williamette	ORMC075516
Lioso	11	S.E.	5	32S	6W	Williamette	ORMC075517
Lioso	12	S.E.	5	32S	6W	Williamette	ORMC075518

INTEREST:

The Company holds a 100% undivided interest in all of the above-listed unpatented lode mining claims subject to the 2% net smelter return royalty in favour of Dr. K.I. Lu described above. Save for the foregoing, the claims are free of all mortgages, charges, encumbrances or liens.

Title investigations undertaken by the Company's U.S. counsel indicate that the Formosa 1,3,5,7,9,11 and 13 claims may partially overstake claims owned by independent third parties. In addition it appears that the Lioso 1-12 claims also overstake claims owned by independent third parties. As to the newly staked Formosa 26-44 claims, the Company has not yet had an opportunity to properly evaluate its title to such claims. Accordingly, the Company has decided to confine its proposed work program on the unpatented claims to the Riddle 1-10 and Formosa 1-25 claims and, with respect to the Formosa 1,3,5,7,9,11 and 13 claims, to take steps it deems prudent to ensure its work is confined to the portion of those claims to which it has good title.

In an effort to clarify the precise nature and extent of any overstaking the Company intends to have the staking and locating of its claims reviewed in the field by a qualified land man.

LEGAL DESCRIPTION (Continued)

The above-listed claims were located on the following dates:

Claim Name	Date of Location
Formosa 1-12	February 28, 1984
Formosa 13	February 29, 1984
Riddle 1-8	February 29, 1984
Lioso 1-4	June 9, 1984
Lioso 5-12	June 10, 1984
Riddle 9-10	June 25, 1984
Formosa 14-16	November 2, 1984
Formosa 17-21	November 3, 1984
Formosa 22-25	November 4, 1984
Formosa 26-44	November 18, 1985

Notices of Mining Location were recorded with the Douglas County (Oregon) Clerk on the following dates:

Claim Name	Recording Date	County Record No.	
		Book	Page(s)
Formosa 1-13	March 1, 1984	874	153-165
Riddle 1-8	March 1, 1984	874	145-152
Lioso 1-12	June 11, 1984	883	726-739 (Inc.Map)
Riddle 9-10	July 17, 1984	887	428-429
Formosa 14-25	November 5, 1984	898	25-36
Formosa 26-44	November 18, 1985	927	878-896

Notices of Location for these claims have been recorded with the Bureau of Land Management Office in Portland, Oregon.

ASSESSMENT WORK:

Assessment work has been filed with the Bureau of Land Management for the Formosa 1-25, Riddle 1-10 and Lioso 1-12 claims thereby maintaining them in good standing until September 1986. The Formosa 26-44 claims are in good standing until November 18, 1986 being the first anniversary of staking.

II. MINERAL LEASE AND OPTION TO PURCHASE THE SILVER BUTTE CLAIMS

By a mineral lease and option to purchase agreement dated November 16, 1984 between the Company and Silver Butte Mining and Milling Company (the "Vendor"), the Company leased, with option to purchase, patented fee land with vested mineral rights (120 acres) which land is contiguous to the Formosa and Riddle claim groups. The Vendor is a private Oregon corporation with no relationship to Rand Ventures Inc. and or its principals. Under the terms of the lease option to purchase agreement, Rand paid to the Vendor $7,000.00 U.S. upon signing the agreement, a further $7,000.00 (U.S.) on November 16, 1985 and is obliged to make the following additional lease payments:

Date of Payment	Amount of Payment
November 16, 1986	$15,000.00 (U.S.)
November 16, 1987	$50,000.00 (U.S.)

and a further $50,000.00 (U.S.) every 12 months thereafter until the full purchase price of $350,000.00 (U.S.) has been paid. In addition, upon commencement of commercial production from the acreage, the Vendor is entitled to a 5% net smelter return royalty (as defined in the agreement) or $50,000.00 (U.S.) per annum, whichever is greater until the full purchase price has been paid. All these payments are to be applied against the purchase price. Under the terms of the Agreement between Dr. Lu and the Company, the Company's interest in the Silver Butte claims are subject to an additional 2% net smelter return royalty in favour of Dr. Lu. If, as and when the Company has paid the full purchase price for the Silver Butte claims to the Vendor, the Silver Butte Claims will be owned by the Company subject to the 2% net smelter return royalty in favour of Dr. K.I. Lu.

III. History of the Silver Peak Property

The Silver Peak ore body was discovered in 1910, and by 1930 had produced 3,294 tons of ore, reported to have averaged 0.67 oz/ton Gold, 3.72 oz/ton Silver, 5.8% Zinc, and 5.84% Copper. The original development work was done by the Silver Butte Mining and Milling Co., and the last underground work was carried out by the Umpqua Consolidated Mining Co. in 1952. In 1977 and 1978 Chevron Resources Co. conducted an exploration program on the property. In 1983, Dr. K.I. Lu visited the property and recognized the property's high potential for massive sulfide mineralization of the Kuroko type.

IV. Exploration Program

The Company financed for a total of $74,207.00 a systematic program of surface and underground geological mapping, data compilation, and geochemical rock and soil sampling in 1984 and 1985.

As more fully disclosed in the report of R.R. Culbert, Ph.D., P.Eng. dated October 1985 (the "Culbert Report") a copy of which forms a part of this prospectus the ore body, split between the Formosa claim block and the adjacent Silver Butte patented acreage, shows classic Kuroko features. In Kuroko nomenclature, it consists in descending stratigraphic order of black ore (massive sphalerite, barite and pyrite with lesser galena, tennantite and chalcocite), yellow ore (bedded pyrite and chalcopyrite with a quartz-sericite matrix) and siliceous ore (sulphide-bearing quartz stockwork in a quartz-sericite host). The sequence is capped by a barite bed. The layering has been complexly deformed, either by slumping in the original environment or by tectonic shearing.

A summary of results of sampling on the known ore blocks in the ore deposit occurring within the Formosa-Silver Butte claim area, together with known results of Chevron's sampling and other published data is shown in Table II.

TABLE II: SUMMARY OF SAMPLING ON A PORTION OF THE SILVER PEAK ORE BODY

	Block	Thickness (M)	Strike (m)	oz/t Au	oz/t Ag	%Z	%Cu
Black Ore	I	1.94	70	0.2798	1.623	10.72	1.84
	II	0.76	25	0.1080	1.197	15.94	1.50
	III	1.14	25	0.2740	5.440	N/A	8.49
	*IV	5.0	12	0.1250	6.427	N/A	11.12
Yellow Ore	I	4.67	25	0.042	2.340	N/A	2.65
	*II	5.0	10	0.049	2.536	N/A	6.04
Siliceous Ore	I	1.65	46	0.022	0.961	N/A	2.19

* Stope

The ore zone has been mapped for over 70 meters along strike in the Formosa claim area and up to 46 meters in the Silver Butte patented claim area. However, it would appear that the known mineralization has been only incompletely explored and the width along the dip has not yet been obtained. The lowest level adit on the Formosa claims intersected the main black ore zone, but the adit driven above FT-1 adit stopped well short of intersecting the black ore horizon and did not therefore test the potential up-dip extension of the ore zone. Of the two holes drilled by Chevron in the area, one appears to have been drilled parallel to the ore horizon and the other intersected it at a locality known to be of poor grade from the underground workings. Considerable exploration potential thus remains in the area of known mineralization.

Grid-controlled geochemical sampling showed a number of coincident anomalies in copper, zinc, lead and barium. As expected, the exposed ore body gave very anomalous results, and there were also anomalous trends leading out from it making horizons which are metal rich and have potential for unexposed Kuroko ore lenses.

In addition to geology and geochemistry, the ore-potential trend is marked by massive sulphide float, old adits, sheared and altered tuff, and some gossans.

V. Recommendations of the Culbert Report (October, 1985)

Based upon the results of the exploration program conducted by the Company on the Silver Peak Property, the Culbert report recommends:

Phase II

A detailed ground electromagnetic survey be carried out along the Kuroko trend as outlined by mapping and geochemistry and along the logical extension of the axis to the northeast (Estimated costs - $32,500).

Phase III

Contingent upon the results of Phase II exploration, the Culbert Report recommends drilling, tunneling, mapping, and sampling as a Phase III exploration program: (Estimated costs - $155,000.00)

As mentioned above, due to some uncertainties arising out of apparent overstaking on some of its unpatented claims, the Company does not intend to carry out any work on the Lioso 1-12 claims and will take steps to ensure that any work carried out on the Formosa 1,3,5,7,9,11 and 13 claims is confined to the portion of those claims to which it has good title. As well, the Company does not intend to carry out any work, excepting assessment work, on the Formosa 26-44 claims.

PROMOTERS

Under the definition of "Promoter" contained in the Securities Act, British Columbia, Grant W. Lang, Tomotaka Tsukada and Brian K. Westwood may be considered its promoters in that they took the initiative in the organization of the Company.

The Company issued the following shares at a cost of $0.01 per share subject to Escrow restrictions, to Directors and Promoters as follows:

NAME	NUMBER OF SHARES
Dr. K.I. Lu	300,000
Grant Wells Lang	300,000
Brian K. Westwood	100,000
Tomotaka Tsukada	50,000

For details of the escrow restrictions relating to such shares, refer to the caption "Escrowed Shares" herein.

Dr. K.I. Lu, Grant Wells Lang, Brian Westwood and Tomotaka Tsukada are also considered promoters of the Company by virtue of their having received the escrow shares noted above, which shares together with their other holdings represent a greater than 10% interest in the issued capital of the Company.

In addition, the Promoters purchased the following shares in the Company at the indicated prices:

Ranko E. Lu	115,000*	@	$0.15
Grant Wells Lang	1	@	$1.00
	60,000**	@	$0.15
Brian K. Westwood	10,000	@	$0.15
	5,000	@	$0.30

* Spouse of Dr. K.I. Lu.

** Registered to RCC Resource Capital Corp., a non-reporting British Columbia company, wholly-owned by Mr. Lang.

Finally, Dr. Lu has been granted options to purchase up to 103,000 shares, and Mr. Lang, up to 50,000 shares, in the capital of the Company at $0.60 per share as more fully set forth under the caption "Incentive Stock Options" on page 4 hereof.

The promoters have received no remuneration or other consideration in the form of cash, shares or otherwise, for acting in such capacity.

PENDING LEGAL PROCEEDINGS

Neither the Company nor its property is the subject of any legal proceedings, nor are any such proceedings known to be contemplated.

ISSUANCE OF SHARES

The authorized capital of the Company consists of 10,000,000 common shares without par value of which 1,462,001 common shares are issued as fully paid and non-assessable. All shares of the Company, both issued and unissued, are common shares of the same class and rank equally, as to dividends, voting powers and participation in assets. No shares have been issued subject to call or assessment. There are no preemptive or conversion rights and no provision for redemption, purchase for cancellation, surrender or sinking or purchase funds. Provisions as to the modifications, amendments or variation of such rights or such provisions are contained in the Company Act of the Province of British Columbia.

DIRECTORS AND OFFICERS

Name and Address	Principal Occupation During Last 5 Years
*Grant Wells Lang West Vancouver British Columbia V7S 2C3 President/Director	President, RCC Resource Capital Corp. (02/82) present; Director of Investor Financial Relations, Canada Development Corp. (08/78-04/82) President and Director, Ohio Resources Corporation
*Dr. K.I. Lu North Vancouver British Columbia V7L 1Y9 Director	Consulting Geologist (12/83 - present); Project Geologist, United Nations Development Program (7/82-12/83); Consulting Geologist, D.G. Leighton & Assoc. (1/7-7/82)
*Tomotaka Tsukada, C.A. Vancouver British Columbia Director	Chartered Accountant and Certified Public Accountant (Japan), Audit and Business Consulting (Sept. 1977 - present)

Brian K. Westwood Langley British Columbia Director	Self-employed Businessman (Sept. 1979 - present); director Summit Ventures Inc.
Pauline Kelly Vancouver British Columbia Secretary	Self-employed Businesswoman (02/83 - present), Management & Administrative Consulting; Prior to 1983, Office Manager, Western Canada Hydraulic Laboratories Ltd.

*Member of the Audit Committee

Some of the directors of the Company also serve as directors of similar companies involved in natural resource development. Accordingly, it may occur that natural resource properties will be offered to both the Company and such other companies. Furthermore, those other companies may participate in the same properties as those in which the Company has an interest. As a result, there may be situations which involve a conflict of interest. In that event, the directors would not be qualified to vote at meetings of the directors on resolutions which evoke any such conflict. The directors will attempt to avoid dealing with such other companies in situations where conflicts might arise and will at all times use their best efforts to act in the best interest of the Company.

REMUNERATION OF DIRECTORS AND SENIOR OFFICERS

As at December 31, 1985 the Company incurred $16,836.00 (of which $2,036.00 remains payable) for geological and consulting fees to Dr. K.I. Lu, a Director of the Company.

RCC Resource Capital Corp., a non-reporting British Columbia company of 806 - 850 West Hastings Street, Vancouver, British Columbia, wholly-owned by Grant W. Lang, a Director and President of the Company, has entered into a management agreement (dated May 10, 1984) with the Company pursuant to which RCC Resource Capital Corp. ("RCC") receives $1,500.00 per month for the provision of management and professional services. To December 31, 1985 the Company paid $25,500.00 and accrued $6,000.00 for management services. The Company has also incurred $8,325.00 as at December 31, 1985 (of which $1,619.00 remains payable) in unreimbursed expenses incurred by RCC on behalf of the Company. With the exception of the remuneration noted above, no remuneration is otherwise paid to the Directors and/or Senior Officers of the Company, nor has any remuneration been paid to the Directors and/or Senior Officers in their capacity as such, since the date of incorporation.

ESCROWED SHARES

Designation of Class	Number of Shares Held in Escrow	Percentage of Class
Common Shares	750,000	51.3%

At the date of this Prospectus, 750,000 shares are held in escrow by Guaranty Trust Company of Canada subject to the direction or determination of the Superintendent of Brokers (the "Superintendent") and, after listing, the Vancouver Stock Exchange (the "Exchange"). The escrow restrictions provide that the shares may not be traded in, dealt with in any manner whatsoever, nor released, nor may the Company, its Transfer Agent or escrow holder make any transfer or record any trading of the shares without the consent of the Superintendent and/or the Exchange.

The complete text of the escrow agreement is available for inspection at the Company's head office at 806 - 850 West Hastings Street, Vancouver, B.C.

POOLED SHARES

An aggregate of 512,000 common shares in the Company, consisting of 210,000 shares issued at $0.15 per share and 302,000 shares issued at $0.25 per share, are held in pool by Guaranty Trust Company of Canada, of 800 West Pender Street, Vancouver, British Columbia by agreement dated for reference the 10th day of March, 1985. The agreement provides that the shares will be released from pool on the following basis:

(a) twenty-five (25%) percent at the time of listing of the Company's shares on the Vancouver Stock Exchange, Development Section;

(b) a further twenty-five (25%) percent every three months thereafter until all of the shares are released from pool.

It is provided, however, that if the Company's shares have not been listed on the Vancouver Stock Exchange, Development Section, by April 18, 1987 being twelve months after the date of the issuance of a receipt by the Superintendent for this Prospectus, then the pooled shares shall be automatically released.

PRINCIPAL HOLDERS OF SHARES

To the knowledge of the Directors and Senior Officers of the Company the following persons are the only persons who hold beneficially, directly or indirectly, more than 10% of the shares of the Company as at the date of this Prospectus:

Name and Address	Designation of Class	Type of Ownership	Number of Shares Owned	Percentage of Class
Grant Wells Lang	Common	Direct	1	-
125 Stevens Drive	(Escrow)	Direct	300,000	20.5%
West Vancouver	Common	Indirect*	60,000	4.1%
British Columbia	(Pooled)			
V7S 1C5				
Dr. K.I. Lu	Common	Direct	300,000	20.5%
215 East 8th St.	(Escrow)			
North Vancouver	Common	Indirect**	115,000	7.9%
British Columbia	(Pooled)			
V7L 1Y9				

(*) Grant W. Lang has indirect ownership of 60,000 Common Shares registered to a wholly-owned, non-reporting Company, RCC Resource Capital Corp.

(**) Held in the name of Ranko E. Lu (Spouse).

The Promoters, Directors and Officers as a group own directly or indirectly 940,001 shares of the Company, representing approximately 64.30% of the issued shares. On completion of this Offering, the Promoters, Directors, and Senior Officers will hold approximately 45.59% of the issued shares of the Company. Shares being offered by this Prospectus represent approximately 29.1% of all shares issued on completion of this Offering.

INTEREST OF MANAGEMENT AND OTHERS IN MATERIAL TRANSACTIONS

Reference is made to the caption "Remuneration of Directors and Officers" for particulars of remuneration paid to Dr. K.I. Lu, a Director, and a management contract between the Company and RCC Resource Capital Corp. a non-reporting company controlled by Grant W. Lang, President and a Director of the Company.

In addition and as disclosed under the heading "Business and Property of the Company" the Company has, pursuant to an agreement made May 14, 1985, agreed to pay to

Dr. K.I. Lu a 2% net smelter return royalty out of the proceeds of commercial production from the Silver Peak Property.

PRELIMINARY EXPENSES

Preliminary expenses to December 31, 1985, are approximately $185,935.00. As of the date hereof the Company has paid incorporation, property acquisition, and development and exploration expenses as follows:

Incorporation		$ 187.00
Property Acquisition		$39,112.00
Exploration & Development:		
Engineering & Geological Fees	$52,219.00	
Field Supplies & Expenses	13,727.00	
Survey Fees	3,265.00	
Assay Fees	4,696.00	
Licences	300.00	
TOTAL:	$74,207.00	

The total administration, exploration and operational expenses to December 31, 1985 are set out in the Company's Unaudited Financial Statements attached hereto.

AUDITORS, REGISTRAR AND TRANSFER AGENT

Auditors:

Dunwoody & Company
4 Bentall Centre
1055 Dunsmuir Street
Vancouver, B.C.

Registrar and Transfer Agent:

Guaranty Trust Company of Canada
800 West Pender Street
Vancouver, B.C.

MATERIAL CONTRACTS

There are no other material contracts to which the Company is a party that have not been disclosed herein and there are no contracts to which the Company is a party which may be considered outside the usual course of business.

All material contracts of the Company may not be inspected during normal business hours at 1700-750 West Pender Street, Vancouver, British Columbia.

OTHER MATERIAL FACTS

Shares held by Underwriter

A. An associate of the Underwriter has purchased a total of 50,000 shares of the Issuer at prices of $0.15 per share (as to 20,000 shares), and $0.25 per share (as to 30,000 shares). These shares are subject to an undertaking by such person to the following effect:

(a) No sale or other dealing in the said shares will take place prior to the expiry of six months from the date of listing of the Issuer's shares on the Vancouver Stock Exchange.

(b) Sales of shares in the 3-month period following the expiry of six months from the date of listing of the Issuer's shares on the Vancouver Stock Exchange will be limited to 25% of such shares acquired.

(c) Sales of shares in each 3-month period thereafter will be limited to 25% of such shares acquired.

(d) No shares will be sold until at least seven (7) days after notice of the intended sale is filed with the Superintendent of Brokers and the Vancouver Stock Exchange. Where such sale or other dealing does not take place within 120 days from the date of notice, further notice will be given.

B. A partner of the Underwriter has loaned to the Issuer, pursuant to a Convertible Promissory Note dated October 28, 1985, $10,000 bearing interest at 15% per annum payable on demand with conversion rights with respect to principal and interest. The loan may be converted, in whole or in part, into fully paid and non-assessable common shares of the Issuer at the price of $0.60 per share at any time following the Effective Date for a period of 150 days thereafter. The lender has agreed to hold any shares acquired pursuant to exercise of the conversion right unconditionally for a period of one year from October 28, 1985. Thereafter disposition of the shares acquired will be made in accordance with the restrictions set forth in paragraph A. to the extent that they are applicable.

Claim Settlement

The Company paid $36,000.00 to an associate of the Directors of the Company and his associates. The associate and his friends had applied for 200,000 shares of the company on the understanding that the associate would be a founder/ promoter. This did not occur, and because the associate was not involved in the Company, the Directors voted to reject subscriptions for 200,000 shares to the group, and to pay them $36,000.00 in settlement of any claim that they might have brought against the Company and/or the Directors.

There are no other material facts relating to the securities offered by this Prospectus which are not disclosed herein.

RISK FACTORS

There is at present no market for the Company's shares. The common shares offered hereby are considered speculative due to the nature of the Company's business. Management proposes to expend substantially all of the funds raised pursuant to this Offering in the exploration and development of mineral properties. There is no certainty that the properties, when tested and explored, will be found to contain sufficient reserves of minerals which can be profitably produced and sold. The properties are without a known body of commercial ore and the proposed program is an exploratory search for ore. For the industry as a whole only a small portion of properties explored are found to be commercially productive. Further, the unpatented claims referred to in this Prospectus have not been surveyed and therefore, in accordance with the mining laws of the applicable jurisdictions, the existence of and the area of such mineral claims could be in doubt.

PURCHASER'S STATUTORY RIGHT OF RESCISSION AND WITHDRAWAL

Sections 60 and 61 of the Securities Act (British Columbia) provide, in effect, that where a security is offered to the public in the course of primary distribution:

(a) A purchaser has the right to rescind a contract for the purpose of such security, while still the owner thereof, if a copy of the last Prospectus together with financial statements and reports and summaries of reports relating to the securities as filed with the British Columbia Securities Commission, was not delivered to him or his agent prior to delivery to either of them of the written confirmation of the sale of the securities. Written notice of intention to commence an action for rescission must have been served on the person who contracted to sell the security within sixty (6) days of the date of delivery of the written confirmation, but no action shall be commenced after the expiration of three (3) months from the date of service of such notice.

(b) A purchaser has the right to rescind a contract for the purchase of such security, while still the owner thereof, if the Prospectus or any amended Prospectus offering such security contains an untrue statement of a material fact or omits to state a material fact necessary in order to make any statement therein not misleading in the light of the circumstances in which it was made, but no action to enforce this right can be commenced by a purchaser after expiration of ninety (90) days from the later of the date of such contract or the date on which such Prospectus is received by him or his agent.

Reference is made to the said Act for the complete text of the provisions under which the foregoing are conferred, and the foregoing summary is subject to the express provisions thereof.

RAND VENTURES INC.

INDEX TO FINANCIAL STATEMENTS
31 JULY 1985

RAND VENTURES INC.

BALANCE SHEET
AS AT 31 JULY 1985

ASSETS

CURRENT		
Cash and term deposits		$ 12,356
RESOURCE PROPERTIES, note 2		29,497
DEFERRED EXPLORATION, DEVELOPMENT AND OTHER EXPENDITURES		100,890
INCORPORATION COSTS		187
		$142,930

LIABILITIES

CURRENT		
Accounts payable		$ 4,429

SHARE CAPITAL AND DEFICIT

SHARE CAPITAL, note 3		
Authorized		
10,000,000 common shares without par value		
Issued		
1,462,001 shares	$174,501	
DEFICIT, claim settlement, note 6	36,000	138,501
		$142,930

SIGNIFICANT ACCOUNTING POLICY, note 1
RELATED PARTY TRANSACTIONS, note 4
OPERATIONS, note 5

Approved by the Directors

RAND VENTURES INC.

STATEMENT OF DEFERRED EXPLORATION, DEVELOPMENT AND OTHER EXPENDITURES
FOR THE FOURTEEN MONTHS ENDED 31 JULY 1985

EXPLORATION AND DEVELOPMENT		
The Silver Peak Property, Douglas County, Oregon, U.S.A.		
Exploration program		
Engineering and geological fees	$41,465	
Field supplies and expenses	13,727	
Survey fees	3,265	
Assay	4,390	
Balance deferred, end of period		$ 62,847
ADMINISTRATION AND GENERAL EXPENSES		
Audit	3,000	
Bank charges and interest	668	
Legal	4,031	
Management services, note 4	21,000	
Miscellaneous	1,383	
Office and secretarial	8,514	
Travel	742	
	39,338	
Less interest income	1,295	
Balance deferred, end of period		38,043
TOTAL BALANCE DEFERRED, END OF PERIOD		$100,890

RAND VENTURES INC.

STATEMENT OF CHANGES IN FINANCIAL POSITION
FOR THE FOURTEEN MONTHS ENDED 31 JULY 1985

SOURCE OF FUNDS		
Proceeds from issue of shares		$174,501
APPLICATION OF FUNDS		
Deferred administration and general expenses	$38,043	
Deferred exploration and development expenses	62,847	
Acquisition of mineral properties	29,497	
Claim settlement, note 6	36,000	
Incorporation costs	187	166,574
INCREASE IN WORKING CAPITAL AND WORKING CAPITAL, END OF PERIOD		$ 7,927
REPRESENTED BY		
Current assets	$12,356	
Current liabilities	4,429	$ 7,927

RAND VENTURES INC.

NOTES TO FINANCIAL STATEMENTS
31 JULY 1985

1. SIGNIFICANT ACCOUNTING POLICY

Deferred Exploration, Development and Other Expenditures

The Company is in the process of exploring and developing its mineral properties. Accordingly, property acquisition and exploration, development and administrative costs are deferred until the property to which they relate is placed into production, at which time they will be amortized on a basis yet to be determined.

All deferred acquisition, exploration and development costs relating to mineral properties abandoned or sold are written off in full in the year of abandonment or sale. Deferred general and administrative costs are written off in the year of abandonment or sale on a basis that is proportionate to the cost of those properties.

Incidental revenues such as interest income have been offset against deferred general and administrative costs.

The ultimate realization of the deferred costs and of the mineral property costs is dependent upon the discovery of commercially viable orebodies.

2. RESOURCE PROPERTIES

During the period, the Company has acquired the following properties (collectively referred to as the Silver Peak property) in Douglas County, Oregon, U.S.A.:

(a)	Formosa 1-25, Riddle 1-10, Lioso 1-12	$20,233
(b)	Silver Butte	9,264
		$29,497

(a) Formosa 1-25, Riddle 1-10, Lioso 1-12

By an agreement dated 14 May 1984 for reference between the Company and Dr. Lu, the Company acquired a 100% interest in 21 lode mining claims known as the Formosa 1-13 and Riddle 1-8 forming part of the Silver Peak property located in the Douglas County in the State of Oregon, U.S.A.. The Company granted Dr. Lu a 2% net smelter return royalty on these claims and any additional claims or interest therein, within eight kilometers of the boundaries of Formosa 1-13 and Riddle 1-8, which the Company acquires after the date of the agreement up to and including 14 May 2004.

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RAND VENTURES INC.

NOTES TO FINANCIAL STATEMENTS
31 JULY 1985

2. RESOURCE PROPERTIES - Continued

(a) Formosa 1-25, Riddle 1-10, Lioso 1-12 - Continued

In the summer of 1984 the Company, under the direction of Dr. Lu, had an additional 14 claims consisting of the Lioso 1-12 and Riddle 9-10 recorded for and on behalf of the Company.

In November 1984, also under the direction of Dr. Lu, recorded an additional 12 claims consisting of the Formosa 14-25.

Title investigations indicate the possibility of some overstaking, which the Company intends to have reviewed in the field by a qualified land man. The Company has undertaken to confine its work program to those claims to which it has good title.

(b) Silver Butte

On 16 November 1984 the Company entered into a Mineral Lease and Option to Purchase Agreement for 120 acres of patented fee land with vested mineral rights. This acreage is contiguous with the Company's Formosa and Riddle lode mining claim groups. Terms of the Agreement call for the Company to pay in U.S. funds $7,000 upon the signing of the agreement; $7,000 on 16 November 1985; $15,000 on 16 November 1986; $50,000 on 16 November 1987 and $50,000 every twelve months thereafter, until a full purchase price of $350,000 has been reached.

Upon commencement of commercial production from the acreage, the optionor is entitled to 5% of net smelter returns or $50,000 per annum, whichever is greater, until the full purchase price has been paid. All lease payments are to be applied against the purchase price, and all payments are in dollars of the United States of America.

3. SHARE CAPITAL

During the year the Company issued 1,462,001 common shares for cash consideration of $174,501. 750,000 shares will be held in escrow. Stock options for 103,000 shares were granted to a director and 50,000 shares to an employee, all at $0.60 per share to be exercised within five years. These options may not be exercised until the Company receives regulatory approval of a prospectus currently being prepared and the director's options receive shareholders' approval.

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RAND VENTURES INC.

NOTES TO FINANCIAL STATEMENTS
31 JULY 1985

4. RELATED PARTY TRANSACTIONS

During the period, the Company paid $21,000 to a company owned by one of the directors for management services. An agreement between the parties provides for a monthly payment of $1,500 for management services. The Company was also charged $4,600 by the related company for office rent, telephone and other expenses.

The vendor of 21 lode mining claims, referred to in note 2(a), was made a director of the Company in consideration for vending these claims, and agreed to assist the Company in acquiring additional claims in the area.

During the year, the Company paid a director $12,800 for geological consulting fees.

5. OPERATIONS

The Company was incorporated on 4 May 1984 in the Province of British Columbia. The Company is an exploration and development company engaged in the acquisition, exploration and development of resource properties. The Company has not attained commercial production on its properties.

The Company is in the development stage and therefore operations depend on the Company's ability to obtain financing from third parties or continuing support from shareholders.

Subsequent to 31 July 1985, the Company entered into an underwriting agreement to issue 600,000 shares at $.54 each net to the Company.

6. CLAIM SETTLEMENT

The Company rejected 200,000 of the original share subscriptions. The Company entered into an agreement to pay $36,000 in settlement of any claim which might have been brought against the directors or the Company.

RAND VENTURES INC.

INDEX TO FINANCIAL STATEMENTS
31 DECEMBER 1985

RAND VENTURES INC.

INTERIM BALANCE SHEET
AS AT 31 DECEMBER 1985
(Unaudited)

	31 December 1985	31 July 1985
ASSETS		
CURRENT		
Cash and term deposits	$ 36	$ 12,356
RESOURCE PROPERTIES, note 2	39,112	29,497
DEFERRED EXPLORATION, DEVELOPMENT AND OTHER EXPENDITURES	146,636	100,890
INCORPORATION COSTS	187	187
	$185,971	$142,930
LIABILITIES		
CURRENT		
Accounts payable and accrued liabilities	$ 37,470	$ 4,429
Note payable, note 3	10,000	-
	47,470	4,429
SHARE CAPITAL AND DEFICIT		
SHARE CAPITAL, note 4		
Authorized		
10,000,000 common shares without par value		
Issued		
1,462,001 shares	174,501	174,501
DEFICIT	36,000	36,000
	138,501	138,501
	$185,971	$142,930

SIGNIFICANT ACCOUNTING POLICY, note 1
RELATED PARTY TRANSACTIONS, note 5
OPERATIONS, note 6

Approved by the Directors

RAND VENTURES INC.

INTERIM STATEMENT OF DEFERRED EXPLORATION, DEVELOPMENT AND OTHER EXPENDITURES
FOR THE FIVE MONTHS ENDED 31 DECEMBER 1985
(Unaudited)

	Five Months Ended 31 December 1985	Fourteen Months Ended 31 July 1985
EXPLORATION AND DEVELOPMENT		
The Silver Peak Property, Douglas County, Oregon, U.S.A.		
Exploration program		
Engineering and geological fees	$ 10,754	$ 41,465
Field supplies and expenses	-	13,727
Survey fees	-	3,265
Assay	306	4,390
Licenses	300	-
	11,360	62,847
Balance deferred, beginning of period	62,847	-
Balance deferred, end of period	74,207	62,847
ADMINISTRATION AND GENERAL EXPENSES		
Audit	1,600	3,000
Bank charges and interest	645	668
Legal	17,151	4,031
Listing fees	2,683	-
Management services, note 5	7,500	21,00
Miscellaneous	-	1,383
Office and secretarial	4,890	8,514
Travel	-	742
	34,469	39,338
Less interest income	83	1,295
	34,386	38,043
Balance deferred, beginning of period	38,043	-
Balance deferred, end of period	72,429	38,043
TOTAL BALANCE DEFERRED, END OF PERIOD	$146,636	$100,890

RAND VENTURES INC.

INTERIM STATEMENT OF CHANGES IN FINANCIAL POSITION
FOR THE FIVE MONTHS ENDED 31 DECEMBER 1985
(Unaudited)

	Five Months Ended 31 December 1985	Fourteen Months Ended 31 July 1985
SOURCE OF FUNDS		
Proceeds from issue of shares	$ -	$174,501
APPLICATION OF FUNDS		
Deferred administration and general expenses	34,386	38,043
Deferred exploration and development expenses	11,360	62,847
Payment for mineral properties	9,615	29,497
Claim settlement	-	36,000
Incorporation costs	-	187
	55,361	166,574
(DECREASE) INCREASE IN WORKING CAPITAL	(55,361)	7,927
Working capital, beginning of period	7,927	-
WORKING CAPITAL (DEFICIENCY), END OF PERIOD	($47,434)	$ 7,927
REPRESENTED BY		
Current assets	$ 36	$ 12,356
Current liabilities	47,470	4,429
	($47,434)	$ 7,927

RAND VENTURES INC.

NOTES TO INTERIM FINANCIAL STATEMENTS
31 DECEMBER 1985
(Unaudited)

1. SIGNIFICANT ACCOUNTING POLICY

Deferred Exploration, Development and Other Expenditures

The Company is in the process of exploring and developing its mineral properties. Accordingly, property acquisition and exploration, development and administrative costs are deferred until the property to which they relate is placed into production, at which time they will be amortized on a basis yet to be determined.

All deferred acquisition, exploration and development costs relating to mineral properties abandoned or sold are written off in full in the year of abandonment or sale. Deferred general and administrative costs are written off in the year of abandonment or sale on a basis that is proportionate to the cost of those properties.

Incidental revenues such as interest income have been offset against deferred general and administrative costs.

The ultimate realization of the deferred costs and of the mineral property costs is dependent upon the discovery of commercially viable orebodies.

2. RESOURCE PROPERTIES

The Company acquired the following properties (collectively referred to as the Silver Peak property) in Douglas County, Oregon, U.S.A.:

(a)	Formosa 1-44, Riddle 1-10, Lioso 1-12	$20,233
(b)	Silver Butte	18,879
		$39,112

(a) Formosa 1-44, Riddle 1-10, Lioso 1-12

By an agreement dated 14 May 1984 for reference between the Company and Dr. Lu, the Company acquired a 100% interest in 21 lode mining claims known as the Formosa 1-13 and Riddle 1-8 forming part of the Silver Peak property located in the Douglas County in the State of Oregon, U.S.A. The Company granted Dr. Lu a 2% net smelter return royalty on these claims and any additional claims or interest therein, within eight kilometers of the boundaries of Formosa 1-13 and Riddle 1-8, which the Company acquires after the date of the agreement up to and including 14 May 2004.

In the summer of 1984 the Company, under the direction of Dr. Lu, had an additional 14 claims consisting of the Lioso 1-12 and Riddle 9-10 recorded for and on behalf of the Company.

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RAND VENTURES INC.

NOTES TO INTERIM FINANCIAL STATEMENTS
31 DECEMBER 1985
(Unaudited)

2. RESOURCE PROPERTIES - Continued

(a) Formosa 1-44, Riddle 1-10, Lioso 1-12 - Continued

In November 1984, also under the direction of Dr. Lu, the Company recorded an additional 12 claims consisting of the Formosa 14-25.

In the fall of 1985, the Company staked an additional 19 claims consisting of the Formosa 26-44.

Title investigations indicate the possibility of some overstaking, which the Company intends to have reviewed in the field by a qualified land man. The Company has undertaken to confine its work program to those claims to which it has good title.

(b) Silver Butte

On 16 November 1984 the Company entered into a Mineral Lease and Option to Purchase Agreement for 120 acres of patented fee land with vested mineral rights. This acreage is contiguous with the Company's Formosa and Riddle lode mining claim groups. Terms of the Agreement call for the Company to pay in U.S. funds $7,000 upon the signing of the agreement; $7,000 on 16 November 1985; $15,000 on 16 November 1986; $50,000 on 16 November 1987 and $50,000 every twelve months thereafter, until a full purchase price of $350,000 has been reached. Payments are up to date.

Upon commencement of commercial production from the acreage, the optionor is entitled to 5% of net smelter returns or $50,000 per annum, whichever is greater, until the full purchase price has been paid. All lease payments are to be applied against the purchase price, and all payments are in dollars of the United States of America.

3. NOTE PAYABLE

The loan is secured by a convertible promissory note bearing 15% interest per annum payable on demand upon which the monthly interest and principal sums due be converted to $.60 per share of fully paid non-assessable common shares of the Company, from thirty days and up to 150 days after the shares of the Company are listed with the Vancouver Stock Exchange.

4. SHARE CAPITAL

Stock options for 103,000 shares were granted to a director and 50,000 shares to an employee, all at $0.60 per share to be exercised within five years. These options may not be exercised until the Company receives regulatory approval of a prospectus currently being prepared and the director's options receive shareholders' approval.

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RAND VENTURES INC.

NOTES TO INTERIM FINANCIAL STATEMENTS
31 DECEMBER 1985
(Unaudited)

5. RELATED PARTY TRANSACTIONS

During the period, the Company paid $4,500 and owes $3,000 to a company owned by one of the directors for management services. An agreement between the parties provides for a monthly payment of $1,500 for management services. The Company was also charged $3,725 ($2,106 paid; $1,619 payable) by the related company for office rent, telephone, secretarial and other expenses.

For the period ended 31 December 1985, the Company was charged $4,036 ($2,000 paid; $2,036 payable) by a director for geological consulting fees.

6. OPERATIONS

The Company was incorporated on 4 May 1984 in the Province of British Columbia. The Company is an exploration and development company engaged in the acquisition, exploration and development of resource properties. The Company has not attained commercial production on its properties.

The Company is in the development stage and therefore operations depend on the Company's ability to obtain financing from third parties or continuing support from shareholders.

On 21 October 1985, the Company entered into an underwriting agreement to issue 600,000 shares at $.54 each net to the Company.

GEOLOGICAL REPORT

ON THE

SILVER PEAK PROPERTY

RAND VENTURES OREGON PROJECT
DOUGLAS COUNTY, OREGON

FOR

RAND VENTURES INC.

BY

R.R. CULBERT, PH.D., P.ENG.

OCTOBER, 1985

TABLE OF CONTENTS

SUMMARY AND CONCLUSIONS

1. The Silver Peak property consists of two blocks (Formosa and Riddle) totalling 35 mineral claims 100% owned by Rand Ventures Inc., and 120 acres of patented claims optioned from the Silver Butte Mining and Milling Co. The property is located north of the town of Riddle in Douglas County, Oregon. Road access is excellent.

2. The property includes a massive sulphide deposit discovered in 1910 and having produced 3,294 tons of ore grading 0.067 oz/t gold, 3.27 oz/t silver, 5.84% copper, and 5.8% zinc by 1930. This ore body appears to be a classic Kuroko deposit. The property covers most of the geological trend of acid submarine volcanics in which other such deposits have a good probability of occurring.

3. An exploration program was carried out on the two claim blocks in 1984 and extended in 1985. Work has consisted of surface geological mapping, underground mapping, geochemical sampling and regional studies.

4. Results of the geochemical soil grid survey carried out over the claims showed an anomalous chemical trend leading out from the known deposit. This trend is also marked by massive sulphide float, old adits, sheared and altered tuff and gossans.

5. It is concluded that the Formosa claim - Silver Butte's patented claim area contains a classic Kuroko-type massive sulphide deposit with potential for extensions of known mineralization and/or additional sulphide lenses, and that the property contains geology characteristic of Kuroko ore environments with good potential for undiscovered mineralization.

6. A follow-up program of detailed geophysical surveys, limited underground development and diamond drilling is recommended on the property to evaluate the extent of the known Kuroko mineralization. This should be done in two phases at an estimated total cost of Cdn $187,500.

INTRODUCTION

This report summarizes the current data on a mineral property in southern Oregon, consisting of two claim blocks owned by Rand Ventures Inc. It is based on two visits to the property by the writer, one in 1981 and one in the spring of 1984, and on an examination of results of a surface geological mapping and geochemical sampling program carried out on behalf of Rand Ventures Inc. during the summer of 1984.

LOCATION, ACCESS AND TERRAIN

The Silver Peak property is located in Douglas County of southwestern Oregon, about 48 km north of the city of Grants Pass. The Formosa and Riddle claim blocks are in Sections 13, 23, and 27 respectively of Township 31S, Range 6W. The claims are all near the summit of a forested knoll known as Silver Butte, to the south of the town of Riddle, Oregon.

The property may be reached from Riddle by thirteen kilometres of road, the first part of which is paved. The road serves a forestry lookout station on the summit of Silver Butte in the Formosa claims, but also connects with a labyrinth of logging roads which access other part of the property.

Most of the area is either heavily timbered or already logged off. Where the timber is standing, it is dominantly a mature forest and of easy access. Some slopes, however, are covered with thick bush, especially those facing east. The terrain is moderate to steep.

CLAIM DATA

As shown on Figure 2, the property is comprised of two claim blocks, named the Formosa and Riddle mineral claims and 120 acres of patented claims leased from Silver Butte Mining & Milling Co. These mineral claims were staked in February, June, and November, 1984 and are wholly owned by Rand Ventures Inc., subject to a 2% net smelter return in favour of Dr. K.I. Lu. The details are as follows:

TABLE I: CLAIM DATA

CLAIM	DATE STAKED	REG. BLM NUMBER
Formosa 1 - 13	Feb. 28, 1984	ORMC0074194-0074206
Formosa 14 - 25	Nov. 3-4, 1984	ORMC0079596-0079607
Riddle 1 - 8	Feb. 29, 1984	ORMC0074207-0074214
Riddle 9 - 10	Jun. 25, 1984	ORMC0075519-0075520

HISTORY

The Silver Peak ore body was discovered in 1910, and by 1930 had produced 3,294 tons of ore, reported to have averaged 0.067 oz/t Au, 3.72 oz/t Ag, 5.84% Cu, and 5.8% Zn. (Brook and Ramp, 1968; Hotz, 1971.) Five adits were driven to develop the ore body. These workings appear to be split between the Silver Butte patented claim and the Formosa claims, with three of the adits on the Formosa claims. The original development work was done by the Silver Peak Copper Company*, and the last work underground was by the Umpqua Consolidated Mining Co. in 1952.

Assessment work in the area was reported in 1969 and 1970 by J. Sullivan, and in the 1977 and 1978 there was a program in this region by Chevron Resources Co. which included four diamond drill holes on the property area.

In addition to the main workings, other adits have investigated mineralized zones on the Riddle property, but its history is not known.

During the summer of 1984, Rand Ventures Inc. financed a systematic program of surface and underground geological mapping, previous data compilation and geochemical rock and soil sampling on the Formosa, Riddle and Silver Butte claims. This program was the result of a recognition by Dr. K.I. Lu of the property's high potential for massive sulphide mineralization of the Kuroko type.

* Presently reorganized as Silver Butte Mining and Milling Company.

GEOLOGY

The regional geology (Hotz, 1971) features the Dothan and Rogue formations, which extend through this area on a northeast trend. These are Jurassic formations, with the Dothan being dominantly metasedimentary (shales, greywacke, conglomerate and minor greenstone) and the Rogue mainly submarine volcanics. Most of the Rogue Formation volcanic rocks are basaltic flows, including pillow structures, but there are also intermediate and acid flows and pyroclastics. The known mineralization of the Silver Peak deposit is associated with acid units of the Rogue Formation.

The geology of the Formosa-Silver Butte-Riddle claims has been mapped at a scale of 1:5,000 and the underground workings on the Formosa claims at a scale of 1:500. Adits in the other claims are caved in, flooded and inaccessible. Although moderately complex and altered by metamorphism, there is clearly a major band of acid to intermediate flows and tuffs which trends through the two claim groups and through the patented property. The ore body is directly associated with an altered tuff within this sequence.

RESULTS OF FIRST PHASE WORK

A mapping and soil chemistry program was carried out over the claims in 1984, and extended to the northeast in a brief program in 1985. The objectives of this work were as follows.

1. To examine as far as possible the Silver Peak mine and evaluate the possibility of remaining reserves.
2. To evaluate the geological setting for a potential of further Kuroko ore bodies.
3. To attempt to trace by means of mapping and soil geochemistry, the favourable stratigraphic horizon outward from the known deposit. This would provide control for a future detailed geophysical study which will seek drill targets.

The program was successful in indicating potential for further ore in the Silver Butte area and in delineating a zone through the Formosa, Silver Butte and Riddle properties which is marked by geochemical anomalies, acid tuffs, shearing and alteration, and with some gossans and massive sulphide float. The following describes these results in more detail.

1) Silver Butte Ore Body

Underground mapping in the accessible portions of the Silver Butte mine confirmed that it is a massive sulphide horizon in acid volcanic rocks with many features characteristic of Kuroko mineralization. Mine geology is shown in Figure 3, and the sample sites and section average assays are compiled in Figure 4.

The known ore body is split between the Formosa claim block and the adjacent Silver Butte patented claim. In Kuroko nomenclature, it consists in descending stratigraphic order of black ore (massive sphalerite, barite and pyrite with lesser galena, tennantite and chalcocite), yellow ore (bedded pyrite and chalcopyrite with a quartz-sericite matrix) and siliceous ore (sulphide-bearing quartz stockwork in a quartz-sericite host). The sequence is capped by a barite bed. The layering has been complexly deformed, either by slumping in the original environment or by tectonic shearing.

A summary of results of 1984 sampling on the known ore blocks in the ore deposit occurring within the Formosa-Silver Butte claim area, together with known results of Chevron's sampling and other published data is shown in Table II.

TABLE II: COMPILATION OF SILVER BUTTE SAMPLING DATA

	Block	Thickness (m)	Strike (m)	Au oz/t	Ag oz/t	Zn %	Cu %
Black Ore	I	1.94	70	0.2798	1.623	10.72	1.84
	II	0.76	25	0.1080	1.197	15.94	1.50
	III	1.14	25	0.2740	5.440	N/A	8.49
	*IV	5.0	12	0.1250	6.427	N/A	11.12
Yellow Ore	I	4.67	25	0.042	2.340	N/A	2.65
	*II	5.0	10	0.049	2.536	N/A	6.04
Siliceous Ore	I	1.65	46	0.022	0.961	N/A	2.19

* Stope

The black ore zone has been mapped for over 70 meters along strike in the Formosa claim area and into the Silver Butte claim area. However, it would appear that the known mineralization has been only incompletely explored and the width up-dip has not yet been obtained. The lowest level adit (FT-1) on the Formosa claims intersected the main black ore zone, but the adit driven above FT-1 adit (FT-2) stopped well short of intersecting the black ore horizon and did not therefore test the potential up-dip extension of the ore zone. Considerable exploration potential thus remains in the area of known mineralization.

2) Surficial Mapping

Geological mapping of the limited outcrop in the Formosa and Silver Butte claim areas showed complex volcanic stratigraphy typical of Kuroko environments. Of special interest are several acid to intermediate tuff horizons or lenses. The stratigraphy appears to be cut by northwest trending cross-faults, but the situation is not clear. Figure 5 shows the geology in the Formosa 1 - 13 claim area and south thereof.

3) Geochemical Results

The applicability of geochemistry in Kuroko exploration is limited, due to the relatively small size and isolation of the massive sulphide targets. A favourable stratigraphic horizon, however may often be traced by soil chemistry, typically producing a trend of discontinuous anomalies of moderate strength in the heavy metals and in barium. On this property, there was also a tendency for steep slopes to smear out anomalies in some areas, noteably westward from the mine site and on the Riddle claims.

Figures 6 and 7 compile data on geochemical anomalies and sample sites. A good multi-element trend runs northeastward from the mine site, which led to an extension of the property in this direction. Geochemical sampling in the northeast corner in 1985 again succeeded in picking up this trend.

To the southwest, the situation is less clear. Anomalies in the Riddle claims are of a lower order of magnitude, and the barium results do not match the anomalous axis outlined by the heavy metals.

In summary, given the geological complexity and the limitations of soil geochemistry, the trend shown across this property is considered good, and will provide a good guide to detailed geophysical work.

RECOMMENDATIONS

On the basis of the results from the first phase of exploration, a follow-up program of detailed geophysics and diamond drilling is warranted and recommended. Although drill targets exist at present, more precise target definition may be obtained through ground EM and magnetometer surveys which should precede the drilling program. Follow-up work should therefore be done in two phases as follows.

Phase II - Geophysics Program

A ground electromagnetic survey should be carried out along the Kuroko trend as outlined by mapping and geochemistry, and along the logical extension of this axis to the northeast. This survey should be detailed, designed for deep penetration with slope correction, and accompanied by magnetometer readings to assist in interpretation.

Phase III - Drilling Program

Contingent upon successful definition of geophysical anomalies in Phase II, the following work should be done to locate and evaluate mineralized areas:

1. The extensions of the existing known ore body should be tested to indicate if it is of sufficient dimensions to be viable. To accomplish this, the caved part of the Silver Butte tunnels should be rehabilitated for detailed geological examination and the heads of FT-1 and FT-2 adits should be extended by about 20 m and 40 m respectively. The known ore zone up-dip would be outlined by the FT-2 adit extension. Drilling from the heads of these two adits and from the surface would define the vertical and lateral extent of the ore body and provide grade estimates.

2. The high potential zone for further massive sulphide lenses on the property should be tested by a modest surface drilling program.

3. The presence of mineralization within the old adit on Riddle property should be tested by draining, mapping and sampling it.

COST ESTIMATES

Cost estimates for the Phase II and Phase III exploration programs are as follows:

Phase II

Wages (including benefits) - 30 days		
Project Manager (Geologist)	5,500.00	
Geophysicist	4,000.00	
Field Assistant	3,000.00	$12,500.00
Field, accommodation		
90 man-days @ $60		5,400.00
Transportation		
Truck rental	1,200.00	
Gas	500.00	1,700.00
Geophysical equipment		
EM rental		
4 weeks @ $2,300	9,200.00	
Magnetometer rental		
4 weeks @ $450	1,800.00	11,000.00
Field equipment, supplies		500.00
Report preparation		1,400.00
TOTAL PHASE II		$32,500.00

Phase III

Wages (including benefits)		
Project Manager		
2 mos. @ $5500	11,000.00	
Geologist		
2 mos. @ $4000	8,000.00	
Field Assistant		
2 mos. @ $3000	6,000.00	$ 25,000.00
Meals, accommodation 180 days @ $60		10,800.00
Transportation		
Truck rental		
2 mos. @ $1200	2,400.00	
Gas	800.00	3,200.00

Tunnel rehabilitation, timbering cleaning out	2,700.00
Tunneling 200 ft @ $330/ft all inclusive contract rate	66,000.00
Diamond drilling 900 ft @ $33/ft	29,700.00
Mobilization and demobilization of underground tunneling and drilling equipment	13,200.00
Assay 200 samples @ $15.00	3,000.00
Report preparation	1,400.00
TOTAL PHASE III	$155,000.00
TOTAL ESTIMATED EXPENDITURE PHASES II AND III	CDN $187,500.00

BIBLIOGRAPHY

Brook, H.C. and Ramys, L. (1968): Gold and Silver in Oregon, Dept. of Geol. Min. Indust., Bull.61.

Hotz, P.E. (1971): Geology of Lode Gold Districts in the Klamath Mountains, California and Oregon. U.S.G.S. Bull.1290, 91p.

Lu, K.I. (1981): Exploration Proposal for Volcanogenic Massive Sulphide Ore in the Canyonville Area of the Grants Pass Region, Southwest Oregon (Unpubl.).

Lu, K.I. (1984): Completion Report of Phase I investigations on the Formosa-Riddle-Lioso claims, Douglas County, Oregon, for Rand Ventures Inc.

CERTIFICATE AND STATEMENT

I, R.R. CULBERT, hereby certify that:

1. I am a practicing professional engineer with offices at 208 - 2786 West 16th Avenue, Vancouver, British Columbia.

2. I am a member in good standing of the Association of Professional Engineers of the Province of British Columbia, and have practiced mining exploration for twenty-two years.

3. I am a graduate of the University of British Columbia, B.A.Sc. (1964), Ph.D. (1971).

4. I have visited the Formosa and Riddle properties on two different occasions and am familiar with the work carried out there.

5. I have no interest, direct or indirect, in the properties or securities of Rand Ventures Inc. or Silver Butte Mining Co., nor in the Formosa, Riddle or Lioso properties.

6. I hereby give permission for Rand Ventures Inc. to use this report or excerpts therefrom in a Prospectus or Statement of Material Facts or in other reports as required.

DATED at Vancouver, B.C., this 10th day of October, 1985.

Dick Culbert

R.R. Culbert, Ph.D., P.Eng.

APPENDIX C

CERTIFICATE

The foregoing constitutes full, true and plain disclosure of all material facts relating to the securities offered by this Prospectus as required by Part 7 of the Securities Act of British Columbia and the regulations thereunder.

Grant Wells Lang
Director, President and
Promoter

K.I. LU by his attorney
in fact T. Tsukada
K.I. Lu
Director

Tomotaka Tsukada
Director and Promoter

Brian K. Westwood
Director and Promoter

DATED at the City of Vancouver, in the Province of British Columbia this 28th day of February, 1986.

APPENDIX D

CERTIFICATE OF THE UNDERWRITER

To the best of our knowledge, information and belief, the foregoing constitutes full, true and plain disclosure of all material facts relating to the securities offered by this Prospectus as required by Part 7 of the Securities Act of the Province of British Columbia and the regulations thereunder.

DATED: February 28, 1986

C.M. OLIVER & COMPANY LIMITED

Per:

P, 13

Bibliography:

Dole, H. M. and Baldwin, E. M.; A reconnaissance between the Almeda and Silver Peak mines of Southwestern Oregon: Oregon Dept. Geology and Min. Industries, The Ore-Bin vol 9, no. 12, pp. 95-100, Dec. 1947.

as foot note

Oregon ~~state~~ Dept. Geology and Mine Industries, ~~Oregon~~ metal mines handbook; Coos, Curry, and Douglas Counties: Oregon Dept. Geology and Mineral Industries Bull. 14-C, vol. 1, 1940.

Shenon P. J., Copper deposits in the Squaw Creek and Silver Peak districts and at the Almeda mine, Southwestern Oregon, with notes on the Pennell & Farmer and Banfield Prospects; U.S. Geol. Survey Circular 2, 1933

op cit

(1) Suggested addition -- All of the above mentioned mines with the exception of the Golden Gate Mine show relatively minor, leached, mineralized zones. These probably are very local in extent.

(2) Dave -- as I recall it, the leached gossan zone of the main Silver Peak mine showed in a bulldozer road extending east from the "switchback" in the road to the fire lookout. The strike here and also elsewhere along the zone was about N 10°E. If this were projected on the same strike it could not be the same mineralized zone as that at the nearest of the Silver Peak prospects to the southwest. In other words I don't think that the mineralized zone of the Silver Peak prospects is a continuation of the mineralized zone of the Silver Peak mine unless offset by faulting or unless a drastic change in strike has occurred.

B

Because Shenon (1933) discusses the Silver Peak and Umpqua Consolidated mines, a detailed review of ore deposits and developments at these mines is not included in this report. The mines and prospects visited during this reconnaissance are listed below. All elevations mentioned were determined with an altimeter and only a minor amount of control was available for checking and adjusting the readings of the instrument.

Gold Bluff locality

STATE OF OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
ASSAY LABORATORY

REQUEST FOR SAMPLE INFORMATION

The State Law governing free analysis of samples sent to State Assay Laboratories requires that certain information be furnished the Laboratory regarding samples sent for assay or identification. A copy of the law will be found on the back of this blank. Please fill in the information called for as completely as possible, and submit it along with your sample. Keep a copy of the information on each sample for your own reference.

Your name in full **DOGAMI - David White (Silver Peak - Grayback reconnaissance)**

Post office address **Portland**

Are you a citizen of Oregon ______ Date on which sample is sent **Sept. 26, 1950**

Name (or names) of owners of the property ______

Name of claim sample obtained from ______

Location of property or source of sample (describe as accurately as possible below):
(If legal description is not known, give location with reference to known geographical point.)

County **Douglas** Mining district **Riddle**

Township **31 S.** Range **5 W.** Section **5** Quarter section **NE¼**

How far from passable road and name of road **On logging road 200 ft. below lower mine working of Gold Bluff mine**

	Channel (length)	Grab	Assay for	Description
Sample no. 1		**x**	**Au, Ag**	**Across 15 ft. of outcrop**
Sample no. 2				

(Samples for assay should be at least 1 pound in weight; clay samples for ceramic testing, at least 5 pounds.)

IMPORTANT: A vein sample should be taken in an even channel across the vein from wall to wall. Location of sample in the workings, together with the width measured, should be recorded.

(Signed) **David J. White**

DO NOT WRITE BELOW THIS LINE - FOR OFFICE USE ONLY - USE OTHER SIDE IF DESIRED

Description **Iron-stain siliceous material with disseminated sulphides**

Sample number	GOLD oz./T.	Value	SILVER oz./T.	Value				
P-10389	**Nil**	**- -**	**Nil**	**- -**	**- - -**	**- - -**	**- - -**	**- - -**

Report issued ______ Card filed ______ Report mailed **10-2-50** Called for ______

SIR-5

Canyon Creek

STATE OF OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
ASSAY LABORATORY

REQUEST FOR SAMPLE INFORMATION

The State Law governing free analysis of samples sent to State Assay Laboratories requires that certain information be furnished the Laboratory regarding samples sent for assay or identification. A copy of the law will be found on the back of this blank. Please fill in the information called for as completely as possible, and submit it along with your sample. Keep a copy of the information on each sample for your own reference.

Your name in full **DOGAMI - David White (Silver Peak Grayback recon.)**

Post office address **Portland**

Are you a citizen of Oregon ____ Date on which sample is sent **Sept. 26, 1950**

Name (or names) of owners of the property ____

Name of claim sample obtained from ____

Location of property or source of sample (describe as accurately as possible below):
(If legal description is not known, give location with reference to known geographical point.)

County **Douglas** Mining district **Riddle**

Township **31 S.** Range **5 W.** Section **12** Quarter section **SW¼**

How far from passable road and name of road **East side of Pacific Highway**

	Channel (length)	Grab	Assay for	Description
Sample no. 1	**Chip sample**		**Au, Ag, Cu**	**200 ft. approx. along strike**
Sample no. 2				

(Samples for assay should be at least 1 pound in weight; clay samples for ceramic testing, at least 5 pounds.)

