5070

82G/1W

FINAL GEOLOGICAL REPORT - 1973

COMMERCE CLAIMS - BRITISH COLUMBIA

49°11'N, 114°22'W Commerce, Beth
82G/1W

KINTLA EXPLORATIONS LIMITED
#7-8540-109 St., Edmonton, Alberta
R.J. GOBLE, M.Sc.; February 5, 1974

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KINTLA EXPLORATIONS LIMITED

FIGURES ACCOMPANYING REPORT

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INTRODUCTION

This report outlines the geological exploration carried out on the Commerce Claims during the period 1967 through 1972. It also presents data gathered during the 1973 field season by personnel of Kintla Explorations Limited. Finally, it summarizes all the data obtained to date and concludes as to the economic significance of the Commerce Claim blocks.

The Commerce Claim blocks comprise 84 full and 3 fractional claims covering approximately 4422 acres. The claims are centred upon Latitude $49^{o}11'$ N and Longitude $114^{o}22'$ W, approximately 2 miles northeast of Commerce Peak in the Fort Steele Mining Division (see Figure 1 for location map of the Commerce Claims).

Access to the eastern portion of the claim blocks is good via logging roads up the Sage and Roche Creek valleys and via an extension of the Roche Creek logging road to 'Camp Lake' at the head of Roche Creek (see Figure 2). This road is generally passable to summer traffic although wet weather may render it impassable to all but 4-wheel drive vehicles. From Camp Lake the west-central portion of the claims (the 'Gossan Mountain' area) is accessable by 4-wheel drive vehicle via a bulldozer trail established in 1973. Access to the west and northwest portions of the claim blocks is via a logging road up the Commerce Creek valley. This road does not, however, extend onto the main claim block. A seismic trail extending up the Commerce Creek valley from the end of this logging road is impassable at the present time.

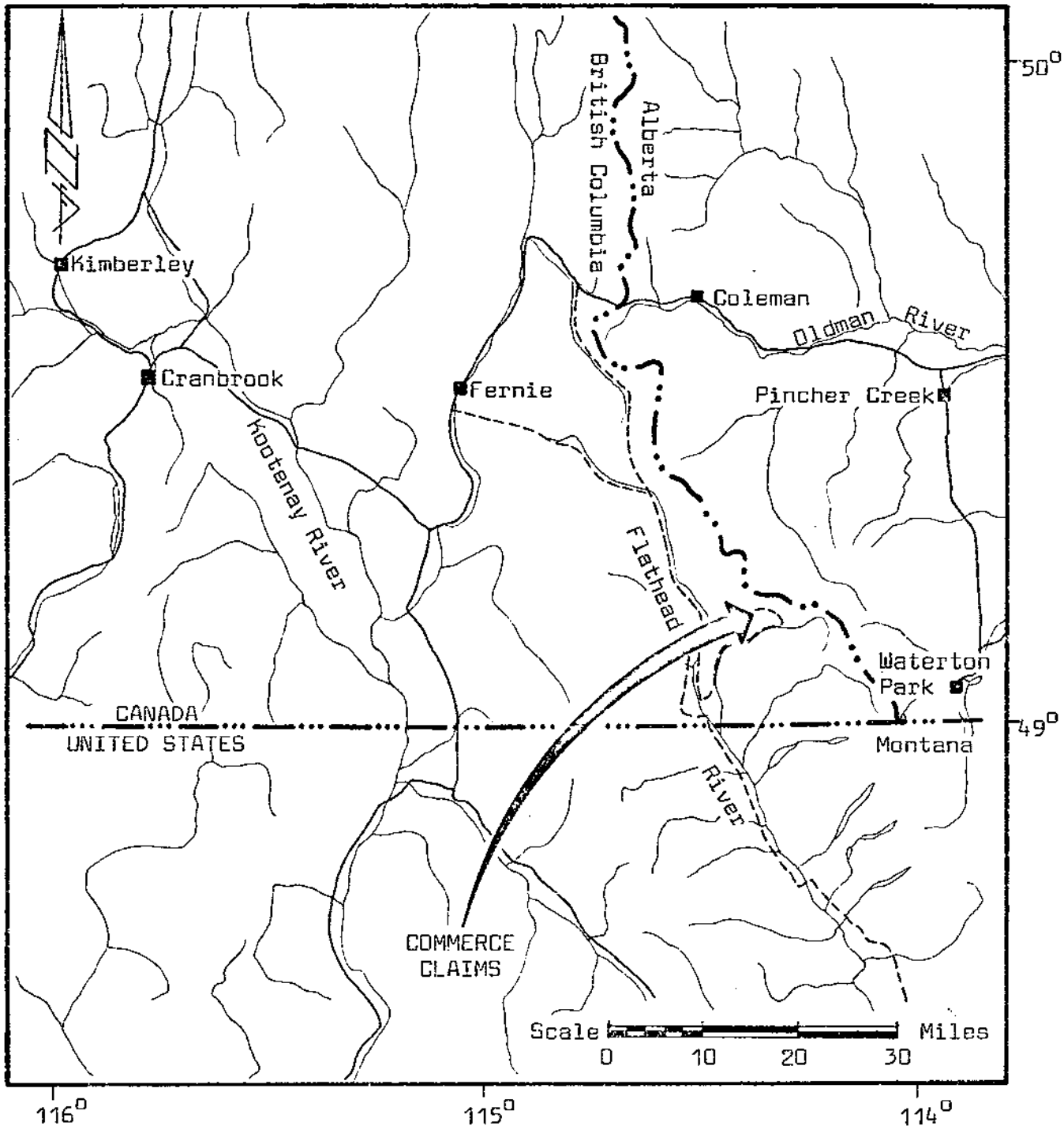

FIGURE 1: LOCATION MAP OF COMMERCE CLAIM BLOCKS

HISTORY AND PREVIOUS WORK

Prior to the location of the first of the present Commerce Claims in 1967, the area had been staked several times for gold in the 20th Century by C. Wise, L. Ashman, and F.M. Goble. Claim posts from this period are still present near some of the current posts, as are the remains of several other, much older claim posts. Two old trenches have also been located. One of these has since been obliterated by bulldozer trenching on Sill Mountain. The other, on Gossan Mountain, is still visible, near the location of a high Au-assay (3.84 oz/Ton) taken in 1972.

The original 45 Commerce Claims (Commerce 1-16, 19-39, 41-48) were staked in 1967 by F.M. Goble and R.J. Goble, employees of Kennco Explorations (Western) Limited. Under an agreement between F.M. Goble, R.J. Goble and Kennco Explorations (Western) Limited, these claims were sold on July 9, 1968 to the Goble Family (F.M. Goble, L.E. Goble, D.F. Goble, E.O. Goble, R.J. Goble, F.J. Goble). The Goble Family assigned the claims to Goble Explorations Syndicate on September 25, 1969, which in turn optioned the claims to Falconbridge Nickel Mines Limited on January 2, 1970. This option lapsed and on December 29, 1971 the claims were assigned by Goble Explorations Syndicate to Franklin Motel Co. Ltd. On January 29, 1972 Franklin Motel Co. Ltd. in turn sold the claims to Kintla Explorations Limited. At the date of this report the claims are registered to the Goble Family.

In March 1973 9 claims (Commerce 50-57, 68) were staked adjoining the original 45 claims. At this time a separate block of 10 claims (Commerce 58-67) was staked to the northwest of the original claim block. An additional 3 full (Commerce 69-71) and 3 fractional (Commerce 72-74) claims were staked adjoining the original 45 in July 1973. Finally, 17 claims (Commerce

75-91) were staked southeast of the original block in August 1973. Current claim boundaries are indicated on Figure 2.

Exploration was carried out on the original 45 Commerce Claims by Kennco Explorations (Western) Limited in 1967/68; by the Goble Family in 1968/69, 1970/71, 1971/72; by Falconbridge Nickel Mines Limited in 1969/70; and by Kintla Explorations Limited in 1972/73. Several diamond drill holes were put down by the Goble Family but core recovery was poor (F.M. Goble, pers. comm.) and no cores or logs are available for these holes. Results of explorations carried out by Falconbridge Nickel Mines Limited in 1969/70 are summarized in a report entitled "Record of Work on the Commerce Claims, Goble Family Option - Commerce Nos. 1-16, 19-39, 41-48. N.T.S. 82 G/1W, Lat. $49^{o}09'$ - $49^{o}12'$, Long. $114^{o}20'$ - $114^{o}25'$, June - July 1970" dated February, 1971. Results of exploration carried out by Kintla Explorations Limited in 1972/73 are summarized in a report entitled "Geological Report on the Beth and Commerce Claims located 45 miles Southeast of Fernie, 49^{o} 114^{o} S.E." dated July 19, 1973. To the end of 1972 exploration work totalling approximately $34,000.00 had been performed on the 45 original Commerce Claims.

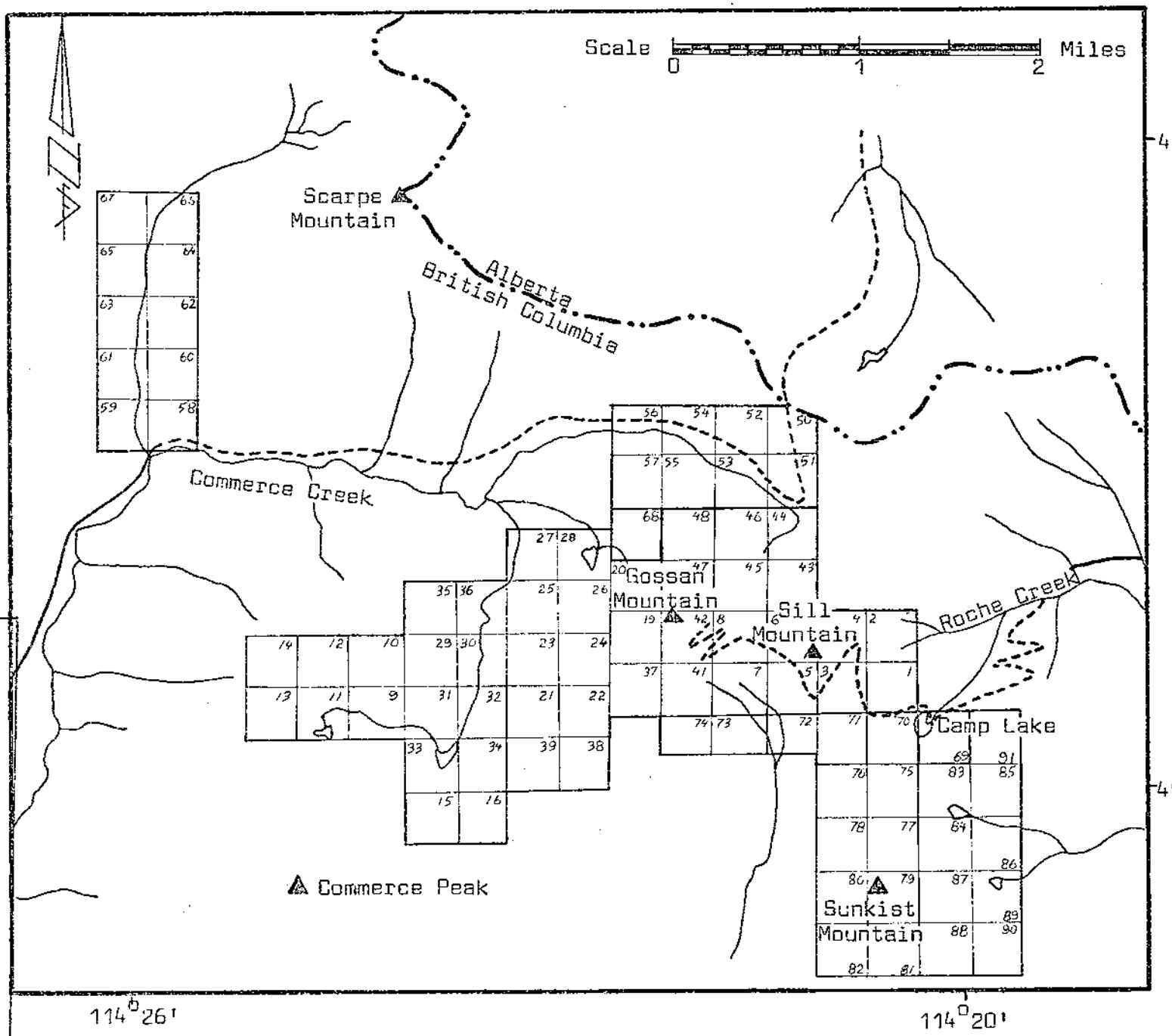

FIGURE 2: CLAIM BOUNDARIES - COMMERCE CLAIM BLOCKS

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Assessment Report of Mineral Resources

No. 5070 MAP #2

REGIONAL GEOLOGICAL SETTING

The Au/Ag, Cu/Ag deposits of the Commerce Mountain area occur within rocks of the Precambrian Lewis Series and within associated intrusive rocks. The Lewis Series, the local equivalent of the Purcell (Belt) Supergroup, outcrops within the Lewis thrust plate, a sheet of gently folded, almost horizontal Precambrian strata which has been thrust over Paleozoic and Mesozoic formations (see Figure 3). Subsequent to movement along the Lewis thrust, the thrust plate has been folded into a series of en-echelon structures trending south to southeast (BOSTOCK et al., 1957). The dominant structure, the Akamina syncline, parallels the Purcell anticlinorium, formed west of the Rocky Mountain Trench (HUME, 1932).

The Lewis thrust sheet is cut to the west by the Flathead fault, one of a set of listric normal faults formed after emplacement of the Lewis overthrust by "back-slippage" along pre-existing thrusts during a phase of post-orogenic uplifting (BALLY et al., 1966). The thrusting and subsequent normal faulting occurred as part of the Laramide orogeny of the Middle Paleocene and Eocene, with movement on the Flathead fault continuing well into the Oligocene (JONES, 1969).

The rocks of the Lewis thrust sheet are for the most part shallow-water, subaerial and marine quartzites, argillites, and carbonates with minor submarine lava flows and deeper water sediments. The stratigraphic succession as given by PRICE (1962) is shown in Figure 4. Deposition of the Lewis Series occurred in a slowly subsiding basin or trough of relatively high stability. The rate of subsidence kept close pace with the quantity of supply, with some localities exposed to subaerial conditions while others were submerged below wave-base (REESOR, 1957). Conditions such as this

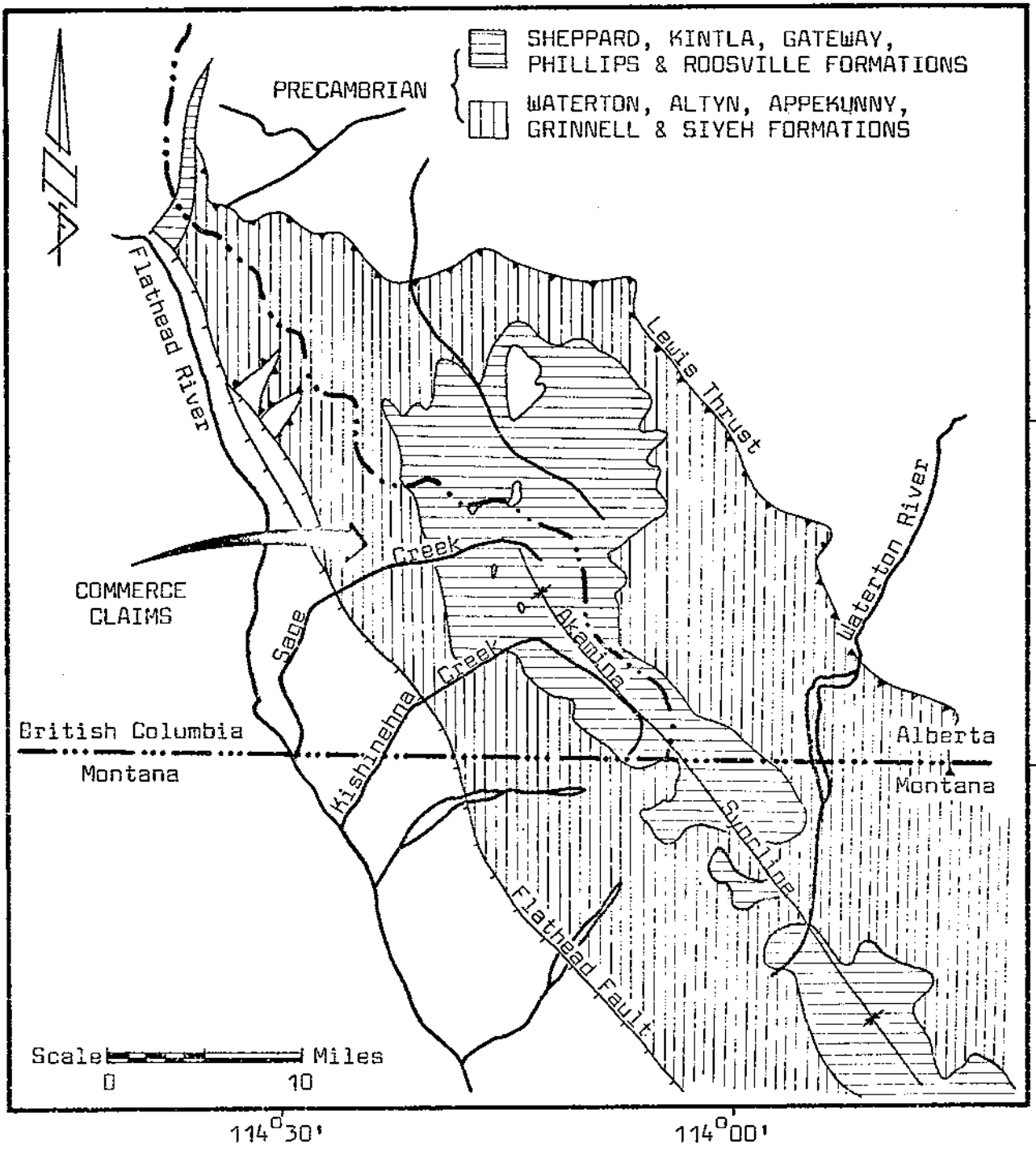


FIGURE 3: GEOLOGY OF LEWIS THRUST SHEET (after PRICE, 1965).

