SAWYER CONSULTANTS INC.





# PRELIMINARY GEOCHEMICAL AND GEOLOGICAL ASSESSMENT REPORT ON THE BIX, A AND SP CLAIMS

Mayo Mining District, Yukon Territory

on work carried out from

July 20, 1981 to October 20, 1981

NTS 115P

Longitude 63°15'N

Latitude 136°30'W

for

PACIFIC RIDGE RESOURCES CORPORATION

by 091070

T. GREG HAWKINS, F.G.A.C.

OCTOBER 20, 1981
Amended AUGUST 20, 1982

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This report has been examined by the Geological Evaluation Unit under section 53 (4) Yukon Quartz Mining Act and is allowed as representation work in the amount of $ 7,200.

P Watson

1st Regional Manager, Exploration and Geological Services for Commissioner of Yukon Territory.

## SUMMARY

The Sunshine Creek property is located in an area of favourable host rocks for tin/tungsten mineralization. Known occurrences in the area include Clear Creek tin, Dublin Gulch tungsten, and Campbell Chibougamau tin occurrences. Anomalous values in drill holes on the Sunshine Creek property were encountered by Cominco in 1979. Values were up to 2.25% tin over 25 foot widths with recoverable values in silver. No serious exploration attempt was made to investigate the area for skarn/scheelite deposits.

Further assessment is required on the Sunshine Creek property. Areas of interest include the skarns around Zone B and tourmalinized breccia zones at Zones A, B, and C. Possible high tin concentrations are projected at depth in the granitic host below these breccia structures. Due to the high cost of drilling operations, especially in the Yukon, further indirect methods are recommended including geochemistry and geophysics over the area of interest. Positive results will be used in order to locate further drilling including deep holes into the granite body underlying Zones A and B. Approximately 50 kilometres of grid work have been recommended at a total estimated cost of $130,000 to be expended over a period of four months.

Knowledge of these Yukon tin deposits is not thorough and their exploration is a relatively new Canadian experience. This may result in higher exploration costs and longer lead time to production.

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MAYO MINING DISTRICT

# GENERAL LOCATION MAP

1" ≃ 80 miles


SAWYER CONSULTANTS INC. OCTOBER, 1981

FIGURE No. 1

## INTRODUCTION

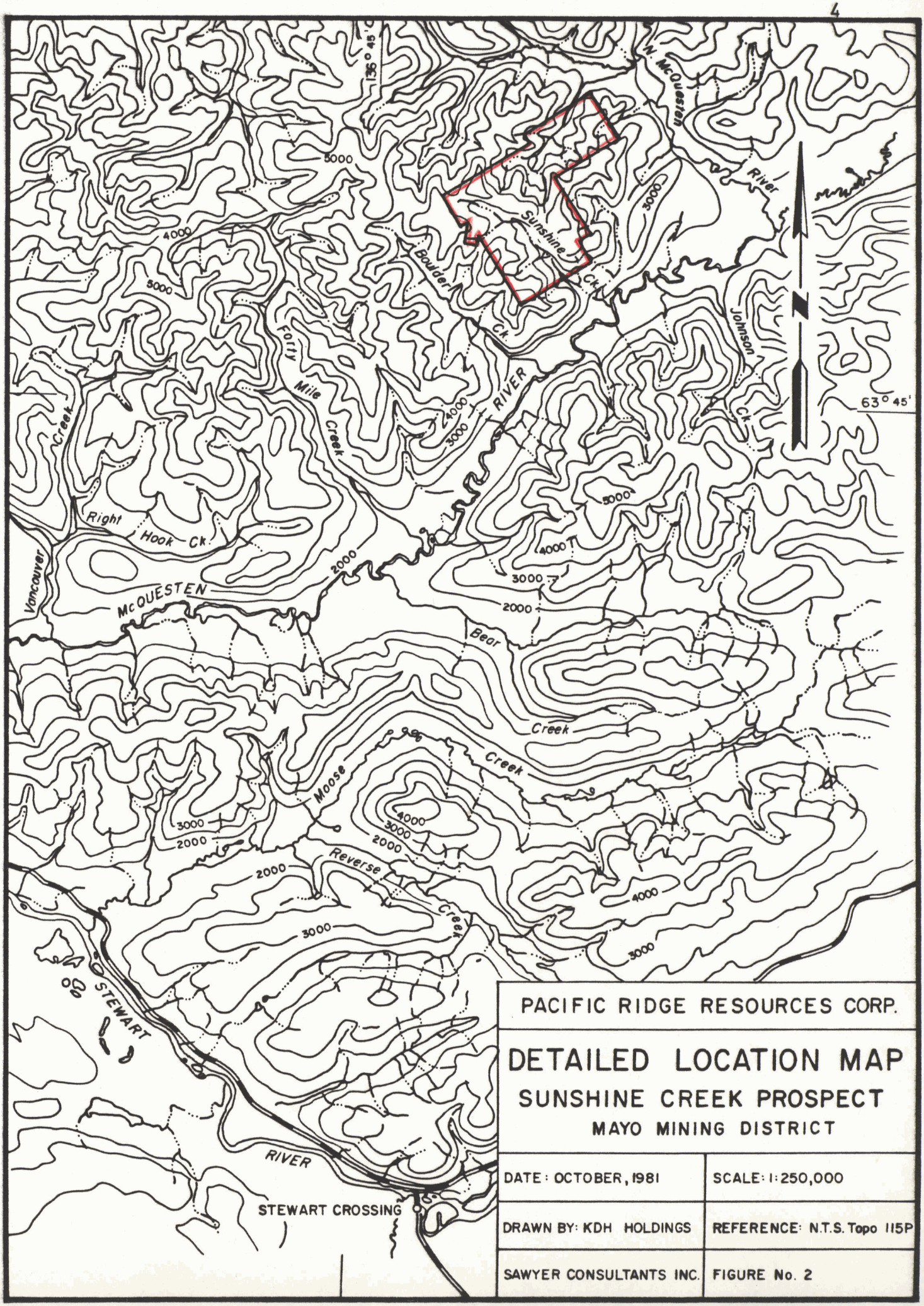
Following a brief property inspection on August 3rd, 1981, Sawyer Consultants Inc. agreed on August 13th, 1981 to provide geological consulting services on the Sunshine Creek prospect of Pacific Ridge Resources Corporation. In further written communication to Mr. Harry L. Williams, President of the Corporation, on August 27th, Sawyer Consultants Inc. agreed to provide a report on the property including recommendations for a 1982 work program. A preliminary discussion and review indicated need for geophysical surveys and a pan concentrate stream survey. It was agreed that the pan concentrate survey could proceed during the completion of the report in order that some further assessment could be made using the new data in conjunction with the past information during the 1981 season. This 33 sample survey was completed by Sawyer Consultants Inc. during the period September 6th to September 25th, 1981. A summary report on the preliminary assessment with recommendations for a 1982 program was completed on October 20, 1981. This amended version is provided for assessment purposes.