IMPORTANT: A vein sample should be taken in an even channel across the vein from wall to wall. Location of sample in the workings, together with the width measured, should be recorde

(Signed) **David J. White**

DO NOT WRITE BELOW THIS LINE - FOR OFFICE USE ONLY - USE OTHER SIDE IF DESIRED

Description **Grey siliceous material with disseminated sulphides**

Sample number	GOLD		SILVER		COPPER			
	oz./T.	Value	oz./T.	Value	Cu			
P-10387	**Trace**	**- -**	**Nil**	**- -**	**Nil**	**- - -**	**- - -**	**- - -**

Report issued ____ Card filed ____ Report mailed **10-2-50** Called for ____

SIR-5

STATE OF OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
ASSAY LABORATORY

REQUEST FOR SAMPLE INFORMATION

The State Law governing free analysis of samples sent to State Assay Laboratories requires that certain information be furnished the Laboratory regarding samples sent for assay or identification. A copy of the law will be found on the back of this blank. Please fill in the information called for as completely as possible, and submit it along with your sample. Keep a copy of the information on each sample for your own reference.

Your name in full **DOGAMI - David White**

Post office address **Portland**

Are you a citizen of Oregon ____ Date on which sample is sent **Sept. 26, 1950**

Name (or names) of owners of the property ____

Name of claim sample obtained from ____

Location of property or source of sample (describe as accurately as possible below):
(If legal description is not known, give location with reference to known geographical point.)

County **Jackson** Mining district **Ashland**

Township **38 S.** Range **1 E.** Section **31** Quarter section **SE¼**

How far from passable road and name of road **East of Mattern mine along SP R.R.**

	Channel (length)	Grab	Assay for	Description
Sample no. 1			**Au, Ag**	
Sample no. 2				

(Samples for assay should be at least 1 pound in weight; clay samples for ceramic testing, at least 5 pounds.)

IMPORTANT: A vein sample should be taken in an even channel across the vein from wall to wall. Location of sample in the workings, together with the width measured, should be recorded.

(Signed) ____

DO NOT WRITE BELOW THIS LINE - FOR OFFICE USE ONLY - USE OTHER SIDE IF DESIRED

Description **Siliceous material from shear zone**

Sample number	GOLD		SILVER					
	oz./T.	Value	oz./T.	Value				
P-10388	**Trace**	**- -**	**Nil**	**- -**	**- - -**	**- - -**	**- - -**	**- - -**

Report issued ____ Card filed ____ Report mailed **10-2-50** Called for ____

SIR-5

W fork of Canyon Crk.

STATE OF OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
ASSAY LABORATORY

REQUEST FOR SAMPLE INFORMATION

The State Law governing free analysis of samples sent to State Assay Laboratories requires that certain information be furnished the Laboratory regarding samples sent for assay or identification. A copy of the law will be found on the back of this blank. Please fill in the information called for as completely as possible, and submit it along with your sample. Keep a copy of the information on each sample for your own reference.

Your name in full **DOGAMI (Silver Peak - Grayback recon.)**

Post office address **Portland**

Are you a citizen of Oregon ______ Date on which sample is sent **Sept. 26, 1950**

Name (or names) of owners of the property ______

Name of claim sample obtained from ______

Location of property or source of sample (describe as accurately as possible below):
(If legal description is not known, give location with reference to known geographical point.)

County **Douglas** Mining district **Riddle**

Township **31 S.** Range **5 W.** Section **15** Quarter section **SE¼**

How far from passable road and name of road **East of road along W. fork of Canyon Creek on east side of creek**

	Channel (length)	Grab	Assay for	Description
Sample no. 1	**Grab sample from dump**		**Au, Ag, Cu**	
Sample no. 2				

(Samples for assay should be at least 1 pound in weight; clay samples for ceramic testing, at least 5 pounds.)

IMPORTANT: A vein sample should be taken in an even channel across the vein from wall to wall. Location of sample in the workings, together with the width measured, should be recorde

(Signed) **David J. White**

DO NOT WRITE BELOW THIS LINE - FOR OFFICE USE ONLY - USE OTHER SIDE IF DESIRED

Description **Quartz with sulphides (mainly pyrite)**

Sample number	GOLD		SILVER		COPPER			
	oz./T.	Value	oz./T.	Value	Cu			
P-10386B	Trace	- -	Nil	- -	1.20%	- - -	- - -	- - -

Report issued ______ Card filed ______ Report mailed **10-2-50** Called for ______

SIR-5

Silver Peak

needs more work. Mapped wrong by Shenon. Is at top of Rothan ncary ctw. Rooque vlc. series. In one of layers of volcanics near contact. Barite & sr.

Tom Ryan, atty. for mine whole area should be

Silver Peak, Douglas Co.

T 31 S, R 6 W, Sec. 23, 26, 27.

Examined July 31, 1953 for DMEA loan and rejected. Examination took 6 hours. Metallurgical testing was also done.

U. S. National Bank is trustee, W.D. Hinson of Portland office trust officer, 1952.

A lot of metallurgical work was done by the Albany office, USBM.

There is a DMEA map in the files, dated 1953 and a lot of 1942 WMM maps, but I don't believe these go beyond the published maps.

On the whole this very extensive file appears to add very little or nothing to the already available material.

Silver Peak Copper Co. (Patented Land)

sec 26
N $\frac{1}{2}$ of NW $\frac{1}{4}$, SW $\frac{1}{4}$ of NW $\frac{1}{4}$, Sec 26, T31S, R6
Geo. Hermans, St. Sec., Rt #2, Forest Grove, Or
[NE $\frac{1}{4}$ & S $\frac{1}{2}$ owned by C & D Lbr Co, Roseburg.
Remaining SE $\frac{1}{4}$ of NW $\frac{1}{4}$, Public Domain]

Silver Peak Group (Oregon Exploration Co.)

sec 23
Silver Peak #1, 2, 3, 4, & 5, Silver Peak Fraction, Silver Peak Base, Lower Silver Peak, Silver Peak North Base, Lower Silver Peak North, Iron Dike #1, 2, & 3, Bonner, Canyon, & Southbound Lode Claims, all in Sec 23, T31S.
Book 14, P457 – Affadavit of annual labor filed for year of June 30, 1953 – June 30, 1954 for above group, states that work was done on behalf of Homer B. Morris by Lester Harrison – Affadavit filled out & sworn to at Kellogg, Idaho. Homer B. Morris is listed as Trustee & Contractee for Oregon Exploration Co. No subsequent affadavits or notices filed.

INDUCED POLARIZATION, RESISTIVITY

AND MISE-A-LA-MASSE SURVEY

SILVER PEAK PROJECT

DOUGLAS COUNTY, OREGON

FOR

CHEVRON OIL COMPANY

PROJECT 0646

mining
geophysical surveys

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DISTRIBUTION:

ORIGINAL & 2 COPIES: Myron A. Goldstein, Denver

INDUCED POLARIZATION, RESISTIVITY
AND MISE-A-LA-MASSE SURVEY
SILVER PEAK PROJECT
DOUGLAS COUNTY, OREGON

FOR

CHEVRON OIL COMPANY

SUMMARY:

Anomalous induced polarization response trends N70°E in a narrow dike-like zone from Line 24+00S to Line 0+00N (see plan maps). This zone is buried 50' to 100' along strike and is less than 200' wide. It closely follows a mapped gossan zone which suggests that the anomalous response is sourced by sulfide mineralization. While the apparent IP response of the zone southwest of Line 0+00N is rather weak (≤16 ms), the fact that the zone is narrow and buried requires a significantly larger true IP response for the zone.

At Line 0+00N the mise-a-la-masse IP data indicate that the anomalous zone splits into two zones that trend N35°E. These two zones continue northeast to Line 24+00N. Anomalous response has not been cut off to the NE beyond Line 24+00N. We cannot make quantitative statements about the two zones because we lack theoretical models for mise-a-la-masse surveys. However, the IP data suggest that the northwestern zone is narrow, near surface and discontinuous along strike, while the southeastern zone is continuous along strike. The northwestern zone also follows the mapped gossan, suggesting a sulfide sourced IP response.

Another small zone of anomalous IP response is centered at 0+00W on Line 32+00S.

INTRODUCTION:

An induced polarization and resistivity survey as well as a mise-a-la-masse survey was carried out in the titled area during the period October 18-30, 1976. The survey was under the direction of Myron A. Goldstein, geophysicist for Chevron Oil Company, with assistance from Adam L. Sotelo, technician for Mining Geophysical Surveys. The report and interpretation are by Robert E. West and W. Gordon Wieduwilt, geophysicists for MGS.

The IP survey was carried out on N60°W Lines 0+00N, 4+00S, 12+00S, 24+00S, 32+00S, and 36+00S. The mise-a-la-masse survey was conducted in the area from 0+00N to 24+00N on a N30°E base line and N60°W lines spaced 400' apart.

The rocks exposed in this area are volcanics and metamorphosed volcanics. The strike of the contacts and the foliation is NNW to NW. A narrow zone of phyllite, chert, and gossan extends from Lines 36+00S to 20+50N where it is cut off by a fault. This zone is of particular interest because anomalous IP response occurs along it.

SURVEY PROCEDURE:

Induced Polarization and Resistivity Survey:

The induced polarization and resistivity measurements are made in the time-domain mode of operation using a DCS model IPR-2 receiver and an EGC model 45A transmitter with a capability of transmitting a maximum of 10 amps to the ground. A trailer-mounted power supply was used for the first part of the survey, and an EGC model P45A power supply was used for the remainder of the survey. A conventional system of measurements which uses a time cycle of 2.0 seconds "on" and 2.0 seconds "off" - 2.0 seconds "on" and 2.0 seconds "off" (current reversed) was employed.

The commencement of the measurement of the secondary voltage is delayed by 0.45 seconds to avoid coupling and other transient effects. The integration is performed during the period from 0.45 to 1.10 seconds after the cessation of current.

To conform to a standard presentation, the integral time constant is adjusted to give induced polarization readings equivalent to those obtained with transmitter cycles of 3.0 seconds "on" and 3.0 seconds "off", with integration of the secondary voltage during the first second of the "off" period.

Throughout the survey a conventional inline dipole-dipole array of seven current electrodes was used, with the dipole lengths "a" equal to 200'. A 400' "a" spacing was also used on Line 0+00N. Measurements were made for dipole separation factors "n" of 1/2 and 1 to 6 for all lines except 32+00S where the "n" of 1/2 was not read. The potential electrodes occupied positions on both sides of the current-electrode spread, thereby providing a line coverage of approximately nine times the dipole length for a standard line of seven electrodes. The total length of line is determined by the number of spreads or additional current-electrodes used.

Apparent polarization values are the average of a number of IP measurements. If a considerable amount of noise occurs, a histogram of the measurements is plotted. The histogram is used by the receiver operator to determine when a sufficient number of IP measurements has been taken.

Very little noise was observed during the survey and no histograms were made. However, on Line 36+00S, two "bullseye" anomalies occur with peak values of 17 and -13 ms, suggesting noise.

Apparent polarization response is in units of millivolt-seconds-per-volt, or milliseconds (ms), and apparent resistivity is in units of ohmmeters. The data from each line is plotted in quasi-section to facilitate presentation of data at all spacings used.

Mise-a-la-masse Survey:

The near current electrode for the mise-a-la-masse survey was placed underground 100'-150' beneath the surface at 14+00N, 1+00E. The reference current electrode was located approximately

10,000' N10°W of the near current electrode.

Both potential difference (primary voltage) and IP measurements were made along all lines using a 100' potential dipole. The potential differences were normalized by the transmitted current, and summed along the path of the potential dipole to give the "absolute" potential every 100'. The absolute potential refers to the potential difference between a particular station and the potential at station 0+00W, 4+00N, which was assigned an arbitrary value of 1000 mv/amp. The measured chargeability was plotted at the midpoint of potential dipole.

The following table summarizes the mise-a-la-masse survey. The data collected on October 13, 1976 was not used because of current regulation problems.

SUMMARY OF MISE-A-LA-MASSE SURVEY

DATE	LINE	BEGINNING STATION	ENDING STATION	LOOP ERROR (MV/AMP)
10-14-76	0+00W	0+00W, 16+00N	00+00W, 16+00N	32.4
"	"	" "	" "	-12.7
"	16+00N	" "	" "	25.7
10-15-76	12+00N	" , 12+00N	" , 12+00N	12.0
"	16+00N	" , 16+00N	" , 16+00N	6.6
"	8+00N	" , 8+00N	" , 8+00N	-20.1
10-15, 10-16-76	12+00N	" , 12+00N	" , 12+00N	22.2
10-16-76	8+00N	" , 8+00N	" , 8+00N	-2.0
"	4+00N	" , 4+00N	" , 4+00N	8.4

(Cont'd)

DATE	LINE	BEGINNING STATION	ENDING STATION	LOOP ERROR (MV/AMP)
10-16-76	4+00N	0+00W, 4+00N	0+00W, 4+00N	3.0
"	0+00N	" , 0+00N	" , 0+00N	0.4
10-17-76	"	" "	" "	2.0
"	20+00N, 24+00N	" , 20+00N	" , 24+00N	19.8
"	20+00N, 24+00N	" , 24+00N	" , 20+00N	-67.4

Potential difference measurements for each line were made in "loops". A loop consists of measuring potential differences along a path where the potential of the beginning and ending station is known from previous measurements. The sum of the potential differences from the beginning to the ending stations should equal the sum that was established by previous measurements, but errors cause the two sums to differ by an amount referred to as the "loop error" in the table.

The loop error was distributed in two different ways. On Lines 20+00N and 24+00N, the error was distributed linearly with respect to the number of potential difference measurements. This method was necessary because the beginning and ending stations were different and only one measurement was made for most of the stations.

For the rest of the lines, the loop began and ended at the same station and two measurements were made at each dipole setup. The potential differences were averaged for the two measurements and the potential was calculated from this average.

A comparison of the two methods of distributing the loop errors was made for the first loop surveyed on October 14, 1976, which had a loop error of 32.4 millivolts/amp. The maximum difference between the potential calculated for a particular station using both methods was 3.2 millivolts/amp. This implies that either method will remove loop errors adequately.

On October 14, 1976 five measurements of the potential difference between stations 0+00W, 6+00N and 0+00W, 7+00N were made from 11:15 to 11:25. The potential difference varied between 175 and 158 millivolts/amp. or 17 millivolts/amp. The maximum difference between these measurements is the same order of magnitude as the loop errors, and it occurs over a time period that is much less than the time necessary to complete measurements about a loop. This suggests that linear distribution of loop errors is probably inappropriate and averaging of several measurements of the potential difference between two stations may provide a more precise value.

When more than one measurement of the IP response was made, the average value was used.

INTERPRETATION:

IP AND RESISTIVITY SURVEY, LINES 0+00N to 36+00S

Weakly anomalous IP response occurs in a dike-like pattern on Lines 24+00S to 0+00N and trends N70°E. The resistivity of the anomalous zone is variable. The dike has an apparent dip on Lines 4+00S and 24+00S. On Line 24+00S the response appears to be in a low resistivity (200 ohmmeters) dipping layer. A steep (>45°) apparent NW'ly dip is suggested by the data but dip directions are difficult to determine with the dipole-dipole array and we lack complete coverage over the dike to the northwest.

The anomalous dike trend is buried. We estimate the depth to the top of the anomalous zone along strike varies from less than 50' to about 100'. The zone is less than 200' wide on all lines.

Although the apparent response of this zone never exceeds 16 ms, the true response must be significantly greater since the zone is narrow and buried. Negative apparent response off the southeastern flanks of the dike on Line 24+00S is expected (although rarely observed) from a low resistivity responsive dike.

The anomalous dike response closely follows a mapped gossan. This suggests that the source of the IP response is buried sulfides.

Another anomalous zone is centered at 0+00W on Line 32+00S. This anomalous response is 200' to 400' across and occurs in a low resistivity (200 ohmmeter) surface layer. The response is greater than 20 ms and bottoms out at a depth of about 100'. Apparent resistivity data suggest that steeply dipping high and low resistivity rocks occur beneath the low resistivity layer. Again, negative apparent IP response occurs off the southeastern flank of this conductive response zone.

A possible IP contact occurs in the vicinity of Line 0+00N at 24+00W on the 400' "a" spacing profile. Anomalous(?) response is to the northwest.

The remainder of the IP survey area has a background IP response of around 1-5 ms.

Complex apparent resistivities occur on all of the lines and attempts to correlate resistivity contacts from line to line are shown on the plan map. A buried high resistivity (3000 ohmmeters) dike-like feature occurs on Lines 0+00N to 12+00S. This does not appear to be a topographic effect since it does not correlate with the crest of the NE'ly trending ridge. A 400' "a" spacing used on Line 0+00N suggests that it is a high resistivity block whose southeastern boundary is located at 4+00E. The top of the block is shallow and has an apparent NW'ly dip. We estimate that the depth to the top is less than 100' at 2+00E, the point where its depth of burial is least, and about 200' at 12+00W.

MISE-A-LA-MASSE SURVEY, LINES 0+00N to 24+00N

Unfortunately, we lack theoretical models for this type of survey and, because of this, the following comments are necessarily qualitative.

The IP data show a continuation of anomalous response to the NE but the single dike-like zone south of Line 0+00N splits into two anomalous trends which we assume to be sourced by two separate anomalous response zones.

Both of these zones trend N35°E but the northwestern zone has a much more variable and higher amplitude response. The high IP gradients suggest that this zone is near surface. The relative narrowness of the high amplitude part of this anomaly suggests a narrow source. Since this zone follows the mapped gossan, buried sulfides probably cause the anomalous response. The extreme variability of the response may reflect a change in width as well as variable % total sulfides along strike. The high amplitude IP response continues NE to Line 24+00N, uninterrupted by a fault that cuts off the gossan at surface about 20+50N, 0+00W. The extremely high positive and negative IP values of the trend at the south end of the grid may reflect a complex geology.

The southeastern IP anomaly is lower amplitude, broader, and does not vary rapidly along strike. This suggests that the true response is rather constant along strike. Anomalous response has not been cutoff to the northeast.

The potential contours are elongated along the geologic strike direction. This indicates a general low resistivity trend in the strike direction.

The axis of elongation of the potential contours and the northwestern IP anomaly are offset approximately 100' northwest of the buried current electrode. This is an effect of the steep southeasterly dip that occurs in this area.

Respectfully submitted,

Robert E. West

Robert E. West
Geophysicist

W. Gordon Wieduwilt

W. Gordon Wieduwilt
Geophysicist

8842
W. GORDON
WIEDUWILT
DATE SIGNED 1/18/77

January 14, 1977

Tucson, Arizona

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                                      RECORD IDENTIFICATION
                                        RECORD NO............  M061226
                                        RECORD TYPE..........  X1M
                                        COUNTRY/ORGANIZATION.  USGS
                                        MAP CODE NO. OF REC..

                                      REPORTER
                                        NAME..........................  JOHNSON, MAUREEN G.
                                        UPDATED.......................  81 04
                                        BY............................  FERNS, MARK L. (BROOKS, HOWARD C.)

NAME AND LOCATION
  DEPOSIT NAME.................  SILVER PEAK

  MINING DISTRICT/AREA/SUBDIST.  RIDDLE

  COUNTRY CODE.................  US
  COUNTRY NAME:  UNITED STATES

  STATE CODE...............  OR
  STATE NAME:  OREGON

  COUNTY...................  DOUGLAS
  DRAINAGE AREA............  17100302 PACIFIC NORTHWEST
  PHYSIOGRAPHIC PROV.......  13 KLAMATH MOUNTAINS
  LAND CLASSIFICATION......  01

  QUAD SCALE         QUAD NO OR NAME
   1:   62500          CANYONVILLE

  LATITUDE           LONGITUDE
   42-51-22N           123-22-52W

  UTM NORTHING       UTM EASTING        UTM ZONE NO
   4744683.4           468860.6            +10

  TWP......  31S
  RANGE....  06W
  SECTION..  26 23
  MERIDIAN.  W.M.

  ALTITUDE..  3300

  LOCATION COMMENTS: SW 1/4  23,  NW 1/4   26


COMMODITY INFORMATION
  COMMODITIES PRESENT..........  CU   AG   AU   ZN   PB   BA
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OCCURRENCE(S) OR POTENTIAL PRODUCT(S):
               POTENTIAL.......
               OCCURRENCE...... PB    BA

  ORE MATERIALS (MINERALS,ROCKS,ETC.):
    PYRITE, SPHALERITE, CHALCOPYRITE; MINOR BORNITE, GALENA, TENNANTITE, CHALCOCITE, AND COVELLITE.

  COMMODITY SUBTYPES OR USE CATEGORIES:
    0.021 AU:AG

  COMMODITY COMMENTS:
    MASSIVE GRANULAR TO DISSEMINATED SULFIDES


EXPLORATION AND DEVELOPMENT
  STATUS OF EXPLOR. OR DEV.   4
                              PROPERTY IS INACTIVE
  PRESENT/LAST OPERATOR....   CHEVRON OIL CO. (1978)


DESCRIPTION OF DEPOSIT

  DEPOSIT TYPES:
    MASSIVE SULFIDE
  FORM/SHAPE OF DEPOSIT: LENS; BANDS

  SIZE/DIRECTIONAL DATA
    SIZE OF DEPOSIT......  SMALL
    MAX WIDTH............  100 FEET
    STRIKE OF OREBODY....  NE
    DIP OF OREBODY.......  SE

DESCRIPTION OF WORKINGS
     SURFACE AND UNDERGROUND
     LENGTH OF WORKINGS............... 2640 FEET
     OVERALL LENGTH OF MINED AREA.... SMALL

  COMMENTS(DESCRIP. OF WORKINGS):
    3 ADITS, WKGS 1/2 MI,


PRODUCTION
      YES
      SMALL PRODUCTION


 ANNUAL PRODUCTION (ORE,COMMOD.,CONC.,OVERBURD.)  YES

   ITEM         ACC  AMOUNT  THOUS.UNITS YEAR  GRADE,REMARKS
  1  ORE   SML         6.420  TONS
  2  AU    SML          .487  OZ          .075 OZ/T
  3  AG    SML        22.426  OZ         3.493 OZ/T
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SOURCE OF INFORMATION (PRODUCTION).. USBM YEARBOOK

GEOLOGY AND MINERALOGY

   AGE OF HOST ROCKS.............  JUR
   HOST ROCK TYPES...............  TUFFACEOUS GREENSTONE
   IGNEOUS ROCK TYPES............  RHYODACITE

   PERTINENT MINERALOGY.........  GANGUE = QUARTZ & BARITE

   IMPORTANT ORE CONTROL/LOCUS..  NEAR THRUST CONTACT WITH DOTHAN FM.

   GEOLOGICAL DESCRIPTIVE NOTES.  GREENSTONE IS SILICIFIED RHYOLITIC FLOWS & TUFFS

   LOCAL GEOLOGY
     NAMES/AGE OF FORMATIONS,UNITS,OR ROCK TYPES
      1) NAME: ROGUE VOLCANICS
          AGE: JUR
      2) NAME: DOTHAN
          AGE: JUR

     SIGNIFICANT ALTERATION:
       SERICITE - CHLORITE SCHIST


GENERAL REFERENCES
   1) RAMP, L., 1972, GEOLOGY AND MINERAL RESOURCES OF DOUGLAS COUNTY, OREGON; ODGMI BULL. 75, P. 29
   2) LOWELL, W.R., 1942, THE PARAGENESIS OF SOME GOLD ANDCOPPER ORES OF SOUTHWESTERN OREGON; ECON. GEOL. VOL. 37,
     557-595
   3) OREGON METAL MINES HANDBOOK, 1940, ODGMI BULL. 14-C, VOL. 1, P. 110
   4) SHENON, P.J., 1933, COPPER DEPOSITS IN THE SQUAW CREEK AND SILVER PEAK DISTRICTS AND AT THE ALMEDA MINE,
     SOUTHWESTERN OREGON;  USGS CIRC. 2, P. 15
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(COPY)

ZINC RESERVES IN OREGON

INTRODUCTION.

On the basis of previously published reports of zinc in non-active mines in the Santiam, Silver Peak, and Bohemia mining districts, twelve properties were visited during May by geologists of the State Department of Geology and Mineral Industires. Five of these have developed reserves of ore, and the others show distinct possibilities. The results of this survey have been correlated with information supplied by private agencies to give the following estimates of tonnage:

(1) Development is such that actually proven reserves are small; but the total of reserves that we classify as "highly probable" ~~of sum~~ total in excess of 600,000 tons of ore on which, on the basis of numerous assays, should yield approximately 50,000 tons of metallic zinc. This figure includes both the proven and probable ore.

(2) It is entirely possible that before the limits of ore in these mines are reached, the tonnage may exceed 1,500,000 tons; which should yield over 130,000 tons of metallic zinc, in addition to the above extimated tonnage from "Proven"and "Probable" classifications.

ZINC RESERVES AT THE SILVER PEAK MINE
Douglas County, Oregon

SUMMARY

Development and Production: The Silver Peak ore bodies are developed by three levels: the lowest crosscut is 600 feet long with 600 feet of drifts; the second main crosscut is 55 feet higher and is 480 feet long with 700 feet of drift; the third level is 195 feet above the first and is 170 feet long.

Production has been nominal, and values from it are averaged as follows:

	Tons Produced	Au ozs.	Ag ozs.	Cu.	Zn.
1926-1937 Totals:	6623	.095	3.77	5.61	6.00

Assays and Sampling: Returns from sampling and assaying across widths, averaging about 7 feet, give values of lower than the mine run as considerable waste material which can be sorted out in mining was included in the channel sampling.

Tonnage Reserves: Calculations of tonnage have been made on the basis of 8 cubic feet of ore to the ton. With widths of massive sulphide varying from 3 to 15 feet, the average is probably over 8 feet if both the two parallel ore-bodies are combined. The simplest possible claculations, based on a total length of 300 feet and a vertical distance of 200 feet, give an estimate of more or less certain ore of around 60,000 tons. The estimate of probable ore will add at least 40,000 tons. The ore is primary and should go without change to considerable depth, so "possible" ore might add at least another 300,000 tons. On the basis of the average zinc content of 6 percent, the proven tonnage of metallic zinc is 3600 tons; "probable" 2400 tons; and "possible" 18,000 tons, a total of 24,000 tons.

Shenon 33:15-23 gives the following description: "Location and access: The copper deposits of the Silver Peak district lie in the southern parts of Douglas County, Oregon, in secs. 23 and 26, T. 31 S., R. 6 W. By airline the mines are about 7 miles directly south of Riddle, a shipping point on the Southern Pacific Railroad, but by road the distance is about 9½ miles. The road is steep and narrow, but except during stormy periods is readily passable."

......"Deposits south of Silver Peak - History and Development: The mines of the Silver Peak Copper Co. and the Umpqua Consolidated Mining Co. are on a steep slope south and slightly west of Silver Peak, at a mean altitude of about 3,300 feet. The property of the Silver Peak Copper Co. is in sec. 26, T. 21 S., R. 6 W., and that of the Umpqua Consolidated Mining Co. which adjoins it on the north is in sec. 23. Ore was first discovered here in 1910 by Robert Thomason, on what is now Silver Peak Copper Co.'s ground. In 1912 J. E. Reeves purchased a patented timber claim which included a large portion of the ore that has since been developed. Little work was done until 1920, when the Oregon Exploration Co. located mineral claims over part of the timber claim. From 1922 to 1929 the property was in litigation, but during this period and in the following year 3,256 tons of ore was shipped from workings now owned by the Silver Peak Copper Co. In 1929 the Oregon Exploration Co. was reorganized as the Umpqua Consolidated Mining Co. This company shipped one car of ore (38 tons) in 1930. Both mines were idle at the time the writer visited them in Septmeber, 1930.

"The ore bodies have been explored on three principal levels. The lowest, the main level of the Umpqua Consolidated Mining Co., is a crosscut adit 600 feet long with two drifts aggregating about 600 feet. The main level of the Silver Peak Copper Co., 55 feet higher than the working mentioned and connected to it by a raise, is another crosscut adit about 480 feet long with 550 feet of drifts. The third level, known as No. 1, 195 feet above the Umpqua level, is an adit 170 feet long driven near the dividing line of the properties. There are in addition several shallow workings including a 30-foot shaft at a point 75 feet higher than level 1 and 270 feet above the main level of the Umpqua Consolidated Mining Co. Comfortable camps have been built on both properties, and atthe Silver Peak Copper Co.'s mine a No. 10 Ingersoll-Rand compressor and a Fairbanks-Morse 120-horespower engine, both new, were installed in 1930.

"Ore-bodies: The ore minerals occur as massive tabular bodies and diseminated in highly foliated schist. The two principal workings expose a zone of mineralized schist more than 100 feet wide. Across most of this zone sulphide minerals are rahter sparsely distributed, but in at least two places bodies of nearly solid sulphide ore occur. One of these, in the main crosscut of the Silver Peak Copper Co., the "northwest band", is about 15 feet wide and another, the "southeast band", is over 20 feet wide. Both pinch out to the northeast, one within a distance of 200 feet and the other within 60 feet. Two sulphide bodies are exposed also on the main level of the Umpqua Consolidated mine, but there the northwest body is only about 10 inches wide, whereas the southeast body is about 10 feet wide. Normally the massive ore grades into schist with disseminated sulphides, but in some places, especially where the massive ore pinches, one or both walls are slickensided fault surfaces commonly lined with several inches of gouge.

"The massive sulphide ore is distinctly banded, probably in part because the ore minerals have replaced schistose rocks and in part because the minerals were introduced along parallel fractures in the rock. The sulphides include pyrite, sphalerite, chalcopyrite, bornite, galena, tennantite; chalcocite, and covellite, named in the ralative order of their abundance. The last four mentioned occur in relatively small amounts. In addition to the occurrence of native copper is reported by Mr. Reeves. The gangue minerals are principally quartz. barite, and sericite. Epidote was seen in one thin section of the ore.

"At the surface oxidation is almost complete. Level 1, for example, follows a porous, iron-stained, and greatly leached gossan in which no sulphides are visible. A short distance from the portal sulphides become visible and are abundant near the face. Sulphides were struck also in the 30-foot shaft on the Umpqua Consolidated property. Traces of oxidation extend as deep as the lower levels, as shown by thin films of oxide minerals a long fractures.

"Quartz was the first gangue mineral to be deposited. It is everywhere fine grained but tends to be coarser in the fractures along which it was introduced. Barite was introduced next, then fracturing occurred, and pyrite was deposited. After a second fracturing sphalerite, tennantite, chalcopyrite, bornite, galena, and chalcocite were deposited as an overlapping series and probably in the order named, although the relation of galnea and chalcocite was not well established.

"The mineral composition differs in the differenct ore bodies and within the layers of a single ore body, as shown for example by the northwest and southeast ore bodies in the Umpqua Consolidated mine. The sulphides of the northwest ore body are associated with abundant quartz but very little barite, whereas the southeast ore body contains much barite and small amounts of quartz. The southeast ore body contains much barite and smaller amounts of quartz. The southeast body in the stopes above the level consists of nearly solid sulphieds with some layers of barite. The barite is lenticular in outline, and any one layer does not persist very far. The sulphides are distinctly banded. One stope shows seven distinct bands with parallel structure. The composition of the northwest ore body resembles that of layers 3 and 6 of the southeast ore body as shown in the illustration. The ore exposed on the Silver Peak Copper level more nearly resembles the ore of the southeast ore body of the Umpqua Consolidated levle. However, in some places - for example, near the top of the connecting raise - the copper sulphides are less abundant and the proportion of barite is greater than normal. At the turn in the drift, 30 feet northwest of the raise, the rocks are largely replaced by very fine grained silica that has irregular red jasperlike streaks.

"Four carefully cut samples taken at selected places serve to show the relative proportions of the metals to one another but do not necessarily illustrate the average metal content of the ore, which may be more closely determined from the production figures that follow. Analyses of the samples made in the chemical laboratory of the United States Geological Survey are given below:

Analyses of ores from the Silver Peak district, Oregon
(E. T. Erickson, analyst)

Sample No.	Silver(ounces per ton)	Gold(ounces per ton)	Copper(percent)	Zinc(peronet)
8	0.59	0.09	4.05	5.5
9	.30	.01	.90	.9
10	4.58	.03	5.13	7.5
11	.46	.01	.93	.6

"8. Silver Peak Copper tunnel, northwest ore body. Sample taken in stope 33 feet above tunnel level across 5½ feet of massive sulphide ore.

"9. Umpqua Consolidated tunnel, main corsscut immediately northwest of massive sulphide band. Sample taken across 9 feet of schist with disseminated sulphides.

"10. Umpqua Consolidated tunnel. Sample taken across 7 feet of massive sulphide ore in stope along line A-A', plate 4.

"11. Silver Peak Copper tunnel, 30 feet northwest of top of connecting raise. Sample taken across 6 feet of intensely silicified rock containing some visible sulphides.

"The results show that copper and zinc increase and decrease together, but indicate no similar relations between those metals and gold and silver or between the gold and silver themselves.

......."Origin of the ore: The mineralogy of the ores described above is evidence of their hypogene (deedp-seated) origin- that is, the mineral assemblage as shown by the careful observations of many geoligists belongs to Lindgren's mesothermal type, deposited at moderate depths by hot solutions. The source of the solutions is not evident from the geology in the immediate vicinity of the deposit, but quartz diorite and related rocks, which are believed to be the sources of many ore deposits in southwestern Oregon, are exposed a few miles distant and are probably not far below the surface at Silver Peak.

"The ore-bearing solutions, whatever their source, deposited gangue and sulphide minerals as they moved through the schistose rocks. The solutions apparently rose along planes of schistosity and replaced the adjoining material. Certain beds in the schist were apparently either more susceptible to replacement or were more readily penetrated by the solution than others, because solid sulphides occur interbedded with schist in which sulphides are sparsely distributed. The composition of the ore-bearing solutions probably changed during the period of deposition, because minerals of different composition have been deposited in an overlapping succession. Movements occurred within the rocks during the mineralization, once after the gangue minerals were deposited and again after the deposition of the pyrite. The later sulphides were deposited as a continuous series. After the deposition of the sulphides, strains within the rocks were relieved along faults, some of which have displaced the ore. More recently the sulphides near the surface have been oxidized, and much of the metal content of the outcrops has been removed by leaching. Erosion has kept pace fairly well with the oxidation, for at no place in the vicinity are oxide minerals known in abundance very far beneath the surface.

"Economic Aspects: The ore bodies at the Silver Peak Copper and Umpqua Consolidated mines have not been sufficiently developed to permit exact tonnage estimates, nor has the ground in the immediate vicinity been sufficiently explored to indicate the probability of undiscovered ore bodies of good-grade massive sulphide ore are present. Also sampling shows that there is a possibility, when metal prices recover, of mining and milling lower-grade disseminated ore along with the hihger-grade material.

"Only a very small percentage of the sulphides found on the lower levels are supergene (descended from above), and therefore it follows that there is not much likelihood of any material change in the metal content of the ore for some little distance below the present deepest level. However, owing to the fact that the outcrop has been almost entirely oxidized and much of the metallic content removed, more or less sulphide enrichment is to be expected immediately below the zone of oxidation.

"The facts available permit some conclusions as to the probable vertical and horizontal content of the ore. Foliated schists similar to those containing the ore are exposed at the surface for some distance north and south of the known ore bodies. In places they are mineralized-for example, at the Golden Gate mine, to the north. Some mineralization was also noted in a schist of similar appearance about half a mile to the southwest. Underground the ore has been followed along the strike for a total distance of over 450 feet, and in at least two places it continues beyond the present workings. Both bodies of solid sulphide continues beyond the present workings. Both bodies of solid sulphide ore were sheared off in the northeast drifts of the Silver Peak Copper Co.'s main level but continue into the walls to the southwest of the present workings.

"The southeast ore body on the Umpqua Consolidated level appears to turn into the southeast wall of the drift about 50 feet from the face. It appears also to have undergone shearing, and further work may prove that it is displaced. At the south end of the same drift the ore appears to end against an east-west, southward-dipping fault. Sulphide ore interlayered with barite is exposed on one side of this drift about 20 feet from the face, and it seems likely that the ore body may continue southwestward from this point. Thus the evidence underground does not suggest that the horizontal limits of the ore bodies have been reached. Even where the ore is sheared off by faulting there is no known reason why the segments may not be recovered. Out crops of partly oxidized sulphide ore occur 140 and 270 feet above the ore bodies found on the two main levels. No raises have been driven through to the sruface to prospect the ground betwen these outcrops, although at one place ore has been stopped above the Silver Peak Copper Co.'s level for a vertical distance of about 90 feet. It seems reasonable, however, to expect the ore to continue to the surface, though not necessarily as one continuous body, because of the possibility of fault displacement. It is generally recognized that there is usually a relationship between the horizontal extent of an ore body and its downward extension, and as the ore bodies under discussion are exposed on the lower levels over a horizontal distance of 450 feet without having ended, they can reasonalby be expected to extend from some distance below the present workings."

ESTIMATION OF RESERVES:

Definition of Terms: For the purposes of this report, one drift of ore in a hillside, together with a fairly well-exposed outcrop, will establish "proven"ore in the included vein when vertical distances are less than 100 feet. "Probable" ore is here regarded as ore that is outlined by development on only one or two sides. "Possible" ore is that ore that may possibly be mined before the entire ore-reserves of the mine are exhausted. Calculations of these "possible" reserves, the continuity of the known ore-bodies, the type of ore, and the structural conditons, are all factors which have been taken into account.

Development: On the Silver Peak--Umpqua Consolidated Property--development has been insufficient, as can be seen on th accompanying map, to block out the ore-bodies, however, certain estimations can be made with the above assumptions well in mind.

The two levels are over 200 feet below the outcrop, and the upper is 50 feet above the lower. The aggregate length of the ore exposed on both levels is nearly 700 feet with thicknesses from one to two feet up to over 15 feet. At the junction of the upper crosscut with the two ore-bodies, the total thickness of both lanses is over 25 feet of solid sulphide; but usually the thickness is between 5 and 10 feet.

Correlation even between the two developed levels is very difficult since although the ore-bodies are similar in strike and dip, they are offset both along their length and across their strike.

Production and Assays:		Width	Zn.	Au.	Ag.	Cu.
Production Figures from Smelter Returns						
Silver Peak Mine						
1926	389			.12	7.3	6.0
1928	937			.044	2.7	6.6
1929	1666			.07	3.6	5.6
1930	264			.057	3.0	4.4
1936	1001		6.88	.128	4.23	6.07
1937	2328		5.13	.058	234	5.13
Umpqua Consolidated						
1930	38			.24	2.2	3.9
Assays						
Silver Peak Mine						
Z1 From S.E.Drift:Stope,100'N.of main Xcut, up 15' S side		5'	1.3	.04	0.4	2.5
Z2 From S.E.Drift:25' S. of S. crosscut near raise		5'	0.6	.02	Tr.	1.1
Z3 From S.E.Drift:Stope, 100'N.of main Xcut,up15', N.Side		5'	9.2	.01	1.1	2.5
Z4 FromS.E.Drift: ~~35' from S. end~~ E.end of main crosscut		15'	1.2	.03	0.8	2.1
Z6 From S.E.Drift: 35' from S. end		6'	0.8	Tr.	Nil	0.1
8 From N.W.Drift: Stope,35' up, ~~from~~near main Xcut		5'6"	5.5	.09	.59	4.05
10		7'	7.5	.03	4.58	5.13

Estimates:

A block of massive ore 8 feet wide, 300 feet long, and 200 feet high (entirely above the lower tunnel level) gives, on a basis of 8 cubic feet of massive sulphide ore to the ton, 60,000 tonswhich at 6% should yield 3600 tons of metallic zinc. The entire length of the zone could give over 100,000 tons; and if another 100 feet of depth below the lower level were taken, the total tonnage should be over 200,000 tons of ore to yield 12,000 tons of metallic zinc. The type of ore suggests that ore bodies may continue to depths of many hundreds of feet, so the amount of "possible" ore may be as much as 500,000 tons.

ZINC RESERVES IN THE NORTH SANTIAM DISTRICT

On the north fork of the Santiam River there are a number of mines with ore containing an important zinc content. Of these the Amalgamated Mine (Pacific Smelting and Refining Co.) is by far the best developed. Details concerning this property are given in reports by Merritt and Rosenberg. The vein has been proven for a mile and a half on the surface and has been developed underground for a horizontal distance of 1500 and a vertical distance of 480 feet. The vein has an average width of 12 feet and an average of many assays gives 7.96% zinc, 1.14% lead, 0.36% copper, 0.033 ounces gold, and 0.404 ounces silver. Most engineers would give this property about 200,000 tons of #developed" ore, that is, ore reasonably well blocked out on two, three, or four sides by drifts and raises. The "probable" ore reserves amount to about 200,000 tons; and the "possible" reserves will be four or five times this amount, based on the sattement above as regards surface exploration of the vein, vertical extent of known ore bodies, and our knowledge of the habit of mineralization in this area.

Other mines in the district contain zinc ore assaying as high as 25%; but development does not permit tonnage estimates.

The Blue Jay is a part of the Amalgamated Group, lying half a mile to the east of the main tunnel. The vein is said to have been traced for over 2000 feet on the surface. One 400 feet drift shows that the average width of the vein approaches 4 feet, carrying up to 16% zinc.

The Blende Oro vein is proven by tunnels and open cuts for a horizontal distance of 1000 feet and a vertical distance of over 300 feet. In the lower 200-foot drift the vein averages 3 feet wide, and an ore shoot 100 feet long in the vein shows massive sphalerite lenses several feet long up to six inches wide in a zone of altered andesite from 12 to 65 inches wide which contains much disseminated sulfide. An assay of this latter material gave 4.6% zinc; .09 ox. Au.; 2.6 oz. Ag.; and 4.3% Cu. The average value of the ore should be considerably higher than this.

The Busche Group shows development on two veins totaling 100 feet and proving the vein for several hundred feet. The vein varies from one to six feet in width; one sample across four feet assaying 3.4% zinc.

The King #4 - A 40-foot tunnel on the King #4 claim shows a one foot vein of massive sulphide assaying 6.5% Zn and o.2% Cu.

The Capitol, Mineral Harbor, and Silver King properties were also visited, but development was insufficient to determine any values.

ZINC RESERVES IN THE BOHEMIA DISTRICT

Although many properties in the Bohemia district have showing of zinc ore, only three show developed and unmined reserves. The most extensively developed of these is the Champion Mine (now being developed by the H & H Mines). Details concerning this property are given in reports by Higgins and Hinsdale. The vein has been developed over a vertical distance of 600 feet on 7 levels for over 1600 feet laterally. The average width is 26 inches. Assays average 7% zinc along the western 400 feet of the vein, and 3% or less along the eastern 1000 feet. Gold averages over half an oz. for the eastern part of the vein, less for the western. There is an ore reserve of probably close to 100,000 tons of ore classed as "probable" with possibilities offour or five times that much, expecially as development on the western end of the vein, which is highest in zinc, has not reached the point where tonnage can be estimated. This mine has not been developed as a zinc mine but rather only for its precious metals content. If there should be a local smelter where zinc concentrates could be sold the mining policy would be changed somewhat and instead of this mine producing 5 to 8 tons per day of zinc concentrates--as it will be within a few months, smelter or no smelter--it might produce several times this quantity of zinc.

The Musick vein has been proven for a distance of 1800 feet by development on four levels giving a vertical distance of 400 feet, The ore shoots which total about 900 feet in length, have been largely mined for 200 feet of this distance. The vein averages over 18 inches wide and assays from 6% to 8% zinc with usually at least 0.2 oz. of gold, 2 Oz. of silver, 3% lead, and 9.5% copper. The unmined ore reserves are estimated at 30,000 tons "proven" and at greater depth will possibly reach four times that amount.

Helena Mine - The Helena vein has been proved for a distance of 3,000 feet in length and developed on 5 levels with a differential elevation of over 300 feet. The lowest or working tunnel runs for 750 feet along the vein, averages at least 5 feet in width with nearly half its length definitely in ore. The zinc content of sorted ore has in the past averaged nearly 3½%, with gold up to 2.0 ozs., as well as silver and copper vlaues.

Samples taken across the vein and from the mine dump gave values as follows:

Width	Zn	Au	Ag	Cu
4' gouge and quartz	1.3	Tr.	Nil	
8½' qtz. & sulphide	1.9	.02	0.4	
3' sulphide	2.4	.03	0.6	
Sorted ore from dump	4.7	2.58	5.5	0.2

The Sultana vein has been proved by two drifts, 650 and 850 feet long from crosscuts, by a 20-foot shaft, and by numerous shallow cuts for a horizontal distance of more than 2500 feet. The vein is mostly 3 to 4 feet wide containing shoots of quartz and sulphides; sphalerite, and galena being most abundant. One sulphide shoot is reported to be 80 feet long and from 6 inches to 2 feet wide. Panned concentrates from the ore assayed 40% Zn.; .02 oz. Au.; and .4 oz. Ag. The lead content is said to be frequently very high, running the silver up to 20 or 30 oz.

The Grizzly, Leroy, Sunset, and War Eagle were also visited, but development was insufficient to determine values.

PACIFIC NORTHWEST ZINC RESERVE

as reported by United States Geological Survey
October 4, 1941

Mine and District	Tons of Ore	%Zinc	Tons of Slab	Sub-Total	Grand Total
Metalline Falls					
Pend Oreille	1,000,000	9.0%	90,000	279,000	
Reeves McDonald	3,000,000	6.3%	189,000		
Bohemia					
Music and)		7.0%			
Champion)	100,000	5.9%	7,000		
Helena	14,000		826		
				7,826	
Santiam					
Ruth ~~Bluejay~~	150,000	8.13%	12,195		
Bluejay	6,000	12.0 %	720		
Busche	3,600	9.0 %	324		
				13,239	
Silver Peak					
Silver Peak	15,000	5.0%	750		
				750	
					300,81 5

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

2033 First Street Baker, Oregon	1069 State Office Building Portland 1, Oregon	239 S.E. "H" Street Grants Pass, Oregon

MG-445
Au, Ag, Cu

REQUEST FOR SAMPLE INFORMATION

The State law governing analysis of samples by the State assay laboratory is given on the back of this blank. Please supply the information requested herein as fully as possible and submit this blank filled out along with the sample.

Your name in full **David J. White (DOGAMI)**

Post office address **P. O. Box 417 Grants Pass, Oregon**

Are you a citizen of Oregon **Yes** Date on which sample is sent **10-8-52**

Name (or names) of owners of the property

Are you hiring labor?

Name of claim sample obtained from

Are you milling or shipping ore?

Location of property or source of sample (If legal description is not known, give location with reference to known geographical point.)

County **Douglas** Mining district **Riddle**

Township **31 S** Range **6 W** Section **23** Quarter section

How far from passable road and name of road **On road to Silver Butte Lookout**

	Channel (length)	Grab	Assay for	Description
Sample no. 1		**x**	**Au,Ag,Cu**	
Sample no. 2				

(Samples for assay should be at least 1 pound in weight.)

(Signed) **David J. White**

DO NOT WRITE BELOW THIS LINE - FOR OFFICE USE ONLY - USE OTHER SIDE IF DESIRED

Description **Sample of disseminated sulphides in grey schist from dump of material recent mined from new crosscut off of S.W. end of Umpqua Consolidated tunnel.**

Sample number	GOLD		SILVER		COPPER			
	oz./T.	Value	oz./T.	Value	Cu			
P-13573 MG-445	Trace	- -	Nil	- -	0.90%	- - -	- - -	- - -

Report issued ______ Card filed ______ Report mailed **10-17-52** Called for ______

SIR-

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

"Hogwash"

PRELIMINARY REPORT ON SILVER PEAK-
SILVER, GOLD AND COPPER PROPERTY DOUGLAS COUNTY, OREGON

BY B. VAN ZEIPEL.

PHYSIOGRAPHY

The relief of Silver Peak district is pronounced. Several peaks rise to nearly 4000 feet, and the elevation of the lowest valley is somewhat above 700 feet. The luxuriant vegetation has, to some extent, veiled the geologic features of the region. Great forest cover the mountain slopes, and the district is noted for its timber value.

GEOLOGY

There are a great variety of rocks in Douglas County. The age of many of the massive intrusives have not been clearly determined. They are identified with both the Paleozoic and Jurassic, and with the latter, in Riddle's quadrangle, there occur some porphyries that have been classified as ancient rhyolites.

The rocks of Silver Peak district are gabbro, porphyries, serpentine, andesite, diabase and schist. They vary from light to dark in color. Metamorphism and sericitization are common occurrences.

The formation represents the granitoid phase of the more basic rocks.

OCCURRENCE OF THE ORES

The ores occur in fissures in a 35 foot dike with N. E. strike and a dip of from 75 deg. to 85 deg. The fissures vary from 4 to 8 feet in width. Where they have been cut by a short tunnel at a depth of less than 30 feet, one 4 foot fissure is conspicuous for its economic value, containing chalcopyrite and antimonides of silver. High values of gold and silver are not uncommon and traces of these metals are found in all the material of the oxidized zone.

In a 40 foot open cut South from the upper tunnel gold is easily detected in hematite and barite. Some of the soft honey-combed gossan yields much fine gold to the pan.

In the lower cross cut tunnel sulphate of copper is present in many places on the walls. Pans from the floor of the tunnel often yield native copper and rarely silver and gold.

SECONDARY ALTERATION AND ENRICHMENT

After being filled the veins were brecciated, and as a result oxygenated waters allowed to percolate downward along the fractured zone. The ores were thus oxidized and sulphides leached out and carried downward to the groundwater level. The chalcopyrite ($Cu Fe S_2$) is oxidized to copper sulphate which is dissolved and carried down the vein. Coming in contact with the unaltered chalcopyrite a reaction takes place which enriches the sulphade changing it to covellite ($Cu S$). When additional copper sulphade in solution comes in contact with the covellite, a further enrichment would takeplace with the formation of chalcocite ($Cu_2 S$). In each case there is an interchange of metals, iron in the original sulphade going into solution as a sulphade, thus taking the place of copper which has been precipated.

SILVER

The silver minerals of this deposit would normally begin near the demarkation line between the oxidized and primary ore and may extend along the fissures to a maximun depth of 1000 feet below it. Native silver, however, may be associated with barite, calcite and quartz in even greater depths. The sulphides may be deposited with the gangue as well as being replacements.

REGIONAL METAMORPHISM

In the vicinity of the veins the mineralizing solutions have greatly altered the country rocks. For a considerable distance from the veins the color of the rock changes to a reddish tinge while near the deposit it is dark red and the rock crumbles easily.

Where exposed in an open cut near the shaft the hanging wall rocks have assumed a thoroughly schistose structure.

ZONE OF OXIDATION

In the open cut above the upper tunnel the iron oxides, limonite and hematite form the skeleton of the gossan, where the soluble minerals originally accumulated. When these were carried away, the outcrop assumed its present characteristic, porous and cellular structure.

As but little quartz is present, it is possible that the outcrop may have been compressed by lateral pressure and dislocation. The dike may therefore widen out below the zone of decomposition.

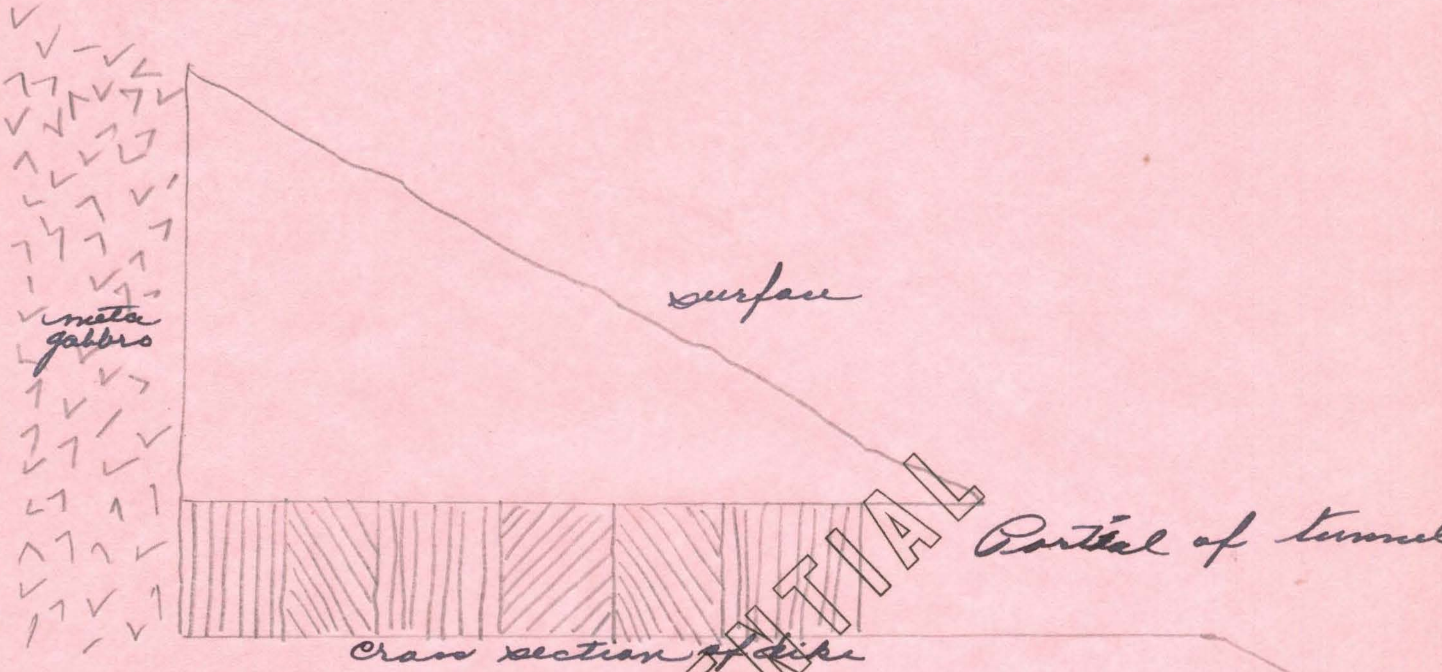
As there is a large amount of altered and secondary material and a conspicuous and abundant gossan, it would indicate a large amount of sulphide ore in the unaltered veins. The accumulations of hematite on the surface are decomposition products of the pyrites.

DEEP-SEATED ALTERATIONS

The alterations in the zone of oxidation develop strong acid solutions which gradually change character in depth. Oxygen is eliminated and free acid decreases. Hydrogen sulphide and carbon dioxide are generated. These gases by their precipitating action on the ascending solutions may for replacement ore shoots, conditions being favorable.

MINING DEVELOPMENT

One upper 40 foot tunnelcuts the dike near the surface exposing the oxidized fissuresas illustrated.



One 30 foot shaft has been sunk 126 feet North of the transverse falts. West from shaft is a 200 foot cross cut tunnel, the face of which is 37 feet past the vertical shaft line. It would cut the dike at te 120 foot level.

FAULTS

The transverse fault, weakening the structure, causing a trough shaped depression, strikes East--West 120 feet to South of the shaft.

South of the transverse fault the intersection fissure, formed by replacement of plates of rock in between multitudes of parallel fractures cuts the dike at an acute angle.

FUTURE DEVELOPMENT

The primary object is to drive a tunnel at some horizon below the oxidizedzone. As the intersection fissure carries gold, the most logical prodedure is to follow the cross course to a point past the dike and then drift on the ore shoot.

CHAPTER II

Occuring in the large laccolith of metagabbro the dike can be traces for several miles. It is included in the extensive gold belt which is characterized by quartzose ores with free gold and auriferous sulphides. To the North and Northeast the Bohemia and Blue River districts are noted,,and far away the Blue Mountains of Oregon with gold quartz veins in Paleozoic slates and diorite.

The rock in the lower tunnel is an alteration of the normal gabbros to a mixture of epidote, garnet and other silicates, commonly known as saussurite, having a dark gray to greenish color and granular texture. The saussurite gabbros are strongly compressed and dymamically altered rock masses. The basic lime solda feldspar is completely replaced by zoicite and albite.

The massive arsenopyrites and pyrites in the dike would suggest magmatic sergregation.--Opposed to this hypothesis are the barites, being common constituents in the decomposed fissures. Barite is not a mineral of igneous origin. It is common, however, in veins formed by aqueous solutions in igneous or sedimentary rocks, associated with metallic sulphides, particularly lead and silver.

Near the upper tunnel the dike is intersected by a fissure, cutting it at an acute angle, causing an enrichment or an ore shoot as demonstrated by drifting on one of the fissures near the hanging wall. The vertical depth of the ore shoot may be very great. The several fissures, heavily charged with iron pyrites, are intersected by another under circumstances which may have had a profound effect upon the deposit. Large ore bodies are likely to occur along the line of intersection.

In contra distinction to gold and silver copper may be deposited in greatest quantity in deep levels and at high temperatures.

With the oxidized ores are manganese, antimony and tetrahedrite. Analysis of thedlike material also disclose the presence of lead, zinc, tungsten and tin, which metals certainly have a place in the list of magmatic emanations. Included in the gaseous solutions are sulphur, carbon, chlorine, fluorine, boron and other elements which dissolved in water, ascend, propelled by the expansion of the gases. The high temperature facilitates the solutions of other elements in the surrounding rocks. In the upper levels gases condense to liquid solutions and precipitation begins by reduction of temperature and pressure. Finally meteoric water mingle with the magmatic and this again causes deposition.

As manganese id conspicuous in the dike, a brief discussion of the chemical effect upon other minerals may be warranted.

A manganeferous silver ore carrying chlorides in solution will liberate chlorine, which would react with silver to form horn silver. This would be fixed in the manganeferous ore. And such silver ore would be comparatively stable. On the other hand rich ores could not be formed where the solutions carreid abundant sulphuric acid and little or no chlorine, for the soluble silver sulphate would be formed and the manganeferous ores leached.

Investigation of many deposits in Colorado and Neveda indicate that silicious ores are much more favorable than the highly pyricic ores for the formation of a surface cholride zone. If manganese is present in appreciable amount, if the physical conditions for a downward circulation in the lode are favorable, and if the primary ores carry gold, it would be reasonable to expect an enrichment of gold below the zone of chloride encrichment of silver. In the presence of ferric sulphate waters silver like gold is dessolved from the out crop, and in many mines where both metals are present in important quantities the out crop and the oxidized zone for a short distance below are leached of both silver and gold.

