

Howell

CONFIDENTIAL

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Crowsnest

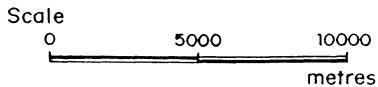
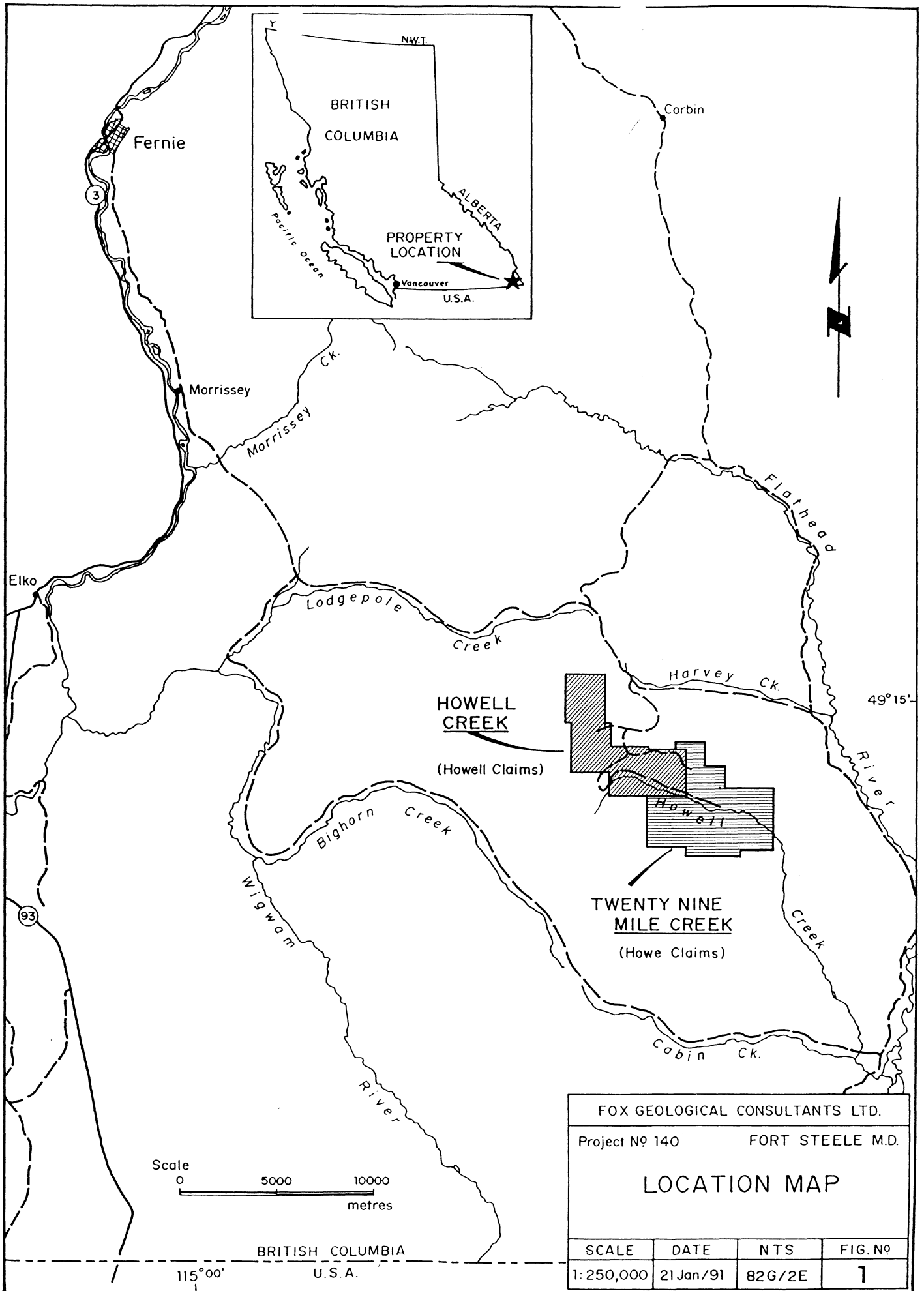
VOS  
July 1983

## LOCATION AND ACCESS

The prospects are situated in the Flathead area of southeastern B.C. in the vicinity of Howell Creek and Twenty-Nine Mile Creek (Figure 1). The property lies 30 kilometres southeast of Fernie and 25 kilometres north of the British Columbia-Montana border at latitude 49°13'N and longitude 114°38'W. The area is within the MacDonald Range of the Rocky Mountains between elevations 1,490 metres and 2,400 metres. Most of the claim block is below treeline. A regional view is given in Plate I.

