84-1182-13352

12/55

GEOLOGICAL REPORT
ON THE BITTER CREEK PROPERTY
SKEENA MINING DIVISION
LATITUDE 56 DEGREES 2 MINUTES 30 SECONDS NORTH
LONGITUDE 129 DEGREES 51 MINUTES WEST
FOR
MARALGO MINES LIMITED
BY

GEORGE W.G. SIVERTZ
W.G. TIMMINS EXPLORATION & DEVELOPMENT LTD.

NOVEMBER 30, 1984

N.T.S. 104A/4W

Claims owned by: GREY SILVER MINES LTD. FMC 265524; and,
WILLIAM L. McCULLAGH FMC 266036 (operator)

The Claims occur in two groups:
BITTER CREEK GROUP:
HD 1/2FR/3FR/4FR; Alberta 5/6; Morgan -/1/3/4/6; Ophir 2/3; Creek, Radio Fr.,Radio 2, Miller, Northern Bell, Roosevelt 2/1, Radio, Radio 3, Morgan 5 + Mayou; Mayou Fr. + Ophir.

ORE MOUNTAIN GROUP:
Lakeshore, Lead Coil, Gold Hill #1; Lead Coil #2; Ore Fr.; Ore Hill -/3/4; Hill Fr.; Ore Mtn. #5; Ore Hill #6/#2

GEOLOGICAL BRANCH
ASSESSMENT REPORT

13,352 Part 1 of 2

W. G. TIMMINS EXPLORATION & DEVELOPMENT LTD.

SUMMARY

Maralgo Mines Limited holds by option and directly a mineral property located on Ore Mountain, 13 km north of Stewart, B.C., in the Skeena Mining Division.

The property is referred to as the Bitter Creek property in this report; it encompasses five main mineral showings, some of which were among the first mineral discoveries in the Stewart area.

During the period September 4 to September 19, 1984, an exploration programme, consisting of systematic sampling and mapping, was carried out.

The results of this programme indicate that the Bitter Creek property has low potential for mineral deposits of moderate to large tonnage. Based on underground sampling, two mineral occurrences on the property appear to have some potential for small scale selective mining, providing a market can be found for limited amounts of raw silver-lead or gold-copper ore.

Respectfully submitted,

George W.G. Sivertz, B.Sc.
November 30, 1984

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## INTRODUCTION

Maralgo Mines Limited holds a mineral property near Stewart, B.C., in the Skeena Mining Division. The property comprises 32 reverted Crown-granted claims held by option, and one 8-unit claim and three fractional claims held directly.

A work programme, consisting of systematic sampling, mapping, and prospecting, was carried out on the property during the period September 4 to September 19, 1984, by W.G. Timmins Exploration & Development Ltd.. The programme was designed to evaluate the known mineral prospects and to discover additional mineralization and structures with untested potential.

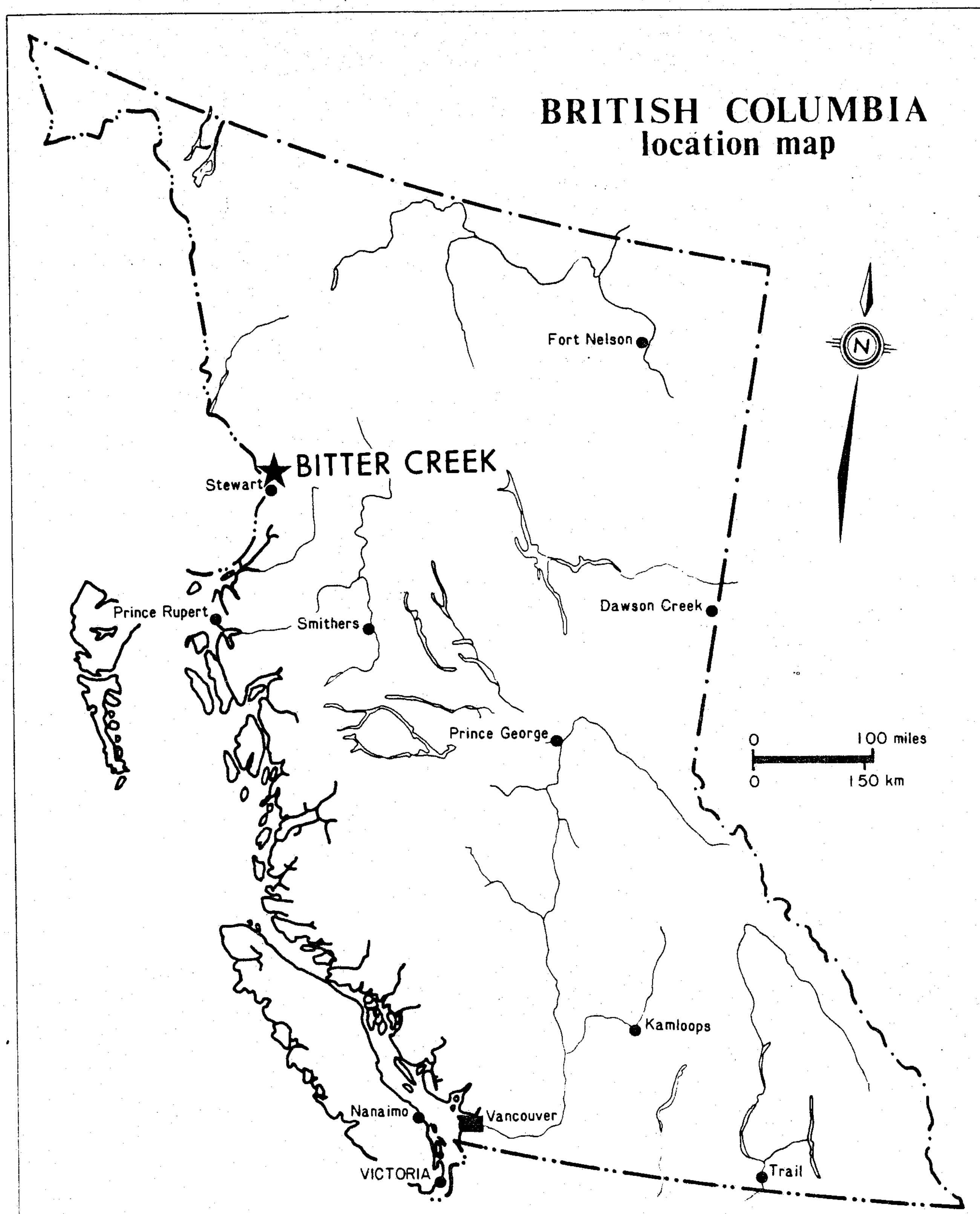
Personnel involved in the exploration programme were George W.G. Sivertz, B.Sc., Frank B. Gigliotti, B.Sc., Peter S. Hall, B.Sc., and S. Frank Sivertz.

## PROPERTY

The Maralgo Mines Limited property, hereafter referred to as the Bitter Creek property, consists of the reverted Crown grants and located fractional and full size claims listed below.

| Claim Name | R.No. | RCG No. | Expiry Date |
|---|---|---|---|
| Lake Shore | 882 | 4808 | Jan. 9, 1985 |
| Lead Coil | 883 | 4811 | " " " |
| Gold Hill | 884 | 4812 | " " " |
| Lead Coil #2 | 885 | 4813 | " " " |
| Ore Fraction | 886 | 4814 | " " " |
| Ore Hill | 887 | 4815 | " " " |
| Ore Hill #3 | 888 | 4817 | " " " |
| Ore Hill #4 | 889 | 4818 | " " " |
| Hill Fraction | 890 | 4819 | " " " |
| Ore Mountain #5 | 891 | 4820 | " " " |
| Ore Hill #6 | 892 | 4821 | " " " |
| Roosevelt #1 | 515 | 896 | Mar. 1, 1986 |
| Roosevelt #2 | 516 | 895 | Mar. 1, 1986 |

| Claim Name | R.No. | RCG No. | Expiry Date |
|---|---|---|---|
| Radio | 518 | 4571 | Mar. 1, 1985 |
| Ore Hill #2 | 1129 | 4816 | Mar. 2, 1985 |
| Alberta #5 | 467 | 5875 | Dec. 7, 1984 |
| Alberta #6 | 468 | 5876 | " " " |
| Morgan | 474 | 5881 | " " " |
| Morgan #1 | 475 | 5882 | " " " |
| Morgan #3 | 476 | 5883 | " " " |
| Morgan #4 | 477 | 5860 | " " " |
| Morgan #6 | 478 | 5862 | " " " |
| Ophir #2 | 479 | 5871 | " " " |
| Ophir #3 | 480 | 5872 | " " " |
| Creek | 488 | 4570 | " " " |
| Radio Fraction | 489 | 4575 | " " " |
| Radio #2 | 490 | 4573 | Dec. 7, 1985 |
| Miller | 491 | 893 | Dec. 7, 1985 |
| Northern Bell | 492 | 897 | Dec. 7, 1985 |
| Radio #3 | 848 | 4574 | Dec. 22, 1984 |
| Morgan #5/Mayou | 849 | 5861 | Dec. 22, 1984 |
| Mayou Fr./Ophir | 850 | 5869 | Dec. 22, 1984 |
| HD 1 | 3862 | N/A | May 2, 1985 |
| HD 2 Fr. | 3863 | N/A | May 2, 1986 |
| HD 3 Fr. | 4657 | N/A | Oct. 1, 1985 |
| HD 4 Fr. | 4658 | N/A | Oct. 1, 1985 |




| MARALGO MINES LIMITED | |
|---|---|
| PROPERTY LOCATION MAP | |
| DRAWN BY: P. HALL | SCALE: 1:7,500,000 |
| DATE: AUGUST 1983 | |
| | FIG. No. 1 |

## LOCATION AND ACCESS

The Bitter Creek property lies east of the Stewart-Cassiar Highway, 13 kilometers north of Stewart. It comprises several non-contiguous blocks of claims straddling Ore Mountain and an unnamed peak 2 km to the northeast. Bitter Creek, a tributary of Bear River, and Roosevelt Creek, which flows into Bitter Creek, form the southern and eastern boundaries of the property.

Access to the various blocks of claims on the upper slopes is best gained by helicopter, but most sections can be reached on foot from a washed-out logging road lying along the north bank of Bitter Creek. Foot access to centrally located claims in the alpine areas is best gained by ascending the steep gulch of Radio Creek, but this route should only be used after the winter snowpack has melted since the Radio Creek gulch and most of the other gulches draining Ore Mountain serve as avalanche chutes in the winter and spring. The eastern claim block, including the important Roosevelt #1 claim, can be reached by a two hour walk along the logging road, which is impassable by conventional 4-wheeled vehicles.

Old trails, which were built to facilitate travel into the alpine areas, are in very poor repair. These trails were routed away from the southern and southwestern flanks of Ore Mountain, which are very steep and craggy. Most of the mountainside east of Radio Creek and west of Roosevelt Creek is also dangerously steep; access routes should be selected with extreme care and used only in the snow-free months.