In the Comstock lode, which in 1911 had yielded a total of $376,-400,000 in silver and gold, a "zone of manganese oxide occupies the entire length of the lode from the out crop 200 feet down". (USGS) The ores at and near the outcrop were low grade. The longitudinal projections show that many of the stopes carried from below stop some distance below the ~~surf~~ surface.

LEACHED SURFACE ORES

(SAMPLED BY OREGON BUREAU OF MINES)

Sample No.	Gold Ounces	Value	Silver ounces	Value	Copper percent
1	.02	.41	.44	.44	o.38
2	.06	1.24	.70	.70	1.30
3	.02	.41	.84	.84	0.75
4	.03	.62	1.17	1.17	0.28
5	.02	.41	1.14	1.14	0.20
6	.06	1.24	1.64	1.64	0.39

Following assays were made by Campbell, Wells and Elmendorf of Seattle, Washington:

# 1 Copper 8.58%	$28.21
# 2 Gold 0.38; Silver 1.56 oz. Copper o.1%	9.31
# 3 Copper 4.1%	16.40

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

SUMMARY

THE FACTS ON SILVER PEAK MAY BE BRIEFLY SUMMARIZED AS FOLLOWS:

1. Deep -seated veins are expressed by quartz crystals developing from the sides and as it is here occurring by metallic minerals like wolframite and cassiterite attached to the walls of the fissures. Close intergrowth of sul;hides resembling the eutectic textures of igneous rocks and common in deep-seated deposits are observed.

2. The barites are in all probability precipitates from theascending sodium chloride solutions. Where barite is present secondary replacement processes play an extensive part.

3. Pseudomorphic textures are also accompanied by a marked enrichment of the metallic content of a deposit.

4. The rich silver-copper veins occur most often in gabbroid rocks in a barite gangue, carrying much quartz in the lower levels.

5. It is noteworthy that rich silver ores like pyrargyrite and proustite argentiferous tetrahedrite as well as native silver show a tendency to form at vein intersections of similar mineralogic type.

6. Where pyrites and sulphides predominate at fissure intersections, the fact must be emphasized that many bonanzas have been uncovered under identical conditions. An impoverishment at such vein corssings is very rare.

7. As copper occurs in the country rock and being common in the gabbros deposition by metasomatic processes is probable as the wall rocks favor replacement.

8. The fissures are evidently genetically connected with the granite a significant feature.

9. Hydrogen sulphide precipitates cuprous sulphide from cupric sulphate. Sulphides may develope by direct precipitation from other reduicing solutions of gases. From sulphate solutions zinc readily precipitates copper as covellite or chalcocite. Secondary enrichment appears therefore to be a practical certainty.

10. The Manganese in the fissures is a very good indication of rich ore.

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

Riddle, Oregon, August 19, 1920

Oregon Exploration Company,
1014 Chamber of Commerce Bldg.
Portland, Oregon

Gentlemen:

After examining your mining property as requested, and taking samples therefrom forassaying and making a general survey of the premises as directed, I will submit my report thereof as follows, to-wit:

First I refer you to a report by Ben Van Zeiple relative to the geology of Silver Peak and adjacent vicinities, and since I am unable to add thereto, I will confine my remarks to a less technical version and deal strictly with tangible parts coming within the purview of my investigations.

LOCATION, ROAD, TRAIL, DISTANCE FROM RIDDLE

Your holdings are situated on the Southwestern slope of Silver Peak Mountain--general strike of dike is Northeasterly and Southwesterly--and located in Sections 23, 26, and 27, Township 31, South Range 6 West, Douglas County, Oregon and approximately eight miles from Riddle, a small town on the Southern Pacific Railroad, which will be your nearest Post Office and shipping point.

The property can be reached by a good County road to foot of mountain and from there over a serviceable trail direct to workings.

A 6% grade can be established and a wagon road built along said grade for a sum not ot exceed $1,000.00 per mile. The distance of road would be less than eight miles.

PROPERTY AND IMPROVEMENTS.

I find your holdingsto consist of four claims recorded and offically known as the Heln, Silver Peak No. 1, Silver Peak No. 2, and the Captain, and title is held by location. Improvements consists of two corss-cut tunnels; 40 and 205 feet respectively; one shaft 30 feet, and numerous open cuts; one log cabin; black smith shop, etc.

CONFIDENTIAL

WATER AND TIMBER SUPPLY.

There is sufficient water on the premisies for all local requirements, and within a mile an abundant flow can be had for the operation of a mill and other purposes.

An excellent growth of timber is available on the property for every need necessary for development of the property.

Umpqua Consolidated

ASSAYS.

Sample No. 1 This sample was taken from silicious hematite, barite and quartz in order to obtain surface values from same.

Gold, 1 oz. 3 dwt.-------	$22.50
Silver, 3.5 oz..---------	3.50
Copper, 1.5%--------------------	
	26.00

The ore from this point will amalgamate $20.00 free 50# sample.

Sample No. 2. Average of four foot fissure at depth of 25 feet.

Gold .4 oz.	$ 8.00
Silver 25 oz.	25.00
Copper 5.5%	15.40
Total	$48.40

Some gray copper in sample--will concentrate 20 to 1

Sample No. 3. Special sample of what might be rich workable ore.

Gold 1 oz. 2.75 dwt.	$22.20
Silver 40 oz.	40.00
Copper 7.84% (14 cents net)	18.20
Total	$80.40

Native silver, both bead and wire, was found and would concentrate 15 to 1.

REMARKS

Out of 11 sample assayed the values run from 0.1 to 2 oz. gold, and silver from trace to 40 oz., and copper from 3% to 7%.

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CONCLUSIONS

In conclusion I desire to say that your property posses considerable merit. My investigations indicate that its ultimate future carries great promise.

Respectfully submitted,

Julien A. Becker.

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

Production and Assays:	Tons	Width	Zn.	Au.	Ag.	Cu.
Production Figures from smelter returns:						
Silver Peak Mine						
1926	389			.12	7.3	6.0
1928	937			.044	2.7	6.6
1929	1666			.07	3.6	5.6
1930	264			.057	3.0	4.4
1936	1001		6.88	.128	4.23	6.07
1937	2328		5.13	.058	2.34	5.13
Umpqua Consolidated						
1930	38			.24	2.2	3.9
Assays						
Silver Peak Mine						
Z1 From S.E. Drift: Stope, 100' of main Xcut, up 15' S side		5'	1.3	.04	0.4	2.5
Z2 From S.E. Drift: 25' S. of S. crosscut near raise		5'	0.6	.02	Tr.	1.1
Z3 From S.E. Drift: Stope 100' N. of main Xcut up 15' N. side		5'	9.2	.01	1.1	2/5
Z4 From S.E. Drift: E. end of main crosscut		15'	1.2	.03	0.8	2.1
Z6 From S.E. Drift: 35' from S end		6'	0.8	Tr	Nil	0.1
8 From N.W. Drift: Stope 35' up near main X cut		5' 6"	5.5	.09	..59	4.05
10		7'	7.5	.03	4.58	5.13

CONFIDENTIAL

Estimates:

A block of massive ore 8 feet wide, 300 feet long, and 200 feet high (entirely above the lower tunnel elvel) gives, on a basis of 8 cubic feet of massive sulphide ore to the ton, 60,000 tons which at 6% should yield 3600 tons of metallic zinc. The entire length of the zone would give over 100,000 tons; and if another 100 feet of depth below the lower level were taken, the total tonnage should be over 200,000 tons of ore to yield 12,000 tons of metallic zinc. The type of ore suggests that ore bodies may continue to depths of many hundredgs of feet, so the amount of #possible" ore may be as much as 500,000 tons.

Geology of the Silver Peak Mine,
Douglas County, Oregon

A Dissertation

Presented in Partial Fulfillment of the Requirement for the

DEGREE OF DOCTOR OF PHILOSOPHY

Major in Geology

in the

UNIVERSITY OF IDAHO GRADUATE SCHOOL

by

ROBERT ERWIN DERKEY

August, 1982

ABSTRACT

Kuroko-type massive sulfide mineralization occurs in subaqueously deposited, Jurassic-age pyroclastic rocks at the Silver Peak mine. The stratigraphic sequence from the base upwards is (1) basaltic flows and tuffs, (2) dacite tuff, (3) foliated tuff and tuff breccia, and (4) bedded tuffs. Stratabound massive sulfide mineralization occurs as interbeds in the foliated tuff and tuff breccia. Massive sulfide interbeds consist of varying amounts of subrounded pyrite grains containing blebs and matrix chalcopyrite, bornite, tennantite, and sphalerite. The zoning sequence in the massive sulfide from the base upwards is friable yellow ore, black ore, barite, and sulfide lapilli tuff with ferruginous chert fragments. Syndepositional features indicative of subaqueous, debris flow deposition for the host foliated tuff and tuff breccia and the massive sulfide include graded bedding, flame structures, channel scour structures, load structures, disrupted bedding, floating clasts, rip-up-clasts, and poor sorting.

A genetic model for mineralization at Silver Peak includes rapid crystallization of pyrite in a hot spring plume, transport by debris flow to a small depression, and cementing of the detrital pyrite by Cu-Zn sulfides. Cu-Zn sulfide blebs were entrapped in rapidly crystallizing pyrite grains in the plume. The Cu-Zn sulfides surrounding the pyrite grains crystallized from brine which accumulated in the depression. When filled, oxygenation at the upper interface of the brine pool produced sulfate which combined with barium to produce barite. These changes in the brine pool produced the observed Kuroko-type zoning sequence.

Extensive pyroclastic deposits and evidence of mass deposition suggest the Silver Peak deposit could have formed in a submarine caldera. Suggested areas with potential for additional mineralization are in units equivalent to the foliated tuff and tuff breccia unit.

SUMMARY REPORT

ON THE

1986 EXPLORATION WORK

[PHASE I OF SECOND STAGE EXPLORATION]

AT THE

SILVER PEAK KUROKO PROJECT
DOUGLAS COUNTY, OREGON

FOR

FORMOSA RESOURCES CORPORATION

BY

KUANG INE LU, Ph.D.
President

ARIADNA CHERNAVSKA, Ph.D., B.Sc.
Staff Geologist

HANS E. MADEISKY, B.Sc., F.G.A.C.
Consulting Geologist

FEBRUARY 1987

FORMOSA
RESOURCES CORPORATION

SUITE 580, 355 BURRARD STREET
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SUMMARY & CONCLUSION

I. The Silver Peak Kuroko Project is made up of three blocks of claims and one parcel of patented land, totaling approximately 1460 acres (591 hectares). Formosa Resources Corp. owns 100% of the 68 lode mining claims comprising the three blocks (Formosa, Riddle and Lioso) and has a lease (with an option to purchase) to the 120 acre parcel of patented land owned by the Silver Butte Mining and Milling Company.

II. The southern part of the Formosa claim block and the adjoining northern part of the Silver Butte patented land contain several lenses of bedded massive sulfide ore of economic grade, which are called the Formosa and Silver Butte ore zones and which together are known as the Silver Peak Mine. These massive sulfide lenses exhibit characteristics of a typical Kuroko type volcanogenic massive sulfide deposit.

The mine, from it's discovery in 1910, until work ceased in 1936, had a recorded production of 6,620 short tons or ore grading 0.074 oz/ton gold, 3.32 oz/ton silver, 5.56% copper and 5.5% zinc.

The entire property covers much of the known extent of a major trend of submarine acid volcanics and volcaniclastics which are part of an ancient island arc. This trend contains a number of significant polymetallic sulfide showings, hosted by foliated pyroclastics, suggesting the strong possibility of discovering additional Kuroko type deposits.

III. Since 1984 a comprehensive exploration program has been underway on the property. To date this work has consisted of surface mapping, underground mapping and sampling, a geochemical soil survey, and in 1986, a geophysical survey, regional mapping and prospecting, surface core drilling, underground rehabilitation, and underground core drilling. Further rehabilitation of underground workings and preparation of two more underground drill stations are currently underway.

IV. The soil geochemical survey carried out over the Formosa block, the patented land and the Riddle block show coincident anomalous trends for Cu, Zn, Pb and Ba, extending along strike in both directions from the known deposit.

The transient EM survey covering the mine area shows several strong conductors, confirming the strike of the geochemical anomalies.

Surface and underground core drilling has intersected economic massive sulfide mineralization beyond the old workings. The company has purchased its own diamond drill in anticipation of more drilling in order to further outline ore reserves.

V. A present ore reserve has been calculated based on the 1986 drilling results and previous (1986 - 1984) assay data from various sources. 21 ore blocks together contain approximately 207,000 tons of ore grading 0.058 oz/ton Au, 1.791 oz/ton Ag, 5.16% Zn and 3.79% Cu.

The ore zone is open down-dip and, probably, along strike. However, numerical estimates of ore reserves in these extensions are not made.

VI. The results of the exploration work completed to date corroborate the predictions of earlier academic work that the Formosa/Silver Butte ore zones are part of a Kuroko system and that the property held by the company is in a favorable geologic environment with excellent potential for the discovery of extensions of the Kuroko system at the known ore zones and the discovery of additional ore deposits beyond these ore zones area.

A continued program of surface and underground core drilling, regional geological, soil and litho-geochemical and geophysical surveys is recommended. Contingent on the drilling results, a 200 m tunnel and 180 m drift are proposed for bulk testing of the down dip extension of the ore zones.

This proposed work should be carried out in several successive phases at an estimated total cost of U.S. $3,000,000.

INTRODUCTION

Since the last company report in July 1986, Formosa Resources Corporation (formerly Rand Ventures Inc.) has continued the exploration of the Silver Peak mine and adjoining lands.

The Silver Peak ore deposit is a Kuroko-type volcanogenic massive sulfide deposit located on the west slope of Silver Butte, 11 km south of Riddle, Oregon (Fig. 1). The mine workings consist of five levels situated between 1009 m and 1092 m above sea level, and are referred to as the Formosa No. 1, No. 2 and No. 3 levels and the Silver Butte No. 1 and No. 2 levels. The workings straddle the boundary between the SW ¼ of Sec. 23 and the NW ¼ of Sec. 26. T.31S, R.6W., W.M., in the Canyonville 15 minute map quadrangle. Massive sulfide related mineralization can also be recognized in old workings (adits, cuts and prospect pits) along strike from the mine.

The exploration work being carried out on the Formosa/Silver Butte property is the practical application of an exploration model developed by Dr. K. I. Lu. This report reviews and integrates previous work together with the company's 1986 exploration efforts, and outlines the plans for the continued exploration of the property.

LOCATION AND ACCESS

The Formosa/Silver Butte property is located in Douglas County, Oregon, about 48 km north of the city of Grants Pass, Oregon. The Formosa and Riddle claim blocks are in Sections 13, 23 and 27, respectively, of Township 31S, Range 6W; and the Lioso claim block is in Sections 5 and 8 of Township 32S, Range 6W. The claims are situated on and around the summit of a forested ridge known as Silver Butte, south of the town of Riddle, Oregon (Fig. 1).

The property is reached from Grants Pass by following Interstate Highway No. 5 northward about 70 km to Canyonville, thence northwest by 7.5 km of paved road to Riddle. From Riddle, 13 km of partly paved road lead to the forestry lookout tower at the Silver Butte summit. The road is well maintained and connects with a network of logging roads which provide access to the other parts of the property.

TOPOGRAPHY AND WEATHER

The area is mountainous with narrow ridges and deep canyons. Elevations range from about 855 m to 1221 m above sea level. (Riddle and Canyonville are situated at about 230 m above sea level). The area is either heavily timbered or already logged off. The standing timber is predominantly a mature forest with little undergrowth. Some areas, however, are covered with dense brush, especially east facing slopes.

Drainage on the property accumulates into Middle Creek, a major tributary running westerly to Cow Creek, and thence to the sea. Should the property become an operating mine, its location will not present any unusual environmental concerns.

The weather in the area is generally dry in the summer and there is typically about forty to fifty centimeters of snowfall in the winter. Temperatures range form 10 to 35 degrees C in summer and -2 to 15 degrees C in the winter.

CLAIM DATA

As shown on the accompanying map (Fig. 2), the property consists of 55 claims in three blocks, namely, the Formosa, Riddle and Lioso claims totaling approximately 1340 acres, and 120 acres of patented land leased from Silver Butte Mining & Milling Co.. Thus the property covers approximately 1460 acres (591 hectares) in total.

Formosa Resources Corp. holds a lease, with an option to purchase, to the patented land, and owns 100% of the mining claims listed below:

Claim	Location Date	BLM Serial No
Formosa 1-13	Feb. 28, 1984	ORMC 0074194-0074206
Formosa 14-25	Nov. 2-4, 1984	ORMC 0079596-0079607
Formosa 26-44	Oct. 8-10, 1985	ORMC 0085133-0085151
Formosa 45, 46	June 10, 1986	ORMC 0087921, 0087922
Riddle 1-8	Feb. 29, 1984	ORMC 0074207-0074214
Riddle 9, 10	June 25, 1984	ORMC 0075519, 0075520
Lioso 1-12	June 9-10, 1984	ORMC 0075507-0075518

The required assessment work for these claims has been performed and recorded. The claims are all in good standing until August 31, 1987.

HISTORY AND PRODUCTION

The geology of the Riddle 30-minute quadrangle, which includes Silver Butte, was first mapped by Diller and Kay (1924). The first published description and account of the mine was by Shenon (1933). Subsequent reports have updated the mine's operational history (Oregon Department of Geology and Mineral Industries, 1940; U.S. Bureau of Mines War Minerals Report, 1943; Magill, 1953; Brooks and Ramp, 1968; Hotz, 1971; Ramp, 1972).

According to Shenon, mineralization was discovered on Silver Butte in 1910 by Robert Thomason. Mineral rights to the Sec. 26 portion of the mine were obtained in 1912 with the grant of a 120-acre timber patent. In 1920, the Oregon Exploration Company located lode mining claims in Sec. 23 and over part of the timber patent in Sec. 26. Tunnels were driven on several levels and ore was shipped by 1926. Litigation ensued, and continued through 1929, when it was settled by a U.S. Supreme Court decree in favor of the owners of the Sec. 26 timber patent, namely, the Silver Peak Copper Company now organized as the Silver Butte Mining and Milling Company. Despite the litigation, development proceeded and ore was shipped during 1928 - 31, and also in 1936 and 1937 (Ramp 1972). The last development work was in 1952 when the Umpqua Consolidated Mining company rehabilitated the lowest level at the mine and extended the drift south of the winze (personal communication, Derkey 1987).

The Silver Peak mine produced 6,620 short tons of ore, which yielded 735,600 pounds of copper, 21,980 ounces of silver, and 490 ounces of gold (Ramp, 1972). In addition, the shipped ore had a zinc content roughly equal to its copper content. However, during the 1926 - 1931 production period, smelters charged a penalty for zinc. So ore with a very high zinc content was left behind by the miners, and the zinc content of the shipped ore was kept as low as possible by blending ores from various parts of the mine (Derkey, 1982).

Lowell (1942) included several samples from the Silver Peak mine in a study on the paragenesis of gold and copper ores in southwestern Oregon. The mine was also included in a thesis on the geology of massive sulfide deposits of the Silver Butte area (Witte, 1977). And in 1982, R.E. Derkey completed a doctoral dissertation on the geology of the Silver Peak mine. Derkey had access to all five levels of underground workings and his underground observations formed the basis for his work.

From 1976 to 1979 the mine and adjoining lands were under lease to Chevron Resources Company. A series of geochemical and geophysical surveys were performed and four diamond drill holes were completed with inconclusive results.

Since 1984, when it acquired the mine and adjoining properties, Formosa Resources Corp. (formerly Rand Ventures Inc.) has been actively exploring the property. During the summers of 1984 and 1985, Formosa Resources Corp. carried out a systematic program of surface geological mapping and geochemical soil and rock sampling on the three claim blocks (Formosa, Riddle and Lioso) and the patented land. Underground geological mapping and sampling were carried out in the four accessible levels; the Silver Butte No. 1 level was and remains inaccessible (Lu, 1984, 1985). In the fall of 1985, the company staked additional claims in the area north of the mine.

Beginning in May 1986, an active exploration program, involving a geophysical survey, local and regional mapping, surface diamond drilling, underground rehabilitation, and underground diamond drilling (in the Formosa No. 1 level) has been carried out on the property. Eight holes, F86S-1 through 8, have been drilled from five sites on the surface, and five holes, F86U-1 through 5 have been drilled from an underground site. Additional drilling is planned from two other underground sites in Formosa No. 1 level

REGIONAL GEOLOGY

The Silver Peak deposit occurs in the Western Jurassic Belt of the Klamath Mountains geomorphic province. This belt is the youngest and westernmost of four arcuate, north-south trending lithologic belts which comprise the Klamath Mountains (fig. 3) as described by Irwin (1964).

Each belt is bounded on the west by a major east-dipping thrust fault, with the Coast Range Thrust separating the Western Jurassic belt of the Klamath province from the adjacent Franciscan rocks of the Coast Range Province. The structural lithological, and age relationships among the rocks of these belts and provinces indicate that there has been a sequential accretion of ocean-crust and island-arc terranes and associated sedimentary units to the western edge of the North America continent, beginning in the early to middle Paleozoic and continuing through the Mesozoic.

In particular, the Western Jurassic belt was accreted during the Nevadan orogeny (late Jurassic), with associated regional metamorphism of its rocks to the lower greenschist facies. And this belt was in turn underthrust by the accreting Coast Range Province during the Cretaceous. The Silver Peak deposit is located about 800 m east of the Coast Range thrust in the northern part of the Western Jurassic belt.

This northern part of the Western Jurassic belt consists of the Rogue Formation of metavolcanics (tuffs, agglomerates, flow breccias and flows ranging in composition from basaltic to rhyodacitic), the Galice Formation of metasedimentary rocks (slate, metagraywacke and minor conglomerate, with intercalations of volcanics similar to those of the Rogue), intrusive rocks of the Chetco Complex, amphibolites, and serpentines (see Fig.4). On the other side of the Coast Range Thrust are the

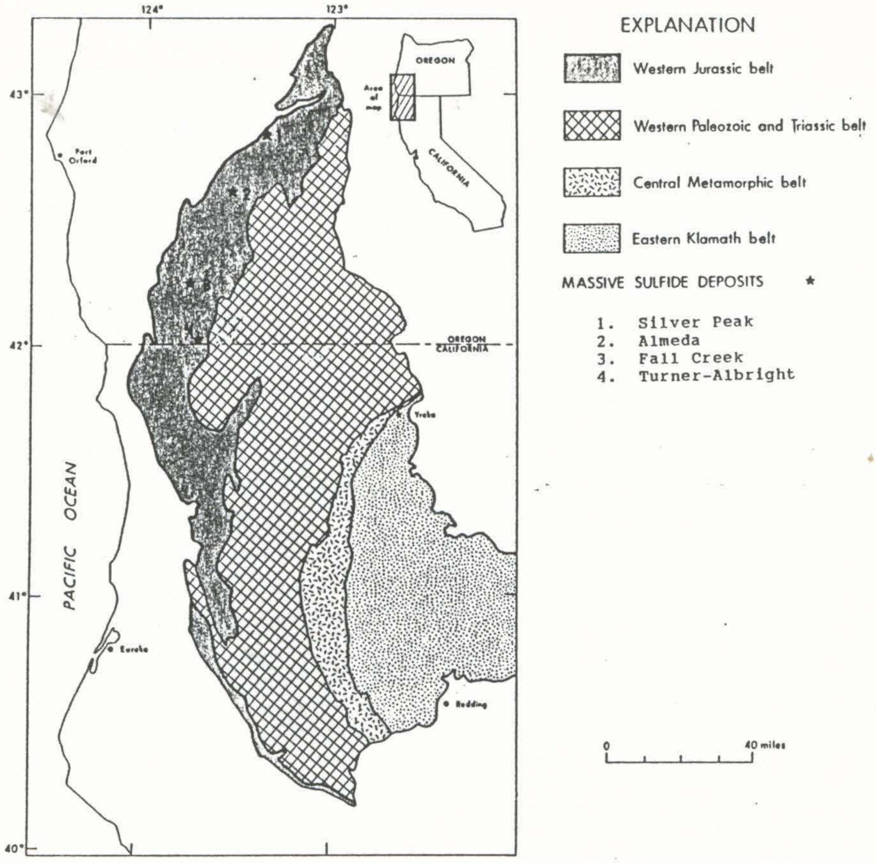


Figure 3. Lithologic Belts of the Klamath Mountains (modified after Irwin (1972), cited in Derkey, 1982).

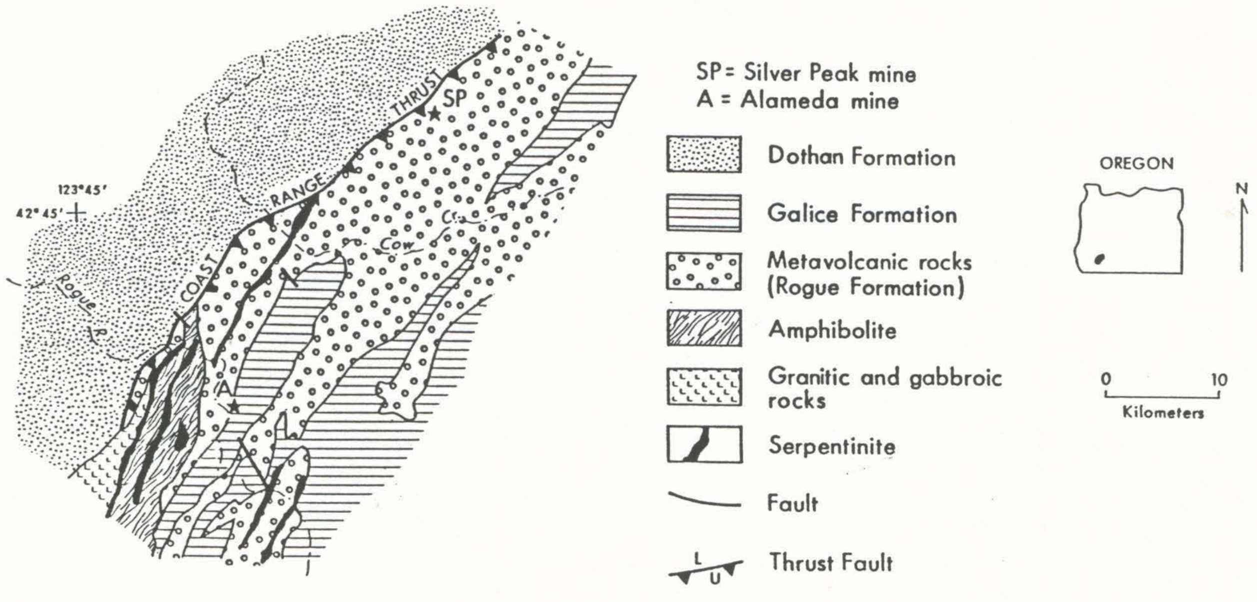


Figure 4. Generalized Geology of the Silver Peak and Almeda Mine Areas (modified after Koski and Derkey (1981), cited in Derkey 1982).

Upper Jurassic mudstones and graywackes, with minor chert and pillow basalt, of the Dothan and the more westerly Otter Point Formations of the Coast Range Province. Like the Franciscan melange, the Otter Point Formation is strongly disrupted and includes exotic blocks of serpentinized peridotite, eclogite, and blueschist, while the Dothan is less disrupted and contains few exotic blocks.

The Rogue and Galice Formations are regarded as island-arc volcanic rocks and arc-derived flysch sediments. This interpretation was suggested by Dickinson (1969), Dott (1971) and McKee (1972), who based their views on the petrographic descriptions of Wells and Walker (1953). Garcia (1978, 1979) concluded that the rocks of the Rogue-Galice assemblage formed as an island arc because of their texture, composition, and major and rare earth-element patterns. Garcia (1982) also pointed out that the Rogue-Galice rocks were the carapace of the arc; the intruding gabbroic to granodioritic rocks (including Rogue volcanics metamorphosed to amphibolites) were its core; and the Dothan and Otter Point rocks were the forearc basin and subduction complex outboard of the Rogue-Galice island arc (Fig. 5).

Besides the Silver Peak deposit, three other massive sulfide deposits are located in the Western Jurassic belt as shown in Fig. 3. The Almeda deposit, similar to the Silver Peak deposit, occurs in rhyodacitic pyroclastic units of the Rouge Formation of metavolcanic rocks. Both deposits are recognized as being Kuroko-type deposits hosted in an island arc assemblage. The Turner-Albright and Fall Creek deposits occur in basaltic flows and breccias near large bodies of ultramafic rock. These deposits are recognized as being similar to the Cyprus-type, and their host rocks are regarded as part of a back-arc (inter-arc) ophiolite assemblage. (Strickler, 1986, Harper, 1983)(see fig. 6)

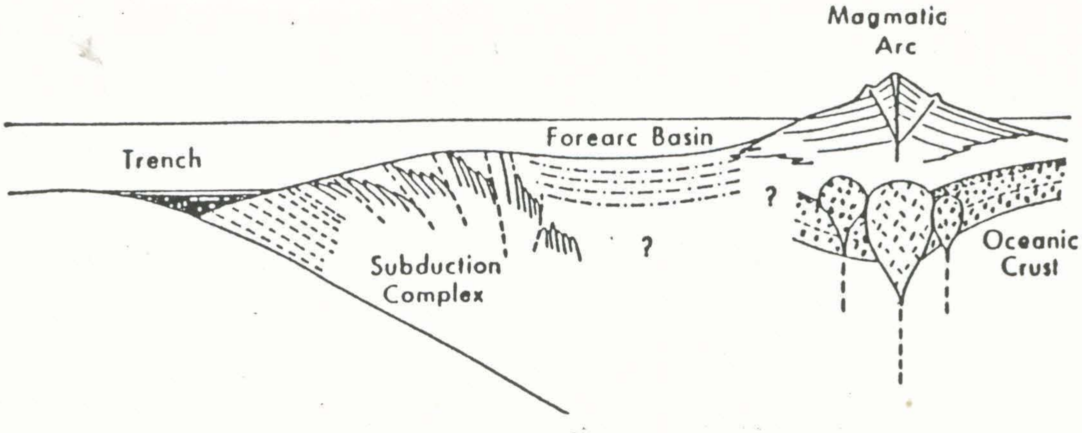
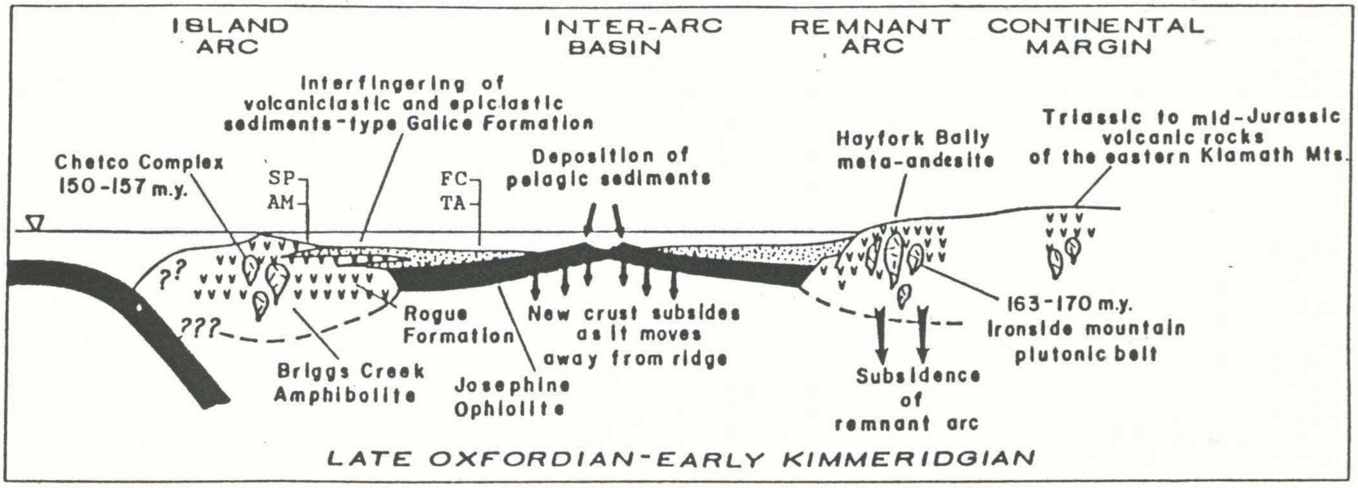


Figure 5. Hypothetical Cross-Section of an Island Arc (copied from Garcia, 1982).



SP	Silver Peak	FC	Fall Creek
AM	Almeda	TA	Turner-Albright

Figure 6. Tectonic Model for the Late Jurassic of the Klamath Mountains (modified after Harper (1980), cited in Harper, 1983).

GEOLOGY OF SILVER BUTTE AND THE SILVER PEAK MINE AREA

STRATIGRAPHY AND ROCK DESCRIPTIONS

Diller and Kay (1924) included Silver Butte in a belt of fine-grained basaltic to dacitic greenstones These volcanics were named the Rogue Formation by Wells and Walker (1953). In more recent mapping, Johnson and Page (1979) recognized two units of Jurassic metavolcanic rocks above the Coast Range Thrust in the Silver Butte area (Fig. 9).

In his dissertation on the geology of the Silver Peak deposit, Derkey (1982) distinguished six units, rather than just two, and he classified them on the basis of whole rock chemical analyses of fifty-eight specimens collected from the mine workings, (Chevron) drill core, and surface outcrops. Using Bowen's (1971) "Graphic Normative Analysis Program" to calculate norms and to generate selected plots of the analytical data, Derkey produced an AFM diagram of Silver Butte analyses with the tholeiitic to calc-alkaline boundary of Irvine and Baragar (1971) shown (see Fig. 7). Derkey also produced a triaxial orthogonal plot for weight percent of various constituents (Fig. 8), and noted that many of the analyses fall into two separate populations in or near the basalt and dacite fields established by Church (1975). This is corroborated by a classification scheme due to Taylor (1969), according to which most of the rocks from Silver Butte are either high-alumina basalts (less than 53.0% SiO2) or dacites (between 62.0 and 68.0% SiO2). Derkey explained that sample compositions falling outside of the two fields are either epiclastic rocks, or rocks that have been altered during metamorphism and hydrothermal alteration, or later unrelated intrusive dikes and sills.

Regional mapping in 1986 by Yanai (1986) for Formosa Resources Corp. basically confirmed the earlier outlines of Johnson-Page and Derkey, with some further distinctions in rock units

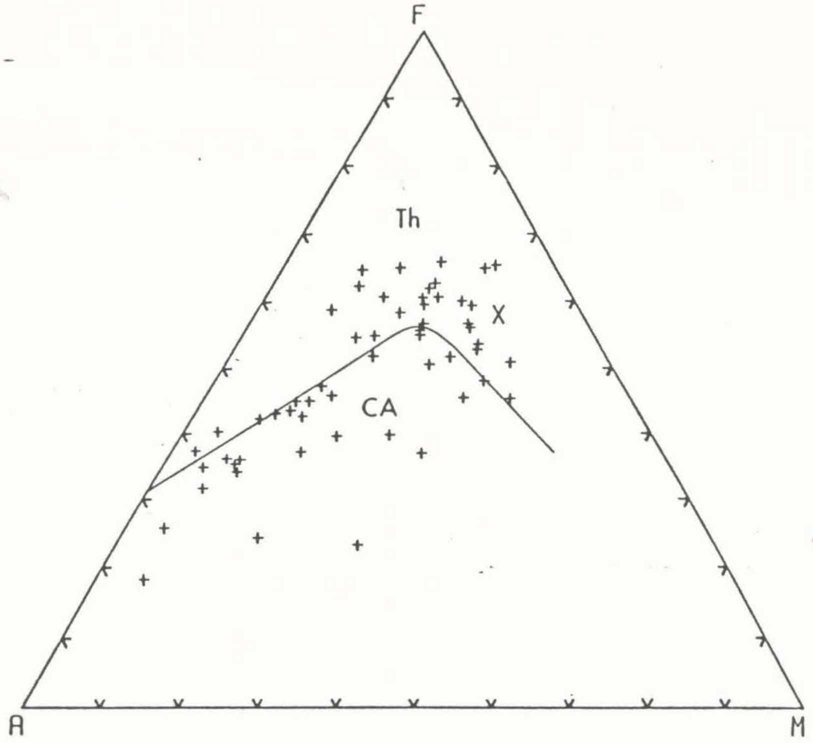


Figure 7. AFM Diagram of 58 Samples from Silver Butte Whole-Rock Analyses. Line represents the boundary between the tholeiitic field (Th) and the calc-alkaline field (CA) of Irvine and Baragar (1971). X represents a sample analysis reported by Diller and Kay (1924) (copied from Derkey, 1982).

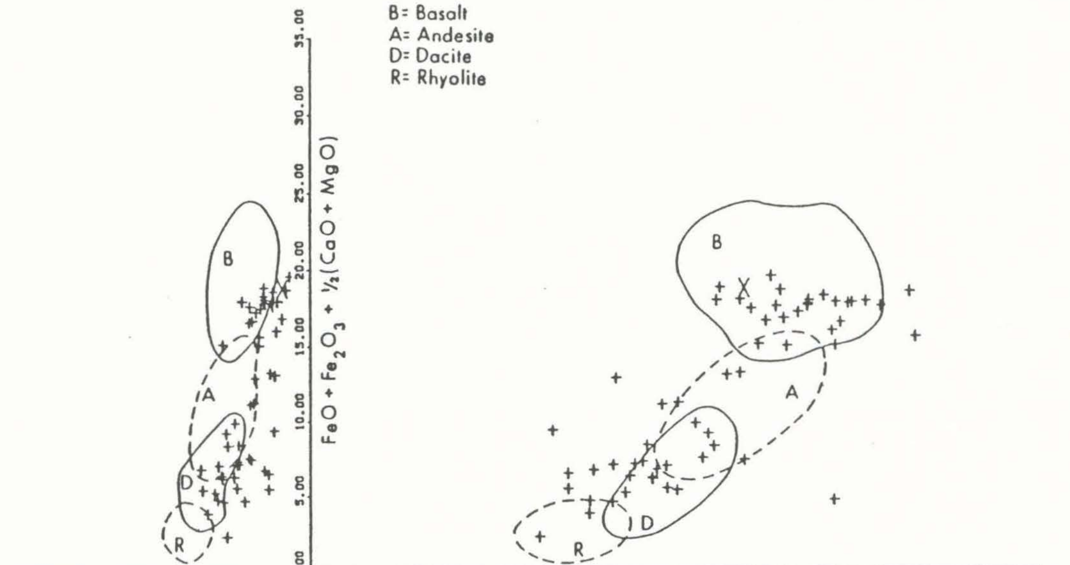


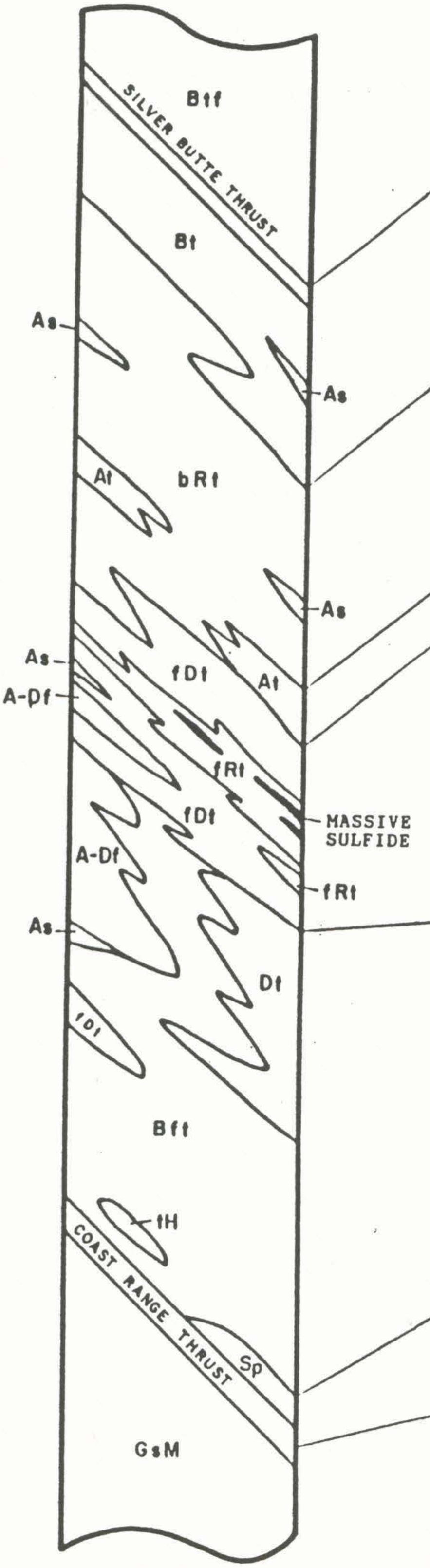
Figure 8. Triaxial Orthogonal Plot of the Silver Butte Whole-Rock Analyses. Fields for basalt, andesite, dacite, and rhyolite are from Church (1975). X represents a sample analysis reported by Diller and Kay (1924) (copied from Derkey, 1982).

(Please see the stratigraphic section in Fig. 9, and the regional and local geology maps in Figs. 10 and 11).

Inspection of the underground workings and the 1986 drill core by Shimazaki (1986) and company geologists led to subdivisions of the [fDt] and [fRt] surface rock units. The results of this work are shown on four plans and five profiles, labeled Plates 1-9 and attached to this report, which distinguish a total of fifteen rock units. These underground and drill core rock units are number labeled from [1] to [15], and fit stratigraphically from the [Dt] surface rock unit up through the [bRt] unit.

These rock units are described in stratigraphic order as follows:

Figure 9: Schematic Stratigraphic Succession of the Silver Butte Area



FORMOSA RESOURCES CORP. 1986 MAPPING	R.E. DERKEY 1982 MAPPING	JOHNSON AND PAGE 1979 MAPPING
(Btf) BASALTIC TUFFS AND FLOWS	BASALTIC TUFF OF SOUTH FORK Upper plate rocks above the Silver Butte thrust. Locally contain abundant milky white plagioclase crystals up to 5 mm long.	MASSIVE TUFFS AND FLOWS Characterized by outcrops of massive greenstone containing dark pyroxene crystals from 1 to 3 mm in diameter and milky white altered paiglioclase crystals up to 5 mm long. Common lithologies include foliated pumiceaous crystal-lithic tuffs, massive tuffs which locally show graded bedding and contain pyroxene and plagioclase crystals in a vitric tuff matrix and in cognate glassy lapilli, medium-grained agglomerates with crystals and volcanic lapilli commonly near equal in size in a remnant glassy matrix with local well preserved shards, dark-green to black fine-grained basalt flows and pyroxene-plagioclase seriate andesite flows.
(Bt) BASALTIC TUFFS (with minor flow units)	BASALTIC TUFF Lower plate basaltic tuff below the Silver Butte thrust. Lithologically similar to the basaltic tuff of South Fork and to the basaltic flows and tuff unit.	
(bRt) WELL-BEDDED PORCELANEOUS TO MED-GR. RHYODACITIC TUFFS	BEDDED TUFF Predominantly fine sand- to silt-sized group of 1 to 3 cm thick graded beds and massive bedded tuff and tuffaceous sandstone. Large areas are well indurated, porcelaneous tuff. This unit intertongues with foliated tuff and tuff breccia near the basal contact.	RHYODACITE FLOWS AND BEDDED TUFFS Foliated, light gray to green rhydacite flows predominate toward base; very fine-grained bedded procelaneous tuffs predominate toward top. Pyroxene-plagioclase agglomerates and basalt flows locally present throughout the unit. Rhyodacite flows consist of albitized plagioclase laths in flow alignment with chlorite in interstices; remnant mafic minerals replaced by clinozoisite. Coarser grained portions of porcelaneous tuffs are composed of angular, altered plagioclase crystals, quartz, rare pyroxene, and green epidote crystals, set in a dusty iron-oxide-rich matrix. Graded beds indicate unit is upright. Upper part of bedded tuffs gradational to more massive crystal-lithic tuffs. (Johnson and Page, 1979)
(At) ANDESITIC TUFFS		
(fDt) FOLIATED DACITIC TUFFS	FOLIATED TUFF AND TUFF BRECCIA Composite unit consisting of sulfide-lapilli tuff with ferruginous chert fragments, quartz-sericite-pyrite foliated tuff and tuff breccia, large accidental basaltic blocks, and chlorite-albite-epidote-quartz foliated tuff and tuff breccia subunits. Fine-grained tuffs have an overprint of locally intense foliation parallel to bedding (compaction foliation).	
(fRt) FOLIATED RHYOLILIC TUFFS (hosts massive sulfide)		
(Dt) DACITIC TUFFS	DACITE TUFF Fine-grained tuff containing numerous clots and veinlets of quartz and large accidental blocks of basalt. This unit grades upwards into foliated tuff and tuff breccia.	
(A-Df) ANDESITE, SILICIFIED ANDESITE TO DACITIC FLOWS		
(Bft) BASALTIC FLOWS AGGLOMERATES AND TUFFS	BASALTIC FLOWS AND TUFFS Vesicular and amygdaliodal flows and interbedded tuffs containing intertonguing lenses of dacite tuff.	
(tH) TECTONIZED HARZBURGITE (Sp) SERPENTINITE AND GREENSCHISTS	SERPENTINITE Small slivers of serpentinite along thrust faults.	
(GsM) GREYWACKE AND SANDY MUDSTONE	DOTHAN FORMATION Massive to thick-bedded graywacke sandstone with thin interbeds of dark siltstone (Franciscan Formation equivalent). (Derkey, 1982)	

INTRUSIVE UNIT:
(As) ANDESITE SILL
(or dike)

[Bft] Basaltic-Flows, Agglomerates and Tuffs

At its base this unit is in contact with the Coast Range Thrust. And at its upper contact this unit interfingers with [A-Df] and [Dt]. The majority of pyroclastic basalt is dark gray, aphanitic, with 10-20 vol. % light green irregular lenses and bands which may contain tiny chloritized fragments. A coarse agglomeratic or flow breccia texture with up to 20 vol. % clasts (3-8 cm across) is sometimes visible on the weathered surfaces of outcrops. Vesicles are often preserved, but somewhat flattened. A porphyritic basalt lava which contains large (up to 2 mm) augite phenocrysts in a groundmass of altered plagioclase is exposed at the Formosa No. 1 portal. Derkey (1982) reports that identifiable alteration minerals in the groundmass of this basalt flow include submicroscopic albite, chlorite, and epidote. The road cut between the Formosa No. 1 and Silver Butte No. 1 portals exposes a very fine grained basalt which sometimes contains small (1-5 mm) flattened vesicles.

[A-Df] Andesite, Silicified Andesite to Dacitic Flows

These flows are massive, pale to medium green, aphanitic, often vesicular and contain round quartz-filled amygdules. The rock is andesitic in appearance and the vesicles are often filled with quartz, suggesting either later silicification or a more dacitic original composition. It was sometimes difficult to distinguish whether visible quartz bits were vesicle fillings or phenocrysts.

[Dt] Dacitic Tuffs [15]

Dacitic tuff from surface outcrops is typically light gray to tan, while samples from mine and drill core are typically pale to medium green. Derkey (1982) reports that in thin section, this tuff consists of approximately 5% partially altered plagioclase phenocrysts in a groundmass of fine-grained, sub microscopic quartz, epidote, chlorite, and possibly albite.

Numerous clots and veinlets of white quartz with dark green chlorite occur in the dacite tuff exposed in the underground and drill core. In addition, inspection of drill core from holes F86S-5 and S-8 shows this unit can include so called "creme fragments". These are large (up to 30 cm across) very fine-grained, massive, light greenish-yellow, chucks of what may have been volcanic glass and is now altered into microfine-grained quartz and epidote. These creme fragments are particularly numerous in one of the hanging wall [fDt] units to be described below.

The estimated total thickness of all three of these intercalated units is about 650 m up from the Coast Range Thrust.

[fDt] Foliated Dacitic Tuffs [14], [13], [12], [7], [6], [3]

This is a complex sequence, approximately 100-150 m thick, of assorted green, purple and brown colored heterogeneous pyroclastics which often include lapilli-to-block size volcanic rock fragments (of basic to siliceous composition), flattered pumice, large feldspar crystals, and sometimes sulfide clasts, scattered in a wispy matrix of medium-to-fine grained tuff. Derkey (1982) reports that this unit is chemically similar to the [Dt] unit, and that x-ray diffraction analysis indicates the matrix to consist of chlorite, epidote, albite and quartz.

Foliation is expressed in the alignment of matrix minerals and flattened pumice and fragments. It is of variable intensity and locally results in fissility of the rock. Foliation is parallel to bedding and wraps around the clasts. The foliation is sometimes crenulated and is sometimes disrupted in a way which may be interpreted as due to soft-sediment deformation or slumping. A SE trending subhorizontal lineation is frequently visible on foliation surfaces.

Distinctions within this [fDt] rock unit are best recognized in the drill core and underground. The best surface exposure of this unit is in road cuts south of the Silver Butte No. 1 adit. These surface exposures look most like rock [3] seen in the drill core. In the approximate middle, stratigraphically, of this [fDt] unit is the [fRt] rock which hosts the massive sulfide lenses. The footwall units of [fDt], namely [14] and [13], and the hanging wall units [7], [6], [3], are described as follows.

[14] Foliated Green and Brown Lithic Tuffs

This unit is exposed only in the Formosa No. 1 and No. 2 levels and in F86S-1. It is mostly green but can include up to 3 vol. % pale brown wisps. It includes 0.1 to 3 cm laminated bands of usually bright red (but sometimes almost black), greasy material interpreted to be an Fe-clay, from 5 to 35 vol. % of the rock. In [14], this Fe-clay frequently has a hematitic sheen and sometimes includes visible specular hematite. The origin of Fe-clay was considered by Shimazaki (1986) and is discussed in "Mineralization" below.

[13] Foliated Purple and Green Lithic Tuffs

This unit is exposed in the Formosa No. 1 level and in F86S-1, 2, 3, 4, 6, 8. It includes 0.2 to 10 cm angular siliceous lithic fragments, from 40 to 80 vol. % of the rock. It also can include up to 7 vol. % red Fe-clay wisps as part of its matrix. At its top, the unit is in contact with the [10] unit of [fRt], and in the drill core exposures the upper portions of [13] are frequently interbedded with the lower portions of [10]. Away from its contacts with [10], unit [13] is all dark purple in color. Close to its contacts with [10], unit [13] gradually becomes green. First the matrix becomes green, with still purple lithic fragments. Then the lithic fragments also become green from their edges (and from fractures) inward. Finally, the last 20-80 cm in direct contact with [10] is completely green and fissile. This is interpreted as a chloritization due to hydrothermal alteration of the tuff near its contacts with the massive-sulfide hosting unit [10].

[12] Very Fissile Green Tuff
This is a pale green chlorite-(talc?)-sericite tuff that occurs only as an interbed within the [10] unit. It is exposed in the Formosa No. 1 and Silver Butte No. 1 levels and in drill holes F86S-2, 7, with poor exposures in holes F86U-1, 2, 3, 4 and 5. These exposures might in fact be interbeds of [13] which have been completely chloritized.

[7] Sulfide Lapilli Tuff
This unit occurs stratigraphically directly above the [10] or [8] units of [fRt], and is exposed in the Formosa No. 1, Formosa No. 2, and Silver Butte No.1 levels and in all drill holes. It is not observed in outcrop. The unit was named by Derky (1982) because of the presence of lapili-size sulfide grains, aggregates of grains, or massive sulfide fragments, which constitue up to 10 vol. % of the tuff near its basal contacts. Sulfides are predominately pyrite and chalcopyrite, with occasional traces of sphalerite. In addition, near its basal contacts, this unit is a dark purple-gray color and can contain lapilli-size "eyes" and fragments of pink to red ferruginous quartz (up to 3 vol. %), wisps of red Fe-clay (up to 20 vol. %), pink clay material on fracture surfaces, and 1 mm disseminated grains of magnetite (up to 3 vol. %). It also frequently has a 3-15 cm bleached and sulfide rich alteration halo directly in contact with [10] or [8]. And in at least one instance a small interbed of purplish [7] occurs within the upper part of the massive sulfide lens. The presence of ferruginous quartz eyes and fragments in [7], and its stratigraphic location directly above massive sulfide, led Derkey (1982) to consider [7] to be analogous to the ferrugenous chert (Tetsusekiei) zone of typical Kuroko stratigraphy (see "Mineralization" below).

In its stratigraphically higher portions, this unit grades in color from purplish gray to various green shades, with lapilli-size pale gray, pale green, or pale blue rounded quartz (up to 15 vol. %), lapilli-size, flattened feldspar fragments (up to 10 vol. %), and lapilli-size yellow epidote star shaped crystal agregates (up to 10 vol. %) all of which act as "eyes" in a foliated matrix of greenish "wisps" including up to 10% yellow epidote wisps. Sulfide lapilli and magnetite grains may or may not be present. Thus in the drill reports, this upper portion of [7] is sometimes called "Foliated Wisps-and-Eyes Tuff".

[6] Foliated Green Pumice Tuff

This unit is clearly exposed only in drill holes F86S-1, 2, 5, and F86U 1, 2, 3, 4, 5. It is pale to dark green and has a characteristic "torn veil" look. This unit includes purplish zones caused by the presence of dark to red (magnetic) Fe-clay wisps. In F86-1 and all the underground holes, [6] includes a 20 to 100 cm thick horizon which is paler and grayer than the rest of the unit and which in some cases contains 1% fine scattered grains and laminations of gray sulfides (sphalerite and/or galena) and a 2-10 mm bed of pink ferruginous quartz lapilli.

[3] Foliated Heterogeneous Green Tuff

This unit is exposed in all the surface drill holes but is not clearly differentiated on surface. It fits the general description of [fDt] given above, but is always greenish in color. This unit especially includes frequent (greater than 5 vol. %) "creme fragments", which were described above as they occurred in the [Dt] unit. Here the creme fragments are flattened parallel to foliation and include tension gashes perpendicular to foliation filled with milky quartz (and rare pyrite grains) which are also sometimes cut by a second generation of fine fractures. In addition this unit includes numerous clots of white quartz and dark green chlorite. Going down hole from about 45-65 m above the massive sulfide mineralization, this unit starts to include first pink ferruginous quartz fragments (greater than 1 vol. %) which become more numerous further down (up to 3 vol. %), and then bright red to almost black magnetic Fe-clay (up to 12 vol. %, including small zones with greater than 30 vol. %) sometimes with visible grains of magnetite. The presence of magnetite in the hanging wall units [3], [6], [7], as opposed to hematite in the footwall unit [14], was noted by Shimazaki (1986) and is discussed in "Mineralization" below.

There is another type of [fDt] which is present for 70 m in hole F86S-6, but in no other drill core, surface, or underground exposures. It is a foliated, greenish-gray quartz lapilli tuff which includes 10-25 vol. % pale oblong quartz lapilli (2-10 mm). In its approximate stratigraphic middle, this rock has a 14 m thick zone which includes [3] and [7], with a 1.35 m thick layer of gray colored quartz and fine grained pyrite (3 vol. %) in disseminated beds. The [3] and [7] do not have any Fe-clay or magnetite or hematite. The 1.35 m gray quartz and pyrite layer may be due to a very weak episode of hydrothermal activity similar to that which elsewhere produced the [fRt] unit which hosts the massive sulfide.

A similar gray quartz and pyrite zone, though only 3-5 cm thick, was exposed in F86S-1, 2 and 7, within unit [3], about 60 m stratigraphically above the massive sulfide mineralization.

Another siliceous rock occurring within [3] was exposed in F86S-1, 2, 8, and called [4]: Gray Siliceous Crystal Tuffs. This unit occurs as a 0.6 to 1 m bed of unfoliated, dark purplish to greenish gray quartz with 7 vol. % pale epidote and quartz subrounded crystals (less than 2 mm in size). It also occurs as a mixture with [3] in a 2.2 m thick zone which is composed of 40 vol. % large (1-4 cm) fragments of gray siliceous crystal tuff; this is exposed in F86-1.

[fRt] Foliated Rhyolitic Tuff

This unit occurs entirely within the [fDt] unit, and is exposed in all the drill holes (except F86S-6) with a thickness from 20 to 70 m. On surface, it is intermittently exposed for a strike length of approximately 1.7 km in the Formosa claims (southern end), Silver Butte patented land, and Riddle claims. In addition, there are very intermittent exposures over 400 m in the north end of the Formosa claims, exposures over 700 m of strike length south of the Riddle claims (South Fork Prospect), and an exposure west of the Formosa claims (Golden Gate mine). Underground and in the drill core, [fRt] can be subdivided into two units, [10] and [9], plus massive sulfide [8]. Surface exposures are usually gossans of porous, foliated quartz with strong limonitic or hematitic stain, and occasional clearly bedded massive sulfide which has survived weathering. Hole F86-8 intersected about 20 m of such gossanous remains from the weathering of [10] and [8].

The mineralized units [10], [9], and [8] will be discussed in "Mineralization" below.

[At] Andesitic Tuffs [2]

On surface this unit is seen in roadcuts between exposures of [fDt] and [bRt]. These tuffs are bedded, sometimes weakly foliated, and can contain up to 40 vol. % 1-2 mm feldspar crystals and fragments in a medium green, aphanitic matrix. A finely foliated clastic texture is commonly apparent only on weathered surfaces; fresh surfaces are massive. Bedding thickness varies from a few centimeters to several meters.

In the drill core, examples of [At] are exposed in holes F86S-1, 2, 3, 4, 5, 7, 8, and included under the numerical label [2]: Homogeneous Green Tuffs (not or weakly foliated). These tuffs occur as beds from 10 to 30 m thick, interbedded with [3] and [1]. These are fine to medium grained, medium to dark green in color, with no pumice, rock fragments, or Fe-clay. They do include the creme fragments and the clots of white quartz and dark chlorite described as occurring in [Dt] and [fDt], and they include randomly oriented wisps of pale epidote.