Access to the claims is by logging roads leading from the locality of Morrissey, 13 kilometres south of Fernie on Highway 3, for a distance of about 60 kilometres following Morrissey Creek, Lodgepole Creek, Harvey Creek and then by logging roads into the valleys of Howell Creek and Twenty-Nine Mile Creek. An extensive network of logging roads provides vehicle access to most areas of the property. A large portion of the claims is logged.

There are no environmental concerns but reclamation requirements with respect to exploration activities are strictly enforced. Drill roads must be back-filled and seeded and felled timber must be either decked or slashed.



FOX GEOLOGICAL CONSULTANTS LTD.			
Project No 140		FORT STEELE M.D.	
<b>LOCATION MAP</b>			
SCALE	DATE	NTS	FIG. No
1: 250,000	21 Jan/91	82G/2E	1

BRITISH COLUMBIA  
U.S.A.

115°00'

49°15'

The nearest populated centre is Fernie, B.C. With a population base of over 5,000, it supports a mining- and forestry-based economy with minor transportation and tourism interests.

## PROPERTY HISTORY

The Flathead region and its immediate area have been the focus of major industrial activities. Logging of merchantable timber, now largely complete, has developed access to all drainages in the district. Exploration for coal and phosphate has included several major exploration programs including the Sage Creek Coal Deposit of Rio Algom, which reached the feasibility and permitting stage in 1988. Shell Canada and Chevron Canada have conducted several drilling campaigns in the Flathead district in the search of CO<sub>2</sub> reservoirs to provide CO<sub>2</sub> for use in oil recovery programs.

The first claims in the Howell Creek area were staked in 1972. Limited sampling work was done for a brief period but failed to identify any targets. Cominco staked the Howell 1 to 5 claims in 1983. Over the next several years, Cominco completed reconnaissance-style soil sampling and prospecting. Dome Exploration (Canada) Limited followed up the results from a regional prospecting program in early 1984 and staked the Howe 1 to 7 claims on the east side of Cominco's Howell claims. In 1988, Placer Dome Inc. optioned the Howell claims from Cominco and completed comprehensive soil surveys and two drill campaigns in 1988 and 1989. Work history is tabulated below.

- 1983 - Cominco stakes Howell Creek claims, limited prospecting
- 1984 - Silt sample Howell Creek, 29 Mile Creek, Trachyte Ridge (Dome Exploration)
- 1985 - Stake Howe 1 adjacent to Cominco's Howell claims
- 1986 - Stake Howe 2 to 7
  - Soil sample Howe A Grid
- 1987 - Soil samples Howe Grid A
- 1988 - Option Howell 1 to 5 claims from Cominco Ltd.
  - Soil sample Howell Grid A, Grid E
  - Drill Howe Grid A - 10 holes (3651 feet reverse circulation)
  - Drill Howell Grid A - 15 holes (5111 feet reverse circulation)
- 1989 - MAG-VLF Howell Grid E
  - Soil sample Howell Grid E
  - Diamond drill Howell Grid A - 3 holes (1624 feet)
  - Diamond drill Howell Grid E - 4 holes (1970 feet)

## CLAIM INFORMATION

The Twenty-Nine Mile Creek property consists of the Howe 1 to 7 claims which comprise 116 units situated the Fort Steele Mining Division on NTS 82G/2E. Claims status is given below.