## PROPERTY LOCATION, ACCESS, TITLE

The Sunshine Creek property of Pacific Ridge Resources Corporation lies 42 kilometres west of the town of Mayo, Yukon Territory on the McQuesten map sheet, NTS 115P, at longitude 63°15'N, latitude 136°30'W. It lies within the Mayo Mining District. Access to the property is approximately twenty minutes by helicopter from Mayo. Road access to within five miles of the property and to the south side of the McQuesten River is via the Highet Creek road which services placer operations at Johnson Creek. The condition of this road is not presently known although seasonal placer operations took place in 1981. The claim group is comprised of 216 units as follows:

| Claim Name | No. of Claims | Record Nos. | Expiry Date |
|---|---|---|---|
| BIX 1-24 | 24 | YA38290-YA38313 | Sept. 20, 1982 |
| A 1-128 | 128 | YA30393-YA30520 | May 29, 1984 |
| SP 1-40 | 40 | YA39308-YA39347 | May 28, 1984 |
| SP 42 | 1 | YA39349 | May 28, 1984 |
| SP 53-62 | 10 | YA39360-YA39369 | May 28, 1984 |
| SP 64 | 1 | YA39371 | May 28, 1984 |
| SP 73-84 | 12 | YA39380-YA39391 | May 28, 1984 |
| | 216 | | |

All of the above claims are registered to Mr. Gordon F. Dickson of Whitehorse. On May 1st, 1981 Pacific Ridge Resources Corporation signed an option agreement with Mr. Dickson whereby the Corporation acquired the right further to explore the property in return for a cash consideration.




PACIFIC RIDGE RESOURCES CORP.

# DETAILED LOCATION MAP

## SUNSHINE CREEK PROSPECT

### MAYO MINING DISTRICT

| | |
|---|---|
| DATE: OCTOBER, 1981 | SCALE: 1:250,000 |
| DRAWN BY: KDH HOLDINGS | REFERENCE: N.T.S. Topo 115P |
| SAWYER CONSULTANTS INC. | FIGURE No. 2 |

## HISTORY

Wood tin and crystal cassiterite have been known to occur in placer gold black sands of the Klondike in the Mayo-McQuesten area since the early 1940's, (Bostock 1942, 1951). Aho (1949, 1964) reported that heavy mineral concentrates contained up to 25% tin at Clear Creek and Arizona Creek, 30.8% at Haggart Creek, and numerous quartz pebbles and cobbles at Dublin Gulch contained 80%-90% cassiterite. A lode deposit at Dublin Gulch was also found in 1943, (Mulligan 1975). It has been stated that tin recoveries are very sporadic and consistent economic concentrations are non-existent in the placers.

Recent exploration in the Yukon and Alaska has developed an interesting number of tin/tungsten prospects in the alkaline intrusives north of the Tintina Trench from Watson Lake to beyond Fairbanks. In the area around Mayo-McQuesten a number of prospects have been developed by Canada Tungsten Corporation, Campbell Chibougamau Mines Ltd. and Cominco.

