681176

GEOLOGICAL REPORT & WORK PROPOSAL

ON THE

SIWASH CREEK PROPERTY

SIMILKAMEEN M.D.

N.T.S. 92H/16W

FOR

TOWER HILL MINES LTD

BY

EDWARD W. GROVE, Ph.D., P.Eng.

VICTORIA, B.C. SEPTEMBER 12, 1989

SUMMARY

The Siwash Creek mineral property is located on Siwash Creek about 31 kilometers (19 miles) north-northeast of Princeton, in south central British Columbia. The property lies in a forested upland plateau and can be accessed by any of three good logging roads from paved highways. Extensive logging on the property is now providing new road access and outcrop. Lack of good access and a dense timber cover have impeded exploration in the past. The property presently comprises 46 claim units covering an area of about 800 hectares and is 100% owned by Tower Hill Mines Ltd. (formerly Ashnola Mines Ltd.). Work on the property dates to 1917 when high grade silver-lead-zinc fissure veins were explored near the junction of Galena and Siwash Creeks by several adits which are now located on the ED 2 and Crown Granted FISSURE MAIDEN No. 2 FR mineral claims. Little work was done in the area until 1979-1981 when personnel from nearby Brenda Mines Ltd. performed grass-roots exploration followed by scattered diamond core drilling. After acquiring 100% interest in the property in 1988 Ashnola Mines Ltd. (Tower Hill Mines Ltd.) took rock samples for analysis and followed this with a geochemical soil survey in late 1988. One new showing called the Monty West was located from which assays to 0.624 opt Au were returned across 2.4 meters.

Although the limited Brenda Mines exploration program did not locate an economic Cu-Mo deposit it has provided some basic information on rock type, alteration and Ag-Pb-Zn mineralization in the general area. The recent Tower Hill Mines Ltd. work has shown that the known mineralization such as the Monty showing (Au, Ag, Cu, Pb, Zn) is more extensive than previously known.

In 1989 Inel Resources Ltd. optioned the Tower Hill Mines Ltd. Siwash Creek property and carried out an extensive geological mapping project which also involved relogging and sampling the old Brenda Mines core holes as well as basic preliminary preparation for further evaluation of the claim group. Sampling of the many old workings, dumps, and associated structures showed significant values of silver, copper, lead and zinc as well as anomalous gold associated with shear zones. One sample from an extension of the #2 adit, Three Adit Gap workings, gave 3.046 opt Au, 123.54 opt Ag, 0.92 per cent Cu,

42.25 per cent Pb, and 2.38 per cent Zn.

The Inel Resources Ltd. program essentially completed the Stage I portion of the exploration proposed by the writer in March, 1989. It is recommended that Tower Hill Mines Ltd. implement a scaled down Stage II work program on several limited parts of the mineral property which have been defined by the 1989 work as having geological potential for mineralization. Cost of the 1989-1990 program is estimated at $188,025.00.

INTRODUCTION

The Siwash Creek group of mineral claims are currently owned by Tower Hill Mines Ltd. The property extends across the Siwash Creek - Galena Creek junction located in south central British Columbia. The general area is noted for both major underground and open pit porphyry copper and molybdenum production from volcanic and intrusive host rocks. Significant gold and silver has also been recovered from these deposits.

Access to the area is excellent. It can be reached by any of three logging roads from local paved highways.

Gold bearing silver-lead-zinc mineralization has been located on this property on the FISSURE MAIDEN No 2 FR, VM 2 and adjoining ED 2 claims in several adits and trenches. Core drilling has shown the presence of widespread galena-sphalerite and pyrite as stockwork-like veins, some with associated fluorite veining. Epidotization and kaolinization of the mainly granitic to syenitic host rocks are pervasive.

The writer examined some of the core now stored at Penticton and visited the Siwash Creek property in late February, 1989 in the company of Mr. Norm Bonin, V.P., Tower Hill Mines Ltd. The area was covered by snow at the time of this visit and rock exposure in road cuts was rare.

As a result of an option agreement between Tower Hill Mines Ltd. and Inel Resources Ltd. on the Siwash Creek claims the latter undertook Stage I of a geological program outlined and partly supervised by the writer. In late April through early May Inel contractors relogged and sampled Brenda Mines

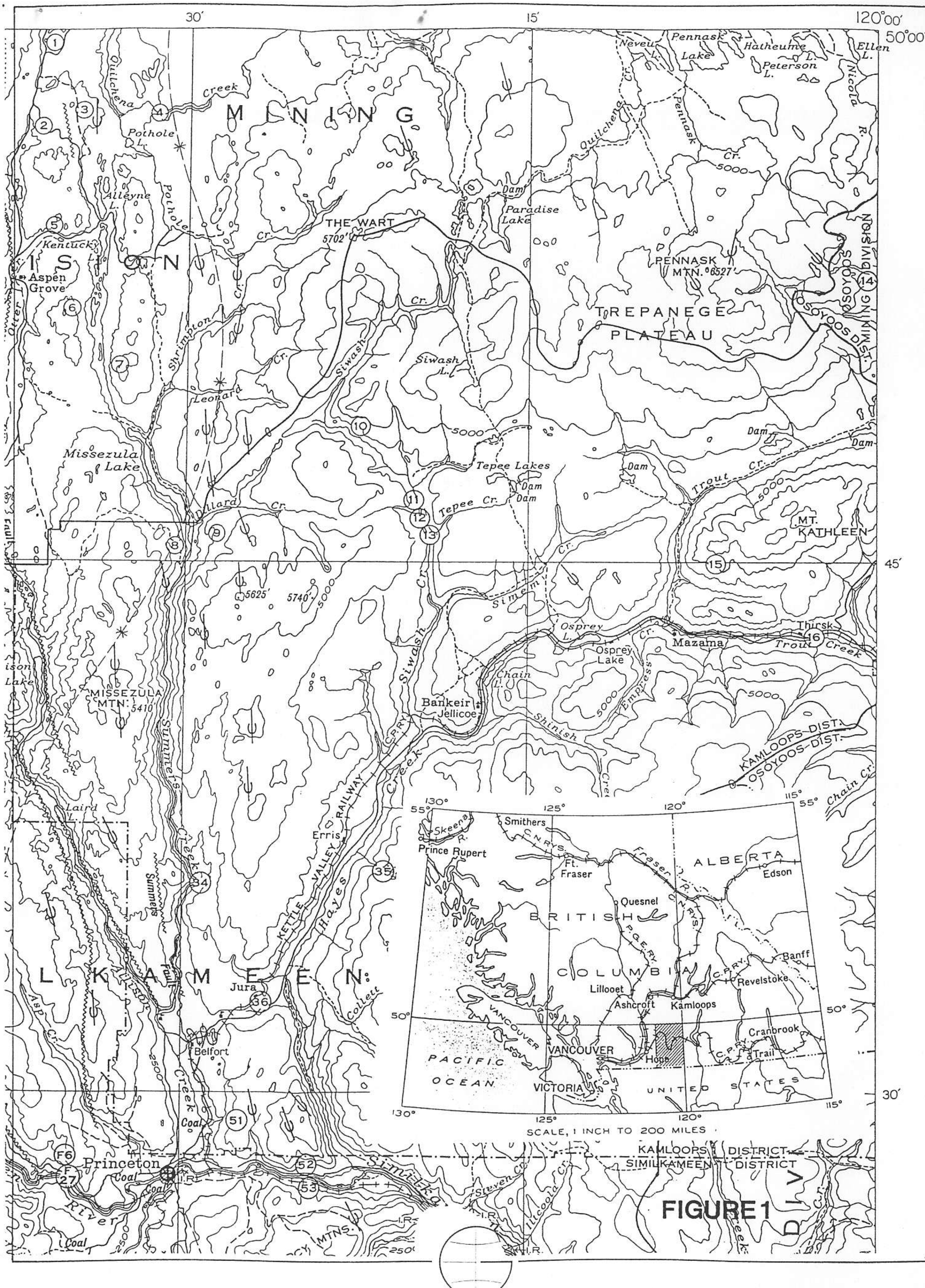
30′
15′
120°00′
50°00′
45′
30′
MINING
DIVISION
SIMILKAMEEN
Quilchena Creek
Pothole L.
Alleyne L.
Kentucky L.
Aspen Grove
Otter
Shrimpton Cr.
Leonard Cr.
Missezula Lake
Dillard Cr.
Neveu L.
Pennask Lake
Hatheume L.
Peterson L.
Ellen L.
Nicola R.
Pennask Cr.
Paradise Lake
Dam
THE WART 5702′
PENNASK MTN. 6527′
TREPANEGE PLATEAU
OSOYOOS DIST.
OSOYOOS DIVISION
Siwash L.
Siwash Cr.
Tepee Lakes
Tepee Cr.
Trout Cr.
MT. KATHLEEN
5625′
5740′
5000
Simem Cr.
Osprey L.
Osprey Lake
Mazama
Thirsk
Trout Creek
Chain L.
Bankeir
Jellicoe
Shinish
Empress
KAMLOOPS DIST.
OSOYOOS DIST.
Chain Cr.
MISSEZULA MTN. 5410
Summers Creek
Laird L.
Erris
KETTLE VALLEY RAILWAY
C.P.RY.
Hayes Creek
Jura
Collett
Belfort
Asp Cr.
Coal
Princeton
Similkameen River
MTNS.
Steven Cr.
Illicoola Cr.
I.R.
KAMLOOPS DISTRICT
SIMILKAMEEN DISTRICT
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
34
35
36
51
52
53
F6
27
130°
125°
120°
115°
55°
50°
Skeena R.
Prince Rupert
Smithers
C.N.RYS.
Ft. Fraser
Fraser R.
ALBERTA
Edson
Quesnel
BRITISH COLUMBIA
P.G.E.RY.
Banff
C.P.RY.
Revelstoke
Lillooet
Ashcroft
Kamloops
VANCOUVER
Cranbrook
Trail
Hope
PACIFIC OCEAN
VICTORIA
UNITED STATES
SCALE, 1 INCH TO 200 MILES

FIGURE 1

core stored at Penticton, B.C. Work on the Siwash Creek mineral property followed in May and June 1989. Work on the Siwash Creek mineral property is estimated to have cost about $175,000.00

The writer visited the Siwash Creek property four days during the Inel program and has been commissioned by Mr. C. Shynkaryk, President, Tower Hill Mines Ltd. to write this report and make work recommendations.

LOCATION, ACCESS AND TOPOGRAPHY

The Siwash Creek mineral property lies across the junction of Galena Creek with Siwash Creek just west of Teepee Lakes in the Thompson Plateau about 31 kilometers north-northeast of Princeton (Figure 1). Because of recent logging the claims can be accessed by three good logging roads from paved highways. The most direct route from the west is via Highway 5, then east on the Dillard Creek logging road to Siwash Creek. Alternate routes are from the Summerland-Princeton road at Osprey Lake, and from Peachland by the Peachland Main Logging road.

The claims lie in a timbered, rolling, upland plateau between elevations 1220 to 1460 meters cut by Siwash Creek and its tributaries. In this area stream flow reaches the maximum during mid-June. The surface exploration field season is generally between mid April and mid November. Winter snow is relatively light, and the main logging roads are well cleared and graded.

SIWASH CREEK CLAIM GROUP

The Siwash Creek property under discussion currently includes 13 contiguous claims in the Similkameen Mining Division comprising about 46 units with an area of about 800 hectares (Figure 2). The claims are 100% owned by Tower Hill Mines Ltd. and include the following:

Name	Units	Record No.	Expiry Date
ED	6	074	June 29, 1993
ED 2	2	172	Nov. 23, 1993
V.M. No 1	1	445	October 5, 1993