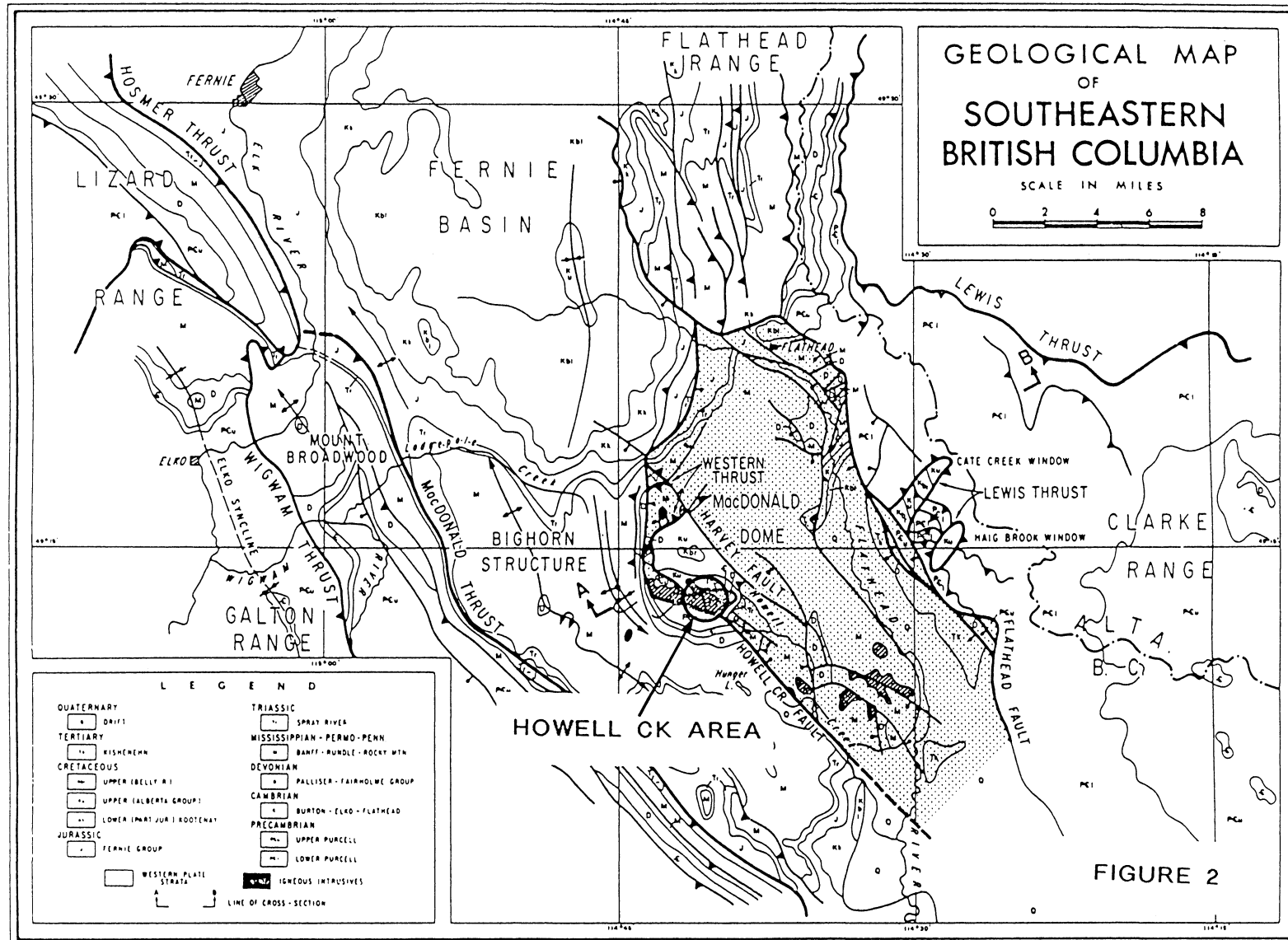
Claim Name	Record No.	Units	Group	Expiry Date
Howe 1	2401	20	A	June 14, 1996
Howe 2	2634	15	A	June 23, 1994
Howe 3	2635	20	A	June 23, 1994
Howe 4	2636	16	A	June 23, 1994
Howe 5	2637	20	A	June 23, 1994
Howe 7	2639	9	A	June 23, 1994

The Howell Creek prospect covers the Howell 1 to 5 claims, a total of 88 units, located in the Fort Steele Mining Division on NTS 82G/2E. Claim status is given below.

Claim Name	Record No.	Units	Group	Expiry Date
Howell 1	1868	20	83-1	July 14, 1998
Howell 2	1869	20	83-1	July 14, 1998
Howell 3	1870	20	83-1	July 14, 1998
Howell 4	2016	20	83-1	October 31, 1998
Howell 5	2017	8	83-1	October 31, 1998

## GEOLOGY

The Twenty-Nine Mile Creek and Howell Creek prospects are located in the Flathead region of the southern Rocky Mountains. The area is geologically unique and is closely related to structural styles to the south in Montana. Regional geology is presented on Figure 2.