[5] Biotite-Dacite Dike

This unit cuts through [7], [6] and [3] in holes F86S-2, U-1, 2, 3, 4, and its occurrences vary in thickness from 2 to 11 m. This rock is weakly foliated, greenish gray, medium to coarse grained with approximately 40 vol. % quartz and feldspar, 50 vol. % darker minerals, less than 1 vol. % fine disseminated pyrite, and including up to 5 vol. % hornblende needles in holes S-2 and up to 5 vol. % biotite in the underground holes. Occurrences of [5] in the underground holes usually show chilled aphanitic margins and the adjacent rock shows margins of epidotization. Like the rocks in the [Dt], [fDt] and [At] categories, [5] includes clots of white quartz and dark chlorite, as well as the so-called "creme fragments" which include white quartz. The latter may be just due to epidotization of the rock around some of the places where white quartz developed.

Silicified Dacite

The bottom of hole F86S-2 exposes 12 m of another rock which is called silicified dacite. It is unfoliated, dense and siliceous, dark purplish gray in color, with about 7 vol. % randomly oriented subhedral feldspar laths (1 mm). It has one occurrence of hematitic red Fe-clay, one occurrence of a creme fragment with ferruginous quartz, and frequent occurrences of red Fe-clay and minor pyrite on fracture surfaces.

[11] Basalt Blocks

These are from 0.2 to 5 m thick and occur scattered in [fRt], and possibly [fDt]. They are exposed in many locations in the drill core and in the underground levels. They are medium to dark green unfoliated, massive, medium-coarse grained (1-4 mm), composed of about 50 vol. % dark-green chlorite and 50 vol. % pale epidote grains. Clots of white quartz and dark chlorite are often present. Randomly oriented wisps and zones of epidote are sometimes present. Sometimes up to 15 vol. % randomly oriented or weakly foliated feldspar grains (0.5 to 4 mm in size) are present. Sometimes the blocks include zones of foliated dark chlorite eyes, or foliated quartz eyes with chlorite rims. And blocks occurring in contact with [8], e.g., in F86S-1, 4, have 5-30 mm bleached and pyritized halos which include large 2-5 mm pyrite cubes.

STRUCTURE

The northeast-trending Coast Range thrust and the apparently related, subordinate and subparallel, Silver Butte thrust are the most obvious structures in the Silver Butte area. Both thrusts dip to the southeast. Though poorly exposed at Silver Butte, the Coast Range thrust is thought by Hotz (1969) to have a dip ranging from vertical to 40 degrees SE.

The strike of the rock units at Silver Butte parallels the trend of the Coast Range and Silver Butte thrust faults. Bedding dips about 60-70 degrees SE, but varies locally from 25-85 degrees SE. Graded bedding and cross bedding in [bRt] indicates the unit is upright with tops to the east. In the [fRt] unit, a small syncline observed in the southwest corner of the patented land and a parallel anticline observed in a road cut 300 m further southwest and also near the old workings in the middle of the Riddle claim block, are the only indication of folding on Silver Butte. This minor syncline-anticline pair may be the present expression of a monocline in the original beds that was higher to the southeast and then was tilted to dip southeast along with the other rocks.

Foliation, when present, is generally parallel to bedding. And especially in the [fRt] unit there is often a lineation visible on the foliation surfaces which plunges 20-30 degrees to the SE. Yanai (1986) notes that such foliated and lineated rocks are LS-tectonites which ideally form though "plane strain simple shear" which results in elongation (causing a lineation) in one direction compensated by flattening (causing foliation) at right angles to the direction of elongation. This type of deformation is typical of ductile shearing. In contrast, Derkey (1982) argues that the observed foliation is due to simple compaction (flattening) of subaqueous pyroclastic flows under the weight of later flows, and that the observed elongation is either due to the pyroclasics having been deposited and compacted on a slope, or else reflects an alignment during flowage prior to deposition

(Derkey, 1982). However, Yanai points out that the compaction associated with subaqueous pyroclastic flows should be local and small scale. Yet in the Silver Butte area the observed foliation, weakly or strongly developed, with or without lineation, is not limited to rocks which could be recognized as pyroclastic flows, but rather occurs in all the lithologic units except andesite sills and basalt blocks. So this deformation is better understood as a shearing deformation, which occurred in rocks which had been subject to local very intense hydrothermal alteration, to regional metamorphism to the lower greenschist facies, and then subject to regional and local tectonic stresses.

MINERALIZATION

WITH GENETICAL CONSIDERATIONS

In general, volcanogenic massive sulfide deposits are believed to form by the accumulation on the sea floor of sulfide minerals which precipitate from venting plumes of hydrothermal fluids. In particular, the idealized geology of a typical Kuroko-type deposit is shown in Fig. 12 (based on Sato, 1974, and Horikoshi and Sato, 1970) and in Figure 13 (from Eldridge, Barton and Ohmoto, 1983). In addition, the widely recognized clastic fragmental texture of Kuroko massive sulfide is believed due to its transportation and redeposition, both during and after formation, into local structural or topographic lows (grabens or basins) on the sea floor.

Since the ore deposit in the Formosa/Silver Butte property, is of the Kuroko-type, correlations with the Kuroko model are noted in the following descriptions.

DESCRIPTIONS OF THE MINERALIZED UNITS

Three mineralized units, namely, quartz-sericite-pyrite foliated tuff [10], quartz-sulfide tuff [9], and massive sulfide [8] can be recognized in the drill core and underground workings of the Formosa/Silver Butte property:

[10] Quartz-Sericite-Pyrite Foliated Tuff

This is the thickest of the three units and can be seen underground in all levels and in all the surface and underground drill holes (except F86S-6). It occurs footwall to [9] and [8], and in addition, in holes F86S-3, 4, 5, 8, thin (less than 2 m) hanging wall zones of [10] are exposed between [8] and [7].

This is a gray to white tuff made up of sand-sized grains of

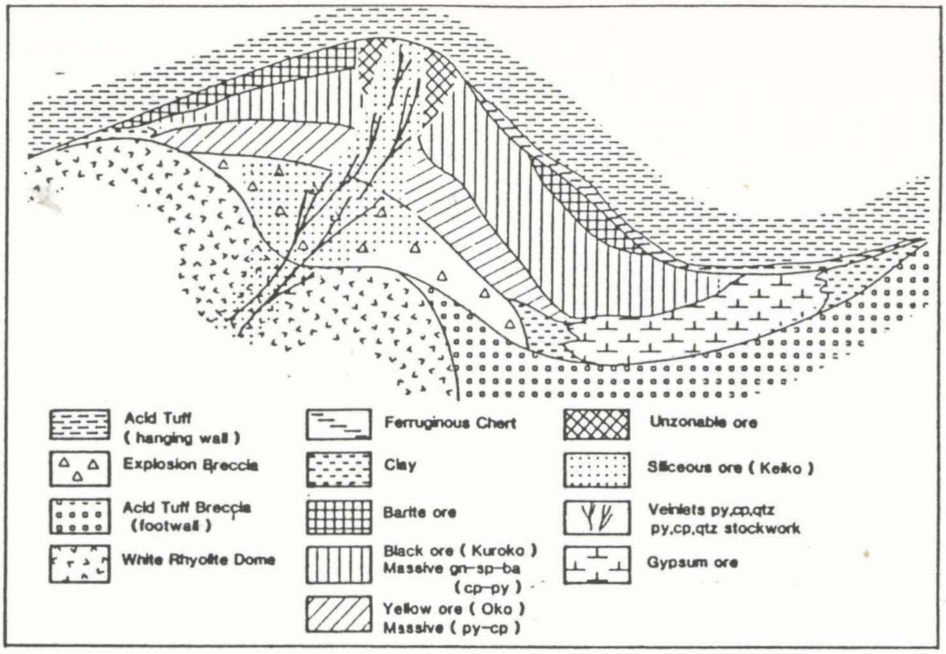


Figure 12. Idealized Cross Section of a Typical Kuroko Deposit (copied from Franklin, et. al., 1981; based on Sato, 1974, and Horikoshi and Sato, 1970).

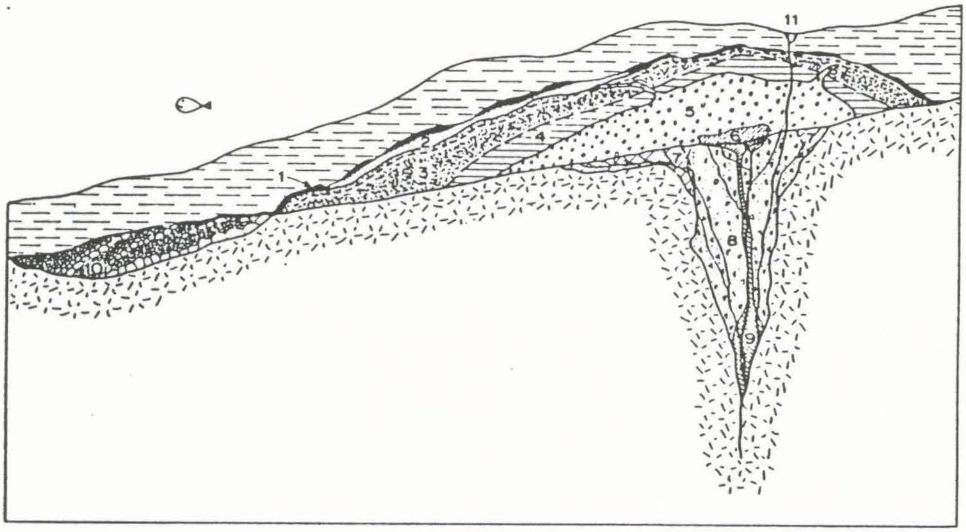


Figure 13. An Idealized Representation of a Relatively "Undisturbed" Kuroko Deposit. 1 = tetsusekiei or chert-hematite layer; 2 = barite ore; 3 = massive black ore (sphalerite + pyrite + galena + barite) where the fine dotted line separates the overlying fine-grained ore from the coarser grained ore below; 4 = massive semiblack ore (sphalerite + pyrite + chalcopyrite); 5 = massive yellow ore (chalcopyrite + pyrite); 6 = massive pyrite ore (pyrite + quartz); 7 = siliceous black ore (sphalerite + pyrite + galena + quartz); 8 = siliceous yellow ore (chalcopyrite + pyrite + quartz); 9 = siliceous pyrite ore (pyrite + quartz); 10 = transported, fragmental massive ore (mostly black); 11 = late-stage sulfide veins which can be either black or yellow ore. Gypsum ore is often present underneath and peripheral to massive ore, it has been deleted for the sake of simplicity. (Copied from Eldridge, Barton, and Ohmoto, 1983.)

quartz and pyrite with minor amounts of other sulfides and with varying amounts of platy sericite up to 2 mm in diameter. Derkey (1982) notes that the pyrite grains are detrital, and are subrounded when greater that 0.1 mm in size. The pyrite grains occur in regular (sometimes graded) beds of various thicknesses (from several mm to several cm) and densities (from disseminated to exclusively pyrite grains). Chalcopyrite occurs as irregular blebs, usually between pyrite grains in a pyrite bed but also between quartz grains in irregular zones that are discordant to bedding. Sphalerite occurs as fine grains usually in very fine beds, alone or with minor pyrite. Alternating bands of granular quartz and pyrite (with or without other sulfides) are probably transitional between [10] and massive sulfide. In some areas, the banding consists of repeated groups of alternating sharp quartz-pyrite contacts and diffuse pyrite-quartz contacts. Derkey (1982) notes that these can be interpreted as a group of graded beds similar to those discussed by Ito and others (1974).

Besides quartz, sericite and sulfides, [10] often includes varying amounts of volcanic rocks fragments, flattened pumice, quartz eyes (sometimes pale blue), and smaller feldspar crystals. Some zones with much sericite can be very fissile. Zones far from one of the massive sulfide lenses can be pale green in color and include greenish fragments and pumice, and pale epidote wisps.

Quartz-sericite-pyrite foliated tuffs are generallly understood to be zones of [fDt] which have been hydrothermally altered and mineralized as part of the same hydrothermal episode which produced the massive sulfide.

[9] Quartz-Sulfide Tuff

This unit, when present, occurs footwall to a massive sulfide lens, either in direct contact with massive sulfide (i.e., in Formosa No. 1, Silver Butte No. 1 and F86S-1, 3, 5, F86U-1, 2, 3, 5) or in contact with a thin zone of intervening [10] (i.e., in Formosa No. 2). Unlike [10], this rock is very dense and siliceous, is not foliated, and lacks sericite. Exposures in the underground drill holes contain much more sphalerite than pyrite ("siliceous black ore"), while the occurrence in F86S-1 contains more chalcopyrite than pyrite ("siliceous yellow ore"). But like [10], [9] can include distinguishable fragments of volcanic rock and pumice. In addition, in F86S-1, [9] includes 1-2 cm thick bands (or large fragments) of bright pink ferruginous chert. Occurrences of [9] can be interpreted to be zones of [10] which have been further silicified and mineralized.

The best developed occurrences of [9], namely underground footwall to the main massive sulfide lenses in Formosa No. 1 and Silver Butte No. 1, are approximately the same maximum thickness but roughly one-third of the total strike length of the exposed massive sulfide. Thus [9] may be considered analogous to the Kuroko siliceous ore (Keiko) zone, which in this case lacks the veining characteristic of a vent-feeder system and so may be peripheral to or displaced from a feeder system.

[8] Massive Sulfide

Massive sulfide is exposed in all five underground levels and in all surface and underground drill holes (except F86S-6). It occurs in four bodies which are from less than 1 to over 5 m thick, from 20 to 90 m in exposed continuous strike length, and with a maximum down-dip extension of at least 100 m. The massive sulfide is stratiform, with regular or disrupted bedding, and consists predominantly of pyrite with chalcopyrite, sphalerite, and lesser amounts of bornite, tennantite, galena, and chalcocite. Barite and quartz are gangue minerals.

CLASSIFICATION OF ORE AND THE KUROKO MODEL

The following Kuroko-deposit terminology is used to classify massive sulfide on the basis of relative quantities of mineral constituents (Horikoshi, 1976; Lambert and Sato, 1974; Lu, 1970 and 1983). Note that the word "ore" is used in this terminology without regard to considerations of economic grade.

Gypsum ore (SEKKOKO): Principally gypsum-anhydrite, with minor sulfides, quartz, and clays.

Pyrite ore (RYUKAKO): Principally pyrite, minor quartz, with or without minor chalcopyrite. This ore occurs either as friable pyrite ore or as indurated pyrite ore.

Yellow ore (OKO): Pyrite and chalcopyrite.

Semi-Black ore (HANGROKO): Pyrite and chalcopyrite, with sphalerite, barite, and quartz; transitional between yellow and black ores.

Black ore (KUROKO): Sphalerite, barite, pyrite, galena, and chalcopyrite; with tetrahedrite-tennantite and sometimes with bornite.

Barite ore (JUUSHOSEKI-KO): Principally barite, with minor sulfides.

Classically, these ore types occur stacked on top of each other as listed and as shown in Figs. 12 and 13, unless the massive sulfide is slumped or transported. Occurrences of these ore types at the Silver Peak mine are described as follows:

Gypsum ore is not present. However, very minor gypsum appears to fill in cracks in minor portions of [10] in F86S-5.

Both kinds of pyrite ore are present at Silver Peak. Friable pyrite ore which occurs as a loosely consolidated aggregate of subrounded, sand-size granular pyrite in a sericite matrix, in present in the Silver Butte No. 2 level, according to Derkey (1982). The indurated, silica-cemented pyrite ore consists of finely-bedded subrounded, sand-sized granular pyrite with minor interstitual chalcopyrite. This indurated pyrite ore is present in all the underground levels and in holes F86S-1, 2, 3, 4, 5, 7,

8. It is reported by Derkey (1982) that chalcopyrite can also occur as small (less than 0.03 mm across) oval blebs within the pyrite grains.

Yellow ore is chalcopyrite rich indurated pyrite ore which is grain-supported or, with increasing interstitial chalcopyrite, matrix-supported. The concentration of blebs of chalcopyrite (and occasionally tennatite) within individual pyrite grains also increases, according to Derkey (1982). This ore is present in Formosa No. 1 and Silver Butte No. 1 levels and F86S-4, 5, 7, F86U-1, 2, 5.

Both the indurated pyrite ore and the yellow ore usually have a regularly laminated-bedded texture. Some beds have fine quartz-filled tension gashes oriented perpendicular to bedding. In addition, lapilli to pebble size clasts of quartz, barite, massive pyrite, and/or volcanic rock fragments sometimes produce load structures or other disruptions in the laminations and fine beds. And some of the siliceous clasts contain minor bornite.

Three types of semi-black ore are present at Silver Peak. The first kind is yellow ore which includes sphalerite-rich lamination or beds. This occurs in Formosa No. 1, Silver Butte No.1 and F86S-4, F86U-1, 2, 3, 4. The second kind consists of granular pyrite, fine grained sphalerite and lesser chalcopyrite, with laminations and lapilli-pebble size fragments of quartz and barite. The texture is disrupted and fragmental. This occurs in Formosa No. 1, Silver Butte No. 1, and F86S-1, 2, 4, 5, 7. Bornite is characteristic of another kind of massive sulfide ore which is rich in Cu, Zn, Au, Ag, and occurs in drill hole F86S-5. It contains less than 20 vol. % granular pyrite and up to 50 vol. % lapilli-pebble size fragments of quartz and barite suspended in a matrix of bornite, tennantite, minor sphalerite, and very minor chalcopyrite. The texture is again disrupted and fragmental.

Black ore is best developed in the northeast half of the Formosa No. 1 drift, and is exposed in F86S-4 and F86U-1, 4, 5. It consists of bedded fine-grained sphalerite and granular pyrite, silica cemented, with or without minor chalcopyrite and very minor galena. Barite occurs as lamination and as lapilli-pebble size matrix-supported clasts. In the underground workings, bedding is frequently contorted and disrupted in a manner which can be interpreted as due to syndepositional deformation. And in F86U-1 and 4, bedding is totally disrupted by the inclusion of 25 vol. % rounded massive pyrite lapilli.

Derkey (1982) reports that the pyrite grains in the semi-black and black ores contain increasing concentration (up to 25 vol. %) of blebs of copper and zinc sulfides (chalcopyrite, bornite, tennantite and sphalerite). He also reports that unlike the pyrite grains the sphalerite grains are not detrital. And the sphalerite (like the barite) from a contortedly-bedded sample is recrystalized and twinned, while sphalerite from a normally bedded sample is fine-grained with no apparent recrystallization or twinning.

Relatively thin (less than 0.3 m) beds of massive white barite ore occurs in Formosa No. 1, Silver Butte No. 1, F86S-1, 2, 5, and F86U-2. Only in Formosa No. 1 is it in its "correct" stratigraphic position directly above the black ore. In Silver Butte No. 1 Derkey (1982) noted that a thin bed of massive barite underlies yellow ore. Similarly, in F86S-1, 2, a massive bedded barite lens underlies pyrite ore, while in F86U-2 it underlies semi-black ore. In F86U-5, massive barite with minor sulfides occurs with slumped disrupted bedding, in one case below and in another case above, equally disrupted semi-black bornite ore.

Finally, we recall that the hanging wall unit [7], Sulfide Lapilli tuff, may be considered as analogous to the Tetsusekiei chert-hematite zone of a typical Kuroko deposit (Derkey, 1982). However, magnetite crystals occur in [7] (with or without Fe-clay) and in [3] (with Fe-clay), while hematite occurs in the footwall unit [14] (with Fe-clay). According to the Kuroko model, hematite is more likely to occur in the hanging wall. The occurrence of hanging wall magnetite and footwall hematite, and the origin of the Fe-clay, remain to be explained. Shimazaki (1986) noted that the Fe-clay could have fallen as fragments into the tuff units where it occurs, or it could be due to early and end stage low-temperature hydrothermal activity precipitating SiO2, Al2O3, and Fe2O3, which formed the Fe-clay. The clay either filled in cracks in the tuffs or replaced some original constituent(s) in the tuffs. And he noted that the occurrence of end stage magnetite required relatively reducing conditions during the time of the deposition of the hangingwall tuff.

DEFORMATION AND REWORKED TEXTURES

One pronounced feature of the massive sulfide at the Silver Peak Mine is the disrupted stacking order of the "ore" types, as mentioned above, and the presence of numerous structures and textures indicative of soft sediment deformation and slumping. These observations suggest that the massive sulfide has been wholly or in part transported and deposited some short distance from its site of origin. Shimazaki (1986) notes that the distance must have been short because a crude but still classic Kuroko stratigraphic succession is preserved in places in the Formosa No. 1 level, and orderly bedding within portions of the massive sulfide is frequently preserved, as shown in the drill core.

Derkey (1982) thoroughly reviews the syndepositional structures exhibited in [fRt], including [8], and explains many of them by proposing a subaqueous debris flow mechanism for the transport and deposition of the foliated tuff and granular pyrite in [fRt]. A debris flow is a kind of sediment gravity flow which contains more than 80 wt. % solids (and has other properties). Sediment gravity flow is, according to Middleton and Hampton (1973), the "flow of sediment or sediment-fluid mixtures under the action of gravity." In particular the following are indicative of debris flow deposition: the detrital, abraded character of the granular pyrite; the poor sorting and matrix supported clasts in [fRt] and in the enclosing [fDt] units [14], [13], [7], [3]; the load structures and rip-up clasts of massive sulfide in [10] and [8]. The size and compositionally graded bedding (normal and reversed) in [10] and [8] indicates debris flow deposition and also indicates reworking by water. And the disturbed and disrupted bedding in [8] indicates submarine slumping of the beds.

Since slumping and debris flow work essentially by gravity, these tuffs and massive sulfides must have accumulated in sea floor grabens or basins. The presence of basalt blocks, which are interpreted as having fallen into [fRt] and possibly [fDt], also lend support to this notion of accumulation in sea floor lows. Finally, at least some instances of thickening of the massive sulfide bodies, as for example in F86S-5, may be due to the stacking of massive sulfide via debris flow or slumping during (re)deposition in sea floor lows.

Alternatively, this or other instances of massive sulfide thickening may be due to stacking by shearing, which will be discussed next.

SHEARING AND FAULTING

The second major feature of the massive sulfide bodies at the Silver Peak mine is the presence of shears or faults, within the bodies and at their hanging wall contact. A related feature is that the massive sulfide occurs in the middle of a 150-200 m thick sequence of foliated tuff, whose foliation is also believed to be the expression of shearing deformation. The general orientation of these shears and this foliation parallels the general structural orientation in the Silver Butte area, namely, a strike of about 035-050 degrees Az. and a dip of about 60-75 degrees SE. This orientation is exhibited by the regional thrust faults, the bedding and foliation of other rock units, the orientation of the massive sulfide bodies, and the bedding and laminations within the massive sulfide.

This shearing deformation probably occurred well after the sea-floor deposition of massive sulfide discussed above; it likely occurred during and after the accretion of the Rogue-Galice island arc. Foliation developed in [fRt] and [fDt] because of the presence of micaceous minerals, sericite and chlorite, which formed presumably by hydrothermal alteration as a halo in the tuffs around the massive sulfide. Shears and faults parallel to the regional thrusting also developed. In particular, in the five profiles (Plates 5 to 9) two massive sulfide zones are shown, namely the Formosa and Silver Butte ore zones with the Formosa ore zone stratigraphically above the Silver Butte ore zone and a fault between them. The two zones may be the proximal and distal parts of one much bigger lens, which were stacked on top of each other by reverse movement on the intervening fault. In the four plans (Plates 1 to 4), the strike extensions of each of the two ore zones are shown as offset by left-lateral movement on a tear fault. Thus the four apparently separate massive sulfide zones may in fact have originally been just one or two larger massive sulfide lenses whose parts were dissevered, dislocated, sometimes attenuated, and maybe sometimes stacked, by post-depositional movement along reverse and tear faults.

At present, only a limited area of the Formosa/Silver Butte property has been explored, and 1986 drilling results indicate that the ore zones are still open to down-dip and strike extensions. Therefore, further exploration work is required to accumulate the necessary information to clarify the nature, distribution and genesis of the ore.

1984 RECONNAISSANCE GEOCHEMICAL SURVEY

During June and July 1984, soil samples were collected from grids laid out on the Formosa claims and Silver Butte patented land, and on the Riddle claims.

The dimensions of the grid covering the Formosa claims and Silver Butte patented land are 1900 m x 1000 m, with 100 m line spacing. The lines run NW-SE with 50 m sample spacing in the vicinity of the mine and 100 m sample spacing on the remainder of the lines. A total of 164 samples were collected and analyzed from this grid.

The dimensions of the grid on the Riddle claims are 800 m x 800 m. The lines are laid out E-W, 100 m apart, with 100 m sample spacing. A total of 81 samples were collected and analyzed from this grid.

All samples were dried, screened, and analyzed for 32 elements by Inductively Coupled Plasma Analysis (ICP) at Acme Analytical Laboratories Ltd. of Vancouver, B.C.

Since the population of samples from each grid is too small to permit meaningful statistical analysis, the ICP results for Cu, Pb, Zn and Ba were plotted on the grid maps and contoured at regular intervals as follows:

		Formosa/Silver Butte grid:	Riddle grid:
Cu	in	100 ppm interval	25 ppm interval
Zn	in	150 ppm	75 ppm
Pb	in	50 ppm	not plotted
Ba	in	250 ppm	50 ppm
		(refer to Figs. 14-17)	(refer to Figs. 18-20)

The contours reflect the distribution patterns of these elements in the soil within the sampled area. The results are described as follows:

Formosa/Silver Butte Grid Area

The distributions of Cu, Zn, Pb and Ba in the soil (Figs. 14-17) exhibit a very close spacial relationship to the lithological trends and subdivisions in the survey area (Figs. 10 and 11).

Taking into account their relative mobilities in soil, the distribution patterns of Cu, Zn, Pb, and Ba overlap fairly well, leading to several coincident anomalies in the survey area. In the vicinity of the mine, the anomaly corresponds very well to the known ore zone. It has a dispersion halo down slope to the west due to contamination derived from the mine workings.

Two other coincident geochemical "highs" (anomalies) for Cu, Zn, Pb and Ba values are observed:

1) The southwest corner of the grid area, where small sulfide lenses and gossans crop out;

2) Along strike from the known ore zone in the NE quardrant of the survey grid.

In the area between grid lines F02N to F02S and stations 10W to 25W, there are several single samples showing significant values (Cu, Ba, etc.) that should be investigated further.

Riddle Grid Area

The values observed from this sample grid are generally lower that those from the Formosa/Silver Butte grid. Therefore, in order to emphasize the distribution patterns of Cu, Zn and Ba, narrower contour intervals were selected. Pb was not plotted because only one "point-high" (16 ppm) was found, located above an old working.

Cu as well as Zn distribution patterns coincide well with observed lithlogical boundaries, and the "highs" match the trend of the known mineralization. Down slope contamination from the old workings can be seen.

Ba distribution shows the same trend as observed for Cu and Zn. The down slope contamination of Ba from the old workings is more restricted in this area.

The trend of anomalies that emerges, although of somewhat lower absolute value perhaps due to thicker soil cover, is a continuation of the anomaly observed at the SW end of the Formosa/Silver Butte grid.

1986 RECONNAISSANCE GEOPHYSICAL SURVEY

During May and June 1986, an EM survey was carried out over the Silver Peak Mine area by Malcolm Petty Associates of San Francisco, California. The objective of this preliminary survey was to delineate the extent of the conductive ore zones. The survey are is characterized by very steep (30-35 degree) slopes, with ground cover ranging from cleared timber and fallen trees to forest and dense brush. The EM method chosen for this survey is known as the Transient (TEM), or Pulse (PEM) Electro-magnetic method. It uses a large array (several hundred meters square) and a fixed transmitter antenna which is laid on the surface of the ground: and it measures the decay of the secondary magnetic field influenced by the subsurface conductor. In the 1986 survey, the vertical component of the magnetic field decay was measured.

The equipment employed in this survey was a Geonics EM37 using the Geonics DAS54 data aquisition system. The data processing was carried out on a Compaq computer, using modeling software provided by Geonics Ltd.

Survey Results

Fig. 21 shows conductive plate locations in plan form, and the relationships of the transmitter loops, profile lines, and station locations.

The conductive plate locations were derived from modeling the measured data profiles (see Appendix I). The model assumes a horizontal transmitter loop and profile, and then rotates these from the horizontal by the average ground surface slope of each profile line.

A total of 25 conductive plates were modeled, using two or more channels of data for each traverse. These conductors are listed in Tables 1 and 2. They generally trend in a NNE direction, and are dipping steeply to the SE. These locations should be checked by drilling, in order to identify the conductor and clarify the subsurface geology.

Due to the limitations of this preliminary survey it was not possible to experiment with different transmitter loop locations. The proximity of the transmitter to some of the measurement stations is suspected to have caused the responses observed at or near stations 200 W on lines 900 S, 1000 S, and 1100 S. The targets located on lines 400 S and 500 S should probably be drilled first. In future work, the transmitter loop should be located further away from the measured station locations.

Table 1. Conductive Plate Values (Channel 9).

Plate No.	Data from Lines	Channel	Center of Plate (Line,	Station)	Strike	Dip	Length (m)	Depth Top	Extent	Resist. Ohm-M.	CON	Plate(m (Thick)
19	1000 S	9	1000	20 W	042	80 E	50	50	30		200	53
25	1100 S	9	1100	25 W	042	80 E	50	50	30		200	53
3	400/500 S	9	410	70 W	057	70 W	100	25	55	1450	100	27
23	1100 S	9	1100	100 W	047	80 E	100	50	35		100	27
14	900 S	9	900	100 W	047	75 E	100	100	100		80	21
9	700 S	9	650	25 E	052	70 E	100	35	55	1650	50	13
10	700 S	9	650	40 W	057	87 W	150	35	100	1650	48	13
1	400/500 S	9	375	210 E	049	80 E	80	25	55	1450	23	6
5	500 S	9	500	220 E	052	75 E	100	30	55	1650	22	6
15	900 S	9	900	180 W	032	70 E	300	50	190		20	5
22	1100 S	9	1100	225 W	037	68 E	300	50	190		19	5
4	500 S	9	500	60 W	052	70 W	100	40	60	1650	18	5
7	500/600 S	9	600	0 W	052	75 E	250	30	45	1650	17	5
2	400/500 S	9	400	100 E	057	75 W	50	25	55	1450	16	4
6	600 S	9	580	130 E	052	75 E	100	35	70	1650	15	4
11	800 S	9	800	220 E	087	80 S	200	25	55	1450	15	4
12	800/900 S	9	850	55 W	041	70 W	100	35	65	1325	14.5	4
8	700 S	9	650	150 E	057	80 E	100	25	100	1650	12	3
16	1000 S	9	1000	200 W	037	70 E	100	30	60	1250	10	3
17	1000 S	9	1000	100 E	047	70 E	100	20	60	1250	10	3
21	1100 S	9	1090	70 E	031	55 E	100	30	60	1200	10	3
20	1100 S	9	1100	200 W	037	70 E	100	35	60	1200	10	3
13	900 S	9	900	200 W	037	70 E	100	35	70	1200	9	2

ASSUMPTIONS

1.	1/2 Space Resistivity	1500 ohm/m.
2.	Plate Resistivity	400 ohm/m.
3.	Conductivity ratio	3.75

No assumptions are made as to the type of mineralization.

CON is the product of the conductivity contrast x thickness of the model conductor, in relation to the conductivity of the host rock.

The assumptions of the resistivity value 400 ohm/m for the conductive plates were chosen as an example; the 1500 ohm/m value for the host rock is representative of those values found to work best in the modelling.

The plate thickness is derived from the CON value and the assumed conductivity ratio.

Table 2. Conductive Plate Values (Channels 11, 15 and higher)

Plate	Data	from	Center of Plate		Strike	Dip	Length	Depth		Resist.	CON	Thick(m
No.	Lines	Channel	(Line,	Station)			(m)	Top	Extent	Ohm-M.		(Plate)
19	1000 S	18	1000	20 W	042	80 E	50	50	30	1500	200	53
25	1100 S		1100	25 W	042	80 E	50	50	30		200	53
23	1100 S	18	1100	100 W	047	80 E	100	50	35	950	100	27
3	400 S	11	425	75 W	057	81 W	100	25	50	1600	90	24
14	900 S	11	900	100 W	047	75 E	100	100	100		80	21
17	1000 S	18	1000	100 E	047	70 E	100	50	100	1500	80	21
18	1100 S	18	1050	75 E	032	55 E	100	50	100	950	60	16
10	700 S	11	650	40 W	057	87 W	150	35	100	1650	48	13
9	700 S	12	650	25 E	052	70 E	100	35	55	2900	45	12
1	400 S	11	375	210 E	049	80 E	80	25	55	1600	25	7
7	500/600 S	11	600	0 W	052	75 E	250	30	45	3050	23	6
5	500 S	12	500	220 E	052	75 E	100	30	55	3200	22	6
15	900 S	11	900	180 W	032	70 E	300	50	190		20	5
24	1000 S	18	1000	175 W	037	68 E	300	50	190	1500	19	5
20	1100 S	18	1100	200 W	037	70 E	300	50	190	950	19	5
22	1100 S	11	1100	225 W	037	68 E	300	50	190		19	5
4	500 S	12	500	60 W	052	70 W	100	40	60	3200	18	5
6	500/600 S		580	130 E	052	75 E	100	35	70	1650	15	4
12	800/900 S	18	850	55 W	041	70 W	100	35	65	1100	14.5	4
8	700 S	12	650	150 E	057	80 E	100	25	100	1650	12	3
13	900 S	11	900	200 W	037	70 E	100	35	70	1200	12	3
2	400 S	11	400	100 E	057	75 W	80	25	55	1600	10	3
21	1100 S		1090	70 E	031	55 E	100	30	55		10	3

ASSUMPTIONS:

1. 1/2 Space Resistivity 1500 ohm/m.
2. Plate Resistivity 400 ohm/m.
3. Conductivity ratio 3.75

No assumptions are made as to the type of mineralization.

CON is the product of the conductivity contrast x thickness of the model conductor, in relation to the conductivity of the host rock.

The assumptions of the resistivity value 400 ohm/m for the conductive plates were chosen as an example; the 1500 ohm/m value for the host rock is representative of those values found to work best in the modelling.

The plate thickness is derived from the CON value and the assumed conductivity ratio.

1986 SURFACE AND UNDERGROUND DIAMOND DRILLING PROGRAM

In 1986, eight diamond drill holes were completed from five surface sites and five diamond drill holes were completed from one underground site (see Table 3 for details). The drill and assay logs for the sampled portion of each hole are attached in Appendix II. The assay certificates and geochemical analyses from Acme Analytical Laboratories Ltd. are attached in Appendix III.

Geological information from all holes except F86S-6 is profiled in Plates 5 through 9. Hole F86S-6 was drilled from surface Site 3 located about 500 m SW of the other sites (see fig. 11) and no significant mineralization was encountered.

Assay results from the 1986 drilling program and from previous underground sampling are shown in Plate 10 and discussed in the following section "Ore Reserve Calculations".

STATISTICS OF DIAMOND DRILLING; SILVER PEAK PROJECT

1986

HOLE NO.	GRID LOCATION	ELEVA-TION	INCLINATION start-end	STRIKE start-end	DEPTH feet (meters)	CASING meters	RECO-VERY	CORE SIZE	DRILL('86) start-finish	SAMPLE NUMBERS	REMARKS
*F86S-1	495S-118E	1150m	61 - 54	316 - 328	548' (167.03m)	3.66m	95%	NQ	Sept. 5-9	6001-6032	—
F86S-2	" - "	"	75 - 64	325 - 336	624' (190.20m)	6.71m	95%	"	Sept. 11-16	6051-6085	—
F86S-3	584S-075E	1131.5m	55 - 51.5	306 - 309	430' (131.06m)	6.10m	90%	"	Sept. 18-22	6101-6144	Void from 103.33-105.46m old stope?
F86S-4	" - "	"	46 - 44.5	316 - 316	390' (119.87m)	15.24m	95%	"	Sept. 23-27	6151-6185	—
F86S-5	" - "	"	78 - 66.8	298 - 305	666' (203.00m)	15.24m	95%	"	Sept. 28- Oct. 4	6201-6286	—
F86S-6	1000S-146E	999m	29 - 25	307 - 319	350' (106.68m)	9.12m	90%	"	Oct. 5-8	6298-6300	—
F86S-7	545S-070E	1122m	65 - 66	307	134.48m	3.96m	95%	BW44	Oct. 30- Nov. 15	6301-6320	—
F86S-8	609S-040E	1113m	60 - 65	287	76.20m	2.74m	95%	BW44	Nov. 17-22	6351-6365	—
**F86U-1	508½S-091E	1009m	50	309	30.48m	-	65%	BW44	Dec. 12-14	6401-6407	15% recovery from 21.95-29.76m
F86U-2	" - "	"	45	269	24.68m	-	90%	"	Dec. 14-15	6421-6429	Void from 22.95-24.38m
F86U-3	" - "	"	60	269	35.66m	-	70%	"	Dec. 15-17	6441-6450	10% recovery from 26.57-35.66m
F86U-4	" - "	"	47	349	21.64m	-	85%	"	Dec. 17-18	6461-6462	15% recovery from 19.69-21.64m
F86U-5	" - "	"	67	344	24.81m	-	85%	"	Dec. 18-19	6481-6483	15% recovery from 20.74-22.75m

*F86S denotes surface drilling
**F86U denotes underground drilling

ORE RESERVE CALCULATION

DATA SOURCES

The Silver Peak mine was periodically in production in the 1920's and 30's. During that time some stope and drift sampling was done by the operators, and shipment of ore was reported to the U.S. Bureau of Mines. Since then the mine has been examined and sampled several more times. Consequently the production records and some of the mine assay data are available from these sources; (Appendix VI)

	Sample No. in Plate 10
Silver Peak Mining and Milling Company (1928), Feasibility Study (by L.A. Lavansaler)	L-1, L-2,....
Silver Peak Mine (1937, July) Assay map of underground workings by B. Lockwood Jr.	1, 2, 3,.....
United States Geological Survey Circular 2, p. 20 (1933) by P.J. Shennon	S-1, S-2,....
Department of Geology and Mineral Industries, Oregon, (1941) by B.V. Zeipel, note and map.	Z-1, Z-2,....
Pacific Minerals (1941) map only	EM1-1, -2,... EM5-2,.P-95,.
Chevron Resources Company Company Report (1978) (in plan map)	A047801, A047821,.....
Rand Ventures Inc., Vancouver, Canada, Company Report (1984)	FT-1, -2,.... ST-1, -2,....

These data were complied as part of this company's evaluation of the Formosa/Silver Butte property in 1984, indicating in a minimum estimate of 47,000 tons of ore grading 0.145 oz/ton Au; 1.683 oz/ton Ag; 5.87% Zn and 2.21% Cu.

In 1986, a total of thirteen holes were drilled and 301 core samples were cut and submitted for assaying and geochemical analysis. This information provided the basis for a more precise calculation of ore grade and tonnage.

CRITERIA FOR OUTLINING ORE BLOCKS

As shown in Plate 10, the ore exposed in the underground drifts or stopes and in the drill holes has been subdivided into 21 blocks along three longitudinal sections for the purpose of ore reserve calculation. Because the Silver Peak deposits are a stratiform massive sulfide, relatively uniform tabular-shaped ore bodies can be expected, and are indeed found in many locations in the mine. Therefore, the following criteria have been used to outline the ore blocks:

1) A 20m x 20 m block is drawn, centered around an ore intersection of known grade exposed in either drift, stope, or drill hole, and the grade and thickness of that intersection is assumed to be uniform throughout the block (unless otherwise indicated by additional sampling).

2) If another drill hole is located nearby, then a block boundary is drawn halfway between the adjacent holes, according to the Random Spacing Rectangular method (Hazen, 1968).

3) Within the same drift or stope, a block boundary may be drawn either for geological reasons (such as different ore compositions or the presence of a fault) or because assay information for different parts of the drift or stope come from different sources and hence may have differing degrees of confidence.

CALCULATION OF ORE RESERVE AND GRADE

For an ore block outlined in a drift or stope, the weighted average grade of all assays pertaining to that block and the average thickness of all sample intervals are calculated. For a block drawn around a drill hole intersection, the weighted average grade and the true thickness of the intersected ore are calculated.

The volume of each block is calculated by multiplying the block area times the average true thickness of the ore zone. The metric tonnage contained in each block is calculated by multiplying the volume of each block by the estimated specific gravity of the ore observed in that block.

The specific gravity of the massive sulfide ore is conservatively estimated as 3.75, with massive sulfide defined as rock containing more than 60 vol. % sulfides and noting that the major component of the massive sulfide is pyrite (s.g. = 5.02). A specific gravity of 3.0 is selected for the siliceous ore which has 30-60 vol. % sulfides.

A conversion factor 1.1023 is then used to convert metric tons to short tons since the assay results (see Appendix III) are reported per short ton.

After the tonnage within each block is calculated using the measurements from the longitudinal (vertical) section, a correction is made to allow for the dip length of the ore zone which is foreshortened by the vertical projection.

The figures resulting from these calculations are summarized below (also shown on Plate 10):

SUMMARY OF ORE RESERVE CALCULATION

BLOCK	TONNAGE (Short Tons)	GRADE oz/T Au	oz/T Ag	% Zn	% Cu
I.	25,300	0.042	1.840	N/A (4% ?)	2.55
II.	35,200	0.104	3.303	4.01	7.54
III.	3,700	0.008	1.353	4.39	2.76
IV.	6,600	0.071	0.850	2.77	2.62
V.	5,500	0.021	1.263	0.10	3.15
VI.	21,200	0.024	1.430	0.07	3.04
*VII.	9,600	0.034	0.980	0.07	2.45
VIII.	27,900	0.048	0.652	11.82	2.62
IX.	500	0.108	1.197	15.94	1.50
X.	3,000	0.205	1.914	9.32	2.79
XI.	7,400	0.025	2.307	3.51	4.04
XII.	8,600	0.028	1.591	9.53	2.13
XIII.	3,700	N/A	N/A	10.20	0.45
XIV.	2,800	0.123	1.507	7.61	0.43
XV.	6,000	0.040	1.620	2.43	1.80
XVI.	5,300	0.022	0.961	N/A (4% ?)	2.19
XVII.	8,000	0.192	4.915	5.50	8.63
XVIII.	7,400	0.031	0.815	6.02	4.47
XIX.	5,700	0.013	1.100	2.35	2.73
XX.	11,500	0.036	0.795	5.25	2.35
XXI.	2,400	0.059	3.920	7.67	9.35
	207,300				
Ave.		0.058	1.791	5.16	3.79

*Original intersected massive sulfide zone is 7.35 m (from 22.24 m to 29.59). Because the intersection is highly oxidized and leached, only a portion of the relatively less leached zone is calculated.

Including all 21 blocks, the combined drill indicated and drift or raise indicated ore reserve at the Formosa/Silver Butte property is calculated to be 207,300 short tons at an average grade of 0.058 oz/ton Au, 1.79 oz/ton Ag, 5.16 wt. % Zn, and 3.79 wt. % Cu.

It must be noted that these tonnages are calculated directly and without regard to dilution and mining method. These calculated reserves are our appraisal of the property at the present stage of exploration.

PROBABLE AND POSSIBLE ORE RESERVES

Examination of the geologic profiles (Plates 6 and 8) shows that the Formosa/Silver Butte ore bodies are open down-dip below the lower boundaries of the calculated reserve blocks.

Although additional reserves are indicated down-dip and, perhaps, along strike, no attempt was made to numerically estimate probable and possible ore reserves.

Further exploration, especially drilling, with provide the data necessary to extend the current ore reserves.

BUDGET
pp. 62-68
REMOVED

FUTURE EXPLORATION AND BUDGET

As described in the previous sections, the exploration work performed in 1986 (referred to as Phase I of the Second Stage of Exploration) indicates a high potential for finding additional economic ore along both down-dip and strike extensions of the Formosa/Silver Butte ore zones. Further diamond drilling is clearly warranted, and, furthermore, it is recommended that an adit be driven 25 m below the Formosa No. 1 level in order to explore and evaluate the extensions of the ore zones.

Regionally, within a 3 km radius of the known deposit, the 1986 geological mapping outlined the belt of submarine acid volcanics which probably hosts other Kuroko-type deposits. The results of the 1984 reconnaissance geochemical survey support this probability. Therefore, more detailed work beginning with geological, geochemical and geophysical surveys, is recommended to examine the belt. Contingent on the results of these surveys, surface exploratory drilling will be required to test for ore potential.

The Lioso claim and vicinity should be explored in a manner similar to that planned for the Formosa and Riddle claims in order to evaluate the potential for additional ore reserves.

Furthermore, joint exploration ventures with the owners of some of the land adjacent the Company's property should be considered because of similar favorable geology. Regional geological investigation by Kuroko experts and some follow-up geochemical and geophysical surveys are recommended here.

Details of the recommended work and the budget are listed below: Phase I of the Second Stage of Exploration was described in the Company's July 1986 Report (Lu, 1986).

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I. Continuation of the Silver Peak Mine, Underground Sampling (by B. Lockwood, Jr. July 1937)

Sample No.	Sample m.	Width (ft.)	Au oz/T	Ag oz/T	Zn %	Cu %	Ore Block No.
110	1.19	(3.90)	0.02	0.80	6.30	9.40	XI
112	1.16	(3.80)	0.01	0.20	0.25	6.10	XI
113	1.22	(4.00)	0.01	0.20	4.10	5.10	XI
114	1.01	(3.30)	TR	0.20	6.70	2.70	XI
115	1.42	(4.65)	0.04	1.40	0.40	4.40	XI
116	0.27	(0.90)	0.04	0.80	27.60	1.10	XI
117	1.13	(3.70)	0.03	1.00	12.80	5.60	XVIII
118	1.22	(4.00)	0.02	0.80	8.10	4.10	XVIII
119	0.91	(3.00)	0.01	0.20	5.80	4.30	XVIII
120	0.82	(2.70)	0.01	0.20	8.20	4.40	XVIII
121	1.46	(4.80)	0.01	0.20	4.80	5.10	XVIII
122	0.82	(2.70)	0.01	0.60	12.30	4.70	XVIII
123	0.82	(2.70)	0.04	2.00	2.30	2.20	XVIII
124	0.91	(3.00)	0.02	0.20	7.30	3.40	XI
125	1.13	(3.70)	0.04	0.40	0.50	3.90	XI
126	1.01	(3.30)	0.06	2.80	1.10	2.30	XI
127	0.70	(2.30)	0.02	0.20	0.20	0.50	XI
128	0.76	(2.50)	0.04	2.94	0.30	1.80	XI
129	0.46	(1.50)	0.04	7.00	0.10	0.90	XI
130	1.16	(3.80)	0.02	12.60	3.40	2.00	XII
131	0.94	(3.10)	0.02	14.00	5.60	5.00	XI
132	0.30	(1.00)	0.04	2.80	1.30	5.70	XI
133	0.64	(2.10)	0.06	1.40	12.00	3.00	XII
134	1.89	(6.20)	0.08	0.40	8.00	2.50	XII
135	0.79	(2.60)	0.08	1.60	8.70	4.80	XII
136	1.22	(4.00)	0.08	0.40	11.80	4.30	XII
138	0.46	(1.50)	0.08	0.80	8.20	1.00	XII
139	0.67	(2.20)	0.02	1.60	8.30	2.60	XII
140	1.34	(4.40)	0.01	0.60	1.90	1.10	XII
141	0.82	(2.70)	0.04	1.10	3.40	4.10	XII

II. Silver Peak Mine Mining & Milling Co. Feasibility Study, (by L.A. Lavansaler, 1928)

Sample No.	Sample m.	Width (ft.)	Au oz/T	Ag oz/T	Zn %	Cu %	Ore Block No.
L-3	2.74	(0.99)	0.01	0.40	--	3.77	XVII
L-8	2.13	(6.99)	0.09	1.59	--	2.43	I
L-9	2.44	(8.00)	0.02	1.92	--	3.45	I
L-24	0.46	(1.51)	0.09	8.02	--	21.26	XVII
L-25	0.46	(1.51)	2.51	16.39	--	14.04	XVII
L-26	0.91	(2.99)	0.04	13.80	--	13.48	XVII
L-33	1.07	(3.50)	0.16	9.94	--	14.14	XVII
L-34	0.91	(2.99)	0.21	7.63	--	10.86	XVII
L-35	1.22	(4.00)	0.03	2.45	--	8.68	XVII

III. United States Geological Survey, by P.J. Shennon
(U.S.G.S. Circular 2, p. 20, 1933)

Sample No.	Sample m.	Width (ft.)	Au oz/T	Ag oz/T	Zn %	Cu %	Ore Block No.
S-8	4.68	(15.35)	0.09	0.59	5.50	4.05	XVII
S-9	2.74	(8.99)	0.01	0.30	0.90	0.90	XII
S-10	2.13	(6.99)	0.03	4.58	7.50	5.13	X

VI. Silver Peak Mine, Chevron Resources Co. (1978)

Sample No.	Sample m	Width* (ft.)	Au oz/T	Ag oz/T	Zn %	Cu %	Ore Block No.
A047820	30.47	(99.97)	0.547	1.351	11.00	2.40	X
A047821	22.86	(75.00)	0.023	2.06	10.00	0.95	X

*strike length

V. Pacific Minerals
(1941 ?) (map only)

Sample No.	Sample m.	Width (ft.)	Au oz/T	Ag oz/T	Zn %	Cu %	Ore Block No.
EM1-2	4.57	(14.99)	0.04	2.96	--	2.59	I
EM1-5	4.57	(14.99)	0.04	2.96	--	2.59	I
P-94	2.13	(8.99)	--	--	18.60	2.50	XII
P-95	1.22	(4.00)	--	--	10.20	0.45	XIII

VI. Department of Geology & Mineral Industries, Oregon
by B.V. Zeipel (1941)

Sample No.	Sample m.	Width (ft.)	Au oz/T	Ag oz/T	Zn %	Cu %	Ore Block No.
Z-4	4.57	(14.99)	0.01	1.10	9.20	2.50	I

VII. Rand Ventures Inc., Vancouver, Canada
Company Report (1984)

Sample No.	Sample m.	Width (ft.)	Au oz/T	Ag oz/T	Zn %	Cu %	Ore Block No.
FT-1A	0.42	(1.38)	0.049	1.21	18.64	1.37	IX
FT-2B	0.34	(1.12)	0.181	1.18	12.61	1.67	IX
FT-4	0.88	(2.89)	0.032	0.62	11.34	2.18	X

CERTIFICATION

I, Dr. R.H. Seraphim, of the City of Vancouver, Province of British Columbia, hereby certify as follows:

1. I am a Geological Engineer residing at 4636 West 3rd Avenue, Vancouver, B.C., and with office at #316, 470 Granville Street, Vancouver, B.C.

2. I am a registered Professional Engineer of British Columbia. I graduated with a Master of Applied Science from the University of British Columbia in 1948, and with a Doctor of Philosophy in geology from the Massachusetts Institute of Technology in 1951.

3. I have practiced my profession continually since graduation.

4. I have no interest, direct or indirect, in the claims of Formosa Resources Corp. and will not acquire any interest in the claims, the Company, or its affiliates.

5. The attached memorandum is based on a study of maps, sections and reports. The property was not visited.

6. I consent to the use of this memorandum report in or in connection with the prospectus or in a statement of material facts relating to the raising of funds for this project.

DATED at Vancouver, British Columbia, this 2nd day of April, 1987.

R.H. Seraphim

R.H. Seraphim, Ph.D., P.Eng.

CERTIFICATE

I, Hans E. Madeisky, hereby certify that:

1. I am a consulting geologist with an office at 611 - 850 West Hastings Street, Vancouver, B.C.

2. I am a Fellow of the Geological Association of Canada, a Member of the Association of Exploration Geochemists and a Member of the Canadian Institute of Mining and Metallurgy.

3. I am a graduate of the University of Ottawa. B.Sc. Geology (1980)

4. I have practised my profession in Canada, the U.S.A. and Europe since 1968.

5. I have supervised and participated in the work described herein.

6. I have no interest, directly or indirectly, in the properties or the securities of Formosa Resources Corporation.

7. I am a co-author of this report, and consent to the use of this report in or in connection with a prospectus or in a statement of material facts or in reports as required.

DATED at Vancouver, B.C., this 2nd day of April, 1987.

Hans E. Madeisky, B.Sc., F.G.A.C.