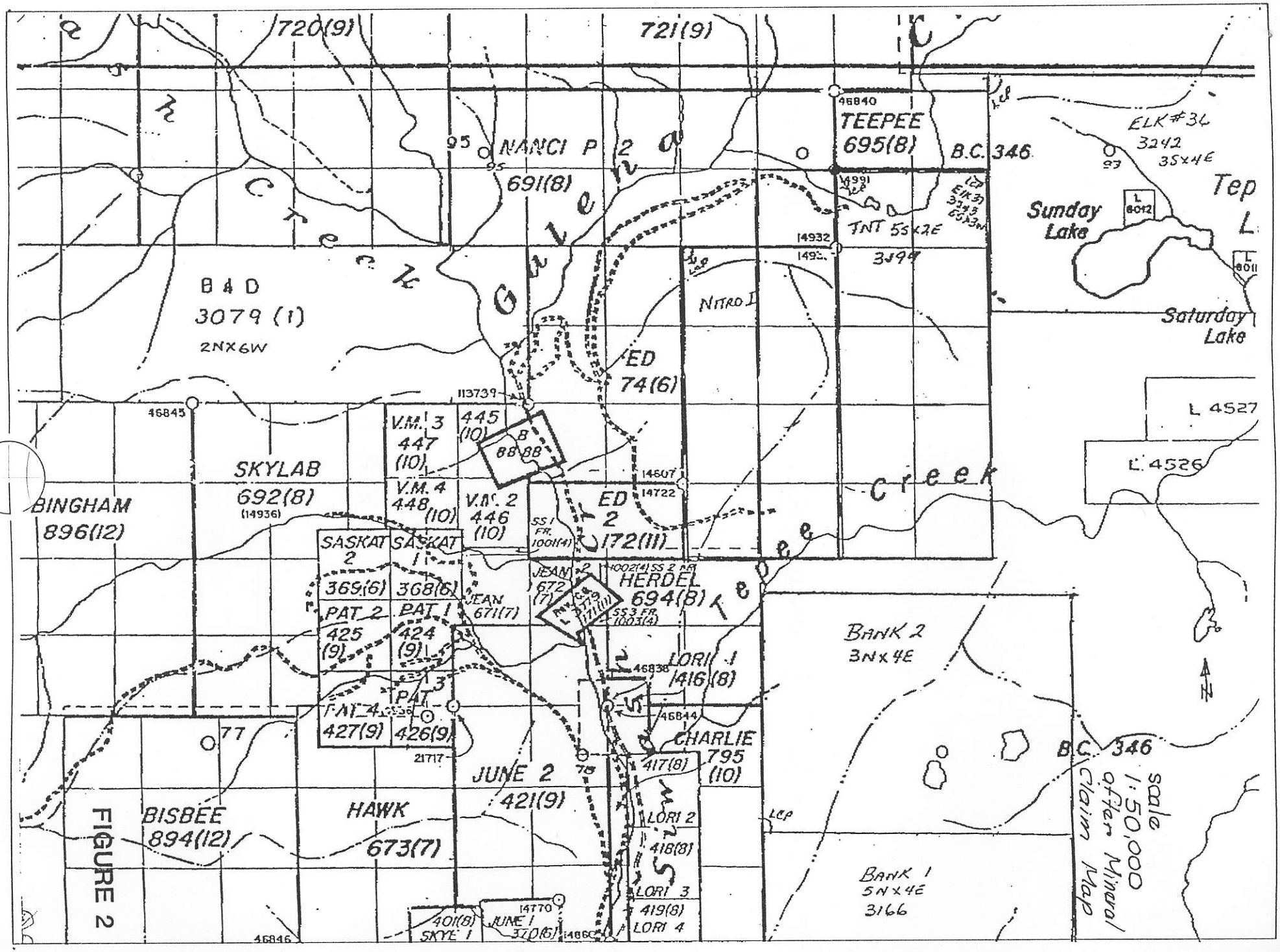
720(9)
721(9)
NANCI P 2
691(8)
46840
TEEPEE
695(8)
B.C. 346
ELK #36
3242
35X4E
Sunday Lake
Saturday Lake
TNT 55X2E
3494
B & D
3079 (1)
2NX6W
NITRO I
ED
74(6)
113739
46845
SKYLAB
692(8)
(14936)
BINGHAM
896(12)
V.M. 3
447
(10)
445
(10)
V.M. 4
448
(10)
V.M. 2
446
(10)
14607
14722
ED
2
172(11)
L 4527
L 4526
creek
SASKAT 2
369(6)
SASKAT 1
368(6)
PAT 2
425
(9)
PAT 1
424
(9)
PAT 3
426(9)
PAT 4
427(9)
JEAN
671(7)
JEAN 2
672
(7)
HERDEL
694(8)
BANK 2
3NX4E
LORI 1
416(8)
46838
46844
CHARLIE
795
(10)
417(8)
BISBEE
894(12)
HAWK
673(7)
JUNE 2
421(9)
LORI 2
418(8)
LORI 3
419(8)
LORI 4
JUNE 1
370(6)
14770
401(8)
SKYE 1
46846
BANK 1
5NX4E
3166
B.C. 346
LCP
scale
1:50,000
after Mineral
Claim Map

FIGURE 2

V.M. No 2	1	446	October 5, 1993
V.M. No 3	1	447	October 5, 1993
V.M. No 4	1	448	October 5, 1993
PETERSON	1	8888	February 6, 1994
FISSURE MAIDEN No 2 FR	1	171	Nov. 22, 1993
B & D	12	3079	January 4, 1993
JEAN 1	1	671	July 26, 1993
JEAN 2	1	672	July 26, 1993
TNT	10	3199	Sept. 28, 1989
NITRO 1	8	3200	Sept. 27, 1989

Two placer leases and three placer claims recorded in the names of Donald Edmund Agur (P.L. Nos. 18839 and 18844) and Christopher Cowan (RHINO 1, 2, and 3; Record Nos. 89, 90 and 91) respectively, overlie a portion of the subject mineral claims.

HISTORY

Although the public records are poor it appears that the earliest work on Siwash Creek was placer mining in an area about 32 km long by 3.2 km wide between the source of Hayes Creek and the headwaters of Siwash Creek. This mining was chiefly confined to the benches above the creek in early 1900's. Lode mining dates to 1917 when the first claims were recorded on Siwash Creek. Properties on which development work was done along Siwash Creek included the MABEL claim, and Renfrew and Claremont groups. Nearly all of this work entailed drifting, open cuts, trenches and shallow shafts on quartz-sulfide veins. In 1927, 27 tons of ore shipped to Trail from the RENFREW contained 3 oz. gold, 3,379 oz. silver, and 1,578 lbs of lead. The most extensive work appears to have been performed on the CLAREMONT Group (Monty Showing) including some 400 to 500 feet of drifting, as well as surface work. Only one assay on argentiferous galena from the CLAREMONT has been reported. Other nearby properties on which work was done included the BLUE STONE and ARGENTITE claims and the Lucky Strike and El Paso claim groups. With the exception of the El Paso, all of the mineralization explored was found to be hosted by intrusive rocks.

In 1951 and 1952 limited underground work was continued on the relocated Snowstorm Group (Lucky Strike) and one new adit

was driven 30 feet on a "nine foot wide" sphalerite vein. About 100 tons of material was stockpiled on the property but no record of shipment is available.

More recently the general area has been examined by various major companies exploring for porphyry-type copper-molybdenum deposits utilizing mainly grass-roots geochemical and geophysical methods. These include Phelps Dodge (1972), Great Plains Development Company of Canada Ltd. (1973), Pan Arctic Explorations Ltd. (1973 - one drill hole), Utah Mines Ltd. (1974), and Brenda Mines Ltd. (1980 & 1981). The Brenda Mines work which is pertinent to the property under discussion included geological and geochemical surveys followed by scattered core drilling. In 1988 Tower Hill Mines Ltd. took control of the Siwash Creek property and performed limited rock sampling and a soil geochemistry survey of the property. This work was the first to investigate the gold, silver potential of the claims since the 1950's.

In 1989 under an option agreement with Tower Hill Mines Ltd, Inel Resources Ltd. undertook a detailed geological study of the Siwash Creek property with the prime objective of outlining the local geology and geological controls for the mineralization, and secondly to provide a base for future exploration and development should the option be continued. At the termination of the Stage I program Inel Resources Ltd. indicated they would not undertake any further work commitment and the property reverted to Tower Hill Mines Ltd.

1989 SPRING WORK PROGRAM

Inel Resources Ltd. completed a Stage I work program on Tower Hill Mines Ltd.'s Siwash Creek property between late April to mid-June, 1989, to evaluate the mineral potential of the Siwash property.

This program included relogging and sampling Brenda Mines' 1979-1981 drill core, locating and sampling old working on the property, prospecting and rock chip sampling, geological mapping, petrographic studies, mapping till coverage, soil orientation test pits, limited soil sampling, and cutting an East-West base line across the NITRO I and TNT mineral claims.

Roads, trenches, pits, adits, surviving claim posts, and the old Brenda base line were surveyed to provide a planimetric base for geological mapping.

Approximately 4040 meters of drill core from the 1979-1981 Brenda Mines exploration program was relogged and sampled. A total of 195 samples of core were collected and assayed for 32 elements, including Au, which was not originally assayed. Brenda samples were also resampled to check original assays. Mineralized core not previously sampled was also split and submitted for analysis.

Field work included locating, mapping and sampling in detail the known showings including Monty West, Claremont and Three-Adit Gap. Prospecting and geological mapping were carried out over much of the property and 88 rock chip samples were collected. Mapping was completed along road cuts and major drainages at 1:5000 scale on an airphoto enlargement mosaic base. To supplement mapping and logging, 21 core and rock chip samples were sent for petrographic analysis and a skeleton selection of Brenda Mines' drill core was assembled for easy rock identification.

In preparation for soil sampling a till coverage map was completed and nine soil test pits were dug. A limited soil sampling program of 76 samples was completed across Galena Creek at a copper anomaly previously identified by Brenda Mines. Sampling by Inel contractors also included analysis of soils for Au which had not been previously tested. In addition, a 1.8 km base line was cut in preparation for soil and/or geophysical surveys over the NITRO I and TNT claims area.

Cost of this work program on the Siwash Creek property was about $175,000.00.

AREAL GEOLOGY

The Siwash Creek property and surrounding area are underlain by a variety of extensive plutonic masses which have intruded Triassic and older volcanic and sedimentary rocks. The intrusive which underlies the property, called the Pennask Lake Body by Rice (1960), extends east to include the Brenda Mines

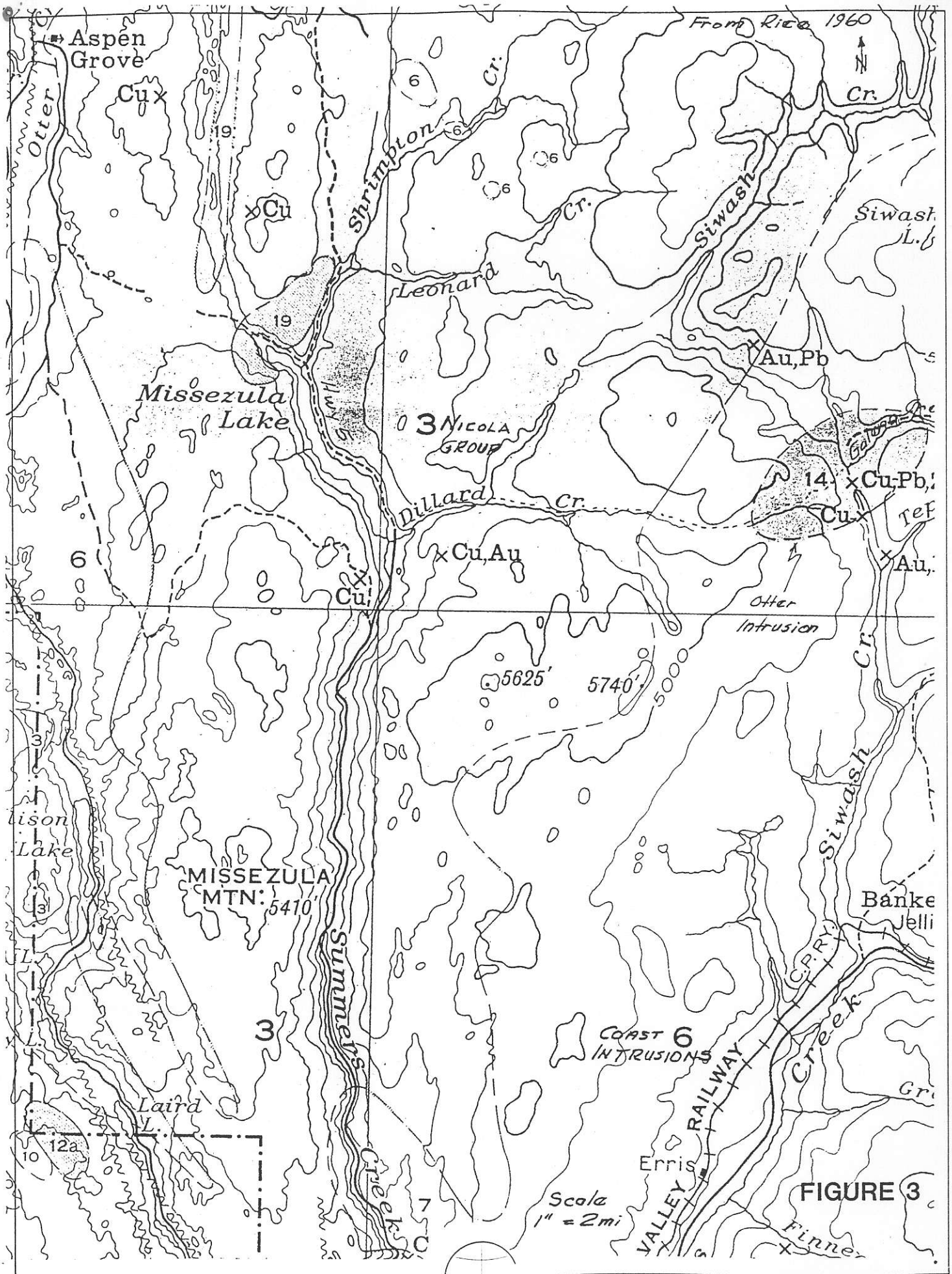
From Rice 1960
Aspen Grove
Otter
Cu
19
Cu
Shrimpton Cr.
6
Leonard
Missezula Lake
Hwy 5
3 NICOLA GROUP
Siwash Cr.
Siwash L.
Au,Pb
Gatwa Cr.
14
Cu,Pb,
Cu
Dillard Cr.
Cu,Au
Au,
Otter Intrusion
5625'
5740'
5000
Siwash Cr.
MISSEZULA MTN. 5410'
Summers Creek
3
COAST INTRUSIONS 6
C.P.R.Y.
VALLEY RAILWAY
Creek
Banke
Jelli
Laird L.
12a
10
7
Erris
Scale 1" = 2mi
Finne

FIGURE 3

porphyry molybdenum-copper deposit near Peachland. Rice indicated that the Pennask pluton comprised mainly reddish, coarse grained, siliceous granite and granodiorite. Within this body he outlined units which he related to the younger pinkish Otter Lake intrusions. In spite of extensive alteration Rice related the Siwash Creek body to the Otter Lake intrusions to which he associated many of the areal mineral deposits.