Canada Tungsten Corporation has been working in the Dublin Gulch and Clear Creek areas. Dublin Gulch has potential for a high grade tungsten property, and it will likely be developed in the near future. Present work in the Clear Creek area has indicated high grade but sporadic tin values in greisen (Canada Tungsten Corporation - personal communication).

In 1979 Campbell Chibougamau Mines Ltd. announced values up to 1% tin in core lengths in excess of 4 metres (George Cross News Letter October 4th, 1979). Their property lies on the opposite or south

side of the McQuesten River from the Pacific Ridge Resources Corporation Sunshine Creek property.

1979 drilling and grid work by Cominco on the Pacific Ridge Sunshine Creek property have indicated at least three zones of anomalous high grade tin values. Approximately 20 kilometres of detailed grid work were completed over zones A and B (Figure 5). This included mapping, geochemistry and drilling on two main breccia structures adjacent the Sunshine Creek intrusive. Drill holes SC79-1 and SC79-2 in Zone B intersected anomalous values in tin, silver, copper, lead and zinc. Holes SC79-3 to SC79-5 provided more encouraging results especially in hole SC79-4 which assayed 0.28% tin over 25 feet. DDH SC 79-5 produced two 5 foot intersections of 0.28% tin and 0.26% tin. The option was dropped in 1980.

## GEOLOGY

### Regional Geology (Figure 3)

The Sunshine Creek area is characterized by numerous high level intrusions. They are Cretaceous Coast Range bodies of variable composition ranging from "moderately alkaline and mafic to felsic and acidic types" (Bostock, 1949, 1964). These intrude the Yukon Group which consists of sedimentary, volcanic and metamorphic rocks of Precambrian(?) age.

#### Intrusives

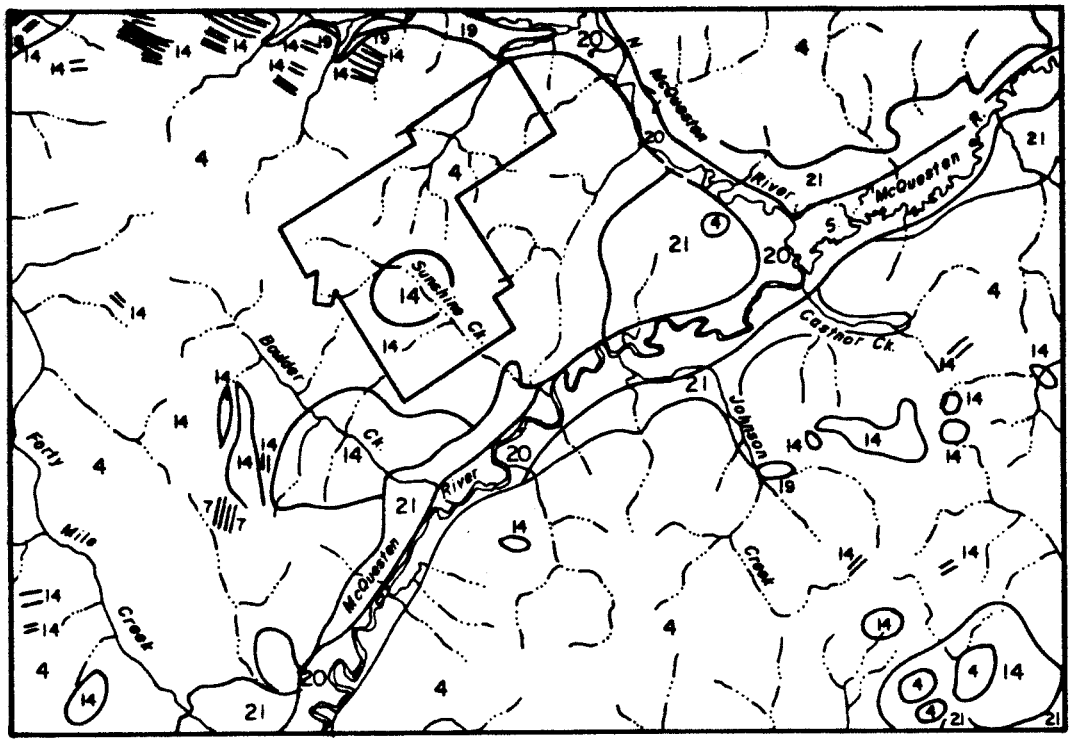
The extrusive/intrusive rocks represent a series of Cretaceous/ Jurassic phases of magmatic differentiation. The following table gives some comparison between the Yukon tin occurrences and other tin provinces of the world.