## TOPOGRAPHY, VEGETATION, AND CLIMATE

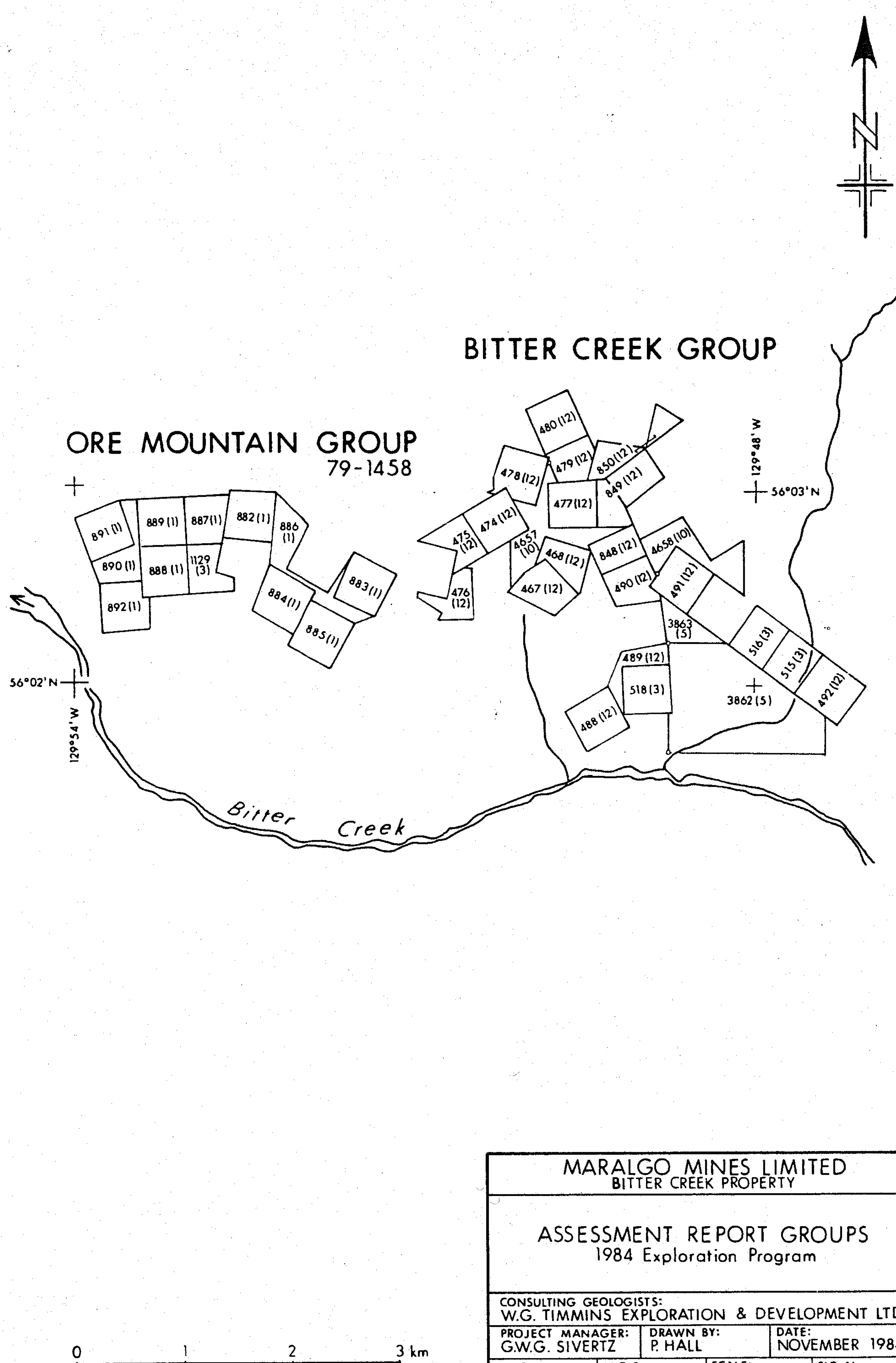
The valleys of Bear River and Bitter Creek display steep sided U-shaped profiles, the result of valley glaciation. Summits and ridges underlain by sedimentary or plutonic rocks have a rounded aspect and offer relatively easy routes for travel, whereas those underlain by volcanic-epiclastic rocks are often very rugged.

Elevations within the property range from 150 m to 1,770 m and steep slopes, particularly below treeline, are the rule rather than the exception. Treeline lies between 1,000 m and 1,200 m depending on the exposure and angle of the slope.

Above treeline, the steeper slopes are covered with talus or alpine grasses, depending on the bedrock. The more rounded ridgetops are covered with felsenmeer or alpine grasses, while those of a steeper aspect are generally bare rock. North facing slopes are often covered with glacial ice or firn.

Below treeline, in unlogged areas, the slopes are densely forested with large cedar, hemlock, and Douglas Fir trees which block out sunlight, inhibiting undergrowth. Where the canopy is breached by natural or man-made openings, devil's club, huckleberry, and other scrub plants abound. Avalanche chutes, coinciding with most of the lower stream gulches, are thickly overgrown with an unpleasant mixture of slide alder, devil's club, wild raspberry, huckleberry, and blueberry plants.

The climate of the Stewart area is wet-temperate verging on sub-arctic. The average mean temperature at Stewart townsite, from records beginning about 1915, is just below 6 degrees Celsius; the average total precipitation is 179.4 cm, and the average snowfall is 5.04 m. Inland, at higher elevations, the climate is more severe and the snowfall is much heavier.




| | | | | |
|---|---|---|---|---|
| MARALGO MINES LIMITED<br>BITTER CREEK PROPERTY | | | | |
| ASSESSMENT REPORT GROUPS<br>1984 Exploration Program | | | | |
| CONSULTING GEOLOGISTS:<br>W.G. TIMMINS EXPLORATION & DEVELOPMENT LTD. | | | | |
| PROJECT MANAGER:<br>G.W.G. SIVERTZ | DRAWN BY:<br>P. HALL | | DATE:<br>NOVEMBER 1984 | |
| M. DIV:<br>SKEENA | N.T.S.<br>104 A4 (W) | SCALE:<br>1:50,000 | FIG. No.<br>2 | |

The combination of low average temperatures and high snowfall maintains large icefields such as the Cambria Icefield which lies just east of Stewart and occupies an area exceeding 500 square km. This and other icefields feed many glaciers which terminate at low elevations; some of these overhang Stewart townsite and the Stewart-Cassiar Highway. Recent studies indicate that the glaciers are currently receding and their host icefields are ablating (Grove, E.W., B.C.D.M.P.R. Bull 58, 1971).

The wet, cool climate creates considerable low lying fog and cloud which can frustrate exploration efforts dependent on helicopter or fixed-wing transport.

## MINING HISTORY

The town of Stewart, and the development of the area in general, are direct results of mining efforts dating back to 1898, when gold seekers first landed at the head of Portland Canal. None of the promised rich placer deposits materialized, but the first argonauts remained in the area to stake mineral claims. The Roosevelt #1, and other claims near Bitter Creek, were staked in 1899, during this first round of exploration. Placer gold in small amounts was finally discovered in the gravels of Bitter Creek, and was mined in a small way in 1902.

The period 1902-1910 saw a mining boom in the Bear River district, as high grade mineralization was discovered in a number of locations. A narrow gauge railway was constructed between tidewater at Stewart and the newly discovered Red Cliff property on American Creek but the property could not sustain production. It and the railway were abandoned, and the mining boom collapsed.

After World War 1, exploration resumed in the Bear

River and Salmon River districts, and high grade gold-silver ore was uncovered at the Premier property, which had been initially staked before the War. Subsequent development at the Premier Mine led to sustained profitable production, and the rich deposit provided impetus for many an exploration venture in the following years.

Production was achieved by a total of 50 properties during the period 1910-1968; the collective yield totalled 5,678,361 ounces of silver and 1,894,565 ounces of gold. The Premier-Silbak property alone accounted for over 82% of the silver and over 95% of the gold. Of the other producers, only 11 yielded more than 1000 ounces of gold and/or 10,000 ounces of silver each. The majority of the mines were small 'high-grade' properties which still produce small tonnages of shipping grade ore from time to time.

The exploration and mining history of the Bitter Creek property closely parallels that of the Bear River district in which it is located. Following discovery and staking in 1899-1902, the various showings were opened up during the pre-1910 mining boom. A small shipment of 15 tons of hand-sorted ore was made from the Roosevelt #1 claim in 1915; this material, probably from the Silver Tunnel, returned values of 0.26 oz/ton gold, 101 oz/ton silver, 34% lead, and 8% zinc. After World War 1, work continued at a slow pace; the properties appear to have become dormant by the mid 1930's.

Modern re-evaluation began in 1966 when Crest Ventures Ltd. acquired many of the old claims. The known showings were examined and sampled, and the tunnels on the Roosevelt #1 claim were rehabilitated, extended, and bulk sampled. Certain of the claims were optioned to Ardo Mines Ltd. in 1971 and further underground work was done, culminating in production of an estimated 5,000 tonnes from the Silver Tunnel vein on the Roosevelt #1 claim. This ore was mined in 1972 and 1973 and was milled in the Adam custom mill on lower Bitter Creek. Examinations of the stope and remnants of stockpiled ore lead to the conclusion that dilution was excessive; it is unlikely that the mining operation was profitable.

Later work on the Bitter Creek property consisted mainly of informal examinations of mineral showings on the old Crown grants and assessment work on adjoining located claims; this was done most recently in 1978 by Beaver Gold Resources Ltd..

REGIONAL GEOLOGY

The Stewart area is underlain by deformed volcanic, sedimentary, and metamorphic rocks of Jurassic age, which have been intruded by stocks, plugs, sills, and dykes of Jurassic to Tertiary age.

The supracrustal rocks are part of the informally named 'Stewart Complex' which extends north from Alice Arm through the Stewart area to Iskut River and lies along the western edge of the Bowser Basin, a thick marine sedimentary assemblage (Grove, E.W., B.C.D.M.P.R. Bull. 58, 1971).

Within the Bear River district, 'Stewart Complex' rocks include volcanic sediments and breccias, dark claystone and siltstone (argillite), sandstone, and minor carbonate, all of Jurassic age. These have been intruded by small stocks and plugs, sills, and dykes, all of Tertiary age.

Various workers in the district have encountered difficulty in correlating their mapping with that of previous workers, so a confusing plethora of formational names exists in the literature. Attempts to divide the rock-stratigraphic units on the basis of lithology have been frustrated by the lack of marker horizons and fossils, and the interfingering stratigraphy and complex structure.

Recently published reports from the area (Carter and Grove, 1969; Grove, 1971) assign all non-intrusive rocks in the Stewart area to the Hazelton Assemblage (Lower Jurassic) and the Bowser Assemblage (Middle and Upper Jurassic), which are separated by an uncomformity. The two Assemblages are hard to tell apart within the Stewart area, since they are lithologically similar. Work outside the area has clarified the picture and allowed the separation of the two Assemblages to be made with reasonable confidence (Grove, E.W., B.C.D.M.P.R. Bull. 58, 1971).