This area has now been made very accessible because of the extensive network of logging roads which grid the general area providing access Rice (1960) was denied. Work on the Siwash Creek property and surroundings suggests new areal mapping should be implemented in order to upgrade the overall picture and provide continuity over this mineral belt from Princeton to Peachland.

LOCAL GEOLOGY

Rice's (1960) areal geology map indicated that the entire Siwash Creek mineral property lay within an intrusive unit termed the Otter Intrusion, an ovoid stock-like mass about 5 km long, centered on the Galena Creek-Siwash Creek junction (Figure 3). Later mapping by Brenda Mines, and Tower Hill Mines suggested the claims were largely underlain by a leucocratic porphyritic granite which they termed 'quartz eye porphyry', as well as several other variants of the Otter Intrusion.

More detailed mapping by Inel Resources has shown that only the central portion of the claim group, lying roughly along Siwash Creek, is underlain by two discrete masses of the aptly named quartz eye porphyry. Three other granitic units marked by distinct texture and composition, probably forming part of the so-called Otter Intrusion lie east and west of the central leuco-granite. These comprise a megacrystic syenite, and a coarse grained syenite. A third unit which lies on the east and west sides is represented by a fine to coarse grained hornblende granodiorite. The larger area surrounding the claim group is underlain by the predominantly red, coarse-grained biotite granite forming part of the extensive Pennask Batholith (Figure 4 - pocket).

GEOLOGICAL SUMMARY
ON THE
SIWASH PROJECT

Located in the Similkameen Mining Division
NTS 92H/16W
49°47' North Latitude
120°20' West Longitude

- Prepared for -

INEL RESOURCES LTD.

- Prepared by -

A. MONTGOMERY, Geologist
S.L. TODORUK, Geologist

June, 1989

1989 Spring Work Program

Pamicon Developments Ltd., on behalf of Inel Resources Ltd.,has completed a phase I work program on Tower Hill Mines Ltd.'s Siwash Silver Property. The property is located in the Thompson Plateau about 31 km north-northeast of Princeton, British Columbia. Work was carried out between late April to mid-June to evaluate the mineral potential of the Siwash property.

This program included relogging and sampling Brenda Mines' 1979-1981 drill core, locating and sampling old workings on the property, prospecting and rock chip sampling, geological mapping, petrographic studies, mapping till coverage, soil test pits, limited soil sampling, and cutting a base line over the NITRO and TNT mineral claims.

Approximately 4040 metres of drill core from the 1979-1981 Brenda Mines exploration program was relogged and sampled. 195 samples of core were collected and assayed for 32 elements, including Au, not originally tested for. Brenda samples were resampled to check original assays. Areas not sampled previously were also sampled.

Field work included locating and mapping in detail the previously known showings: Monty, Monty West, Claremont & 3-Adit Gap All showings were sampled including chip sampling of the Monty showing. Prospecting and geological mapping was carried out over much of the property. Eighty-eight rock chip samples were collected. Mapping was completed along road cuts and major drainages at 1:5000 scaled on an airphoto blow-up base. To supplement mapping and logging, 21 core and rock chip samples were sent for petrographic analysis and a skeleton selection of Brenda Mines' drill core was assembled for easy rock identification.

In preparation for soil sampling a till coverage map was completed and 9 soil test pits were dug. A limited soil sampling program of 76 samples was completed across Galena Creek at a Cu-anomaly identified by Brenda Mines. Sampling by Pamicon included analysis of soils for Au which had not been tested for previously. In addition, a 1.8 km base line was cut in preparation for soil an/or geophysical surveys over the NITRO and TNT claims area.

The Siwash property lies within an area dominated by Jurassic or later Coast Intrusives, just east of an extensive area of Triassic Nicola Group volcanics and sediments. The property mostly covers an oval shaped stock-like occurance of Upper Cretaceous to Tertiary Otter Intrusives which intrude Coast granites and diorites along Siwash Creek.

The Otter Intrusives characteristic of this stock are porphyritic to subporphyritic and of rhyodacite/dacite and latite composition (see Vancouver Petrographics Ltd. reports). Four distinct rock types have been classified including Megacryst K-spar Porphyry, Quartz Feldspar to Quartz Eye Porphyry, Quartz Syenite and Biotite Quartz Feldspar Porphyry.

Megacryst K-spar Porphyry - a quartz feldspar porphyry (of rhyodacite/dacite composition) with very distinctive k-spar megacrysts to 4 cm long; the abundance of megacrysts varies from very rare to abundant, however, only rocks with magecrysts were included in this catagory.

Quartz Feldspar Porphyry/Quartz Eye Porphyry - a quartz feldspar porphyry (of rhyodacite composition) similar in general to the Megacryst unit but lacking the distinctive k-spar megacrysts; smaller feldspar phenocrysts (2-4 mm) may or may not be as common as quartz phenocrysts reflected in the two names. Locally brecciated. The Quartz Eye Porphyry locally exhibits abundant and characteristic doubly terminated quartz crystals 3-5 mm in size.

n.b.: the Megacryst K-spar Porphyry and the Quartz Feldspar Porphyry are very similar in composition and appearance and have been arbitrarily distinguished by the presence or absence of megacrysts.

Quartz Syenite - fine to medium grained, subporphyritic to equigranular, lacking the well developed phenocrysts of the above two units; distinctive "chalky" white (kaolinte altered) weathered appearance with 5-8% finely disseminated pyrite, commonly fragmental, brecciated locally.

Biotite Quartz Feldspar Porphyry - in appearance very similar to the Quartz Feldspar Porphyry and, as K-spar megacrysts are sometimes present, to the Megacryst K-spar Porphyry, but with the distinctive addition of fine to medium grained biotite phenocrysts 1-3 mm (a latite composition); this unit

appears to occur as dykes, observed in drill core as 10-20 metre wide intervals cutting granite and quartz syenite and on surface also cutting the diorite along Peachland Road to the east.

Similarities in composition and appearance and intimate spatial relationships suggests these four rock types are closely related genetically. The Megacryst K-spar Porphyry is the most extensive of these units and possibly forms the core of this intrusive complex, while the biotite quartz feldspar porphyry appears as the most recent event occurring as dykes. The quartz feldspar porphyry hosts the vast majority of mineralized shear and fault zones and is therefore considered a prime mineralizing host.

In general, the Otter Intrusives are weakly to moderately altered and locally strongly to intensely altered relating to shears and faults. Common alteration products include kaolinite and sericite with lesser epidote, ankerite and quartz. The quartz feldspar porphyry is commonly limonitic weathered near surface. The Quartz Syenite is usually moderately kaolinite altered. Manganese forms a common weathering product at shears and brecciated zones. Sulphides are usually absent except within the quartz syenite where pyrite is ubiquiously disseminated.
The Otter Intrusives are surrounded by granite to granodiorite and diorite of the Jurassic or later Coast Intrusives, which border the property on all sides (ie. Pennask Batholith to east and Osprey Lake Complex to south and west).
Granite (to Granodiorite) - medium to coarse grained equigranular, pink to green with pink k-spar, plagioclase and quartz dominating, hornblende/biotite noted to 20% in drill core. Composition appears to grade toward granodiorite, or this could be a distinct second phase,oftan brecciated and/or sheared and altered; alteration varies weak to strong sericite, chlorite +/- kaolinite, ankerite epidote,hematite; weak to moderately magnetic; andesite dykes cut granite, rare aplite dykes were observed in drill core but not in outcrop.

Diorite - medium to coarse grained, grey; alteration moderate to fresh including kaolinite, sericite, carbonate, chlorite with hematite in places; moderately magnetic, weakly to moderately developed foliation noted in west

To the south and north the Otter Intrusives are in contact with granites of the Osprey Lake Complex (Rice, 1947). To the east and west diorite borders the Otter rocks. Contacts between the Otter Intrusives and the Coast Intrusives appear to be regular, however biotite quartz feldspar porphyry and quartz feldspar porphyry are observed projecting into Coast Intrusives.

Areas of brecciation are observed in both the Otter Intrusives and the Coast Intrusives. These zones are of a scale of tens to hundreds of metres. Within the Otter Intrusives breccia zones observed in areas of quartz feldspar porphyry and quartz syenite vary in texture and composition from round to angular fragments, fine grained to cobble size. In many instances fragments were of multiple lithologies suggesting far reaching breccia zones.

Abundant fracturing and jointing and numberous shears and faults were observed within the Otter Intrusives, and to a lesser extent within the Coast Intrusives. Faults and shears observed predominently trend east-northeast and north-northwest. East-northeast structures host all of the old showings located along Siwash Creek and are paralleled by Otter biotite quartz feldspar porphyry dykes. The noth-northwest structures appear to offset a number of Otter Intrusive units including biotite quartz feldspar porphyry dykes and parallel Siwash and Gavin Creeks which supposedly represents a major fault structure (Ferguson, 1980). This suggests that younger northerly faulting cuts older easterly mineralized faulting that was syngenetic with late stage Otter Intrusives.

MINERALIZATION

Several mineral occurrances have been documented on the Siwash property,generally centered along Siwash Creek between Tepee and Galena Creeks. The most notable of these showings consist of quartz veins and shear zones hosting lead-zinc-copper-silver mineralization. Lesser values in gold occur in several occurrences with higher assays being quite local.

The B.C. Department of Mines Annual Reports document much of the historical development work with several company assessment reports summarizing the more recent surface exploration.

3-Adit Gap (Renfrew ?)

The most extensive of these workings is the 3 Adit Gap (historically called the Renfrew Adits) where 400-500 feet of underground development has been undertaken in 3 separate adits. Government geological reports from the 1920's indicate the presence of mineralized quartz veins varying in thickness from a few inches to 6 feet in width. A shipment of 27 tons hand sorted material in 1926 produced 3 ounces of gold, 3,379 ounces of silver, and 1,578 pounds of lead.

The 3 adits in this vicihity have been designated as follows; #1 Adit located on east bank of Siwash Creek (35-50 feet), #2 Adit located on west bank across from #1 Adit (at least 300 feet), #3 Adit located on west bank of Siwash Creek - 60 feet downstream from #2 Adit (at least 125 feet). During the 1989 program the author partially accessed all of the adits but without proper safety equipment did not enter to the end of the workings.

In general, the 3 adits in this area have been driven along several mineralized quartz vein shears. Although Siwash Creek appears to be a major structure through this area, similar veining is found on both sides of the creek apparently not significently offset in any manner.

Several samples were collected from this area as listed below;

#1 Adit

Sample Number	Ag (o/t)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Remarks
37051	2.52	6362	1373	4725	across 28"
37052	1.08	6265	1750	2348	across 30"

#2 & #3 Adits

Sample Number	Au (ppb)	Ag (o/t)	Cu (%)	Pb (%)	Zn (%)	Remarks
24687	180	6.60	0.94	1.00	1.33	select dump
24688	2780	3.19	0.66	0.15	18.71	"
24689	260	1.86	0.31	0.53	0.42	"
24690	730	15.37	0.43	14.20	0.42	"
24691	490	7.30	1.43	2.29	4.77	"

Located 30 feet above the #2 Adit portal, sample number 37053 was a select sample of a 7 inch wide massive galena quartz shear with minor pyrite - chalcopyrite -sphalerite. This appears to be the main structure the adit continues in on. Assay results are listed below:

Sample Number	Au (o/t)	Ag (o/t)	Cu (%)	Pb (%)	Zn (%)
37053	3.046	123.54	0.92	42.25	2.38

Brenda Mines drilled holes SS-80-24 & SS-80-25 in the vicinity of the #2 & #3 Adits in a location uphill to the west and south. Both holes intersected several narrow quartz vein stringers hosting pyrite-sphalerite-galena mineralization. Re-samples of remaining drill core assayed in 1989 are listed below. (Note: Less than half of drill core was often remaining following Brenda Mines core splitting).

SS-80-24

Sample Number	Interval (m)	Ag (ppm)	Pb (ppm)	Zn (ppm)
24657	24.7-26.2	7.6	5,400	9,926
24658	26.2-27.7	5.6	13,535	12,835
24659	33.5-35.1	8.6	5,485	8,149
24660	35.1-36.6	15.5	3,619	11,249
24661	36.6-38.1	40.2	9,516	17,166
24662	38.1-39.6	8.6	4,350	8,942
24663	39.6-41.2	4.9	5,638	14,967

SS-80-25

Sample Number	Interval (m)	Ag (ppm)	Zn (ppm)
24613	20.0-21.0	35.7	>20,000
24614	21.0-22.0	11.8	>20,000
24615	22.0-23.0	5.6	14,568
24619	27.0-28.0	4.1	9,999
24622	46.0-47.0	10.1	14,131
24623	75.5-77.0	5.7	>20,000
24624	79.0-80.5	11.1	13,582
24625	98.0-99.0	6.7	16,128

Based on inspection of mineralized dump material found outside of the #2 & #3 Adits (ie. size of material indicating minimum thickness of quartz veining) and records from historical government reports which suggest veins attaining thicknesses of up to 6 feet wide within the workings, it is possible that drill holes SS-80-24 & SS-80-25 did not intersect the strongest structures in this area which may also be auriferous.