The geology of the Flathead district is that of Laramide thrust faults and broad, open folds modified by Tertiary extensional faults, listric normal faults and low angle reverse faults, part of the Flathead Graben that extends southerly to Montana. Cretaceous intrusions comprising alkalic stocks, dykes and sills are common but restricted to areas of Tertiary faults. Strata exposed in the Flathead area include Proterozoic Purcell Group clastics, Paleozoic carbonate and clastic rocks, Mesozoic clastic sequences and coal, and Tertiary fault scarp breccias related to Tertiary faults.

A number of intrusive bodies are exposed in the valleys of Howell Creek and Twenty-Nine Mile Creek. These bodies vary from stocks and plugs to large bodies two kilometres in diameter. The character of the intrusive complex is that of a large, hypabyssal subvolcanic centre. Rocks vary from alkali feldspar syenite to nepheline syenite. Intrusions are distinctly porphyritic with up to 60% euhedral orthoclase to 2 cm in size. Accessory minerals include albite, melanite, aegirine augite, aegirine, analcite and nepheline. Nepheline-bearing intrusions are light green and usually form sills having tinguaitic textures. Subjacent diatreme breccias are common. These comprise rock fragments and igneous clasts of variable proportions set in a carbonate-rich matrix (Plate II). Alteration effects around the breccias and intrusive units include widespread pyritization and carbonatization of the intrusions, silicification and argillization of wall rocks, and vein stockworks of quartz, adularia-quartz and barite-fluorite (Plate II). Anomalous concentrations of gold, silver and base metals are associated both with the intrusions and hydrothermally altered wall rocks. Geology of the claim blocks is presented in Figure 3 together with gold soil geochemistry and drill collar locations.

## MODEL

The geology of the Howell Creek and Twenty-Nine Mile Creek prospects bears many similarities to the Cripple Creek District in Colorado, which produced some 21 million ounces of gold between 1891 and 1959. The Cripple Creek district is dominated by a diatreme-intrusive complex within a collapsed caldera. Intrusive rocks include phonolite, trachyte and syenite. Unlike the Howell Creek area, the Cripple Creek district is hosted by coeval volcanic tuffs and epiclastic material, diatreme tuffs, and fall back breccias. Bonham (1988) developed a schematic model for an alkalic gold deposit (Figure 4). Key elements are the association of gold with silicification and carbonatization of alkalic hypabyssal rocks and the presence of variable amounts of bornite, fluorite, adularia, pyrite, and molybdenite together with lead, zinc and copper sulphides. Central to the model is a postulated alkalic porphyritic stock at depth.

The Howell Creek area fits this model in many respects. Central to the property is a large porphyry syenite stock at the headwaters of Twenty-Nine Mile Creek containing a well developed quartz stockwork. Distal to the stock are carbonate replacements (Howell Grid A), base metal mantos (Howe Grid A) and auriferous breccias and diatremes (Howell Grid E) all developed in wall rocks that include Precambrian siltites, quartzites and Paleozoic carbonates.

## **TARGETS**

Exploration work on the Howell Creek and Twenty-Nine Mile Creek prospects has relied on geochemistry. Initial work utilized conventional silt sampling techniques. Drainages in the area of Howell and Twenty-Nine Mile Creeks returned highly anomalous gold values from 20 ppb gold to 173 ppb gold with associated arsenic, antimony, base metal and silver. First phase follow-up and target definition was accomplished by mapping, prospecting and soil sampling on regular grids with lines spaced 100 metres apart and samples collected at 50-metre intervals. B horizon soil material was collected where possible from either poorly developed residual soils or mixed till and colluvium. Soils were analyzed for gold by AA methods and for 30 additional elements by ICP methods. This work outlined extensive coincident gold, arsenic, antimony, silver and base metal anomalies throughout the various claim blocks. Three high priority target areas were outlined and are discussed in detail below.

### Twenty-Nine Mile Creek

Geology of Twenty-Nine Mile Creek consists of gently dipping Purcell Group maroon and grey siltstones, mudstones and shales, Cambrian Flathead Formation quartz sandstone and green fissile shale, Cambrian Elko Formation limestone and Devonian Fairholme Formation limestone.