Table I

Tin Granite Sequence of Intrusion

| Yukon/McQuesten | Nigeria Plateau (Generalized) |
|---|---|
| Volcanic Cycle: | |
| - porphyritic volcanic flows, breccias, agglomerates, trachyte, gabbro, peridotite, diabase. | - rhyolite, explosion breccias, early basic dykes (hornblende micro-gabbro). |
| - aplite? | - quartz porphyries. |
| Granitic Cycle: | |
| - alkaline mafic syenite, monzonite. | - felsic, acidic granites, granite, granodiorite, quartz monzonite. |
| - quartz feldspar porphyry. [evidence of further differentiation at depth(?)] | - granite porphyry stage - hornblende, biotite granite - biotite granite - hornblende granite - granite porphyry. |
| - late stage dykes. | - late dolerites. |

Reference (Cominco 1979; MacLeod 1971; Bostock 1942)




## LEGEND

ORDOVICIAN (?) OR EARLIER
YUKON GROUP

| | |
|---|---|
| 4 | Schist, quartzite, phyllite, limestone |
| 7 | Varicoloured slate |

ORDOVICIAN (?) OR LATER

| | |
|---|---|
| 8 | Limestone, slate, phyllite, quartzite |

JURASSIC AND/OR CRETACEOUS
COAST INTRUSIONS

| | |
|---|---|
| 14 | Granite, granodiorite, quartz monzonite |

TERTIARY AND LATER
PLIOCENE (?) AND LATER

| | |
|---|---|
| 19 | Stream deposits, alluvium; 19 a, "White Channel gravel" |

QUATERNARY
POST-GLACIAL

| | |
|---|---|
| 20 | Stream deposits, alluvium |
| 21 | Surficial deposits, undivided |

Sunshine Creek Prospect Property boundary

PACIFIC RIDGE RESOURCES CORP.

# REGIONAL GEOLOGY MAP
## SUNSHINE CREEK PROSPECT
### MAYO MINING DISTRICT

| | |
|---|---|
| DATE: OCTOBER, 1981 | SCALE: 1:253,440 |
| DRAWN BY: KDH HOLDINGS | REFERENCE: G.S.C. Map 1143A |
| SAWYER CONSULTANTS INC. | FIGURE No. 3 |

Tasmanian tin tungsten deposits are generally associated with acidic granitoid rocks ranging from two-mica granites to quartz feldspar porphyries, (Solomon 1981). Complex differentiation in the Nigerian granites is probably better known due to the greater exposure and more extensive weathering. Ten to fifteen phases of granitic intrusions are identified in the numerous granitic complexes of the Plateau geological province. They are believed to be weathered up to two kilometres below the cupola or roof of the initial intrusions. In the Tasmanian case, however, the degree of weathering has not been as extensive and the exposure of this complex may not be in evidence at surface. In the Mayo-McQuesten area weathering is even less intense and only initial indications or "cupolas" (Mulligan, 1979) of differentiated granites and ring dyke structures have been exposed. Relative degrees of tin production in the three areas may also be evidence of the fact that the final and key phase of the tin bearing differentiates have yet to be exposed especially in the Yukon case.

Stratabound Basement Rocks

The Palaeozoic/Proterozoic basement host is similar in all previously mentioned tin areas. These rock types host deposits related to the chemistry of late stage differentiation and structural features that intersect them. The Sunshine Creek area is underlain by the upper Yukon Group basement consisting of schist, quartzite, phyllite and limestone. The package is characterized by generally uniform mica schist and micaceous quartzite. Occasional massive lenses of crystalline limestone are interbedded with the micaceous granites.

Structure

The most prominent local structure of the Mayo-McQuesten area is an east trending anticline the axis of which cuts through the centre of the Sunshine Creek property. This uplift or "doming" may be the result of a large extrusive event that is expressed at surface by numerous small plugs. "Transverse and oblique secondary faults are probably of major importance to mineralization" (Mulligan, 1975). The other major feature is the Tintina Trench, a regional tectonic feature that traverses the Yukon Territory and Alaska. Both Tasmanian and Nigerian tin provinces are spatially related to similar continental margin or failed rift systems.

Local Geology (Figure 5)

The local geology has been mapped by Butrenchuk of Cominco Ltd. (1979). His work outlined in more detail the Sunshine Creek intrusive and the sedimentary stratigraphic units into which it was emplaced. The main intrusive body which is in the centre of the claim group is quartz monzonite and porphyritic quartz monzonite. The Yukon Group basement rocks are comprised of quartz muscovite schist, chlorite schist, graphitic schist with quartzite, some limestone, and quartz biotite schist, and spotted by a tight schist, phyllite, quartz feldspar porphyry, quartz muscovite schist, foliated quartzite and limestone.

Intrusives

The surface area of the main quartz monzonite body or Sunshine intrusive is approximately 6 square kilometres occupying the centre of the property. It has been cut by several late stage

dykes of quartz feldspar porphyry and aplite. These dykes also have cut the sedimentary package in several places. A quartz feldspar porphyry concordant with the sedimentary package has also been mapped but is not believed to be related to the later Cretaceous intrusives (Cooke, 1979).

Stratabound Basement Rocks

A package of micaceous schists, quartzites, minor limestones and phyllites cover the remainder of the claim area. In general they trend northeast-southwest but local deformation around the intrusive body has altered the strikes of bedding to run parallel to the intrusive contact in places. As previously stated (see Regional Geology), the greatest mass of the upper Yukon Group consists of interbedded quartz muscovite schist and micaceous quartzites. Minor amounts of limestone, calc-silicate and skarn are also in evidence especially in the north-central part of the claim group adjacent to the northernmost boundary of the intrusive.