Monty Showing

The Monty Showing is located 150 metres downstream from the 3-Adit Gap on the east side of Siwash Creek. The first recorded mention of this

occurrence appears to be in 1928 in the Report of the Minister of Mines (p. 264). A short 30 foot adit was driven along a shear hosting abundent pyrite - sphalerite and minor galena mineralization in 1952. During the mid - 1980's this area was excavated with a backhoe exposing more of the shear and associated wallrock. During the 1989 field program, channel sampling across the apparent strike of the zone produced the following results:

Sample Number	Au (ppb)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (%)	Remarks
37164	6	5.3	248	1,144	2.49	1m chip
37165	47	13.8	757	1,100	5.82	"
37166	32	6.4	165	967	2.21	"
37167	27	9.5	302	1,149	2.49	"
37168	2	7.7	346	935	2.51	"
37169	46	3.8	70	695	2.16	"
37170	22	6.8	102	782	7958 ppm	"

During Brenda Mines 1980 program, drill holes SS-80-22 & SS-80-23 were drilled near the Monty Showing and both intersected zinc-silver mineralization in the form of narrow fracture stringers to narrow quartz vein stringers. Low gold, copper and lead values were reported. Comparison of the drill core to the exposed showing indicates that the Monty Showing itself possibly was not intersected. Results of assays from these holes obtained during re-sampling of drill core in 1989 are tabulated below:

SS-80-22

Sample Number	Interval (m)	Ag (ppm)	Zn (ppm)
24571	25.9-27.4	27.5	>20,000
24572	27.4-29.0	10.5	>20,000
24573	29.0-30.5	5.1	15,336
24574	30.5-32.0	2.8	6,698
24575	32.0-33.5	3.4	8,812
24576	33.5-35.1	3.6	5,424

Sample Number	Interval (m)	Ag (ppm)	Zn (ppm)
24629	14.0-15.5	3.6	9,754
24630	15.5-17.1	6.5	10,627
24650	143.0-144.5	13.5	17,720

Claremont Adits

These workings are located on the east side of Siwash Creek approximately 100 metres downstream from the Monty Showing and just down the steep embankment below the road. The adits are now caved but historical government reports indicate approximately 500 feet of underground development was completed consisting of 3 adits with crosscuts attempting to follow a vein varying from a few inches to a foot. It is reported that a sample across the vein in the upper tunnel assayed 269.8 o/t silver and 0.1 o/t gold (Report of the Minister of Mines, 1918). It is possible that adits have yet to be located above the main road. A sample consisting of sphalerite - pyrite -galena was obtained above a caved adit directly below the road cut which may or may not be of the main structure. The results of this sample are below:

Sample Number	Au (o/t)	Ag (o/t)	Cu (ppm)	Pb (%)	Zn (%)	Remarks
37085	0.037	3.32	935	5.71	15.88	across 20 cm

Fisher Maiden Adits

The Fisher Maiden adits are located south of the Claremont, Monty and 3-Adit Gap (Renfrew) workings and vary from all of the above in that this occurrence is hosted within Coast Intrusive granite versus the quartz feldspar porphyry. This zone consists of a quartz shear mineralized with fine-grained galena and sphalerite with minor pyrite-chalcopyrite. A 50 foot adit located on the east side of Siwash Creek exposes the mineralization up to 4 inches in width for a strike length of 17 feet

before pinching out within the shear. Across Siwash Creek on the west bank old diggings have exposed the probable extension of this zone where the vein is up to 10 inches wide but not as strongly mineralized. Samples from each of these workings are listed below:

Fisher Maiden-East side of Siwash Creek

Sample Number	Au (o/t)	Ag (o/t)	Cu (%)	Pb (%)	Zn (%)	Remarks
24677	0.640	4.71	0.59	15.97	10.56	select grab

Fisher Maiden Extension-West side of Siwash Creek

37056	0.243	44.11	---	4.94	2.34	select grab
24686	0.056	65.85	---	2.61	1.33	select grab

Brenda Mines Copper Soil Anomaly

Soil geochemisty surveys carried out in 1980 by Brenda Mines identified an area of anomalous copper in soils south of Galena Creek and north of the Peachland Road. Prospecting and mapping in this area in 1989 identified sporadic narrow quartz-carbonate stringers hosting chalcopyrite mineralization within Coast Intrusive (Pennask) diorite. Four test soil survey lines were ran accross this zone to confirm the copper anomaly as well as to test gold potential. The 1989 survey confirmed the presence of copper but indicates low gold values with the highest being 56 ppb gold.

Other Areas

Reported gold values from the Monty West Showing (located approximately 100 metres north of SS-80-24) could not be verified. Pyrite - galena - sphalerite mineralization occurs within a silicified contact zone.

Narrow vuggy quartz veins up to 4 inches were found along Siwash Creek south of Galena Creek. Low gold values were obtained.

Prospecting in the western area of the B&D claims in the vicinity of Brenda

Mines 1980 Pb-Zn soil anomaly was unable to locate any significant mineralization. The area is locally swampy which may in part explain these anomalies.

Very little copper mineralization was found or seen west of Siwash Creek.

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APPENDIX

EXCERTS FROM MINISTER OF MINES REPORTS

from Geological Survey of Canada — Memoir 243

"Geology and Mineral Deposits of the Princeton Map Area, British Columbia"

by H.M.A. Rice

ounce a ton, and 32·76 ounces a ton in gold respectively. He points out that gold occurs principally in the flat, mineralized shears, which, unfortunately, are neither numerous nor large.

PROPERTIES ON SIWASH CREEK

The lower part of Siwash Creek, which joins Hayes Creek near Jellico on Kettle Valley Railway, flows over rocks of the Osprey Lake granodiorite body. Just north of Tepee Creek the granodiorite has been intruded by a stock-like body of granite that has been called the Siwash Creek body and correlated with the Otter intrusions. This body is clearly younger than the Osprey Lake granodiorite, and is believed to be a member of the Otter intrusions of post Lower Cretaceous but pre-Miocene age. Apart from a few small dykes of Miocene age or younger, the Otter intrusions are the youngest known in the area, and it is rather surprising, therefore, to find that not only is a large part of the Siwash Creek body profoundly altered by hydrothermal solutions but that mineralized quartz veins occur along fractures in it. On Trout Creek, some 8 miles east of the Siwash Creek body, another similar stock, known as the Trout Creek body, has profoundly altered and mineralized the granodiorite on its eastern margin, and it is clear that its parent magma contained the necessary mineralizing solutions. It seems most probable, therefore, that the Siwash Creek stock was consolidated before the underlying magma, and that the alteration of the exposed granite and the mineralization in it and in the adjacent older rocks may thus have been affected by mineralizing solutions escaping from this magma. It is certain that the mineralization took place during Upper Cretaceous or early Tertiary time.

The Siwash Creek deposits consist of quartz veins following fractures in the Osprey Lake granodiorite body, the Siwash Creek granite body, and, in one instance, in volcanic rocks of the Nicola group near the granodiorite contact. These quartz veins are mineralized with pyrite, sphalerite, and galena, and the latter mineral sometimes carries high silver and substantial gold values. Some of the silver may be carried in argentite and tetrahedrite, which have been reported in places. Chalcopyrite and arsenopryite are rare. One property differs from the others in that the principal metallic mineral is specular hematite. Development work to date has failed to reveal sizable ore shoots, although a few small shipments of high-grade ore have been made.

Mabel Claim (13)

Reference: Ann. Rept., Minister of Mines, B.C., 1927, p. 247.

The Mabel claim, owned by F. Bailey and G. Price of Jellico and Princeton, is on Siwash Creek some 8 miles above its junction with Hayes Creek and just above Tepee Creek. Workings consist of open-cuts, shallow shafts, and short adits, all but the first being caved and inaccessible. The showings consist of strong mineralized shear zones in granodiorite, with a general easterly strike and a steep dip. They occur well within the Osprey Lake intrusive body, but not far from the contact of the younger Siwash Creek body of the Otter intrusions. Several large dykes related to the Siwash Creek body occur near the showings.

The shear zones carry quartz veins, and the crushed granitic rock is abundantly altered to chlorite. The principal metallic mineral is specular hematite, which occurs as veinlets and patches and is accompanied in places by a little pyrite and chalcopyrite. One such mineralized zone is exposed on the west side of Siwash Creek opposite the cabin. It is 10 feet wide, is exposed for about 50 feet, and contains some nearly massive hematite that is said to carry gold. A spectrographic examination revealed a trace of manganese.

Iron Duke and Fisher Maiden Claims (13)

These claims are on Siwash Creek about half a mile above the Mabel claim and may form part of the Mabel group.

The showings consist of mineralized shear zones in granodiorite, and are similar to those on the Mabel claim. Here, too, Otter intrusive dykes occur. The shear zones are silicified and mineralized with hematite, but more pyrite and chalcopyrite can be seen than on the Mabel claim, and in one place the shattered granodiorite shows small amounts of copper carbonate over an area of 30 square feet or more.

Claremont Group (possibly Argentite) (12)

References: Ann. Repts., Minister of Mines, B.C.: 1917, p. 206; 1927, p. 248.

The Claremont group is on Siwash Creek about a mile north of Tepee Creek. Several adits, now caved, have been driven into the steep bank of the main creek and have exposed several mineralized shear zones in the southern margin of the Siwash Creek body of the Otter intrusions, which in this vicinity have been profoundly altered to a soft, kaolin-sericite-quartz-carbonate rock. The shear zones have a general easterly strike and steep dips. They are in part silicified and carry considerable pyrite. Sphalerite and galena are also present, but very little could be seen. The galena is apparently argentiferous, for a selected sample of the mineral taken by the Resident Engineer assayed 0·10 ounce a ton in gold and 269·8 ounces a ton in silver. Apparently, however, such high-grade material is scarce, for in spite of the fact that between 400 and 500 feet of underground development has been done, no substantial shipments have been made. The writer found a number of fine seams of fluorite occupying joints in the altered granite.

Renfrew Group (11)

References: Ann. Repts., Minister of Mines, B.C.: 1925, p. 210; 1927, p. 247; 1928, p. 264; 1929, p. 277.

The Renfrew group, formerly known as the Snowstorm, consists of the E.J.A., B.H., H.J.B., and other claims, and is owned by Frank Barber *et al.* of Princeton. It is on Siwash Creek about 1½ miles above Tepee Creek. More development work has been done on these showings than on any others in the vicinity, and in 1926, 27 tons were shipped by pack-horse 9 or 10 miles to Jellico Siding. From this 3 ounces of gold, 3,379 ounces of silver, and 1,578 pounds of lead were recovered.

The deposits consist of fairly strong mineralized shear zones from a few inches to 5 feet wide striking northeasterly across granitic rocks of the Siwash Creek body of the Otter intrusions. This body has been profoundly altered in the vicinity of the claims to a soft, watery green or buff rock, the only recognizable original constituents being rounded crystals of quartz the size of peas. The sheared and altered rock has been silicified and well banded, and crystalline vein quartz, with both comb structures and vugs, has developed along the shear zones. Both the veins and silicified areas are generally well mineralized with sulphides, the following being observed: pyrite, sphalerite, galena, chalcopyrite, and arsenopyrite. Tetrahedrite and argentite are reported, but were not seen by the writer. In addition to the normal constituents of the minerals mentioned above, the spectrograph revealed traces of cadmium, manganese, antimony, and tin. Several of these veins have been explored by four or five adits, most of which are now caved. The following samples were taken by the Resident Engineer.

Gold	Silver	Copper	Zinc	Lead	—
Oz. a ton	Oz. a ton	Per cent	Per cent	Per cent	
Tr.	1·6	1	13·4	.....	Across 6-inch vein, No. 2 adit
Tr.	1·8	Tr.	24	.....	2½-foot vein, No. 2 adit
Tr.	1·6	1·4	16·2	.....	14 inches of ore from open-cut
Tr.	5	0·7	.....	.....	3 feet of ore from open-cut
Tr.	2	0·6	2·4	Nil	2 feet of ore in No. 1 adit
0·44	20·4	.....	16·0	5	2 feet of ore in No. 1 adit
0·20	63	.....	.....	24	Selected samples of galena ore

Blue Stone Claim (11)

Reference: Ann. Rept., Minister of Mines, B.C., 1927, p. 248.

The Blue Stone claim, owned by F. Barber and W. Cunningham of Princeton, lies on Siwash Creek about three-quarters mile northwest of the Renfrew group. The showing consists of a quartz vein, much like those of the Renfrew, in an easterly striking shear zone cutting the Siwash Creek granite body. The vein is 1 inch to 4 inches wide where seen, and is mineralized with tetrahedrite, pyrite, and some galena and sphalerite. Exploratory work consists of an open-cut and an adit, now caved, driven 50 feet below it.

El Paso Group (10)

The El Paso group is on the northeast side of Siwash Creek some 3 miles north of the Renfrew group. Unlike the properties on Siwash Creek already described, all of which occur in intrusive bodies, the deposits of the El Paso group are in volcanic rocks of the Nicola group near the northwest contact of the Osprey Lake granitic body. The workings seen were two adits, both caved, and some open-cuts. These have exposed one or more veins of banded quartz, carrying arsenopyrite, pyrite, sphalerite, and galena. The walls of the veins consist of crushed and carbonatized volcanic rocks and the quartz veins themselves have been brecciated and healed with veinlets of carbonate. One open-cut exposes a small dyke of the Otter intrusions that has been much brecciated and later healed with barite. No sulphides could be seen in association with the barite. Manganese is the only element revealed by the spectrograph whose presence could not be inferred from the mineralogy.

GRASSHOPPER MOUNTAIN CHROMITE DEPOSITS (29)

References: Ann. Repts., Minister of Mines, B.C.: 1917, pp. 27, 210; 1918, p. 214. Camsell: 1913, pp. 168-170; 1918, p. 29. Cairnes, 1922, p. 96. Poitevin, 1923, pp. 84-101. Cairnes, 1929, pp. 185, 186. Stevenson, 1940.