PERIOD OR EPOCH	GROUP FORMATION	LITHOLOGY	THICKNESS (feet)
	EROSIONAL UNCONFORMITY		
PURCELL	MOYIE INTRUSIONS	Diorite sills and dykes.	
PURCELL (LEWIS)	ROOSVILLE FORMATION	Green argillite, siltstone, sandstone, stromatolitic dolomite.	3500 ±
	PHILLIPS FORMATION	Red sandstone, siltstone, argillite.	500 - 700
	GATEWAY FORMATION	Argillite, argillaceous siltstone, dolomite, dolomitic sandstone, and argillite.	1150 - 3000
	SHEPPARD FORMATION	Quartzitic & dolomitic sandstone, dolomite, oolitic dolomite, argillite, siltstone, pillowed andesite.	150 - 900
	EROSIONAL UNCONFORMITY IN PART		
	PURCELL LAVA	Chloritized andesite, & amygdaloidal andesite, pillowed andesite.	00 - 600
	SIYEH FORMATION	Limestone, dolomite, argillite & sandy limestone & dolomite, argillite, stromatolitic limestone.	1130 - 3000
	GRINNELL FORMATION	Red argillite, sandstone & siltstone; white, green & red quartzite.	350 - 1700
	APPEKUNNY FORMATION	Green argillite, white, grey & green quartzite; sandy argillaceous dolomite & dolomitic argillite; siltstone.	1500 - 2000
	ALTYN FORMATION	Argillaceous limestone & dolomite; sandy dolomite, argillite, & stromatolitic dolomite.	500 - 4000
	WATERTON FORMATION	Limestone & dolomite, argillite, & argillaceous dolomite.	1500 +

FIGURE 4: STRATIGRAPHIC SUCCESSION - LEWIS SERIES

(after PRICE, 1962).

would occur on or adjacent to the flood plain of a large subsiding delta (PRICE, 1964).

There are two distinct groups of structures within the Clarke Range (PRICE, 1962). The first of these, a series of thrust faults (e.g. Lewis thrust) and related folds (e.g. Akamina syncline) is generally cut by the second, a group of younger normal faults dipping towards the southwest or west (e.g. Flathead fault). This may represent late Mesozoic and early Tertiary thrusting followed by late Tertiary normal faulting (BALLY et al., 1966). The normal faults, which are steep at the surface, also flatten at depth (listric normal faults) and may merge with older thrust faults. A third set of northeasterly-trending transverse faults occurring in the Clarke Range may have originated as gravity faults, whose orientations were controlled by the anisotropy of the basement rocks underlying the region (PRICE, 1967).

Two periods of Purcell plutonism within the Lewis thrust sheet took place at 1580 - 1400 million years and 1110 - 1073 million years (HUNT, 1962). These gave rise to Moyie-type chloritized diorite and diabase sills and dykes concentrated within the Altyn, Appekunny, Grinnell, and Siyeh Formations, some occurring as high in the stratigraphic sequence as the Phillips Formation. The second of the two phases of igneous activity also resulted in the extrusion of andesitic lavas belonging to the trachybasalt family (HUNT, 1964). A third period of igneous activity resulted in the intrusion of leucocratic alkalic intrusives of Cretaceous and/or Tertiary age (PRICE, 1962). These occur as narrow dykes and irregular anastamosing stock-like masses, trachyte being the most common rock type, with aegirine-augite and aegirine trachytes and syenites, latites, felsites, and intrusion

breccias also being present (PRICE, 1962). It is these younger alkalic intrusives which are concentrated within the Commerce Mountain area.

GEOLOGY OF COMMERCE CLAIM BLOCKS

Stratigraphy

The Commerce Mountain area contains outcrop of rocks of all formations from the Altyn to the Phillips (see Figure 5). Apart from the immediate contacts with sills and dykes, these rocks are unmetamorphosed. Details of the local stratigraphy as mapped by BADHAM (1972) are given below. For a summary of the local stratigraphic column see Table 1.

Altyn Formation:

Approximately 1000' of dark fissile shales with dolomitic horizons outcropping to the south and west of the claims are assigned to the Altyn Formation.

Appekunny Formation:

The base of this formation is taken at the lower of two 50' thick distinct white sandstone bands which outcrop, 100' apart, to the south and west of the claims. These sandstones are overlain by about 2000' of grey and green fissile shales with occasional dolomitic horizons. There are an increasing number of intercalated thin white sandstone beds towards the top of the formation.

Grinnell Formation:

The base of this approximately 2000' thick formation is marked by the incoming of the first red bed, which conformably overlies the Appekunny. The lower part of the Grinnell consists of red silts and marls with buff and green horizons and very rare sandstone beds. The sandstone beds increase in number and thickness up the Grinnell, making up some 30% of the outcrop in the middle Grinnell and 50% of the outcrop in the upper 500' of Grinnell.

The buff and green horizons in the lower Grinnell are not true beds,

FORMATION		LITHOLOGY	THICKNESS (feet)	
PHILLIPS		Buff shales with calcareous and arenaceous horizons.		>50
GATEWAY		Red silts and shales with sandstone lenses. Salt casts, ripple marks, sun cracks and mud-flake conglomerates.		~300
SHEPPARD	Upper	Buff limestones and calcareous shales with good stromatolitic horizons (hemispheroid-continuous linkage), ripple marks and sun cracks.	250	350
	Middle	Massive chloritized andesite flow with up to 50% chlorite-quartz filled vesicles in top 5'.	30	
	Lower	Interbedded green shales and buff, calcareous shales with three distinctive 2' thick quartz grit beds, containing fragments of green shale and chloritized andesite.	70	
PURCELL LAVA	Upper	Thin, highly vesicular flows.	50	200-400
	Middle	Massive flows with vesicular flow tops. Thins to north.	100-250	
	Lower	Pillowed flows with vesicular and variolitic horizons. Thins to north.	50-100	
SIYEH	Upper	Interbedded flaggy green and grey fissile shales, silts and sandstones.	200-250	2100-2150
	Middle	Interbedded pale sandstones and dolomites. A 30' stromatolitic dolomite (parallel to hemispheroid-continuous linkage) near the top. Dolomites contain 'heiroglyph' and 'molar tooth' patches of limestone.	~400	
	Lower	Buff weathering, black-grey dolomites, shales and calcareous shales. Well-bedded, with sparse sandstone units near the base, containing pyrite micronodules.	~1500	
GRINNELL	Upper	Interbedded red silts and sandstones with silt clasts. 50% sandstones in 6" to 3' beds.	500	1500-2000
	Middle	Interbedded red and green silts and marls and sandstones, with silt clasts. 30% sandstones in 1" to 12" beds.	500-750	
	Lower	Red marls and silts with sparse green silts and 1" to 6" sandstone beds.	500-750	
APPEKUNNY	Upper	Green shales and interbedded sandstones, with the proportion of sandstone increasing toward the top.		~2000
	Lower	Interbedded fissile black and green shales, silts and occasional flags. The base is taken at the lower of two 50' distinctive white sandstone beds, ~100' apart.		
ALTYN		Buff and green shales and dolomites.		>1000

TABLE 1: STRATIGRAPHIC COLUMN - COMMERCE CLAIM BLOCKS

(after BADHAM, 1972).

but have developed around thin beds and lenses of coarser silt and sandstone, presumably during post-depositional ground water percolation. The sandstones are not homogenous along strike but vary from pure to 'dirty', from massive to laminated to cross-bedded, and from empty to shale clast bearing. In the lower and middle Grinnell (actual boundaries are not defineable) the shale clasts are usually green, but green and red ones become mixed in the upper Grinnell.

The silts contain ripple marks, suncracks and mud-flake conglomerate horizons. The sandstones are often cross-bedded, have rippled and scoured bases, and contain shale clasts. The rocks were deposited in part in very shallow water and in part subaerially. They are interpreted as being the deposits of a deltaic floodplain, with the sandstones representing periodic channel spills (BADHAM, 1972).

Siyeh Formation:

The basal 1000'-1500' of this formation consist of well-bedded, buff-weathering grey and black shales and dolomites, with sparse sandstone beds.

The basal shales and dolomites are overlain by approximately 400' of interbedded dolomites and sandstones. The dolomites are often algal (hemispheroid to parallel, continuous linkage, indicating just sub-tidal) and often contain inclusions of grey limestone with 'molar tooth' (DALY, 1912) and heiroglyph structures. These are interpreted partly as brecciated fragments of algal mat and partly as soft sediment brecciation during compaction and cementation (ADSHEAD, 1963). Towards the centre of the middle Siyeh a 50' thick algal dolomite is a distinctive marker and towards the top there is another such dolomite, 30' thick. The depositional environment is interpreted as having been shallow lagoonal (BADHAM, 1972).

The upper Siyeh consists of 200'-250' of well-bedded fissile argillites and arenites, with green and grey shale being the dominant lithology.

Purcell Lava:

Between 200' and 400' of pillowed, massive and vesicular green to purple andesitic flows (basaltic andesites and trachybasalts) overlie the Siyeh with complete conformity. The flows thin to the north. The vesicles, which may be round, ellipsoid, amoeboid or tubular and branching, are filled with chlorite, quartz, and carbonate and contain rare specks of pyrite and chalcopyrite. Larger vug cavities are lined with quartz and, occasionally, pyrite. The lavas are interpreted as being extruded both into shallow water and subaerially (BADHAM, 1972).

Sheppard Formation:

The apparent thinning of the Purcell Lavas, and the presence of volcanic fragments in quartz-grit beds in the base of this formation testify to unconformity here, shown as a disconformity in this area, and representing small tectonic adjustments to the volcanic event.

The basal Sheppard contains three distinct quartz-grit beds, in 70' of shales and calcargillites. A 30' thick flow and set of flows, indistinguishable from Purcell Lava in the field, overlies these, and is in turn overlain by 250' of stromatolitic dolomites (just subtidal) and calcargillites, representing a return to lagoonal conditions (BADHAM, 1972). The top of the lava flow is ropy and scoriaceous.

Gateway Formation:

300' of red siltstone with shale and sandstone horizons overlie the Sheppard conformably and represent the return of deltaic conditions (BADHAM, 1972). The unit is typified by ripple marks, suncracks, mud-flake conglom-

erates and salt casts.

Phillips Formation:

50' of buff shales overlying the Gateway Formation to the southeast of the claims are ascribed to the Phillips Formation.

Structure

The rocks underlying the Commerce area are folded on an easterly-trending axis into large tight anticlines and open synclines (F_1) (see Figure 5), which are severely discontinuous, and occur mainly in the outcrops of the Grinnell Formation. Associated meso-drag-folds are present in all formations. Large open, northerly-trending folds (F_2), related to the Akamina syncline, have refolded the F_1 structures so that they have a double plunge. F_2 drag folds are only common near the crests of the F_2 anticlines.

Good non-penetrative F_1 and F_2 cleavages are developed in the axial regions of both F_1 and F_2 folds where two easterly-plunging F_1 folds bring the outcrop of the Appekunny Formation onto the western Commerce Claims. The axial planes of F_1 drag folds have broken occasionally, allowing small 'faults' to develop. Overall, however, faulting is very minor, most of the recognized faults being joint planes along which minor adjustments have occurred.

Intrusive Rocks

The top of the middle Siyeh, the upper Siyeh, the Purcell Lavas, and the lower Sheppard are intruded by numerous dykes and sills of diabasic to dioritic composition. The zone of major intrusion stretches from North Ridge, through Gossan Mountain, to Andradite Mountain, with the majority

of sills and dykes occurring in the top 400' of the Siyeh Formation. The sills and dykes as mapped by BADHAM (1972) are described individually in Table 2 and are numbered, or lettered, on Figure 5.

Most of the sills are plagioclase-hornblende porphyritic diorites. The texture is generally diabasic, but patches of pegmatitic plagioclase are common. The sills are characterized by abundant amphibolitized xenoliths, chilled margins, baked host rocks at the contacts, and late magmatic segregation pods, veins and dykes. Nodules containing olivine, plagioclase, and pyroxene have been noted. K-feldspar and quartz-bearing pods occur frequently and the late magmatic dykes and veins are occasionally K-feldspar-hornblende-biotite porphyritic, but are more generally pink and aplitic. Local segragation pods of biotite were observed in the thicker sills, and late dykes of fine quartz-feldspar with large blebs of golden mica (phlogopite ?) have been noted.

The sills are not strictly stratabound but jump on joint planes, have apophyses and offshoot dykes and sills, and may bifurcate and rejoin. They are frequently both fed by and cut by dykes of identical texture and composition. No intrusives have been noted below a more diabasic sill (sill # 14 - see Table 2) outcropping in the middle Siyeh.

Only one sill (sill # 11) is ascribed to the Precambrian periods of intrusive activity, the remainder represent a period of late Cretaceous and/or Tertiary intrusive activity. The texture and mineralogy of the diorites suggest that they were intruded at fairly low temperatures, at shallow depths and under hydrous conditions (BADHAM, 1972).

SILLS

SILL NO.	THICKNESS (ft)	DESCRIPTION
1	15	Unmineralized medium-grained diorite.
2	>100	'Sill Mountain Sill'. Mostly grey, unmineralized diorite, but contains pegmatitic, quartz-rich and K-feldspar-rich patches and late dykelets. The base steps near the Purcell Lava-Sheppard contact, and contains many large blocks of Sheppard sediment. The southern contact with the Purcell Lava is well exposed with the lava impregnated with 15-20% sulphides (Py>Po>Cp). Fed by dyke (a).
3	10	Unmineralized diorite. Fed by dyke (a).
4	10	Uniform diorite sill. Unmineralized in its eastern outcrop, but on Gossan Mountain contains up to 5% Py>Po. Surrounding sediments impregnated with Py.
5	10	Similar to (4).
6	10	Diorite. The sill and surrounding sediments are well mineralized. On Gossan Mountain the sulphides concentrate up to 5% in the margins of the sill, and drop to ½% in the central portions. Py>Po.
7	15-20	Very irregular diorite. 5-10% Py>Po throughout its outcrop. Intrudes the middle to upper Siyeh contact and has sparse blocks of stromatolitic dolomite caught up in its base. The shales above are well mineralized with pyrite. No sulphides were observed below.
8	5-10	Diorite. Very small patches of up to 1% sulphide in southern outcrop.
9	5-10	Similar to (8).
10	5-10	Similar to (8). Mineralized with 1% pyrite on Andradite Mountain. Surrounding rocks not mineralized. (10a) and (10b) appear to be barren continuations of (10).
11	>100	Mostly grey diorite but with varying texture and grain size. Heavily sheared in places with the shear planes heavily epidotized. Beneath North Ridge the sill is a polygnese mixture of diorite and syenite at least 300' thick. It is full of epidotized shears here and has many dykes and veins extending upward from it. All the rocks above it are bleached but they are unaffected 5' below it. Unmineralized.
12	10	Well-mineralized diorite sill. Fed by and cut by vertical, mineralized dykes.
13	10	'Purcell Sill'. Unmineralized diorite sill. Appears to bifurcate in Sheppard limestone.
14	10	Diabase. 100' below (11). Sediments bleached for 20' on each side. Sediments and sill unmineralized.

DYKES

DYKE NO.	THICKNESS (ft)	DESCRIPTION
a	20	Unmineralized diorite feeder dyke to sills (2) and (3).
b	3	Pinkish, trachytic, syenite dyke. Unmineralized.
c	2-5	Quartz-feldspar dyke with blebs of golden mica and sparse pyrite.
d	2-5	Similar to (c).
e	4	Diorite with 1% pyrite.
f	5-10	Diorite with 1-3% pyrite and pyrrhotite. Most of its outcrop is inaccessible.
g	5-10	Similar to (f).
h	5-10	Similar to (f).
j	3	Unmineralized diorite.
k	2-5	(k), (m), (n), (p), (q), (r), (s), (t), form a complex network of vertical dykes of well mineralized diorite. Mineralization from ½-3%. Pyrite and pyrrhotite varies laterally and is generally lower in the central portions.
m	2-5	See (k).
n	2-5	See (k).
p	2-5	See (k).
q	2-5	See (k).
r	2-5	See (k).
s	2-5	See (k).
t	2-5	See (k).
u	2	Quartz-feldspar dyke with blebs of golden mica and sparse pyrite.
v	1	Barren fine-grained diorite.
w	5	Discontinuous semitrachytic syenite. Unmineralized.

In addition the section from Gossan Mountain to North Ridge, above the 100' sill, is laced by a complex network of thin, unmineralized dykes, sills and veins in the dolomites and sandstones.

TABLE 2: SILLS AND DYKES OUTCROPPING ON COMMERCE CLAIM BLOCKS (after BADHAM, 1972).

Mineralization

Economically significant mineralization within the Commerce Mountain area is of three types: (1) Cu/Ag within the sediments, (2) Cu/Ag within quartz-carbonate veins, (3) Au/Ag within the dioritic intrusive rocks. Sulphides within the contact zones surrounding the intrusives may carry gold values but are treated in the third group. Many of the intrusives carry minor chalcopyrite and/or galena but this mineralization is not economically significant.

Sediments

Altyn Formation:

Many of the bedding planes in the shales are covered in a thin plating of pyrite, but no other minerals have been noted.

Appekunny Formation:

Pyrite occurs as thin smears on joint planes in the shales and pyrite and hematite blebs are present in some of the upper sandstones. No copper minerals have been noted.

Grinnell Formation:

Secondary hematite is common in many of the sandstone beds, usually crystallized from primary detrital iron oxides, the lag concentrates on cross-bed foresets. Pyrite occurs less frequently in the sandstone beds, usually as small blebs disseminated amongst the quartz grains, and as partial replacements of green shale clasts.

The copper minerals bornite, covellite, chalcocite, and chalcopyrite, with secondary malachite and, rarely, azurite are found in some of the sandstone beds. The copper mineralization is confined to the 'dirty' and clast-bearing portions of the sandstone beds and has occasionally been

noted in the surrounding shales. The sulphides occur as disseminated blebs, or as partial or complete replacements of green shale clasts. No copper mineral has been seen replacing a red shale clast, and only very rarely are copper minerals seen in sandstone beds containing red clasts.

Each showing of copper mineralization in the Grinnell Formation is detailed in Table 3 and located on Figure 5.

Siyeh Formation:

Sandstone beds near the base of the Siyeh Formation contain grains of pyrite and, within 30' of the base, one bed has about 5% micronodules of pyrite. Dolomites within the basal 500' of the formation have been observed carrying minor galena and sphalerite.

Purcell Lava:

Specks of pyrite and chalcopyrite occur within vesicles within the lavas. Larger vug cavities are occasionally lined with pyrite. No primary mineralization has been seen in the matrix of the rocks.

Sheppard Formation:

Mineralization within the Sheppard lava flow is similar to that within the Purcell lavas. No mineralization has been observed within the Sheppard sediments.

Gateway Formation:

No copper mineralization has been observed within the Gateway sediments.

Phillips Formation:

Two 6-8' dolomites carrying very fine-grained bornite, covellite, hematite, and malachite occur approximately 100 stratigraphic feet apart in the southeast Commerce area (see Figure 5).