The dominant structural trend is northwest; a large north plunging fold, the American Creek Anticline, controls the structure in the Bear River district. The major Portland Canal dyke swarm trends northwest to north-northwest in the Bear River and Bitter Creek areas; these dykes are generally steeply dipping but in some cases lie at moderate angles, parallel or sub-parallel to bedding planes in their host rocks.

## PROPERTY GEOLOGY AND MINERALIZATION

The Bitter Creek property is underlain by a sequence of dark colored sedimentary rocks, which have been intruded by the Bitter Creek Pluton and a vast number of dykes. The sedimentary sequence was given the name 'Bitter Creek Formation' by early workers (McConnell, 1913; Hanson, 1929) and was assigned a Lower Jurassic age. Recent workers have dropped the Formational name and assigned the sequence to the Lower Jurassic Hazelton Assemblage. The intrusive rocks are all of Tertiary age; dykes of the Portland Canal swarm, very numerous on the west side of the property, are apparently distal 'fingers' of the Bitter Creek Pluton.

The dark coloured sedimentary rocks are dominantly argillite and slate; thin beds of sandstone and pebble conglomerate are quite common. Lenses of coarse crystalline grey carbonate are present but are fairly rare. A few massive beds of agglomerate occur on the southwest flank of Ore Mountain, in association with thin units of dark green, fine grained tuff. These volcanic units cannot be traced far along strike, suggesting that they are lens shaped. Ribbons, blebs, and irregular masses of white 'bull' quartz are very common in the sedimentary sequence.

Dykes, sills, and plugs of granite, granodiorite, and quartz monzonite are very common, especially on the west half of the property. On the top and west flank of Ore Mountain, these intrusives, mainly anastomosing dykes, make up 70% or more of the rock volume. The dykes and sills are commonly 3 m to 30 m thick and have northwesterly trends and westerly dips. Crosscutting dykes are less common but are still important; many of these are composed of dark coloured diabase or lamprophyre. The crosscutting dykes are generally much narrower than the Portland Canal type. The most common texture seen in all the dykes is porphyritic, but equigranular and aphanitic textures are also often seen.

The Bitter Creek Pluton, where it underlies the westernmost claims, is quite variable in texture and composition. Near Bitter Creek the Pluton is uniformly coarse equigranular granodiorite; upslope, at 300 m to 400 m elevation, a creamy pink-grey rock with only a few phenocrysts of quartz is the dominant phase. This phase contains many fine-grained, dark dyke-like members.

The sedimentary sequence trends north-northwest to north-northeast on average, but the rocks are complexly folded and many local variations in strike and dip occur. Faulting on all scales is common; large north-trending faults, some marked by pronounced scarps and erosional troughs, are present on the west flank of Ore Mountain. Small faults and localized fracture zones can be found almost anywhere in the sedimentary sequence. The argillite is brittle and weak; small kink and drag folds are common in fault zones.

Many of the dykes show evidence of forceful emplacement; zones of crushed, deformed argillite mixed with quartz and sulfides are common along contacts. Evidence of thermal metamorphism along intrusive contacts is spotty; a small plug near the top of Ore Mountain has a well-developed hornfels zone enveloping it, which extends outwards for a few meters from the contact. However, most of the dykes and sills show some crushing and shearing along their contacts but little evidence of alteration or heating. Chilled margins were noted in some dykes but the majority do not display this texture.

Sulfide mineralization, inluding pyrite, chalcopyrite, sphalerite, and galena, is widespread. Pyrrhotite and tetrahedrite are present in important amounts in two locations. The sulfide minerals occur in three distinct structural settings:

(1) Narrow but persistent quartz-sulfide veins with clearcut walls in faults along the margins of northwest trending dykes of acid composition;

(2) Irregular, discontinuous pods and lenses, with and without important amounts of quartz, in faults and local zones of shearing along the margins of acid dykes, and along joint planes and fractures within the dykes;

(3) Quartz stockworks in faulted, fractured, and brecciated argillite without apparent dyke association.

Gold and silver are also widespread on the property, but important amounts of these precious metals occur in only two main sulfide suites:

(1) Gold occurs with lesser silver in quartz-chalcopyrite-pyrite and quartz-galena-sphalerite veins associated with northwest trending acid dykes;

(2) Silver occurs with minor gold in massive sulfide lenses containing abundant galena and tetrahedrite in fault zones along the margins of acid dykes.

## MAJOR MINERAL OCCURRENCES

Exploration work, including trenching and underground development, has been carried out in times past on five major showings. Lesser amounts of effort have been expended on a large number of prospects of lesser importance.

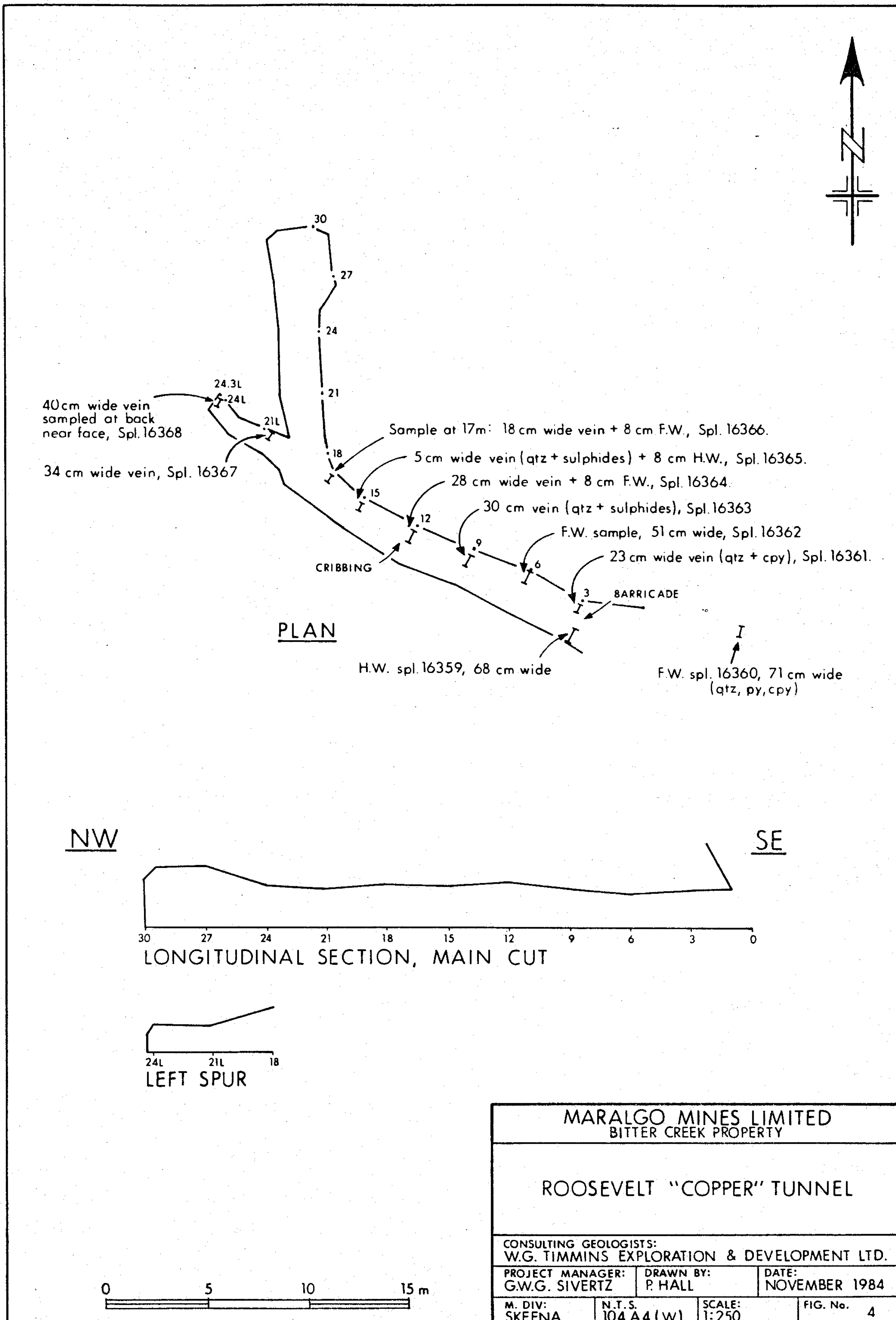
The five major showings, from east to west, are the Roosevelt Copper Tunnel vein system, the Roosevelt Silver Tunnel vein system, the Morgan vein-fault, the Lead Coil showings, and the Lakeshore showings.

These showings were methodically mapped and sampled during the 1984 exploration program. Detailed descriptions and summaries of sample results follow.

### (1) Roosevelt Copper Tunnel Vein System

The Copper Tunnel vein system is exposed in the west wall of the Roosevelt Creek canyon at an elevation of 440 m. Like the Roosevelt Silver Tunnel vein system, it lies on the Roosevelt #1 claim. It trends west-northwest and can be traced on surface up the steep west wall of the canyon for about 30 m. It does not appear to continue southeast across Roosevelt Creek.

The main vein is composed of white quartz and contains disseminated chalcopyrite with lesser pyrite. Gold content is consistently high. The vein ranges in width from 12.5 cm to 48 cm; its footwall consists of a light green, highly altered and silicified dyke containing erratically-distributed chalcopyrite and pyrite. This dyke is so altered that recognition of its true nature is difficult; however, it contrasts strongly with the argillite and slate lying to the east and west, has a persistent tabular form, and crosscuts its bedded host rocks.



30
27
24
21
24.3L
24L
21L
18
15
12
9
6
3
40cm wide vein sampled at back near face, Spl. 16368
34 cm wide vein, Spl. 16367
Sample at 17m: 18 cm wide vein + 8 cm F.W., Spl. 16366.
5 cm wide vein (qtz + sulphides) + 8 cm H.W., Spl. 16365.
28 cm wide vein + 8 cm F.W., Spl. 16364.
30 cm vein (qtz + sulphides), Spl. 16363
F.W. sample, 51 cm wide, Spl. 16362
23 cm wide vein (qtz + cpy), Spl. 16361.
CRIBBING
BARRICADE
PLAN
H.W. spl. 16359, 68 cm wide
F.W. spl. 16360, 71 cm wide (qtz, py, cpy)
N
NW
SE
30 27 24 21 18 15 12 9 6 3 0
LONGITUDINAL SECTION, MAIN CUT
24L 21L 18
LEFT SPUR
0 5 10 15 m
MARALGO MINES LIMITED
BITTER CREEK PROPERTY
ROOSEVELT "COPPER" TUNNEL
CONSULTING GEOLOGISTS:
W.G. TIMMINS EXPLORATION & DEVELOPMENT LTD.
PROJECT MANAGER: G.W.G. SIVERTZ
DRAWN BY: P. HALL
DATE: NOVEMBER 1984
M. DIV: SKEENA
N.T.S. 104 A4 (W)
SCALE: 1:250
FIG. No. 4

The immediate hangingwall of the quartz vein is a fault zone containing crushed, sheared argillite, veinlets and lenses of quartz, and disseminated pyrite. This fault zone is bounded on the west by relatively undeformed, well bedded argillite. The quartz vein tends to wander in and out of the altered dyke on the footwall side, so that both walls in places are composed of altered, brecciated dyke material. This geometry is well displayed on surface at a point about 25 m above Roosevelt Creek, where the vein splays around a 'horse' of altered dyke rock, and the hangingwall fault zone contains fragments of dyke rock.