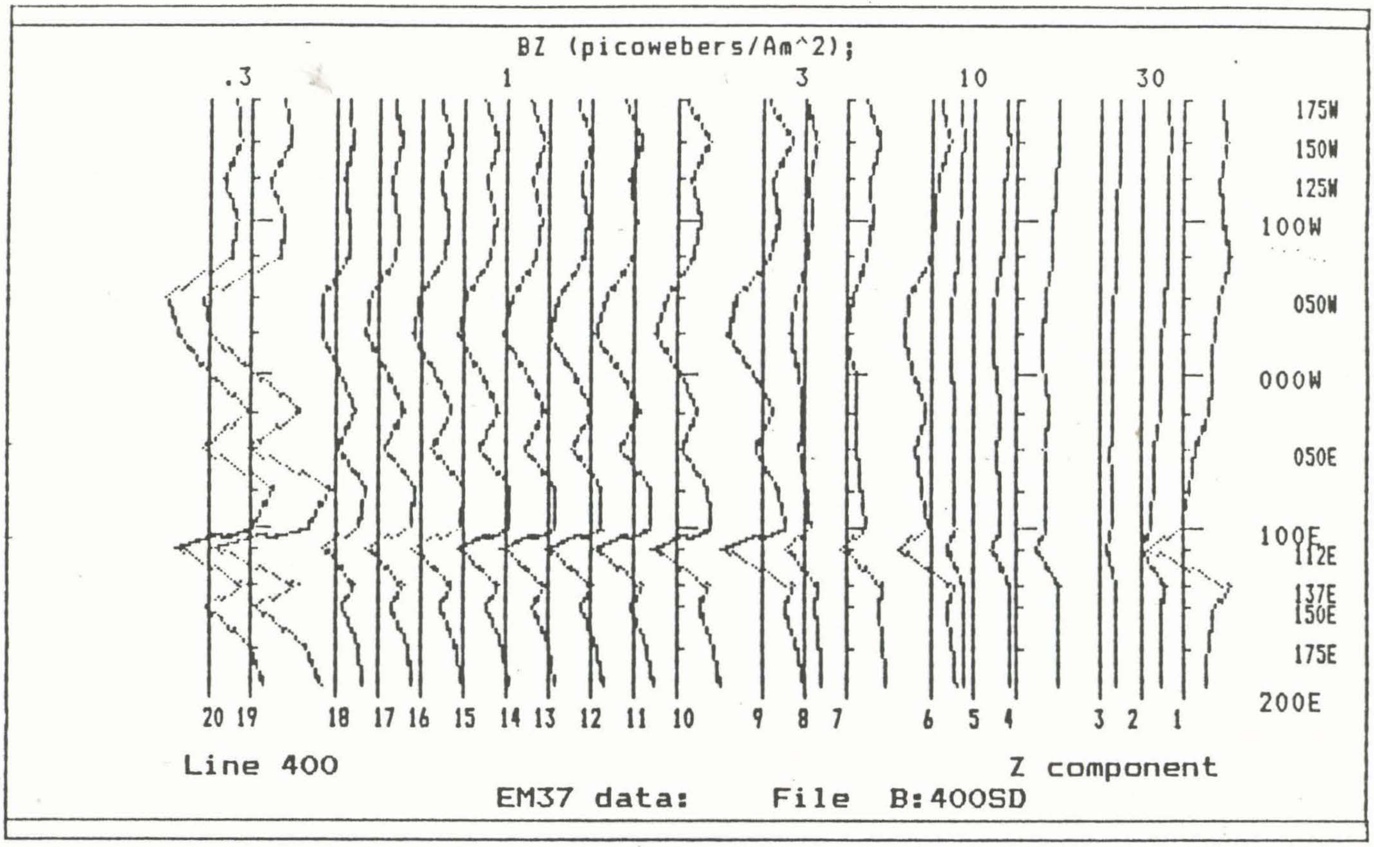
APPENDIX I

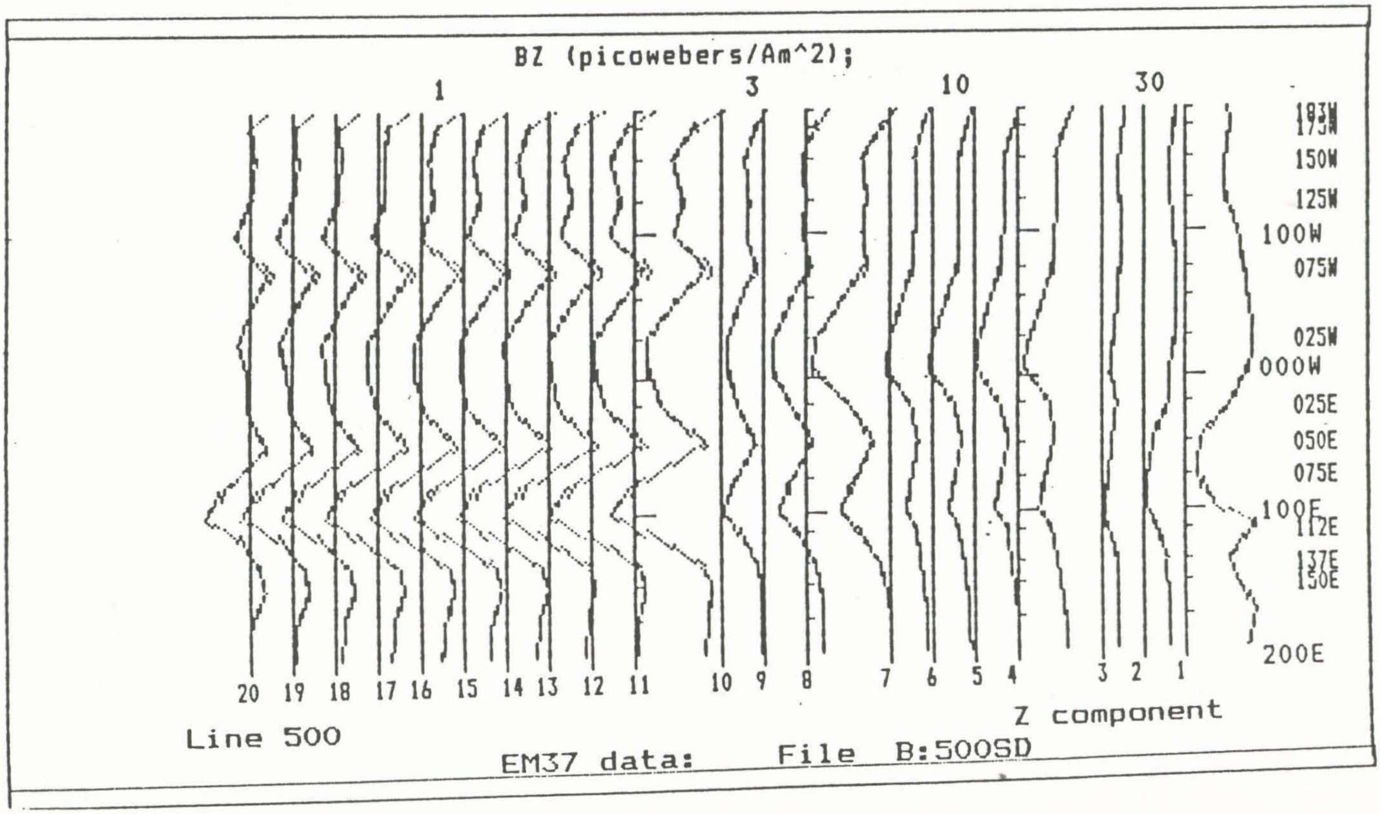
Measured Data Profiles for the
1986 T.E.M. Geophysical Survey

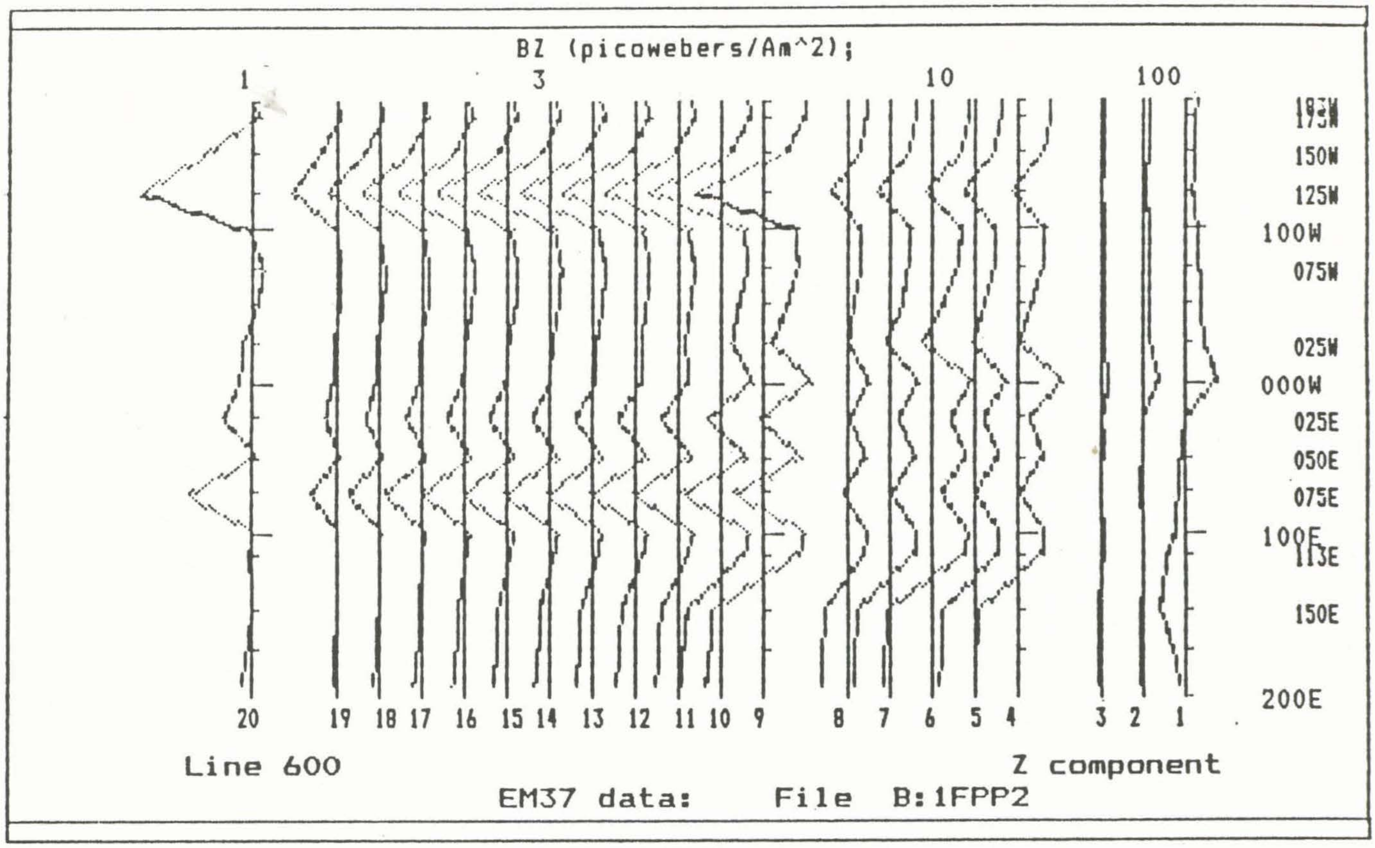
The information contained in each profile, reading from top to bottom of each printout, is as follows;

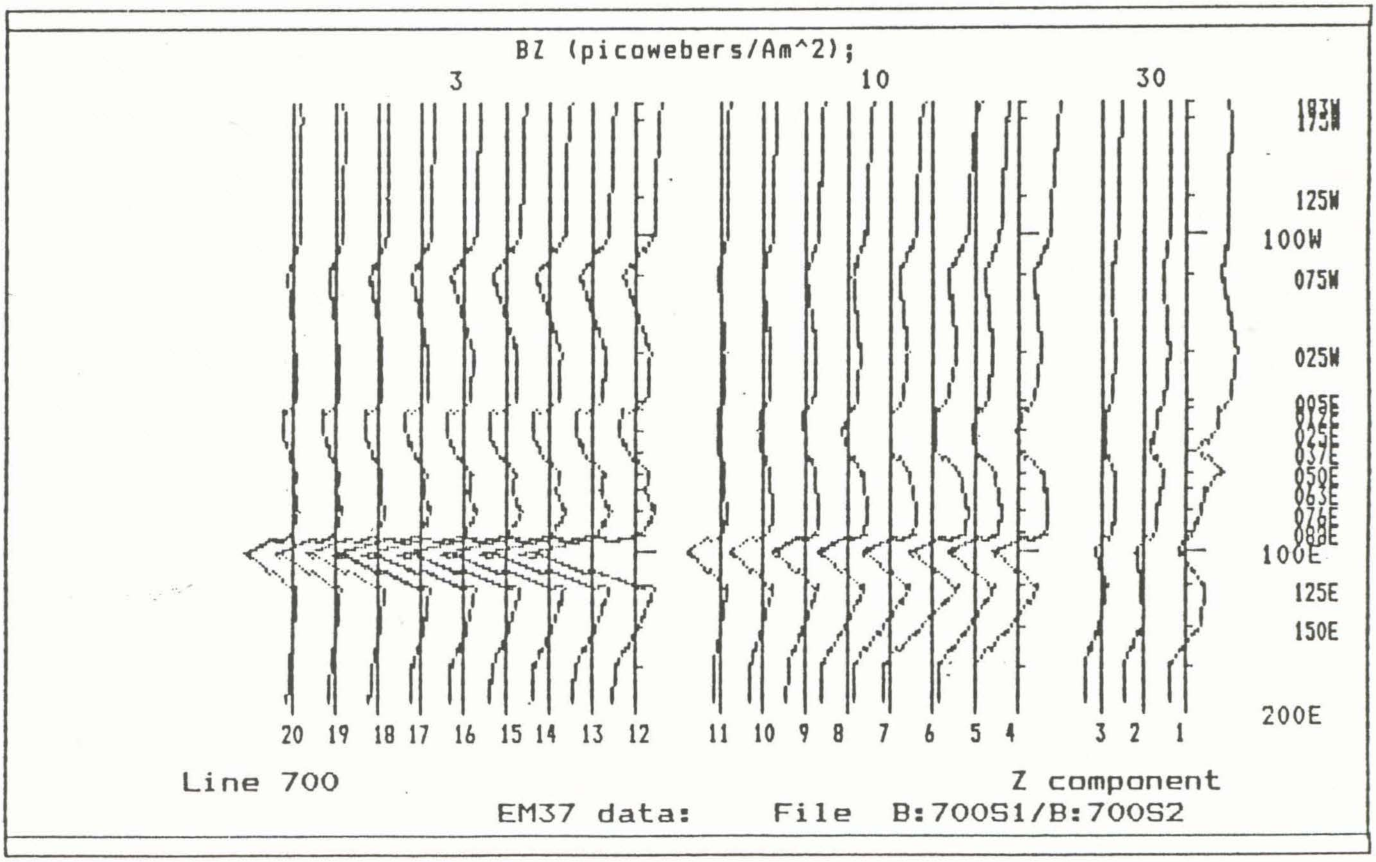
1) measurement type, in this case it is BZ, which is the integrated measured strength of the induced vertical secondary magnetic field; the units are picowebers/ampere-meter squared.
2) the scale dimension of the measured signal.
3) the station locations (on right side).
4) receiver channel no. (1-20).
5) Line No. and measured field decay component (X, Y, or Z)
6) data file name from which the information is retrieved.

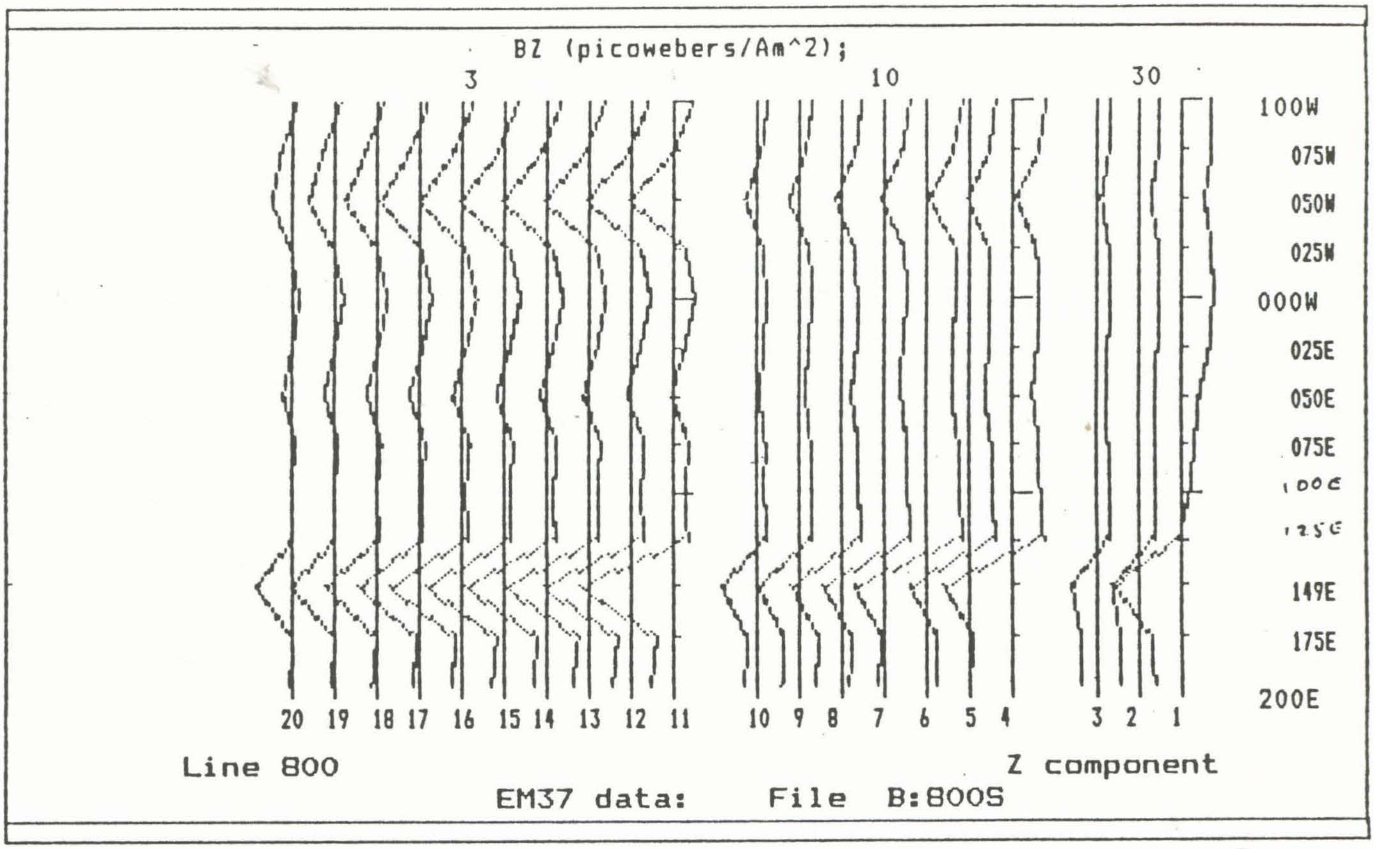
The early time channels provide the near-surface response and the later time channels give information to increasing depth.

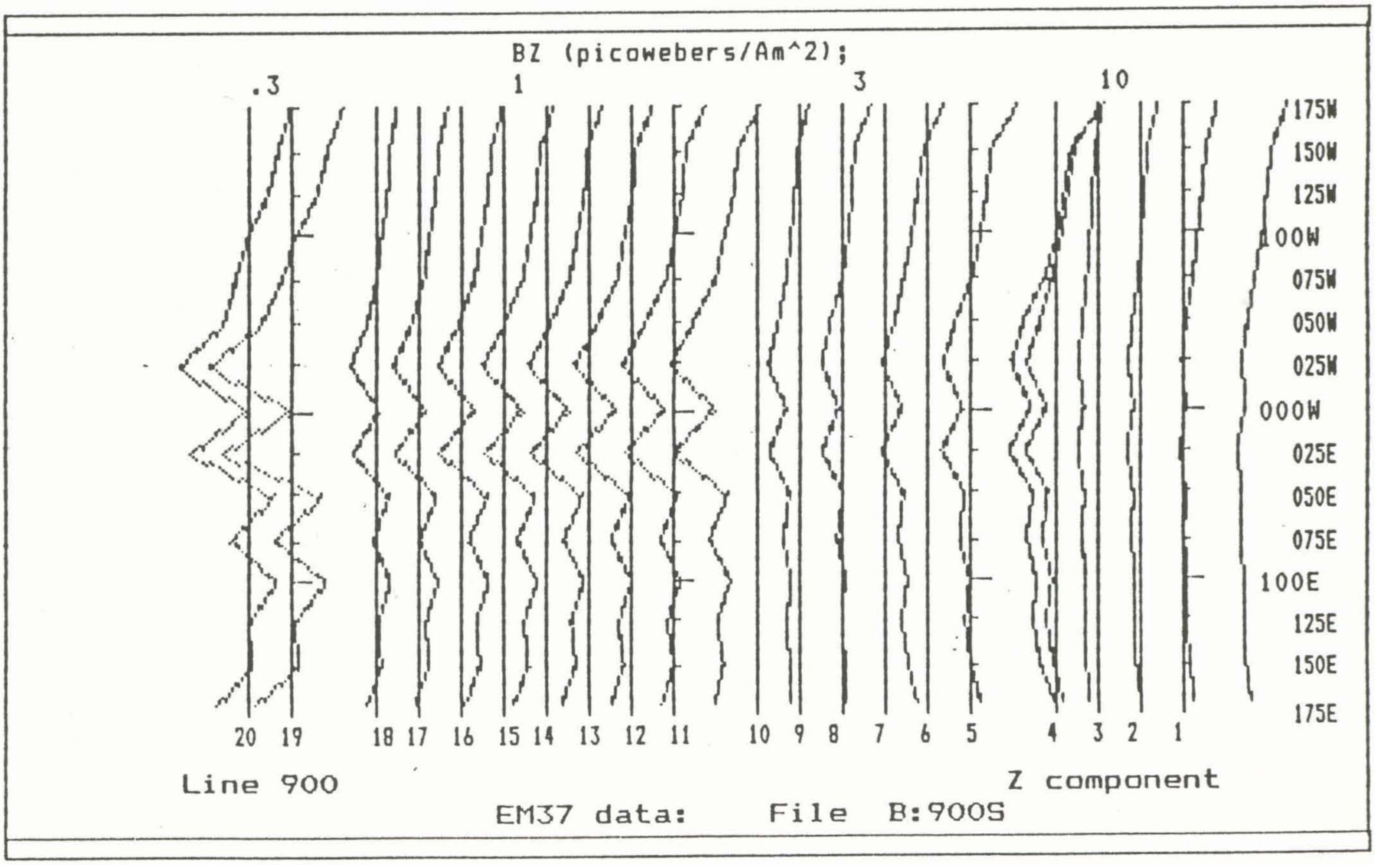

BZ (picowebers/Am^2);
.3
1
3
10
30
175W
150W
125W
100W
050W
000W
050E
100E
112E
137E
150E
175E
200E
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Line 400
Z component
EM37 data: File B:400SD

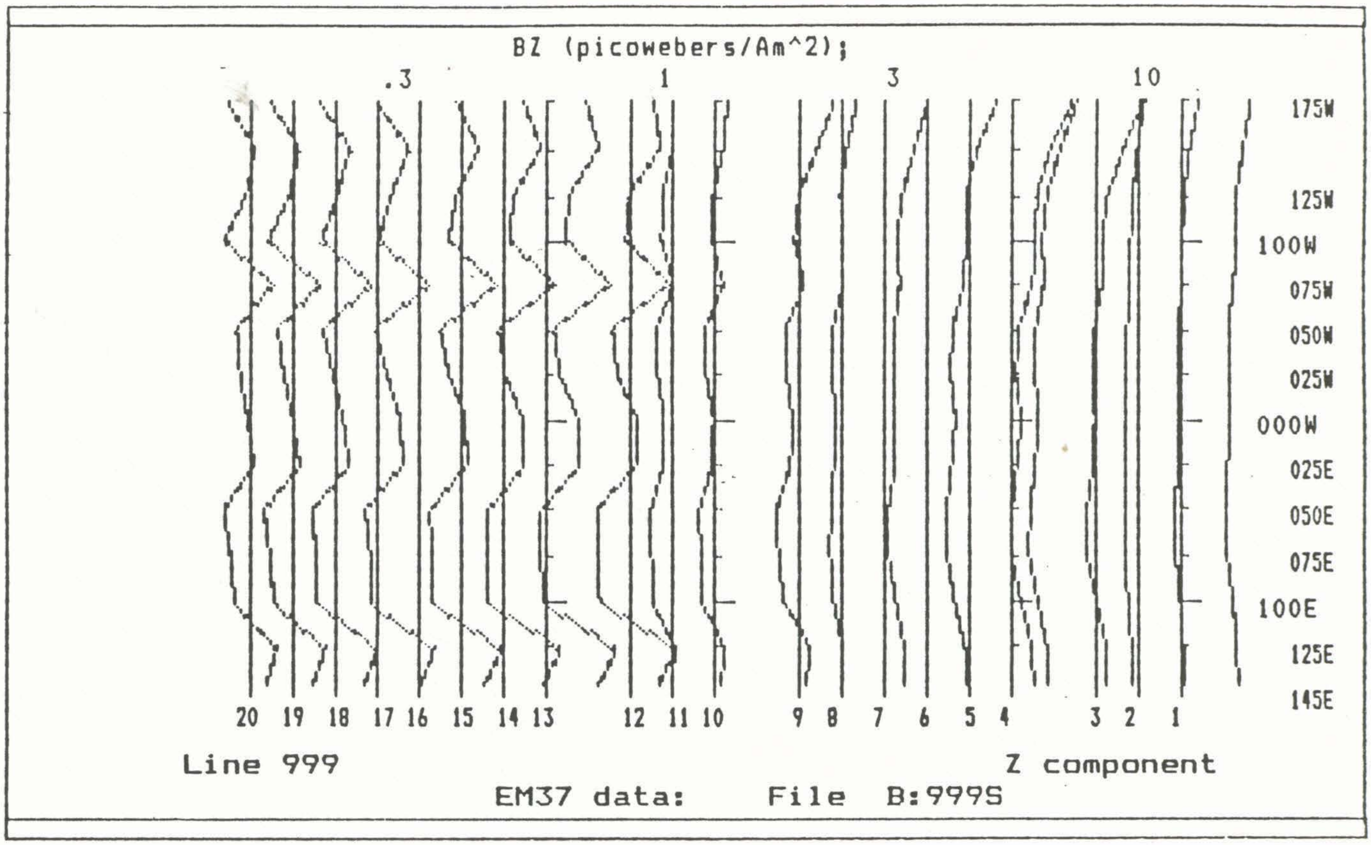

BZ (picowebers/Am^2);
1
3
10
30
183W
175W
150W
125W
100W
075W
025W
000W
025E
050E
075E
100E
112E
137E
150E
200E
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Z component
Line 500
EM37 data: File B:500SD

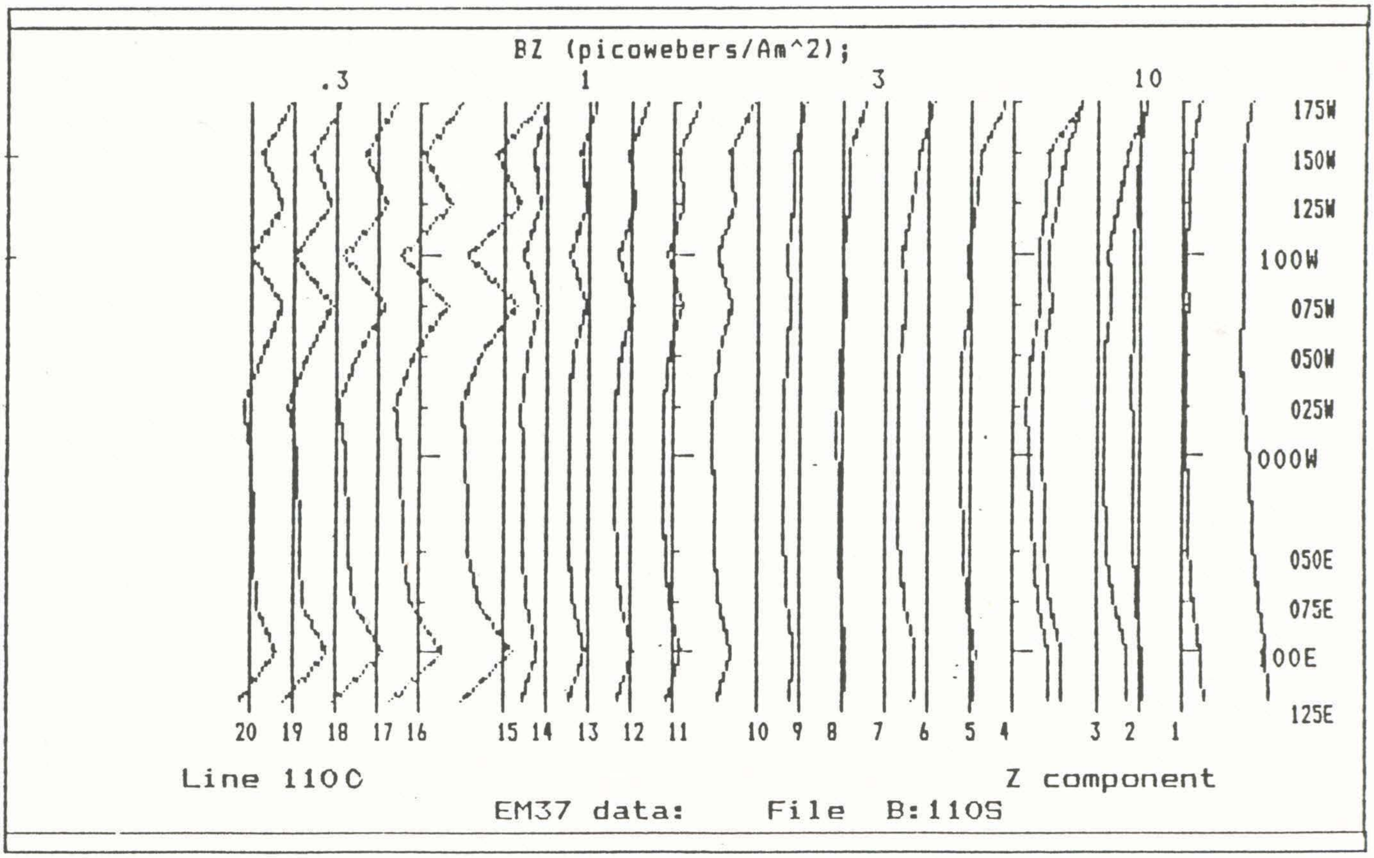

BZ (picowebers/Am^2);
1
3
10
100
183W
175W
150W
125W
100W
075W
025W
000W
025E
050E
075E
100E
113E
150E
200E
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Line 600
Z component
EM37 data: File B:1FPP2


BZ (picowebers/Am^2);
3
10
30
183W
175W
125W
100W
075W
025W
005E
012E
025E
037E
050E
063E
076E
088E
100E
125E
150E
200E
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Line 700
Z component
EM37 data: File B:700S1/B:700S2


BZ (picowebers/Am^2);
3
10
30
100W
075W
050W
025W
000W
025E
050E
075E
100E
125E
149E
175E
200E
20 19 18 17 16 15 14 13 12 11
10 9 8 7 6 5 4
3 2 1
Line 800
Z component
EM37 data: File B:800S


BZ (picowebers/Am^2);
.3
1
3
10
175W
150W
125W
100W
075W
050W
025W
000W
025E
050E
075E
100E
125E
150E
175E
20 19
18 17 16 15 14 13 12 11
10 9 8 7 6 5
4 3 2 1
Line 900
Z component
EM37 data: File B:900S


BZ (picowebers/Am^2);
.3
1
3
10
175W
125W
100W
075W
050W
025W
000W
025E
050E
075E
100E
125E
145E
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Line 999
Z component
EM37 data: File B:999S


BZ (picowebers/Am^2);
.3
1
3
10
175W
150W
125W
100W
075W
050W
025W
000W
050E
075E
100E
125E
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Line 110C
Z component
EM37 data: File B:110S

APPENDIX II

Drill and Assay Logs for the 1986 Diamond Drilling Program.

Attached are drill and assay logs for the mineralized portions of the eight surface and five underground diamond drill holes completed in 1986.

Assay results are reported in weight percent (%) or in troy ounces (oz; 31.103 g) per short ton (2,000 lbs.). Some samples were submitted for geochemical analysis rather than assaying. These results were reported in parts per million, with Au reported in parts per billion. For listing in the drill logs, these results were converted to weight percents, with Au and Ag results converted to troy ounces per short ton. Such converted results are marked by the presence of a "greater than" sign before the Fe value (since geochemical analysis gives a minimum value for Fe). Pb values less than 0.05 wt % are not listed in the drill logs.

Hole No. F86S-1.

DRILL AND ASSAY LOG OF MINERALIZED PORTION OF DIAMOND DRILL HOLE F86S-1

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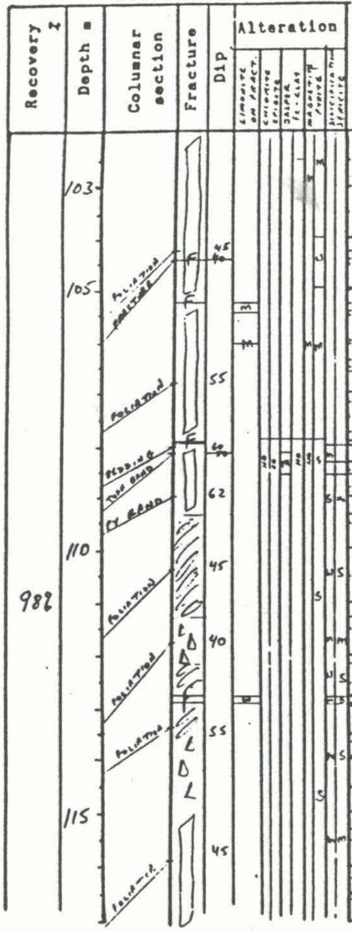

Rock Description (VOLUME PERCENTS)

4% SULPHIDES IN AGGREGATE. (PY + VERY MINOR CHALCO)

SULPHIDE LAPILLI TUFF
FOLIATED DARK PURPLISH
<3% PINK, DISSEM. MAGNETITE

104.00
SPECIMEN (104.25-.31)½
104.38-.98 QZ TENSION GASH (8X45 mm) WITH 3 mm CHALCO ON OPPOSITE SIDE OF CORE
PALE GREENISH WISPS
30% PALE QZ EYES (1-2 mm ROUND)
2% PY
104.97
105.25-.26 GREY CLAY GOUGE
105.96 LIMONITE ON FRACT.
106.07 LIMONITE ON FRACT.
SPECIMEN (106.90-.98)½ WITH PY + JASPER FRAGS FE-CLAY
106.55
107.00 } WHITE SILICA FRAGS +
107.15 } EPIDOTE WORM-FRACT.
} MED. GREEN WITH 3% MAGNETIC FE-CLAY WISPS + EPIDOTE WORMS
107.80
107.96 DARK PURPLE WITH 1cm BLEACHED ALT. RIND
107.99
SPECIMEN (108.15-.31)¼ } BEDDED PYRITE, CHALCO + SILICA CEMENT; WITH < 1cm JASPER LAPILLI IN BARITE BED AT BOTTOM
108.31 SPECIMEN (108.25-.48)¼ } BARITE + PYRITE LAMINATIONS WITH JASPER LAPILLI + QZ PEBBLE
108.53
SPECIMEN (108.81-109.32)¼ } "SEMI-BLACK" WITH 10% BARITE AS WISPS + ELONGATED LAPILLI-PEBBLES + 10% QZ PEBBLES
MASSIVE SULPHIDE
109.35

FISSILE
QUARTZ-SERICITE-PYRITE FOLIATED TUFF
111.28
112.20 } FISSILE
112.78 WHITE CLAY + SERICITE + MINOR LIMONITE
112.96
} FISSILE
113.23 3cm of 20% CHALCO
113.96 1cm of 20% CHALCO
SPECIMEN (113.96-114.12)¼
114.50
SPECIMEN (115.39-.54)¼
WITH 70% LARGE (15X40 mm) PALE GREY TUFF FRAGS SO LOOKS SCALY
SPECIMEN (116.30-.32)¼
SPECIMEN (116.48-.58)¼

	SAMPLE INTERVAL	Assay result						SAMPLE NUMBERS
		Cd % Cu %	Pb % Zn %	Ga % Au OPT	Ag OPT	Ba %	Fe %	
106.96	1.00	.01	.39	–	.01	.91	>3.22	6001
	.32	2.52	.07	.036	1.84	3.99	34.47	6002
108.31	.50	.01 .87	.94	.004 .044	.54	23.39	11.12	6003
108.81	.54	.03 2.24	.06 5.19	.003 .040	2.49	12.78	22.31	6004
109.35	.81	.11	.71	.001	.08	.60	9.47	6005
110.16	1.12	.01	.30	.001	.03	.44	3.40	6006
111.28	.92	.01	.23	.001	.05	.30	6.59	6007
112.20	.58	.04	:10	.001	.05	.36	7.53	6008
112.78				NOT SAMPLED				
112.96	1.00	.26	.04	.001	.10	.38	13.41	6009
113.96	1.00	.58	.05	.001	.07	.28	12.73	6010
114.96	.85	.11	.30	.001	.03	.16	12.38	6011
115.81	1.05	.09	.03	.001	.06	.46	11.72	6012
116.36								6013

Hole No. F86S-1.

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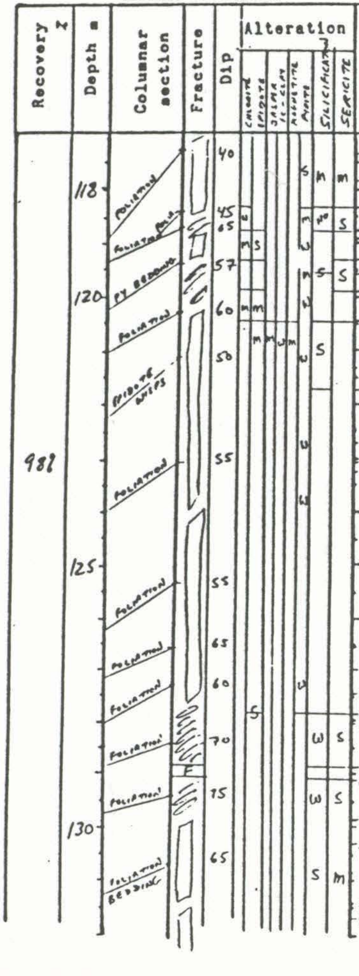

Rock Description (VOLUME PERCENTS)

SPECIMEN (117.42-.68)¼
SPECIMEN (117.68-.96)¼
QUARTZ-SERICITE-PYRITE FOLIATED TUFF
118.38
118.87 } SLUMPED, FISSILE Q-S-P INTERBEDDED WITH GREENTUFF 118.50-.52 AND 118.63-.83
118.94
STRONG EPIDOTE ALT. of BASALT BLOCK OR GREENTUFF
60% SWIRLY EPIDOTE; 30% DARK GREEN, 10% SILICA + <1% PY
119.36
119.53 } SLUMPED FISSILE Q-S-P WITH GREENTUFF 119.49-.53
119.90
QUARTZ-SERICITE-PYRITE F. TUFF
4cm WHITE QZ + DARK CHLORITE MOBILIZED: 5cm GREENTUFF WITH DARK CHLORITE FOLIATED
3cm PALE GREEN FOLIATED TUFF INTERBEDDED (40° CONTACT); 33 cm. " " "
12cm CREME FRAG
120.47
GREY SILICEOUS (CRYSTAL?) TUFF
SPECIMEN (121.40-.48) WITH RED-FE-CLAY PY, + MAGNETITE
WITH EPIDOTE + WHITE QZ INJECTIONS
5% EPIDOTE WISPS DEFINE FOLIATION
<3% JASPER FRAGS WITH EPIDOTE + <1% DISSEM. MAGNETITE
121.66
SPECIMEN (122.60-.66)½
SPECIMEN (123.09-.16) PINK CLAY
123.20 DISSEM. PY IN HAIRLINE FRACT.

SULPHIDE LAPILLI TUFF
FOLIATED, DARK PURPLE
WITH 5% PALE PLAG FRAGS (2-10 mm)
<2% FINE DISSEM. MAGNETITE
+ FREQUENT PINK CLAY ON FRACTURES

SPECIMEN (126.54-.62)½ PINK CLAY
127.48 1cm MAGNETITE + HEMATITE BED
127.83 2cm. EPIDOTE RIND AT CONTACT, BLEACHED
128.03 } 10% PALE EPIDOTE WISPS; SLUMPED + CRENULATED
} FISSILE GRADUALLY FOLIATION
QUARTZ-SERICITE-PYRITE F. TUFF
75% WHITE + PALE GREY FLATTENED TUFF FRAGS (10-30 mm)
128.90
129.08 FAULT BRECCIA; WHITE CLAY GOUGE
} FISSILE
129.82
SPECIMEN (130.39-.60)
QUARTZ-SERICITE-PYRITE
FOLIATED TUFF
WITH 30% LARGE (10-30 mm) GREY TUFF FRAGS.
> 30% SULPHIDES (AVE.)
(PYRITE IS CONCORDANT WITH BEDDING)
(CHALCO IS DISCORDANT)
SPECIMEN (131.40-.48)¼
SPECIMEN (131.66-.73)¼

	SAMPLE INTERVAL	Assay result						SAMPLE NUMBERS
		Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	
	.79	.25	.11	.001	.08	.45	18.61	6013
117.68	.70	.43	.07	.001	.07	.25	7.65	6014
118.38	.56	.44	.67	.007	.21	2.60	>8.11	6015
118.94	.42	.07	.04	–	.05	1.12	>4.83	6016
119.36	.55	.29	.01	.001	.18	2.55	7.19	6017
119.90	.57	.05	.11	.001	.05	.28	>8.13	6028
120.47	1.00	.00	.08	–	.01	1.47	>2.94	6029
121.47	1.00	.00	.17	–	.02	1.34	>2.70	6030
122.47								
126.83	1.00	.00	.48	–	.23	4.14	>2.99	6031
127.83	1.02	.81	1.09	.001	.37	4.43	3.26	6018
128.90				NOT	SAMPLED			
129.08	.80	.98	.19	.001	.16	4.91	9.96	6019
129.82	1.00	2.14	.16	.001	.31	3.96	21.31	6020
130.82	1.11	1.67	.14	.001	.44	2.96	18.72	6021
131.99								

Hole No. F86S-1.

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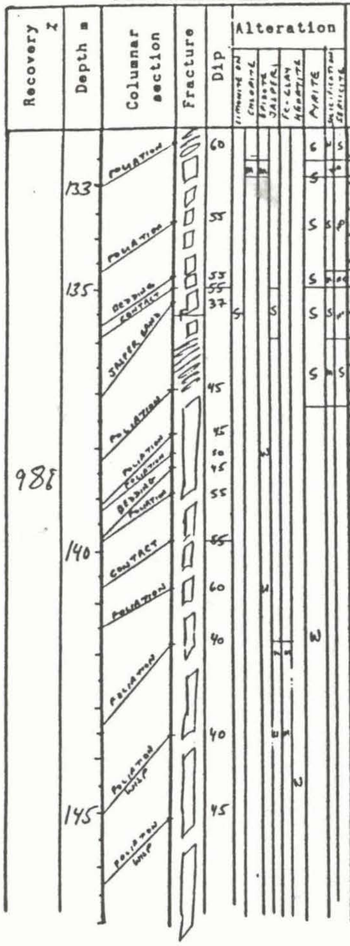

Rock Description (VOLUME PERCENTS)

- 132.56 3mm RIND — BASALT BLOCK MASSIVE NOT FOLIATED — 132.56
- 132.89 30mm RIND: PY SUBPG (2-5mm) — COARSE GRAINS OF EPIDOTE 60% + DARK CHLORITE 40% — 132.89

SLUMPING SOFT-SED. DEFORMATION

QUARTZ - SERICITE - PYRITE FOLIATED TUFF — 133.69

>30% SULPHIDES (AVE.)

- 134.69 SPECIMEN (134.84-135.00)¼ MASSIVE BEDDED PYRITE; 3% QZ LAPILLI (55°, 45° + 50° ∠ TO CORE) — 134.69
- 135.00 — 135.00

QUARTZ - SULPHIDE TUFF WITH 1-2mm JASPER BANDS

- 3cm ZONE LIMONITE ON FRACT.
- 136.00 — 136.00

QUARTZ - SERICITE - PYRITE FOLIATED TUFF

FISSILE WITH 9% PALE EPIDOTE WISPS

FROM SPILLED BOX

- 137.25 — 137.25
- SPECIMEN (137.5-.6) 35cm BASALT BLOCK
- SPECIMEN (137.85-.87) 30cm FOLIATED GREEN TUFF WITH 5% DARK CHLORITE LITS FOLIATED (2-8mm LONG) + FINE-GRAINED, PALE GREEN GROUNDMASS
- 60cm "SALT + PEPPER" MED-GRAINED FOLIATED GREEN TUFF (CHLORITE, EPIDOTE, SILICA)
- SPECIMEN (138.50-.59) 20cm FINE-BEDDED MISCELLANEOUS TUFF
- SPECIMEN (139.00-.10) 90cm "SALT + PEPPER" GREEN TUFF WITH 20cm PURPLE INTERBED 139.30-.50
- SPECIMEN (139.50-.55)½ GRADES BACK TO "SALT + PEPPER" GREEN TUFF
- SPECIMEN (139.90-140.00)½ DARK PURPLE + GREEN TUFF: PURPLISH FE-CLAY FRAG!
- 140.00

FROM SPILLED BOX

20cm OF PURPLE FOLIATED LITHIC TUFF

- SPECIMEN (140.60-.65)½ WACKY WITH SOME YELLOW FLATTENED FRAGS

80% PURPLE
20% PALE GREEN FRAGS

FOLIATED PURPLE + GREEN LITHIC TUFF

- 141.65 GREEN WITH PURPLE FRAGS GRADES TO
- 141.65
- SPECIMEN (141.90-.94)½ WACKY 0-7% JASPER-FE-CLAY FRAG-WISPS
- 142.05

3% PALE BROWN

BROWNISH-GREEN SILICEOUS FOLIATED TUFF WITH FE-CLAY WISPS + BANDS

WISP-COMPONENT

(SOMEWHAT UNIFORM NOT VERY FRAGMENTAL)

- SPECIMEN (143.40-.51)½ JASPER-FE-CLAY
- SPECIMEN (144.35-.42) HEMATITE WITH THE FE-CLAY,
- SPECIMEN (145.00-.08) BLACK & RED FE-CLAY WISPS
- SPECIMEN (145.31-.42)½ ZONE WITH ≤1% BLACK NON-MAGNETIC GRAINS — 5-7% PALE BROWN (ROCK IS PALER)
- SPECIMEN (146.25-.40)
- 146.85 — 1% PALE BROWN (SEE NEXT PAGE)

SAMPLE INTERVAL	Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
.57	.86	.10	.001	.29	2.91	15.22	602
.33	.02	.03	–	.00	2.08	>5.16	603
.80	1.34	.13	.001	.39	1.75	21.01	602
1.00	1.17	.09	.001	.38	3.06	23.92	602
.31	.44	.25	.001	.08	.46	8.80	602
1.00	2.46	.14	.001	1.21	1.26	32.93	602
1.25	1.22	.30	.003	.29	.37	3.81	602

SPEC. 145.31 LOOKS LIKE HOLE 7

DRILL AND ASSAY LOG OF MINERALIZED PORTION OF DIAMOND DRILL HOLE F86S-2

Hole No. F86S-2.

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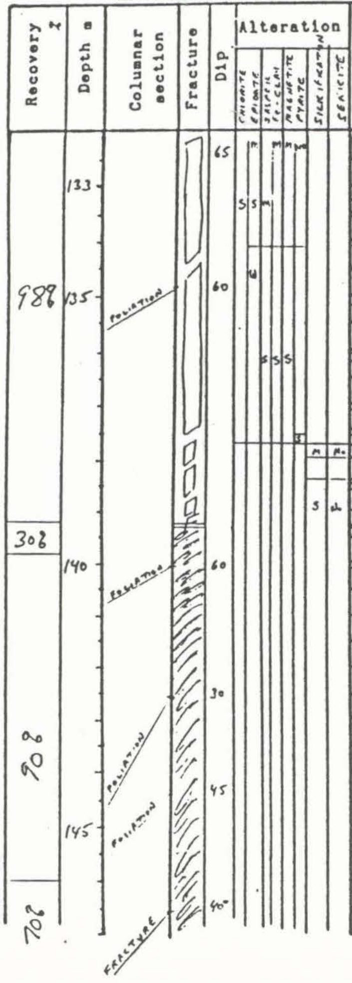


Rock Description (VOLUME PERCENT:)

20% EPIDOTE, PALE PURPLISH GREEN
5% FE-CLAY

- 132.50

LESS TO NO (BLACK) FE-CLAY

FOLIATED GREEN WISPS + EYES TUFF

- 133.25-.64 CREME FRAG WITH JASPER
- SPECIMEN (133.57-.64) + CHIP

GREENER

- 134.05
- 135,16 3mm BED OF RED FE-CLAY + MAGNETITE

SULPHIDE LAPILLI TUFF

FOLIATED
DISSEM + BEDDED MAG.

- SPECIMEN (136.06-.33)½ PINK-CLAY ON FRACTURE SURFACE
- 136.26 2-3 cm SLUMPED BED OF MAGNETITE + FE-CLAY WITH 1cm WHITE QZ + JASPER BELOW (PROF. S.)

GREEN WITH 7% WHITE PLAG + SILICA FRAGS (1-7mm)

136.80

- 137.10

DARK PURPLE (NO WHITE FRAGS)

- 137.65 PY FRAGS 3-8mm — 2cm ALTERATION RIND
- 137.80 — 137.80
- SPECIMEN (137.80-.90) BEDDED PYRITE, CHALCO + SILICA CEMENT
- 138.00 — 138.00
- BARITE + SULPHIDE LAPILLI TUFF
- 138.40 — 138.40
- SPECIMEN (138.37-.44)¼ "SEMI-BLACK" WITH 20% BARITE (AS WISPS + ELONGATED LAPILLI-PEBBLES) AND 20% QZ PEBBLES

MASSIVE SULPHIDE
SLUMP STRUCTURES

- 139.30-.35 GOUGE — 139.30
- 140.10 50° LINEATION ON FOLIATION SURFACE — 30% GREY G-S-P F. TUFF
- 15% GREY G-S-P F. TUFF

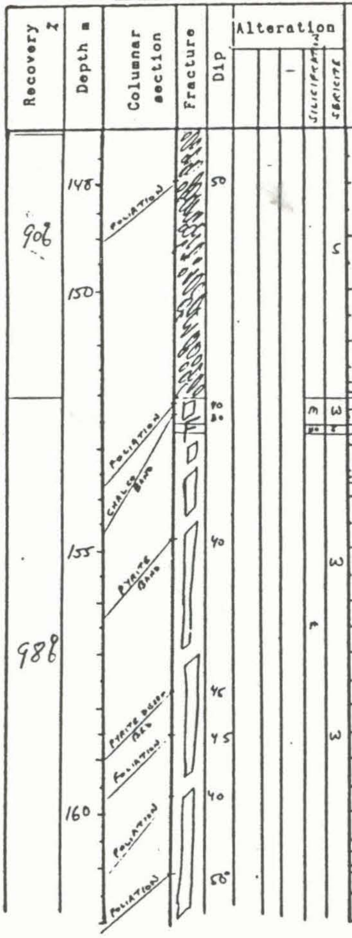
VERY FISSILE GREEN TUFF
(CHLORITE - SERICITE TUFF)
(3% PY)

143.10

- 146.58 2mm SERICITIC FRACTURE

SAMPLE INTERVAL	Cd % Cu %	Zn %	Ga % Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
1.00	.03	.80	.006	.04	1.21	4.11	6051
.20	.62	.12	.024	1.34	3.38	28.91	6052
.40	.02	.10	.047	1.45	>9.99	4.21	6053
.90	.07 .38	12.61	.004 .179	1.57	14.79	9.79	6054
3.80	.01	.05	.001	.01	.73	>3.62	6055-6058
4.00	.00	.02	.000	.00	.39	>4.15	6059-6062

Hole No. F865-2 .



Rock Description (VOLUME PERCENTS)

VERY FISSILE GREEN TUFF
(CHLORITE - SERICITE TUFF)
(3% PY)

151.80 }
152.10 } 30% GREY Q-S-P F. TUFF WITH PYRITE CUBES (≤3%) AND FINE CHALCO (≤1%) ON FOLIATION SURFACES

SPECIMEN (152.10-.23) 1/4
SPECIMEN (152.30-.42) 1/4 } "SCALY" WITH 3% CHALCO BANDS

152.60 CLAY GOUGE & BROKEN Q-S-P GRITTY (LIKE IN HOLES U-1, U-3)
153.75 } "SCALY"

153.65
153.75 } SOFT, FOLIATED, 7% CHALCO

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF

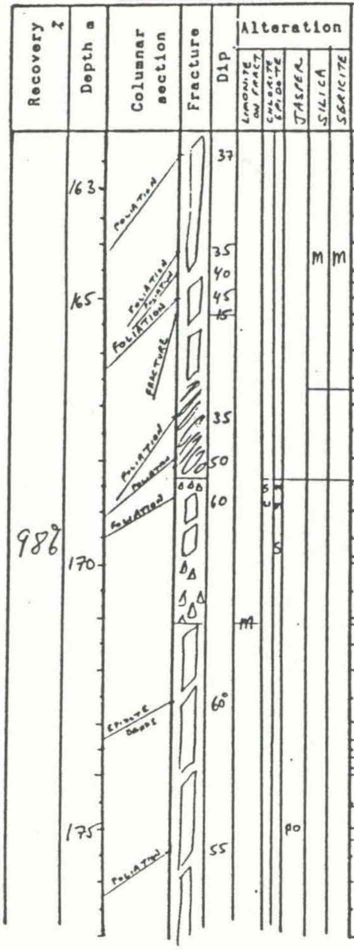
>30% SULPHIDES (154.75 - 156.75)

160.75
161.10: 25° LINEATION ON FOLIATION SURFACE } SOME CRENULATION + SLUMPING

	SAMPLE INTERVAL	Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
147.10 – 152.10	5.00	.03	.03	.000	.01	.40	>2.42	6063 - 6067
152.10 – 152.60	.50	1.61	.44	.001	.05	.11	8.14	6068
152.60 – 152.75		NOT	SAMPLED					
152.75 – 153.75	1.00	1.61	.07	.003	.03	.18	8.51	6069
153.75 – 154.75	1.00	.63	.02	.001	.01	.26	8.10	6070
154.75 – 155.75	1.00	.93	.13	.012	.02	.29	13.60	6071
155.75 – 156.75	1.00	.91	.37	.004	.04	.80	15.60	6072
156.75 – 157.75	1.00	.17	.08	.003	.01	.36	>9.69	6073
157.75 – 158.75	1.00	.15	.09	.002	.01	.17	>4.04	6074
158.75 – 159.75	1.00	.14	.03	.001	.01	.14	>5.11	6075
159.75 – 160.75	1.00	.33	.13	.004	.05	.27	>7.71	6076
160.75 – 161.75	1.00	.08	.07	.003	.02	.32	>6.69	6077

6078

Hole No. F865-2 .



Rock Description (VOLUME PERCENTS

162.75 } SOME CRENULATION SLUMPING

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF
(FINE + ORDERLY FOLIATION)

164.95 TOP 30° LINEATION ON FOLIATION SURFACE
165.35 FRACTURE 15° ∠ to core
} 5% SILICEOUS FRAGS (1cm) AS EYES IN FOLIATION

166.75 } SOFT, FISSILE, SLUMPING
N% OPAQUE PALE GREY PUMICE FRAGS
<1% EPIDOTE + GREEN PUMICE FRAGS

168.45 BROKEN PIECE OF FOLIATED GREEN TUFF WITH DARK CHLORITE EYES (2mm)

BASALT BLOCK UNIFORM NOT FOLIATED
FINE (<<1mm) GRAINS: EPIDOTE (40%) + DARK CHLORITE (60%)
WITH RANDOMLY ORIENTED EPIDOTE WISPS + ZONES

SPECIMEN (169.83-.85)

171.10 LIMONITE ON FRACTURES
171.50 } < 2% WHITE SPECKLES (LIKE IN HOLE 5) 2-7mm.
SPECIMEN (173.30-.43) 1/2
SPECIMEN (173.71-.80) 1/2

173.80
SPECIMEN (173.80-.89) 1/2 } GREEN WITH PALE PURPLE FRAGS. (2-20mm)
174.53 SPECIMEN (174.40-.65)

SPECIMEN 175.14-.24 WITH DARK RED-PURPLE FRAGS

FOLIATED PURPLE + GREEN
LITHIC TUFFS
WITH APPLE GREEN (2-30mm) FRAGS
AND DARK RED-PURPLE (2-5mm) FRAGS
AND <1% TINY (<<1mm) BRIGHT WHITE SPECKS

	SAMPLE INTERVAL	Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
161.75 – 162.75	1.00	.28	.38	.005	.08	.42	>7.40	6078
162.75 – 163.75	1.00	.13	.04	.003	.02	.25	>9.46	6079
163.75 – 164.75	1.00	.15	.03	.003	.03	.42	>8.89	6080
164.75 – 165.75	1.00	.20	.04	.003	.03	.24	>8.26	6081
165.75 – 166.75	1.00	.10	.11	.003	.01	.09	>6.56	6082
166.75 – 167.64	.89	.02	.03	.002	.01	.08	>3.82	6083
167.64 – 168.45	.81	.35	.07	.003	.03	.11	>5.23	6084
168.45 – 169.45	1.00	.03	.03	.000	.02	.01	>6.55	6085

≈ LIKE IN HOLE 3 at 117.25 - 119.21 m

LIKE IN HOLE 4 at 104.05 - 111.56 m
LIKE IN HOLE 7

Hole No. F86S-3 .

DRILL AND ASSAY LOG OF MINERALIZED PORTION
OF DIAMOND DRILL HOLE F86S-3

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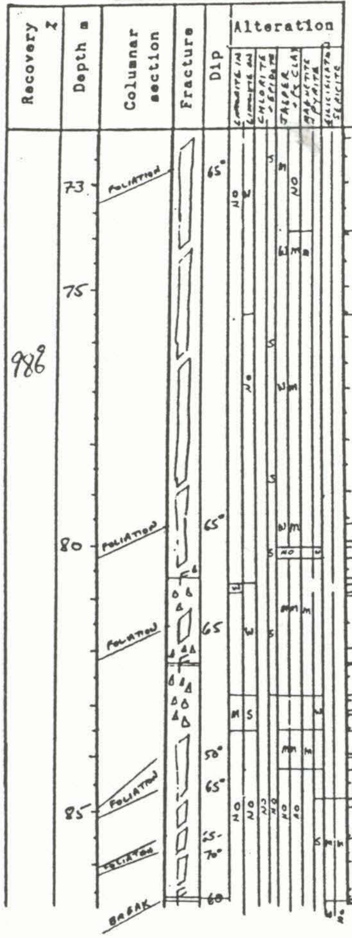

Rock Description (VOLUME PERCENT)

- SPECIMEN (72.10-.19)

FOLIATED WISPS AND EYES
TUFF

- 73.95 DARKER GREEN COLOUR
AND Fe-CLAY DARK RED-BLACK WISPS 3-5% ROCK
WITH MAGNETITE

- SPECIMEN (75.52-.59)

SOMETIMES MORE EPIDOTE
SOMETIMES MORE Fe-CLAY

GRADES TO GREYISH COLOUR
WITH EPIDOTE BITS

- SPECIMEN (79.63-.74) EXHIBITS MORE Fe-CLAY

- 80.10 / 80.25 SPECIMEN (80.15-.21) PYRITE ON FOLIATION SURFACES: NO Fe-CLAY

- 80.70-.72 GREEN GOUGE BITS
- 80.79 SHATTERED TEXTURE + WEAK LIMONITE STAIN 80.79-.95

GREYISH-PURPLISH-GREENISH FOLIATED
SULPHIDE LAPILLI TUFF 81.85
WITH 15% PALE-EPIDOTE SUBANGULAR FRAGS (2-3mm)
FINE MATRIX HAS 5% JASPER BITS + Fe-CLAY
2% MAGNETITE 82.85

- 81.25-.28 GREEN-GRAY CLAY GOUGE
SPECIMEN (81.30-.38)
- 82.85
- Q-S-P & H. WITH <<1% N
- 83.52

ZONE of BLEACHING LIMONITIC STAIN
BRIGHT YELLOW POWDER, <<1% FUCHSITE! 83.52

- SPECIMEN (84.08-.29)¼
- 84.29

FOLIATED SULPHIDE LAPILLI TUFF
5% PY; 3% JASPER + Fe-CLAY 1% MAGNETITE
<<1% FUCHSITE AT BOTTOM 84.29

SPECIMEN (84.32-.78)¼
ALTERATION RIND, BLEACHED (WITH 1% PALE BLUE Qz BITS) 84.83
- 84.83

- SPECIMEN (85.51-.69)¼

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF 85.83
WITH 3% DISSEM. PYRITE
5% CHALCO BLEBS ON FOLIATION SURF.

- 86.79-.82 GOUGE 86.82

SPECIMEN (86.89-87.16)¼ MASSIVE SULPHIDE

HORIZON IN HOLE 4 75.77-76.40 m.

SAMPLE INTERVAL	Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
1.00	.00	.06	.000	.11	.83	>2.84	6101
.67	.09	>4.39	.000	.34	>4.28	> .74	6102
.77	.00	.72	—	.02	1.54	>2.68	6103
.54	.09	1.74	—	.16	2.19	>1.84	6104
1.00	1.46	1.23	.001	.31	.68	2.45	6105
.99	1.30	.42	.001	.15	.39	4.34	6106
.68	2.15	.15	.014	.57	.20	38.38	6107

Hole No. F86S-3 .

DIAMOND DRILL RECORD

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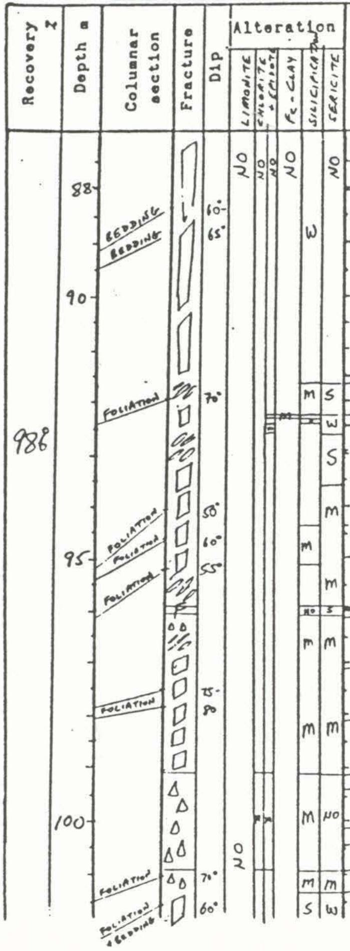

Rock Description (VOLUME PERCENT)

MASSIVE SULPHIDE 87.50

- SPECIMEN (88.06-.28)¼

FINELY BEDDED PYRITE GRAINS
WITH SILICA + CHALCO CEMENT 88.50

5% WHITE SILICEOUS LAPILLI
(SOMETIMES WITH BORNITE) 89.50

90.50

- 91.50 SPECIMEN (91.33-.68)¼ WITH WHITE SILICEOUS TUFF + 5% BORNITE 91.50
- 91.68 91.68

- 92.31 3cm GREEN + Fe-CLAY BANDS; WHITE STRINGER QZ (BARITE?) 92.37
- 92.50 YELLOW EPIDOTE WISPS + BRIGHT YELLOW (CLAY?) LINE S-S, 1cm
- 92.96-93.00 MASSIVE PYRITE

(TELL TOPS: UPSIDE-DOWN) 93.37
>30% SULPHIDES (AVE.)