ZONE	DESCRIPTION
A	Thinly bedded (<12") sandstones carry bornite, malachite, and hematite, both replacing green shale clasts in the sandstone units and as disseminated blebs in the sandstones. The bornite is clearly not a primary mineral. Copper mineralization is confined to the sandstone beds, but is not continuous along the bed, occurring only over some five yards along strike.
B	Similar to (A).
C	5% bornite with minor hematite is found replacing green shale clasts in a 2" sandstone bed about 150 stratigraphic feet above the base of the Grinnell. 400 stratigraphic feet above the base thin sandstones (2-20") occur approximately every 5' in red shales, and small patches (not exceeding 2%) of chalcopyrite, bornite, covellite, chalcocite, tetrahedrite (?), and pyrite are present in nine of these beds. About 1500 stratigraphic feet up into the Grinnell, five beds (12-18") contain up to 5% chalcopyrite, pyrite, and bornite on the edges of green shale clasts and as disseminated blebs. In all mineralized sandstones the sulphides are present in the 'dirtier' (i.e. greater silt content) sandstone beds, and where these become 'cleaner' laterally the proportion of sulphide decreases. Sulphides are confined to the sandstones and do not persist laterally for more than 300'.
D	Malachite and sparse chalcopyrite occur in an 11" sandstone 60' from the top of the Grinnell. Two other minor beds (<6") with minor malachite and chalcopyrite are present in the top 400' of the formation. Approximately 490-500' from the top a 20' thick series of sandstone beds contains malachite, bornite, chalcopyrite, chalcocite, and pyrite. The thickest bed (3-5') contains 2-3% copper sulphides concentrated in shale clasts and shaley lenses. Below this bed 5 thin sandstone beds contain blebs of chalcopyrite and bornite in lenses and pods.
E	A small lens of copper minerals (mainly chalcopyrite) occurs over 3' in two adjoining 6" thick beds.
F	In the middle Grinnell two sandstone beds carry chalcopyrite and malachite. The first is 6" thick and <1% Cp is present over 3'. The second is approximately 3' thick and is exposed for 150-200' on a dip-slope. Small vertical quartz-filled joints, parallel to F_1, cut the rock and both these and the bedding planes are covered in chalcopyrite and malachite. Disseminated blebs of chalcopyrite and chalcocite (?) occur in the bed. The jointing has stepped the bed giving an illusion of greater thickness. The bed is mineralized over its whole outcrop here, in the core of an F_1 syncline.
G	The fourth sandstone (12") from the top of the ridge contains green and red shale clasts and has blebs and smears of chalcocite at between 3 and 5% present over its whole outcrop. The thirteenth sandstone from the top is 6" thick and contains 1% chalcocite over 3'.
H	Quartz-siderite veins up to 3' in width, carrying concentrations of tetrahedrite, chalcopyrite, pyrite, malachite, and azurite, occur in minor faults in the core of two tight anticlines. Small amounts of galena have also been noted. The Grinnell rocks are bleached for up to 150' from the veins. Sandstone beds within the bleached zone commonly contain copper, iron, and lead sulphides but the mineralization does not persist laterally beyond the altered zone. On the south side of the southmost vein three copper-bearing sandstone-argillite units occur and persist for up to 50' from the vein. These contain disseminated blebs of chalcocite and chalcopyrite up to 3% in concentration. 50' to the north, in the rusty zone, 18 beds or sets of beds (3"-5') contain chalcopyrite, bornite and malachite. The lower nine have between ½% and 5% of chalcocite blebs, a black soft mineral smeared around quartz grains (tetrahedrite ?), and some chalcopyrite knocks. In the upper nine beds the proportion of chalcopyrite increases sharply at the expense of the other minerals, keeping a concentration of 1-5% sulphides. Malachite and azurite are well developed. These mineralized beds do not persist laterally, but fade out by the end of the bleached zone.
I	The top 600' of Grinnell contains three sandstones (2-3') with minor pyrite, malachite, chalcopyrite (up to ½%).
J	1500' south of (H). Four copper-bearing sandstones occur in the top 500' of Grinnell: two 2-4" with chalcopyrite, malachite; one 6" with chalcocite, bornite, malachite; one 8" with sparse chalcopyrite. Nineteen copper-bearing sandstones are present in the interval 550-600' from the top of the Grinnell, totalling ~30' (2"-8' each bed). These beds carry pyrite, chalcopyrite, chalcocite, covellite, bornite, malachite.
K	One buff weathering bed outcrops with an 8-12" sandstone bed in the center carrying abundant bornite, chalcocite, covellite, malachite. The bed has been traced (with mineralization) for 200' north and intermittently for 2000' south.
L	Two 20' thick dark fine-grained diabase sills occur at the top of the Grinnell and 215' below the top. There is a sudden change in bedding attitude below the lower sill. Several very thin sandstones present in the 51yem above the top sill carry pyrite and malachite. One 6" sandstone with minor malachite is present approximately 100' below the top of the Grinnell. Small amounts of disseminated chalcopyrite occur in sandstone beds 190-200' below the top, including a 12" bed carrying bornite, chalcopyrite, pyrite, and malachite.

TABLE 3: COPPER SHOWINGS WITHIN GRINNELL FORMATION

ON COMMERCE CLAIM BLOCKS

(after BADHAM, 1972, GOSLE, 1967).

Veins

On the west face of Fault Mountain the Grinnell Formation has been folded into two tight anticlines (see Figure 5). The crests of these anticlines have cracked and allowed dilation and minor faulting. Quartz has been remobilized from the sandstone beds and deposited with carbonate as veins in parts of these cracks. Where bedding is parallel to the veins, the sandstone beds are recrystallized to quartzite, and the vein, as such, is a bed. Such 'beds' can sometimes be traced laterally to a point where they crosscut the bedding and form a 'vein'. The veins are podiform, being wider at slight kinks. Often there are small offshoots and nearby tension fracture pods.

The south vein is generally barren where it transects the Grinnell, although blebs of chalcopyrite are seen, in places up to 5%. Minor galena has also been reported. This vein does not transect the Siyeh and the sills higher up on Fault Mountain.

The north vein is more regular than the south vein, although in places it does pinch out, to reappear higher in the stratigraphic section. Tetrahedrite, chalcopyrite, pyrite, malachite, and azurite are present, commonly concentrated near irregularities in the vein wall. Numerous offshoot veins and tension fracture pods are present near the main vein. The north vein cuts the Siyeh and parts of the upper Grinnell sediments but fails to transect the sills within the Siyeh higher up on Fault Mountain.

The Grinnell rocks are severely bleached to the north of the south vein, for 100-150', and the beds for the first 50' north of the vein are weathered rusty. These bleached beds (pale green and brown) can be traced laterally into the normal red succession except in the lower part of the

section where a segment of Appekunny has apparently been faulted into the core of the anticline. There is a small amount of bleaching around the north vein.

Intrusives

All of the dioritic rocks contain some primary sulphides, mainly pyrite and pyrrhotite, with rarer chalcopyrite and galena. However, in both igneous and sedimentary rocks, major amounts of mineralization are almost entirely confined to the upper Siyeh shales.

Sulphide mineralization is nearly absent where the sills intrude middle Siyeh rocks. The sandstones and limestones are bleached and recrystallized and the growth of epidote, andradite, idiocrase (?), grossularite, tremolite, and diopside has been observed in the siliceous algal bands in the dolomites. For isolated sills, bleaching and metamorphism is not apparent beyond 20' from the contacts, but in zones of multiple intrusion the metamorphism is more widespread. Where the sills intrude upper Siyeh rocks both they and the shales are often well-mineralized. The Purcell lavas are commonly extensively replaced by sulphides along contacts with sills. Mineralization is not evident in Sheppard rocks intruded by sills.

The dykes are more commonly mineralized throughout their lengths, but some are, nevertheless, barren.

The sulphides are present in the sediments as metablasts and as platings on bedding and joint planes. There is no sign of skarn on contacts between intrusives and limestones, and only a few small patches of malachite have been seen on such contacts. The sulphides in the igneous rocks occur as disseminated primary blebs, and as coatings on joint planes. It is apparent that the sulphides are of magmatic origin, and that the physical (and

chemical ?) nature of the Siyeh shales permitted intrusion of the sills and mineralization at this horizon.

SUMMARY OF EXPLORATION RESULTS PRIOR TO 1973

The date of the earliest period of exploration on the Commerce Mountain area is unknown. A gold value of $72.00 per ton is reported to have been obtained from a trench on Sill Mountain in the 1930's (F.Goble, pers. comm.). Modern exploration was initiated in the area in 1967 by Kennco Explorations (Western) Limited. Reports on this exploration and subsequent exploration carried out by the Goble Family are generally nonexistent or unavailable. It is known that interesting copper showings were discovered in the western half of the claim block and that trace quantities of gold were encountered in the eastern half of the claim block. Results of exploration carried out on the copper showings in the western half of the claim block in 1970 are detailed in a Falconbridge Nickel Mines Limited report entitled "Record of Work on the Commerce Claims, Goble Family Option - Commerce Nos. 1-16, 19-39, 41-48. N.T.S. 82 G/1W, Lat. $49^{o}09'$ - $49^{o}12'$, Long. $114^{o}20'$ - $114^{o}25'$, June - July 1970", and are summarized below. Results of exploration carried out on the entire claim block in 1972 are detailed in a Kintla Explorations Limited report entitled "Geological Report on the Beth and Commerce Claims located 45 miles Southeast of Fernie, 49^{o} 114^{o} S.E.", and are also summarized below.

Cu - Exploration

Exploration for copper on the Commerce claim blocks has been concentrated on showings within the Grinnell Formation. These are of two types: (1) stratabound copper within quartzites, (2) copper within and associated with quartz-siderite veins.

Stratabound Copper

During the period 1967 to 1969 prospecting on the Commerce Claims by employees of Kennco Explorations (Western) Limited and by the Goble Family revealed numerous interesting occurrences of copper sulphides within the rocks of the Grinnell Formation. During June and July of 1970 one geologist, one diamond driller, and six prospectors were employed by Falconbridge Nickel Mines Limited to test the economic importance of these occurrences.

Exploration was concentrated in three areas: (1) northeast of Commerce Mountain (Zone J of Figure 5), (2) east of Commerce Mountain (Zone B of Figure 5), (3) north of Commerce Mountain (Zone F of Figure 5).

Northeast of Commerce Mountain there is a succession of quartzite beds (1 inch to 5 feet thick), each with minor signs of copper mineralization. However, the mineralization is extremely scattered along the lateral extent with 10-20 feet of barren quartzite separating two copper indications. No further work was done in this area.

One sample was taken east of Commerce Mountain. A 2" quartzite bed with malachite assayed 0.07% Cu, 1.0 ppm Ag, 12.0 ppm Co. No further information is available on this zone.

Better mineralization was encountered to the north of Commerce Mountain. One of the areas was believed to merit special attention. Two gently north-dipping quartzite bands, 30-40 feet apart, are well-mineralized (1.5-4.0% Cu) and extend in the north-south direction for at least 200 feet and 1,000 feet respectively. They occur near the top of a ridge, limiting their east-west extension by topographic cut-off to a few hundred feet. The thickness of the mineralized beds never exceeds 6 inches along the outcrop examined and there is no structural indication of a possible thickness improvement in

any direction (see Figure 6 for assays and sample locations).

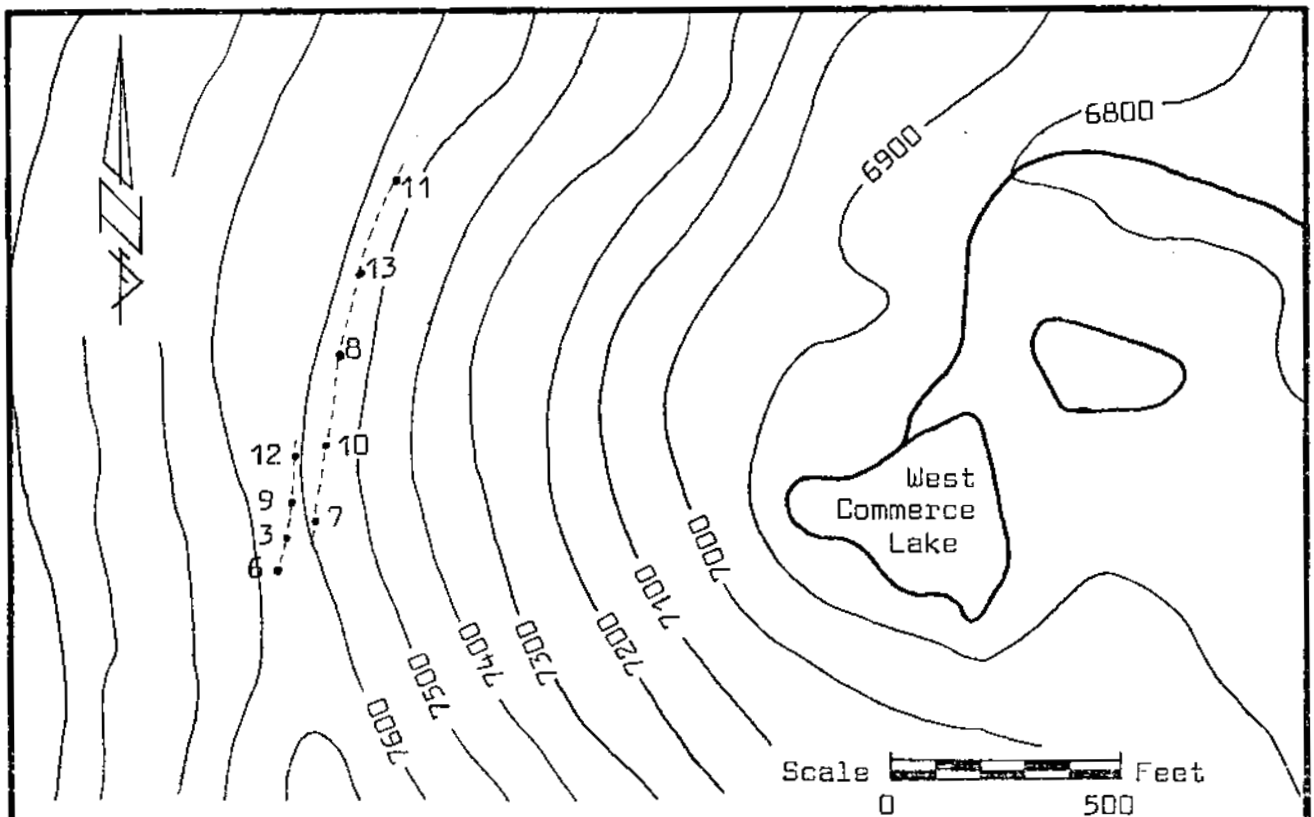
Five diamond drill holes totalling 250 feet (35', 60', 40', 40', 75') were completed in two areas (one 75' diamond drill hole in the center of Claim 14, the remaining four diamond drill holes on the junction of Claims 9, 10, 11, 12 - see Figures 2, 5) to test Cu-mineralized quartzites. Sampling was carried out on 5 foot sections of core with discouraging results. Only very minor bornite (<½%) and minor malachite were encountered in the cores.

Vein Copper

Numerous quartz-siderite veins from a few inches to several feet across occur within the Grinnell and Siyeh Formations on the west face of Fault Mountain. The major vein (previously referred to as the north vein) is intermittently exposed for approximately 500 vertical feet cutting the axial plane of an anticline within Siyeh strata. Thicknesses vary up to 3 feet. Concentrations of tetrahedrite, chalcopyrite, and pyrite, with azurite and/or malachite, are found in the edges of this vein. Sampling of mineralized portions by the Goble Family revealed grades of 1 1/4-1 3/4% Cu, 0.1-0.6 oz/Ton Ag across 1-3 feet. Mineralization varies sharply, the copper sulphides being concentrated at changes in vein wall attitude. Other similar but smaller quartz-siderite veins in the immediate vicinity also carry minor concentrations of pyrite and chalcopyrite. Galena has been noted in a smaller vein to the south.

Au - Exploration

Exploration for gold on the Commerce claim blocks has been concentrated on the syenite/diorite intrusives and related sulphide mineralization within



SAMPLE NO.	% Cu	Ag (ppm)	Co (ppm)	THICKNESS (inches)
3	1.78	2.2		3
6	1.26	12.0		3
7	4.30	33.0	3.0	6
8	3.00	21.0	4.0	4
9	1.70	14.0	3.0	2
10	2.03	17.0	6.0	3
11	2.27	18.0	3.0	4
12	1.47	14.0	3.0	3
13	1.63	13.0	5.0	4

FIGURE 6: 1970 WEST COMMERCE COPPER ASSAYS (after GYR, 1971).

the surrounding sediments. During the 1972 field season employees of Kintla Explorations Limited put in some 165 man-days mapping, trenching, and sampling for gold on the Commerce Claims. Encouraging results were obtained in three areas: (1) the 'Sill Mountain Sill', (2) 'Sill No. 7', (3) the 'Purcell Sill'.

'Sill Mountain Sill'

The 'Sill Mountain Sill' lies just above the Purcell Lava, separated from it by a few feet of Sheppard Formation sediments. It is best exposed along the west ridge of Sill Mountain, most of the east face and south ridge being covered by grass and float. The sill varies from syenite to diorite, often with large crystals of plagioclase and potassic feldspar. It is probable that the 'Sill Mountain Sill' actually consists of more than one intrusive. However, shortage of outcrop makes it difficult to subdivide it into more than one mappable unit. Xenoliths of diorite, argillite, and amphibolite are common.

Gold values were reportedly obtained in the 1930's from a 130' long trench put down in a shatter-zone within the sill. This area was trenched by bulldozer to a maximum depth of 15' during the 1972 field season. At a depth of 15' the rock remains badly shattered and heavily leached.

In the bulldozer trench it appears that diorite has been intruded and altered by pegmatites and then by late-stage fluids, along a north-south direction. It should be noted, however, that the trend of the shatter zone is almost east-west, as revealed in a 1973 road cut. This corresponds to a distinct lineation visible on air photos and shown on Figure 5. The visible mineralization is confined almost entirely to the pegmatites.

With the exception of the trench, the only mineralized zone found is

on the north ridge, where a few percent of pyrite are present in the sill.

Assay results for samples taken on the 'Sill Mountain Sill' are plotted on Figures 7 and 8. Very minor gold (0.01 oz/Ton) was encountered north of Sill Mountain, as well as minor silver (0.78 oz/Ton) near the same area.