Structure

As previously mentioned, the axis of an east-trending anti-cline passes through the property at the south end of the Sunshine intrusive, the northern limb of which contains interesting and anomalous values in tungsten, silver and tin in structurally controlled zones. Mulligan emphasized the possible importance of transverse and oblique faults that aided in the localization of mineralization in the area. Zones A and B are both in areas that have been projected to have fault features that are represented by breccia trains along a fault path. These are both northeast-southwest trending features that appear

to be oblique to bedding and to the axis of the anticline. The South Zone also has an outcrop of breccia just off the southwest edge of the property. Small structural features are also represented in greisenized zones that were visible in the core but these are relatively minor.

Pneumatolytic alteration is a key mineralizing feature in this area as well as in other environments similar to it. This type of alteration is represented by greisening and tourmalinization and results from the action of the final differentiates of a magma in the gaseous state. Deposition of the relevant minerals is along structural planes.

Greisening is of three basic types:

(1) The most common of all greisen occurs in silica rich veins within the granitic host and appears on the walls of the quartz vein structure. It consists basically of a large amount of micaceous material which can often be high in such elements as lithium, boron, and fluorine.

(2) A second type of greisen is a type of igneous rock similar to aplite and pegmatite which is in fact an intrusive differentiate and consists of dykes of white mica and quartz.

(3) Larger bodies of greisenized material may occur at the periphery of a granitic intrusion or within the granitic intrusion itself. In general they are not related to structural features and might therefore be considered as an intrusive phase of their own. Examples of both type (1) and type (3) are seen in outcroppings and in drill core on the Sunshine Creek property.

Tourmalinization accompanies greisenization. Tourmaline is often a normal constituent of acid and alkalai types of granites. It is very much in evidence in the breccia zones of the Sunshine Creek property both at surface and in drill core. It is expected that the tourmaline breccias are in fact high level expressions of what would be encountered at depth as intense greisenization of the granitic cupola and roof rocks.

Types of Tin Deposits

Classification of tin deposits is not a thoroughly understood subject. Among the parameters considered in recent publications are form, geological environment, mineralogy, inferred temperature and mode of deposition. Mulligan presents a general classification and Solomon presents classifications with specific reference to Tasmania. Table II is a brief summary of the classifications. To date there have been no deposits of the magmatic dissemination type found in Canada. Most other types of mineralization are in evidence although not many of these known showings are of economic importance at the present time. The known showings around the Sunshine Creek area are basically pneumatolytic hydrothermal veins comprised of quartz, greisen, and tourmaline. They may in fact be high level indications of a more mineralized lower level source. The widespread occurrence of high level cupola intrusions into the Yukon Group throughout the north side of the Tintina Trench is an indication of a possibly highly differentiated granitic suite at depth. Therefore it is important to consider at least three types of possible tin deposits in the area (Figure 4).

(1) Pneumatolytic hydrothermal veins.

(2) Magmatic disseminations.

(3) Skarn.

This does not preclude the existence of any other types but the design of the exploration program is centered around the discovery of these types of mineralization. At present in Zones A, B and C quartz tourmaline veins and lodes are known to exist and to contain anomalous values in tin and silver along with geochemical highs in copper, lead and zinc. Due to the exotic suites of minerals often associated with quartz greisen tin deposits two samples taken by Sawyer Consultants Inc. in August of 1981 were tested for lithium, columbium and tantalum as well as tungsten, tin, copper, silver and gold. High lithium contents up to 0.013% were indicated. In a sample of the A Zone breccia a very minor amount of tantalum was also detected. The B Zone breccia, although higher in tin, did not produce as high a value in lithium but did report tantalum. The high lithium content is due to the lithium bearing micas associated with greisening. It has been known to occur in quantities that would make its recovery an economic by-product in production of lode deposits in Nigeria (Hawkins, 1981). The anomalous exotic mineral contents in the samples taken, i.e. lithium and possibly tantalum, indicate that there is a possible magmatic dissemination system in existence in the granitic rock beneath the Yukon Group cover at the Sunshine Creek property. Zones A and B illustrate pneumatolytic and hydrothermal alteration in breccia zones in basement rocks believed to be above a zone of quartz greisening in the granites beneath. They are themselves potential targets for

economic development as also are their projected possible magmatic dissemination or quartz greisen sources below.