- 94.37

QUARTZ - SERICITE -
PYRITE
FOLIATED TUFF 94.37

95.12

- 95.97 / 96.12 GREY GOUGE BROKEN BITS 95.97 / 96.12

- 97.00 / 97.12 MASSIVE PYRITE 97.12

98.12
- 98.12 GREY SERICITE ON FOLIATION SURFACES

- 99.12 99.12

BASALT BLOCK UNIFORM NOT FOLIATED

- 99.32 CHALCO + BORNITE AT QZ-FILLED FRACTURE
COARSE (1-4mm) GRAINS OF
PALE EPIDOTE (60%) + DARK CHLORITE (40%)
- 100.12
- SPECIMEN (100.47-.55)¼
(LIKE HOLE S-4 SAMPLE 6175)

- 100.92 100.92
FISSILE
- 101.33 101.33

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF
>30% SULPHIDES (AVE.)

SAMPLE INTERVALS	Cd% Cu %	Pb% Zn %	Ga% Au OPT	Ag OPT	Ba. %	Fe %	SAMPLE NUMBERS
.68	2.15	.15	.014	.57	.20	38.38	6107
1.00	1.53	.07	.010	.54	.51	37.61	6108
1.00	1.62	.05	.010	.71	.26	38.35	6109
1.00	3.39	.15	.018	1.35	.17	37.50	6110
1.00	2.52	.05	.022	.96	.02	37.98	6111
.18	3.31	.06	.026	2.46	2.14	28.89	6112
.69	1.15	.21	.005	.49	5.49	17.38	6113
1.00	.34	1.94	.036	.51	15.70	9.39	6114
1.00	.64	1.65	.011	.60	1.18	11.92	6115
.75	.22	.30	.002	.09	.45	8.17	6116
.85	.11	.24	.002	.06	.45	13.30	6117
		NOT		SAMPLED			
1.00	.02	.01	.001	.02	.27	14.81	6118
1.00	.02	.30	.001	.03	.28	8.49	6119
1.00	.03	.14	.001	.03	.46	8.13	6120
1.80	.03	.09	.000	.01	.05	4.74	6121, 6122
.41	.97	1.25	.006	.11	1.11	11.83	6123
1.00	.02 .60	.38 3.84	.001 .007	.28	6.25	22.45	6124

Hole No. F865-3.

Recovery %	Depth m	Columnar section	Fracture	Dip	Alteration				Rock Description (VOLUME PERCENT)	SAMPLE INTERVAL	Assay result						SAMPLE NUMBERS
					EPIDOTE	CHLORITE	SILICIFICATION	SERICITE			Cd % Cu %	Pb % Zn %	Co % Au OPT	Ag OPT	Ba %	Fe %	
98%	103	FOLIATION + BEDDING		60°			S	NO	QUARTZ - SERICITE - PYRITE FOLIATED TUFF >35% SULPHIDES (AVE) 102.33	1.00	.12 .60	.38 3.84	.001 .007	.28	6.25	22.45	6124
									-103.33	1.00	1.15	.19 .78	.004	.08	1.05	13.42	6125
NONE	105		VOID						VOID STOPE FROM SILVER CUTE No 1 LEVEL		VOID						
40%								m	-105.46 -106.00 } 27 cm. of Q-S-P.F. TUFF; REST IS GROUND PEBBLES of Q-S-P + GREEN TUFF	.54	.01 2.73	.11 2.35	.003 .013	1.10	2.93	20.58	6126
90%		FOLIATION OR BEDDING		70°			S	W	QUARTZ - SERICITE - PYRITE FOLIATED TUFF >25% SULPHIDES -107.00	1.00	.73	.23	.005	.13	1.25	20.88	6127
								NO	BRITE QZ STRINGER ZONE 107.70-.20 MASSIVE SULPHIDE 108.00	1.00	1.16	.09 .36	.008	.18	2.48	28.28	6128
									-108.00 SPECIMEN (108.56-.76)¼ FINELY-BEDDED PYRITE GRAINS WITH SILICA + CHALCO 109.00	1.00	.59	.24	.014	.08	1.56	34.76	6129
	110	FOLIATION OR BEDDING		65-70°					-109.00. SPECIMEN (109.81-110.00)¼ 20% LITHIC CLASTS: ELONGATED LAPILLI-PEBBLE SILICEOUS 5% FRACTURED PYRITE LAPILLI IN BEDS 110.00	1.00	1.81	.08 .16	.006	.06	.18	26.42	6130
								W	-110.00 QZ FRAG 110.48-.60 111.00	1.00	.70	.25	.007	.03	.60	13.92	6131
									-111.00 QUARTZ - SERICITE - PYRITE FOLIATED TUFF 112.00	1.00	.07	.18	.002	.02	.70	15.42	6132
		FOLIATION		50-65°			m	M	-112.00 } FISSILE SLUMP STRUCTURES: SUGGEST RIGHT-SIDE-UP 113.00	1.00	.13	.10	.001	.01	.34	12.97	6133
		FOLIATION		60°					-113.00 -113.25  TOP 40°L LINEATION ON FOLIATION SURFACE >35% SULPHIDES 114.00	1.00	.07	.25	.001	.02	.28	21 30	6134
		FOLIATION		65°	M	M	w	no	-114.00 BASALT CLOCK? DARK CHLORITE FLATTENED BITS WITH WHITE QZ + DARK CHLORITE INJECTIONS (LIKE HOLE S-4 AT SAMPLE 6178) 114.69	.69	.01	.11	—	.00	.17	5.93	6135
	115	FOLIATION		60°			m	m	-114.69 } WITH 3% EPIDOTE-GREEN TUFF SLUMP STRUCTURES: SUGGEST RIGHT-SIDE-UP 115.97	1.28	.08	.17	.001	.04	.12	8.87	6136
									-115.97	1.28	.01	.05	.001	.03	.16	5.74	6137

Hole No. F865-3.

Recovery %	Depth m	Columnar section	Fracture	Dip	Alteration						Rock Description (VOLUME PERCENT)	SAMPLE INTERVAL	Assay result						SAMPLE NUMBERS
					LIMONITE IN	LIMONITE ON	CHLORITE EPIDOTE	JASPER	SILICIFICATION	SERICITE			Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	
											-117.25 Q-S-P FOLIATED TUFF (WITH 3% EPIDOTE-GREEN) 117.25	1.28	.01	.05	.001	.03	.16	5.74	6137
50%	118	FOLIATION	Δ	60			m				SPECIMEN (117.65-.79) FOLIATED PURPLE + GREEN LITHIC TUFF WITH GREEN MATRIX + 10% PALE-PURPLE FRAGS. SLUMP STRUCTURES (HOLE S-4 at 104.05-.60 m) -119.28 119.18	1.93	.00	.03	.000	.04	.63	>1.80	6138
25%	120	FOLIATION	Δ	55			W		W	W	QUARTZ - SERICITE - PYRITE FOLIATED TUFF WITH 20% PALE GREEN TUFF 4% PYRITE GRADES TO EPIDOTE-YELLOW TUFF 121.92	2.74	.00	.09	.001	.05	.67	>3.07	6139
65%		FOLIATION	Δ	50				m			-122.55 } 40% EPIDOTE-YELLOW TUFF WITH 1% JASPER + 1% PYRITE SLUMP STRUCTURES SUGGEST RIGHT-SIDE-UP -123.44 123.44	1.52	.00	.06	.002	.08	.56	>2.60	6140
29%		FOLIATION		60							} 60% EPIDOTE-YELLOW TUFF -124.97 124.97	1.53	.00	.03	.001	.05	.34	>2.43	6141
23%	125	FOLIATION		55			W				} PALE GREEN (WEAKLY FOLIATED) WITH <1% PY WITH MINOR JASPER FRAGS. (4x15mm) -127.71 127.71	2.74	.02	.02	.000	.02	.18	>2.86	6142
86%		FOLIATION		40	m	m				M	WEAK FOLIATION DACITIC TUFF (UNFOLIATED) PALE - MEDIUM GREEN WITH LIMONITE STAIN NOT FOLIATED, VUGGY, <5% PY ON FRACTURES, <1% NATIVE Cu (DISSEM + IN QZ FILLINGS) 129.54	1.83	.11	.03	.000	.01	.06	>3.07	6143
93%	130										-129.54 SPECIMEN (129.54-.65) SPECIMEN (129.92-130.15) WITH NATIVE Cu (HOLE S-4, 114.66 - END) -131.06 131.06	1.52	.04	.05	—	.01	.03	262	6144

END of HOLE

Hole No. F86S-4 .

DRILL AND ASSAY LOG OF MINERALIZED PORTION OF DIAMOND DRILL HOLE F86S-4

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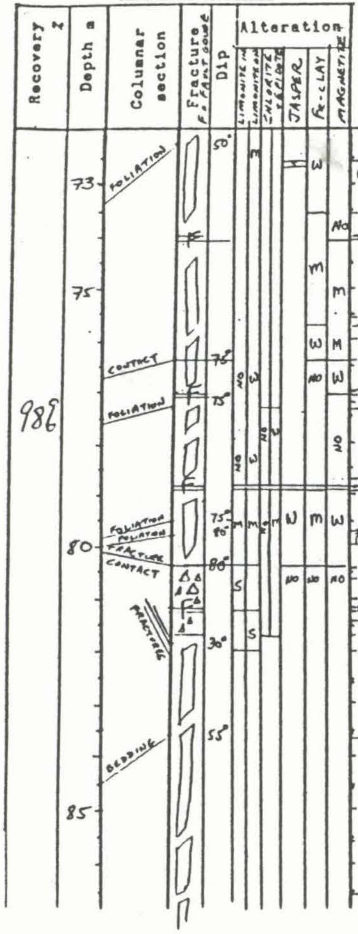

Rock Description (VOLUME PERCENTS)

- SPECIMEN INCLUDES 2x2mm JASPER FRAGS (72.56-.66)

FOLIATED WISPS AND EYES TUFF

- 73.57 } WITH 3% DARK RED-BLACK Fe-CLAY WISPS
- CLAY GOUGE + BROKEN BITS (74.00-74.10)

"SULPHIDE LAPILLI TUFF"
} WITH 20% DARK RED-BLACK Fe-CLAY WISPS 2% FINE, DISSEM. MAGNETITE

- SPECIMEN (75.59-.67)
- 75.77
- SPECIMEN (76.00-.07) } GRADATIONAL LOSS of Fe-CLAY + PINKISH-GREY SILICEOUS FRAGS. PALE APPLE-GREEN FRAGS INCREASE
- 76.40
- SPECIMEN (76.39-.52) } GREY-GREENISH FOLIATED TUFF <1% MAGNETITE DARK CHLORITE + WHITE QZ INJECTIONS [A FALLEN BLOCK?]
- 77.10 BROKEN BITS SPECIMEN (77.27-.35) PALE GREEN ALTERATION RIND (?) DARK CHLORITE + WHITE QZ INJECT.
- 77.42

HOMOGENEOUS GREEN TUFF GRADES TO 3% DISTINCT PALE SPECKLES 3-7mm

- SPECIMEN (78.70-.77) GREEN GOUGE (78.85-.95)
- 78.95

"SULPHIDE LAPILLI TUFF"
PITTED + VUGGY 1% MAGNETITE
DARK GREY-PURPLISH-BROWN 3% Fe CLAY + JASPER

- SPECIMEN (79.70-.80)
- 80.45 } ALTERATION RIND, BLEACHED PYRITIZED
- 80.65

QUARTZ-SERICITE-PYRITE FOLIATED TUFF

- ~~81.19-.26 FAULT GOUGE, LIMONITIC (IN SURFACE)~~
- 81.40 } 50% WHITE CLAY, SERICITE, LIMONITIC STAIN
- 81.70 }
- 82.00 } LIMONITE IN FRACTURES (5mm THICK)
- 82.55

MASSIVE SULPHIDE
FINELY BEDDED PYRITE GRAINS WITH SILICA + CHALCO CEMENT

- SPECIMEN (83.64-.83)¼
- 84.55

5% WHITE SILICEOUS LAPILLI SOMETIMES WITH MINOR BORNITE

- 85.55
- 86.55
- SPECIMEN (86.55-.74)¼ WITH BORNITE SHOW

QUARTZ-SERICITE PYRITE FOLIATED TUFF >30% SULPHIDES

Sample interval depths: 78.95, 80.45, 80.65, 81.70, 82.55, 83.55, 84.55, 85.55, 86.55

HORIZON IN HOLE 3 30.10-25m.

SAMPLE INTERVAL	Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
1.00	.01	.22	—	.01	.66	1.78	6151
.20	.05	.59	—	.02	1.66	1.34	6152
1.05	2.47	.04	.005	.44	.35	17.64	6153
.85	2.52	.07	.020	1.61	.14	36.32	6154
1.00	3.69	.13	.018	1.56	.16	34.92	6155
1.00	2.63	.04	.038	1.37	.02	37.13	6156
1.00	2.25	.05	.016	.93	.04	38.80	6157
1.00	4.05	.06	.028	1.71	.20	37.58	6158
.50	1.19	.02	.007	.49	323	21.05	6159

Hole No. F86S-4 .

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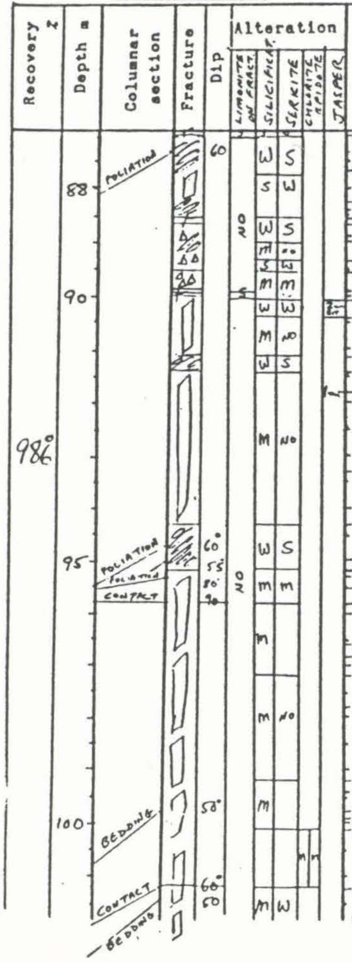

Rock Description (VOLUME PERCENTS)

- 87.05-.07 LIMONITIC, GREY + WHITE GOUGE
- 87.65 } FISSILE } WITH WHITE STRINGER QZ ON FRACTURES

QUARTZ-SERICITE-PYRITE FOLIATED TUFF (>30% SULPHIDES) WITH BARITE

- 88.25 GREY GOUGE
- 88.40 GREY GOUGE
- 88.55-.70 GREY GOUGE } FISSILE
- 88.88-89.00 GREY GOUGE
- 89.35 MASSIVE SULPHIDE: CHALCO CEMENTED PYRITE GRAINS
- 89.55 SILICIFIED + 3% BORNITE GREY GOUGE SLUMP TEXTURES
- 89.90-.92 LIMONITIC GOUGE BASALT BLOCK (LIKE SAMPLE 6175)
- 90.05-.07 LIMONITIC GOUGE
- 90.46 } 4% GREEN TUFF

QUARTZ-SERICITE PYRITE FOLIATED TUFF

- 91.15
- 91.45 } FISSILE
- 91.80 1mm JASPER IN 3mm GREY FRAG
- SPECIMEN (WITH WHITE TUFF + WHITE QZ) (92.52-.83)¼

IRREGULAR FOLIATION WITH SLUMP TEXTURES
(WITH ZONES of QUARTZ-SULPHIDE TUFF)
>30% SULPHIDES

- 94.30 } FISSILE
- 95.20
- SPECIMEN (95.30-.45) SPECIMEN (95.46-.67)¼
- 95.50-.53 SPHALERITE
- 95.80

"BLACK ORE": SPHAL. BEDS (0.5-3cm) SLUMPING, WITH BARITE

- SPECIMEN (96.62-.82)¼
- SPECIMEN (96.82-97.02)¼
- 97.20

BEDDED PYRITE-CHALCO RICH WITH 15% SPHALERITE LAMINATIONS (2-5mm) AND 5% LITHIC CLASTS

MASSIVE SULPHIDES "SEMI-BLACK ORE"

- SPECIMEN (97.94-98.02)¼

MASSIVE SULPHIDES WITH BARITE AND 35% LITHIC CLASTS ELONGATED, LAPILLI-PEBBLE SILICEOUS

- 99.20
- SPECIMEN (99.40-.52)¼
- SPECIMEN (99.81-.91)¼
- SPECIMEN (99.96-100.15)¼

BEDDED PYRITE-CHALCO-RICH WITH 10% SPHALERITE LAMINATIONS (2-7mm)

- 100.15 LITTLE RIND

BASALT BLOCK LIKE IN HOLE S-3 (SAMPLE 6121-22)
HOMOGENEOUS, NOT FOLIATED
1% CREAM ALBO BITS 2mm.
<1% PY + CHALCO ON FRACTURES

- 101.29
- SPECIMEN (101.29-.58)¼

QUARTZ-SERICITE-PYRITE FOLIATED TUFF

Sample interval depths: 87.05, 87.75, 89.00, 89.35, 89.90, 90.45, 91.45, 92.30, 93.30, 94.30, 95.20, 96.20, 97.20, 98.20, 99.20, 100.15, 101.29

SAMPLE INTERVAL	Cd % Cu %	Pb % Zn %	Ga % Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
.70	1.29	1.09	.037	.36	13.59	10.47	6160
1.25	.79	1.49	.015	.31	6.99	10.73	6161
.35	5.62	.60	.027	.71	.76	39.51	6162
.55	1.78	.34	.009	.37	2.32	14.83	6163
.55	1.48	.26	.006	.18	3.57	11.07	6164
1.00	.03 .90	4.64	.003 .015	.91	9.95	10.02	6165
.85	.07 .86	.05 7.35	.007 .039	1.03	3.03	16.92	6166
1.00	.05 .91	.16 4.52	.004 .038	.84	7.27	14.41	6167
1.00	.01 .87	.06 2.19	.003 .059	.28	1.91	11.67	6168
.90	.01 1.61	.79	.002 .006	.07	1.04	21.72	6169
1.00	.05 4.06	.58 9.48	.005 .022	1.72	20.96	14.09	6170
1.00	.07 5.30	.18 11.70	.006 .032	1.13	12.60	24.64	6171
1.00	.02 1.92	3.69	.002 .074	.32	8.73	17.98	6172
1.00	.01 1.94	1.97	.001 .010	.19	1.91	17.74	6173
.95	.03 4.98	.22 6.12	.004 .061	1.46	5.66	34.39	6174
1.14	.07	.11	—	.06	.11	5.01	6175
1.00	.69	.27	.004	.07	1.18	14.80	6176

Hole No. F86S-4.

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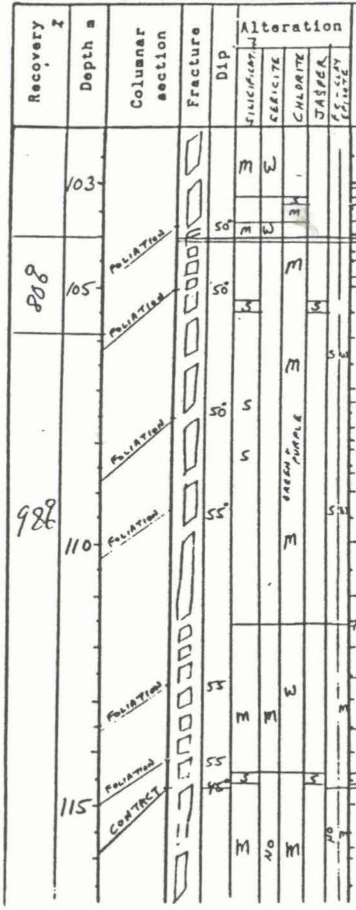

Rock Description
(VOLUME PERCENTS)

102.21

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF

103.20 30° ∠ LINEATION ON FOLIATION SURFACE
103.25 BASALT BLOCK? DARK CHLORITE FLATTENED BITS
103.41 LIKE HOLE S-3 AT SAMPLE 6135

103.25

103.70

104.05 GOUGE + BROKEN BITS

104.05
104.15

SPECIMEN
104.50 PALE GREEN WITH 20% PALE PURPLE FRAGS (SPECIMEN 104.35-.40)
104.75
105.00 SILICIFIED MEDIUM PURPLE WITH JASPER FRAG
(1-3mm WHITE SILICA FRAGS) NO MAGNETITE

105.95

PURPLE + APPLEGREEN FOLIATED
LITHIC TUFF

SPECIMEN (107.26-.29) SILICIFIED WITH TINY BRIGHT WHITE BITS ≪1mm
+ DARK JASPER FRAG

107.60 6mm ROUND EPIDOTE FRAG.

SPECIMEN (108.15-.22)

SPECIMEN (108.60-.63)

- ABOUT 20% PALE-MEDIUM GREEN COMPONENT
- PATCHES of INTENSE FISSILITY
PATCHES of INTENSE SILICIFICATION

111.56 PALE GREEN 111.50-.56 — 111.56

QUARTZ - SERICITE - PYRITE FOLIATED TUFF
FISSILE
WITH APPLE + EPIDOTE GREEN TUFF COMPONENT

112.56
113.56 } 10% GREENTUFF

112.56

113.56

} 30% EPIDOTE-GREENTUFF

114.40 } SILICIFIED WITH JASPER + WHITE QZ VEINS

114.66 — 114.66

(MASSIVE) DACITIC TUFF
PALE-MEDIUM GREEN
LIKE HOLE S-3 (127.71 - END)
NOT FOLIATED, VUGGY, <1% PY ON FRACTURES

115.85 } LIMONITE STAIN IN ROCK + ON FRACTURES

115.66

SAMPLE INTERVAL	Assay result						SAMPLE NUMBERS
	Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	
1.00	.69	.27	.004	.07	1.18	14.80	6176
.96	.05	.13	.002	.04	.90	13.84	6177
.45	.09	.04	.001	.01	.20	6.57	6178
.35	.01	.13	.001	.02	.18	9.99	6179
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6185
1.30	.00	.01	—	.00	.05	1.54	6180
	NOT SAMPLED LIKE IN HOLE 2 at 173.80 - 182.40m						
1.00	.00	.08	—	.06	.60	4.10	6181
1.00	.00	.04	—	.11	.54	5.63	6182
1.10	.00	.05	—	.05	.52	2.54	6183
1.00	.00	.02	.000	.00	.08	2 93	6184

DRILL AND ASSAY LOG OF MINERALIZED PORTION OF DIAMOND DRILL HOLE F86S-5

Hole No. F86S-5.

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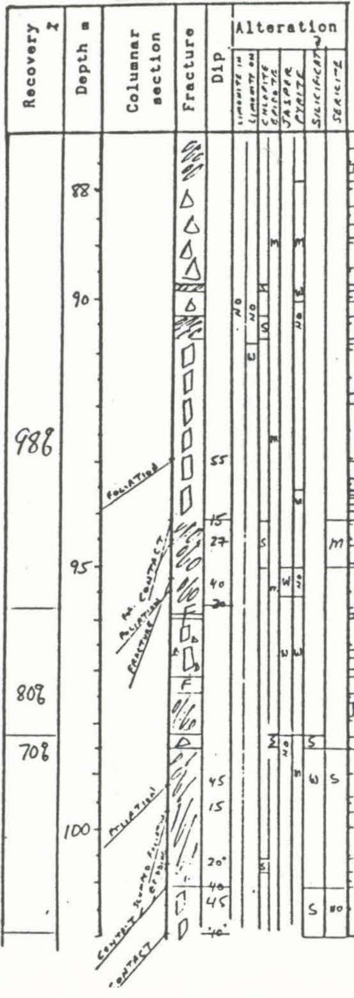

Rock Description
(VOLUME PERCENTS)

87.25 } SPECKLED

CREME FRAG. } CHLORITIC, FISSILE, BROKEN
87.85

CREME FRAG.

LESS CHLORITIC

SPECIMEN (88.95-89.04) WITH SPHALERITE ≪1% IN FRACTURE

89.47 SPHALERITE, FINE IN 1cm. BLEB; PYRITE <1% of ROCK, FINE, IN BLEBS

DARKER, MORE CHLORITIC, FOLIATED
90.10

DARKER, MORE CHLORITIC, FOLIATED
90.90

HOMOGENEOUS MED.-GREEN
(WEAKLY FOLIATED) TUFF

CREME FRAG
SPECIMEN (91.87-.91) WITH MALACHITE STAIN

SPECIMEN (93.05-.10) FINE-GRAINED. FOLIATED

CREME FRAG.
CREME FRAG PYRITE + CHALCO IN WITH GREYISH QZ
CREME FRAG

} FINE-GRAINED

SPECIMEN (94.18-.27) WITH SERICITE? OR TALC?

FISSILE GREEN PUMICE TUFF

94.60-.62 BLEACHED + LIMONITIC ALTERATION ZONE

94.60

GRADES DARKER TO:

} NO PYRITE

95.60

95.70 FRACTURE WITH GOUGE + BROKEN BITS 12mm THICK
CLAY GOUGE 95.95-96.00

SULPHIDE LAPILLI TUFF
<5% PYRITE
2% JASPER FRAGS, ALONE + IN GREY SILICA HALO
SLUMPED, FOLIATION ALMOST PARALLEL TO CORE

96.60 DARK GREEN

96.60

LIGHT GREEN
BROKEN, CLAY GREY-GREEN
DARK GREEN
LIGHT GREEN

98.30 ALTERED BASALT CLOCK EPIDOTE, SILICIFIED WITH CHALCO + PYRITE — 98.30
98.50

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF

99.14

99.39
99.65 MASSIVE SULPHIDE: FINE-BEDDED PYRITE GRAINS; CHALCO + SILICA CEMENT

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF

100.14

100.54 } FISSILE WITH 5% GREENTUFF
100.80 } 2.5cm PYRITE BED SLUMPED (20°∠ to CORE)

101.14

} <30% SULPHIDES

101.14

45° LINEATION ON FOLIATION SURFACE } SCALY WITH WHITE STRINGER QZ

102.00 — 102.00

FOLIATED GREEN TUFF

SAMPLE INTERVAL	Assay result						SAMPLE NUMBER
	Cu %	Zn %	Au OPT	Ag OPT	Ca %	Fe %	
10C	.11	.26	.000	.10	.82	>3.52	6201
1.00	.00	.60	.000	.01	1.84	>2.34	6202
1.70	.06	.66	.001	.03	1.79	>2.61	6203
.84	.31	.02	.004	.19	.50	>4.01	6204
1.00	1.78	.03	.027	.47	.33	23.43	6205
1.00	.94	.07	.016	.20	.29	22.83	6206
.26	1.26	.01	.010	.30	.50	11.90	6207

Hole No. F86S-5.

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Recovery %: 98%

Depth m: 103, 105, 110, 115

Columnar section: CONTACT, FOLIATION, FOLIATIONS, FOLIATION, CONTACT, CONTACT, FOLIATION, CONTACT, BEDDING, CONTACT

Dip: 15, 40, 35, 50, 40, 20°, 33, 30, 15°, 60°, 60°, 40°

Interval	Chlorite	Epidote	Jasper	Silicification	Sericite
102.50–105.64	m	M	No		
105.64–108.04	S		No		
108.04–109.04	m	m			
109.04–109.75	m	W			m
109.75–110.35				W	S
110.35–111.40	No	No	W	S	M
111.40–112.15	M	M	No	No	No
112.25–114.10				m	N
114.10–115.50				S	No
115.50–116.25				m	No
116.25–	W	S			No

Rock Description (VOLUME PERCENTS)

- 102.50 FOLIATED GREEN TUFF — ROUND 1mm QZ EYES WITH CHLORITE HALO MAKE DARK EYES IN TUFF. DEFINE FOLIATION (15°∠ core)
- CRENE FRAG.
- SPECIMEN (103.00-.08) WITH PY + GREY SILICA IN FRACTURES
- BASALT BLOCK — 50% EPIDOTE + 50% CHLORITE SPECKS: <1/mm; WHITE QZ + DARK CHLORITE INJECTIONS; EPIDOTE INJECTIONS RANDOMLY ORIENTED
- PYRITE AS 2% <1mm FRAGS. DISSEM. CUBES + GRAINS + IN FRACTURES WITH GREY SILICA HALO
- 105.44 – 105.64 } FOLIATED GREEN TUFF WITH 8% DARK CHLORITE EYES (1-2mm)
- } FISSILE PALE GREEN TUFF WITH 3% LARGE (5-10mm) WHITE PUMICE + GREY LITHIC FRAGS AS EYES IN TUFF
- 106.40 – 106.70 } 25% QUARTZ-SERICITE-PYRITE
- } VERY FISSILE PALE GREEN TUFF
- 108.04 8 cm of DARK EYES, FOLIATED 50°∠ to core
- BASALT BLOCK — 50% EPIDOTE, 40% CHLORITE, 10% SIL SPECKS; LIGHTER THAN 103.00
- 109.04 20 cm of QZ WITH CHLORITE HALO EYES, FOLIATED 75°∠ to core
- 109.75 } WITH 10% GREENTUFF } FRAGS — QUARTZ-SERICITE-PYRITE FOLIATED TUFF
- 110.35 — WITH BRIGHT YELLOW-ORANGE MINERAL (LIME IN HOLE) (S-3, 92.5m) <30% SULPHIDES
- 110.70 – 110.90 } WHITE QZ WITH CHALCO STRINGERS
- <1% JASPER FRAGS AT BOTTOM
- 111.40 BASALT BLOCK — ⅓ EACH: EPIDOTE, LITE + DARK GREEN SPECKS WITH WHITE QZ + DARK CHLORITE INJECTIONS
- 112.15 – 112.25 GREY GOUGE
- SPECIMEN (112.34-.49)¼ } (INTERSTITIAL)-CHALCO RICH FINELY BEDDED PYRITE (GRAINS) "YELLOW ORE" — MASSIVE SULPHIDE
- 113.50 – 113.75 } 5% BORNITE
- } 25% BARITE; SOFT-SED. DEFORMATION
- 114.10
- 114.20 10cm SPHALERITE ZONE
- SPECIMEN (114.35-.47)¼
- 114.60 GALENA SHOWS?
- SPECIMEN (114.89-115.02)¼
- SPECIMEN (115.16-.28)¼
- SPECIMEN (115.31-.50)¼
- } "SEMI-BLACK BORNITE ORE" 30% BORNITE + CHALCO MATRIX; 20% SAND-SIZE PYRITE GRAINS; 30% SILICEOUS LAPILLI-PEBBLES; 15% BARITE LAPILLI-PEBBLES
- 115.50 [illegible]
- SPECIMEN (115.50-.66)¼
- SPECIMEN (115.89-116.06)¼ } (INTERSTITIAL)-CHALCO RICH FINELY BEDDED PYRITE (GRAINS), WITH 10% DISTORTED BEDS of WHITE SILICEOUS TUFF
- 116.25 BASALT BLOCK — 50% CHROME FRAG. VUGGY (WITH ZONE of DARKER CHLORITIC FOLIATED TUFF 116.95-117.10)

Assay result

To (m)	Sample interval	Cd % / Cu %	Zn %	Ga % / Au OPT	Ag OPT	Ba %	Fe %	Sample number
102.50	.50	.04	.07	.000	.01	.13	>8.32	6208
104.64		NOT SAMPLED						6209 NOT SAMPLED
105.64	1.00	.03	.26	.000	.02	.01	>5.79	6210
107.04	1.40	.00	.02	.001	.02	.55	>2.85	6211-6212
108.04	1.00	.01	.09	.001	.03	.34	>2.24	6213
109.04	1.00	.02	.02	.000	.03	.02	>5.68	6214
109.75	.71	.02	.19	.002	.03	.42	>3.69	6215
110.70	.95	.15	.41	.003	.06	.30	4.97	6216
111.40	.70	.10 1.25	23.10	.006 .019	.40	11.39	9.86	6217
112.15	.75	.71	.29	.003	.02	.44	>5.87	6218
112.25	.10	9.58	.81	.015	.91	.62	>10.12	6219
113.00	.75	9.25	.35	.027	.75	5.15	32.40	6220
113.75	.75	8.50	.70	.056	2.60	7.01	29.38	6221
114.60	.85	.07 10.49	12.02	.007 .027	5.21	21.56	13.38	6222
115.50	.90	.05 13.77	7.34	.005 1.010	6.42	13.79	19.80	6223
116.25	.75	6.96	.67	.039	1.91	.78	24.67	6224
	1.05	.17	.05	.004	.02	.34	>3.77	6225

Hole No. F86S-5.

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Recovery %: 98%

Depth m: 118, 120, 125, 130

Columnar section: SLUMPING, SLUMPING, CONTACT, FOLIATION, FOLIATION, FOLIATION, FOLIATION, FOLIATION, FOLIATION, FOLIATION, FOLIATION

Dip: 15, 30, 40°, 40°, 40, 50, 55, 50, 35, 40

Interval	Chlorite	Epidote	Jasper	Silicification	Sericite
117.30–117.80				m	No
117.83–120.70				S	No
120.70–121.60		W	W	M	No
121.60–122.30		No		m	m
122.30–122.37				S	No
122.37–122.65				m	m
122.65–123.65				S	W
124.8–126.30				m	m
126.30–127.70				W	m
127.70–129.98				No	S
129.98–130.43				w	s
130.43–131.85				m	m

Rock Description (VOLUME PERCENTS)

- BASALT BLOCK
- 117.30 QUARTZ-SULPHIDE TUFF WITH WHITE STRINGER QZ IN FRACTURES + 2 GREENTUFF LUMPS
- 117.80 GREY GOUGE (117.80-.83)
- SPECIMEN (118.01-.12)¼
- SPECIMEN (118.43-.70)¼ } "SEMI-BLACK BORNITE ORE" 40% BORNITE + CHALCO MATRIX; 25% SAND-SIZED PYRITE GRAINS; 20% SILICEOUS, 15% BARITE } LAPILLI-PEBBLES AND DISRUPTED BEDS — MASSIVE SULPHIDE
- 120.70 – 121.60 } MED-GREY MASSIVE BARITE (NOT BEDDED) WITH PALE GREEN, PALE JASPER + CHALCO WISPS; CONTACT FEATURES: "UPSIDE DOWN"
- 122.10 LOAD STRUCTURES: UPSIDE DOWN } WITH 30% BARITE AS WISPS + ELONGATED LAPILLI-PEBBLES
- SPECIMEN (122.30-.37)¼ ZONE of WHITE QZ WITH CHALCO STRINGERS } WITH 2 1cm. SPHAL BEDS — <30% SULPHIDES
- 122.65
- } UNFOLIATED, WITH WHITE QZ IN FRACTURES "STRINGER ZONE"?
- 123.65
- 124.10 } INCLUDES LITHIC OBLONG (7 X 8 mm) PALE + MED GREY SILICEOUS FRAGS.
- GREY GOUGE + BITS 124.40-.42
- 124.60
- 124.8 } PALE GREY
- 125.65 } MED. GREY
- 126.30 } WITH 20% OPAQUE GREY PUMICE FRAGS (5-20mm) — QUARTZ-SERICITE PYRITE FOLIATED TUFF
- 127.70 } VERY FISSILE SOFT WITH LARGE (1X5cm) GREY TUFF FRAGS
- GREY GOUGE
- 129.98 GREY GOUGE
- 130.43 } 40% LARGE (1-5cm) GREY TUFF FRAGS.
- } PYRITE IS CONCORDANT WITH BEDDING + FOLIATION CHALCO IS NOT — <30% SULPHIDES (AVE)
- 131.85 (SOFT-SED DEFORMATION AT BOTTOM)

Assay result

To (m)	Sample interval	Cd % / Cu %	Pb % / Zn %	Ga % / Au OPT	Ag OPT	Ba %	Fe %	Sample number
117.30	1.05	.17	.05	.004	.02	.34	>3.77	6225
117.80	.50	1.69	.20	.008	.09	16.00	5.36	6226
118.70	.87	18.86	.60	.031	10.19	12.23	20.58	6227
119.70	1.00	.01 14.38	1.05	.004 .056	6.11	16.93	19.33	6228
120.70	1.00	.03 10.48	.05 4.78	.005 .034	6.78	26.37	11.26	6229
121.60	.90	.29	.06	.011	.10	47.32	.64	6230
122.30	.70	.04 7.59	7.04	.006 .016	4.61	19.41	20.79	6231
122.65	.35	.02 2.19	3.13	.02 .005	.10	1.16	11.10	6232
123.55	.90	1.54	.44	.003	.05	2.43	5.19	6233
124.80	1.25	.36	.79	.002	.03	.49	>5.41	6234
125.65	.85	1.45	.27	—	.23	..19	>11.47	6235
126.30	.65	.25	.73	.006	.12	.93	>7.59	6236
127.70	1.40	.72	1.25	—	.32	1.61	>10.30	6237
129.98	2.28	.12	.05 1.32	.004	.14	1.14	>3.91	6238
130.43	.45	.01	.40	.003	.03	1.02	>4.05	6239
131.85	1.42	2.61	.05 .28	.015	.40	1.67	>11.87	6240

Hole No. F86S-5 .

Recovery %: 98%

Depth m: 133, 135, 140, 145

Columnar section: PY BEDDING; PY BEDDING; PY BED; PY BEDDING; SLUMPED BEDDING; FOLIATION; PY BEDDING; PY BEDDING; PY BEDDING

Dip: 55; 60; 65 50; 35; 40; 55; 45; 45; 55

Alteration (CHLORITE, SILICIFICATION, SERICITE): m W'; m W; m Ab m; S No; W; W

Rock Description (VOLUME PERCENTS)

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF

>33% SULPHIDES (AVE.)

>40% SULPHIDES (133.63 – 134.57)

-134.50 PYRITE BED (6.5 cm)

20% OPAQUE GREY TUFF FRAGS
BANDED WITH 1-4 cm PYRITE BEDS

-135.37 – -137.40 BEDDING LESS ORDERLY
SOFT-SED DEFORMATION

-137.40 – -138.70 FISSILE, SOFT
WITH 2% GREEN TUFF

-138.70 – -139.00 MASSIVE SULPHIDE: 75% PYRITE; 30% PALE-MED. GREY TRANSLUCENT SILICEOUS FRAGS.

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF

5% OPAQUE GREY TUFF FRAGS (>1 cm)
20% TRANSLUCENT GREY SILICEOUS FRAGS. (<1 cm)

>30% SULPHIDES (AVE.)

-144.28 – -145.98 5% WHITE STRINGER QZ ON FRACTURES
WITH BARITE? (NOT CALCITE)

-145.98 – -146.13 BROKEN ZONE WITH WHITE MINERAL (GYPSUM!)
AND DARK MINERAL (FINE PYRITE?)

– 147.18 3% WHITE STRINGER QZ
7% PALE BLUE-GREY QZ
LAPILLI (2-5 mm)
<<1% BRIGHT APPLE GREEN BITS (1mm)
FUCHSITE?

Sample interval depths: 132.70, 133.63, 134.57, 135.39, 136.37, 137.40, 138.70, 140.33, 141.83, 143.03, 144.28, 145.98

SAMPLE INTERVALS	Cu %	Pb % Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
.85	.23	.09	—	.10	.29	>13.80	6241
.93	.61	.05 .25	.005	.15	3.05	>10.21	6242
.94	1.98	.24	.008	.27	.52	>19.98	6243
.80	.22	.13	.003	.08	2.59	>7.22	6244
1.00	1.00	.07 .26	.005	.22	1.54	>17.53	6245
1.03	.38	.17	.004	.17	.54	>12.75	6246
1.30	.03	.03	.002	.01	.81	>2.59	6247
1.63	1.00	.14	.006	.21	.27	>18.02	6248
1.50	.06	.07 .25	.003	.10	.87	>17.65	6249
1.20	.07	.07 .47	.004	.13	.93	>17.28	6250
1.25	.14	.20	.005	.09	1.29	>15.01	6251
1.50	.31	.22	.003	.11	1.82	>13.10	6252
1.50	.11	.05 Pb .11	.002	.02	.29	>7.65	6253

Hole No. F86S-5 .

Recovery %: 98%

Depth m: 148, 150, 155, 160

Columnar section: FOLIATION; FOLIATION; PY BEDDING; FOLIATION; FOLIATION; BREAKAGE; BREAKAGE; FOLIATION; FOLIATION

Dip: 35; 35; 55; 35; 50; 55 to 40; 35; 50

Alteration (CHLORITE, EPIDOTE, SILICIFICATION, SERICITE): m W; m W; m m; m m; W m; W; m; S; W W W S

Rock Description (VOLUME PERCENTS)

-147.18 – -147.23 BROKEN ZONE WITH GYPSUM? + FINE PYRITE

-147.45-.48 GYPSUM + FINE PYRITE

-149.28

-149.76-.78 GYPSUM + FINE PYRITE IN FRACTURE

30° LINEATION ON FOLIATION PLANE

>30% SULPHIDES (AVE.)
1 cm PYRITE BEDS
BEDDING DISORDERED
(MED.-GREY BACKGROUND SILICA)

-154.08 – -154.83 10% LARGE (1x5 cm) WHITE - PALE GREY OPAQUE TUFF FRAGS; 1% PALE EPIDOTE WISPS

-154.83 – -155.68 SOFT: 25% LARGE WHITE - PALE GREY OPAQUE TUFF FRAGS; 3-5% PALE EPIDOTE WISPS

BASALT BLOCK WITH WHITE QZ + DARK CHLORITE INJECTIONS
CHLORITIZED
15% WHITE (PLAG.) SPOTS (.5-4 mm)

-SPECIMEN (156.45-.48)½

WEAKLY FOLIATED DUE TO CHLORITE
(PLAG SPOTS NOT FOLIATED)

-157.58

<1% (1-2 mm) PYRITE CUBES ROTATED IN GREY SILICA HALO
(NOT LIKE BOTTOM of HOLES 3 + 4)

-158.71

FOLIATED, FISSILE SLUMPY GREEN TUFF
PALE GREEN (5 x 10 mm) + NEAR WHITE (1 x 3 mm) FRAGS MAKE EYES
GRADES TO GREY ↓

-159.66

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF

-160.60-.62 GREY GOUGE

VERY FISSILE
25% GREEN TUFF; <5% PALE EPIDOTE WISPS
3x4 mm "EYES" of GREY SILICA WITH SULPHIDES

162.16

Sample interval depths: 147.23, 149.28, 150.78, 152.03, 152.83, 154.08, 154.83, 155.68, 159.58, 158.71, 159.66

SAMPLE INTERVAL	Cu %	Pb % Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
1.50	.11	.05 .11	.002	.02	.29	>7.65	6253
200	.09	.11 .17	.002	.03	.22	>8.97	6254
1.50	.08	.07 .21	.001	.06	.70	>13.21	6255
1.25	.04	.07 .13	—	.08	.98	>16.47	6256
.80	.23	.06 .22	.003	.12	1.65	>10.54	6257
1.25	.02	.15 .14	.004	.03	1.52	>4.00	6258
.75	.22	.06 .67	—	.17	.95	>10.94	6259
.85	.00	.01	.002	.01	.93	> 1.70	6260
1.90	.04	.01	.000	.08	.03	>4.18	6261
		NOT		SAMPLED			
.95	.00	.01	.000	.01	2.25	·207	6262
2.50	.01	.02	.001	.05	.88	·2.45	6263

Hole No. F865-5 .

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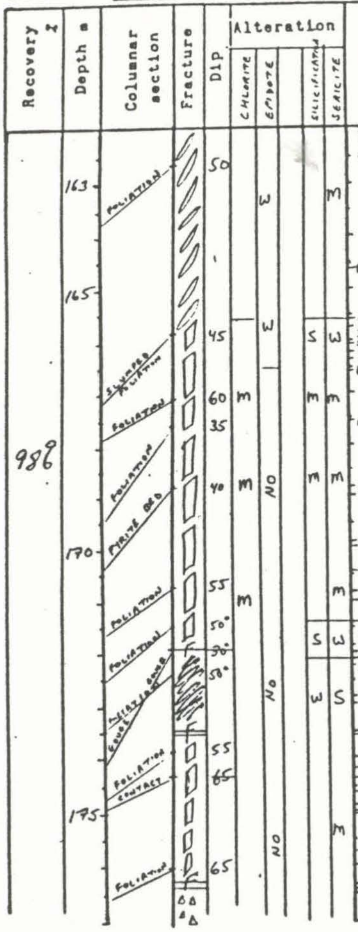

Rock Description (VOLUME PERCENTS)

} 10% GREGAT UFF

PALE GREY, FISSILE
7% PALE EPIDOTE WISPS

QUART- SERICITE - PYRITE
FOLIATED TUFF

162.16

164.66 } PALE GREENISH-GREY COLOUR

164.66

165.51

165.51

SPECIMEN (165.62-.69)¼
SPECIMEN (165.79-.93)¼
SPECIMEN (166.09-.28)¼
SPECIMEN (166.29-.40)¼
SPECIMEN (166.44-.56)¼ } WITH 3% SPHALERITE (IN 2-4 mm BEDS)

166.56 } 30% PALE GREEN
5% PALE EPIDOTE

(5cm. ZONES of BRECCIATED PALE TUFF FRAGS WITH DARK GREY SILICA CEMENT)

166.56

167.56 } PALE GREEN TUFF FRAGS NOW HAVE WHITE OPAQUE ROUNDED INDISTINCT BITS (<1mm) IN THEM

169.56

VERY PALE GREENISH
QUARTZ- SERICITE- PYRITE
FOLIATED TUFF

168.56

168.80 2mm VERY [illegible] PY BED

169.90 MINOR WHITE QZ(BLEBS)

80% VERY PALE GREEN TUFF FRAGS. WITH SPECKLY TEXTURE DUE TO IN SITU BRECCIATION ??

170.06

170.45 DARK GREY SILICA + FINE PY MATRIX BETWEEN PALE GREEN TUFF
(A ZONE of SILICA GEL THAT THE TUFF FRAGS FELL INTO?)

170.85

171.41

171.41

SPECIMEN (171.41-.49)¼
SPECIMEN (171.60-.66)¼ BLUE FRAGS
SPECIMEN (171.86-.97)¼ } 30% PALE-BLUE OPAQUE SILICEOUS PUMICE FRAGS.

172.16

172.16

172.20-25 WHITE QZ + BLACK FINE PY
172.85 TRANSLUCENT QZ WITH FINE PY (25mm) } FISSILE

173.37
173.56 GREY GOUGE

173.56

174.22] WHITE + GREY QZ FRAG. (FELL IN TUFF)
174.34
174.59] WHITE + GREY QZ FRAG'
174.79
175.06 } ORDERLY FOLIATION

175.06

175.75 } 5% INDISTINCT WHITE SPOTS (<2mm), IN PALE GREEN TUFF FRAGS. (30% LATHES, 70% ROUNDED)

176.43
176.46 GREY GOUGE

176.46

SAMPLE INTERVAL	Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
2 50	.00	.13	.000	.04	.99	>2.61	6264
.85	.02	.35	.003	.05	.64	>4.06	6265
1.05	.06	1.21	.002	.06	.47	>3.20	6266
1.40	.01	.13	—	.01	.57	>3.00	6267
1.00	.00	.13	.001	.07	.72	>2.72	6268
1.50	.00	.04	—	.02	.82	>2.92	6269
1.35	.00	.08	.002	.06	.39	>3.28	6270
.75	.02	.34	—	.10	.86	>3.05	6271
1.40	.00	.03	.000	.05	.56	>2.63	6272
1.50	.00	.01	.000	.04	1.77	>1.85	6273
1.40	.00	.01	.000	.07	.63	>2.05	6274
1.50	.00	.02	.001	.07	1.75	3.27	6275

Hole No. F865-5 .

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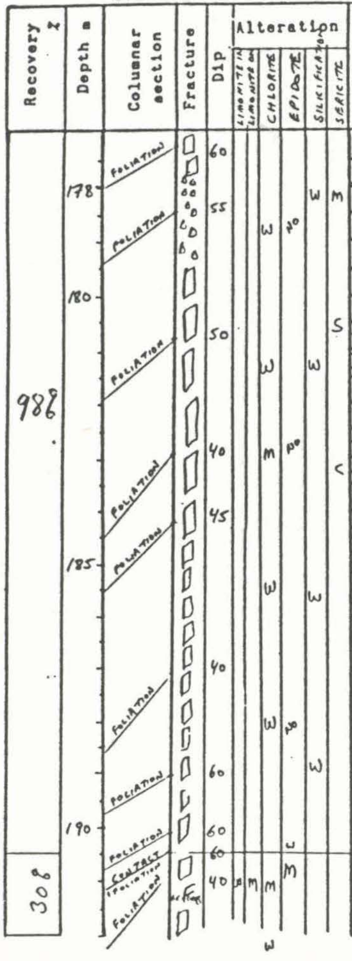


Rock Description (VOLUME PERCENTS)

VERY PALE GREENISH
QUARTZ-SERICITE-PYRITE
FOLIATED TUFF

177.50 } 40% VERY PALE GREENISH-WHITE
177.96 OPAQUE PUMICE FRAGS.

177.96

178.50 } 50% PALE BLUE OPAQUE
179.00 PUMICE FRAGS.

OPAQUE GREYISH-WHITE WITH VERY SLIGHT GREENISH TINGE

179.51

180.51

180.65 2mm SPHAL BED
181.13 2mm SPHAL BED } WITH 2% WHITE QZ ON FRACTURES
181.45 2mm SPHAL BED

181.51

182.51

SPECIMEN (182.62-.71)½ GALENA BIT IN SPHALERITE

182.35 15mm PY+SPHAL BED

183.49

SPECIMEN (184.00-.05)½ GALENA BIT IN SPHALERITE
184.20 2mm SPHAL. BED

184.49

SPECIMEN (184.75-.91)¼
SPECIMEN (185.22-.44)¼ SHOWS BRECCIATION (<1cm) OF OPAQUE FRAGS WITH GREY SILICA MATRIX

OPAQUE GREYISH-WHITE WITH VERY SLIGHT GREENISH TINGE

185.47

185.70 5cm BRECCIATION, WITH VUG, WHITE QZ, GREY QZ MATRIX INFILLINGS

186.47

187.47

187.47 } <5% GREY SILICA (NO EPIDOTE)

189.67

190.49 PALE EPIDOTE AT CONTACT

190.49

SPECIMEN (190.50-.58) PALE GREEN WITH LIMONITE STAIN

BROKEN ROCK ZONE

GREEN DACITIC TUFF
WEAKLY FOLIATED
WITH EPIDOTE WISPS

SPECIMEN (191.70-.77)

191.97 } DARKER, PURPLISH-GREENISH-GREEN
192.22 SILICIFIED + SHATTERED TEXTURE

SAMPLE INTERVAL	Cu %	Pb Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
1.50	.00	.02	.001	.07	1.75	>3.27	6275
1.55	.00	.04	.003	.17	2.37	>4.60	6276
100	.00	.07	.004	.24	1.58	>4.51	6277
1.00	.01	.17	—	.16	1.61	>3.07	6278
1.00	.01	.10 .25	—	.26	.87	>2.51	6279
.98	.63	.12 .54	.004	.13	.42	>3.32	6280
1.00	.03	.73	.002	.10	1.00	>2.53	6281
.98	.11	.08 1.79	.006	.20	.51	>3.18	6282
1.00	.01	.29	—	.11	.75	>2.75	6283
1.00	.00	.04	—	.07	.75	>3.89	6284
2.00	.00	.02	.000	.04	.56	>2.33	6285
.82	.00	.01	.000	.01	.60	>1.79	6286

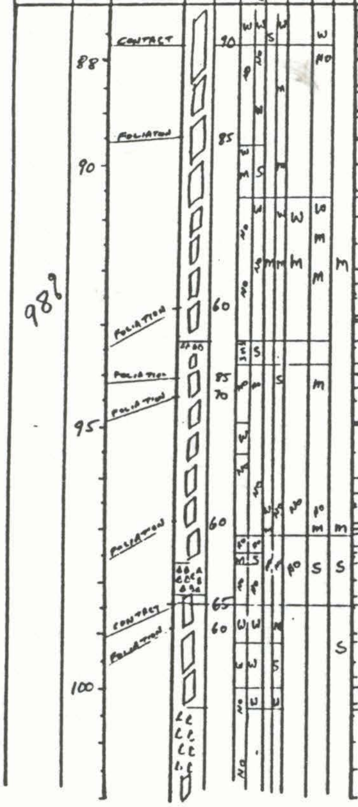
Hole No. F86-6 .

DRILL AND ASSAY LOG OF MINERALIZED PORTION

OF DIAMOND DRILL HOLE **F86S-6**

Page 7 of 8 .

Recovery % | Depth m | Columnar section | Fracture | Dip | Alteration: Limonite in Limonite on, Chlorite Epidote, Jasper, Pyrite, Silicification



Rock Description
(VOLUME PERCENTS)

- SPECIMEN (87.04-.12)
BASALT BLOCK
- SPECIMEN (87.60-.63) CHLORITIC (<1% PY ON SURFACES)
- 87.70
- SPECIMEN (87.69-.74) SHOWS CONTACT TUFFY
(WEAKLY FOLIATED)
- 88.67-.70 PALE CREME FRAG
HETEROGENEOUS FOLIATED GREYISH-GREEN TUFF WITH PUMICE LOOK
- SPECIMEN (89.10-.22)
(NO QZ LAPILLI)
- 89.32-.63 CREME FRAG, WHITE QZ, DARK CHLORITE
(DARKER, MORE EPIDOTE)
- 90.61 BROKEN PIECE SPECIMEN: SHARP BEDDED CONTACT
SULPHIDE LAPILLI TUFF (?)
RARE EPIDOTE + JASPER FRAGS 3-5 mm.
DARK PURPLISH-GREY SILICEOUS
WITH PALE + DARK GREEN CHLORITE
(WEAKLY FOLIATED, NO MAGNETITE)
- SPECIMEN (92.30-.40)
- 92.55 PY FRAG (2mm) ALONE IN TUFF
- 92.90
- SPECIMEN (92.95-93.04) WITH WHITE QZ (STRINGER STYLE ON FRACTURES)
- 93.40
LIMONITIC IN + ON ROCK
- 93.82
- CREME FRAG
WITH EPIDOTE WISPS (10%) ROCK LIGHTER + GREENER
- SPECIMEN (94.25-.32)
PY IN QZ-EPIDOTE FRAGS + ON SURFACES
(WEAK FOLIATION)
- 94.95 } LIMONITIC
- 95.50
(SOMETIMES DARK + LIGHT CHLORITE ON FRACT. SURFACE WITH PYRITE) 95.35
- 96.35 96.35
- SPECIMEN (96.58-.65)
UNIFORM GREENISH GREY WITH CHLORITE + WHITE CLAY ON FRACT.
- 96.90-97.05 FISSILE WITH 35° LINEATION ON FOLIATION SURFACE
GRADE: TO:
- 97.10 97.10
- SPECIMEN (97.25-.38)
- 97.38 LIMONITE
GREY SILICIOUS ZONE
3% FINE DISSEM. PYRITE
- 97.58 } BROKEN BITS (NO LIMONITE)
- 98.25
- 98.45 98.45
SPECIMEN (98.40-.53) WITH CONTACT
- 99.20-.30 BRECCIATED (SUBROUNDED, FITTED FRAGS 1-7mm)
HETEROGENEOUS FOLIATED GREYISH-GREEN TUFF WITH PUMICE LOOK
- SPECIMEN (99.83-.92)
- 100.00
- 100.25-.32 PALE CREME FRAG.
25% PALE QZ LAPILLI OBLONGS 3-7mm.
- 100.40
BROKEN (NO QZ LAPILLIS)
WITH FINELY SHATTERED PALE EPIDOTE
SEE SPECIMEN (102.95-103.00)
- 101.50
FOLIATED GREENISH-GREY QZ. LAPILLI TUFF

SAMPLE INTERVAL	Cu %	Zn %	Au OPT	Ag OPT	Ca %	Fe %	SAMPLE NUMBER
1.00	.00	.01	.000	.00	.03	2.70	6298
.75	.00	.01	.000	.00	.04	2.74	6299
1.35	.00	.00	.000	.01	.02	1.93	6300

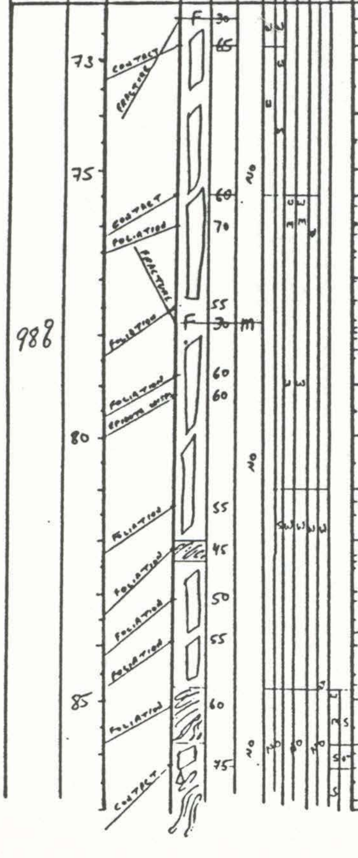
Hole No. F86S-7 .

DRILL AND ASSAY LOG OF MINERALIZED PORTION

OF DIAMOND DRILL HOLE **F86S-7**

Page 6 of 10 .