Results from the bulldozer trench in the fracture zone were discouraging (see Figure 8). In the trench itself only minor gold was encountered (maximum 0.010 oz/Ton). Very minor silver accompanies this gold (Ag:Au ratio approximately 10:1) but higher concentrations of silver (up to 1.24 oz/Ton) are associated with trace quantities of lead (up to 0.35%) and probably occur in association with galena. The higher gold values from the trench were encountered in the south-west and north-east sections, as well as in the wall separating the main level of the trench from the bench on the north side. No noticeable linear trends were picked up crossing sample lines.

One grab sample of diorite from north-east of the trench proper returned an assay of 0.258 oz/Ton gold. This sample represents unaltered 'Sill Mountain Sill' material from near the trenched east-west fracture zone. Another nearby sample contained 0.008 oz/Ton gold, noticeably higher than the average assay value encountered in the trenched fracture zone.

'Sill No. 7'

'Sill No. 7' outcrops on the ridge between Gossan Mountain and Sill Mountain, approximately 2600 feet west of Sill Mountain (see Figure 9). From this point the sill extends west approximately 1000 feet on the north side of the ridge. There is no observable outcrop of 'Sill No. 7' on the south side of the ridge, due to extensive vegetation and talus development.

The sill is primarily a feldspar-hornblende porphyritic diorite with sulphides disseminated throughout the body of the sill. Locally, minor

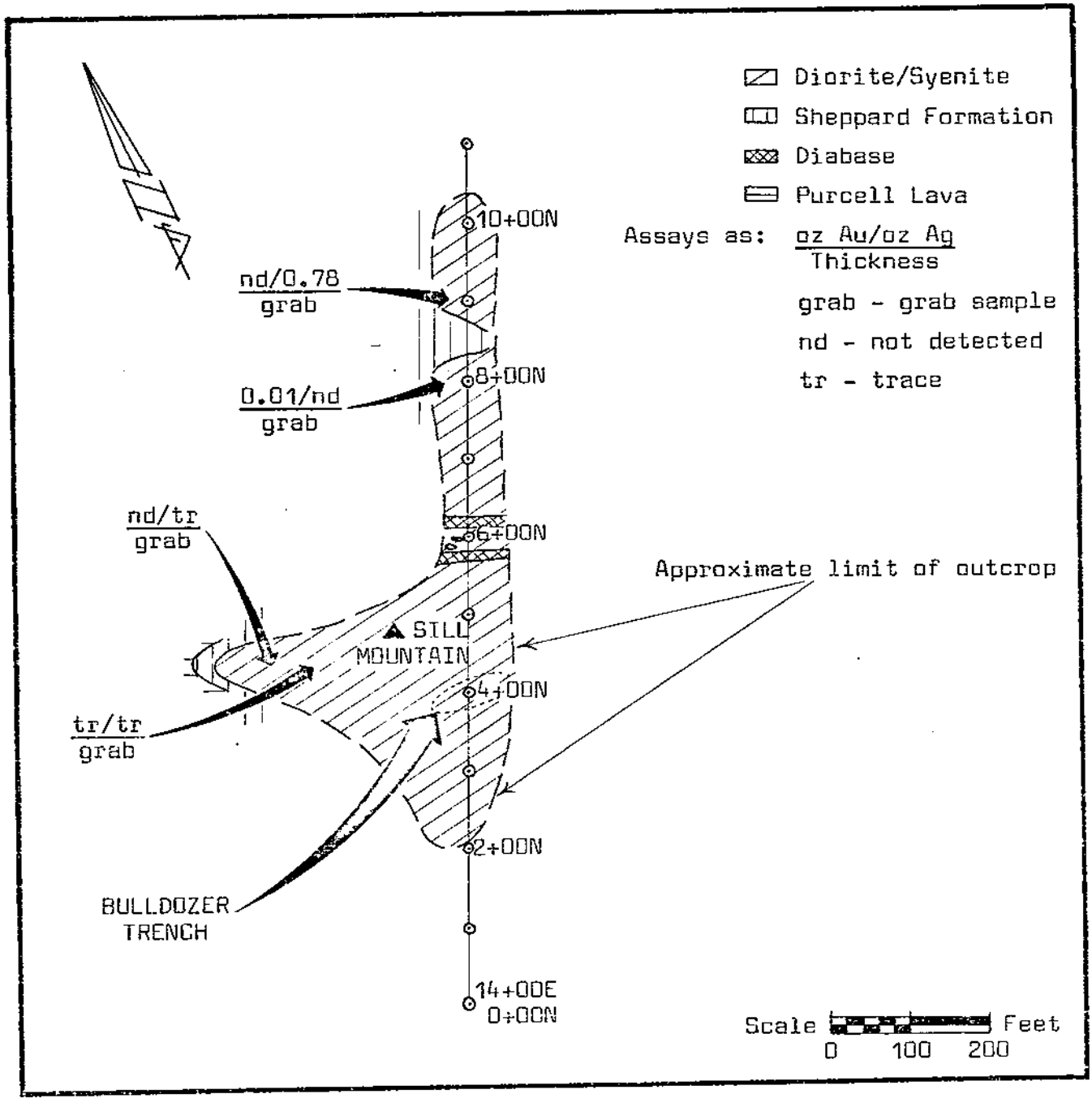


FIGURE 7: GEOLOGICAL MAP OF SILL MOUNTAIN AREA (after NIELSEN, 1972).

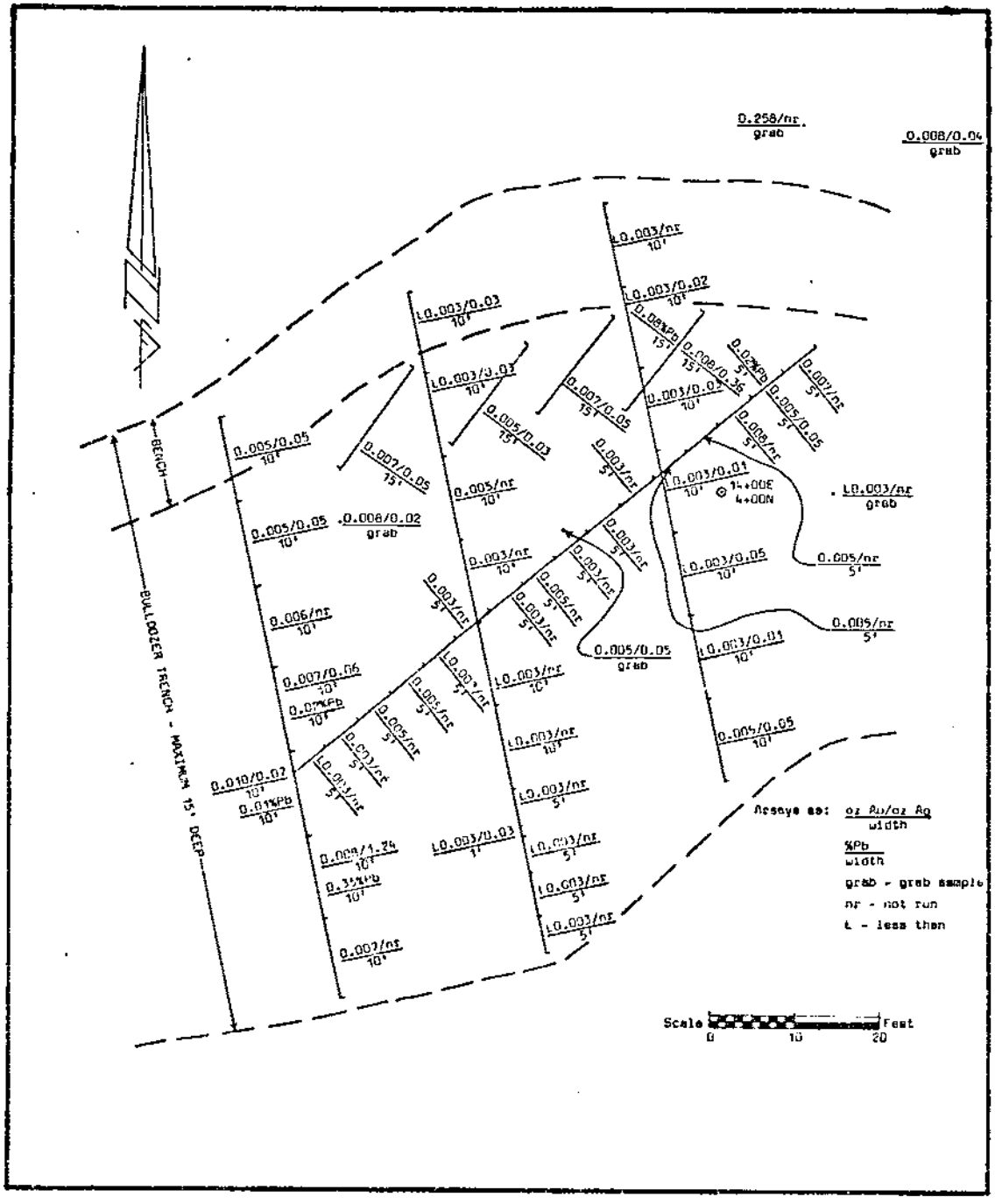


FIGURE 8: ASSAY MAP OF BULLDOZER TRENCH ON SILL MOUNTAIN (after GOBLE, 1972).

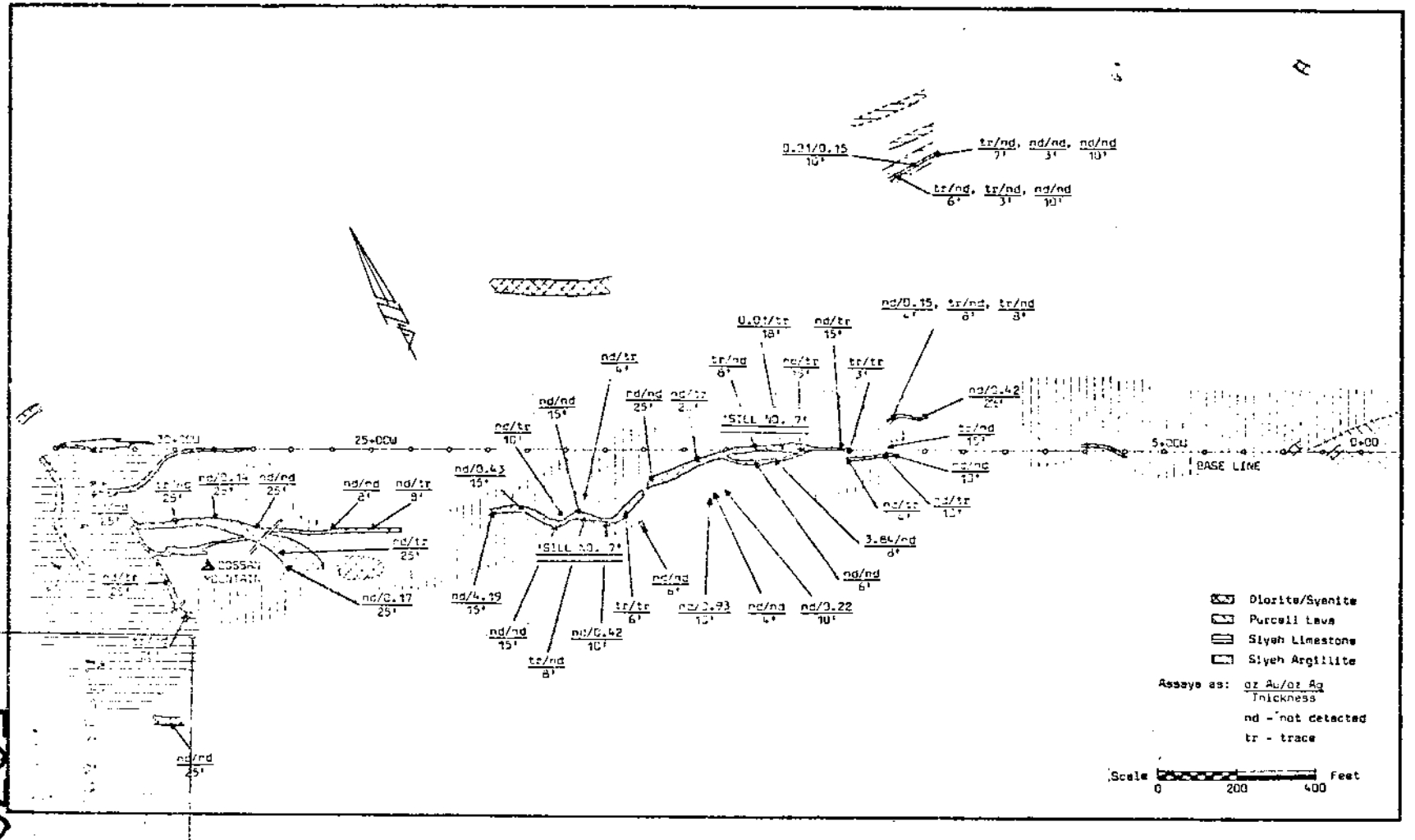


FIGURE 9: GEOLOGICAL MAP OF GOSSAN MOUNTAIN AREA,

INCLUDING 'SILL NO. 7'

(after NIELSEN & HOFFMAN, 1972).

joint plane mineralization is developed. Sulphide mineralization varies from 2-12% and averages 7.35% along the 1000' sill outcrop. The sulphides observed (in decreasing abundance) are pyrite, pyrrhotite, and chalcopyrite. Chalcopyrite is only present when the total sulphide content is greater than 7%.

The surrounding sediments exhibit local joint plane mineralization and frequent development of pyrite replacing the more arenaceous interbeds in the Siyeh argillite sequence. Such mineralization is generally confined to a zone within 10' of the sill at the upper contact.

In addition to 'Sill No. 7', several smaller sills in the immediate area were sampled in 1972. Their outcrop is sporadic and they cannot be traced laterally due to extensive areas of talus development. They may also vary sharply in outline over short distances. For example, one such sill varies from 3" to 10' in thickness over a distance of less than 50' Some of these sills show excellent disseminated sulphides.

Assay results for samples taken on 'Sill No. 7' and closely associated sills are plotted on Figure 9. One sample from an area in which 'Sill No. 7' is actually split into an upper and a lower sill contained 3.84 oz/Ton Au across 8'. Aside from this sample only trace quantities of gold were detected in the sill (one sample did carry 0.01 oz/Ton Au), with the majority of samples having no detectable gold.

Seven samples in and associated with 'Sill No. 7' carried more than trace quantities of silver. Values for these seven samples ranged from 0.15 oz/Ton to 4.19 oz/Ton. No discernable trend re sample locations was apparent although it may be significant that the higher values were recovered near the ends of the sill. Silver values up to 0.93 oz/Ton were encountered

in sediments associated with 'Sill No. 7'.

'Purcell Sill'

The 'Purcell Sill', a feldspar-hornblende porphyritic diorite, intrudes the lower Sheppard Formation on the northern part of Sunkist Ridge, approximately 1200 feet southeast of the trench within the 'Sill Mountain Sill' (see Figure 10). Its outcrop is confined to a zone 240' long following the ridge crest, and passing into an area of heavy tree cover and areas of talus on both slopes of the ridge. The sill is characterized by 2% disseminated pyrite.

100' further north, the uppermost Purcell Lava outcrops. Here, the lava is highly vesicular, the vesicles most often filled by sulphides (pyrite>pyrrhotite>chalcopyrite). Minor pink calcite is also present in some of the vesicles. In addition to vesicle fillings, the sulphides also occur along joint planes, as fracture fillings, and at the contact of successive lava flows.

Along the crest of Sunkist Ridge, the Purcell Lava contains up to 20% sulphides. The lava can be traced sporadically for approximately 1000' to the east, with a gradual decrease in the amount of mineralization from 20% at the ridge crest to 2% at the lowest point sampled. The average exposed thickness is 12' (5-20'), but the mineralized zone may well be thicker than the maximum exposure of 20', a thickness limited by heavy tree cover and extensive soil development.

Assay results for samples taken from the 'Purcell Sill' and related Purcell Lava mineralization are plotted on Figure 10.

The 'Purcell Sill' contained only traces of gold (0.01 oz/Ton maximum). It did, however, show consistent silver values in the range 0.17 oz/Ton to

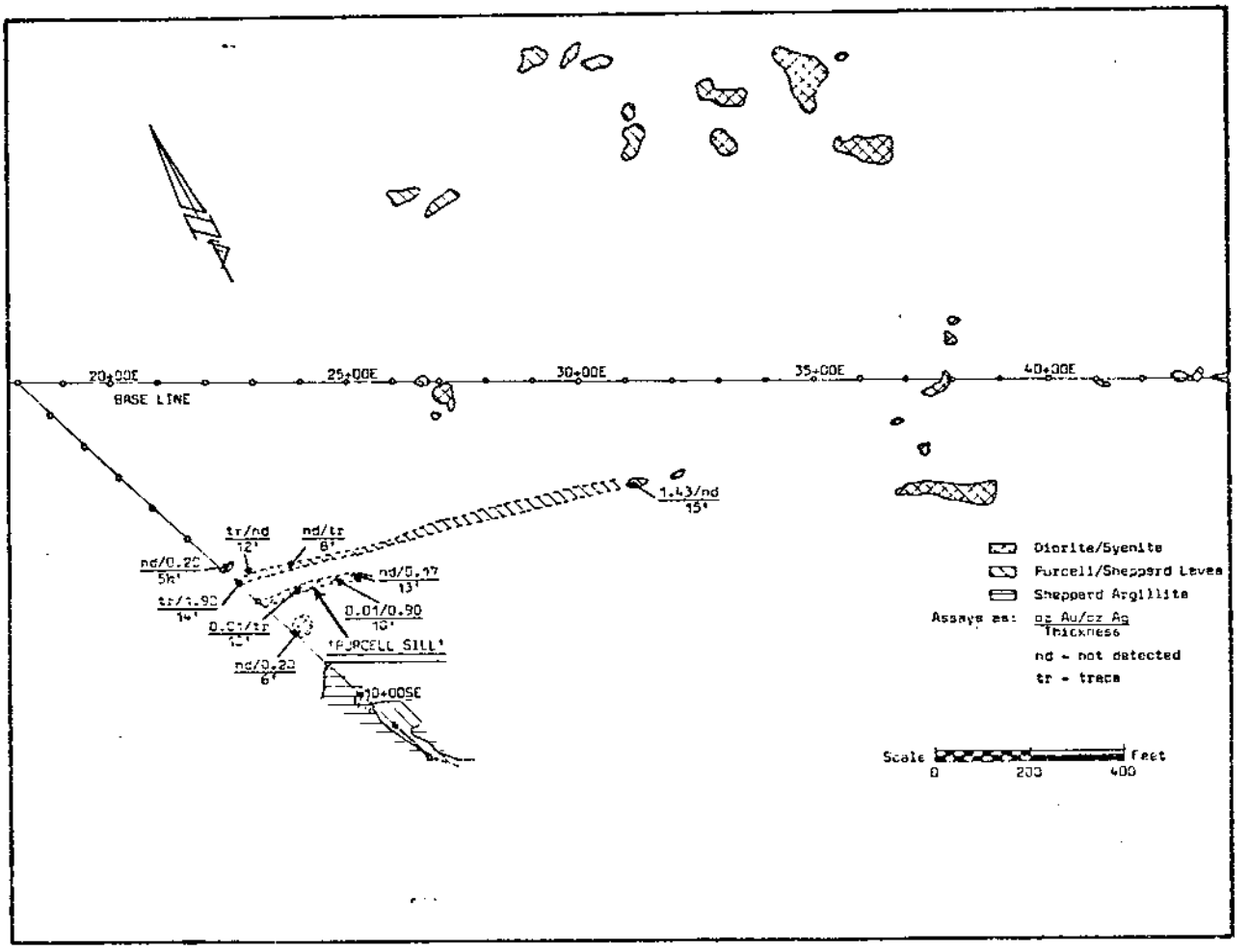


FIGURE 10: GEOLOGICAL MAP OF 'PURCELL SILL' AREA (after NIELSEN, 1972).