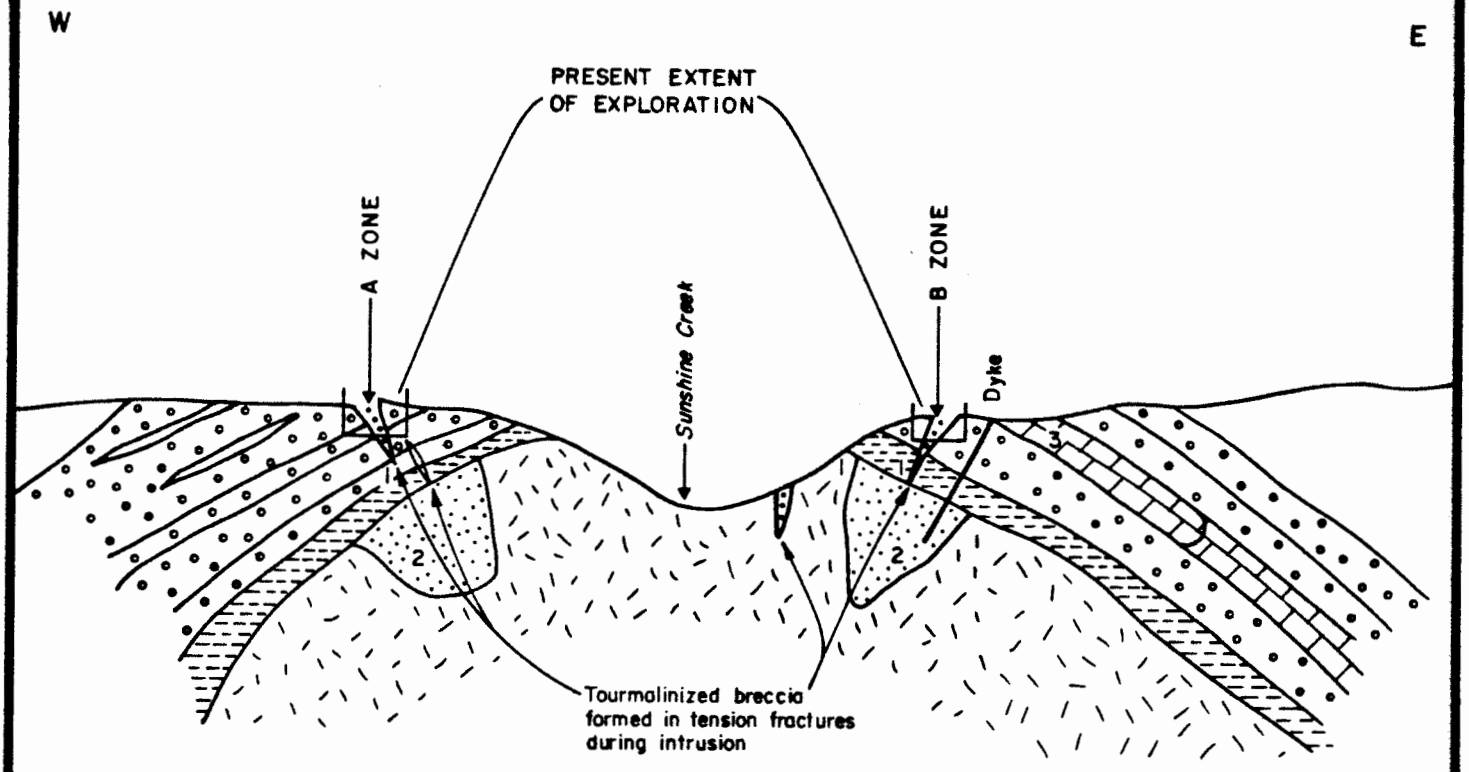
In Zone B a significant amount of limestone and skarn has been mapped. Given the existence of very important skarn deposits in the Dublin Gulch area these become a very important potential target as well. None of these skarn areas or limestone areas have been intersected or sampled for scheelite or tin-bearing minerals by the drilling completed to date.

It is of interest to note that virtually all tin production in Nigeria has been alluvial/eluvial whereas hardrock mining has predominated in Tasmania. Tin "production" in the Yukon to date has been predominantly from alluvial sources but no true economic quantities have yet been discovered. New hardrock discoveries in the Territory have been made since exploration for the metal has increased sharply (Dupont, Canada Tungsten).