Soil sampling has outlined a large composite gold, arsenic, antimony and base metal soil anomaly on the south slopes of Twenty-Nine Mile Creek valley. The anomaly is 2,000 metres long and coincides with the trace of Flathead Formation quartz arenites and shales. Rock chip sampling of road cuts returned low to anomalous values in gold except in locations where a waxy green shale horizon overlies the Flathead Formation. This shale unit is locally anomalous in gold up to 1,742 ppb and enriched in zinc (4,338 ppm).

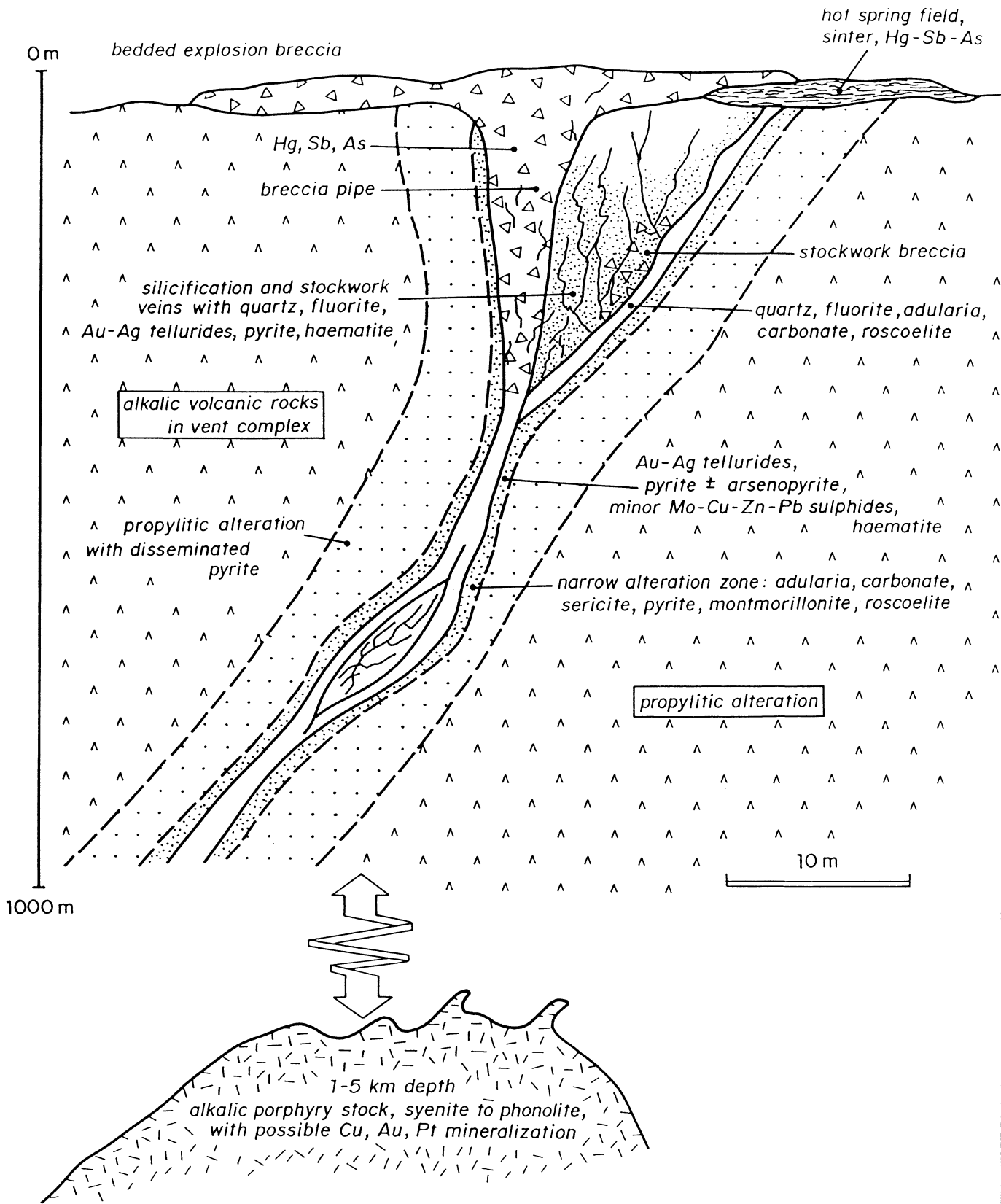


FIG. 4 Schematic model, alkalic Au-Ag deposit.