Recovery % | Depth m | Columnar section | Fracture | Dip | Alteration: Limonite on fract., Chlorite, Epidote, Jasper, Fe-clay, Magnetite, Pyrite, Silicification, Sericite



Rock Description
(VOLUME PERCENTS)

- 72.35 FRACTURE
HOMOGENEOUS BRIGHT GREEN (WEAKLY FOLIATED) SILICIFIED TUFF
- 72.75 SPECIMEN (72.66-.77)½ SHOWS CONTINUATION OF GROUNDMASS + AFTER CONTACT EPIDOTE WISPS ARE DIGESTED
HOMOGENEOUS GREEN TUFF
- SPECIMEN (74.47-.58)½ EPIDOTE ZONES ARE LIKE CREME FRAGS; <<1% PALE (PLAG + SILICA) SPECKLES (2-4mm)
FEW TO NO EPIDOTE WISPS
- 75.50 SPECIMEN (75.48-.57)½
- 75.60 PALE GREEN WISPS + PALE GREY SILICEOUS EYES (1mm)
30% PURPLE, 20% Fe-CLAY, 10% PALE GREEN
- SPECIMEN (76.03-.12)½
10% EPIDOTE WISPS (1/6-TOUGH)
- 76.18
40% PALE GREEN SILICEOUS EYES (1-10mm)
FOLIATED WISPS + EYES GREEN-PURPLE TUFF
PALE GREEN DOMINATES; 10% Fe-CLAY WISPS
- 76.60
DARK PURPLE, SILICIFIED ZONE
<1% MAGNETITE GRAINS (<<1mm)
- 77.05
- 77.47-.50 WHITE QZ + DARK CHLORITE INJECTION
PALE GREEN DOMINATES
- SPECIMEN (77.76-.84)
- 77.84-.96 PURPLE SILICIFIED ZONE; 77.95 LIMONITIC FRACTURE
- 78.07 EPIDOTE ALTERATION AROUND WHITE QZ + DARK CHLORITE INJECTION (NOT CREME FRAG)
- SPECIMEN (78.26-.32)½ SHOWS EPIDOTE ALTERATION IN FROM QZ FILLED FRACTURE
PURPLE SILICIFIED DOMINATES (80%) WITH
5% RED Fe-CLAY WITH MAGNETITE AT CORE
5% PALE EPIDOTE WISPS
PALE GREEN EYES; TRANSPARENT QZ EYES; LITHIC ET.
- 79.50
SAME, PURPLE WISPS WITH 5% (2-9mm) EPIDOTE EYES
- 81.00
- SPECIMEN (81.20-.27)
70% PALE EPIDOTE WISPS WITH + WHITE QZ-DARK CHLORITE INJECTIONS
2% Fe-CLAY <1% MAGNETITE
1% JASPER EYES (<1mm)
1% PYRITE DISSEM.
CRENULATIONS AT 81.60, 82.30
- 82.00
- SPECIMEN (82.35-.38)
FISSILE + BROKEN; PINK CLAY ON FRACTURE SURFACES
- 82.40
32% GREEN, 32% EPIDOTE 32% PURPLE
ORDERLY FOLIATION
2% Fe-CLAY + MAGNETITE (ONE LENSE is 4x6mm)
- 83.15-.30 FISSILE + CRENULATED
DARKER, PURPLE (AS BEFORE AT 78.26-79.50)
- 83.83 PINK CLAY ON FRACTURE SURFACE
"SULPHIDE LAPILLI TUFF"
NO SULPHIDE LAPILLI
1% MAGNETITE
- 84.74-.88 ALTERATION RIND WITH PYRITE CUBES
- 84.88
3mm WHITE GOUGE
} MASSIVE PYRITE, SOFT-SED. DEFORMED WITH 35% WHITE SERICITE-CLAY GOUGE
MASSIVE SULPHIDE
- 85.84 1mm GREY GOUGE 85.84
- SPECIMEN (86.01-.26)¼ } SOLID, BEDDED PYRITE-GRAINS, CHALCO RICH "YELLOW ORE" WITH 5% WHITE SILICEOUS TUFF
- 86.22 86.22
SPECIMEN (86.55-.81)¼ (SPHALERITE) } WITH 40% QUARTZ BANDS, "SEMI-BLACK ORE"
- 86.81 86.81
SLUMPED ALMOST PARALLEL TO CORE (TO 89.02)
QUARTZ-SERICITE-PYRITE FOLIATED TUFF WITH BARITE

SAMPLE INTERVAL	Cu % (Chk %)	Zn % (Chk %)	Au OPT (Gal)	Ag OPT	Ca %	Fe %	SAMPLE NUMBER
.96	.01 2.20	.94	.004 .013	.70	2.86	25.78	6301
.38	.71 6.17	.79	.001 .016	1.92	6.98	27.34	6302
.59	.14 1.66	.32 6.59	.004 .035	.30	18.35	7.25	6303
.39	1.65	.34 .50	.037	.14	15.13	>5.29	6304

Hole No. F865-7.

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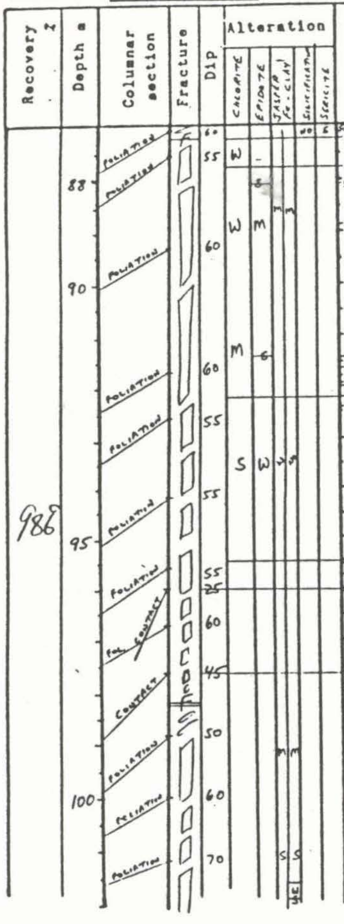

Rock Description (VOLUME PERCENTS)

87.02-.26 fissile; soft / 87.15-.26 gouge — Q-S-P WITH BARITE — 87.20

87.30 – 87.75 } FISSILE, VERY PALE WISPY GREEN

SPECIMEN (88.06-.20)½ WITH "BASALT COBBLE"

PALE BROWN (20%) PALE + MED GREEN 60%
PALE PURPLE RED Fe CLAY

SPECIMEN (88.83-.87)

FOLIATED PURPLE + GREEN LITHIC TUFF

INCLUDES 5cm COBBLES of 'DIGESTED' SILICIFIED EPIDOTE-BASALT

SPECIMEN (91.40-.55)½ WITH SILICEOUS-EPIDOTE ZONE or FRAG
SPECIMEN (91.55-.59) WITH PINKISH-PALE BROWN MICA on FOLIATION
SPECIMEN (91.59-.67)½ WITH Fe-CLAY
SPECIMEN (91.81-.99)½ WITH LITHIC FRAGS (>5cm)
92.20 SPECIMEN (92.34-.40)½ FISSILE PALE GREEN TUFF (20% PLAG FRAGS 1-4mm) FINE DISSEM 3% PY
92.40

VERY PALE GREENISH

QUARTZ-SERICITE-PYRITE
FOLIATED TUFF

20% GREY TUFF FRAGS
1% PALE BLUE SILICEOUS OBLONGS
1 JASPER FRAG (<1cm)

95.48
SPECIMEN (95.62-.65) FOLIATED GREEN TUFF WITH 35% (1-7mm) FLATTENED PALE GREEN FRAGS <2% PY

96.05
SPECIMEN (96.50-.60) 60% GREEN WISPS, 40% PURPLE FRAGS
80% PURPLE WISPS + 20% PALE GREEN FRAGS.

FOLIATED PURPLE + GREEN LITHIC TUFF
SILICIFIED + FISSILE

97.60 1mm GOUGE AT [illegible] CONTACT
SPECIMEN (97.80-.87) WITH JASPER — FOLIATED GREEN TUFF WITH 35% GREEN FLATTENED FRAGS + 15% IVORY WISPS (3% PALE PURPLE WISPS)
98.21-.26 GREY-GREEN GRITTY GOUGE
CHIP SPECIMEN (98.31)
98.53
98.76 CHIP SPECIMENS AT (98.70)+(98.76)
CHIP SPECIMEN (99.07)

PURPLE + PALE GREEN FOLIATED LITHIC TUFF
80% PURPLE + Fe-CLAY + JASPER MATRIX WISPS
20% PALE GREEN (SILICEOUS PUMICE) FRAGS

CHIP SPECIMEN (100.80)
SPECIMEN (101.08-.14)½ WITH 70% JASPER-Fe-CLAY MATRIX WISPS WITH SUBANGULAR, DISCORDANT PALE GREEN FRAGS
101.20-.24 DARK PURPLE SILICEOUS FRAG
101.62
101.80-.90 7% PALE RED Fe-CLAY } DARK PURPLE SILICEOUS FRAGS (<50%) LESS TO NO Fe-CLAY

	SAMPLE INTERVAL	Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBER
–87.20	.39	1.65	.50	.037	.14	15.13	>5.29	304
		NOT SAMPLED						
92.40–93.90	1.50	.02	.04	—	.04	.77	>3.09	6305
93.90–95.40	1.58	.10	.05	.003	.07	1.84	>2.96	6306
		NOT SAMPLED						

Hole No. F865-7.

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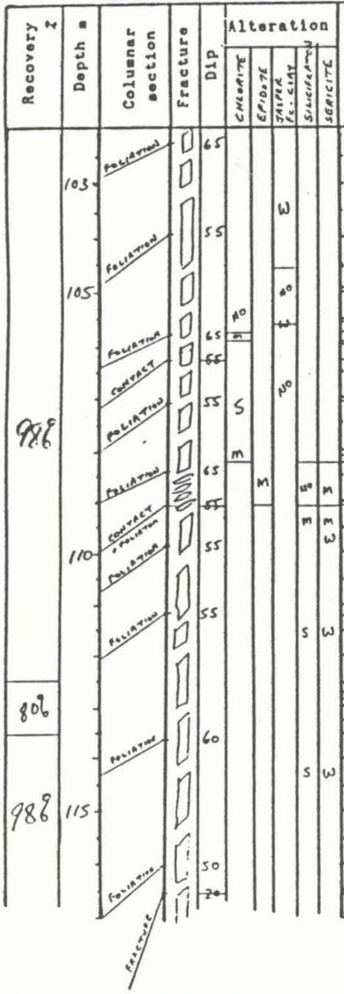

Rock Description (VOLUME PERCENT)

SPECIMEN (102.10-.18) WITH DARK PURPLE SILICEOUS FRAG, "GREENFIED" AT EDGES

PURPLE + PALE GREEN
FOLIATED LITHIC TUFF

WITH 10-20% PALE GREEN FRAGS
10-20% GREEN WISPS
10% SMALL PURPLE FRAGS (<1cm)
<50% LARGE DARK PURPLE SILICEOUS FRAGS (1-10cm)
<3% Fe-CLAY + JASPER FRAGS or WISPS

104.35
SPECIMEN (104.93-105.05)½ } DARK PURPLE SILICIFIED ZONE or VERY LARGE FRAG
105.56-.90 GREEN WISPS + JASPER FRAG
105.76 — 30% GREEN WISPS
SPECIMEN (105.99-106.06)½ 95% GREEN FRAGS + WISPS
106.35 CONTACT HAS YELLOW POWDER-CLAY

SPECIMEN (107.07-.15)½ } VERY PALE TRANSLUCENT GREEN

SPECIMEN (108.25-.31)½
108.31 — .43 GREEN AT START

} PALE GREY + YELLOWISH, FISSILE
109.05 25% PALE EPIDOTE YELLOW WISPS (+ BRIGHT YELLOW POWDER <<1%)

} MEDIUM GREY ORDERLY FOLIATION
111.20

} 20% PALE GREY TUFF FLATTENED FRAGS.

112.80-.83 BRECCIA ZONE, ANGULAR FRAGS (2-4mm) of GREY-TUFF
112.90-.93 SAME WITH BLACK VERY FINE PYRITE + VISIBLE PYRITE MATRIX
113.35

QUARTZ-SERICITE-PYRITE
FOLIATED TUFF

} 40% GREY-TUFF FLATTENED FRAGS "SCALY" LOOK

116.57 IRREGULAR FRACTURE WITH 3mm GREY GOUGE

	SAMPLE INTERVAL	Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBER
108.31–109.05	.74	.01	.10	.002	.13	1.92	>4.20	6307
109.05–111.20	2.15	.22	.11	.007	.09	.64	>11.33	6308
111.20–113.35	2.15	.20	.22	.007	.05	1.02	>10.08	6309
113.35–115.50	2.15	.17	.27	.002	.03	.16	>3.99	6310
115.50–	2.15	.74	.08	.004	.06	.17	>6.32	6311

Hole No. F86S-7.

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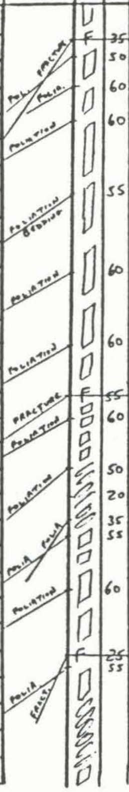
Recovery %: 98%

Depth m: 118, 120, 125, 130



Dip: 35, 50, 60, 60, 55, 60, 60, 55, 60, 50, 20, 35, 55, 60, 25, 55

Chlorite	Epidote		Silicification	Sericite
			S	W
M	M		NO	M
S	M		NO	NO
M				M
	W		W	S
M			NO	S

Rock Description
(VOLUME PERCENTS)

- 117.32 2mm. BAND of CHALCO
- 117.65 3mm GREY GOUGE
- 118.14 3X10mm CHALCO BAND

QUARTZ - SERICITE - PYRITE FOLIATED TUFF

40% GREY-TUFF FLATTENED FRAGS. "SCALY" LOOK

- 121.70 2mm BAND of CHALCO
- 122.25 TOP 30° LINEATION OF FOLIATION PLANE
- 122.95 } CHALCO IN 2-3mm DISCORDANT "RODS"
- 123.02 PY CUBES (2mm), FRACTURED, WITH GREY SILICA INFILLING
- 123.33-.40 YELLOW CLAY-POWDER ON FRACTURE SURFACES
- 123.50-.55 DISCORDANT BAND (1cm) of PY + FINE DARK MINERAL (SPHAL.?)
- 124.15 PY WITH FINE DARK MINERAL
- 124.23 " " " " "
- 124.55 GREY GOUGE
- SPECIMEN (124.96 - 125.04)½ } GREY + YELLOWISH WITH 20-30% PALE EPIDOTE + GREEN TUFF 1% PY
- 125.82
- SPECIMEN (126.00 - .07)½ WITH FRACTURED PY FRAGS (3-5mm) GREEN FOLIATED LITHIC (FISSILE) TUFF 1% PY
- 126.65 - 126.90 } WHITE QZ + DARK CHLORITE INJECTION (WITH PY), SOLID (LIKE CABALT BLOCK)
- SPECIMEN (127.10 - .21)½ SILICIFIED
- SPECIMEN (127.32 - .40)½ WITH YELLOW + ORANGE POWDER } GREY + YELLOWISH 15% PALE EPIDOTE + GREEN TUFF 1% PY
- 127.40
- 128.55-.63 SILICIFIED ZONE (LIKE THE PURPLE ONES)

QUARTZ - SERICITE - PYRITE FOLIATED TUFF

- 129.55 2mm GREY GOUGE
- 130.18-.23 SLUMPING
- } FISSILE, SOME CRENULATIONS
- 131.75 } GREENISH COLOUR

	Sample interval	Cu %	Pb% Zn %	Au OPT	Ag OPT	Ba %	Fe %	Sample number
119.65	2.15	.74	.08	.004	.06	.17	>6.32	6311
119.85	2.20	.06	.03	.003	.02	.19	>7.34	6312
120.95	1.10	.35	.49	.002	.05	.16	>5.95	6313
122.40	1.55	.07	.27	.001	.03	.15	>2.94	6314
122.75	.35	.85	.06 .53	.002	.08	.13	>5.14	6315
124.55	1.80	.49	.13 .39	.003	.26	.27	>5.49	6316
	THESE LOOK LIKE ALTERED GREEN + PURPLE LITHIC TUFF		NOT SAMPLED					
128.85	1.45	.00	.10	.002	.13	1.43	>4.48	6317
130.30	1.45	.00	.05	.003	.17	1.89	>3.81	6318
131.75	1.45	.00	.06	.005	.23	1.77	>3.38	6319
	.75	.01	.01	.001	.10	1.98	>3.22	6320

Hole No. F86S-7.

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Recovery %: 98%

Depth m: 133, 135

Chlorite	Epidote		Silicification	Sericite
M			NO	S
S				
W				

Rock Description
(VOLUME PERCENTS)

(GREENISH) QUARTZ - SERICITE - PYRITE FOLIATED TUFF 132.50

- 132.50
- SPECIMEN (132.50 - .61)½ } PALE TRANSLUCENT GREEN
- 133.03

PURPLE + PALE GREEN FOLIATED LITHIC TUFF

- SPECIMEN (134.20 - .29)½
- 134.48

END of HOLE

Sample interval	Cu %	Zn %	Au OPT	Ag OPT	Ba %	Fe %	Sample number
.75	.01	.01	.001	.10	1.98	>3.22	6320

DRILL AND ASSAY LOG OF MINERALIZED PORTION OF DIAMOND DRILL HOLE F86S-8

Hole No. F86S-8.

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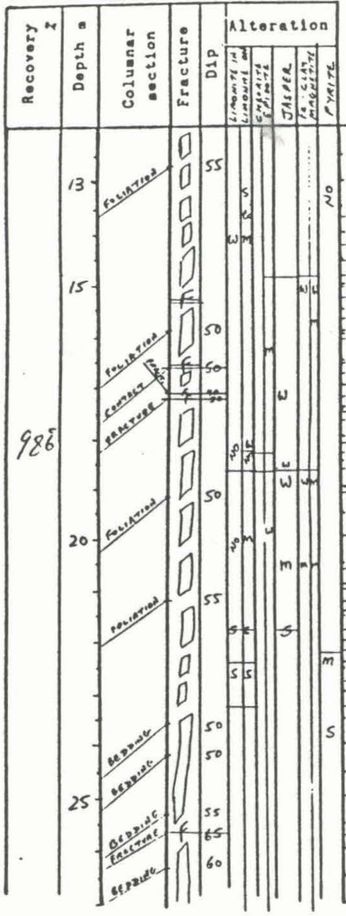

Rock Description (VOLUME PERCENTS)

HOMOGENEOUS GREEN TUFF

40% INDISTINCT FOLIATED PALE SPOTS (1-3mm)

13.90-.93 CREME FRAG — DISTINCT SPECKLES (3-5mm) 3%
14.00 SPECIMEN (13.95-14.03) — PALE GREEN PUMICE (WISPS + EYES + JPK)
14.20-.25 CREME FRAG WITH DARK CHLORITE — DISTINCT SPECKLES 3%
14.52-.54 CREME FRAG.
PALE GREEN PUMICE GRADES TO
14.85
SPECIMEN (15.02-.08) PALE GREENISH PURPLE Fe CLAY WISPS, MAGNETIC ; PALE GREEN SILICEOUS EYES
15.30-.39 ~~PALE GREEN CLAY GOUGE + ROCK BITS~~
PALE PURPLISH GREEN WITH 2% MAG. GRAINS
SPECIMEN (15.70-.76)
15.95-.97 WHITE QZ + DARK CHLORITE INJECTION
16.05
PALE GREENISH PURPLE
16.53-.61 ~~PALE GREEN CLAY GOUGE + ROCK BITS~~
16.67-.74 DARK PURPLISH-GREY SILICEOUS CRYSTAL TUFF FRAG. PALE PURPLISH GREEN
17.00
17.15-.21 BLEACHED PALE ZONE BETWEEN 2 FRACTURES PALE GREENISH PURPLE
17.36 DISCORDANT JASPER FRAG (7x3mm)
17.45 FRACTURE WITH WHITE QZ - EPIDOTE ALT. IN ROCK (LIKE IN HOLE 7 SPEC. 7836)
17.64
PALE PURPLISH GREEN GRADES TO:
18.10 SPECIMEN (18.10-.19) FOLIATED VERY PALE GREEN WITH DARK GREEN FLATTENED (1x3mm)
18.35 SPECIMEN (18.38-.55) BLEACHED PALE GREENISH-IVORY ZONE (LIKE 17.15-.21 ABOVE)
18.68 SPECIMEN (18.67-.77)
19.10 VERY MAGNETIC BLACK Fe-CLAY WISPS

FOLIATED PURPLE + GREEN WISPS + EYES TUFF

FOLIATED PALE GREENISH-PURPLE WISPS + EYES TUFF
WITH 10% EPIDOTE SPECKLE "EYES" (1-5mm)
NO EPIDOTE in GREEN WISPS
3% JASPER FRAGS (4-7mm)

SPECIMEN (20.60-.69) WITH JASPER FRAGS + DARK MAGNETIC Fe-CLAY
20.98 DISCORDANT Fe-CLAY; PALE PURPLISH GREEN
SPECIMEN (21.23-.40) DARK MAGNETIC Fe-CLAY
21.45
PALE GREENISH PURPLE
SPECIMEN (21.73-.81) ½ RED Fe-CLAY BED (5mm) + LIMONITE IN ROCK FROM FRACTURE
22.20-.24 BLEACHED ALTERATION RIND (LIMONITE IN ROCK) GRADES TO
SPECIMEN (22.21-.26)
22.42 } LIMONITIC GOSSAN — QUARTZ - SERICITE PYRITE FOLIATED TUFF
23.37 } LIMONITIC GOSSAN

MASSIVE SULPHIDE
FINE BEDS - LAMINATIONS of PYRITE GRAINS
SILICA + CHALCO CEMENT
WITH 1% SILICIOUS LAPILLI

25.71 2mm WHITE CLAY GOUGE

— HORIZON IN HOLE 4, HOLE 3, HOLE 7
69.18m 70.59m 95.50m

Depth	Sample interval	Cu %	Pb % / Zn %	Au opt	Ag opt	Ba %	Fe %	Sample numbers
22.24–23.37	1.13	.24	.08	.155	.93	.26	>20.33	6351
23.37–24.57	1.00	.91	.03	.019	.50	.10	40.29	6352
24.57–25.37	1.00	2.83	.05	.029	1.10	.06	39.47	6353
25.37–26.37	1.00	2.06	.08	.038	.86	.03	40.22	6354
26.37–	1.00	1.10	.13 .02	.016	.25	.03	42.59	6355

Hole No. F86S-8.

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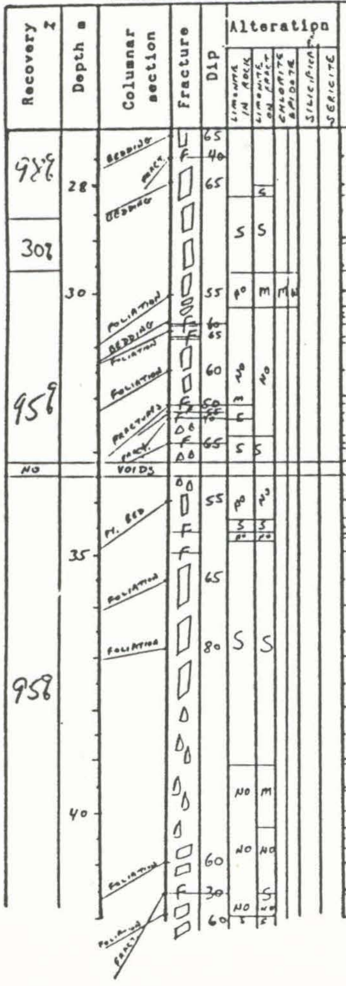


Rock Description (VOLUME PERCENTS)

MASSIVE SULPHIDE
FINE BEDS - LAMINATIONS of PYRITE GRAINS

27.48 2mm LIMONITIC GOUGE
SPECIMEN (27.48-.49) ¼
27.98
28.15 SPECIMEN (28.07-.15) ¼ } 25% GOSSAN
28.66 WHITE QZ (INJECTION?) IN GOSSAN } LIMONITIC GOSSAN
29.59
CASALT BLOCK? FOLIATED DARK CHLORITE
SPECIMEN (29.95-30.03) WITH WHITE QZ + DARK CHLORITE INJECTIONS
30.25-.40 GOSSAN WITH <1% CHALCOCITE SOOT
30.40-.57 MASSIVE PYRITE
30.57-.63 GREY GOUGE
30.85-.88 GREY GOUGE

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF
<30% SULPHIDES

32.11 5mm GREY CLAY GOUGE (WITH 2mm LIMONITE ABOVE)
32.36 5mm GREY CLAY GOUGE
32.72 5mm LIMONITIC GOUGE
32.75
32.93 3mm LIMONITIC GOUGE } GOSSAN
33.25
33.50 } VOIDS DUE TO GOSSAN
34.46
-.60 } GOSSAN
34.75-.74 GREY GOUGE
34.85
34.98 2mm LIMONITIC GOUGE

LIMONITIC GOSSAN

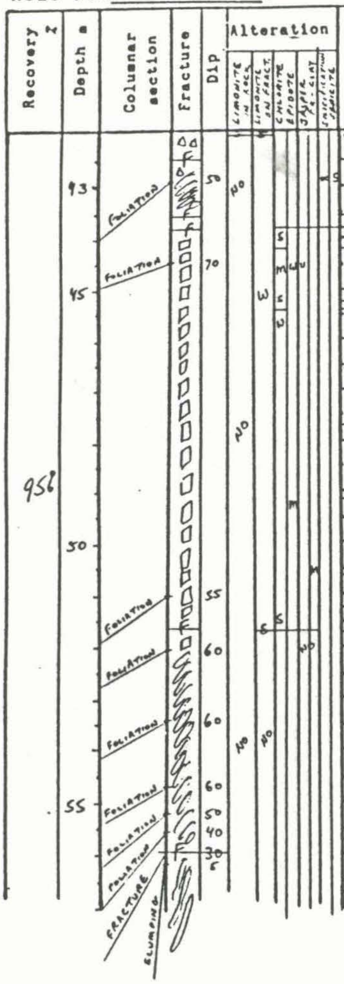
SOFT-SED DEFORMATION

39.05
BASALT BLOCK
SPECIMEN (39.53-.59) WITH ZONES of (WEAKLY FOLIATED) 7% WHITE PLAG SPOTS (1-4mm)
40.30
40.70 } 25% LARGE GREY SILICEOUS FRAGS. (2-5cm) ONE WITH JASPER (2cm) LIKE IN HOLE 5+
41.55 LIMONITE FRACTURE
41.98 -42.06 GOSSAN } FISSILE

QUARTZ - SERICITE - PYRITE
FOLIATED TUFF
<30% SULPHIDES

Depth	Sample interval	Cu %	Pb % / Zn %	Au opt	Ag opt	Ba %	Fe %	Sample number
27.37	1.00	1.10	.02	.016	.25	.03	42.59	6355
28.15	.78	.24	.01	.032	.20	.06	42.46	6356
29.59	1.44	.24	.02	.010	.08	.41	>36.07	6357
30.25	LIKE HOLE 4 (89.72-90.03)	NOT SAMPLED						
31.75	1.50	1.06	.59	.011	.18	3.00	>14.68	6358
33.25	1.50	.74	.05 .04	.022	.32	8.31	>15.13	6359
33.50	VOID							
34.60	1.10	.25	.09 .03	.017	.31	2.14	>16.60	6360
34.95	NOT SAMPLED							
36.90	2.15	.17	.02	.062	.41	7.24	>24.48	6361
39.05	2.15	.21	.02	.075	.94	4.44	>19.96	6362
40.30	NOT SAMPLED							
42.00	1.70	.64	.01	.007	.12	.67	>19.11	6363

Hole No. F86S-8 .



Rock Description (VOLUME PERCENTS)

41.98.06 GOSSAN
42.00-.15 CRENULATION
42.51-.53 GREY GOUGE
43.53-.57 GREY GOUGE + ROCK BITS
} FISSILE + BROKEN

QUARTZ – SERICITE – PYRITE
FOLIATED TUFF

43.70 -.73 PALE GREEN GOUGE } PALE GREEN
44.15
SPECIMEN (44.15-.23)½ + JASPER FRAG
} WITH 10% PALE PURPLE FRAGS.
SPECIMEN (45.21-.25) SILICIFIED PALE GREEN FRAG HAS SHATTERED TEXTURE
45.42

FOLIATED PURPLE + GREEN LITHIC TUFF
LAPILLI-PEBBLE SIZE FRAGS.
SILICIFIED FRAGS. & ZONES
REST IS VERY FISSILE
80% PURPLE; < 20% PALE GREEN FRAGS. + WISPS

LIKE HOLE 4
104.05-111.50

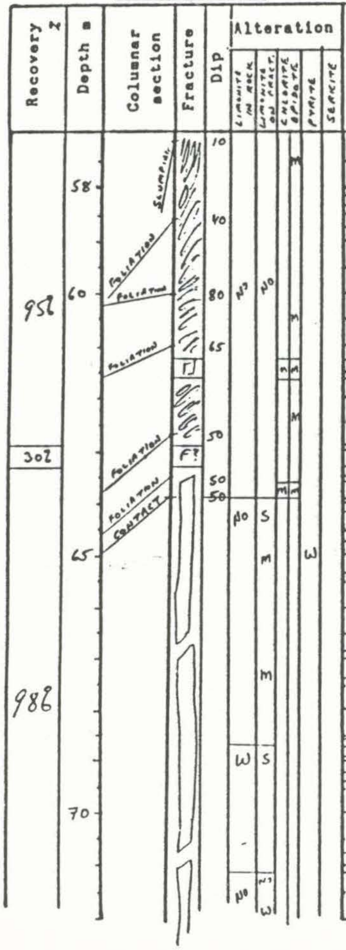
SPECIMEN (47.70 -.74) SILICIFIED PURPLE ZONE
SPECIMEN (49.20-.30)½ SILICIFIED PURPLE ZONE WITH PALE GREEN ALT. COMING IN FROM PALE EPIDOTE FILLED FRACT.
SPECIMEN (50.66-.71) WITH PARTLY "GREENIFIED" PURPLE SILICEOUS FRAG + FE-CLAY + BRIGHT ORANGE-YELLOW CLAY (SCALLITE?)
SPECIMEN (50.93-.99) WITH 1% FE-CLAY + 30% PALE GREEN LITHIC FRAGS (3-10mm)
51.15 } 30% PALE GREEN FRAGS
51.70
-.92 LIMONITE

YELLOWISH
QUARTZ-SERICITE-PYRITE
FOLIATED TUFF
VERY FISSILE
7% PALE EPIDOTE YELLOW WISPS
(< 1% BRIGHT YELLOW POWDER-CLAY)

55.75
56.00 5mm. GREY GOUGE
SLUMPED 5° < to core
56.50
} FOLIATION ALMOST PARALLEL TO CORE

SAMPLE INTERVAL	Assay result						SAMPLE NUMBER
	Cu %	Zn %	Au	Ag	Ba	Fe	
42.00 1.70 43.70	.17	.08	.001	.06	.10	>5.44	6364
	NOT SAMPLED						
51.70 2.40 54.10	.00	.03	.001	.02	.69	>3.35	6365
	NOT SAMPLED						

Hole No. F86S-8 .



Rock Description

} FOLIATION ALMOST PARALLEL TO CORE
58.20
58.40 } BROKEN BITS
58.80 } CRENULATED FOLIATION
} REGULAR + STEEPENING

YELLOWISH
QUARTZ- SERICITE- PYRITE
FOLIATED TUFF
SOFT, FISSILE
WITH 7% PALE YELLOW-EPIDOTE WISPS

61.30
SPECIMEN (61.45-.49) 3mm EPIDOTE ZONE LIKE CREME FRAG
61.63
BASALT BLOCK WITH 9mm FOLIATED GREEN TUFF AT 61.?3 WITH WHITE QZ + DARK CHLORITE INJECTION

YELLOWISH QUARTZ- SERICITE- PYRITE
FOLIATED TUFF

62.95
PALE GREENISH GREY GOUGE + BITS
63.35
} 50% YELLOWISH-GREENISH MATRIX
63.55
SPECIMEN (63.67-.83)½ HETEROGENEOUS FOLIATED GREEN TUFF
63.90
SPECIMEN (64.12-.25)
64.75
SPECIMEN (64.85-.97) IN SITU BRECCIATION of SILICIFIED ZONELETS WITH WHITE QZ INFUSION
65.78-.95 VERY PALE CREME FRAG.

PALE – MEDIUM GREEN
DACITIC TUFF
NOT FOLIATED
NO FRAGS
SILICIFIED ZONELETS

LIKE IN HOLE 4 (114.66 to END)
HOLE 3 (127.71 to END)

66.85
SPECIMEN (66.97- 67.07)
SPECIMEN (67.90-.98) DISTINCT WHITE QZ + DARK CHLORITE
68.52-.58 WHITE QZ + DARK CHLORITE INJECTION
68.62 LIMONITE STAIN + ON FRACTURES
68.87-.90 WHITE QZ + DARK CHLORITE
SPECIMEN (69.12-.28)
69.90
} 60-70% VERY PALE SWIRLS of EPIDOTE-SILICA-GREEN CHLORITE (LIKE INDISTINCT CREME FRAGS.)

SPECIMEN (70.79-.89)
71.10
} VUGGY TEXTURE ON DRILLED SURFACE (WEAKLY SHATTERED LOOK) EPIDOTE YELLOW ZONES LIKE INDISTINCT CREME FRAGS.

Assay result					

DRILL AND ASSAY LOG OF MINERALIZED PORTION OF DIAMOND DRILL HOLE F86U-1

Hole No. F86U-1.

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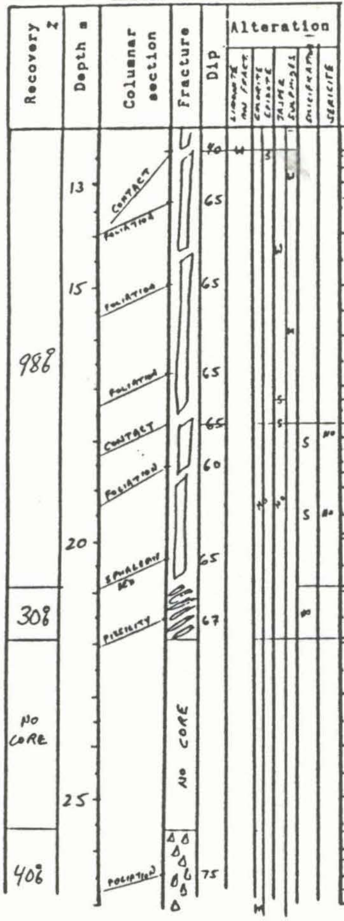

Rock Description (VOLUME PERCENTS)

BIOTITE – DACITE DIKE

- 12.40 7mm GREENISH BROWN FAULT EPIDOTE RIND
- SPECIMEN (12.70–.74) } DARK GREENISH-PURPLISH GREY WITH <1% PY
- SPECIMEN CHIP (13.30) }

SULPHIDE LAPILLI TUFF
DARK GREY
< 3% SULPHIDE FRAGS (PYRITE)
(0 to <<1% CHALCO)

- SPECIMEN (17.32–.44) WITH 2–5mm JASPER + WHITE QZ INJECTION
- 17.75 3cm BLEACHED RIND, 7cm JASPER + WHITE QZ.

MASSIVE SULPHIDE
- SPECIMENS (17.77–.98)%, (17.98–18.25)% } "YELLOW ORE" WITH 35% BARITE AS WISPS AND CLASTS (ROUNDED, ELONGATED, LAPILLI–PEBBLE)
- 18.25
- SPECIMEN (18.25–.70)% } "BLACK ORE"
  - 15 cm { BEDDED SPHALERITE WITH CHALCO LAMINATIONS
  - 30 cm { 25% ROUNDED PYRITE LAPILLI IN SPHALERITE RICH MATRIX
- 18.70

QUARTZ SULPHIDE TUFF
"SILICEOUS BLACK ORE"
>30% SULPHIDES AVE.
WITH 40% GREY TUFF FRAGS (1cm.)
- SPECIMEN (19.85–20.04)%
- 20.95

QUARTZ – SERICITE – PYRITE WITH 25% SPHAL.
FOLIATED TUFF (NOTE 30% RECOV.)
- 21.95

NO CORE RECOVERY
GOUGE, GRITTY, WITH FREQUENT VOIDS
(POSSIBLY OLD WORKINGS)

- 25.60
VERY PALE GREEN (BARREN) FOLIATED TUFF
- SPECIMEN CHIP (26.25)
- SPECIMEN CHIP (26.75)
(MEDIUM GREEN) BASALT BLOCK

From–to	Sample interval	Cu % (Cd %)	Zn % (Pb %)	Au opt (Co %)	Ag opt	Ba %	Fe %	Sample numbers
17.75–18.25	.50	6.20	1.36	.042	.48	20.43	17.72	6401
18.25–18.70	.45	1.22 ('')	23.72 (.06)	.049 (.008)	.87	7.56	19.40	6402
18.70–19.70	1.00	.72 (.03)	6.37	.041 (.001)	.49	4.43	8.84	6403
19.70–20.37	.67	.53 (.08)	6.72	.009 (.002)	.49	.89	7.75	6404
20.37–20.95	.58	.17 (.02)	3.64	.057 (.002)	.71	1.05	7.08	6405
20.95–21.95	1.00	.69 (.06)	14.67 (.06)	.031 (.002)	.55	2.85	9.74	6406

Hole No. F86U-1.

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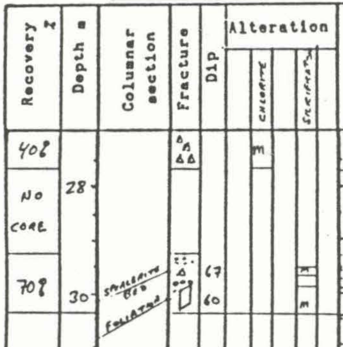

Rock Description (VOLUME PERCENT.)

BASALT BLOCK
- 27.71

NO CORE RECOVERY
(GOUGE)

- 29.35 } GRIT
- 29.56 } SPECIMEN (29.59–.66)% ; 10cm. QUARTZ – SERICITE – PYRITE FOLIATED TUFF WITH CHALCO + SPHAL.
- 29.66 } 29.76 } GRIT

QUARTZ – SERICITE PYRITE FOLIATED TUFF
- 30.48

END of HOLE

From–to	Sample interval	Cu %	Zn %	Au opt	Ag opt	Ba %	Fe %	Sample numbers
27.71–29.35	NOT SAMPLED							
29.56–29.66	.10	[illegible]	.60	.005	.21	.30	2.96	[illegible]
29.66–29.76				NOT SAMPLED				
29.76–30.48	.72	.03	.01	.001	.00	.07	>4.91	6408

Hole No. F86U-2 .-

DRILL AND ASSAY LOG OF MINERALIZED PORTION OF DIAMOND DRILL HOLE F86U-2

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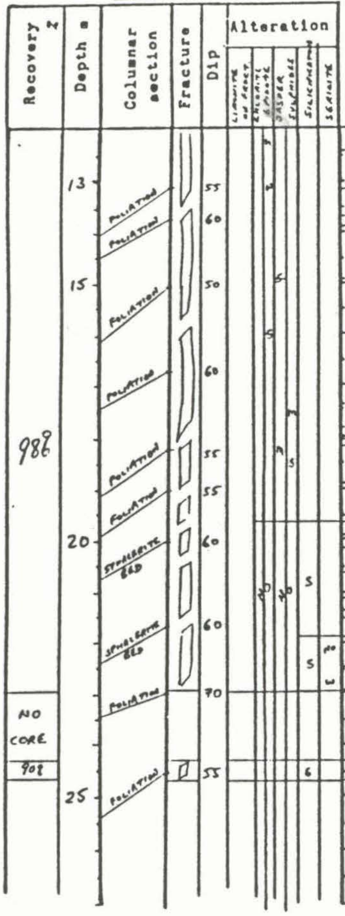


Rock Description (VOLUME PERCENTS)

SPECIMEN (12.75 - .58) DARK GREYISH WITH 5% PALE EPIDOTE + WHITE QZ FOLIATED FRAGS (1-5mm)

13.12 - .19 NO EPIDOTE FRAGS

13.49 - .54 NO EPIDOTE FRAGS

13.59 - .69 NO EPIDOTE FRAGS

13.88 ——— NO EPIDOTE FRAGS DARKER PURPLISH-BLACK

14.94 JASPER FRAG MINI-BED (3mm)

16.00 LARGE EPIDOTE COLOURED PUMICE FRAG (50X12mm) WITH LARGE PY FRAG (<1cm)

SULPHIDE LAPILLI TUFF

17.40 ——— 5% PALE BLUE QZ SPOTS (<2mm) 1-3% PYRITE DISSEM. + FRAGS (<3mm)

SPECIMEN (17.85 - .90)

18.10

18.18 ——— 18.18

SPECIMEN (18.18 - 31) ¼ WITH 1cm. BED of JASPER FRAGS WITH GREY BLUE & SPHAL

SPECIMEN (18.42 - 56) ¼ WITH CHALCO BED (2mm)

SPECIMEN (18.93 - .95) ¼ BARREN

18.93 ——— 18.93

19.68 1cm BLEACHED ALT. RIND ——— 19.68

SPECIMEN (19.68 - .96) ¼ } "SEMI-BLACK ORE"; CHALC + SPHAL. LAMINATIONS WITH 30% BARITE AS ELONGATED PEBBLES & WISPS

19.92 ——— 19.92

SPECIMEN (20.04 - .15) ¼ } BEDDED BARITE WITH 3 cm. SPHALERITE BED

20.15 ——— 20.15

SPECIMEN (20.68 - 21.14) ¼ } "YELLOW ORE"; CHALCO + SPHAL. LAMINATIONS WITH 15% BARITE AS WISPS AND ELONGATED LAPILLI

MASSIVE SULPHIDE

21.10 ——— 21.10

SPECIMEN (21.38 - .72) ¼ } "SEMI-BLACK ORE"; SPHAL. + CHALCO LAMINATIONS WITH 30% BARITE (AS ABOVE)

21.95 ——— 21.95

QUARTZ - SULPHIDE TUFF (>20% SULPHIDES) ↓ GRADES TO:

22.48 SPECIMEN (22.48 - .58) ¼ ——— 22.48

SPECIMEN (22.77 - .89) ¼ QUARTZ - SERICITE - PYRITE FOLIATED TUFF SCALY

22.95 ——— 22.95

VOID (POSSIBLY OLD WORKINGS)

24.38 ——— 24.38

QUARTZ - SERICITE - PYRITE FOLIATED TUFF

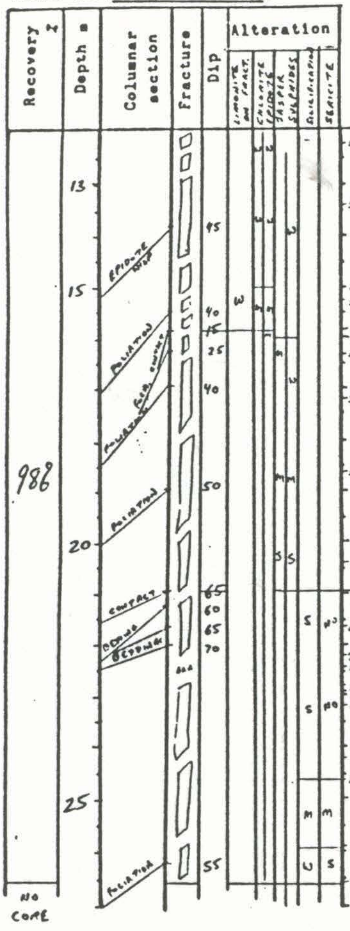
24.68 ——— 24.68

END of HOLE

SAMPLE INTERVAL	Cd % Cu %	Pb % Zn %	Ga % Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBERS
.75	.01	.78	.006	—	.85	>3.75	6421
.75	.32	.82	.001	.02	.50	>5.67	6422
.24	6.22	11.79	.034	.65	18.91	19.84	6423
.23	.76	1.90	.012	.15	48.73	.96	6424
.95	.08 7.80	.05 11.59	.004 .059	1.05	10.17	26.01	6425
.85	.11 4.37	.06 21.38	.006 .042	.89	12.07	17.95	6426
.53	.01 .33	2.71	.003 .009	.13	.83	5.73	6427
.47	.02 .27	3.31	.002 .009	.15	2.44	10.70	6428
.30	.03	.79	.009	.04	.42	>4.78	6429

Hole No. F86U-3.

DRILL AND ASSAY LOG OF MINERALIZED PORTION OF DIAMOND DRILL HOLE F86U-3



Rock Description (VOLUME PERCENTS)

CONTACT UNCLEAR

- SPECIMEN CHIP (12.85)
- SPECIMEN (13.45-.59)

GREENISH-GREY
DACITE DIKE WITH 5% BIOTITE
(WEAKLY FOLIATED)
<1% PY, FINE DISSEM.

- 15.00
- SPECIMEN (15.32-.40)
} GRADES TO FINE-GRAINED, CHLORITIC (CHILLED MARGIN)
- 15.85 SPECIMEN (15.82-.89) SPECIMEN CHIP (15.90) EPIDOTE FNG
- SPECIMEN (16.20-.15)
- SPECIMEN (16.35-.72) WITH ATTENUATED COPPER ON FRACT. SURFACES
- SPECIMEN (17.15-.28)
- SPECIMEN (18.28-.76) WITH JASPER SHOWING (1mm) + WITH 7% PALE BLUE QZ DOTS (<2mm)

SULPHIDE LAPILLI
TUFF
(DARK-PURPLISH-GREY)
3% PY

- SPECIMEN (20.46-.66)

(2% JASPER IN CLEAR QZ)

- 20.97 TOP: 1 WHITE QZ + EPIDOTE (? RHYOLITE SWIRLS) (NO SULF. FINE)
- SPECIMEN (20.97-30.48) 1/4
- SPECIMEN (21.40-.69) 1/4
- 21.69 SPECIMEN (20.69-.99) 1/4
- SPECIMEN (20.79-21.13) 1/4
- 22.19
- 22.29-.39 FISSILE, BROKEN SPHALERITE RICH (LIKE HOLE U-4; 20.95-21.95m)

"SEMI-BLACK ORE"
MASSIVE SULPHIDE
CHALCO + SPHALERITE RICH LAMINATIONS WITH 15-20% BARITE AS WISPS & CLASTS (FRAGMENTS LAPILLI-PEBBLE 1.5 C) (WITH LARGER CLASTS AT BOTTOM)

- 22.90
- 23.12 } MASSIVE SULPHIDE
- 24.00
- 24.75 } MASSIVE SULPHIDE

QUARTZ - SULPHIDE TUFF
"SILICEOUS BLACK ORE"
(> 30% SULPHIDES AVE.)

- 24.62

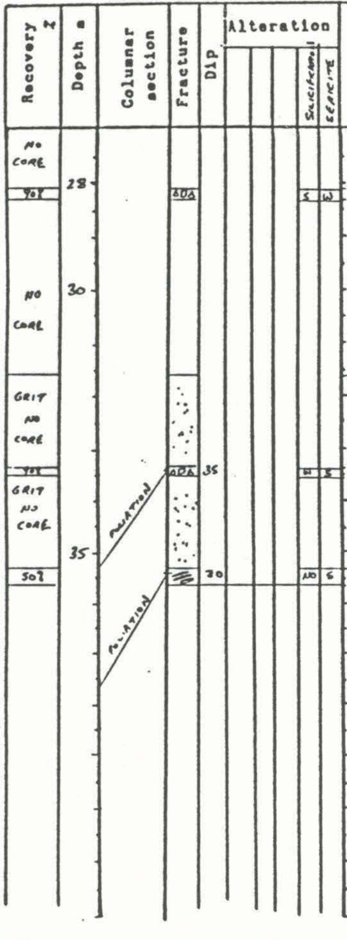
QUARTZ - SERICITE - PYRITE
FOLIATED TUFF

- 25.49
- 26.57 } CLEARLY FOLIATED

NO CORE RECOVERY
GOUGE, FOLIATED BITS

Sample interval		Cu %	Zn %	Au opt	Ag opt	Ba %	Fe %	Sample numbers
		Cd %	Pb %	Ga %				
19.92–20.97	1.25	.55	.17	.008	.06	.38	7.52	6441
20.97–21.69	.72	.11 10.49	19.53	.006 .155	1.87	5.87	20.32	6442
21.69–22.19	.50	.03 3.43	.06 9.97	.003 .016	.79	16.73	25.45	6443
22.19–22.87	.68	.06 .80	10.58	.002 .014	.15	.94	2.78	6444
22.87–23.72	.85	.05 1.52	12.89	.003 .016	.49	6.54	16.59	6445
23.72–24.62	.90	.03 .75	7.36	.002 .011	.25	1.39	7.27	6446
24.62–25.62	1.00	.28	.99	.025	.19	.66	6.54	6447
25.62–26.57	.95	.31	1.90	.010	.15	.63	5.07	6448

Hole No. F86U-3.



Rock Description (VOLUME PERCENTS)

NO CORE RECOVERY
GOUGE, FOLIATED BITS

- 28.15
- 28.35 QUARTZ - SERICITE - PYRITE FOLIATED TUFF

(POSSIBLY OLD WORKINGS)

NO CORE RECOVERY
(NOTHING RECOVERED OVER TWO 5' RUNS)

- 31.69

3cm. SHEARED Q-S-P (CAME FROM ABOVE IN RUN)
GRIT, VERY PALE GREENISH-GREY BITS
3cm. WHITE QZ WITH DARK CHLORITE, GROUND ROCK

- 33.38
- 33.53 QUARTZ - SERICITE - PYRITE F. TUFF (APPROXIMATE LOCATION IN HOLE)

GRIT, VERY PALE GREENISH-GREY BITS

- 35.29
- 35.66 VERY FISSILE, BROKEN PALE QUARTZ-SERICITE-PYRITE F. TUFF

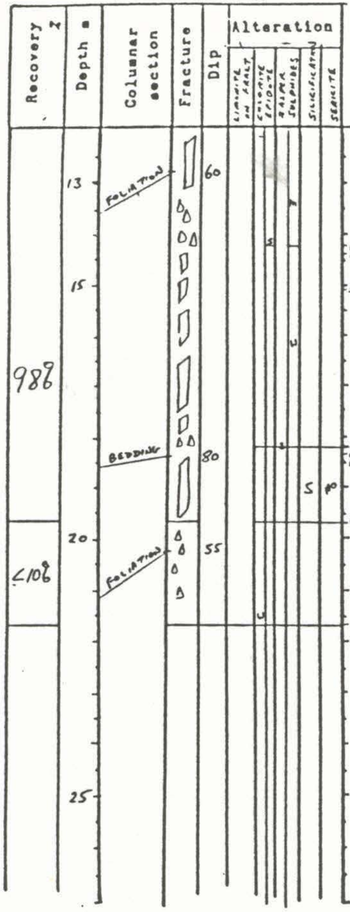
END of HOLE

Sample interval		Cu %	Zn %	Au opt	Ag opt	Ba %	Fe %	Sample numbers
28.15–28.35	.20	.02	.35	.001	.14	.88	>3.81	6449
33.38–33.53	.15	.00	.08	.002	.01	.19	>2.01	6450
35.29–35.66					–	–	–	

DRILL AND ASSAY LOG OF MINERALIZED PORTION OF DIAMOND DRILL HOLE F86U-4

Hole No. F86U-4.

Page 2 of 2.



Rock Description
(VOLUME PERCENTS)

SULPHIDE LAPILLI TUFF
DARK PURPLE
(NO DISTINCT WHITE FRAGS)
1% PY FRAGS

14.20 EPIDOTE ALT. RIND
14.30 CHILLED MARGIN FINE GRAINED

SPECIMEN (15.05-.13)

WEAKLY FOLIATED
GREENISH- GREY
DACITE DIKE WITH 5% BIOTITE
<1% PY, FINE DISSEM.

18.19 EPIDOTE RIND 2-5mm
18.35 SPECIMEN (18.19-.52)¾
18.52
18.35 } SPHAL + CHALCO. RICH LAMINATIONS WITH 20% BARITE "SEMI-BLACK ORE" AS WISPS + CLASTS (ELONGATED, LAPILLI) } SPHAL. RICH MATRIX WITH 20% PY CLASTS (ROUNDED, LAPILLI) "BLACK ORE" 18.19 18.52

} MASSIVE SULPHIDE WITH "SILICEOUS BLACK ORE" ZONES

MASSIVE SULPHIDE

19.69 19.69

} PALE GREY TUFF (BARREN)
21.00
} PALE GREEN TUFF
21.64

<10% CORE RECOVERY
(POSSIBLY OLD WORKINGS)

END of HOLE

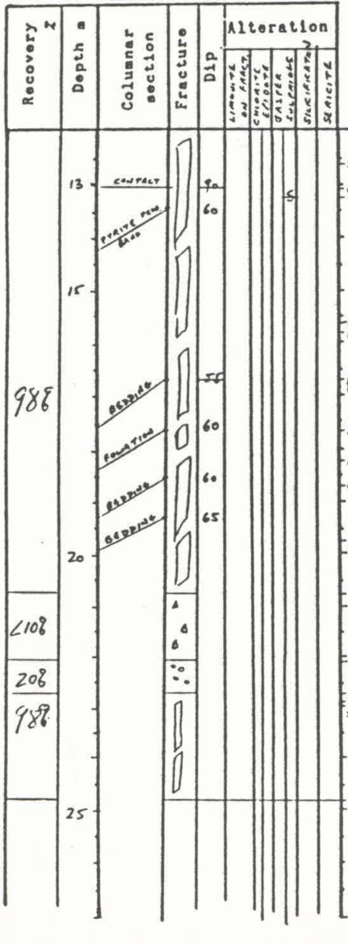
Assay result

	SAMPLE INTERVAL	Cd%	Cu %	Zn %	Ga%	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBER
18.19–18.52	.33	.10	3.95	19.09	.006	.105	1.69	11.13	19.30	6461
18.52–19.69	1.17	.06	.60	12.31	.005	.048	.99	.88	13.98	6462

DRILL AND ASSAY LOG OF MINERALIZED PORTION OF DIAMOND DRILL HOLE F86U-5

Hole No. F86U-5.

Page 2 of 2.



Rock Description
(VOLUME PERCENTS)

SPECIMEN CAP (12.66) } (NO FRAGS) MEDIUM BLUISH-PURPLE COLOUR
13.07
13.10 BAND of PY FRAGS (3mm wide)

DARK PURPLE
(INDISTINCT FRAGS)

SULPHIDE LAPILLI TUFF
<1% PYRITE

15.66
SPECIMEN (15.71-.76)
16.65 PY + CHALCO BED (9mm)
16.69 CHALCO BAND (5mm)
SPECIMEN (17.67-.73)
} WITH 5-7% PALE BLUE SILICEOUS SPOTS

18.24 ALTERATION RIND BLEACHED (1cm) MASSIVE SULPHIDE 18.24
JASPER + PALE SILICA BED (9mm)
SPECIMEN (18.20-.32)¾ } CHALCO RICH. WITH 20% BARITE AS WISPS + "YELLOW ORE" ELONGATED PEBBLES
18.69 18.69
SPECIMEN (18.32-.96)¼
SPECIMEN (18.96-19.14)¼
SPECIMEN (19.14-.34)¼
SPECIMEN (19.53-.91)¾
} SPHALERITE RICH. WITH <20% BARITE (AS WISPS, LAMINATIONS + MINOR, ELONGATED LAPILLI), ONE PE PEBBLE CONTAINING SULPHIDES "BLACK ORE"
19.74 19.74

QUARTZ - SULPHIDE TUFF
<30% SULPHIDES
20.74 20.74

} PALE GREY FOLIATED TUFF (WITH MINOR GREEN)
<10% CORE RECOVERY
(POSSIBLY OLD WORKINGS)
22.10
} MED. GREEN (BASALT BLOCK?) 20% RECOVERY
22.75
22.90 PALE GREEN FOLIATED LITHIC TUFF WITH <3% PY
SPECIMEN (23.00-.04)

BASALT BLOCK?
FINE GRAINED, UNIFORM
MEDIUM GREEN
(OR FOOTWALL AS IN HOLE 3)
SPECIMEN (24.00-.14)
24.81

END of HOLE

Assay result

	SAMPLE INTERVAL	Cd%	Cu %	Pb%	Zn %	Ga%	Au OPT	Ag OPT	Ba %	Fe %	SAMPLE NUMBER
18.24–18.69	.45		10.79		10.03		.099	1.29	12.60	16.54	6481
18.69–19.74	1.05	.12	1.00	.06	22.98	.005	.172	.88	11.99	17.09	6482
19.74–20.74	1.00	.04	1.03		9.97	.003	.064	.59	2.77	8.46	6483

APPENDIX III

Assay Certificates and Geochemical ICP Analyses for the 1986 Diamond Drilling Program

Attached are 18 pages of "Assay Certificates" and "Geochemical ICP Analyses" by Acme Analytical Labs., for 301 drill core samples from the 1986 surface and underground drilling program. These pages are arranged in sample number order, approximately. The samples were assayed or analyzed for Cu, Pb, Zn, Au, Ag, Fe, Ba. The last 4 pages of this appendix are gallium, germanium, cadmium and indium wt. % assay results for 43 assorted samples from holes F86S-2, 3, 4, 5 and F86U-1, 2, 3, 4, 5.

All results listed in this appendix are also listed in the drill logs of Appendix II (except Pb values less than 0.05 wt. %, and Ge, In values).