| No. | Type | Form | Typical host rock | Essential or gangue minerals | Metasomatic associated minerals | Tin minerals | Associated metals and metallic minerals | Canadian examples | Foreign examples | References |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | magmatic ? disseminations | disseminated | granite | | | cassiterite | Ta-Nb, Zr, etc. | | Zaiplasts, South Africa<br>Nigeria | Hunter and Lenthall, 1971<br>Hosking, 1965 |
| 2. | pegmatites | dykes | metasedimentary, metavolcanic, granitoid | feldspar, quartz, muscovite | tourmaline, topaz, fluorite rare | cassiterite | Li, Be, Ta-Nb, etc.<br>W, Mo, etc., rare | Yellowknife (24)<br>Winnipeg R. (30)<br>Linklater L. (34) | Africa, Brazil, etc. (numerous)<br>Carolinas, U.S.A.<br>Black Hills, S. Dakota | Pratt and Sterrett, 1904<br>Roberts and Rapp, 1965 |
| | (albitite) | | | albite, quartz, muscovite | | cassiterite<br>wodginite | | Red Sucker L. (28)<br>Winnipeg R. (30) | | |
| 3. | skarn<br>contact metamorphic | irregular<br>incl. pipes | calcareous-dolomitic | Ca-Mg-Fe aluminosilicates<br>magnetite | fluorite, axinite, danburite, ± tourmaline | cassiterite<br>malayaite<br>hulsite-paigette<br>stannit. ludwigite | W (scheelite ± wolframite)<br>Be (helvite, chrysoberyl)<br>Mo, various sulphides | Cassiar (16 a,e,f) | Lost River, Alaska;<br>Devonshire; Malaya; etc.<br>Brooks Mt., Alaska;<br>Stevens Co., Washington;<br>U.S.S.R. | Sainsbury, 1964<br>Sharkawi and Dearman, 1966<br><br>Bennett, 1962<br>Nekrasova *et al.*, 1965 |
| | | | | | | stannit. Fe-Al silicates | | Cassiar (16a) | Czechoslovakia;<br>Thailand, Devon | Dudák and Novák, 1965<br>Hosking, 1965 |
| 4. | PNEUMATOLYTIC-HYDROTHERMAL | | | | | | | | | |
| | quartz-feldspar-greisen | veins, lodes | generally granite | quartz<br>K-feldspar (secondary) | adularia, albite, ± fluorite, topaz, ± Li micas | cassiterite | | | Erzgebirge, U.S.S.R.<br>Cornwall (South Crofty) | Stemprok, 1964, 1967<br>Cronshaw, 1921 |
| | quartz-greisen | veins, lodes, pipes | quartzose and argillaceous schist, granitic | quartz | muscovite, Li mica, topaz, fluorite, ± tourmaline | cassiterite<br>stannite | W (wolframite)<br>Mo, Be (beryl), local, Li micas<br>arsenopyrite, Cu Zn etc. sulphides minor | Yukon Tungsten (16i)<br>Atlin (15)<br>Burnt Hill (44)<br>New Ross (48)<br>Mt. Pleasant (46) (in part) | Most numerous and important lode types | |
| | quartz-tourmaline (hydrothermal) | veins, lodes<br>veins, lodes | argillite, quartzite<br>argillite, quartzite | quartz<br>quartz | tourmaline, chlorite | cassiterite<br>stannite<br>canfieldite<br>stannite<br>franckeite<br>? | Zn-Pb-Cu-Ag sulphides major<br>Pb, Zn, Sb sulphides<br>V, Zn, Cu, Cu | Dublin Gulch (4j) Sullivan (22k)<br>Snowflake (22a); numerous minor in Cordillera<br>Coal River (14)<br>Tsitsutl Mt. (18) | | |
| | | veins, lodes<br>veins, lodes | argillite, quartzite<br>argillite, quartzite | calcite<br>rhodonite | | | | | | |
| 5. | subvolcanic | lodes, pipes | rhyolitic, volcanic, granitic, hypabyssal | | fluorite, topaz, chlorite | cassiterite<br>stannite<br>other tin sulphosalts | various sulphides and sulphosalts, notably silver | Mt. Pleasant (46) | Bolivian tin-silver belt<br>U.S.S.R.<br>Japan | Ahlfeld (1967)<br>Matveyenko and Shatalov, 1963<br>Miyahisa, 1961 |
| 6. | fumarole | vein and segregation | rhyolitic, volcanic, and hypabyssal | | fluorite, chalcedony, kaolin, hematite | cassiterite (notably wood tin) | | Possible origin wood tin in Yukon placers (3, etc.) | Bolivia<br>Mexico, Southwest U.S.A.<br>U.S.S.R. | Ahlfeld, 1967<br>Sainsbury, 1969<br>Knopf, 1916<br>Matveyenko and Shatalov, 1963 |
| 7. | massive sulphide | concordant | argillite, quartzite rhyolitic, volcanic, and sedimentary | quartz, Fe Zn Pb sulphides<br>Fe Zn Pb Cu sulphides | tourmaline | cassiterite<br>cassiterite<br>stannite | | Sullivan (22k)<br>Bathurst area (45)<br>Kidd Creek (36) South Bay (32a)<br>Geco (35) Lac Dufault (37) | Bleikvassli, Norway<br>Boliden, Sweden | Vokes, 1963<br>Hübner, 1972 |
| 8. | metamorphosed fossil placer (?) | quartz lenses | argilleceous and limy schist | (chlorite-garnet zone) | chlorite | cassiterite | Fe sulphides, Co, Ti | | Isergebirge, Poland | Jaskolski, 1963 |
| 9. | placer deposits | eluvial<br>residual<br>alluvial<br>beach and marine | | | | cassiterite | numerous heavy and resistant minerals of rocks and of primary tin deposits | North Cordillera (3) (4a,i,j) (15) (insignificant) | Congo, Nigeria, Brazil, etc. widespread<br>Malaya, Indonesia, Thailand<br>Cornwall, etc. | |

Types of Tin Deposits from Economic Geology Report No. 28 (Mulligan, 1975)

Table II




LEGEND

- Quartz Monzonite
- Phyllite
- Quartzite, Quartz-Feldspar porphyry
- Quartz-biotite-chlorite schist
- Limestone Skarn
- Greisen

POSSIBLE TARGETS:

1) Quartz-Greisen veins SW-W (Pb, Zn, Ag, Cu)
2) Greisenized Granite SW-W
3) Skarn W-SW

PACIFIC RIDGE RESOURCES CORP.