As is true of so many ultrabasic bodies, those of Olivine Mountain in places carry chromite. The occurrence of this metal is largely restricted to the southern slopes of Grasshopper Mountain, where thirty-two claims, known as the Girl group, were staked by Wm. M. Shaw, of Tulameen, and associates. The chromite occurs as disseminated grains and small veinlets within more or less restricted zones, and was evidently deposited before the final consolidation of the magma, as even when the chromite veinlets follow small fractures in the peridotite, these are, in turn, cut by dykelets of fine-grained peridotite a fraction of an inch wide.

Even the best zone found to date has, unfortunately, proved neither large enough nor rich enough to warrant mining for chromite. However, the clearly demonstrated association of platinum with the chromite has more than once

outside the upper tunnel. An open-cut above the upper tunnel shows plenty of mineralization. The lowest-grade sample, cut along the side of the upper tunnel, assayed 1 per cent. copper, 0.9 oz. silver, and 0.06 oz. gold; the highest assayed 3.90 per cent. copper, 3.40 oz. silver, and 0.12 oz. gold.

Transportation at present is carried out over a steep trail. Should the mine develop, any ore taken out could be cheaply handled by cable to the flat below.

This deposit seems to be of the contact-metamorphic class, being an intrusion of diorite gabbro into the sedimentary limestone, principally a garnet and epidote.

The chief minerals in evidence are bornite, chalcopyrite, arsenopyrite, and pyrrhotite. The ore strikes north-east and south-west. Up to the present the continuance of the ore-body has not been discovered; the tunnels below the outcrop have not been driven far enough to ascertain the possibility of the ore dipping nearly flat into the hill.

Claremont Group.

This group, which is situated on Siwash creek, can be reached by trail from Jellicoe Siding, Kettle Valley Railway, a distance of approximately fifteen miles. A considerable amount of development-work has been done to try and locate the continuance of the ore body, as follows: No. 1 upper tunnel, 198 feet; No. 1 crosscut, 33 feet; No. 2 tunnel, 61 feet; No. 2 crosscut, 27 feet; No. 3 tunnel, 180 feet; total, 499 feet; and also some open-cuts in the gravel-wash approximately 10 feet long. Samples taken across the lead in the upper tunnel assayed 269.8 oz. silver and 0.1 oz. gold to the ton. The principal ore is galena, carrying some iron.

The vein seems to strike in a northerly direction and dips 45 degrees to the east, varying in width from a few inches to a foot, and continues as fas as development has gone in the upper tunnels. The distance from the mine to the railway forms one of the chief difficulties at the present time. Should the mine develop, however, easy grades could be obtained for a wagon-road. The owners are to be congratulated upon the systematic way they are developing the property.

SPOTTED LAKE.

This lake lies approximately one-half mile north of the southern entrance to Richter's pass and has been purchased by the Stewart-Calvert Company, of Oroville, Wash. About twenty men have been employed during the dry period of the season, digging out the magnesium salts from the surface of the lake and transporting them by auto-truck to the Oroville plant for treatment. A large tonnage of these salts is shipped to the Eastern States, where they are used in the preparation of leather. The amount shipped from the lake to the plant in 1917 was 900 tons.

KEREMEOS.

Copper King.

This group consists of the following claims: *Copper King*, *Copper Hill*, *Mountain Lion*, and *Copper King Extension*. The group lies closely to Olalla, on the west side of the valley, at an elevation of approximately 3,400 feet above sea-level, and four miles north of Keremeos, on the Great Northern Railway. There are some good surface showings of chalcopyrite and magnetite lying close to the contact of lime and granodiorite, the lime being well altered and mineralized.

A shaft 30 feet deep sunk through the magnetite-capping develops some chalcopyrite in the bottom; also a tunnel 20 feet long and 30 feet below has been driven with the intention of tapping the bottom of the shaft, but not finished; also two crosscut tunnels 25 feet and 65 feet respectively have been driven across the lime towards the contact, but also not carried far enough to prove any depth on the ore-body.

Four tons was shipped to the Grand Forks smelter for trial in November. This shipment averaged about $24 a ton in silver and copper. This ore was taken from the upper tunnel.

The property has been under lease to A. Hagelberg, Olalla; owner, R. W. Northern, Olalla, Keremeos. Transportation charges to the smelters make it very difficult for the mining men in this district to develop their properties.

Golconda.

This property adjoins the *Copper King* on the north-west and is owned by Dan and Archie McEachern, of Olalla. Over 100 feet of tunnel has been run on the lead, and 4,390 lb. of molybdenite, containing 751 lb. of MoS_2, was shipped to Ottawa. Two tons of copper ore was also shipped, assaying about 19 per cent. copper. The molybdenite lies in small lenses and can easily be extracted.

"KENNEDY MOUNTAIN.

"Exploration-work was started on Kennedy mountain in January. To date 709 feet of diamond-drilling has been done and 823 feet of tunnelling."

H. Barnes, secretary of the Claremont Syndicate on Claremont creek, a tributary of the Jameson creek, states:—

"Tunnel drifts Nos. 1 and 2 have been driven 148 feet and 60 feet respectively on the strike of the vein. Crosscuts were run from each drift towards the foot-wall.

"The outcrop was traced down the hill by a series of open-cuts, and a crosscut is now being driven at a point about 100 feet lower than tunnel No. 1, with the expectation of intersecting the vein on its dip. The total amount of work done totals about 300 feet, including the surface cuts.

"The vein itself appears to be a true fissure, with a strong, well-defined, andesite hanging-wall and a quartz-porphyry foot-wall. The dip is about 50 degrees to the south-east.

"The vein-filling is mainly quartz, carrying galena, pyrite, and small amounts of ruby-silver. The best values seem to be associated with the galena."

OFFICE STATISTICS—SIMILKAMEEN MINING DIVISION.

Free miners' certificates	221
Free miners' certificates (special)	3
Location records	192
Certificates of work	267
Conveyances (mineral claims)	73
Records (placer)	11
Leases (placer)	3
Permits (placer)	5
Powers of attorney	4
Conveyances (placer)	7
Certificates of improvement (mineral claims)	13

Actual yield of gold for 1916, $1,079; average price, $17.50 an ounce. Actual yield of platinum for 1916, $1,764; average price $48 an ounce.

NICOLA MINING DIVISION.

REPORT OF W. N. ROLFE, MINING RECORDER.

I have the honour to submit herewith the annual report and office statistics of the Nicola Mining Division for the year ending December 31st, 1916.

The dominant feature of interest in this Division is the taking-over and active development of the two groups of mineral claims touched upon in my last year's report, the properties in both instances having been lying idle and neglected for a number of years.

Aberdeen Group. One of these is the *Aberdeen* group, situated on Ten-mile creek, on which the purchasing syndicate has during the year accomplished the following work:

One shaft sunk to a depth of 160 feet, as also a manway shaft 100 feet, while drifts have been run on three levels to the extent of 400 feet. Approximately 1,400 tons of ore has been shipped, averaging 7 per cent. copper, coupled with small silver values, while there are some 3,500 tons of second-grade ore on the dump.

With regard to outside developments, a road of about seven miles has been made between the mine and Coyle Station at a cost of $8,000, as also a loading-platform adjoining the railway-track. In addition, a number of mine buildings have been built, and boilers, air-compressor, hoists, pumps, a cage, and mine-cars have been installed and are now being operated.

Donahue Mines. The other property mentioned as having been revived after a long period of inactivity, and an expenditure incurred estimated in excess of $100,000, has been acquired by the Donahue Mines Corporation, the group consisting of eight Crown-granted claims. Upon assuming actual possession of the property in March last, work

Year Ending 1917

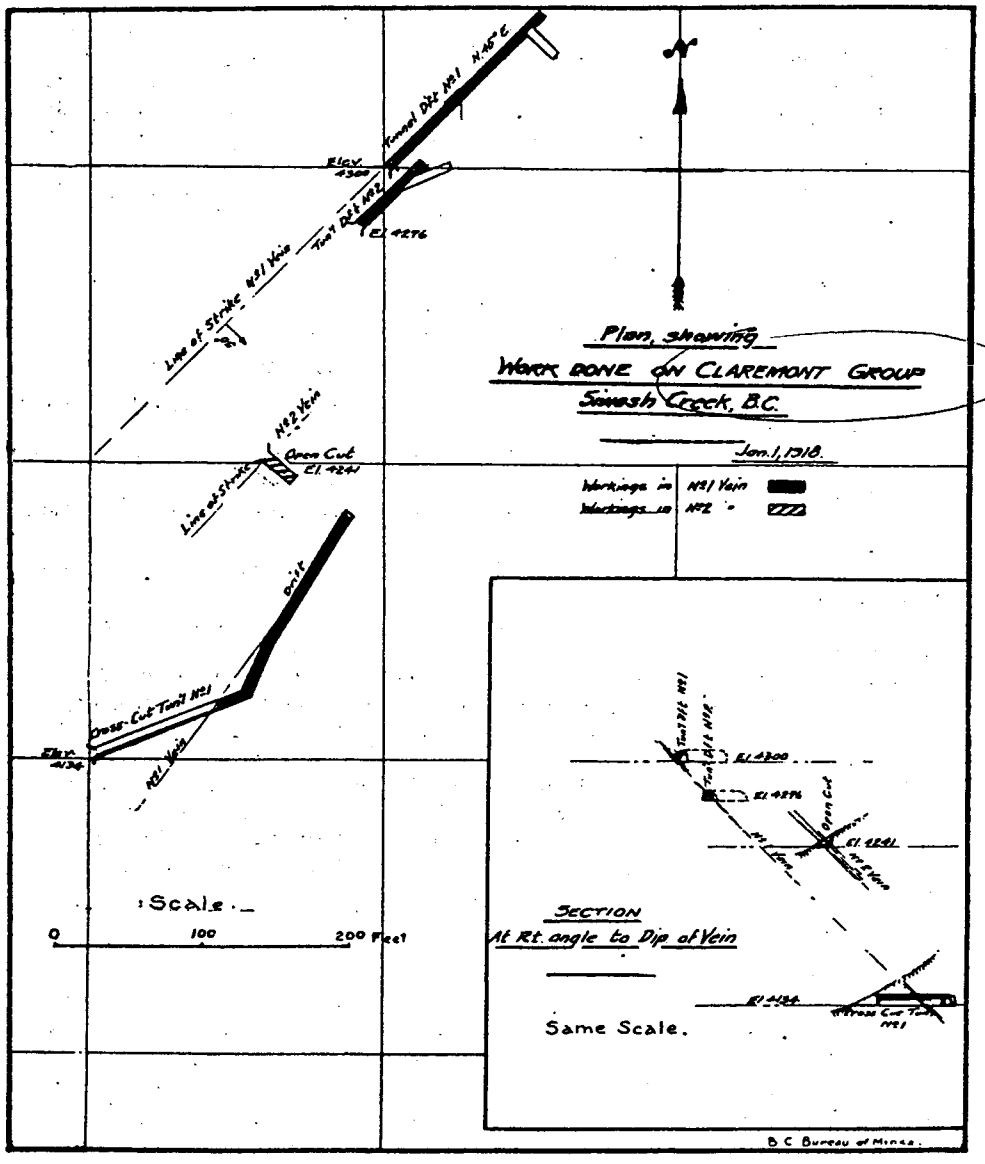
SIMILKAMEEN MINING DIVISION.

REPORT BY HUGH HUNTER, GOLD COMMISSIONER.

I have the honour to forward the annual mining report on the Similkameen Mining Division for the year 1917.

On the Tulameen river a number of men have been placer-mining in a desultory manner, and in most cases good wages have been obtained, the price of platinum having nearly doubled since last year. The Efanjay Syndicate is about to transfer its leases to a new company of Seattle, they not having sufficient funds to carry on the work. Mr. Schubert, of Tulameen, was unable to do much work on his claims, as the water gave out early in the season; he reports a clean-up of 3 oz. of platinum and 3 oz. of gold.

On Copper mountain the Canada Copper Corporation, Limited, is developing its property; a new tunnel is being driven to tap the lower ore-body. A site for the mill was purchased, which



is about four miles south of Princeton, and the proposed branch railway as at present surveyed goes through the property. Experiments were made at the cement plant on nodulizing concentrates, coal-dust being used instead of oil, and these experiments are reported a success. The company has entered into a contract with the West Kootenay Power and Light Company, pursuant to which it will extend its line from Greenwood so as to supply the necessary power for the operation of the properties on Copper mountain.

The Princeton Coal and Land Company mined 52,000 tons of coal during the year 1917.

Work has been resumed on the properties of the Columbia Coal and Coke Company at Coalmont by a Vancouver syndicate under management of Alexander Sharpe, and preparations made for shipping coal on large scale.

The yield of platinum for 1917 was approximately 57 oz. at $70 an oz.

The following report has been received on the *Clarcmont* group from the owners, the Claremont Syndicate:—

"All the work during 1917 was concentrated on the crosscut tunnel mentioned in last year's report, and a drift following the course of a vein intersected by this crosscut. This vein, we believe, is the same one followed by tunnel drifts Nos. 1 and 2. Wooden rails and ties hewn out of timber on the property were laid in the tunnel and drift. The rails were shod with strap-iron, and a small car is now used to transport material from the face of the drift. Both the car and the iron were packed in to the claims on horses at considerable expense. The total amount of work done in 1917 was about 250 feet of combined crosscutting and drifting. A blacksmith-shop and powder-magazine were built at the portal of the crosscut tunnel.