0.90 oz/Ton (one sample contained only a trace of silver).

The Purcell Lava showed sporadic gold mineralization, only one sample containing more than a trace of gold (1.43 oz/Ton). Perhaps significantly, this sample had the lowest sulphide content of the samples analyzed. The lavas also contained sporadic silver values, up to 1.90 oz/Ton. The better values in this case were associated with major sulphide mineralization.

Other Au-Exploration

Numerous sills and dykes in addition to those described above outcrop on Gossan Mountain and were mapped in detail and sampled in 1972 (see Figure 9).

Gossan Mountain is composed of limestone overlain by argillite and intruded by feldspar- and hornblende-bearing dykes and sills. The uppermost intrusives consist of blue plagioclase with minor hornblende and occasional traces of biotite, and contain variable amounts of pyrite and pyrrhotite, usually one or two percent. Chalcopyrite is rarely encountered.

The main sill is twenty-five to thirty feet thick, with an average attitude of 340^{0}, 15^{0} East. Its approximate shape is that of a triangle 500' x 400' x 300'. Other smaller (six inches to five feet) sills and dykes of the same material form a complex network in the argillite. The argillite itself is unmineralized, although sulphides can sometimes be found on joint surfaces.

The lower sills and dykes (feldspar hornblende porphyries) in the limestones are unmineralized or extremely poorly mineralized. Due to lack of visible mineralization and physical difficulties many of these sills have been mapped only approximately or not at all.

A late-stage unmineralized equigranular plagioclase-hornblende diorite

occurs along the north ridge in units varying from three foot sills to thin veins and dykes. Several unmineralized late dykes of fine-grained feldspar and blebs of biotite are also present.

Assay results for samples taken in the Gossan Mountain area are plotted in Figure 9. Only trace quantities of gold were detected in the intrusives outcropping on Gossan Mountain (excluding 'Sill No. 7'). Two samples showed minor amounts of silver (0.14 & 0.17 oz/Ton), but the remainder were essentially barren. One sample from a sill outcropping in the basin north-east of 'Sill No. 7' contained traces of gold and silver (0.01 oz/Ton Au, 0.15 oz/Ton Ag).

1973 EXPLORATION PROGRAM

Au - exploration in 1973 was centered on sulphide-bearing dioritic intrusives near the locations of high-Au assays located in 1972 (i.e. 'Sill No. 7', 'Sill Mountain Sill', 'Purcell Sill'). Sampling was concentrated in the Gossan Mountain area because of the ease of sampling this area coupled with the possibility of outlining large tonnages of Au/Ag mineralization exploitable by open-pit means. Additional samples were taken on the 'Purcell Sill' and 'Sill Mountain Sill' to confirm grade and determine targets for a drill program. Areas unsampled in 1972 were also prospected and sampled in 1973.

Copper sampling was carried out in two areas. In the west Commerce area sampling of a reported dip-slope bed (see page 25) was undertaken, and a similar sampling program was carried out on a late discovery, a dip-slope bed within dolomites of the lower Phillips Formation in the east Commerce area.

Minor prospecting and sampling were also undertaken in the area surrounding the northeast Commerce claim block to determine the block's economic significance.

Gossan Mountain Au - Exploration

Some 302 samples were taken from the Gossan Mountain area in 1973. Of the 302 samples 31 carried at least 0.005 oz/Ton Au, 52 carried at least 0.01 oz/Ton Ag and an additional 32 carried at least 0.005 oz/Ton Au and 0.01 oz/Ton Ag. The best gold and silver values encountered were 0.06 oz/Ton Au, 2.8 oz/Ton Ag.

Figure 11 is a plot of assay locations with Au, Ag values greater than

trace quantities indicated by shading. Assay results are given in Table 4. The dominant trends apparent from Figure 11 are as follows: (1) gold is apparently concentrated at or near abrupt sill or dyke terminations against sediments; (2) the majority of gold values are associated with 'Sill No. 7'; (3) there is a tendency for the gold to be concentrated at the base of the sills; (4) the sediments are generally barren of gold but may carry it in association with gold in the sills and dykes; (5) silver values are sporadic and bear no apparent relationship to sills and dykes.

Other Au - Exploration

104 samples were taken in the Sill Mountain area (including the 'Purcell Sill' and vicinity). 13 carried ≥0.005 oz/Ton Au (maximum 0.01 oz/Ton), 25 carried ≥0.01 oz/Ton Ag (maximum 0.2 oz/Ton), and an additional 3 carried both Au ≥0.005 oz/Ton and Ag ≥0.01 oz/Ton. Sample locations from Sill Mountain are plotted on Figure 12 and from the trench on Sill Mountain on Figure 13. Greater than trace quantities of gold and silver are again indicated by shading. Assay results are given in Table 4.

Within the trench there is a possible trend of gold-bearing samples running approximately N65^{0}E. In the general Sill Mountain area silver values are noticeably concentrated in both the Purcell and Sheppard lava flows as opposed to the intrusive rocks.

An additional 29 samples were taken in the Andradite Mountain area. Only 6 contained more than a trace of silver (maximum 0.06 oz/Ton) and no sample contained more than a trace of gold (see Figure 14 for sample locations, Table 4 for assay results).

TABLE 4: 1973 ASSAYS - LEMPRIERE CLAIMS.

SAMPLE NUMBER	SAMPLE WIDTH (ft)	Au (oz)	Ag (oz)	OTHER
G001	4	tr	tr	
2	5	tr	0.2	
3	3	nd	nd	
4	5	nd	nd	
5	15	nd	0.2	
6	5	tr	tr	
7	6	tr	tr	LO.05%Zn,LO.01%Cu
8	grab	nd	tr	
9	1	0.010	0.08	
10	5	0.015	0.35	
11	25	0.005	0.02	
12	float	tr	tr	
13	13	tr	tr	
14	27	tr	tr	
15	12	tr	0.01	
16	5	nd	0.1	
17	5	nd	0.2	
18	3	nd	nd	
19	4	nd	nd	
20	3	nd	nd	
21	5	nd	nd	
22	5	nd	nd	
23	3	nd	nd	
24	5	nd	nd	
25	5	nd	nd	
G026	float	tr	0.02	LO.05%Pb,LO.05%Zn
27	15	tr	0.02	
28	5½	tr	0.01	
29	12	tr	0.02	
30	9	tr	tr	
31	11	0.005	0.02	
32	11	tr	0.01	
33	4	tr	tr	
34	5	0.01	tr	
35	5	0.015	tr	
36	5	0.01	nd	
37	5	0.01	tr	
38	5	0.01	tr	
39	5	0.02	tr	
40	5	tr	nd	
41	5	0.01	nd	
42	5	0.01	nd	
43	5	tr	nd	
44	8	nd	0.2	
45	10	0.05	0.1	
46	25	nd	0.2	
47	10	nd	0.2	
48	7	nd	2.8	
49	30	0.01	tr	
50	4	tr	tr	
G051	4	tr	0.1	
52	30	0.06	0.2	
53	40	nd	0.3	
54	4	nd	0.1	
55	5	nd	tr	
56	5	nd	tr	
57	5	tr	tr	
58	25	0.01	0.1	
59	4	tr	tr	
60	40	tr	tr	
61	3	tr	tr	
62	4	nd	nd	
63	5	nd	nd	
64	8	tr	0.1	
65	5	tr	nd	
66	4½	nd	0.1	
67	10	nd	tr	
68	7	nd	0.1	
69	8	nd	0.2	
70	5	nd	0.1	
71	7	0.01	0.2	
72	5	tr	0.4	
73	6	tr	tr	
74	5	tr	0.1	
75	4	tr	0.6	
G076	27	tr	0.2	
77	6½	nd	0.1	
78	3	0.01	nd	
79	25	nd	nd	
80	20	tr	nd	
81	15	0.005	0.02	
82	30	tr	tr	
83	5	tr	tr	
84	5	tr	tr	
85	5	0.005	0.02	
86	5	0.015	0.02	
87	5	tr	0.1	
88	5	tr	0.1	
89	15	0.01	0.1	
90	5	tr	tr	
91	3½	0.01	0.2	
92	7	tr	0.1	
93	5	0.015	0.02	
94	6	tr	0.2	
95	2	tr	tr	
96	2	tr	tr	
97	12	0.005	0.02	
98	2	nd	tr	
99	15	tr	tr	
100	40	tr	tr	
G101	3	tr	tr	
102	25	tr	tr	
103	6	0.01	0.15	
104	6	0.02	0.1	
105	12	tr	tr	
106	½	nd	tr	
107	5	tr	0.1	
108	7½	0.01	0.1	
109	10	tr	tr	
110	25	tr	tr	
111	5	tr	tr	
112	5	tr	tr	
113	5	tr	tr	
114	5	0.02	0.1	
115	2	nd	tr	
116	2	nd	nd	
117	5	tr	tr	
118	5	tr	tr	
119	5	tr	0.02	
120	15	tr	tr	
121	5	tr	tr	
122	5	tr	tr	
123	40	0.005	0.02	
124	6½	tr	0.2	
125	10	tr	tr	
G126	5	tr	tr	
127	25	0.02	tr	
128	5	0.02	tr	
129	10	tr	tr	
130	10	nd	0.1	
131	12	tr	0.2	
132	25	0.005	0.02	
133	10	0.005	0.02	
134	5	0.005	0.02	
135	6	tr	tr	
136	6	tr	tr	
137	6½	0.01	nd	
138	8	tr	nd	
139	5	nd	tr	
140	3	nd	0.3	
141	5	tr	nd	
142	5	nd	0.1	
143	5	nd	0.1	
144	6	tr	nd	
145	15	nd	nd	
146	6	nd	nd	
147	8	0.005	0.02	
148	40	0.005	0.02	
149	20	tr	tr	
150	30	tr	tr	
G151	8	tr	tr	
152	55	tr	tr	
153	4	tr	tr	
154	6	tr	tr	
155	15	tr	tr	
156	8	0.005	0.02	
157	40	tr	tr	
158	15	tr	tr	
159	8	tr	tr	
160	30	tr	tr	
161	15	tr	tr	
162	6	tr	tr	
163	30	tr	tr	
164	10	tr	tr	
165	15	tr	tr	
166	4	0.005	0.02	
167	25	0.005	0.02	
168	5	0.005	0.2	
169	5	0.005	0.02	
170	5	tr	tr	
171	5	tr	tr	
172	5	0.005	nd	
173	5	tr	nd	
174	5	tr	nd	
175	8	tr	tr	
G176	8	tr	tr	
177	5	tr	tr	
178	5	tr	nd	
179	5	tr	nd	
180	5	tr	tr	
181	5	tr	tr	
182	20	tr	tr	
183	20	tr	tr	
184	5	tr	tr	
185	5	tr	tr	
186	5	tr	tr	
187	5	tr	tr	
188	5	tr	tr	
189	5	tr	tr	
190	20	tr	tr	
191	1	nd	nd	
192	15	tr	nd	
193	8	0.01	tr	
194	30	nd	tr	
195	20	nd	0.2	
196	20	nd	tr	
197	20	tr	tr	
198	15	0.01	nd	
199	5	tr	tr	
200	5	0.02	tr	

TABLE 4 (continued)

SAMPLE NUMBER	SAMPLE WIDTH (ft)	Au (oz)	Ag (oz)	OTHER
G201	5	nd	nd	
202	5	nd	nd	
203	5	nd	nd	
204	5	nd	nd	
205	5	nd	0.3	
206	5	tr	0.1	
207	20	0.04	tr	
208	4	0.01	tr	
209	15	tr	nd	
210	6	tr	tr	
211	20	nd	nd	
212	20	nd	0.4	
213	20	0.01	nd	
214	5	tr	nd	
215	5	tr	nd	
216	5	tr	nd	
217	5	tr	tr	
218	5	nd	0.1	
219	5	nd	nd	
220	5	nd	nd	
221	20	nd	nd	
222	25	0.02	tr	
223	10	tr	nd	
224	4	tr	nd	
225	15	nd	nd	
G226	20	nd	tr	
227	20	nd	tr	
228	8	nd	0.1	
229	5	nd	0.1	
230	5	nd	nd	
231	20	nd	tr	
232	25	nd	tr	
233	6	nd	tr	
234	20	nd	tr	
235	6	nd	tr	
236	20	nd	tr	
237	40	nd	tr	
238	35	nd	tr	
239	5	nd	tr	
240	5	nd	nd	
241	5	nd	nd	
242	5	nd	nd	
243	5	nd	nd	
244	50	nd	nd	
245	15	nd	nd	
246	8	nd	nd	
247	15	0.01	tr	
248	20	tr	tr	
249	20	tr	nd	
250	5	tr	nd	
G251	5	tr	tr	
252	5	0.01	nd	
253	5	tr	tr	
254	5	0.01	tr	
255	5	tr	nd	
256	5	0.01	nd	
257	15	0.01	nd	
258	20	tr	tr	
259	10	tr	nd	
260	8	tr	nd	
261	5	tr	0.1	
262	5	tr	0.1	
263	5	tr	0.1	
264	10	0.01	tr	
265	50	tr	tr	
266	5	tr	tr	
267	20	tr	nd	
268	4	tr	nd	
269	20	tr	0.1	
270	20	0.01	0.1	
271	25	nd	nd	
272	20	tr	0.1	
273	2	tr	tr	
274	5	tr	nd	
275	5	tr	nd	
S276	5	tr	nd	
277	6	tr	nd	
278	6	tr	tr	
279	5	tr	tr	
280	20	nd	0.1	
281	5	0.01	tr	
282	4	0.02	nd	
283	2	tr	nd	
284	15	tr	tr	
285	20	tr	tr	
286	4	tr	tr	
287	12	tr	tr	
288	20	0.01	tr	
289	10	tr	nd	
290	10	0.01	tr	
291	5	0.02	0.1	
292	15	tr	tr	
293	20	tr	tr	
294	5	tr	tr	
295	10	tr	tr	
296	6	0.015	tr	
297	10	tr	tr	L0.01%Cu
298	6	tr	tr	L0.01%Cu
299	30	tr	tr	
300	4	tr	tr	

SAMPLE NUMBER	SAMPLE WIDTH (ft)	Au (oz)	Ag (oz)	OTHER
S301	3	tr	tr	
302	9	tr	0.02	
S301	5	tr	tr	
2	10	tr	tr	
3	6	0.01	nd	
4	5	tr	tr	
5	5	0.01	tr	
6	7	tr	tr	
7	10	nd	nd	
8	10	nd	tr	
9	12	tr	tr	
10	12	nd	nd	
11	9	nd	tr	
12	float	tr	tr	
13	6	nd	nd	
14	6	tr	nd	
15	5	0.005	nd	
16	20	nd	0.01	
17	5	tr	0.2	
18	5	nd	0.2	
19	5	tr	tr	
20	5	tr	tr	L0.01%Cu
21	5	tr	0.02	L0.01%Cu
22	5	tr	tr	L0.01%Cu
23	15	nd	nd	
24	8	nd	tr	
25	5	tr	0.1	
S026	grab	nd	0.4	
27	grab	nd	0.3	
28	20	nd	0.2	
29	grab	nd	0.1	
30	4	nd	0.1	
31	6	tr	nd	
32	5	tr	tr	
33	grab	nd	nd	
34	10	nd	tr	
35	grab	nd	nd	
36	float	nd	tr	
37	5	0.010	0.02	0.05%Cu
38	4	tr	tr	
39	5	nd	0.1	
40	3	tr	tr	
41	5	nd	0.1	
42	5	tr	tr	
43	5	tr	tr	0.02%Cu
44	5	tr	tr	
45	5	tr	tr	0.01%Cu
46	1	nd	tr	
47	6	tr	0.02	0.01%Cu
48	6	tr	0.02	0.01%Cu
49	4	0.01	nd	
50	5	tr	0.02	0.01%Cu
S051	6	tr	0.02	0.01%Cu
52	12	tr	0.02	0.01%Cu
53	8	tr	tr	0.01%Cu
54	8ft	nd	tr	
55	12	tr	tr	
56	7	0.005	0.03	0.01%Cu
57	7	0.005	0.02	0.02%Cu
58	5	tr		
59	5	tr		
60	5	tr		
61	5	0.005		
62	5	0.005		
63	5	0.005		
64	5	tr		
65	5	tr		
66	grab	0.005		
67	5	0.005		
68	5	0.005		
69	5	tr	tr	
70	5	tr	0.1	
71	5	nd	nd	
72	5	nd	tr	
73	5	tr	nd	
74	5	tr	nd	
75	5	tr	nd	
S076	5	tr	nd	
77	5	nd	nd	
78	5	tr	nd	
79	5	tr	nd	
80	5	tr	nd	
81	4ft	tr	nd	
82	5	tr	nd	
83	5	nd	tr	
84	5	nd	nd	
85	5	nd	nd	
86	4	tr	0.12	
87	5	tr	tr	
88	5	nd	0.4	
89	5	nd	0.3	
90	5	tr	tr	
91	5	tr	nd	
92	5	nd	0.2	
93	5	tr	0.1	
94	4	tr	tr	0.01%Cu
95	5	tr	tr	
96	grab	nd	0.2	
97	5	tr	tr	

TABLE 4 (continued)