The hangingwall fault, the vein itself, and the altered dyke strike east-southeast and dip steeply southwest. The well bedded and undeformed argillite and slate wall rocks strike southeast and dip 60 to 65 degrees southwest.

A drift has been driven west-northwest into the vein outcrop at a point about 8 m above creek level. The portal was formerly accessed by a timber-and-cable suspension bridge leading to a rough trail on the east side of the canyon; this bridge has collapsed and the trail is barely traceable.

The old drift is narrow (1.5 m x 1.6 m) and short; the face lies only 24.3 m from the portal. A diamond drill station, presumably postdating the original drift, has been cut into the footwall of the vein. It provides drill collar locations 7 m to 8 m away from the vein at a point 30 m from the portal. It appears that drilling was done below drift level, since no hole collars are visible on the face or back of the drill station.

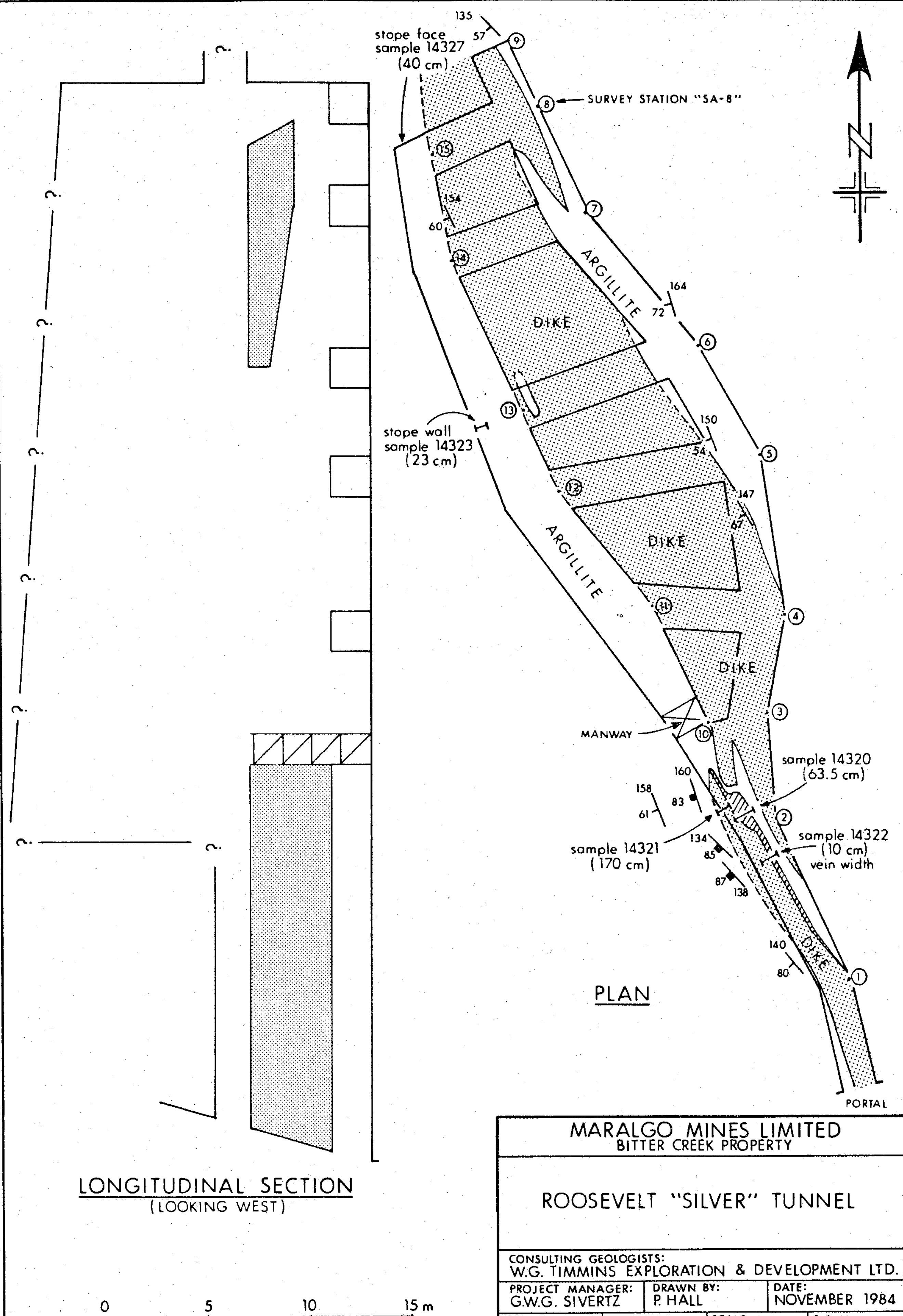
The vein is exposed near the center of the back of the drift from the portal to the face; maximum true width is 48 cm but there are some very narrow segments. The average width, calculated from 11 channel samples taken at intervals from the back of the drift, is 28 cm. The sulfide content is quite variable, ranging from 2-3% to about 20%. Weighted gold values from the 11 channel samples average 25 ppm (0.73 oz/ton) but the range is from 0.27 ppm (0.008 oz/ton) to 86.66 ppm (2.528 oz/ton). The erratic nature of the gold distribution appears to reflect the uneven distribution of the sulfides.

A very narrow quartz-chalcopyrite veinlet is exposed on the footwall of the altered dyke, below the portal and close to creek level. This veinlet has the same attitude as the main vein and can be traced for about 5 m. It appears to pinch out to the west-northwest, and disappears to the southeast into Roosevelt Creek. A single channel sample taken from the veinlet across a 5 cm width returned 24.6 ppm gold (0.717 oz/ton), 52.8 ppm silver (1.54 oz/ton), and 10.3% copper. Another channel sample from a well mineralized section of the dyke adjoining the quartz-chalcopyrite veinlet ran 7.2 ppm gold (0.21 oz/ton) and 0.46% copper over a width of 71 cm. Other samples were taken at intervals from the dyke but none returned significant gold, silver, or copper values.

(2) Roosevelt Silver Tunnel Vein System

The Silver Tunnel vein is marked by two tunnels on the west side of Roosevelt Creek, at the mouth of the canyon. The portals lie approximately 200 m southwest of the Copper Tunnel portal. The upper tunnel, which is much the older of the two, lies about 15 m above creek level; the modern lower tunnel lies about 8 m below the upper one. The old tunnel is caved at the portal and is inaccessible.

The tunnels were driven on a north-northwest trending vein-fault system which lies on the west side of a granodiorite dyke. This dyke is very fresh in appearance and appears to




MARALGO MINES LIMITED
BITTER CREEK PROPERTY

ROOSEVELT "SILVER" TUNNEL

CONSULTING GEOLOGISTS:
W.G. TIMMINS EXPLORATION & DEVELOPMENT LTD.

| PROJECT MANAGER: | DRAWN BY: | DATE: | |
|---|---|---|---|
| G.W.G. SIVERTZ | P. HALL | NOVEMBER 1984 | |
| M. DIV: SKEENA | N.T.S. 104 A4 (W) | SCALE: 1:250 | FIG. No. 5 |

belong to the Portland Canal type. It dips southwest at 54 to 67 degrees and strikes south-southeast. The argillite and slate on either side of the dyke are sheared and crushed; this is particularly apparent on the hangingwall (west) side in proximity to the vein-fault. The dyke is cut at intervals by cross faults with small lateral displacements.

The vein-fault is composed of calcite-quartz-sulfide stringers and lenses ranging in width from a few millimeters to 0.5 m, with abundant bands and inclusions of sheared, rusty argillite. Sulfide minerals include sphalerite, galena, pyrite, chalcopyrite, and tetrahedrite. These minerals are very erratically distributed in the stringer vein system; pods and gash-veins of sulfides occur well into the west or hanging wall. Breccia, composed of argillite clasts in a calcite-quartz-sulfide matrix, is common.

The vein-fault system was mined in 1972-1973, along a length of about 35 m. The single stope is estimated to be about 15-20m in height and ranges in width from 3 m to 5 m. A crown pillar in the first 15 m of the drift provides the only intact and accessible exposure of the vein-fault system containing any important sulfide mineralization; the face of the stope exposes only barren calcite-quartz stringers.

A series of samples was obtained from the vein-fault system. Two were from sulfide-rich lenses exposed in the back of the crown pillar; these returned 1.4 ppm gold (0.042 oz/ton), 881 ppm silver (25.7 oz/ton), 22% lead, 18% zinc, and 0.89% copper, over a width of 10 cm; and 0.8 ppm gold (0.024 oz/ton), 446.7 ppm silver (13.03 oz/ton), 10.8% lead, 16% zinc, and 0.63% copper, over a width of 63.5 cm. These samples were collected at distances of 12.4 m and 15.1 m from the portal.

A gash vein, containing a small lens of galena and sphalerite, was found on the west wall of the stope, 37 m from the portal. This returned trace gold, 82.6 ppm silver (2.41 oz/ton), 1.04% lead, 0.8% zinc, and 0.17% copper over a width of 23 cm. A composite sample of mineralized muck from the stope ran 0.55 ppm gold (0.016 oz/ton), 429.2 ppm silver (12.52 oz/ton), 9.6% lead, 1.1% zinc, and 0.58% copper. This sample is considered representative of the grade obtainable from hand-sorted ore from the stope.