"As shown in the accompanying sketch, a vertical depth of 166 feet below the outcrop of vein No. 1 is attained at the intersection of this vein in the crosscut. This will give a very satisfactory section of stoping-ground if values corresponding to those at the surface are encountered on this level. Owing to winter conditions it is difficult to get to the claims, so at this writing it is impossible to state results and values obtained during the last three months, but work has been carried on steadily."

OFFICE STATISTICS—SIMILKAMEEN MINING DIVISION.

Free miners' certificates	196
Special	1
Location records	205
Certificates of work	286
Bills of sale (mineral claims)	39
Records of placer claims	12
Leases (placer claims)	3
Bill of sale (placer)	1
Powers of attorney	7
Certificates of improvements	4

until the latter part of August, and since then the operations have been of an experimental nature, requiring a continual change in the flow-sheet. The mine and mill have not been operated to full capacity, but it is hoped a maximum output will be attained in 1926, when the flow-sheet will be more or less fixed.

Improvements outside the mill consist of the completion of a 150-foot Dorr thickener, intended for the purpose of reclaiming water from the mill tailings. Mechanical changes in the mill consist of numerous minor changes in equipment already installed and the addition of standard rake and bowl type classifiers to work in close circuit with the ball and tube mills in the fine-grinding department, screens in the secondary grinding department, and one new blower for furnishing air to the flotation unit.

A total of 122,996 tons of ore was shipped from the mine to the mill and approximately 5,366 tons of concentrates shipped to the smelter at Trail, containing copper and gold.

Princeton Mining and Development Co.

This company's property, situated 4 miles east of Princeton, has been reported upon in the Annual Report for 1922, 1923, and 1924. During 1925 from three to five men were working continuously, with a prospect of a larger number in 1926. Development for the year consisted of drifting 150 feet, three upraises, 30, 30, and 10 feet respectively, and a winze 10 feet on the lower or No. 3 level, and a 50-foot extension of No. 2 tunnel to the south. Recent advice from the management states that, after following the stringer of ore developed last year in the face of No. 3 tunnel for 50 feet, it widened out to about 5 feet of fractured vein-matter, which was made up of feldspar with calcite, talc, and a considerable amount of iron oxide in the fractures, and mineralized with chalcopyrite and pyrite containing gold and silver. A picked sample of this ore assayed 0.03 oz. in gold, 2.60 oz. in silver to the ton, and 12.10 per cent. copper.

Plans for 1926 include a continuation of the No. 3 tunnel and an upraise to connect No. 3 and No. 2 tunnels, also an extension of No. 2 for 250 feet. At the present time the face of the No. 3 tunnel is approximately 700 feet below the outcrop of the vein on the surface, which will give plenty of stoping-ground. The construction of a 50-ton concentrator is being contemplated by the management, but this will, of course, await the results of development and the blocking-out of sufficient ore to pay for the mill, plus some return to the stockholders.

Siwash Creek.

E.J.A., B.H., H.J.B., and Owen.

This group of claims, situated about 8 miles up Siwash creek from its junction with 5-Mile creek, is owned by H. H. Avery, H. E. Hansen, Geo. H. Joss, and W. A. McKenzie, of Princeton. Some work, consisting of open-cuts and short tunnels, was done on two veins—one on the *E.J.A.* and *B.H.* striking N. 10° E. (mag.) and dipping slightly to the north-west, and the other on the *H.J.B.* and *Owen* striking N. 40° E. (mag.) and dipping 45° south-east. The widths of these veins vary from 2½ to 6 feet where uncovered and are made up chiefly of pyrite, with small segregations of galena in a gangue of quartz and fragmentary country-rock. Samples across the vein on the *H.J.B.* and *B.H.* assayed a trace in gold and 2.8 oz. in silver to the ton.

A sample of the galena ore on the *E.J.A.* assayed 0.20 oz. in gold, 63 oz. in silver to the ton, and 24 per cent. lead. There is not a sufficient quantity of galena in the ore to represent any tonnage as far as developments have shown, although this condition may change. The country-rock is mainly granite with amygdaloidal diabase rocks in the vicinity of the workings and in which the veins are formed.

The claims are reached by trail approximately 10 miles distant from Jellicoe Siding on the Kettle Valley Railway.

Summit Camp, Tulameen.

The mineral claims in this camp, situated near the headwaters of Amberty creek, which flows into Tulameen river, have been referred to in nearly all the Annual Reports and especially the 1923 and 1924 numbers.

Mary E. Mining Co.

This company, incorporated in the early summer with a capitalization of 2,000,000 shares of a par value of 25 cents each, acquired four claims from W. B. Dornberg and C. Loeb. One of these was originally known as the *Silver Chief* and was formerly held by the Treasure Mountain Mining Company. The original plans of procedure made by W. B. Dornberg, manager, were as follows: That the

"*Certificate of Assay.*

"J. R. Williams, Provincial Assayer and Chemist. Office and Laboratory: Credit-Foncier Building, 850 Hastings Street West, Vancouver, B.C.

"I hereby certify that the following are the results of assays made by me upon samples of ores herein described and received from J. Cleveland Haas, Esq., Seattle, Wash., U.S.A., July 25th, 1927:—

Marked.	Gold.		Silver.		Copper.		Total Value (2,000 lb. per Ton).
	Ounces per Ton.	Value per Ton.	Ounces per Ton.	Values per Ton.	Per Cent.	Value per Ton.	
No. 14	Trace	.....	1.60	$0.90	15.80	$41.08	$41.98
No. 23	0.03	$0.60	3.60	2.02	22.60	58.76	61.38
No. 26	0.06	1.20	2.80	1.57	6.30	16.38	19.16
No. 28	0.03	0.60	1.60	0.90	14.50	37.70	39.20
No. 37	0.03	0.60	2.40	1.34	2.00	5.20	7.14
No. 41	0.02	0.40	52.40	29.47	8.00	20.80	50.67
No. 52	0.03	0.60	3.00	1.68	6.50	16.90	19.18
No. 63	0.02	0.40	3.00	1.68	7.20	18.72	20.80
No. 66	Trace	.....	2.00	1.12	2.20	5.72	6.84
No. 81	Trace	.....	*Nil*	*Nil*	2.20	5.72	5.72

Gold calculated at $20 per ounce. Silver calculated at 56.25 cents per ounce. Copper calculated at 13 cents per pound.

"(Signed) J. R. Williams, *Provincial Assayer.*"

In his concluding remarks statements are made that this ore can be treated ideally by oil-flotation, but no figures on tests made are given. The presence of oxides and carbonates associated with the ore in nearly every part of the mine is a factor that will have to be seriously taken into consideration before an oil-flotation plant is erected. It is possible that deep channel samples have been taken across stated ore-bodies—e.g., 52 feet in No. 2 tunnel—of which there is no evidence at the present time, and these samples assayed and then tested in oil-flotation units to prove that the assay and recovered mill-test values check. The ore-body in No. 2 crosscut is made up of a series of narrow shear-zones varying from ½ to 4 inches in width intermingled with barren country-rock. Owing to the fact that this ore does not persist in width from the roof to the floor of the tunnel, but pinches and swells, it will be necessary to cut wide and deep channel samples on both sides, the roof, and bottom of the level; if not already done, these samples should be assayed and tested for some economical method of recovery before any positive statements can be made regarding the value of the mine as a producer. Unfortunately it was impossible to examine the ore found in the upper part of the upraise owing to the chute being blocked. This ore, stated to be 42 feet wide, may vary in character and deposition from the ore found above in No. 2. From the portal to a point about 100 feet in No. 2 tunnel the shear-zone is highly oxidized, showing much copper carbonates. Near the face of No. 2 tunnel another porphyry dyke has been encountered, striking S. 45° E. (mag.). From the crosscut on No. 2 the tunnel has been driven 186 feet. Along the north-east side of this drift several stringers varying from 1 to 3 inches in width, containing pyrite, chalcopyrite, and malachite, have been struck.

Further development to the south at higher elevations seems to be warranted even if the mill tests do not give satisfactory results.

Voigt's Camp.

Further diamond-drilling was done on some claims in this camp, situated on Copper mountain, by the Consolidated Mining and Smelting Company, the results of which are not to hand. This group has been Crown-granted by the above company.

Siwash Creek Section.

This section embraces an area 20 miles long and 2 miles wide, between the source of Hayes creek and the headwaters of Siwash creek, through which the latter stream flows. In the early

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days a good deal of gold-placer mining was done, chiefly on the benches above the creek. Since that time, probably thirty years ago, this type of mining has been intermittent. The reason appears to lie in the fact that values are "spotty." The source of this gold has never been located, but the appearance of the gravels suggests that they are of glacial origin and may have been brought from the north-west.

Siwash creek has cut a deep channel into the igneous rocks and glaciation has completely eroded any rock sediments that may have existed. Nothing but remnants remain, riding high on the ridges well back from the present stream. Numerous prospects have been partially developed, but no work at depth has been done except on the *Renfrew* claim. Mineralization occurs in quartz veins which have been exposed by the present channel of the creek. On the benches adjacent to the stream there is a deep covering of glacial debris which makes prospecting difficult. The country-rocks mainly in evidence are granite porphyry and fine-grained diorite, cut, especially in the vicinity of the quartz veins, by lamprophyre and alkali-syenite dykes. In several instances quartz veins containing galena and sphalerite are found in the granite porphyry. It seems probable that this porphyry has been disturbed by some later intrusive and the shear-zones filled at that time. Transportation consists of a trail from Jellicoe Siding on the Kettle Valley Railway on the east side of the creek.

Mabel.

This claim, owned by F. Bailey and G. Price, of Jellicoe and Princeton, is situated about 10 miles up Siwash creek on the west side. Development-work consists of open-cuts, ditches, a 6-foot shaft and a 35-foot tunnel driven on a series of quartz veins mineralized with hæmatite, pyrite, and chalcopyrite. Extreme faulting has thrown the vein down the hill to the south and the owners have had considerable difficulty in following it. A sample of this ore carried a trace in gold and 2 oz. in silver to the ton.

E.J.A., B.H., H.J.B., and Owen.

This group of claims lies 1 mile to the north of the *Mabel* claim on Siwash creek and was mentioned in the 1925 Annual Report. Since that time, according to advice received from Frank Barber and partner, who are working on the *E.J.A.* claim, the tunnel on the west bank of the creek has been driven about 40 feet and the vein has widened to 4 feet 6 inches, with 28 inches of good ore in the face. Samples taken from this vein before the above work was done assayed: Gold, 0.20 oz. to the ton; silver, 63 oz. to the ton; lead, 24 per cent. Better values than this will be required before the ore can be shipped direct to the smelter.

Renfrew.

This claim, formerly known as the *Snowstorm*, is located about 18 miles up Siwash creek from Jellicoe Siding, on the east side. In 1926 the Lade Bros. and T. Otto, of Vancouver and Victoria, leased the mine and shipped, by pack-horses and railway, 27 tons of silver-lead ore to the smelter at Trail.

Development consists of an upper tunnel about 90 feet (caved near face), elevation 4,655 feet (barometric); No. 2 tunnel, 36 feet, with two wing-tunnels 40 feet each, elevation 4,610 feet; and No. 3 tunnel, 138 feet long, elevation 4,490 feet, besides several open-cuts and trenches dug to determine the strike and continuance of the vein. In the upper tunnel the vein, averaging 10 inches in width, has been stoped to the surface for 21 feet near the mouth; beyond that point it pinches and is faulted, as far as could be seen. In No. 2 tunnel the vein varies from 6 to 10 inches in width and has been stoped for 20 feet, near the mouth, to the upper tunnel. In the wing-drift, N. 32° E. (mag.), another stope has been driven, having a maximum height of 12 feet. The vein in the face of this tunnel on the floor measures 14 inches and is well mineralized. In the lower tunnel an attempt was made to find the vein in place on the extension of its strike to the south-west. Owing to the extremely shattered nature of the ground, only displaced remnants of the vein-matter were found.

The ore-minerals are galena, pyrite, argentite, tetrahedrite, and arsenopyrite in a gangue of quartz. The main mass of country-rock as far as could be seen is granite porphyry. A black fine-grained lamprophyre dyke follows the foot-wall of the ore in the two upper levels and has probably been the disturbing factor which displaced the veins. Realgar is found in small segregations in the shattered rocks close to the vein. The strike of the vein varies between N. 17° E. (mag.) and N. 65° E., with a dip of 55° S.E. The vein in the face and bottom of No. 2 tunnel is well mineralized and appears to be widening. The shipment of 27 tons contained 3 oz. in gold, 3,379 oz. in silver, and 1,578 lb. of lead. There is a good log cabin which will accommodate about six men.

Blue Stone. This claim, owned by F. Barber and W. Cunningham, of 1-Mile, Princeton, is located about three-quarters of a mile west of the *Renfrew* on Siwash creek. Development-work consists of open-cuts on the top of the ridge and a tunnel on the vein 165 feet in length and 50 feet lower in elevation. The strike of the vein is S. 76° W. (mag.), with a dip of 77° N.E. Owing to a cave near the face of this drift the vein could not be examined entirely. The width of the vein where seen varied from 1 to 4 inches. The ore-minerals are tetrahedrite, pyrite, and occasional segregations of galena and sphalerite in a gangue of quartz. On the surface and in the tunnel the ore was almost entirely oxidized and leached, showing a heavy azurite-stain. The vein occurs in a brecciated zone of diorite about 25 feet wide. To the north and west the diorite is cut by a wide dyke of pulaskite porphyry. Owing to the leached condition of the vein in the tunnel it seems advisable to drive another drift on the lead at a lower elevation. A steep ravine below the mouth of the tunnel permits taking about a 100-foot lift on the strike of this vein. A sample of ore assayed low in silver, due probably to extensive leaching.