SAMPLE #	SAMPLE WIDTH (FT)	Au (oz)	Ag (oz)	OTHER
[illegible]6	5	0.005	tr	
5A	5	tr	0.1	
100	5	tr	tr	
S101	5	tr	tr	
102	5	tr	tr	
103	5	0.01	tr	
104	5	0.01	tr	
A001	5	tr	tr	<0.02%Cu
2	5	tr	tr	<0.02%Cu
3	5	tr	tr	<0.02%Cu
4	5	tr	tr	<0.02%Cu
5	5	tr	tr	<0.02%Cu
6	5	tr	tr	<0.02%Cu
7	5	tr	tr	0.02%Cu
8	5	tr	tr	0.02%Cu
9	5	tr	tr	0.02%Cu
10	5	tr	tr	<0.02%Cu
11	5	tr	tr	<0.02%Cu
12	5	tr	tr	<0.02%Cu
13	3	tr	tr	0.02%Cu
14	10	tr	tr	0.02%Cu
15	2	tr	tr	0.02%Cu
16	6	tr	tr	0.02%Cu
17	5	tr	0.03	0.01%Cu
18	3	tr	0.03	0.01%Cu
19	10	tr	tr	<0.02%Cu
20	3	tr	tr	0.02%Cu
21	2	tr	0.03	0.05%Cu
22	5	tr	tr	0.01%Cu
23	2	tr	tr	0.01%Cu
24	2	tr	0.04	0.01%Cu
25	4	tr	tr	<0.01%Cu
A026	4	tr	0.06	0.01%Cu
27	4	tr	0.04	0.12%Cu
28	4	tr	tr	<0.12%Cu
29	6	tr	tr	<0.02%Cu

SAMPLE #	SAMPLE WIDTH (FT)	Au (oz)	Ag (oz)	OTHER
A001	4/12		0.42	0.69%Cu
2	2/12		0.71	3.11%Cu
3	5/12		0.85	3.15%Cu
4	6/12		0.40	1.5 %Cu
5	6/12		0.20	0.8 %Cu
6	3/12		1.10	4.5 %Cu
7	6/12		0.74	2.8 %Cu
8	10/12			2.15%Cu
9	12/12			0.4 %Cu
10	5/12			1.3 %Cu
11	4/12		0.35	1.19%Cu
12	8/12			2.2 %Cu
13	8/12		0.27	1.6 %Cu
14	6/12		0.37	1.8 %Cu
15	3/12		0.42	0.6 %Cu
16	5/12		0.77	3.5 %Cu
17	6/12		0.40	1.6 %Cu
18	2/12		0.43	1.6 %Cu
19	10/12		0.25	0.7 %Cu
E001	float		0.02	<0.05%Pb,<0.05%Zn
2	8		0.06	0.37%Cu
3	1		0.29	0.90%Cu
4	float	tr	0.1	
5	grab		tr	0.01%Cu
6	3		0.05	0.22%Cu
7	6	0.005	0.11	0.23%Cu
8	7		0.38	1.32%Cu
9	7		0.28	1.07%Cu
10	4		0.23	0.49%Cu
11	5		0.13	0.27%Cu
N001	4		0.23	0.5 %Cu
2	30		0.07	<0.01%Cu,<0.05%Pb,<0.05%Zn
3	20		0.03	<0.01%Cu,<0.05%Pb,<0.05%Zn
4	6	0.02	0.2	
5	float	nd	0.1	

NOTE: Letters which SAMPLE # MEAN denote the area from which the sample was taken:

- O - Ocean Mountain (Figure 11)
- S - Silt Mountain (Figures 12 & 13)
- A - Andradite Mountain (Figure 14)
- O - West Commerce (Figure 15)
- E - East Commerce (Figure 16)
- N - North Commerce (Figure 17)

nd denotes not detected
tr denotes trace
< denotes less than
grab denotes grab sample

West Commerce Cu - Exploration

19 samples were taken from a dip-slope bed outcropping within the Grinnell Formation on the western part of the Commerce Claims (see Figure 15, Table 4 for assay locations and values). Although assays ranged up to 4.80% Cu, 1.10 oz/Ton Ag, thicknesses were less than 12" and averaged only 6". Only a portion of the bed occurs on a dip-slope (see Figure 15A) and calculations in Table 5 indicate that to mine 43,960 tons of ore grading approximately 1½% Cu, ½ oz/Ton Ag would involve the removal of 2.6 million tons of waste.

East Commerce Cu - Exploration

Late in the 1973 field season a dip-slope bed was discovered outcropping within the Phillips Formation on Sunkist Ridge and carrying copper across 7-8'. The copper-bearing horizon is a buff-weathering blue green dolomite with occasional grains of quartz. It carries hematite, covellite, bornite, and malachite as very fine disseminations. The bed outcrops draped over Sunkist Ridge from Hopper Mountain approximately 900' to the south towards Sunkist Mountain (see Figure 16). The outcrop width is approximately 200' on this outcrop. Overburden depth is less than 10'. The bed also occurs on the north and southwest slopes of Sunkist Mountain and dips into the ridge to the west of Hopper Mountain.

9 samples were taken from the bed and carried up to 1.32% Cu, 0.38 oz/Ton Ag (see Figure 16, Table 4 for assay locations and values). Higher values were obtained on the southern edge of the dip slope outcrop than elsewhere.

Two additional samples were taken from this area. One (E001) showed minor Ag in syenite float, while the second (E004) showed minor Ag in

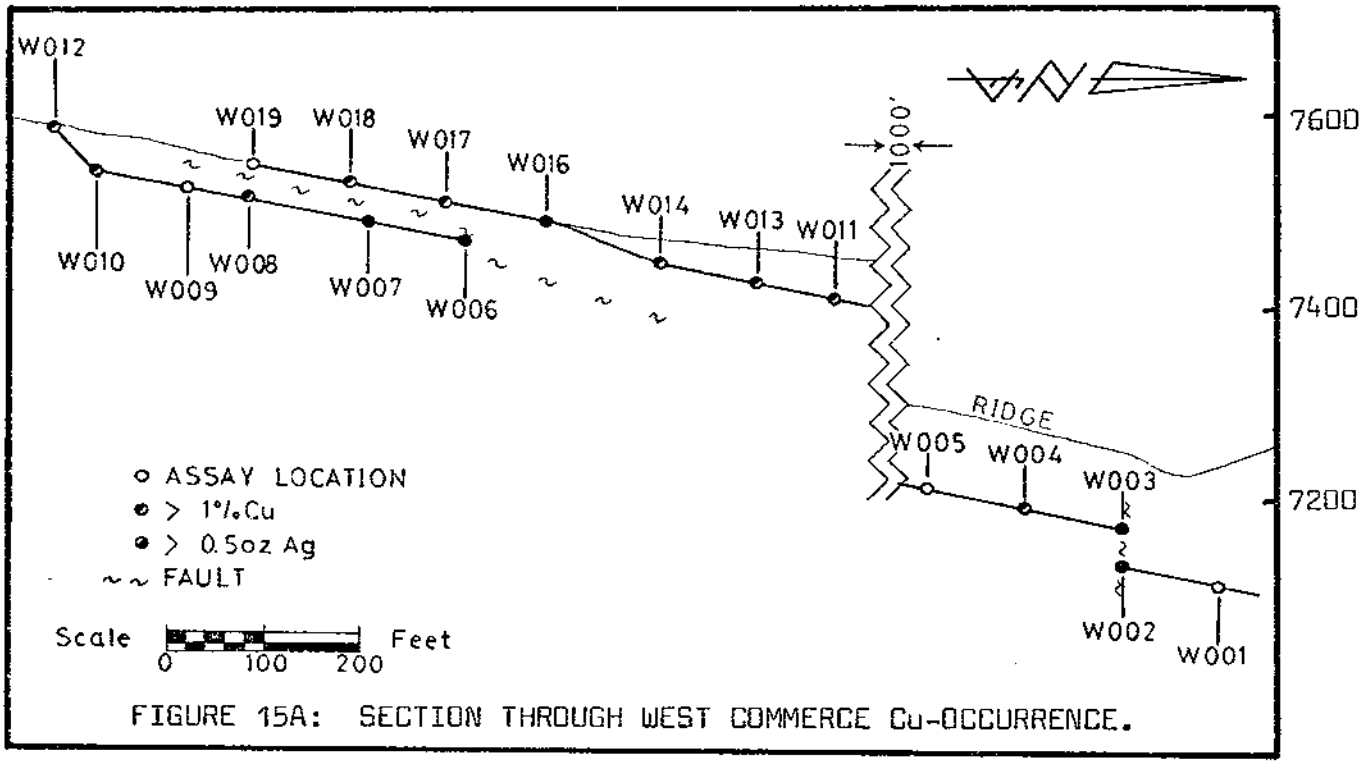


FIGURE 15A: SECTION THROUGH WEST COMMERCE Cu-OCCURRENCE.

SECTION FROM	TO	TONS ORE	GRADE (% Cu/oz Ag)	TONS WASTE
W012	10	1,725	1.65/(~0.40)	21,275
10	6	10,232	2.26/0.92	256,988
19	16	1,078	1.90/0.46	000
16	14	944	2.55/0.57	8,242
14	11	2,438	1.45/0.32	68,250
11	5	20,542	0.97/0.26	1,540,625
5	3	5,741	1.81/0.48	400,417
2	1	1,260	2.95/0.70	321,406
TOTAL		43,960	1.54/0.47	2,617,203

TABLE 5: GRADE AND TONNAGE CALCULATIONS FOR WEST COMMERCE Cu-OCCURRENCE.

galena-bearing quartz float.

North Commerce Exploration

The area to the north of the original Commerce Claim block was prospected for indications of Au and/or Cu mineralization during the 1973 field season. A continuation of the Phillips dolomite bed from the southeast Commerce area carried minor Cu and Ag (sample N001 of Figure 17, Table 4). Minor Ag was also detected in the Purcell Lava in the area (samples N002, N003). Minor Au/Ag occurs in a diabase dyke intrusive into the Grinnell sediments at the head of the north branch of Commerce Creek (sample N004). A piece of conglomerate float from the ridge west of Commerce Creek carried minor Ag (sample N005). No other concentrations of Au or Cu were noted in the area.

SUMMARY AND CONCLUSIONS

Geological investigations carried out to the Fall of 1973 on the Commerce claim blocks have revealed two distinct types of mineralization. They are: (1) Cu/Ag mineralization associated with sediments of the Grinnell and Phillips Formations and with veins cutting the Grinnell Formation; (2) Au/Ag mineralization associated with diorite dykes and sills intrusive into the Siyeh, Purcell Lava, and Sheppard Formations.

Cu/Ag concentrations occur mainly in quartzites and sandstones of the upper Grinnell Formation, outcropping in the western part of the claim blocks. Disseminated covellite, bornite, chalcocite, tetrahedrite (?), and chalcopyrite are the dominant sulphides, and are concentrated in the 'dirty' or clast-bearing portions of the sandstone units. Bornite and covellite are commonly concentrated in shale clasts within the sandstones. Malachite and azurite occur as secondary coatings. Concentrations vary up to approximately 5% Cu, 1 oz/Ton Ag. Unfortunately, mineralization is generally sporadic along strike and the better concentrations have to date been confined to rather thin (<1 foot) sandstones. No economic concentrations in terms of both grade and size have been found.

Cu/Ag in the form of tetrahedrite and chalcopyrite, with secondary malachite and azurite, also occurs in quartz/siderite veins cutting the Grinnell Formation sediments in the west-central portion of the claim blocks. Vein widths vary up to 3 feet, with grades up to approximately 2% Cu, 0.5 oz/Ton Ag. Mineralization and thicknesses vary sharply, precluding economic exploitation of the deposits.

Cu/Ag also occurs within a 7-8 foot thick dolomite bed in the lower Phillips Formation of the eastern Commerce claims. Mineralization takes

the form of very fine disseminations of hematite, covellite, and bornite, with secondary malachite. Grade varies up to approximately 1¼% Cu, ½ oz/Ton Ag. The most promising occurrence is a dip-slope bed draped over Sunkist Ridge and carrying a possible 125,000 tons of ore with little or no overburden. This deposit shows potential for a small scale stripping operation if grade is sufficient to permit trucking to an existing mill.

Au/Ag mineralization is associated with dioritic sills and dykes intrusive into the Siyeh, Purcell Lava, and Sheppard Formations. Significant gold values (up to 3.84 oz/Ton) have been recovered in three areas but subsequent attempts to confirm these values have been unsuccessful. Statistical sampling has revealed a tendency for the gold (1) to be concentrated at or near abrupt sill or dyke terminations against sediments, (2) to be in particular associated with a sill termed 'Sill No. 7', (3) to be concentrated at the base of sills, (4) to occur in sediments in association with Au in the sills and dykes. Silver values are sporadic and bear no apparent relationship to sills or dykes but are concentrated in lava flows. Again, attempts to confirm earlier high-Ag assays have been unsuccessful. Confirmable grades discovered to date are unecomomic.

In conclusion, therefore, it can be stated that:

1) Cu/Ag concentrations within Grinnell Formation quartzites and sandstones are of too low grade and/or small tonnage to permit development.

2) Cu/Ag concentrations within veins in the Grinnell Formation are too irregular in both grade and thickness to permit exploitation.

3) Cu/Ag within a dolomite bed in the lower Phillips Formation is potentially amenable to stripping if grade proves sufficient and if a milling facility can be found close enough to the site to make trucking of the ore economic.

4) High Au/Ag values in the diorites and lavas are difficult to confirm and possibly indicate very sporadic mineralization. Although there are noticeable trends in mineralization there is no indication of mineable quantities of gold ore.

RECOMMENDATIONS

On the basis of the results obtained to date, the following recommendations are made:

1) No further work should be done on the stratabound or vein copper within the Grinnell Formation on the Commerce claims.

2) Sampling should be carried out early in the 1974 field season on the edges of the dip-slope bed within the Phillips Formation. Two men could adequately sample this prospect, trenching where necessary to obtain samples.

3) If results of sampling carried out under (2) above justify further exploration, several shallow (<30 ' deep) diamond drill holes should be put through the dip-slope Phillips bed to confirm grade in the center of the bed.

4) The North Ridge area should be prospected to check on possible gold occurrences. This is the only area remaining to be prospected for gold. Special attention should be concentrated on the zones where sills and dykes terminate against sediments.

5) At the same time the area within 'Sill No. 7' which previously returned a 3.84 oz/Ton Au assay should be re-examined and the termination of the sill at this point sampled.

6) No diamond drilling should be undertaken on the dioritic intrusives unless sampling under (4) or (5) above shows a definite target for such drilling.

With these recommendations in mind, the size of the holdings of Kintla Explorations Limited in the Commerce Mountain area should be reduced as follows:

a) All claims covering the copper showings in the Grinnell Formation on the western half of the original claim block can be dropped. This includes

Commerce Nos. 9/16 (inclusive), 21/36 (incl.), 38/39 (incl.).

b) The northwestern claim block shows little potential and can be dropped. This includes Commerce Nos. 58/67 (incl.).

c) The holdings on the eastern portion of the main claim block should be reduced by dropping Commerce Nos. 50/54 (incl.), 56, 72/74 (incl.).

d) On the basis of sampling to be carried out during the 1974 field season and before the assessment work on these claims comes due, a decision should be made on dropping Commerce Nos. 69/70 (incl.), 75/91 (incl.), or any portion of this group.

This will result in the retention of Commerce Nos. 1/8 (incl.), 19/20 (incl.), 37, 41/48 (incl.), 55, 57, 68, and all or part of Commerce Nos. 69/70 (incl.), 75/91 (incl.). These remaining claims should be regrouped into a single Commerce Claim Group.

WORK AFFIDAVIT

Roadwork and Trenching

Bulldozer charges		$ 6,274.00
Stumpage		2,019.22
	SUBTOTAL	$ 8,293.22

Mapping and Sampling

Wages*:

Allred, M.	02/07 to 25/07, 28/07 to 31/07, 02/08 to 31/08	
	49 days @ $12.33/day	$ 604.17
Demkiw, S.	01/07 to 05/09	
	57 days @ $15.15/day	863.55
Dineen, M.	11/07 to 14/07	
	3 days @ $17.10/day	51.30
Goble, D.	01/07 to 25/07, 28/07 to 31/07, 02/08 to 19/08, 26/08 to 31/08	
	44 days @ $23.15/day	1,018.60
Goble, F.	01/07 to 25/07, 27/07 to 31/07, 02/08 to 19/09	
	67 days @ $40.81/day	2,734.27
Goble, R.	01/07 to 25/07, 28/07 to 19/08, 26/08 to 31/08	
	45 days @ $48.37/day	2,176.65
Kitt, R.	01/07 to 25/07, 28/07 to 31/07, 02/08 to 12/09	
	59 days @ $17.80/day	1,050.20
Kooy, J.	07/08 to 15/09	
	33 days @ $35.06/day	1,156.98
Kyba, B.	01/07 to 19/08, 26/08 to 19/09	
	63 days @ $21.52/day	1,355.76

Camp Costs**:

420 man-days @ $13.85/man-day	$ 5,817.00

Vehicle Costs***:

420 man-days @ $9.88/man-day	$ 4,149.60

Assaying Costs:

Assays	$ 1,947.93
Shipping	137.15
SUBTOTAL	$23,063.16

WORK AFFIDAVIT (continued)

Report Preparation

Wages - 1 geologist for 1 month @ $1,200.00/month	$ 1,200.00
Drafting and supplies (estimated)	150.00
SUBTOTAL	$ 1,350.00

TOTAL COST OF 1973 EXPLORATION PROGRAM ON COMMERCE CLAIMS $32,706.38

NOTE:

* Wages are paid on a 26-day month, the daily wage given is calculated from the monthly wage, but also includes employer's C.P.P., U.Ins. contributions and holiday pay.

** Camp costs/day are calculated for the entire field season and allow for the number of days spent on other properties. Camp costs include wages for a cook and helper as well as equipment costs and rental.

*** Vehicle costs/day are averaged over the entire field season and allow for the number of days spent on other properties.

CERTIFICATE

I, RONALD JAMES GOBLE, of the City of EDMONTON, in the Province of ALBERTA, hereby declare:

(1) That I am a registered Professional Geologist in the Province of Alberta.

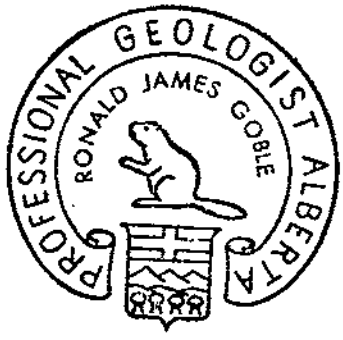
(2) That I am a graduate of the University of Alberta, with the degrees of Bachelor of Science 1968 and Master of Science (Geology) 1971.