ACME ANALYTICAL LABORATORIES LTD.
852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6
PHONE 253-3158 DATA LINE: 251-1011

DATE RECEIVED: SEPT 25 1986
DATE REPORT MAILED: Oct 7/86

ASSAY CERTIFICATE

1.00 GRAM SAMPLE IS DIGESTED WITH 50ML OF 3-1-2 OF HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR. AND IS DILUTED TO 100ML WITH WATER. DETECTION FOR BASE METAL IS .01%. Ba by $LiBO_2$ fusion
- SAMPLE TYPE: CORES AU: 10 GRAM REGULAR ASSAY

ASSAYER: D. Toye DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-2868A PAGE 1

SAMPLE#	Cu %	Pb %	Zn %	Ag OZ/T	Fe %	Ba %	Au OZ/T
6002	2.52	.02	.07	1.84	34.47	3.99	.036
6003	.87	.02	.94	.54	11.12	23.39	.044
6004	2.24	.06	5.19	2.49	22.31	12.78	.040
6005	.11	.01	.71	.08	9.47	.60	.001
6006	.01	.01	.30	.03	3.40	.44	.001
6007	.01	.01	.23	.05	6.59	.30	.001
6008	.04	.01	.10	.05	7.53	.36	.001
6009	.86	.01	.04	.10	13.41	.38	.001
6010	.58	.01	.05	.07	12.73	.28	.001
6011	.11	.01	.30	.03	12.38	.16	.001
6012	.09	.01	.03	.06	11.72	.46	.001
6013	.25	.01	.11	.08	18.61	.45	.001
6014	.43	.01	.07	.07	7.65	.25	.001
6017	.29	.01	.01	.18	7.19	2.55	.001
6018	.81	.02	1.09	.37	3.26	4.43	.001
6019	.98	.03	.19	.16	9.96	4.91	.001
6020	2.14	.02	.16	.31	21.31	3.96	.001
6021	1.67	.02	.14	.44	18.72	2.96	.001
6022	.86	.01	.10	.29	15.22	2.91	.001
6023	1.34	.01	.13	.39	21.01	1.75	.001
6024	1.17	.02	.09	.38	23.92	3.06	.001
6025	.44	.01	.25	.08	8.80	.46	.001
6026	2.46	.03	.14	1.21	32.93	1.26	.001
6052	.62	.03	.12	1.34	28.91	3.38	.024
6054	.38	.10	12.61	1.57	9.79	14.79	.179
6107	2.15	.02	.15	.57	38.38	.20	.014
6108	1.53	.01	.07	.54	37.61	.51	.010
6109	1.62	.01	.05	.71	38.35	.26	.010
6110	3.39	.01	.15	1.35	37.50	.17	.018
6111	2.52	.01	.05	.96	37.98	.02	.022
6112	5.31	.01	.06	2.46	28.89	2.14	.026
6113	1.15	.01	.21	.49	17.38	5.49	.005
6114	.34	.02	1.94	.51	9.39	15.70	.036
6115	.64	.01	1.65	.60	11.92	1.18	.011
6116	.22	.01	.30	.09	8.17	.45	.002
6117	.11	.01	.24	.06	13.30	.45	.002

RAND VENTURES FILE # 86-2868A PAGE 2

SAMPLE#	Cu %	Pb %	Zn %	Ag OZ/T	Fe %	Ba %	Au OZ/T
6118	.02	.01	.01	.02	14.81	.27	.001
6119	.02	.01	.30	.03	8.49	.28	.001
6120	.03	.01	.14	.03	8.13	.46	.001
6123	.97	.04	1.25	.11	11.83	1.11	.006
6124	.60	.38	3.84	.28	22.45	6.25	.007
6125	1.15	.19	.78	.08	13.42	1.05	.004
6126	2.73	.11	2.35	1.10	20.58	2.93	.013
6127	.73	.02	.23	.13	20.88	1.25	.005
6128	1.16	.09	.36	.18	28.28	2.48	.008
6129	.59	.04	.24	.08	34.76	1.56	.014
6130	1.81	.08	.16	.06	26.42	.18	.006
6131	.70	.03	.25	.03	13.92	.60	.007
6132	.07	.01	.18	.02	15.24	.70	.002
6133	.13	.01	.10	.01	12.97	.34	.001
6134	.07	.01	.25	.02	21.30	.28	.001
6136	.08	.02	.17	.04	8.87	.12	.001
6137	.01	.01	.05	.03	5.74	.16	.001

ACME ANALYTICAL LABORATORIES LTD.   852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6   PHONE 253-3158   DATA LINE 251-1011

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: PULP

DATE RECEIVED: SEPT 25 1986 DATE REPORT MAILED: Oct 7/86 ASSAYER. D. Toye ..DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-2868

SAMPLE#	Mo PPM	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Ni PPM	Co PPM	Mn PPM	Fe %	As PPM	U PPM	Au PPM	Th PPM	Sr PPM	Cd PPM	Sb PPM	Bi PPM	V PPM	Ca %	P %	La PPM	Cr PPM	Mg %	Ba PPM	Ti %	B PPM	Al %	Na %	K %	W PPM
6002	4	23841	129	595	55.7	13	4	96	21.03	294	5	ND	1	7	3	280	15	14	.07	.011	3	1	.03	8	.01	5	.04	.01	.05	1
6003	12	8410	182	8702	17.3	18	6	48	11.12	431	5	ND	1	18	54	91	6	13	.08	.023	4	1	.02	15	.01	3	.10	.01	.05	1
6025	43	4271	42	2325	2.6	12	6	68	8.75	44	5	ND	1	7	4	2	2	14	.08	.028	5	3	.02	5	.01	6	.13	.01	.03	1
6026	13	22711	248	1214	37.0	14	8	98	20.61	547	5	ND	1	4	3	89	15	10	.06	.013	2	3	.02	5	.01	3	.04	.02	.02	1
6052	7	6088	227	1090	41.6	21	11	89	19.14	54	5	ND	1	11	8	2	18	14	.09	.024	2	5	.03	8	.02	2	.15	.01	.11	1
6054	63	3379	738	99999	44.2	12	6	67	9.14	422	5	2	1	17	594	194	2	4	.15	.001	4	2	.02	27	.03	3	.26	.01	.09	1
6107	4	19825	134	1043	16.9	11	5	81	22.00	1037	5	ND	1	3	5	376	7	20	.01	.001	2	1	.02	4	.01	2	.01	.01	.02	1
6108	4	13992	76	471	16.0	10	9	80	22.74	416	5	ND	1	3	2	197	15	14	.01	.001	2	2	.02	4	.01	3	.01	.01	.01	1
6109	3	14621	48	306	21.7	9	7	83	22.78	402	5	ND	1	2	1	243	9	12	.01	.001	2	1	.02	2	.01	2	.01	.01	.01	1
6110	5	33223	64	1270	43.6	6	1	87	23.13	332	5	ND	1	2	6	104	14	8	.01	.001	2	1	.02	5	.01	2	.01	.01	.01	1
6111	3	23886	54	304	30.7	4	10	66	19.91	228	5	ND	1	1	3	15	14	5	.01	.001	2	1	.02	1	.01	6	.01	.01	.01	1
6112	7	49647	50	454	79.6	11	1	74	19.79	151	5	ND	1	5	3	21	24	8	.01	.001	2	3	.02	4	.01	2	.01	.01	.01	1
6129	9	5150	309	2111	2.6	13	9	63	20.06	427	5	ND	1	7	6	9	12	3	.02	.001	2	1	.02	5	.01	4	.03	.01	.03	1
6130	24	17223	721	1390	2.1	13	10	67	22.01	376	5	ND	1	6	5	8	9	3	.01	.001	2	4	.02	5	.01	2	.06	.01	.04	1
STD C	21	56	39	133	7.0	70	29	1019	3.96	43	18	8	33	48	17	15	19	63	.48	.108	39	59	.88	179	.08	37	1.73	.06	.14	12

ACME ANALYTICAL LABORATORIES LTD.
852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6
PHONE 253-3158 DATA LINE 251-1011

DATE RECEIVED: SEPT 25 1986
DATE REPORT MAILED: Oct. 7/86..

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE AU* ANALYSIS BY AA FROM 10 GRAM SAMPLE.

ASSAYER: .D Toye.DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-2868B PAGE 1

SAMPLE#	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Fe %	Ba PPM	Au* PPB
6001	58	15	3860	.4	3.22	527	11
6015	4398	156	6702	6.4	8.11	25	230
6016	694	5	386	1.4	4.83	113	6
6027	12203	11	3032	8.9	3.81	11	95
6028	451	33	1156	1.5	8.13	179	18
6029	41	15	766	.3	2.94	560	1
6030	24	12	1681	.6	2.70	587	1
6031	21	126	4784	7.1	2.99	278	1
6032	155	2	329	.1	5.16	59	1
6135	123	6	1089	.1	5.93	351	1

ACME ANALYTICAL LABORATORIES LTD.
852 E. HASTINGS, VANCOUVER B.C.
PH: (604)253-3158 COMPUTER LINE:251-1011

DATE RECEIVED NOV 7 1986
DATE REPORTS MAILED Nov 10/86

GEOCHEMICAL ASSAY CERTIFICATE

SAMPLE TYPE : PULP
BA* - .10GM SAMPLE ARE FUSED WITH .66M LIBO2 AND DISSOLVED IN 50ML 5% HNO3.

ASSAYER D Toye DEAN TOYE . CERTIFIED B.C. ASSAYER

RAND VENTURES FILE# 86-2868BR PAGE# 1

SAMPLE	TOTAL Ba* ppm
6001	9085
6015	26000
6016	11200
6027	3731
6028	2825
6029	14700
6030	13400
6031	41400
6032	20800
6135	1711

ACME ANALYTICAL LABORATORIES LTD. 852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6 PHONE 253-3158 DATA LINE: 251-1011

ASSAY CERTIFICATE

1.00 GRAM SAMPLE IS DIGESTED WITH 50ML OF 3-1-2 OF HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR.
AND IS DILUTED TO 100ML WITH WATER. DETECTION FOR BASE METAL IS .01%.
\- SAMPLE TYPE: ROCK CHIPS AU* 10 GRAM REGULAR ASSAY BA* FUSED, .6 GM LIBO2 & DISSOLVED IN 50 ML 5% HNO3.

DATE RECEIVED: OCT 2 1986 DATE REPORT MAILED: Oct 15/86 ASSAYER. D. Toye. DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-2986A

SAMPLE#	Cu %	Pb %	Zn %	Ag OZ/T	Fe %	Au OZ/T	Ba %
6153	2.47	.01	.04	.44	17.64	.005	.35
6154	2.52	.01	.07	1.61	36.32	.020	.14
6155	3.69	.01	.13	1.56	34.92	.018	.16
6156	2.63	.01	.04	1.37	37.13	.038	.02
6157	2.25	.01	.05	.93	38.80	.016	.04
6158	4.05	.01	.06	1.71	37.58	.028	.20
6159	1.19	.01	.02	.49	21.05	.007	3.23
6160	1.29	.01	1.09	.36	10.47	.037	13.59
6161	.79	.01	1.49	.31	10.73	.015	6.99
6162	5.62	.01	.60	.71	39.51	.027	.76
6163	1.78	.01	.34	.37	14.83	.009	2.32
6164	1.48	.01	.26	.18	11.07	.006	3.57
6165	.90	.03	4.64	.91	10.02	.015	9.95
6166	.86	.05	7.35	1.03	16.92	.039	3.03
6167	.91	.16	4.52	.84	14.41	.038	7.27
6168	.87	.06	2.19	.28	11.67	.059	1.91
6169	1.61	.02	.79	.07	21.72	.006	1.04
6170	4.06	.58	9.48	1.72	14.09	.022	20.96
6171	5.30	.08	11.70	1.13	24.64	.032	12.60
6172	1.92	.03	3.68	.32	17.98	.074	8.73
6173	1.94	.02	1.97	.19	17.74	.010	1.91
6174	4.98	.22	6.12	1.46	34.39	.061	5.66
6176	.69	.01	.27	.07	14.80	.004	1.18
6177	.05	.01	.13	.04	13.84	.002	.90
6178	.09	.01	.04	.01	6.57	.001	.20
6179	.01	.01	.13	.02	9.99	.001	.18

ACME ANALYTICAL LABORATORIES LTD. 852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6 PHONE 253-3158 DATA LINE 251-1011

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE AU* ANALYSIS BY AA FROM 10 GRAM SAMPLE. . BA* NAOH FUSION. EDTA LEACH AND ICP ANALYSIS.

DATE RECEIVED: OCT 2 1986 DATE REPORT MAILED: Oct 14/86 ASSAYER. D. Toye...DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-2986 PAGE 1

SAMPLE#	Mo PPM	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Ni PPM	Co PPM	Mn PPM	Fe %	As PPM	U PPM	Au PPM	Th PPM	Sr PPM	Cd PPM	Sb PPM	Bi PPM	V PPM	Ca %	P %	La PPM	Cr PPM	Mg %	Ba PPM	Ti %	B PPM	Al %	Na %	K %	W PPM	Au* PPB	Ba* PPM
6152	4	497	101	5879	.5	1	3	93	1.34	10	5	ND	1	8	162	6	2	5	.31	.158	6	1	.02	43	.01	4	.34	.03	.21	1	3	16600

ACME ANALYTICAL LABORATORIES LTD. 852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6 PHONE 253-3158 DATA LINE 251-1011

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE

DATE RECEIVED: OCT 2 1986 DATE REPORT MAILED: Oct 14/86 ASSAYER. D. Toye...DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-2986 PAGE 1

SAMPLE#	Mo PPM	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Ni PPM	Co PPM	Mn PPM	Fe %	As PPM	U PPM	Au PPM	Th PPM	Sr PPM	Cd PPM	Sb PPM	Bi PPM	V PPM	Ca %	P %	La PPM	Cr PPM	Mg %	Ba PPM	Ti %	B PPM	Al %	Na %	K %	W PPM
6153	17	24037	43	410	15.5	8	8	22	17.98	112	5	ND	2	1	5	24	2	5	.01	.031	2	1	.02	4	.01	2	.15	.05	.09	1
6154	3	22063	80	613	50.1	7	2	34	18.39	408	5	ND	2	2	6	103	2	10	.01	.006	5	1	.02	2	.01	2	.01	.04	.01	1
6155	2	31893	50	1176	48.6	6	2	21	17.57	341	5	ND	1	1	10	41	2	7	.01	.001	6	1	.02	2	.01	2	.01	.03	.02	1
6156	1	23554	46	345	43.4	5	2	17	19.09	276	5	ND	2	1	5	7	2	3	.01	.001	2	1	.02	2	.01	6	.01	.04	.01	1
6157	1	20260	41	400	29.2	5	2	14	18.31	298	5	ND	1	1	4	30	4	5	.01	.001	5	2	.02	2	.01	2	.01	.04	.01	1
6158	3	36303	61	512	55.4	6	2	16	18.91	271	5	ND	1	1	6	46	5	5	.01	.001	11	1	.02	2	.01	2	.02	.04	.01	1
6159	6	10746	65	142	15.4	2	2	14	17.17	227	5	ND	2	7	1	16	6	2	.01	.003	2	1	.02	3	.02	2	.14	.05	.05	1
6160	17	11820	109	10408	11.3	18	3	15	9.47	270	5	ND	1	20	53	37	2	5	.01	.002	2	1	.01	4	.05	2	.22	.03	.06	1
6162	2	47605	58	5351	22.7	7	2	25	19.93	518	5	ND	2	4	29	30	2	2	.01	.001	2	1	.02	4	.01	11	.02	.04	.02	1
6167	23	7868	1405	50994	27.8	12	2	15	11.43	407	5	14	1	17	378	45	2	4	.03	.001	3	1	.01	14	.03	2	.20	.04	.05	1
6170	36	37301	5246	99999	59.2	13	2	51	11.73	762	5	ND	1	33	467	228	2	12	.02	.001	2	1	.03	6	.01	2	.11	.04	.03	1
6171	42	44377	576	99999	35.1	21	1	39	17.80	707	7	ND	2	11	535	121	2	6	.01	.001	2	1	.02	6	.01	2	.03	.05	.02	1
6172	31	16891	248	39824	9.9	15	2	26	15.48	512	5	ND	1	12	149	56	2	5	.01	.001	3	1	.01	11	.01	2	.06	.04	.03	1
6173	26	17399	217	20180	6.3	11	2	21	14.50	322	7	ND	2	13	73	33	2	2	.01	.001	2	2	.01	42	.01	2	.09	.04	.05	1
6174	22	41625	1735	70385	44.6	20	2	27	21.26	448	5	ND	2	11	239	93	45	2	.01	.001	2	3	.02	6	.01	2	.02	.05	.02	1
6176	28	6117	60	2458	1.8	8	2	11	10.99	120	5	ND	1	11	4	12	10	2	.01	.002	2	2	.01	40	.01	2	.14	.03	.07	1
STD C	20	56	37	128	6.9	66	27	990	3.92	39	18	6	32	46	17	15	19	65	.48	.100	34	55	.88	169	.08	35	1.72	.09	.13	12

ACME ANALYTICAL LABORATORIES LTD. 852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6 PHONE 253-3158 DATA LINE 251-1011

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE

DATE RECEIVED: OCT 9 1986 DATE REPORT MAILED: Oct 22/86 ASSAYER. D. Toye...DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-3140A PAGE 1

SAMPLE#	Mo PPM	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Ni PPM	Co PPM	Mn PPM	Fe %	As PPM	U PPM	Au PPM	Th PPM	Sr PPM	Cd PPM	Sb PPM	Bi PPM	V PPM	Ca %	P %	La PPM	Cr PPM	Mg %	Ba PPM	Ti %	B PPM	Al %	Na %	K %	W PPM
6068	19	14078	194	3955	2.0	3	1	15	7.67	54	5	ND	1	4	15	10	2	3	.04	.005	2	1	.16	3	.01	2	.28	.05	.03	1
6105	10	12963	208	11342	10.0	1	3	18	2.26	17	5	ND	1	3	84	7	2	2	.02	.007	3	1	.01	8	.01	3	.22	.02	.11	1
6205	10	15852	28	295	14.7	8	7	16	18.41	46	6	ND	2	5	1	5	3	5	.17	.030	3	1	.02	2	.08	2	.21	.05	.13	1
6220	13	58228	100	2856	23.3	10	2	28	24.21	1162	5	ND	1	9	19	144	36	5	.01	.002	4	1	.02	3	.01	2	.02	.05	.01	1
6221	13	59825	136	6181	85.9	9	2	31	20.45	1377	5	ND	1	10	45	176	66	20	.02	.005	3	1	.01	3	.01	2	.02	.04	.01	1
6223	55	75390	214	53452	196.8	16	3	65	16.48	505	5	ND	1	14	320	204	181	31	.03	.014	6	6	.01	3	.01	2	.03	.04	.01	1
6226	6	14771	15	1869	2.6	4	5	247	4.94	28	5	ND	1	26	11	4	2	28	.42	.025	3	4	.48	6	.16	7	.87	.06	.05	1
6227	13	91281	196	5254	208.2	15	2	14	16.27	1037	5	ND	1	10	44	248	301	20	.04	.025	4	2	.01	3	.01	2	.04	.04	.01	1
6230	1	2836	45	513	2.6	2	1	2	.65	7	5	ND	1	150	7	6	2	7	.02	.008	2	1	.01	28	.01	2	.02	.01	.01	1
6233	10	14436	40	4144	.9	4	1	24	5.12	180	5	ND	1	5	17	8	2	1	.81	.001	2	3	.01	5	.02	7	1.46	.04	.01	1
STD C	21	59	39	132	6.7	66	27	974	3.95	38	18	7	33	47	17	14	20	65	.48	.097	37	54	.88	176	.08	37	1.72	.09	.13	13

— Assay required for correct result <u>for</u> Cu >10,000 ppm
Zn > 20,000 ppm
Ag > 34 ppm

ACME ANALYTICAL LABORATORIES LTD. 852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6 PHONE 253-3158 DATA LINE 251-1011

GEOCHEMICAL/ASSAY CERTIFICATE

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE AU* ANALYSIS BY AA FROM 10 GRAM SAMPLE. AU* ANALYSIS BY AA FROM 10 GRAM SAMPLE.

DATE RECEIVED: OCT 22 1986 DATE REPORT MAILED: Oct 27/86 ASSAYER.........DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-3329 PAGE 1

SAMPLE#	Mo PPM	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Ni PPM	Co PPM	Mn PPM	Fe %	As PPM	U PPM	Au PPM	Th PPM	Sr PPM	Cd PPM	Sb PPM	Bi PPM	V PPM	Ca %	P %	La PPM	Cr PPM	Mg %	Ba PPM	Ti %	B PPM	Al %	Na %	K %	W PPM	Au* PPB	Au OZ/T	Ba* PPM
6151	3	107	12	2224	.2	1	5	4156	1.78	3	6	ND	1	12	2	2	2	8	.37	.126	6	1	.13	723	.29	4	.49	.01	.14	1	5	-	6641
6175	1	698	129	1067	2.0	10	26	882	5.01	16	5	ND	1	80	5	2	2	156	1.11	.040	5	19	2.31	315	.37	5	2.99	.02	.01	1	69	-	1179
6180	1	15	47	113	.1	3	3	274	1.54	6	5	ND	1	14	1	2	2	9	.13	.021	5	3	.80	172	.11	2	1.08	.04	.05	1	2	-	491
6181	2	28	63	829	1.8	4	7	238	4.10	69	5	ND	1	15	3	2	2	10	.22	.035	4	3	1.03	10	.04	7	1.29	.04	.14	1	20	-	6045
6182	3	24	93	376	3.3	4	8	188	5.63	120	5	ND	1	12	1	6	2	6	.32	.061	4	3	.74	7	.12	10	.95	.03	.12	1	36	-	5386
6183	4	15	27	454	1.6	2	7	141	2.54	43	5	ND	1	34	1	2	2	10	.68	.085	4	1	.35	19	.24	9	1.16	.03	.21	1	40	-	5170
6235	38	13805	61	2679	7.2	3	54	47	11.47	180	5	ND	1	3	15	9	2	2	.03	.001	2	1	.05	3	.01	2	.16	.02	.06	1	210	-	1859
6237	25	7195	105	12525	9.9	5	30	54	10.30	399	5	ND	1	4	67	27	2	2	.25	.003	2	1	.14	6	.01	2	.65	.03	.06	1	240	-	16100
6240	32	26128	530	2798	12.5	1	101	45	11.87	373	5	ND	1	11	8	16	2	2	.03	.001	2	1	.07	3	.01	4	.15	.01	.07	1	-	.015	16600
6241	51	2260	238	877	3.0	1	16	46	13.80	107	5	ND	1	2	3	4	6	2	.02	.001	2	1	.02	2	.01	2	.11	.01	.07	1	106	-	2898
6242	27	6081	518	2450	4.7	1	27	38	10.21	180	5	ND	1	15	6	6	2	1	.03	.003	2	1	.02	46	.01	2	.12	.01	.07	1	-	.005	30500
6243	34	19803	185	2355	8.3	3	81	59	19.98	231	5	ND	1	4	7	6	2	2	.02	.001	2	1	.02	4	.01	2	.06	.01	.05	1	-	.008	5182
6244	14	2196	178	1270	2.5	2	12	32	7.22	110	5	ND	1	15	3	3	2	1	.02	.001	2	2	.02	4	.01	3	.12	.01	.05	1	-	.003	25900
6245	42	9964	700	2569	6.9	1	43	57	17.53	136	8	ND	1	8	7	7	2	3	.02	.001	2	1	.03	14	.01	3	.10	.01	.06	1	-	.005	15400
6246	32	3767	376	1735	5.2	1	21	49	12.75	61	5	ND	1	4	5	2	8	2	.02	.001	2	1	.12	10	.01	4	.19	.01	.06	1	-	.004	5390
6248	45	9991	409	1427	6.5	4	44	57	18.02	112	6	ND	2	3	4	6	2	3	.03	.001	2	1	.11	4	.01	2	.16	.02	.04	1	-	.006	2747
6249	42	588	686	2480	3.2	4	10	57	17.65	124	5	ND	1	3	7	4	6	3	.11	.001	3	1	.02	3	.01	4	.21	.01	.04	1	-	.003	8748
6250	33	688	679	4733	3.9	7	10	57	17.28	132	5	ND	1	4	15	2	12	3	.08	.001	4	1	.02	5	.01	2	.16	.01	.04	1	-	.004	9327
6251	30	1387	227	2047	2.9	5	10	53	15.01	172	5	ND	1	6	6	3	4	2	.07	.001	2	1	.02	3	.01	2	.16	.01	.05	1	-	.005	12900
6252	39	3057	351	2207	3.4	6	18	48	13.10	193	5	ND	1	9	7	2	6	2	.12	.001	2	1	.02	19	.01	8	.25	.01	.06	1	-	.003	18200
6255	25	756	707	2140	1.9	6	9	48	13.21	48	5	ND	1	5	6	3	6	2	.11	.002	4	1	.03	6	.01	3	.21	.01	.05	1	-	.001	6951
6256	22	356	707	1285	2.6	3	17	57	16.47	110	5	ND	1	2	4	9	8	3	.25	.001	4	1	.03	3	.01	2	.50	.02	.05	1	57	-	9787
6257	20	8349	628	2165	3.8	1	38	64	10.54	437	5	ND	1	3	7	26	2	2	.32	.001	2	1	.02	6	.01	9	.64	.01	.04	1	-	.003	16500
6259	18	2186	616	6648	5.2	7	14	51	10.94	310	5	ND	1	3	31	20	2	3	.24	.003	5	1	.13	6	.02	2	.58	.03	.04	1	126	-	9448
6266	21	594	149	12086	1.8	1	7	205	3.20	50	5	ND	1	9	51	2	2	3	.24	.071	2	1	.58	14	.03	6	.78	.05	.07	1	-	.002	4669
6267	5	56	97	1250	.4	1	7	454	3.00	35	5	ND	1	10	3	2	2	6	.27	.089	2	1	1.36	29	.02	2	1.45	.05	.06	1	52	-	5654
6269	2	20	50	426	.7	1	7	521	2.92	32	5	ND	1	15	1	2	2	9	.42	.083	2	1	1.73	35	.07	7	1.90	.04	.05	1	38	-	8219
6271	6	177	228	3423	3.1	1	10	158	3.05	41	5	ND	1	14	14	2	2	7	.54	.071	2	1	.53	16	.12	5	1.05	.06	.04	1	92	-	8608
6278	5	62	221	1717	4.9	1	7	54	3.07	75	5	ND	1	13	4	4	2	7	.97	.076	2	2	.23	17	.11	5	1.34	.06	.03	1	220	-	16100
6279	6	97	989	2534	7.7	1	8	74	2.51	72	5	2	1	17	6	3	2	6	.62	.083	2	1	.36	19	.13	9	.90	.06	.05	1	270	-	8681
6280	10	285	1184	5441	3.9	1	13	160	3.33	139	5	ND	1	16	16	3	2	6	.42	.080	2	1	.58	20	.10	4	.89	.06	.06	1	-	.004	4246
6281	12	278	440	7348	3.1	1	13	184	2.53	81	5	ND	1	14	25	2	2	6	.56	.074	2	1	.49	27	.09	4	1.17	.05	.07	1	-	.002	10000
6282	36	1106	819	17881	6.2	1	9	65	3.18	177	5	ND	1	11	67	5	2	3	.29	.058	2	1	.14	12	.07	6	.43	.04	.08	8	-	.006	5148
6283	7	70	362	2943	3.5	1	9	95	2.75	81	5	ND	1	16	7	2	2	5	.45	.084	2	1	.41	20	.12	12	.77	.06	.12	1	260	-	7547
6284	2	17	76	358	2.3	1	7	125	3.89	68	5	ND	1	19	1	2	2	6	.49	.080	2	1	.57	16	.16	8	.85	.05	.12	1	83	-	7537
STD C/AU-R	21	57	41	132	6.9	70	30	1013	3.95	40	18	8	33	48	17	15	16	63	.48	.103	36	59	.88	179	.08	36	1.72	.06	.14	14	490	-	-

—— Assay required for correct result for Cu > 10,000 ppm.

ACME ANALYTICAL LABORATORIES LTD.
852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6
PHONE 253-3158 DATA LINE: 251-1011

DATE RECEIVED: OCT 9 1986
DATE REPORT MAILED: Oct.22/86..

ASSAY CERTIFICATE

1.00 GRAM SAMPLE IS DIGESTED WITH 50ML OF 3-1-2 OF HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR.
AND IS DILUTED TO 100ML WITH WATER. DETECTION FOR BASE METAL IS .01%.
- SAMPLE TYPE: CORES, AU: 10 GRAM REGULAR ASSAY Ba*- TOTAL

ASSAYER: .DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-3140A PAGE 1

SAMFLE#	Cu %	Fb %	Zn %	Ag OZ/T	Fe %	Au OZ/T	Ba* %
6068	1.61	.02	.44	.05	8.14	.001	.11
6069	1.61	.01	.07	.03	8.51	.003	.18
6070	.63	.01	.02	.01	8.10	.001	.26
6071	.93	.01	.13	.02	13.60	.012	.29
6072	.91	.01	.37	.04	15.60	.004	.80
6105	1.46	.03	1.23	.31	2.45	.001	.68
6106	1.30	.01	.42	.15	4.34	.001	.39
6205	1.78	.01	.03	.47	23.43	.027	.33
6206	.94	.01	.07	.20	22.83	.016	.39
6207	1.26	.01	.01	.30	11.90	.010	.50
6216	.15	.01	.41	.06	4.97	.003	.30
6217	1.25	.02	23.10	.40	9.86	.019	11.39
6220	9.25	.02	.35	.75	32.40	.027	5.15
6221	8.50	.02	.70	2.60	29.38	.056	7.01
6222	10.49	.04	12.02	5.21	13.38	.027	21.56
6223	13.77	.04	7.34	6.42	19.80	1.010	13.79
6224	6.96	.04	.67	1.91	24.67	.039	.78
6226	1.69	.01	.20	.09	5.36	.008	16.00
6227	18.86	.03	.60	10.19	20.58	.031	12.23
6228	14.38	.03	1.05	6.11	19.33	.056	16.93
6229	10.48	.05	4.78	6.78	11.26	.034	26.37
6230	.29	.01	.06	.10	.64	.011	47.32
6231	7.59	.04	7.04	4.61	20.79	.016	19.41
6232	2.19	.01	3.93	.10	11.10	.005	1.16
6233	1.54	.01	.44	.05	5.19	.003	2.43

ACME ANALYTICAL LABORATORIES LTD.
852 E. HASTINGS, VANCOUVER B.C.
FH: (604)253-3158 COMPUTER LINE:251-1011

DATE RECEIVED JAN 9 1987
DATE REPORTS MAILED Jan 15/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER _____ __DEAN TOYE . CERTIFIED B.C. ASSAYER

FORMOSA RESOURCES FILE# 86-3329 R PAGE# 1

SAMFLE	Cu %
6235	1.45

ACME ANALYTICAL LABORATORIES LTD.
852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6
PHONE 253-3158 DATA LINE 251-1011

DATE RECEIVED: OCT 9 1986
DATE REPORT MAILED: Oct.22/86.

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE AU* ANALYSIS BY AA FROM 10 GRAM SAMPLE. BA* TOTAL

ASSAYER: DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-3140 PAGE 1

SAMFLE#	Cu FFM	Fb FFM	Zn FFM	Ag FFM	Fe %	Au* FFB	Ba* FFM
6103	47	15	7145	.8	2.68	1	15400
6104	884	227	17448	5.1	1.84	8	21900
6144	354	5	531	.3	2.62	1	282
6218	7963	13	2886	.7	5.87	82	4400
6219	45796✓	41	8057	22.1	16.12	465	6155
STD C	60	39	133	7.2	3.94	-	-

✓ Assay required for correct result

ACME ANALYTICAL LABORATORIES LTD.
8 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6
P IE 253-3158 DATA LINE 251-1011

DATE RECEIVED: NOV 10 1986

DATE REPORT MAILED: Nov 14/86..

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H20 AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE AU# ANALYSIS BY AA FROM 10 GRAM SAMPLE. BA# - TOTAL

ASSAYER: DEAN TOYE. CERTIFIED B.C. ASSAYER.

RAND VENTURES FILE # 86-3621 PAGE 1

SAMPLE#	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Fe %	Au* PPB	Ba* PPM
6051	276	124	7966	1.3	4.11	194	12141
6053	212	35	1038	45.0	4.21	1470	99999 ✓
6055-6058	83	12	483	.2	3.62	23	7280
6059-6062	5	9	209	.1	4.15	10	3941
6063-6067	285	17	264	.3	2.42	15	3956
6073	1698	34	755	.3	9.69	95	3623
6074	1514	20	885	.4	4.04	70	1747
6075	1363	18	268	.3	5.11	58	1361
6076	3262	49	1288	1.7	7.71	113	2715
6077	817	34	705	.6	6.69	102	3194
6078	2828	68	3801	2.4	7.40	152	4205
6079	1309	34	405	.6	9.46	86	2476
6080	1496	76	250	.9	8.89	94	4166
6081	2008	65	398	.8	8.26	102	2406
6082	990	156	1149	.4	6.56	97	892
6083	152	61	323	.2	3.82	65	824
6084	3488	40	710	1.0	5.23	100	1141
6085	257	36	328	.7	6.55	1	61
6101	32	40	567	3.5	2.84	10	8318
6102	898	80	43876 ✓	10.5	.74	1	42820
6121-6122	293	25	908	.3	4.74	4	547
6138	13	77	313	1.3	1.80	1	6264
6139	29	119	933	1.7	3.07	34	6655
6140	31	161	601	2.4	2.60	56	5627
6141	13	26	283	1.4	2.43	21	3400
6142	186	9	201	.5	2.86	6	1754
6143	1082	5	286	.2	3.07	1	616
6184	19	3	214	.1	2.93	1	777
6185	338	184	194	.4	2.18	11	603
6201	1133	5	2646	3.1	3.52	9	8230
6202	48	9	6039	.3	2.34	5	18376
6203	641	4	6631	.8	2.61	31	17900
6204	13106	16	218	6.0	4.01	125	5021
6208	356	11	726	.4	8.32	12	1348
6210	303	5	2553	.5	5.79	5	91
6211-6212	26	32	158	.7	2.85	23	5493
STD C/AU-R	59	37	133	7.0	3.98	495	-

✓ Assay suggested.

ACME ANALYTICAL LABORATORIES LTD. DATE RECEIVED JAN 13 1987
8 E. HASTINGS, VANCOUVER B.C.
Ph. (604)253-3158 COMPUTER LINE:251-1011 DATE REPORTS MAILED Jan 20/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER D Toye DEAN TOYE , CERTIFIED B.C. ASSAYER

FORMOSA RESOURCE FILE# 86-4020 R PAGE# 1

SAMPLE	Cu %	Pb %	Zn %	Ag oz/t	Au oz/t	Ba %
6301	2.20	.02	.94	.70	-	-
6302	6.17	.04	.79	1.92	-	-
6303	1.66	.32	6.59	.30	.035	18.35
6304	1.65	.34	.50	.14	.037	15.13
6351	-	-	-	-	.141	-
6361	-	-	-	-	.062	-
6362	-	-	-	-	.062	-

ACME ANALYTICAL LABORATORIES LTD. DATE RECEIVED: DEC 19 1986
852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6
PHONE 253-3158 DATA LINE 251-1011 DATE REPORT MAILED: Jan. 8/87..

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE AU* ANALYSIS BY AA FROM 10 GRAM SAMPLE. BA* FE* - TOTAL

ASSAYER: D Toye DEAN TOYE. CERTIFIED B.C. ASSAYER.

FORMOSA RESOURCE FILE # 86-4020 PAGE 1

SAMPLE#	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Fe %	Au* PPB	Ba* PPM	Fe* %
6301	21210	210	9155	23.5	19.91	395	28586	25.78
6302	53822	264	7316	59.6	21.35	505	69783	27.34
6303	16666	2939	70981	9.5	7.35	1150	99999	7.25
6304	16584	3394	5065	6.3	5.32	1200	99999	5.29
6305	162	71	380	1.1	2.82	8	7746	3.09
6306	1048	381	453	2.1	2.76	92	18431	2.96
6307	72	267	1039	4.0	3.74	58	19242	4.20
6308	2237	301	1117	2.8	11.68	210	6447	11.33
6309	1952	526	2242	1.7	10.59	230	10230	10.08
6310	1653	39	2743	.8	3.86	77	1602	3.99
6311	7357	177	849	1.9	6.09	114	1651	6.32
6312	589	67	300	.6	7.29	102	1850	7.34
6313	3517	60	4894	1.4	5.75	67	1552	5.95
6314	693	118	2708	.8	2.87	32	1519	2.94
6315	8512	555	5262	2.6	4.72	72	1270	5.14
6316	4869	1302	3924	8.1	5.31	91	2715	5.49
6317	47	90	1043	3.9	3.98	72	14257	4.48
6318	31	138	466	5.3	3.49	86	18889	3.81
6319	22	128	617	7.3	2.86	152	17637	3.38
6320	51	23	149	3.1	2.80	34	19830	3.22
6351	2370	43	842	29.0	19.08	4830	2598	20.33
6357	2387	86	237	2.4	36.29	320	4111	36.07
6358	10586	52	5900	5.6	14.82	350	29993	14.68
6359	7354	533	442	9.8	14.92	685	83149	15.13
6360	2519	928	279	9.5	16.36	520	21358	16.60
6361	1718	226	177	12.9	23.83	1750	72362	24.48
6362	2147	448	245	29.3	19.84	2320	44378	19.96
6363	6476	39	138	3.7	18.67	205	6747	19.11
6364	1732	24	832	1.9	4.90	33	980	5.44
STD C/AU-R	60	38	135	6.9	3.97	510	-	-

RAND VENTURES FILE # 86-3621 PAGE 2 ✓

SAMPLE#	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Fe %	Au* PPB	Ba* PPM
6213	51	17	896	.9	2.24	30	3376
6214	197	22	179	.9	5.68	6	171
6215	166	105	1932	1.0	3.69	52	4240
6225	1653	11	511	.7	3.77	130	3438
6234	3620	61	7931	1.0	5.41	68	4867
6236	2504	139	7292	3.8	7.59	190	9293
6238	1218	504	13177	4.4	3.91	109	11424
6239	115	33	3994	1.0	4.05	100	10235
6247	349	15	272	.3	2.59	51	8075
6253	1135	520	1106	.5	7.65	49	2890
6254	941	1124	1724	.8	8.97	53	2239
6258	238	502	1359	1.0	4.00	110	15213
6260	12	13	68	.4	1.70	71	9277
6261	391	11	112	2.6	4.18	1	297
6262	10	12	124	.4	2.07	9	22539
6263	16	22	181	1.6	2.45	47	8776
6264	38	149	1342	1.2	2.61	2	9896
6265	155	76	3495	1.6	4.06	97	6397
6268	48	274	1280	2.3	2.72	40	7203
6270	38	321	807	1.9	3.28	56	3857
6272	18	32	268	1.4	2.63	10	5635
6273	10	16	87	1.2	1.85	5	17671
6274	15	16	107	2.3	2.05	9	6338
6275	11	39	197	2.1	3.27	24	17498
6276	19	63	395	5.4	4.60	80	23745
6277	24	201	722	7.6	4.51	126	15754
6285	10	20	177	1.3	2.33	10	5617
6286	19	11	127	.4	1.79	1	5988
6298	6	9	134	.1	2.70	1	308
6299	4	5	104	.1	2.74	2	383
6300	15	5	35	.2	1.93	2	220
STD C/AU-R	57	40	131	6.8	3.96	480	-

ACME ANALYTICAL LABORATORIES LTD. DATE RECEIVED: DEC 19 1986
852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6
PHONE 253-3158 DATA LINE: 251-1011 DATE REPORT MAILED: Jan. 8/87....

ASSAY CERTIFICATE

1.00 GRAM SAMPLE IS DIGESTED WITH 50ML OF 3-1-2 OF HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR. AND IS DILUTED TO 100ML WITH WATER. DETECTION FOR BASE METAL IS .01%.

- SAMPLE TYPE: CORES AU* 10 GRAM REGULAR ASSAY BA* FUSED .6 GM LIBO2 & DISSOLVED IN 50 ML 5% HNO3.

ASSAYER: .D. Toye.DEAN TOYE. CERTIFIED B.C. ASSAYER.

FORMOSA RESOURCE FILE # 86-4020A PAGE 1

SAMPLE#	Cu %	Pb %	Zn %	Ag OZ/T	Fe %	Au OZ/T	Ba* PPM
6352	.91	.01	.03	.50	40.29	.019	990
6353	2.83	.01	.05	1.10	39.47	.029	600
6354	2.06	.01	.08	.86	40.22	.038	290
6355	1.10	.13	.02	.25	42.59	.016	260
6356	.24	.01	.01	.20	42.46	.032	640

ACME ANALYTICAL LABORATORIES LTD. 852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6 PHONE 253-3158 DATA LINE 251-1011

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE

DATE RECEIVED: DEC 19 1986 DATE REPORT MAILED: Jan 8/87 ASSAYER. D. Toye. DEAN TOYE. CERTIFIED B.C. ASSAYER.

FORMOSA RESOURCE FILE # 86-4020A PAGE 1

SAMPLE#	Mo PPM	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Ni PPM	Co PPM	Mn PPM	Fe %	As PPM	U PPM	Au PPM	Th PPM	Sr PPM	Cd PPM	Sb PPM	Bi PPM	V PPM	Ca %	P %	La PPM	Cr PPM	Mg %	Ba PPM	Ti %	B PPM	Al %	Na %	K %	W PPM
6352	1	8022	30	210	16.1	6	2	13	37.26	327	5	ND	1	2	2	51	2	6	.01	.001	2	1	.01	1	.01	2	.01	.03	.01	1
6356	8	2270	19	95	7.3	7	2	7	40.27	216	5	ND	1	1	1	20	6	4	.01	.008	2	1	.01	1	.01	2	.01	.03	.01	1

ACME ANALYTICAL LABORATORIES LTD. 852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6 PHONE 253-3158 DATA LINE 251-1011

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: PULP

DATE RECEIVED: FEB 1987 DATE REPORT MAILED: Feb 4/87 ASSAYER. D. Toye. DEAN TOYE. CERTIFIED B.C. ASSAYER.

FORMOSA RESOURCE FILE # 86-4020 R PAGE 1

SAMPLE#	Mo PPM	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Ni PPM	Co PPM	Mn PPM	Fe %	As PPM	U PPM	Au PPM	Th PPM	Sr PPM	Cd PPM	Sb PPM	Bi PPM	V PPM	Ca %	P %	La PPM	Cr PPM	Mg %	Ba PPM	Ti %	B PPM	Al %	Na %	K %	W PPM
6302	14	53822 ✓	264	7316	59.6 ✓	13	6	61	21.35	1201	5	ND	1	10	72	276	51	48	.01	.002	2	1	.02	2	.01	16	.02	.05	.01	1
6303	40	16666 ✓	2939	70981 ✓	9.5	22	3	140	7.35	523	5	ND	1	31	316	280	17	7	.01	.001	2	1	.01	2	.05	2	.16	.04	.07	1
6305	3	162	71	380	1.1	3	2	836	2.82	20	5	ND	1	21	1	2	4	3	.18	.021	2	2	1.31	10	.06	4	1.48	.08	.11	1

Ba - insoluble from Rock pulp.

✓ ASSAY REQUIRED FOR CORRECT RESULT -

ACME ANALYTICAL LABORATORIES LTD.   852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6   PHONE 253-3158   DATA LINE: 251-1011

ASSAY CERTIFICATE

1.00 GRAM SAMPLE IS DIGESTED WITH 50ML OF 3-1-2 OF HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR.
AND IS DILUTED TO 100ML WITH WATER. DETECTION FOR BASE METAL IS .01%.
- SAMPLE TYPE: CORES   AU* 10 GRAM REGULAR ASSAY   BA* FUSED .6 GM LIBO2 & DISSOLVED IN 50 ML 5% HNO3. (geochem)

DATE RECEIVED: DEC 23 1986   DATE REPORT MAILED: Jan 13/87   ASSAYER.....DEAN TOYE. CERTIFIED B.C. ASSAYER.

FORMOSA RESOURCES   FILE # 86-4061A

PAGE 1

SAMPLE#	Cu %	Pb %	Zn %	Ag OZ/T	Fe %	Au OZ/T	Ba* PPM
6401	6.20	.02	1.36	.48	17.72	.042	204332
6402	1.22	.06	23.72	.87	19.40	.049	75615
6403	.72	.02	6.37	.49	8.84	.041	44309
6404	.53	.01	6.72	.49	7.75	.009	8888
6405	.17	.01	3.64	.71	7.08	.057	10475
6406	.69	.06	14.67	.55	9.74	.031	28481
6407	1.97	.01	.60	.21	8.46	.005	1991
6423	6.22	.01	11.79	.65	19.84	.034	189071
6424	.76	.02	1.90	.15	.96	.012	487300
6425	7.80	.05	11.59	1.05	26.01	.059	101655
6426	4.37	.06	21.38	.89	17.95	.042	120706
6427	.33	.01	2.71	.13	5.73	.009	8269
6428	.27	.01	3.31	.15	10.70	.009	24365
6441	.55	.01	.17	.06	7.52	.008	3772
6442	10.49	.03	19.53	1.87	20.32	.155	58654
6443	3.43	.06	9.97	.79	25.45	.016	167302
6444	.80	.01	10.58	.15	2.78	.014	9423
6445	1.52	.02	12.89	.49	16.59	.016	65431
6446	.75	.01	7.36	.25	7.27	.011	13879
6447	.28	.01	.99	.19	6.54	.025	6624
6448	.31	.01	1.90	.15	5.07	.010	6258
6461	3.95	.04	19.09	1.69	19.30	.105	111328
6462	.60	.04	12.31	.99	13.98	.048	8756
6481	10.79	.02	10.03	1.29	16.54	.099	126039
6482	.97	.06	22.98	.88	17.09	.172	119948
6483	1.03	.04	9.97	.59	8.46	.064	27693

ACME ANALYTICAL LABORATORIES LTD.   DATE RECEIVED JAN 16 1987
852 E. HASTINGS. VANCOUVER B.C.
PH:(604)253-3158 COMPUTER LINE:251-1011   DATE REPORTS MAILED Jan 26/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER ......DEAN TOYE . CERTIFIED B.C. ASSAYER

FORMOSA RESOURCE   FILE# 86-4061A R   PAGE# 1

SAMPLE	Cu %
6482	1.00

ACME ANALYTICAL LABORATORIES LTD.   852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6   PHONE 253-3158   DATA LINE 251-1011

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE

DATE RECEIVED: DEC 23 1986 DATE REPORT MAILED: Jan 13/87 ASSAYER. D. Toye....DEAN TOYE. CERTIFIED B.C. ASSAYER.

FORMOSA RESOURCES FILE # 86-4061A PAGE 1

SAMPLE#	Mo PPM	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Ni PPM	Co PPM	Mn PPM	Fe %	As PPM	U PPM	Au PPM	Th PPM	Sr PPM	Cd PPM	Sb PPM	Bi PPM	V PPM	Ca %	P %	La PPM	Cr PPM	Mg %	Ba PPM	Ti %	B PPM	Al %	Na %	K %	W PPM
6401	42	49061	101	11227	15.1	14	3	59	16.78	78	5	ND	1	14	67	21	2	5	.02	.001	2	1	.02	3	.01	4	.01	.01	.04	1
6402	93	9627	381	99999	23.4	31	7	74	12.74	762	10	ND	2	12	899	97	2	5	.02	.001	2	1	.02	9	.01	3	.09	.01	.05	1
6404	59	4756	110	59091	14.8	10	5	47	6.75	428	5	ND	1	4	238	39	2	1	.11	.001	2	1	.02	2	.01	2	.30	.01	.06	1
6425	68	55730	306	80761	28.4	32	33	80	20.38	391	5	ND	2	12	502	45	2	5	.01	.001	2	1	.02	3	.01	2	.01	.01	.02	1
6426	93	32549	427	99999	24.5	20	16	64	12.38	278	5	ND	2	16	876	110	2	4	.01	.001	2	1	.02	3	.01	2	.03	.01	.03	1
6441	2	4804	9	1397	1.8	2	6	940	6.82	5	5	ND	1	4	4	2	2	7	.30	.124	4	1	.29	11	.08	3	1.35	.01	.18	1
6442	98	69379	198	99999	49.9	18	86	110	15.94	157	5	ND	2	13	781	81	2	4	.01	.001	2	1	.02	3	.01	4	.01	.01	.02	1
6443	56	26199	375	75848	21.5	27	9	66	17.87	450	5	ND	2	14	423	68	2	5	.01	.001	2	1	.02	2	.01	7	.01	.01	.02	1
6481	72	74753	122	68987	37.5	16	1	61	14.28	133	5	ND	1	19	404	47	2	5	.03	.001	2	1	.02	3	.01	3	.01	.01	.03	1
6482	88	8090	421	99999	25.0	30	8	58	10.58	678	7	5	2	17	944	113	2	3	.01	.001	2	2	.01	11	.01	2	.02	.01	.02	1
STD C	20	60	40	136	6.8	65	28	991	3.97	37	21	8	33	48	16	15	19	61	.48	.101	35	57	.88	179	.08	38	1.72	.07	.13	13

ACME ANALYTICAL LABORATORIES LTD.   852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6   PHONE 253-3158   DATA LINE 251-1011

GEOCHEMICAL ICP ANALYSIS

.500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN.FE.CA.P.CR.MG.BA.TI.B.AL.NA.K.W.SI.ZR.CE.SN.Y.NB AND TA. AU DETECTION LIMIT BY ICP IS 3 PPM.
- SAMPLE TYPE: CORE AU# ANALYSIS BY AA FROM 10 GRAM SAMPLE. BA# .6GM LIBO2 & DISSOLVED IN 50 ML 5% HNO3.

DATE RECEIVED: DEC 23 1986 DATE REPORT MAILED: Jan 13/87 ASSAYER. D. Toye....DEAN TOYE. CERTIFIED B.C. ASSAYER.

FORMOSA RESOURCES FILE # 86-4061 PAGE 1

SAMPLE#	Mo PPM	Cu PPM	Pb PPM	Zn PPM	Ag PPM	Ni PPM	Co PPM	Mn PPM	Fe %	As PPM	U PPM	Au PPM	Th PPM	Sr PPM	Cd PPM	Sb PPM	Bi PPM	V PPM	Ca %	P %	La PPM	Cr PPM	Mg %	Ba PPM	Ti %	B PPM	Al %	Na %	K %	W PPM	Au# PPB	Ba# PPM
6365	2	17	15	343	.6	2	4	87	3.35	29	5	ND	1	7	1	2	3	1	.09	.025	8	2	.74	7	.01	6	.97	.03	.14	1	34	6920
6408	12	289	12	145	.1	2	9	27	4.91	12	5	ND	1	3	1	2	4	1	.02	.003	2	2	.02	9	.01	5	.16	.03	.05	1	26	690
6421	8	131	4	7752	.1	1	7	2436	3.75	3	5	ND	1	12	28	2	4	8	.35	.139	4	2	.59	60	.14	2	1.09	.01	.18	1	185	8480
6422	9	3165	9	8195	.6	1	10	2880	5.67	4	5	ND	1	7	25	2	2	8	.31	.116	5	1	.60	14	.13	7	1.61	.01	.17	1	29	4950
6429	19	327	206	7902	1.2	1	12	91	4.78	43	5	ND	1	3	30	2	4	1	.02	.005	2	1	.51	5	.01	5	.64	.03	.10	1	295	4210
6449	20	244	240	3535	4.2	6	9	55	3.81	52	5	ND	1	6	14	2	2	1	.03	.012	2	3	.12	5	.01	4	.33	.03	.09	1	44	8660
6450	2	27	21	776	.3	3	5	52	2.01	9	5	ND	1	7	5	2	2	4	.07	.020	2	2	.36	16	.01	2	.54	.05	.04	1	47	1900
STD C	20	59	37	137	6.9	69	29	982	3.84	39	18	8	32	47	16	15	21	61	.48	.101	35	57	.88	176	.08	34	1.71	.06	.13	14	-	-

ACME ANALYTICAL LABORATORIES LTD.
852 E. HASTINGS. VANCOUVER B.C.
PH: (604)253-3158 COMPUTER LINE:251-1011

DATE RECEIVED JAN 8 1987
DATE REPORTS MAILED Feb 3/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP
HF + AQUA REGIA DIGESTION

ASSAYER D Toye DEAN TOYE . CERTIFIED B.C. ASSAYER

FORMOSA RESOURCES FILE# 86-2986 & 86-3140A R

PAGE # 1

SAMPLE	Ga %	Ge %
6166	.007	.001
6171	.006	.004
6222	.007	.003

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DATE RECEIVED JAN 8 1987
DATE REPORTS MAILED Feb 3/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP Aqua Regia digestion.

ASSAYER D Toye DEAN TOYE , CERTIFIED B.C. ASSAYER

FORMOSA RESOURCE FILE# 86-2986 & 86-3140A R

PAGE#1

SAMPLE	Ga %	Ge %
6166	.001	.001
6171	.001	.001
6222	.001	.001

ACME ANALYTICAL LABORATORIES LTD.
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DATE RECEIVED FEB 11 1987
DATE REPORTS MAILED Feb 16/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER D Toye DEAN TOYE . CERTIFIED B.C. ASSAYER

FORMOSA RESOURCES FILE# 87-0313

PAGE# 1

SAMPLE	Ga %	Ge %
6054	.004	.001
6124	.001	.001
6170	.005	.001
6217	.006	.001
6402	.007	.001
6403	.001	.001
6406	.002	.001
6426	.006	.001
6445	.003	.001
6446	.002	.001
6461	.006	.001
6462	.005	.001
6482	.005	.001
6483	.003	.001

ACME ANALYTICAL LABORATORIES LTD.
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PH:(604)253-3158 COMPUTER LINE:251-1011

DATE RECEIVED MAR 12 1987
DATE REPORTS MAILED Mar 13/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER D Toye DEAN TOYE . CERTIFIED B.C. ASSAYER

FORMOSA RESOURCES FILE# 87-0313 R PAGE# 1

SAMPLE	Cd %
6054	.07
6124	.02
6170	.05
6217	.10
6402	.11
6403	.03
6406	.06
6426	.11
6445	.05
6446	.03
6461	.10
6462	.06
6482	.12
6483	.04

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DATE RECEIVED MAR 16 1987
DATE REPORTS MAILED Mar 19/87

GEOCHEMICAL ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER D Toye DEAN TOYE , CERTIFIED B.C. ASSAYER

FORMOSA RESOURCES CORP FILE# 87-0313 R PAGE# 1

SAMPLE	In ppm
6217	6.4
6402	17.6
6426	36.6
6461	38.0
6482	18.6

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ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER ____D Toye____DEAN TOYE , CERTIFIED B.C. ASSAYER

FORMOSA RESOURCES FILE# 86-2868A R PAGE# 1

SAMPLE	Ga %	Cd %
6003	.004	.01
6004	.003	.03
6126	.003	.01

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DATE REPORTS MAILED Mar 23/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER ____D Toye____DEAN TOYE , CERTIFIED B.C. ASSAYER

FORMOSA RESOURCES FILE# 86-2986A R PAGE# 1

SAMPLE	Ga %	Cd %
6165	.003	.03
6166	.007	.07
6167	.004	.05
6168	.003	.01
6169	.002	.01
6171	.005	.07
6172	.002	.02
6173	.001	.01
6174	.004	.03

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DATE RECEIVED MAR 17 1987
DATE REPORTS MAILED Mar 23/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER ____D Toye____DEAN TOYE , CERTIFIED B.C. ASSAYER

FORMOSA RESOURCES FILE# 86-3140A R PAGE# 1

SAMPLE	Ga %	Cd %
6222	.007	.07
6223	.005	.05
6228	.004	.01
6229	.005	.03
6231	.006	.04
6232	.002	.02

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DATE RECEIVED MAR 17 1987
DATE REPORTS MAILED Mar 23/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER D Toye DEAN TOYE , CERTIFIED B.C. ASSAYER

FORMOSA RESOURCES FILE# 86--4020 R PAGE# 1

SAMPLE	Ga %	Cd %
6301	.004	.01
6302	.001	.01
6303	.004	.04

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DATE RECEIVED MAR 17 1987
DATE REPORTS MAILED Mar 23/87

ASSAY CERTIFICATE

SAMPLE TYPE : PULP

ASSAYER D Toye DEAN TOYE , CERTIFIED B.C. ASSAYER

FORMOSA RESOURCES FILE# 86-4061A R PAGE# 1

SAMPLE	Ga %	Cd %
6404	.002	.03
6405	.002	.02
6425	.004	.08
6427	.003	.01
6428	.002	.02
6442	.006	.11
6443	.003	.07
6444	.002	.06

APPENDIX IV

Assay Results
Formosa/Silver Butt Property

I. Silver Peak Mine, Underground Sampling,
(by B. Lockwood, Jr. July 1937)

Sample No.	Sample m.	Width (ft.)	Au oz/T	Ag oz/T	Zn %	Cu %	Ore Block No.
41	0.53	(1.75)	0.02	4.94	9.31	3.81	III
42	0.64	(2.10)	TR	0.20	7.44	0.49	III
43	0.41	(1.35)	0.04	2.24	4.33	6.05	III
44	1.52	(5.00)	0.02	0.20	3.76	0.08	III
45	0.94	(3.10)	TR	0.68	4.90	0.80	III
46	0.67	(2.20)	TR	2.72	2.40	1.40	III
47	0.43	(1.40)	NIL	0.56	4.40	0.31	III
48	0.52	(1.70)	NIL	0.20	2.20	0.06	III
50	0.52	(1.70)	TR	2.24	1.80	5.80	III
51	0.76	(2.50)	TR	1.64	3.60	4.56	III
52	0.61	(2.00)	TR	1.28	3.00	4.50	III
56	0.73	(2.40)	0.02	1.68	2.90	5.09	III
57	0.47	(1.55)	TR	1.72	4.70	2.92	III
58	0.49	(1.60)	NIL	0.48	8.80	1.02	III
79	0.43	(1.40)	0.42	0.36	0.90	2.55	XVIII
80	0.87	(2.85)	TR	1.84	4.17	7.63	XVIII
81	1.37	(4.50)	TR	0.52	3.80	5.45	XVIII
82	0.88	(2.90)	0.02	0.54	4.00	3.16	XVIII
83	0.70	(2.30)	TR	0.56	2.57	6.58	XVIII
84	0.73	(2.40)	TR	0.64	12.50	2.92	XVIII
85	0.73	(2.40)	TR	0.40	0.71	3.28	XVIII
86	0.94	(3.10)	0.02	0.60	2.70	3.66	XVIII
87	0.76	(2.50)	0.02	0.48	1.40	1.55	XVIII
88	0.87	(2.85)	TR	0.80	1.80	1.55	XVIII
89	0.24	(0.80)	TR	0.68	4.60	3.41	XVIII
90	0,73	(2.40)	0.30	2.14	6.00	4.52	XVIII
91	0.37	(1.20)	0.02	3.66	9.80	4.15	XVIII
92	0.38	(1.25)	TR	0.84	16.40	4.10	XVIII
93	1.43	(4.70)	TR	0.56	1.90	3.60	XVIII
94	0.85	(2.80)	0.06	0.78	8.40	2.42	XVIII
95	0.85	(2.80)	TR	1.56	4.60	3.17	XVIII
96	1.46	(4.80)	0.08	5.08	7.20	12.35	XXI
97	0.52	(1.70)	TR	0.64	9.00	9.00	XXI
98	0.67	(2.20)	0.06	1.94	8.30	6.68	XVIII
99	0.57	(1.85)	0.04	1.52	9.70	6.25	XVIII
100	1.05	(3.45)	TR	0.80	7.00	5.65	XVIII
103	1.01	(3.30)	0.05	0.86	8.30	2.79	X
104	0.91	(3.00)	0.04	3.94	5.70	3.60	X
105	0.30	(1.00)	0.08	1.20	2.60	14.40	X
106	0.88	(2.90)	TR	0.96	2.40	8.20	X
107	1.01	(3.30)	0.12	0.60	7.10	5.22	X
108	1.05	(3.45)	TR	1.08	0.42	1.32	XI
109	0.97	(3.20)	TR	0.80	0.85	2.73	XI