Argentite. This claim, formerly owned by Mike Gaynor, of Granite Creek, is situated about 1½ miles south-west of the *Renfrew*, on the opposite side of the creek. A 30-foot open-cut and 60-foot crosscut have been driven on an oxidized zone created by the intrusion of a porphyry dyke into the diorite. Veinlets of quartz containing pyrite have been formed in the rock fractures. Although some good values were obtained formerly, check samples carried no values.

Lucky Strike. This group, consisting of the *Lucky Strike No. 1, No. 2, No. 3, No. 4, No. 5, No. 6, No. 7,* and *No. 8,* is located about 5 miles north of Princeton, within a mile of the Kettle Valley Railway on Hayes and Summers Creek divide. The owners are G. Broderick and sons and T. Hume, of Princeton. Development consists of many open-cuts, a 10-foot shaft, and three tunnels, about 75, 35, and 25 feet long respectively, over a distance about 1,000 feet in length. The country-rock outcropping near the workings is a metamorphosed basalt intruded by tongues of light, coarse-grained feldspathic pegmatite. The ore-minerals, chalcopyrite and pyrite, occur in and near the contact of the pegmatite and it seems reasonable to suppose that this rock is responsible for the ore-deposition. About a mile to the north the granite batholith forms the bulk of the main ridge skirting the north-west side of Hayes valley and the pegmatite apophyses are probably offshoots from this mass. The gangue of the ore consists of quartz and epidote, impregnated with pyrite and chalcopyrite and much malachite-stain in the rock fractures. In practically all the workings the rock is fractured and displaced. No deep development has been tried. The owners are not financially able to exploit this mineralized area at depth, and it is advisable for them to confine their efforts to surface-trenching and open-cuts to disclose, if possible, the total extent of the mineral-zones. Transportation facilities for railway and motor traffic are excellent and there is plenty of water and timber on the property. This is a prospect worth exploration.

Upper Similkameen Section.

Sparkler. This group, situated on Cambie creek, a tributary of the Similkameen river within about 6 miles of the headwaters, was mentioned in the Annual Report for 1925. Since that time C. Richter and W. Wadsworth, of Keremeos, continued prospecting the mineral-outcrops on Bonanza and Coldwater creeks. There are sixteen open-cuts along the side of the creeks on the different veins and recent developments show a decided increase in width at a maximum depth of 20 feet from the surface. Samples taken from the cuts to the south-west on Bonanza creek, containing a high percentage of pyrite, arsenopyrite, sphalerite, and chalcopyrite, assayed: Gold, 0.34 oz. to the ton; silver, 0.60 oz. to the ton; arsenic, 16.2 per cent. The copper contents were not assayed. On Coldwater creek new bodies of ore were opened up, showing a heavy mineral content. An intrusion of gabbro in contact with a narrow tongue of pyroxenite cuts the sedimentaries at the falls on this creek. Similar minerals occur in the gabbro and no doubt this intrusive has been responsible for some of the ore-deposition. The contacts of this rock and the sediments offer the best locality for further development. In spite of the low values obtained up to the present, the extent of the mineralization and distinct widening at depth warrants more exploration. These claims are reached by trail from the 9-Mile bridge south of Princeton and from thence over the Hope trail to a point about 2 miles north of the summit, where a side-trail turns to the left over Nicomen ridge and down to the Similkameen river, skirting the south-west slope of the Three Brothers mountain.

Jesse.

This claim, situated near Thirsk, on the Kettle Valley Railway, is owned by E. H. Hales and Dan McDonald, of Coalmont. In an open-cut 20 feet and a tunnel 10 feet long beside the railway-track a displaced quartz vein about 6 inches wide was found and followed for 30 feet. In the cut the vein is stained with copper carbonates and iron oxides, and in the tunnel segregations of galena were found carrying good values in silver. Owing to the flat-lying country beyond the upper workings the owners decided to commence another tunnel 75 feet lower in elevation on the strike and dip of the vein. This tunnel at the time of examination had been driven about 80 feet, and the vein, varying from 2 to 8 inches in width, followed to the end of the drift, where it had been displaced by a fault. The ore-minerals in the lower workings are chiefly sphalerite with isolated segregations of pyrite and chalcopyrite. A sample of high-grade ore from the lower tunnel vein assayed: Gold, 0.56 oz. to the ton; silver, 0.70 oz. to the ton; copper, 0.30 per cent.; zinc, 54 per cent. A general sample of this ore assayed: Gold, trace; silver, 1.20 oz. to the ton; copper, 1.8 per cent. The zinc content was not calculated in the last sample, but there was about 10 per cent. present.

Snowstorm.

This group, consisting of the *E.J.A.*, *B.H.*, *H.J.B.*, and other claims, owned by Frank Barbee *et al.*, of Princeton, and situated about 10 miles up Siwash creek, was reported upon in the 1927 Annual Report. In 1928 the tunnel was extended about 70 feet on the vein and an extension uncovered up the hill in an open-cut. About 300 feet down-stream another vein was discovered and, according to the owners who developed it since the examination was made, it was widening out and becoming more highly mineralized. The ore-minerals are galena, sphalerite, and pyrite carrying gold and silver.

Pacific Slope Mines, Ltd.

This property, consisting of the *S. & M.* and *Marion* groups and situated about 21 miles south of Princeton, on Whipsaw creek, was reported upon in the 1927 Annual Report. Until May 18th a considerable amount of development had been done, including the extension of the main crosscut tunnel to 560 feet on the *S. & M.* and various offset tunnels from this crosscut. The face of the main tunnel was roughly 125 feet beyond and to the north-west of the highest workings, and therefore had been driven far enough to tap any downward extension of the vein system discovered in the old workings and mentioned as having developed likely-looking mineral-zones.

It was the intention of the management at that time to swing the main tunnel north and drive the first crosscut south-west ahead to prove the ground in both directions. There has been no advice received as to whether this has been done or not. Near the face of the tunnel on May 18th a fault was struck, striking diagonally across the face and dipping 37° north-west.

On this fault a disintegrated mineral-zone was found, extending the width of the tunnel and about 9 feet in length, containing galena, pyrite, sphalerite, and specks of chalcopyrite in a gangue of quartz and metamorphosed schist. A 3-foot sample of this ore containing the highest mineral content assayed: Gold, 0.01 oz. to the ton; silver, 1.40 oz. to the ton; copper, 0.2 per cent.; lead, 2.10 per cent.; zinc, 1.9 per cent. A sample of quartz taken from the first offset tunnel north assayed: Gold, 0.01 oz. to the ton; silver, 0.3 oz. to the ton. Another sample from a strong quartz vein in the main tunnel assayed: Gold, trace; silver, *nil*. The occurrence of ore, although low grade, was considered sufficiently encouraging to warrant further limited development. Later advice during the summer suggested that more ore was struck, but this has not been corroborated.

On the *Marion* the old main shaft was unwatered and sampled, with the following results: First 14 inches of oxidized vein-matter on south-east side of shaft assayed: Gold, 0.01 oz. to the ton; silver, 2.8 oz. to the ton; zinc, 10 per cent. Second 14 inches on the same side assayed: Gold, 0.01 oz. to the ton; silver, *nil*; zinc, trace. A general sample of the picked dump ore assayed: Gold, 0.04 oz. to the ton; silver, 2.6 oz. to the ton; zinc, 14.9 per cent. This shaft was unwatered and sampled by E. J. Conway, the company's engineer, because the former owner, Sam Spencer, declared that he had found good gold values in the vein. A narrow wagon-road has been constructed over the Hope Trail route from Lamont (9-Mile) Creek bridge, a distance of approximately 13 miles, to camp. P. H. Fraser was director of the mine development.

Day and Night.—These claims are situated across Whipsaw creek, opposite the *S. & M.*, and are owned by Chas. Day, Princeton. In the 1920 Annual Report a short description of the work done was incorporated. Since that time yearly assessments have been done by the owner.

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sample assays quoted under the name of C. E. Cairnes were taken from a property that does not belong to the company.

Wheeler. This group is situated a short distance up Friday creek, which flows into the Similkameen river about 17 miles south of Princeton. The owners, A. E. Wheeler and associates, have done a great deal of development-work, chiefly low down on each side of the creek close to the cabin. Three of the tunnels were caved and could not be examined. According to the owner, these are 250, 100, and 50 feet long respectively; the first two encountered ore. On the dumps several tons of ore have been piled. Up-stream from the cabin two more tunnels have been driven on the same side of the creek. One of these, 75 feet long, contained a fractured zone about 12 feet wide which tapered to a few inches in a short drift. Across the creek a 40- by 50-foot open-cut has been excavated, but the overburden has fallen in and covered the rock-exposures to a great extent. Several tons of ore are piled in the cut. Under this hole a tunnel supposed to be 50 feet long has been driven, in which no ore was found.

The ore on the dumps and where seen in place is associated chiefly with a pink pegmatite very similar in appearance and structure to that found at Copper mountain. The ore-minerals are bornite and chalcopyrite, which are specked through a gangue of epidote, chlorite, and pegmatite, and also in solid slabs in the rock-fractures. The country-rock appears to be chiefly diorite associated with bands and segregations of hornblende and biotite. The relation of these rocks could not be determined owing to caved ground and a heavy mantle of top soil.

Whether or not there are any older volcanic rocks or sediments in the vicinity, in which larger bodies of ore may have been deposited, remains to be discovered. The occurrence is very interesting and well worth intensive prospecting at higher elevations away from the igneous rocks. There are two trails leading to the property, one from the Trans-Provincial road and survey and the other cutting across from the old tote-road.

Princeton Mining and Development Co., Ltd.—Through failure to renew its free miner's certificate this company lost a number of the claims held by it. Walter R. Gilbert, formerly of Chilliwack, one of the stockholders and later a director, restaked three claims covering part of the ground held by the company. It is understood that Gilbert now holds this ground in trust, subject to compensation by the company.

Golden Copper Co., Ltd. This company has an authorized capital of 100,000 shares, par value $1 per share, with W. R. Gilbert as president; Francis Federici, Vancouver, as vice-president; A. C. Ray, 530 Seymour Street, Vancouver, as secretary; A. O. Topley, Chilliwack, as treasurer; and directors, W. R. Gilbert, F. Federici, John Summers, C. S. Halfnights, and C. N. Davidson. These claims cover part of Lot 404, which is owned by S. Sheppard, and, it is understood, the base-metal rights go with the lot and cannot be claimed by the company unless paid for. An arrangement was made between W. R. Gilbert and S. Sheppard so that the latter receives payment for his rights.

Work done consisted of an upraise about 45 feet long from a point about 100 feet from the mouth of No. 2 tunnel. This was done to test the size and quality of the ore above No. 2. High-grade stringers of chalcopyrite were found which were too widely separated to be mined profitably. In No. 3 tunnel, at a point about 35 feet in from the first crosscut east, a small stope and shallow winze were driven on a 4-foot shear-zone containing stringers and lenses of chalcopyrite. A car-load of ore found in the bin was shipped and, according to the management, did not pay expenses. The financing was done by W. R. Gilbert, for which he will receive 51,000 shares for three claims and will advance up to $11,000 if necessary for development.

Snowstorm. This group, situated on Siwash creek and owned by Frank Barber, J. Cunningham, and H. Avery, of Princeton, was developed by driving a No. 2 tunnel 140 feet long and 60 feet down-stream from No. 1 tunnel. Two veins were cut in this tunnel, varying from 2 inches to 2½ feet in width and converging towards each other. The intersection of the veins has not been struck yet. It seems likely that the vein found in the face of this tunnel is the downward extension of No. 1 tunnel vein.

Samples taken assayed as follows: (*a.*) Six-inch vein in crosscut, No. 2 tunnel: Gold, trace; silver, 1.6 oz. to the ton; copper, 1 per cent.; zinc, 13.4 per cent. (*b.*) Two and a half feet ore from face of No. 2 tunnel: Gold, trace; silver, 1.8 oz. to the ton; copper, trace; zinc, 24 per cent. (*c.*) Fourteen inches ore from vein, 500 feet down-stream: Gold, trace; silver, 1.6 oz. to the ton; copper, 1.4 per cent.; zinc, 16.2 per cent. (*d.*) Three feet ore from open-cut across creek: Gold,

Snowstorm (cont)

trace; silver, 5 oz. to the ton; copper, 0.7 per cent. (*c.*) Sample ore taken at intervals from bottom of No. 1 tunnel:—Two feet ore: Gold, trace; silver, 2 oz. to the ton; copper, 0.6 per cent.; lead, *nil;* zinc, 2.4 per cent. Two feet ore: Gold, 0.44 oz.; silver, 20.4 oz. to the ton; lead, 5 per cent.; zinc, 16 per cent.

Shamrock Nos. 1 to 6.

These claims, owned by J. Armstrong *et al.*, of Princeton, are situated about 23 miles up Summers creek on the west side. A mineralized zone striking in a northerly and southerly direction has been traced for about 1,500 feet along the slope of the side-hill. In open-cuts and a short tunnel near the south end the ore-zone varies in width from 18 inches to 10 feet and is made up of pyrite, chalcopyrite, and chalcocite, which has been deposited chiefly in the fractures of the porphyritic rocks. Some very attractive samples of chalcocite assayed high in copper. A shipment of this ore was made late in the year and the copper contents amounted to 5.78 per cent.