(3) That I hold the position of Geologist and Secretary-Treasurer with Kintla Explorations Limited of #7 - 8540 - 109 Street, Edmonton, Alberta.

(4) That I did supervise the work done on the Commerce Claims in the Fort Steele Mining Division between July 1st and September 19, 1973.

(5) That the WORK AFFIDAVIT accompanying this report is a true statement of costs incurred during the exploration carried out on the Commerce Claims and during the preparation of this report.

(6) That this report, entitled "Final Geological Report - 1973, Commerce Claims - British Columbia" is a summary of work carried out on the Commerce Claims.



Respectfully submitted,

Ronald James Goble

RONALD JAMES GOBLE, B.Sc., M.Sc., P.Geol.

DATED February 5th, 1974
Edmonton, Alberta

BIBLIOGRAPHY

ADSHEAD, J.A. (1963): Petrology of the carbonate rocks of the Siyeh Formation, southwestern Alberta. Unpublished M.Sc. thesis. University of Alberta. 108 p.

BADHAM, J.P.N. (1972): Geology and economic potential of the Commerce Claims, British Columbia. Unpublished Kintla Explorations Limited report. 30 p.

BALLY, A.W., GORDY, P.L., & STEWART, G.A. (1966): Structure, seismic data, and orogenic evolution of the Southern Canadian Rocky Mountains. Bull. Can. Petrol. Geol. 14, 337-381.

BOSTOCK, H.S., MULLIGAN, R., & DOUGLAS, R.J.W. (1957): Geology and economic minerals of Canada. Geol. Surv. Can. Econ. Geol. Series No. 1, 4th ed., 283-392.

DALY, R.A. (1912): Geology of the North-American Cordillera at the 49th Parallel. Geol. Surv. Can. Mem. 38.

GOBLE, F.M. (1967): Traverse notes. Kennco Explorations (Western) Limited field notes.

GOBLE, F.M. (1972): Sketch map. Kintla Explorations Limited field notes.

GOBLE, R.J. (1973): Geological report on the Beth and Commerce Claims located 45 miles Southeast of Fernie, 49° 114°S.E. Unpublished Kintla Explorations Limited report. 58 p.

GYR, T. (1971): Record of work on the Commerce Claims, Goble Family option - Commerce Nos. 1-16, 19-39, 41-48. N.T.S. 82G/1W, Lat. 49°09'-49°12', Long. 114°20' - 114°25', June - July 1970. Unpublished Falconbridge Nickel Mines Limited report. 13 p.

HOFFMAN, G. (1972): Report to Kintla Explorations Limited on the Beth Claims and parts of the Commerce Claims. Unpublished Kintla Explorations Limited report. 10 p.

HUME, G.S. (1932): Waterton Lakes - Flathead Valley area, Alberta and British Columbia. Geol. Surv. Can. Summ. Report, Part B, 1-20.

HUNT, G.H. (1962): Time of Purcell eruption in Southeastern British Columbia and Southwestern Alberta. Jour. Alta. Soc. Petrol. Geol. 10, 438-442.

HUNT, G.H. (1964): Chemical correlation of the Purcell igneous rocks. Bull. Can. Petrol. Geol. 12, 544-555.

JONES, P.B. (1969): The Tertiary Kishenehn Formation, British Columbia. Bull. Can. Petrol. Geol. 17, No. 2, 234-246.

BIBLIOGRAPHY (continued)

NIELSEN, P.A. (1972): Detailed geology and economic potential of the Sill Mountain - Gossan Mountain area, Commerce Claim Group, British Columbia. Unpublished Kintla Explorations Limited report. 7 p.

PRICE, R.A. (1962): Fernie map-area, East half, Alberta and British Columbia. Geol. Surv. Can. Paper 61-24.

PRICE, R.A. (1964): The Precambrian Purcell System in the Rocky Mountains of Southern Alberta and British Columbia. Bull. Can. Petrol. Geol. 12, 399-426.

PRICE, R.A. (1965): Flathead map area, British Columbia and Alberta. G.S.C. Mem. 336.

PRICE, R.A. (1967): The tectonic significance of mesoscopic subfabrics in the Southern Rocky Mountains of Alberta and British Columbia. Can. Jour. Earth Sci. 4, 39-70.

REESOR, J.E. (1957): The Proterozoic of the Cordillera in Southeastern British Columbia and Southwestern Alberta in The Proterozoic in Canada. Roy. Soc. Can. Spec. Publ. No. 2, 150-177.

KINTLA EXPLORATIONS LIMITED

MINING EXPLORATION

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ERIK O. GOBLE
PRESIDENT

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RONALD JAMES GOBLE
SECRETARY-TREASURER

Edmonton, Alberta
October 16, 1974

OCT 21 '74 AM

DEPT. OF MINES
AND PETROLEUM RESOURCES

Mr. R. Rutherford
Deputy Chief Gold Commissioner
Department of Mines and Petroleum Resources
Victoria, British Columbia

Dear Mr. Rutherford:

RE: Commerce (Group #1) Mineral Claims
Geological Report #5070
Your file # 166 - Ft. Steele

The above report is a statement of the work carried out during 1973 on the property. The program consisted of extremely detailed sampling of channel samples of a minimum of 25 pounds per sample. The sampling of the property comprised the majority of the 420 man-days worked, with prospecting a lesser portion.

I realize that usual sampling would not involve so many days work, but in this instance, as a direct result of the detailed and very bulky samples taken, it did. We intend to diamond drill the gold showings of sill seven during 1975.

Yours sincerely

KINTLA EXPLORATIONS LIMITED

Per: Erik O. Goble
President

EOG/fj
Encl.

REFERRED TO	DATE	INITIAL
D.M.		
ADM (M)		
ADM (P)		
C.G.C.		
C.P.E.	✓	
[illegible]		
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G.C.		
[illegible]		
GEOL.		
[illegible]		
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FILE NO.		
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KINTLA EXPLORATIONS LIMITED

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FRANK GOBLE
TREASURER

N E W S L E T T E R.

September 10, 1974

Kintla Explorations Limited has received the results of the first phase of a cursory examination of its Commerce Mountain gold property in southwestern British Columbia. A program of re-sampling of "sill #7", found in 1972 to carry 3.84 oz gold per ton in one location, was undertaken in August to determine if inaccurate results were received from the 1973 field program.

The results of the surface sampling in the area of the 1972 high gold assay are as follows:

10329 - 10' sample - 0.17 oz gold /ton
10330 - 12' sample - 0.22 oz gold /ton
10331 - 15' sample - 0.18 oz gold /ton
10332 - 5' sample - 0.24 oz gold /ton
10333 - 15' sample - 0.24 oz gold /ton
10335 - 3' sample - 0.11 oz gold /ton

for an average ten foot thickness containing 0.192 ounces of gold per ton. These samples represent a strike length of 450 feet along the same sill #7 which was found to carry the 3.84 ounces of gold. The samples were taken across the sill from 150 feet east of the high assay to 300 feet west of it.

Six samples were taken to test the earlier results from sills thought to be barren. These samples assayed as follows:

10326 - 30' sample of Purcell Lava - 0.01 oz gold, 0.17 % Cu
10327 - 3' sample barren syenite - 0.02 oz gold
10328 - 12' sample barren dyke west of sill # 7 - 0.04 oz gold, 0.17 % Cu
10334 - 3' section of chalcedony rich bed - 0.02 oz gold
10336 - 4' base of barren sill, east of sill #7 - 0.07 oz gold
10337 - 7' base of barren sill, 50' east of 10336 - 0.02 oz gold

These results are consistent with Kintla's 1971-1972 results which showed background values of approximately 0.02 oz gold per ton in the apparently unmineralized metasediments and barren sills and dykes.

One sample was taken at the "trench" location where early (1932) reports indicated the presence of 2.88 oz of gold per ton:

10338 - 4' section of shattered quartz cemented syenite - 0.15 oz gold per ton.

These results indicate the presence of two zones of gold mineralization in the Sunkist Mountain - Andradite Ridge area of the

property. The third zone where a sample assaying at 1.43 oz of gold per ton was taken in 1972 will be resampled as soon as westher permits.

Due to these encouraging results, the cursory program planned will be extended. Results will be announced in subsequent newsletters.

KINTLA EXPLORATIONS LIMITED

Per: Erik O. Goble
President

Phillips Formation
Gateway Formation
Sheppard Formation
Purcell Lava
U– M– L– } Siyeh Formation
H Grinnell Formation
(see Table III for lettered locations)
Appekunny Formation
Diorite/diabase sills & dykes of varying texture & composition
(see Table II for numbered & lettered locations)
Dip and strike of bedding
Dip of joints
Fold axis and plunge
Fault
Vein
Geological contacts (definite, probable & assumed)
Claim post
Claim boundary
7500 Contours every 500 feet
5+00W 0+00 5+00E Base line

Commerce Creek
West Commerce Lake
Commerce Lake
Camp Lake
Roche Creek
Sunkist Brook

▲7900 Mountain
North Ridge
Blister Ridge
Gossan Mountain
Bulldozer Trail
Andradite Mountain
▲Sill Mountain
▲Fault Mountain
▲Commerce Peak
▲Hopper Mountain
▲Sunkist Mountain

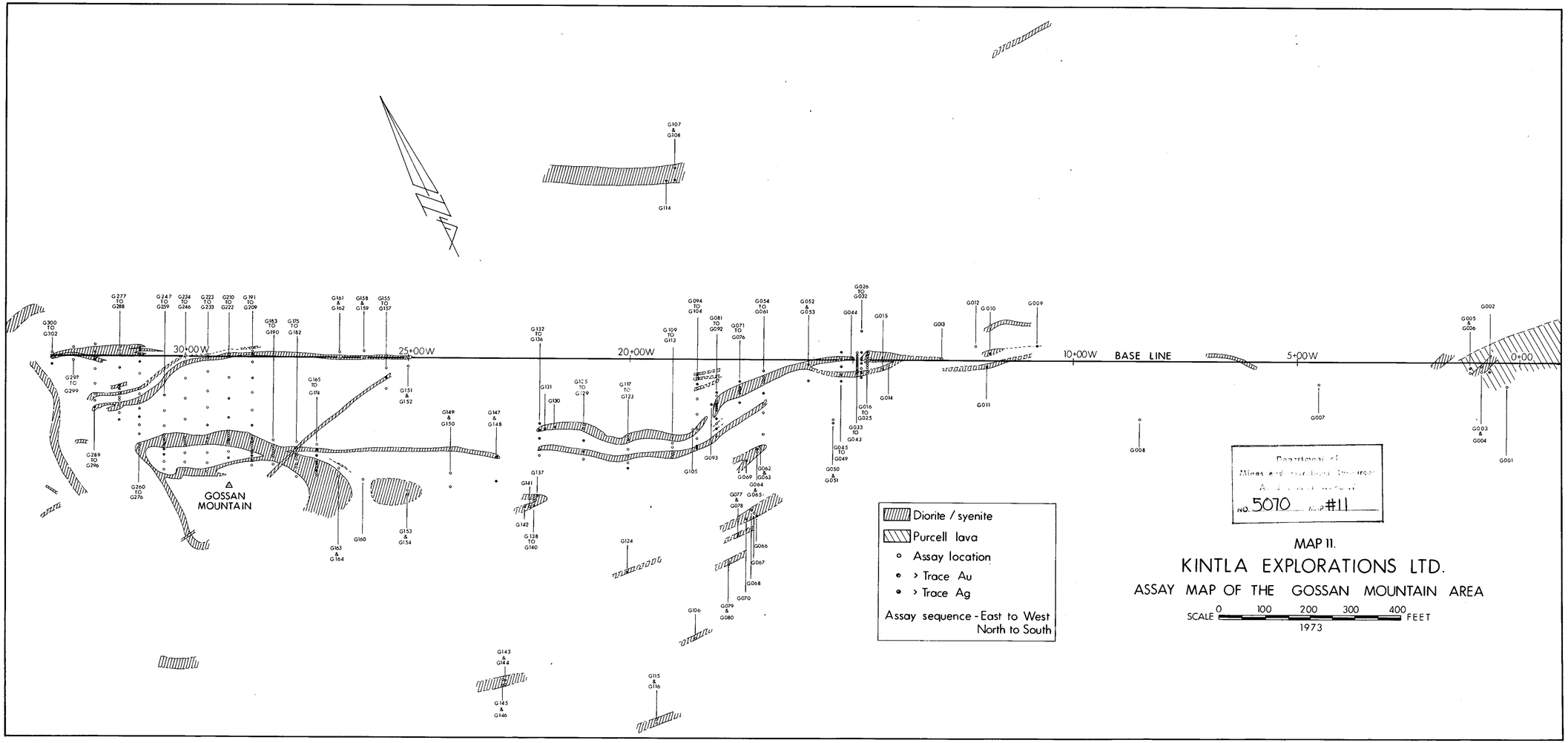
MIDDLE SIYEH FM.
LOWER SIYEH FM.
GRINNELL FM.
APPEKUNNY FM.
LOWER SIYEH FM.
GRINNELL FM.
UPPER SIYEH FM.
PURCELL LAVA FM.
PURCELL LAVA FM.
SHEPPARD FM.
SHEPPARD LAVA FLOW

MAP 5.
KINTLA EXPLORATIONS LTD.
GEOLOGICAL MAP OF COMMERCE CLAIMS
Southeast British Columbia

SCALE 0 500 1000 1500 FEET

1973.

5070
M5



MAP 11.

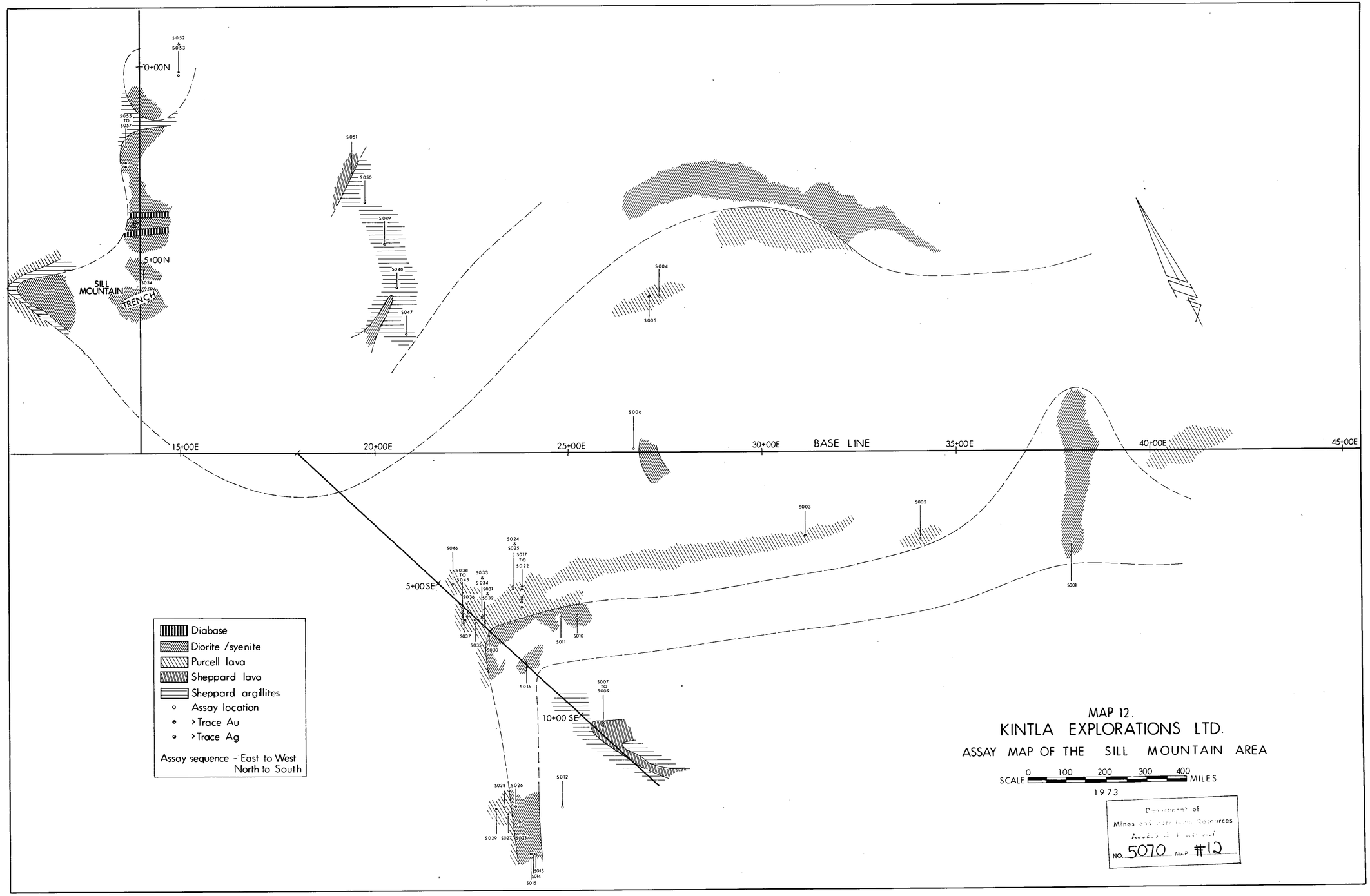
KINTLA EXPLORATIONS LTD.

ASSAY MAP OF THE GOSSAN MOUNTAIN AREA

SCALE 0 100 200 300 400 FEET

1973

5070
M 11



MAP 12.