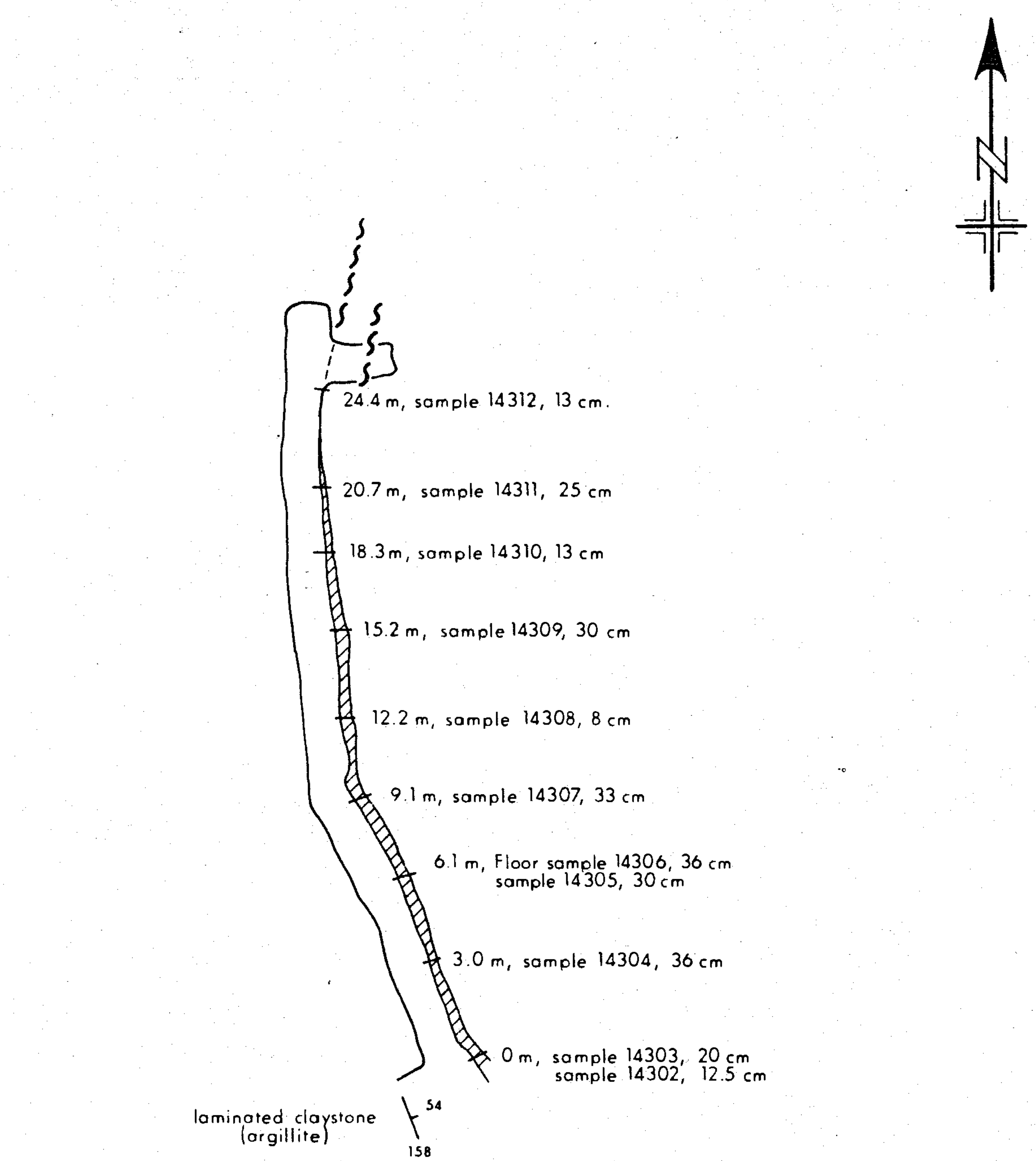
Two further samples from the face of the stope and the west wall of the vein-fault returned negligible assays.

An examination of the area around the ore loading bins west of the portals indicates that no attempt was made to sort mine-run material from the stope. Further examination of a few truckloads of mine-run dumped near the mill on lower Bitter Creek reinforces this conclusion. The erratic distribution of sulfides in the presently accessible sections of the Silver tunnel suggests that mine-run material from the stope was of very low grade, probably containing on the order of 50-100 ppm silver and 1-2% combined lead-zinc. In the quantities mined, this material would have been nowhere near commercial grade.

(3) Morgan Vein-Fault

The Morgan vein-fault lies on the Morgan #6 claim, between the elevations of 1500 m and 1600 m. The fault strikes north-northwest, and dips east at 70 to 80 degrees.

Wall rocks consist of argillite and siltstone, which strike about 160 degrees and dip 55 to 65 degrees to the east; several quartz diorite and granodiorite dykes in the vicinity of the fault trend north and northwest. The fault system does not lie exactly on the margin of any dyke, but a north trending




MARALGO MINES LIMITED
BITTER CREEK PROPERTY

SAMPLE PLAN OF UPPER DRIFT
L. 5862 - Morgan 6 M.C.

| | | | |
|---|---|---|---|
| CONSULTING GEOLOGISTS: W.G. TIMMINS EXPLORATION & DEVELOPMENT LTD. | | | |
| PROJECT MANAGER: G.W.G. SIVERTZ | DRAWN BY: P. HALL | DATE: NOVEMBER 1984 | |
| M. DIV: SKEENA | N.T.S. 104 A 4 (W) | SCALE: 1:250 | FIG. No. 6 |

granodiorite dyke lies a few meters to the east.

The fault system, marked by a rusty fracture zone with intermittent pods and lenses of quartz on surface, can be traced for approximately 100 m. It is not particularly easy to recognize and appears to be a localized feature.

The locations of outcropping mineralization are marked by two tunnels, one about 46 m south of the other and about 30 m vertically below it. The upper tunnel is collared in the footwall of an outcrop of highly oxidized vein matter containing limonite, smithsonite, cerussite, galena, and tetrahedrite. This outcrop undoubtedly drew the attention of the early prospectors to the Morgan fault, since a train of float can still be traced down the hill. The lower tunnel, presumably driven to explore for the downdip extension of the rich vein material found in the upper tunnel, is collared in the footwall of the fault. No outcropping mineralization is present on surface near the lower tunnel.

The upper tunnel follows the footwall of the Morgan fault for 29 m. The mineralized lens exposed on surface can be traced for 24 m before it pinches out. The face of the drift, 29 m from the portal, exposes a narrow, barren fault trace.

Two samples were taken at the portal outcrop, and 9 more were collected at 3 m intervals along the back of the drift. The portal samples represent high and low grade segments of the vein; the high grade portion returned 14,540.2 ppm silver (424.16 oz/ton), 2.4 ppm gold (0.07 oz/ton), and 45% lead. The adjoining sample ran 1329.7 ppm silver (38.79 oz/ton), 1 ppm gold (0.03 oz/ton), and 9.6% lead. The weighted average of the two samples, representing the 33 cm width of the vein, is 6410.7 ppm silver (187 oz/ton), 1.6 ppm gold (0.045 oz/ton), and 23.2% lead.

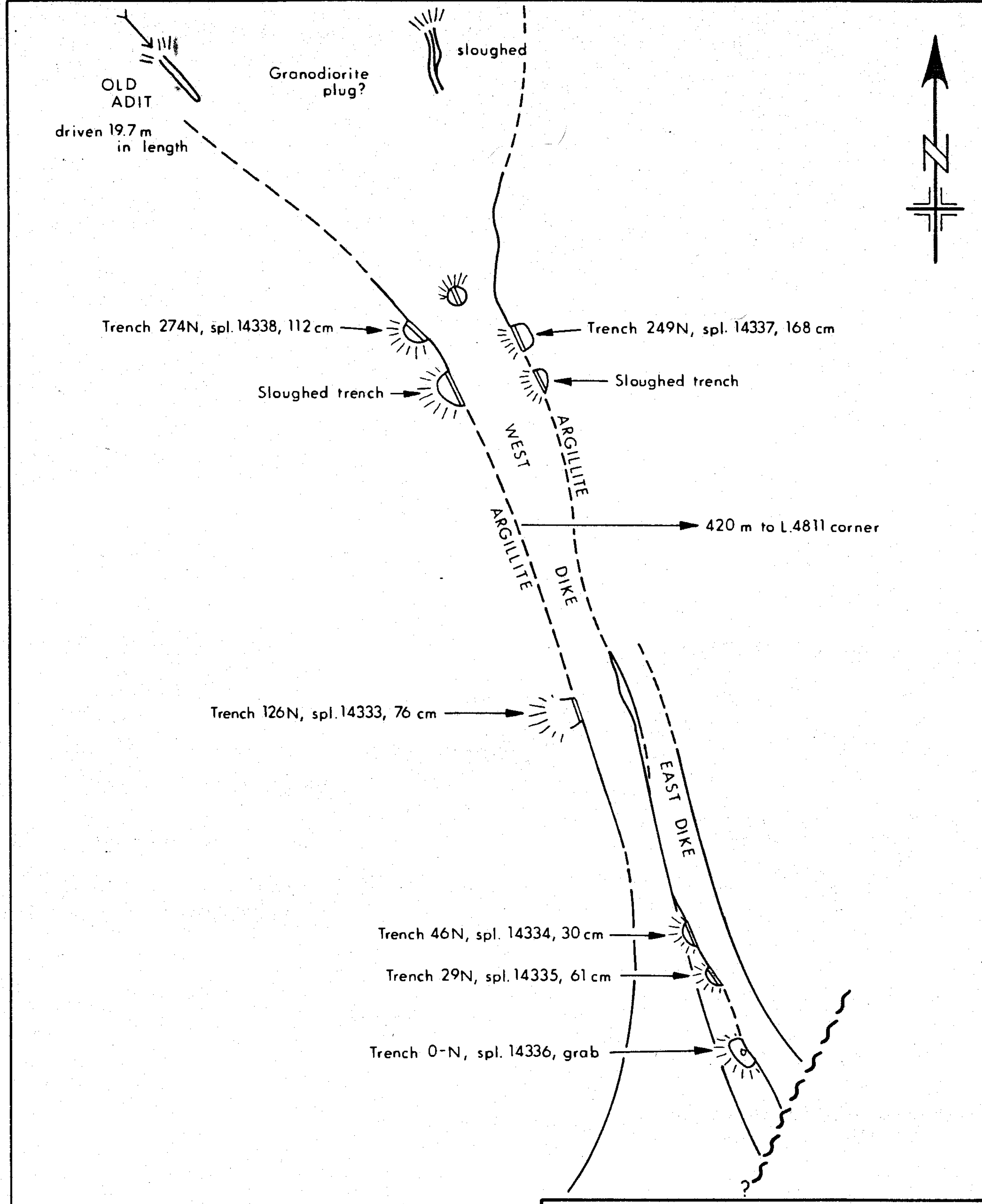
The vein is quite consistent in width and silver grade to a point about 12 m from the portal, although the grades drop once the oxidized portion is passed. The weighted average silver grade, from 9 samples to a point 20.7 m from the portal, is 6941.9 ppm (72.31 oz/ton) over an average width of 27 cm. The range of silver values and widths, however, is quite wide. At the face of the drift, no sulfides are visible and only a barren fault remains. A short crosscut was driven east from the face in an attempt to locate the vein or a parallel structure, but nothing of interest was found.

The lower drift, which probably represents an attempt to trace the high grade vein to depth, was driven north-northwest to a point about 30 m vertically below and to the east of the mid-point of the upper drift. Two crosscuts were driven from near the face in an attempt to intersect mineralization similar to that found in the upper drift, to no avail. The lower drift follows the Morgan fault for most of its length; three channel samples were taken from the fault. The best returned 110 ppm silver (3.21 oz/ton), 0.34 ppm gold (0.01 oz/ton), 1.4% lead, 1.05% zinc, and 0.18% copper across drift width of 2.9 m.

(4) Lead Coil Showings

The Lead Coil mineralization lies on the Lead Coil claim, on the upper southwest slope of Ore Mountain, at an elevation of 1480 m. A number of pits sunk along the margins of two north-northwest trending Portland Canal type dykes expose pyrite, galena, sphalerite, and chalcopyrite in quartz lenses, hosted by sheared argillite. The pits appear to be quite old; a few have been cleaned out recently.