Bowman



Ten reverse circulation drill holes tested the western 700 metres of the anomaly were readily accessible by road. Holes 2, 3, 6 and 7 returned anomalous lead, zinc and silver in a shale member of the Flathead Formation. Gold contents were locally anomalous up to 740 ppb. Holes 8, 9 and 10 collared in rocks lower in the stratigraphic section returned widespread anomalous gold contents in a basal quartz arenite unit. Results are summarized below.

Hole	From (ft)	To (ft)	Length	Pb (ppm)	Zn (ppm)	Ag (ppm)	Au (ppb)	Description
HRC2	340	370	30	2700	12753	7.53		pyritic green shale
HRC3	250	255	5	1178	4329	3.40		shale/dolomite, in anomalous section with gold to 749ppb
HRC6	160	165	5	10057		31.60	240	siltstone
	175	180	5	1105	9598	4.10	250	siltstone
RC7	100	105	5	2146	11012	4.50		green siltstone

#### Howell Creek Grid A

Grid A lies at the eastern boundary of the Howell claims on the ridge between Howell Creek and Twenty-Nine Mile Creek (Plate I). Here, Upper Cretaceous black shales of the Alberta Group are overridden by a slice of disrupted Proterozoic clastics, Flathead Formation quartz arenites, Elko Formation carbonates, Devonian Fairholme Formation limestones and irregular plugs, dykes and sills of clay-altered pyritic syenite. The bounding fault has been called the Western Thrust. This fault is folded and cross-cuts stratigraphy at high angles suggesting a young, low angle normal fault.

Soils in Grid A contain highly anomalous gold contents over large areas (Figure 3). The main soil anomaly, with gold values up to 1,860 ppb, covers an area 1,300 metres long by 400 metres wide. Associated elements not shown in Figure 3 include arsenic, antimony, silver and base metals. Rock types include Cambrian and Devonian limestones and dolomites that have been intruded by abundant syenitic dykes and sills. Widespread anomalous gold contents occur in rock samples with values up to 1,970 ppb.

Fifteen reverse circulation drill holes tested both ends of the peak soil anomaly. Best results were obtained from the northern end in drill hole 25. Hole 25 returned 708 ppb

gold (AA assays) over its entire length of 405 feet including 30 feet that returned 2,987 ppb gold and 15.6 ppm silver. Fire assays done at Placer Dome's laboratory increased the values by approximately 15%. Using Placer Domes gold assays, the first 190 feet returned 1.23 gpt gold.

Hole	From (ft)	To (ft)	Length	Pb (ppm)	Zn (ppm)	Ag (ppm)	Au (ppb)	Description
HRC15	175	200	25	15794	19442	53.20	347	limonitic dolomite
HRC22	180	205	25			29.70	1309	massive fine grained pyrite to 50% in limestone
HRC23	60	65	5				2460	highly anomalous, 10 values >500 ppb
HRC24	245	270	25				788	fine crystalline limestone
HRC25	0	405	405			4.40	708	fine crystalline limestone, 3 to 5% pyrite
Incl.	160	190	30			15.6	2987	

Three diamond drill holes were completed to test the northwestern end of the Grid A target. The holes cored silicified limestone and pyritic, carbonate-altered syenite intrusions. Gold assays up to 3,600 ppb over one metre were obtained.

#### Howell Creek Grid E

Grid E lies five kilometres west of Grid A at the headwaters of Howell Creek near the western border of the Howell claims (Figure 3). Work here developed a gold soil anomaly with dimensions of over one kilometre by two kilometres. Gold values up to 1,340 ppb are present along with anomalous values in arsenic, silver, antimony and base metals. Rock types include pyritized and silicified siltstones of the Kintla Formation and pyritic, fluorite-bearing syenite dykes and sills. One grab sample of a fluorite-bearing syenite dyke returned 645 ppb gold.

Four drill holes tested the northern fringe of the Grid E zone. Drill sites were restricted to accessible areas on north-facing slopes south of Howell Creek. All holes encountered silicified quartzites and siltites and pyritic, fluorite-bearing syenites. Core was anomalous in gold throughout; one sample returned 1,732 ppb gold over one metre. Extensive areas of gold-bearing soils remain to be tested.

## **CONCLUSIONS**