Regal.

This group, situated north-east of and close to Princeton, is owned by W. C. McDougall *et al.*, of Olalla. A lease and bond was taken, it is understood, by A. G. Trites, Vancouver, and some diamond-drilling done under the supervision of J. L. Parker. The holes were drilled in the vicinity of development-work done several years ago, but owing to crushed ground very poor cores were obtained. The values were also considered to be too low grade as far as the drilling extended. There is a large area of altered volcanic and sedimentary rocks containing malachite in the fractures. Some sulphides were also found.

Summit Camp, Tulameen.

Silver King Mining Co.

This company acquired by assignment from William B. Dornberg, Vancouver, two leases of five mineral claims, one of which is Crown-granted; i.e., *Bluebell, Mary E., Mattie, Lobe,* and *Allen,* all situated at Summit camp. The leases are for a term of ten years, and one is from the Capitol Mining and Milling Company and C. C. Julian, and the other is from the Cascade Consolidated Silver Mining Company and C. C. Julian, to W. B. Dornberg. The rentals to be paid to the lessee and mortgagee is one-fourth of the net smelter returns from all ore shipped.

Since this company was formed a crew of men worked until November 1st, when operations ceased owing to trouble in the plant and severe weather. Work in No. 1 tunnel consisted of cleaning up debris and driving a short tunnel on a stringer containing sphalerite and specks of galena, also shipping sorted ore formerly mined from the stope in this level.

Work done in No. 2 consisted of timbering and cleaning up the south-west drift for 300 feet and putting in chutes, etc., preparatory to stoping. A winze was also sunk for 20 feet in the ore. At the time of examination (August 25th) no stoping had been done. When work stopped, according to the management, the stope was 50 feet long and 25 feet high, with ore exposed in the back. An intermediate tunnel was also driven for 50 feet between No. 1 and No. 2 tunnels with the idea of intersecting the vein and supplying air for stoping operations. In No. 1 tunnel the vein on the south side of the dyke has been developed to some extent, but nothing done to ascertain the value of the vein on the north side. In No. 2 tunnel the north vein is the best and similar ore may be found in No. 1. The crosscut tunnel should be produced in No. 1 to the north vein. Three car-loads of sorted ore was shipped to the smelter, containing silver, lead, and zinc.

Advice from H. C. Stephenson, manager, states that it is the intention of the company to erect a jigging and concentration plant in the spring; also No. 3 or the lowest tunnel may be cleaned out and extended in a westerly direction. A truck was employed which hauled in supplies 2½ miles from Tulameen and carried sacked ore on return trips. Costs have been figured as follows: Mining, $12; trucking, $10; railway freight, $8; smelter treatment, $9.58 a ton. The first car-load lot assayed: Silver, 113 oz. to the ton; lead, 40 per cent.; zinc, 19 per cent. The other lots were lower grade owing to being sorted in the mine where visibility was poor.

Summit Camp Mines, Ltd.

During the winter the *Queen Bess,* situated near Amberty basin in Summit camp, was developed by driving a crosscut tunnel 171 feet, which intersected the vein about 147 feet vertically below the outcrop. A drift was driven 33 feet on the vein each way from the crosscut. In the right drift the vein varied from 1 to 8 inches and was mineralized chiefly with pyrite and sphalerite. In the left drift the vein appeared to be widening at the face and contained segregations of galena inter-

Mining of undercuts with jack-leg machines instead of by diamond-drill blast holes was a successful new development in 1951. Twenty-three jack-leg machines and nineteen Holman Silver Bullet stoping-machines, all using tungsten-carbide tipped steel, were used in development and ore breaking. Drilling for pillar blasting is still done with diamond drills. Mining is extensively mechanized. Most of the ore is mined in diamond-drill shrinkage stopes and is transferred from slusher-drift draw-points to grizzlies by electric slusher-hoists. Because of the more friable nature of the ground now being mined, most of the slusher-drifts are reinforced with a concrete lining. Ventilation raises, equipped with auxiliary fans, provide each slusher unit with fresh air, so that the dust and smoke from scraping and blasting are carried away quickly. Diamond drilling done during the year comprised 95,287 feet of exploratory and 330,540 feet of blast-hole drilling.

The major underground development in 1951 was the starting of the new No. 3 inclined shaft from No. 6 level. The shaft is inclined at 45 degrees and is being raised to the surface a slope distance of approximately 1,000 feet. At the end of December it had been advanced about 400 feet. When completed, the new shaft will replace No. 1 shaft, which will be engulfed by subsidence when the 6-1/13 and 6-13 east ore blocks are mined. The search for new orebodies was intensified. An 8,000-foot long exploratory drift was started from the extreme south end of the mine on No. 6 level. At the end of 1951 this drift had been advanced 200 feet. Other long drives into virgin areas to the north and east of the mine workings were started on the Nos. 4, 5, and 7 levels.

The 250-horsepower electric motor on the No. 2 shaft hoist was replaced with a 400-horsepower motor, and the 100-cubic-foot capacity ore skips were enlarged to 123 cubic feet to increase ore-hoisting facilities from No. 8 level to No. 6 level. Two additional loading pockets and grizzlies were built on No. 8 level. No. 3 bunk-house was further enlarged to accommodate an additional twenty-four men.

Safety committees make regular tours of inspection of all surface and underground workings, and their recommendations are discussed at subsequent meetings. The company employs a safety engineer. An emergency hospital with the customary equipment and supplies, including a supply of blood plasma, is maintained at the camp. A trained nurse and industrial first-aid attendants are on hand at all times. Aluminium-dust therapy is available for employees. A doctor visits the Copper Mountain camp twice a week and is available in emergencies. An ambulance is maintained for transporting sick or injured persons to the Princeton General Hospital, 12 miles from the mine. Two trained mine-rescue teams competed in the Similkameen Valley Mine Safety Association's annual competition held in Princeton on June 9th.

A slide on the railway between Copper Mountain and Allenby caused a suspension of production from June 18th to June 22nd. Except for this brief interruption, mining and milling were continuous throughout the year. The crew at Copper Mountain averaged 587, with 464 employed underground. The total crew at the Copper Mountain, Allenby, and Princeton operations was 925 at the end of 1951.

JELLICOE (49° 120° N.E.)*

Gold-Silver-Copper-Lead-Zinc

Lucky Strike

This group is a relocation of part of the Snowstorm group. It consists of the Lucky Strike, Diamond, Blue Grouse, Judy, and other claims and is owned by E. Mullin *et al.*, of Princeton. It is on Siwash Creek, north of the Crown-granted Fissure Maiden Fraction, and about 8 miles by road from Jellieoe on the Kettle Valley Railway. In 1928 the upper adit had been driven 110 feet in a southwesterly direction from the west side of the creek. In 1929

* By E. R. Hughes.

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No. 2 adit, 60 feet downstream from No. 1, was driven 140 feet. These adits were cleaned out in 1951, and a crosscut was driven south 40 feet from the face of No. 1 level to connect with No. 2 level. From the intersection of the levels the face was advanced 45 feet on the vein.

A compressor was installed, and mining was done with a Copco jack-leg machine. No ore was shipped, but about 100 tons was mined and stored at the property.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1925, p. 210; 1927, p. 247; 1928, p. 264; 1929, p. 277. *Geol. Surv., Canada*, Mem. 243, pp. 108–109.]

HEDLEY (49° 120° S.E.)*

Gold

Nickel Plate and French (Kelowna Mines Hedley Limited)

Company office, Room 2630, 630 Fifth Avenue, New York 20, N.Y.; British Columbia office, 640 West Pender Street, Vancouver; mine office, Hedley. George L. Mill, manager; E. W. Johnson, mill superintendent; J. Biggs, mechanical superintendent. This is a private company operating the Nickel Plate mine and the French mine at Hedley. In February the name of the company was changed from Kelowna Exploration Company Limited.

Nickel Plate Mine.—C. T. Williams, mine superintendent; P. C. B. Emery, chief engineer. Full descriptions of the operation have appeared in previous Annual Reports. Major underground development in 1951 consisted of sinking the 4150 winze and driving the 4160 drift. The 4150 winze is an inclined shaft sunk at 46½ degrees from the 4150 level and has a slope length of 430 feet. The bottom of the winze is at an elevation of 3,820 feet on the Morning mineral claim near the boundary of the Nick of Time. The winze was completed in 1951 but had not been completely equipped for hoisting at the end of December. The 4160 drift was driven 1,000 feet for exploratory work in the Climax fault area.

Two new bunk-houses were built to provide additional accommodation for sixteen men. There were no other major additions to plant or equipment. Mining is done with Copco and Gardner-Denver drilling-machines using Copco steel, and Timken and Craig bits. The type of machine and bits used depends on the kind of work to be done and the hardness of the ground to be drilled. Total development consisted of 3,343 feet of drifting, raising, crosscutting, and winze sinking, of which 1,394 feet was done in the Nickel Plate and 1,949 feet in the Morning workings. Diamond drilling amounted to 15,158 feet, of which 12,156 feet was exploratory and the remainder was for stope preparation. At the end of the year 237 men were employed, of whom 125 worked underground.

The percentage production from the main parts of the mine was: Nickel Plate, 80.2 per cent; Morning, 10.8 per cent; Sunnyside, 9.0 per cent. Production: Ore milled, 115,488 tons.

French Mine.—F. Garbutt, mine superintendent. The mine is on the Oregon mineral claim which the company recently purchased from F. H. French and associates, of Hedley. The mine is about 8 miles by road from the company's mill at Hedley, and 1½ miles east of the Hedley–Nickel Plate road. As far as is known at present the ore occurs in a shallow deposit. The workings consist of an adit level at an elevation of 3,910 feet, with two open stopes, one on each side of the level. The broken ore is scraped from the underground workings along the adit level to a storage bin outside the portal. A small crushing and sampling plant is installed at the mine. A 500-cubic-foot Holman belt-driven air compressor powered by a 100-horsepower General Electric motor provides compressed air for the mine. Electrical power is obtained from the West Kootenay Power and Light Company Limited. Two new Canadian Ingersoll-Rand

* By E. R. Hughes.

is available in emergencies. An ambulance is maintained for transporting sick or injured persons to the Princeton General Hospital, 12 miles from the mine. Two trained mine-rescue teams competed in the Similkameen Valley Mine Safety Association's annual competition held in Princeton on June 21st.

The mine was operated continuously throughout 1952. In order to cut production costs, most long-term development work was curtailed near the end of the year; thus while the underground crew at the beginning of the year was 470, in December it had been reduced to 368. For the whole year the crew at Copper Mountain averaged 560, with 431 employed underground. The total crew at the Copper Mountain, Allenby, and Princeton operations was 853 at the end of 1952. The average daily production of ore shipped from the mine was 4,895 tons on 358 days. The total ore milled was 1,751,703 tons, having an average grade of 0.889 per cent copper.

JELLICOE*

Gold-Silver-Copper-Lead-Zinc

Lucky Strike (Siwash Development Co. Ltd.)

(49° 120° N.E.) Company office, c/o Norman Littlewood, Princeton Hotel Block, Harold Avenue, Princeton. Capital: 10,000 shares, $1 par value. E. Mullin, president; W. Lore, mine manager. This company was formed in 1952 and owns the Siwash group, which is a relocation of part of the Snowstorm group and consists of the Lucky Strike, Diamond, Blue Grouse, Judy, Rain Fraction, Raft Fraction, Camp Robber Fraction, and Raven Fraction mineral claims on Siwash Creek, about 8 miles by road from Jellicoe on the Kettle Valley Railway, and about 34 miles by road northeasterly from Princeton. Development in 1952 was confined to the Lucky Strike and Diamond claims. From the intersection of the No. 1 and No. 2 adits on the west side of Siwash Creek the adit was driven 50 feet, making a total distance of 215 feet from the portal of No. 1 adit to the face. Drifting was done on the vein, which ranged from 10 to 20 inches of siliceous material containing gold, silver, copper, and zinc. About 550 feet downstream on the east side of the creek a new adit was started and was driven 30 feet eastward on a vein 9 feet wide mineralized with sphalerite.

Two miles of new road was built and other parts widened so that it is now possible to drive a truck or jeep over the rough road to the property. An old Gardner compressor, belt-driven from a six-cylinder Chevrolet gasoline engine, supplied compressed air, and mining was done with a Copco jackleg machine. No ore was shipped, and that which was mined was stored at the property. A crew of from two to four men worked during week-ends and holidays in the summer and fall months.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1925, p. 210; 1927, p. 247; 1928, p. 264; 1929, p. 277; 1951, p. 130. *Geol. Surv., Canada*, Mem. 243, pp. 108–109.]

HEDLEY*

Silver-Lead-Zinc-Gold

Iota (Hedley Yuniman Gold Fields Limited)

(49° 120° S.E.) Company office, 45 Kingsway, Vancouver. J. W. Gallagher, president. The Iota property is on Stemwinder Mountain, about 3 miles northwest of Hedley. Underground work was confined to extending the adit started in 1951 to a length of 424 feet from the portal. A Canadian Ingersoll-Rand double-drum slusher-hoist with a 30-inch scraper was used to scrape the muck from the face on to a loading ramp, from where the muck was hand-trammed in a mine car to the portal. A 210-cubic-foot-capacity Schramm portable compressor supplied compressed air, and a Copco jack-leg machine was used for drilling. Two men were employed. No ore was

* By E. R. Hughes.