The contacts between the granodiorite dykes and the




| MARALGO MINES LIMITED<br>BITTER CREEK PROPERTY | | | | |
|---|---|---|---|---|
| **LEAD COIL SHOWINGS**<br>L.4811 - Lead Coil M.C. | | | | |
| CONSULTING GEOLOGISTS:<br>W.G. TIMMINS EXPLORATION & DEVELOPMENT LTD. | | | | |
| PROJECT MANAGER:<br>G.W.G. SIVERTZ | DRAWN BY:<br>P. HALL | | DATE:<br>NOVEMBER 1984 | |
| M. DIV:<br>SKEENA | N.T.S.<br>104 A4 (W) | SCALE:<br>1:2,000 | FIG. No.<br>7 | |

argillic sediments on either side are nearly vertical and appear to be faults. The dykes range in width from 5 m to 15 m; the dyke system, which coalesces into a single mass just north of the Lead Coil claim boundary, averages 20 m in width. The system is partially truncated just south of the pit area by a northeast trending fault.

The argillite and slate wallrocks are badly crushed and sheared, especially where there are small flexures in the dyke walls. It appears that the dykes and their wall rocks were carefully prospected years ago, and that trenches were blasted at intervals where shearing and attendant mineralization looked most promising. The common mineral assemblage comprises pyrite, galena, and minor sphalerite and chalcopyrite in a quartz gangue. These quartz-sulfide occurrences have the form of lens shaped bodies which commonly pinch out where the dyke walls straighten out. If the dyke flexures persist to depth, it seems reasonable to assume that the quartz-sulfide bodies may have the shape of vertically elongated, flattened pipes.

The mineralization in the recently rehabilitated trenches was channel sampled; one grab sample was taken from the dump of the southernmost trench, in which no bedrock was exposed. The sample results are as follows:

| Sample | Location | Au, ppm | Ag, ppm | Cu% | Pb% | Zn% |
|---|---|---|---|---|---|---|
| 14336 | Trench ON, grab | 1.9 | 126.2 | .14 | 4.8 | 2.15 |
| 14335 | Trench 29N, 61cm | 2.88 | 113.8 | .08 | 2.5 | 0.06 |
| 14334 | Trench 46N, 30cm | 4.46 0.13 | 231.7 6.76 | .08 | 0.44 | 0.12 |
| 14333 | Trench 126N, 76cm | 0.21 | 8.6 | .07 | 0.10 | 0.03 |
| 14337 | Trench 249N, 168cm | 2.54 | 110.0 | .08 | 2.55 | 0.11 |
| 14338 | Trench 274N, 112cm | 1.58 | 75.1 | .09 | 1.50 | 0.20 |

The trenches lie along a 400 m stretch of dyke; trenches 126N and 274N lie on the west side of the main, western dyke, and the rest lie on its east margin or sandwiched between it and the east dyke. The longest continuous lens of mineralization is exposed by trenches 29N and 46N. This lens is cut off to the north, where the east and west dykes merge, and appears to die out to the south. The other lenses appear to have little continuity along strike.

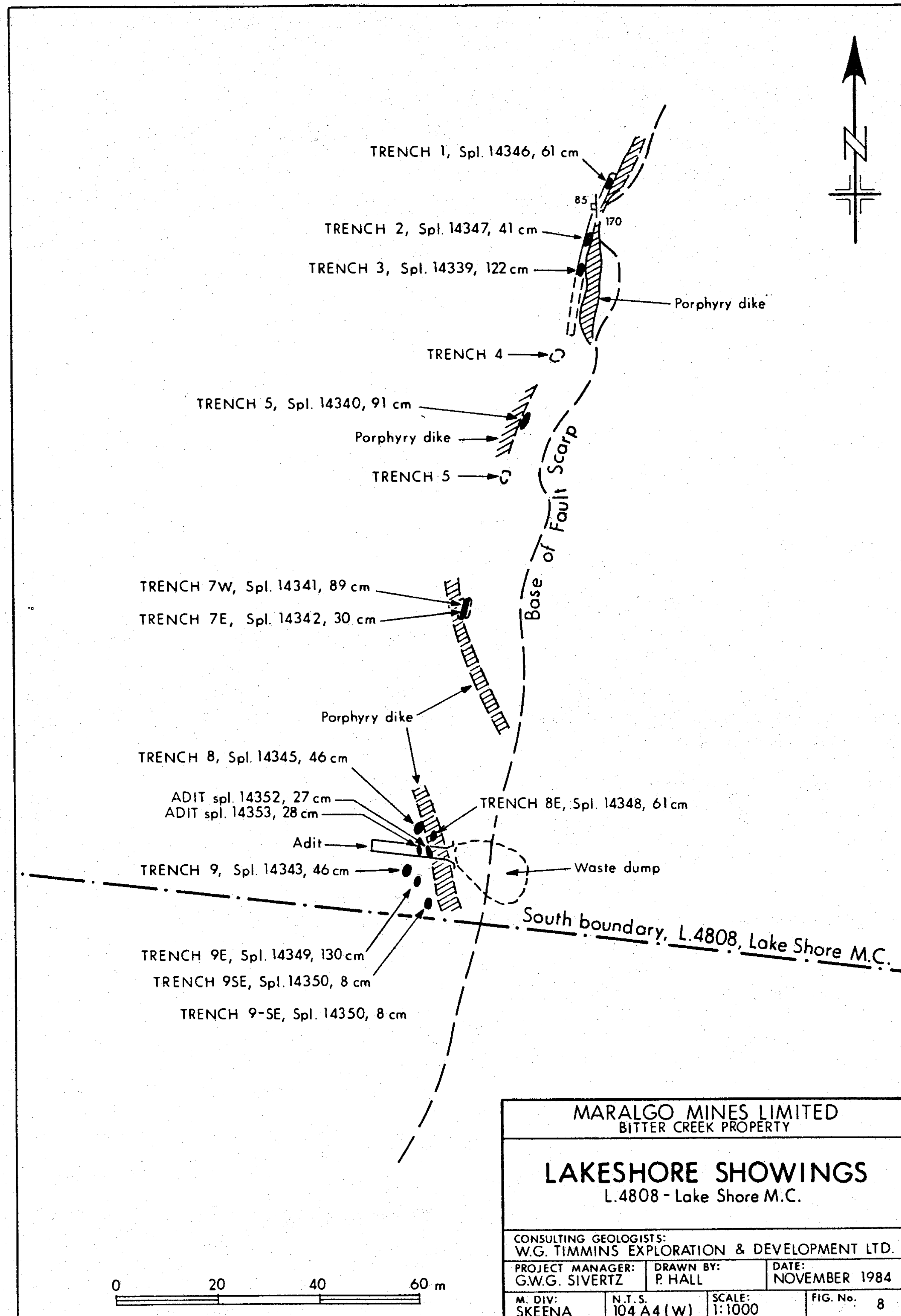
(5) Lakeshore Showings

These are located on the Lake Shore claim, on the west flank of Ore Mountain, at an elevation of 1020 m. They lie on the face and brow of a steep, east facing fault scarp that trends slightly east of north, and are exposed along a length of about 140 m.

The mineralization, consisting of abundant pyrite and pyrrhotite with lesser sphalerite, galena, and chalcopyrite in a siliceous gangue, is controlled by a series of narrow felsic dykes which have intruded argillite and slate. Some mineralization lies within the dykes themselves as fracture fillings and joint-controlled disseminations.

The dyke swarm trends south to southeast, at a small angle to the fault scarp. The fault appears to truncate the dykes to the south and east; prospecting to the east of the fault defile failed to locate the extension of the swarm. The fault appears to be a major feature, since it is easily recognizable on maps and air photos as a marked linear depression. The direction and amount of movement along the fault is unknown.

A number of trenches along the brow of the scarp expose mineralization associated with the felsic dykes. No trenches


TRENCH 1, Spl. 14346, 61 cm
85
170
TRENCH 2, Spl. 14347, 41 cm
TRENCH 3, Spl. 14339, 122 cm
Porphyry dike
TRENCH 4
TRENCH 5, Spl. 14340, 91 cm
Porphyry dike
TRENCH 5
Base of Fault Scarp
TRENCH 7W, Spl. 14341, 89 cm
TRENCH 7E, Spl. 14342, 30 cm
Porphyry dike
TRENCH 8, Spl. 14345, 46 cm
ADIT spl. 14352, 27 cm
ADIT spl. 14353, 28 cm
TRENCH 8E, Spl. 14348, 61 cm
Adit
Waste dump
TRENCH 9, Spl. 14343, 46 cm
South boundary, L.4808, Lake Shore M.C.
TRENCH 9E, Spl. 14349, 130 cm
TRENCH 9SE, Spl. 14350, 8 cm
TRENCH 9-SE, Spl. 14350, 8 cm
0
20
40
60 m
MARALGO MINES LIMITED
BITTER CREEK PROPERTY
LAKESHORE SHOWINGS
L.4808 - Lake Shore M.C.
CONSULTING GEOLOGISTS:
W.G. TIMMINS EXPLORATION & DEVELOPMENT LTD.
PROJECT MANAGER: G.W.G. SIVERTZ
DRAWN BY: P. HALL
DATE: NOVEMBER 1984
M. DIV: SKEENA
N.T.S. 104 A4 (W)
SCALE: 1:1000
FIG. No. 8

were found west of the brow of the scarp; it appears that the mineralization dies out in this direction and is restricted to the immediate vicinity of the fault zone.

Individual mineral occurrences tend to trend parallel to sub-parallel to the scarp face so that they, like the dykes, are eventually truncated at the face. The longest mineralized body exposed by the trenches trends parallel to the scarp for about 20 m, before turning slightly east and disappearing at the bottom of the scarp. Three other mineralized occurrences, exposed in trenches further south, have southeasterly trends and hence can only be traced for a few meters before they are cut off by the scarp.

A total of 14 channel samples was taken; 11 of these were cut from 7 trenches, and the remaining 3 were taken from the back of the crosscut adit driven into the face of the scarp, near the south claim line. The assay data follow:

| Sample | Location | Au,ppm | Ag,ppm | Cu% | Pb% | Zn% |
|---|---|---|---|---|---|---|
| 14346 | Trench 1; 61 cm | 0.4 | 26.1 | .13 | 0.47 | 0.48 |
| 14347 | Trench 2; 41 cm | 0.4 | 53.5 | .12 | 0.8 | 0.24 |
| 14339 | Trench 3; 122 cm | 0.27 | 26.1 | .10 | 0.43 | 0.30 |
| 14340 | Trench 5; 91 cm | 0.21 | 5.5 | .07 | 0.04 | 0.06 |
| 14341 | Trench 7E; 89 cm | 1.58 | 83.3 | .09 | 0.57 | 1.57 |
| 14342 | Trench 7W; 30 cm | 1.23 | 36.7 | .11 | 0.17 | 0.49 |
| 14345 | Trench 8; 46 cm | 0.55 | 152.5 | .10 | 2.0 | 0.27 |
| 14348 | Trench 8E; 61 cm | 0.82 | 46.3 | .19 | 0.45 | 0.39 |
| 14343 | Trench 9; 46 cm | 0.34 | 33.9 | .08 | 0.50 | 0.37 |
| 14349 | Trench 9E; 130 cm | 1.23 | 26.1 | .09 | 0.22 | 0.08 |
| 14350 | Trench 9SE; 8 cm | nil | 5.5 | .13 | 0.04 | 0.13 |

The following samples are from the crosscut driven under trench 8; distances from the portal are given.

| Sample | Location | Au, ppm | Ag, ppm | Cu% | Pb% | Zn% |
|---|---|---|---|---|---|---|
| 14351 | 3.05 m; 124 cm | nil | 1.7 | .09 | .02 | .06 |
| 14352 | 4.95 m; 27 cm | 3.4 | 139.5 | .19 | 1.0 | .62 |
| 14353 | 5.30 m; 28 cm | 2.19 | 153.9 | .14 | 1.72 | .19 |

The low grades, narrow widths, and apparent lack of continuity of the showings do not provide encouragement for further exploration.