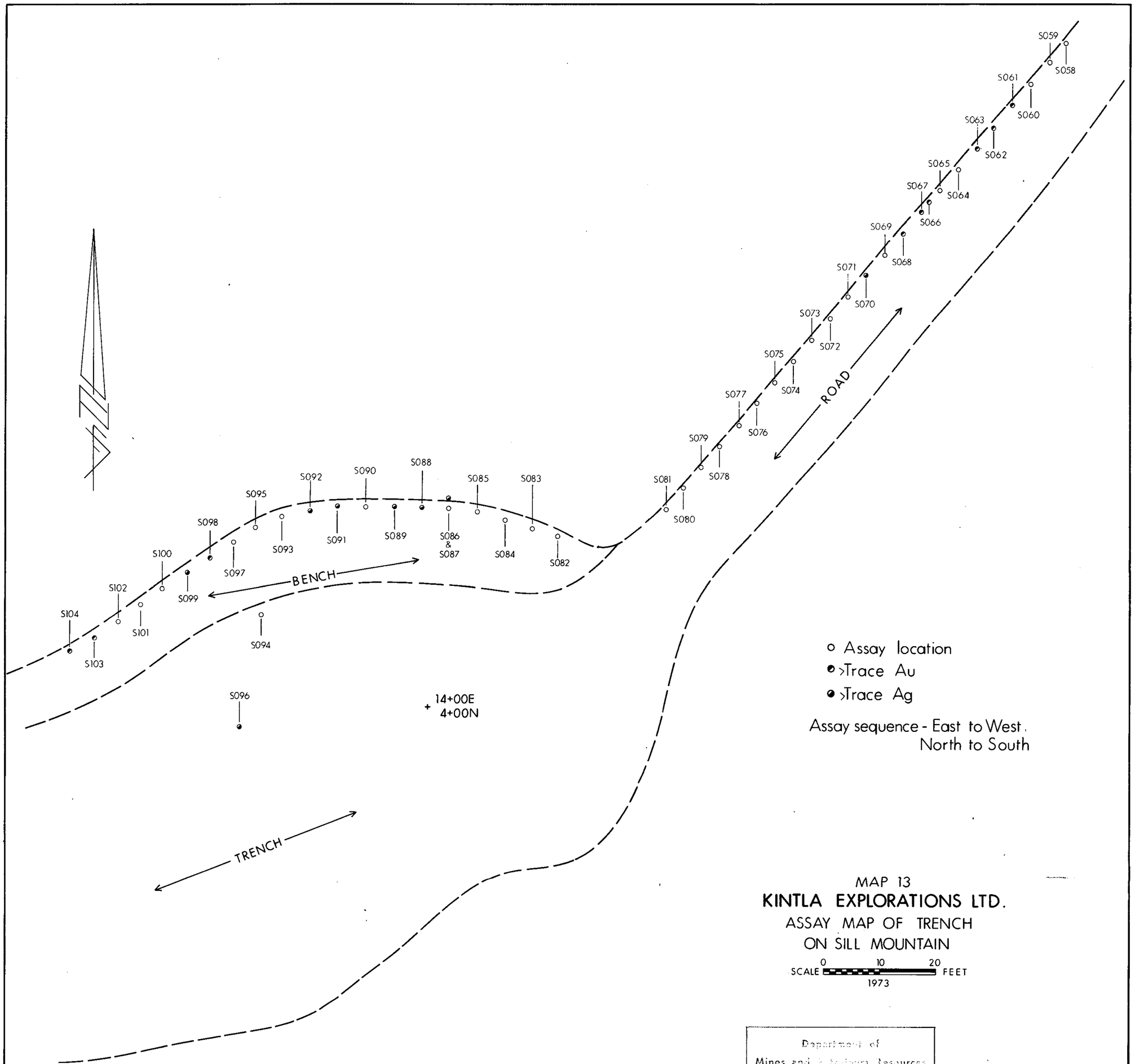
KINTLA EXPLORATIONS LTD.

ASSAY MAP OF THE SILL MOUNTAIN AREA

SCALE 0 100 200 300 400 MILES

1973

5070
M12



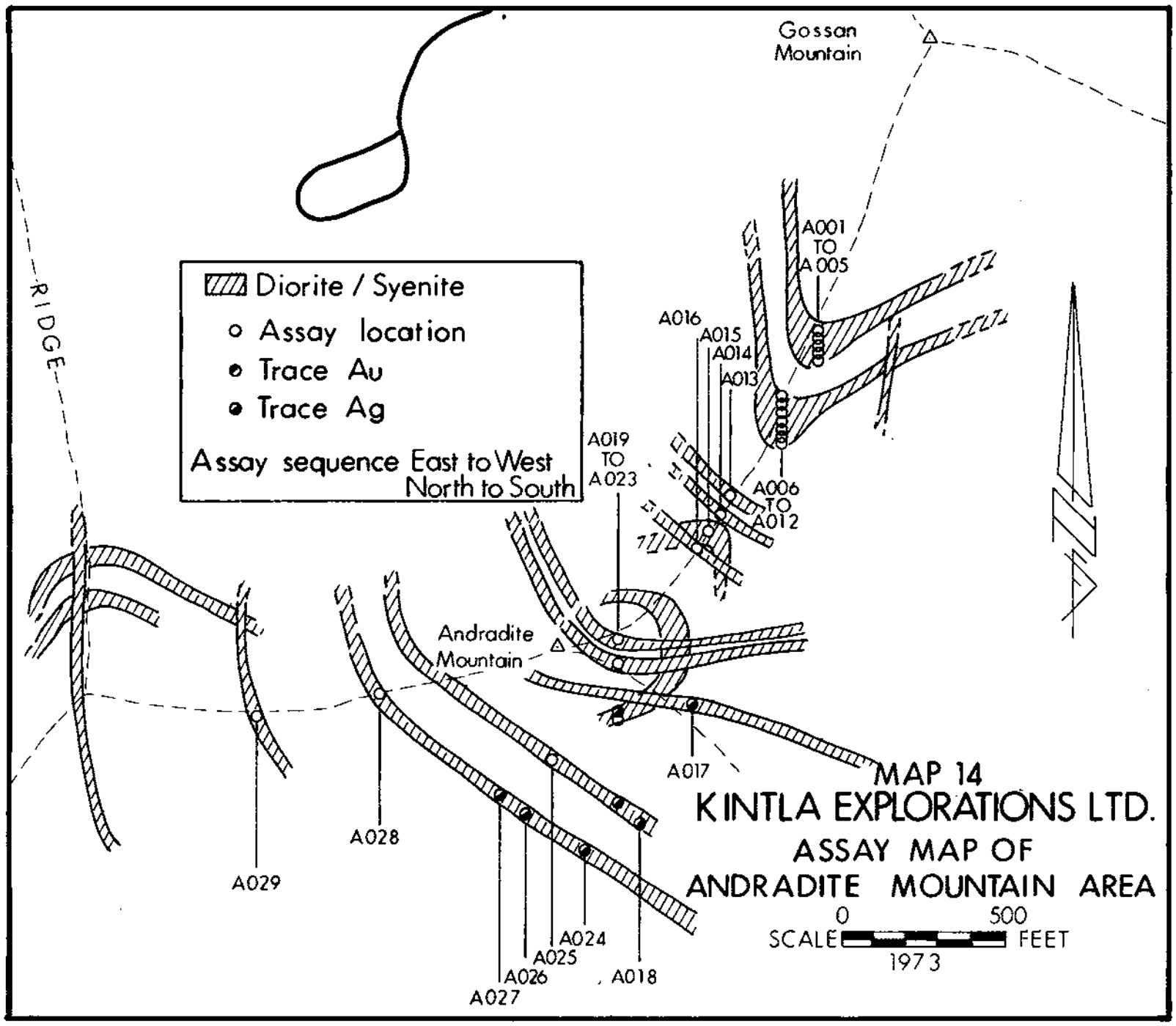
MAP 13

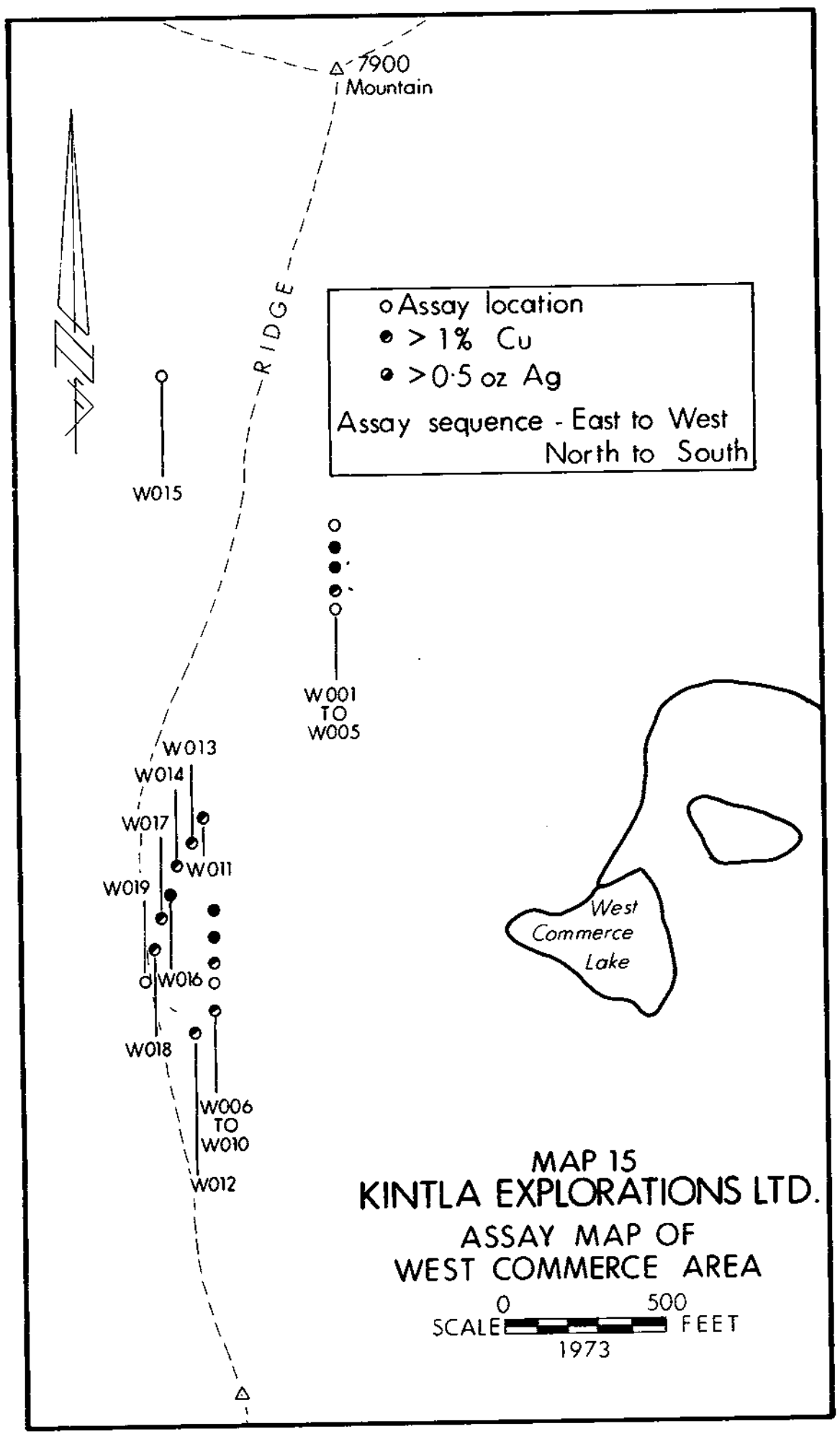
KINTLA EXPLORATIONS LTD.

ASSAY MAP OF TRENCH
ON SILL MOUNTAIN

SCALE 0 10 20 FEET

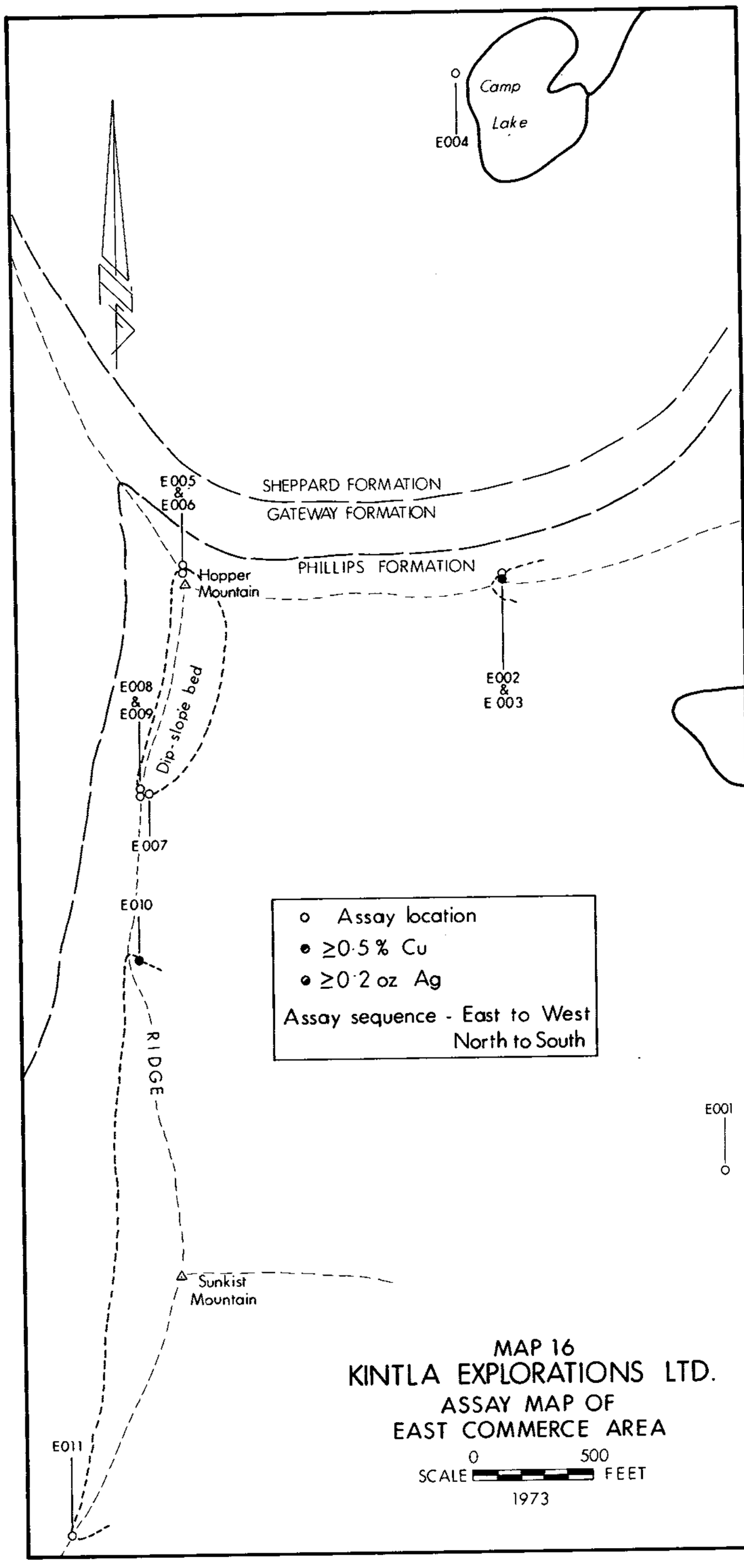
1973





MAP 15
KINTLA EXPLORATIONS LTD.
ASSAY MAP OF
WEST COMMERCE AREA
SCALE 0 500 FEET
1973

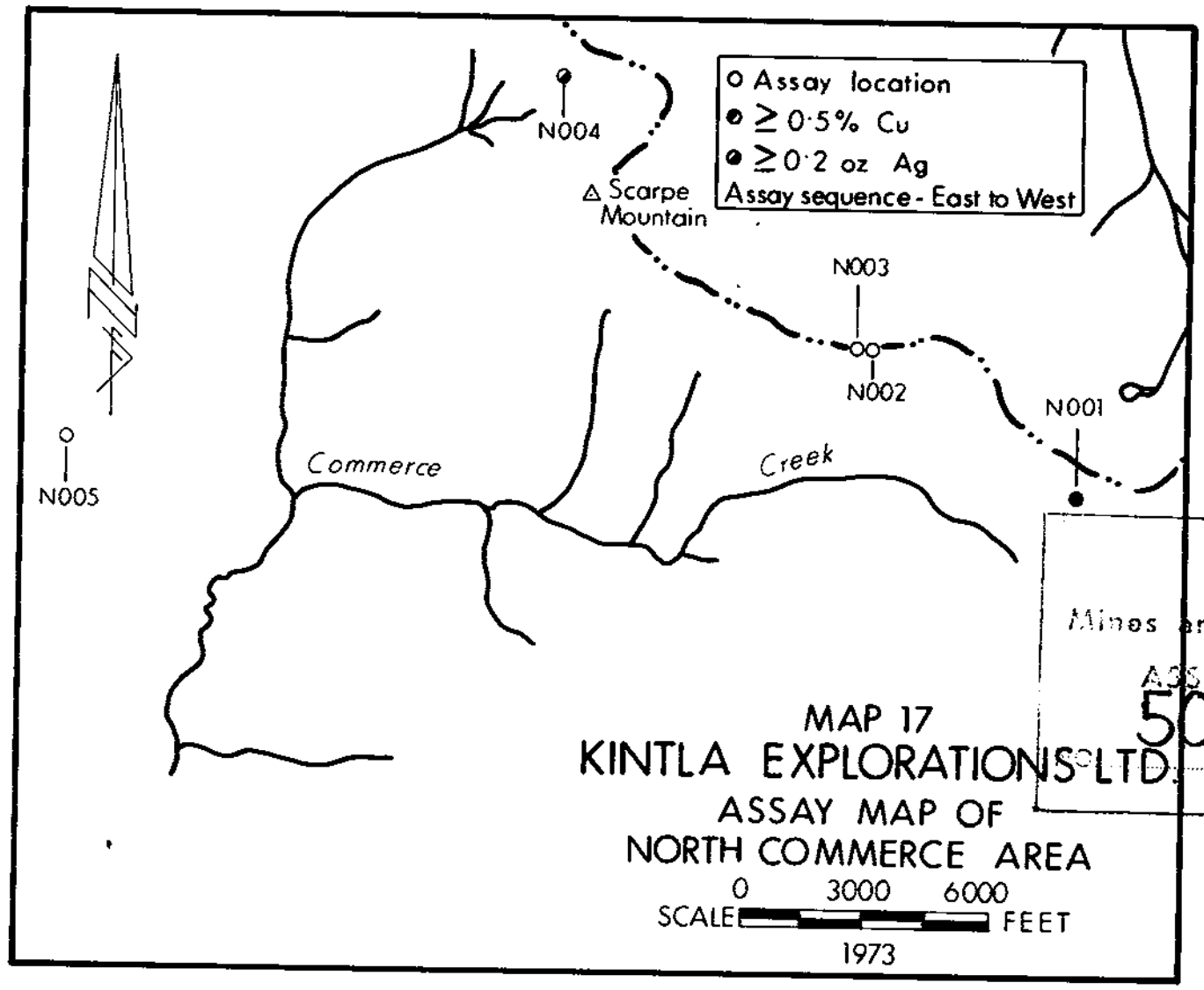
5070
M 15



MAP 16
KINTLA EXPLORATIONS LTD.
ASSAY MAP OF
EAST COMMERCE AREA

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5070 MAP #16

5070
M16



MAP 17

KINTLA EXPLORATIONS LTD.

ASSAY MAP OF NORTH COMMERCE AREA

0 3000 6000

SCALE FEET

1973