## MINOR MINERAL OCCURRENCES

Mineral occurrences of apparent small size were noted on the Morgan, Ore Hill #6, Radio, Radio #2, and HD claims. A brief summary of each of these occurrences follows:

### (1) Morgan Claim

A quartz vein, containing pyrite, galena, and small amounts of sphalerite and chalcopyrite, was noted in the main gulch of Radio Creek, approximately 200 m south of the lower portal on the Morgan #6 claim. This vein is associated with a northwest trending dyke and is exposed in a short section of the east wall of the gulch. The vein pinches and swells; a channel sample was taken across the 30 cm width of the vein and returned 0.75 ppm gold (0.022 oz/ton), 172 ppm silver (5.02 oz/ton), 5.1% lead, 0.28% zinc, and 0.10% copper.

### (2) Ore Hill #6 Claim

A narrow quartz vein, ranging in width from 5 cm to 12 cm, lies in a fault zone in a steep narrow canyon at an elevation of about 300 m. The vein contains pyrite, chalcopyrite, and minor sphalerite. Wall rocks are 'quartz porphyry', a greyish-pink phase of the Bitter Creek Pluton. The fault zone containing the vein follows the south wall of a narrow, east-northeast trending diabase dyke.

The vein cannot be traced for more than about 10 m, but the fault zone and the diabase dyke appear to follow the gulch for at least 50 m.

A channel sample, representing the 12 cm maximum width of the vein, assayed 11.4 ppm gold (0.332 oz/ton) and 165.2 ppm silver (4.82 oz/ton). This is the only mineral occurrence noted within Bitter Creek Pluton rocks on the property.

(c) Radio Claim

Two quartz lenses containing pyrite and chalcopyrite occur near the creek draining the western half of the Radio claim. Both are hosted by sheared argillite and highly altered and fractured dyke rocks. The best exposed lens lies in the canyon of the creek, at an elevation of 530 m. A fault zone, containing badly crushed and highly altered dyke rocks and highly contorted sections of argillite forms the west wall of the canyon, and the lens is found nearly at creek level. A sample across 30 cm of well mineralized quartz returned 0.4 ppm gold (0.012 oz/ton), 41.8 ppm silver (1.22 oz/ton), and 0.36% copper.

A trench about 50 m east of the creek provides a poor exposure of another occurrence containing quartz, pyrite, and chalcopyrite; rubble piled on the side of the trench contains abundant pyrite. Other trenches north and south of the mineralized trench expose only barren bedrock.

(4) Radio #2 Claim

Two mineral occurrences are exposed in the canyon of the creek immediately east of Radio Creek, at elevations of 1130 m and 1150 m. Both lie on the west canyon wall in zones of highly fractured and sheared argillite intruded by a large number of small dykes. The lower of the two showings consists of quartz, pyrite, sphalerite, and galena in a stockwork in shattered argillite. The stockwork zone is approximately 10 m wide and can be traced about 30 m up the wall. A grab sample of the best accessible mineralization assayed 0.55 ppm gold (0.016 oz/ton), 37.4 ppm silver (1.09 oz/ton), 0.44% lead, 0.92% zinc, and 0.24% copper. The stockwork system appears to terminate against the wall of an east trending dyke near the top of the exposure.

The upper showing, about 40 m up the canyon from the lower one, is an east-southeast trending quartz vein varying in width from 50 cm to 75 cm. This vein is hosted by argillite near a narrow southeast trending dyke, and has a near-vertical dip. It is exposed for a length of 15 m to 20 m in the steep west wall of the canyon, just above a small waterfall.

The vein contains disseminated galena, sphalerite, pyrite, and minor chalcopyrite; a well mineralized grab sample assayed 4.39 ppm gold (0.128 oz/ton), 208.4 ppm silver (6.08 oz/ton), 0.62% lead, 0.6% zinc, and 0.13% copper.

(5) HD Claim

A small pod of nearly massive, reddish-brown sphalerite occurs in a narrow southeast trending fault zone exposed in a small gully near the west boundary of the HD 1N, 2E unit. The pod measures about 5 cm in width and is about 30 cm in length. It was sampled and assayed to determine its precious metal content; the assay returned a trace of gold, 229.3 ppm silver (6.69 oz/ton), and 44% zinc.

## CONCLUSIONS AND RECOMMENDATIONS

The Bitter Creek property encompasses five mineral occurrences of sufficient merit to have warranted trenching, underground exploration, limited underground drilling, and an attempt at underground mechanized mining. These mineral occurrences contain some attractive precious metal values which attracted the early miners; some high grade raw ore was shipped. A number of smaller mineral occurrences, with generally lower grades, are also known; all of these have been carefully prospected in the past and have had moderate amounts of work done on them.

The property is well known since it includes some of the first mineral discoveries made in the Stewart area. It has evidently been informally evaluated a number of times in recent years. Despite the fairly intensive exploration work conducted in times past and the recent evaluations, underground work, and attempts at mining, no large commercial bodies of ore have been found, and little intensive surface work, such as trenching or diamond drilling, has been done in search of such mineralization.

A number of factors contribute to this state of present affairs, including the bedrock structure and lithology, the controls and resulting style of the mineralization, and the physical problems created by the rugged topography and severe climate.

The Stewart Complex rocks underlying the property consist mainly of fine grained sediments that have undergone intrusion and regional metamorphism. They are generally incompetent and locally severely deformed, and make poor wall rocks for vein-type deposits. Their low porosity and permeability make them poor hosts for replacement or open-spacefilling type deposits. Volcanic rocks, which host important orebodies elsewhere in the Stewart area, are virtually absent.

All the mineral occurrences examined are structurally controlled; most lie in fault or shear zones, and many are spatially related to granodiorite or quartz diorite dykes. Many are localized in small flexures along the faulted dyke contacts, where localized zones favourable for mineral deposition have occurred.

All the measured mineral occurrences are small; the largest structure with some demonstrated continuity is the Roosevelt Copper Tunnel quartz-sulfide vein, which contains potential reserves of perhaps 18 tonnes per vertical meter (6 tons per vertical foot) over a measured strike length of 24 m. The Morgan vein-fault shoot exposed in the upper Morgan tunnel may have similar tonnage potential but the vertical and lateral continuity appear much less certain. Other occurrences, some with moderate precious metal contents, have even less apparent potential.

The rugged topography of the Ore Mountain area has clearly hampered exploration; the steep middle slopes nearly preclude drillsite or road construction. The access road to the Silver Tunnel portal, which was constructed in the late 1960's and was used for haulage as recently as 1973, is washed out in several places and if rebuilt would undoubtedly be destroyed again unless it was relocated and protected by heavy ballast and rip-rap. This road is also subject to avalanches during the winter and spring. Surface exploration on the property is effectively limited to the period from June to October of each year by heavy snowfall; even during the snow-free period, work is hampered by heavy rainfall and poor flying conditions created by low cloud.

In summary, the writer considers the Bitter Creek property to have low potential for base or precious metal deposits of moderate to large tonnage. Two mineral occurrences, the Roosevelt Copper Tunnel vein, and the Morgan vein-fault, offer some potential for small scale selective mining and contain small amounts of material suitable for shipment to smelters willing to purchase small lots of silver-lead or gold-copper ore.

However, because of the physical difficulties presented by the rugged conditions on the property, the costs of mining and shipping raw ore will be high. Any attempt to undertake a selective mining venture should be preceded by a careful estimate of costs, particularly those related to transportation and sale of ore.

Respectfully submitted,

George W.G. Sivertz, B.Sc.

## REFERENCES


Carter, N.C., and Grove, E.W.

1972: Geological Compilation Map Of The Stewart, Anyox, Alice Arm, And Terrace Areas (B.C. Department Of Mines And Petroleum Resources Preliminary Map 8)

Grove, E.W.

1971: Geology And Mineral Deposits Of The Stewart Area British Columbia (B.C. Department Of Mines And Petroleum Resources Bulletin No. 58)

Timmins, W.G.

1983: Report On The Bitter Creek Claim Group, Bear River Area, For Maralgo Mines Limited (Private Report).

## STATEMENT OF COSTS

The following costs were incurred during the September, 1984 exploration programme described in this report, and during the production of this report.

Field Costs:

| | | |
|---|---|---|
| (1) Labour | | |
| F. Gigliotti, B.Sc.: 15 days @ $300/day | $ | 4,500.00 |
| P. Hall, B.Sc.: 15 days @ $250/day | $ | 3,750.00 |
| F. Sivertz: 16 days @ $150/day | $ | 2,400.00 |
| G. Sivertz, B.Sc.: 16 days @ $300/day | $ | 4,800.00 |
| (2) Assays: (Vangeochem Lab Ltd) | $ | 2,222.50 |
| (3) Helicopter (Vancouver Is. Helicopters): | $ | 3,439.70 |
| (4) Truck Rental (W.G. Timmins Ltd.): | $ | 504.00 |
| (5) Hotel (King Edward Hotel): | $ | 1,855.55 |
| (6) Travel (Airfare, Gasoline): | $ | 774.56 |
| (7) Equipment, Sample Shipments: | $ | 328.43 |
| (8) Food: | $ | 1,810.37 |
| (9) Report Text Preparation: | $ | 2,100.00 |
| (10) Report Illustrations: | $ | 806.00 |
| (11) Report Production: | $ | 30.00 |
| TOTAL COSTS INCURRED: | $ | 29,321.11 |

George W. G. Sivertz

# CERTIFICATE

I, GEORGE WILLIAM GUSTAV SIVERTZ, residing at 6100 Twintree Place, Richmond, British Columbia, do hereby certify that:

1. I am a geologist and have been practising my profession for ten years.
2. I am a graduate of the University of British Columbia and received a B.Sc. Honors degree in Geology in 1976.
3. I am a Fellow of the Geological Association of Canada and a member of the C.I.M.M..
4. I have no interest, beneficial or otherwise, in the properties or securities of Maralgo Mines Limited, nor do I expect to receive any such interest.
5. I am the author of this report which is based on a study of public and private reports and maps and an exploration programme supervised by myself which took place between September 4 and September 19, 1984.

Dated at Vancouver, B.C. this 30th day of November, 1984:

George Sivertz

G.W.G. Sivertz, B.Sc.

# Appendix 1: Assay Certificates

VANGEOCHEM LAB LIMITED
1521 Pemberton Avenue
North Vancouver B.C. V7P 2S3
(604) 986-5211 Telex: 04-352578

PREPARED FOR: W.G. TIMMINS EXPLORATION
NOTES: nd = none detected
: -- = not analysed
: is = insufficient sample

REPORT NUMBER: 84-87-004 JOB NUMBER: 84468



| SAMPLE # | Cu % | Pb % | Zn % | Ag oz/st | Au oz/st |
|---|---|---|---|---|---|
| 14301 | -- | -- | -- | 4.82 | .332 |
| 14302 | 1.80 | 45.00 | 8.40 | 424.16 | .070 |
| 14303 | .26 | 9.60 | 1.95 | 38.79 | .030 |
| 14304 | .58 | 30.50 | 1.00 | 198.37 | .052 |
| 14305 | .28 | 15.60 | 1.85 | 27.65 | .040 |
| 14306 | .83 | 4.80 | 39.00 | 25.94 | .090 |
| 14307 | .47 | 16.80 | 7.30 | 29.83 | .028 |
| 14308 | .42 | 19.85 | 16.50 | 38.22 | .022 |
| 14309 | .21 | 6.90 | 2.70 | 9.97 | .052 |
| 14310 | .15 | 2.50 | 7.00 | 3.72 | .038 |
| 14311 | .43 | 10.40 | 7.80 | 40.32 | .026 |
| 14312 | .11 | .84 | .46 | .43 | .012 |
| 14314 | .12 | .02 | .02 | .06 | <.005 |
| 14315 | .18 | 1.40 | 1.05 | 3.41 | .010 |
| 14316 | .12 | .01 | .05 | .19 | .028 |
| 14317 | .08 | .03 | .06 | .15 | .010 |
| 14318 | .10 | 5.10 | .28 | 5.02 | .022 |
| 14319 | .67 | .03 | <.01 | .14 | 2.528 |
| 14320 | .63 | 10.80 | 16.00 | 13.03 | .024 |
| 14321 | .12 | .32 | .50 | .52 | <.005 |
| DETECTION LIMIT | .01 | .01 | .01 | .01 | .005 |

12.5 20 cm Morgan

COPY

1 Troy oz/short ton = 34.28 ppm 1 ppm = 0.0001% ppm = parts per million

signed: ______________________

VANGEOCHEM LAB LIMITED
1521 Pemberton Avenue
North Vancouver B.C. V7P 2S3
(604) 986-5211 Telex: 04-352578

PREPARED FOR: W.G. TIMMINS EXPLORATION
NOTES: nd = none detected
: -- = not analysed
: is = insufficient sample

REPORT NUMBER: 84-87-004 JOB NUMBER: 84468



| SAMPLE # | Cu % | Pb % | Zn % | Ag oz/st | Au oz/st |
|---|---|---|---|---|---|
| 14322 | .89 | 22.00 | 18.00 | 25.70 | .042 |
| 14323 | .17 | 1.04 | .80 | 2.41 | .006 |
| 14324 | 5.40 | .04 | .01 | 1.74 | .456 |
| 14325 | .80 | .02 | .03 | .39 | .306 |
| 14326 | 10.30 | .01 | .01 | 1.54 | .716 |
| 14327 | .12 | .03 | .31 | .12 | <.005 |
| 14328 | .58 | 9.60 | 1.10 | 12.52 | .016 |
| 14329 | .36 | -- | -- | 1.22 | .012 |
| 14330 | -- | -- | 44.00 | 6.69 | .006 |
| DETECTION LIMIT | .01 | .01 | .01 | .01 | .005 |

COPY

1 Troy oz/short ton = 34.28 ppm 1 ppm = 0.0001% ppm = parts per million

signed:

VANGEOCHEM LAB LIMITED
1521 Pemberton Avenue
North Vancouver B.C. V7P 2S3
(604) 986-5211 Telex: 04-352578

PREPARED FOR: W.G. TIMMINS EXPLORATION
NOTES: nd = none detected
: — = not analysed
: is = insufficient sample

REPORT NUMBER: 84-07-005 JOB NUMBER: 84489



| SAMPLE # | Au ppb | Ag ppm |
|---|---|---|
| 14331 | 15 | 5.7 |
| 14332 | 5 | 1.2 |
| DETECTION LIMIT | 5 | 0.1 |

**VANGEOCHEM LAB LIMITED**
1521 Pemberton Avenue
North Vancouver B.C. V7P 2S3
(604) 986-5211 Telex: 04-352578

PREPARED FOR: W.G. TIMMINS EXPLORATION
NOTES: nd = none detected
: -- = not analysed
: is = insufficient sample

REPORT NUMBER: 84-87-007 JOB NUMBER: 84490



| SAMPLE # | | Cu % | Pb % | Zn % | Ag oz/st | Au oz/st |
|---|---|---|---|---|---|---|
| 14333 | | .07 | .10 | .03 | .25 | .006 |
| 14334 | | .08 | .44 | .12 | 6.76 | .130 |
| 14335 | | .08 | 2.50 | .06 | 3.32 | .084 |
| 14336 | | .14 | 4.80 | 2.15 | 3.68 | .056 |
| 14337 | | .08 | 2.55 | .11 | 3.21 | .074 |
| 14338 | | .09 | 1.50 | .20 | 2.19 | .046 |
| 14339 | LS | .10 | .43 | .30 | .76 | .008 |
| 14340 | LS | .07 | .04 | .06 | .16 | .006 |
| 14341 | LS | .09 | .57 | 1.70 | 2.43 | .046 |
| 14342 | LS | .11 | .17 | .49 | 1.07 | .036 |
| 14343 | LS | .08 | .50 | .37 | .99 | .010 |

COPY

| DETECTION LIMIT | .01 | .01 | .01 | .01 | .005 |
|---|---|---|---|---|---|

1 Troy oz/short ton = 34.28 ppm   1 ppm = 0.0001%   ppm = parts per million

signed: ______________________

VANGEOCHEM LAB LIMITED
1521 Pemberton Avenue
North Vancouver B.C. V7P 2S3
(604) 986-5211 Telex: 04-352578

PREPARED FOR: W.G. TIMMINS EXPLORATION
NOTES: nd = none detected
: — = not analysed
: is = insufficient sample

REPORT NUMBER: 84-07-008 JOB NUMBER: 84492



| SAMPLE # | | Cu % | Pb % | Zn % | Ag oz/st | Au oz/st |
|---|---|---|---|---|---|---|
| 14345 | | .10 | 2.00 | .27 | 4.45 | .016 |
| 14346 | LS. | .13 | .47 | .48 | .76 | .012 |
| 14347 | | .12 | .80 | .24 | 1.56 | .012 |
| 14348 | | .19 | .45 | .39 | 1.35 | .024 |
| 14349 | | .09 | .22 | .08 | .76 | .036 |
| 14350 | | .13 | .04 | .13 | .16 | <.005 |
| 16351 | LS adit | .09 | .02 | .06 | .05 | <.005 |
| 16352 | | .19 | 1.00 | .62 | 4.07 | .100 |
| 16353 | | .14 | 1.72 | .19 | 4.49 | .064 |
| 16354 | | .11 | .02 | .01 | .09 | <.005 |
| 16355 | | .24 | .44 | .92 | 1.09 | .016 |
| 16356 | | .13 | .62 | .60 | 6.08 | .128 |
| 16357 | | 1.56 | .02 | .02 | .65 | .008 |

COPY

| DETECTION LIMIT | .01 | .01 | .01 | .01 | .005 |
|---|---|---|---|---|---|

1 Troy oz/short ton = 34.28 ppm 1 ppm = 0.0001% ppm = parts per million

signed: ________________

**VANGEOCHEM LAB LIMITED**
1521 Pemberton Avenue
North Vancouver B.C. V7P 2S3
(604) 986-5211 Telex: 04-352578

PREPARED FOR: W.G. TIMMINS EXPLORATION
NOTES: nd = none detected
: -- = not analysed
: is = insufficient sample

REPORT NUMBER: 84-07-006 JOB NUMBER: 84493



| SAMPLE # | Cu % | Ag oz/st | Au oz/st |
|---|---|---|---|
| 16358 | 2.65 | .47 | .196 |
| 16359 | .47 | .14 | .026 |
| 16360 | .46 | .06 | .210 |
| 16361 | 3.30 | .46 | .520 |
| 16362 | .18 | .03 | .042 |
| 16363 | 1.80 | .41 | .256 |
| 16364 | .45 | .15 | .214 |
| 16365 | .60 | .38 | .158 |
| 16366 | .10 | .06 | .008 |
| 16367 | .23 | .11 | .056 |
| 16368 | .17 | .42 | 1.135 |
| 16369 | .62 | .11 | .044 |
| 16370 | 1.28 | .33 | .166 |
| 16371 | 1.40 | .21 | .122 |
| 16372 | .48 | .13 | .098 |
| DETECTION LIMIT | .01 | .01 | .005 |

1 Troy oz/short ton = 34.28 ppm 1 ppm = 0.0001% ppm = parts per million

signed: ____________________

GEOLOGICAL BRANCH
ASSESSMENT REPORT
13,352
part 1 of 2
CLEMENTS (BEAR) LAKE
MUDDY GULCH
LAKESHORE SHOWINGS
LEAD COIL SHOWINGS
MORGAN VEIN FAULT
COPPER TUNNEL VEIN
SILVER TUNNEL VEIN
ROOSEVELT CREEK
RADIO CREEK
BITTER CREEK
56°03'00" N
56°02'00" N
129°54'00" W.
129°52'00" W.
129°50'00" W.
129°48'00" W.
L.4820
L.4818
L.4815
L.4808
L.4819
L.4817
L.4816
L.4809
L.4814
L.4810
L.4812
L.4813
L.4821
L.5882
L.5883
L.5881
L.5860
L.5861
L.5866
L.5867
L.5872
L.5870
L.5863
L.5864
L.5869
L.5871
L.5868
L.5865
L.5889
L.5888
L.5890
L.5891
L.4574
L.5876
L.5875
L.5877
L.5874
L.5573
L.893
L.894
L.895
L.896
L.897
L.4572
L.4575
L.4570
HD 3FR
HD 4FR
HD 2FR
plug
hornfels zone
dikes
dike
dike trace
pit
pits
topo low lineation
60 cm wide vein in diabase: Fe and Cu stain.
granitic to diabasic, possibly some Hazelton.
Pb,Zn Au,Ag
Zn,Ag
Cu
Cu,Au
0 500 1000 m
0 1000 2000 3000 feet
Claim locations derived from (1) original C.G. survey plans; (2) preliminary 1:50,000 D.E.M.R. topographic mapping; and, (3) chain and compass survey
LEGEND
INTRUSIVE BODY
MINERAL SHOWING
BEDDING ATTITUDE
DIKE
FAULT
ANTICLINAL AXIS
SYNCLINAL AXIS
EXCLUDED CLAIM
CABIN SITE
ADIT
PIT
WASHOUT
PAVED HIGHWAY
4×4 ROAD
SKID ROAD
TRAIL
MARALGO MINES LIMITED
BITTER CREEK PROPERTY
PROPERTY GEOLOGY
DRAWN BY: P. HALL
N.T.S. 104A/7 (SW)
CONTOUR INT: 100'
M.D. SKEENA
SCALE: 1:10,000
L.D. CASSIAR
DATE: AUGUST 1983
FIG. No. 3
GEOLOGY BY: F.B. GIGLIOTTI, P.Geol.