# IDEALIZED E W SECTION
## SUNSHINE CREEK PROSPECT
### MAYO MINING DISTRICT

| | |
|---|---|
| DATE: OCTOBER, 1981 | SCALE: ~1:30,000 |
| DRAWN BY: KDH HOLDINGS | REFERENCE: COMINCO 1979 MULLIGAN 1975 |
| SAWYER CONSULTANTS INC. | FIGURE No. 4 |

## 1981 SURVEY RESULTS

The panned concentrate survey of the property was completed in order to provide regional indications of other possible anomalous tin areas in relatively covered terrain. In general, by far the most anomalous zone is in the northwestern corner of the claim group.

The results of the geochemical stream sediment sampling survey indicate generally very low values in gold with only one sample reporting a value of 0.01 oz./ton Au. Of the other 32 samples, 28 reported values of 0.002 oz./ton Au or less. Of the remaining four, sample No. SS 6, which reported a value of 0.007 oz./ton Au, was the highest.

With reference to the tin results four of the 33 samples reported values of 0.1% Sn or greater, and of these four, three were samples numbers SS 1, SS 2, and SS 3, which returned values of 0.12%, 0.16%, and 0.26% tin respectively. These samples are on a southern (north flowing) tributary of Sunshine Creek in the southeastern corner of the grid, to the southeast of the A Zone and south of the B Zone. Clearly these samples are anomalous and will require further follow-up work.

Sample No. SS 31 which was taken from Sunshine Creek immediately upstream of the point at which the trace of the east-west trending anticlinal structure crosses it returned a value of 0.15% Sn. The closest samples to the southeast, northwest, and southwest all reported lower values although sample SS 30, the next sample upstream from sample SS 31, did report a slightly higher than background value of 0.04% tin. Some further investigation of this area would be warranted.

Referring to the tungsten values, it can be seen that seven of the 33 samples returned values of 0.01% tungsten or greater and three of these seven are again samples SS 1, SS 2, and SS 3, which had correspondingly anomalous values in tin, and 0.01 oz./ton gold in sample SS 3. Of the remaining samples, numbers SS 6, reporting a value of 0.025% tungsten, and SS 14, reporting a similar tungsten content, are adjacent samples on Sunshine Creek and a southern tributary located immediately east of the base line and of the A Zone area. Samples SS 30 and SS 31 which, as we discussed above, showed slightly higher tin values also reported anomalous values in tungsten of 0.03% W and 0.05% W.

While it is true that none of these results are outstanding, the tin values returned from SS 1, SS 2, and SS 3, with corresponding above background tungsten values, clearly indicate an area for further work. Similarly the area to the southeast of Zone A near the base line 0+00, represented by samples SS 6 and SS 14, deserve some further attention, as also does the general area of samples SS 30 and SS 31. These areas will be followed up with further geology and prospecting and possible grid extensions into areas of interest.

An on site view of some of the higher grade core sections of the Cominco drilling program was completed. It was found that many of these sections had been stored off the property by Cominco and were not available. However, sections demonstrating the various rock types and appropriate alteration and greisening were studied. The breccia zone trends were also visited. Further research and comparative studies were then carried out in Vancouver.

## 1982 PROPOSED PROGRAM

Basic objectives of the 1982 program are further to delineate areas of interest and provide deep drilling targets and targets in areas of new potential. In order to achieve this the following is recommended.

### Grid Work

The two isolated Cominco Grids on Zones A and B provided some results over these specific areas. However in order to provide continuous and consistent results over the entire area of interest a more extensive grid over both areas is proposed. Follow up work in anomalous zones will be on a smaller scale including fill-in lines and fill-in sample points.

### Geophysics

Two basic objectives of the geophysics program are to estimate the depth and size of the intrusive and to delineate any structures that may be mineralized. Magnetics is proposed as an aid in defining the limits of the intrusive. It is believed that the structural features may best be expressed in terms of resistivity. Due to the low disseminated sulphide content IP effect may help to delineate zones of increased metal content. Both resistivity and IP factor will be provided through an induced polarization survey.

### Geochemistry

Previous geochemical sampling provided little or no useful data in terms of anomalous zones of tin and tungsten, however the methods of sample treatment were not consistent with the procedures recommended for these two elements. With a larger grid and increased

line spacing a more regional look at anomalous values of copper, lead, zinc, tin and tungsten will be presented. Treatment must include crushing of all mesh sizes of the soil sample and digestion of the same.

Coincident IP-geochemical anomalies will therefore provide targets for deeper drilling.

Geology

Further detailed prospecting and sampling will be required on the new grid. Attention will be given to the possible existence of scheelite deposits within the skarn horizons. Since the panned concentrate survey indicated that the most anomalous area was the northwestern corner of the claim group, detailed geological mapping including special emphasis on differentiates of the intrusive must be completed.

A fully reinterpreted geologic picture using all chemical, geophysical and geological data must be presented.

The following cost estimates provide for the completion of the above work.

## Budget

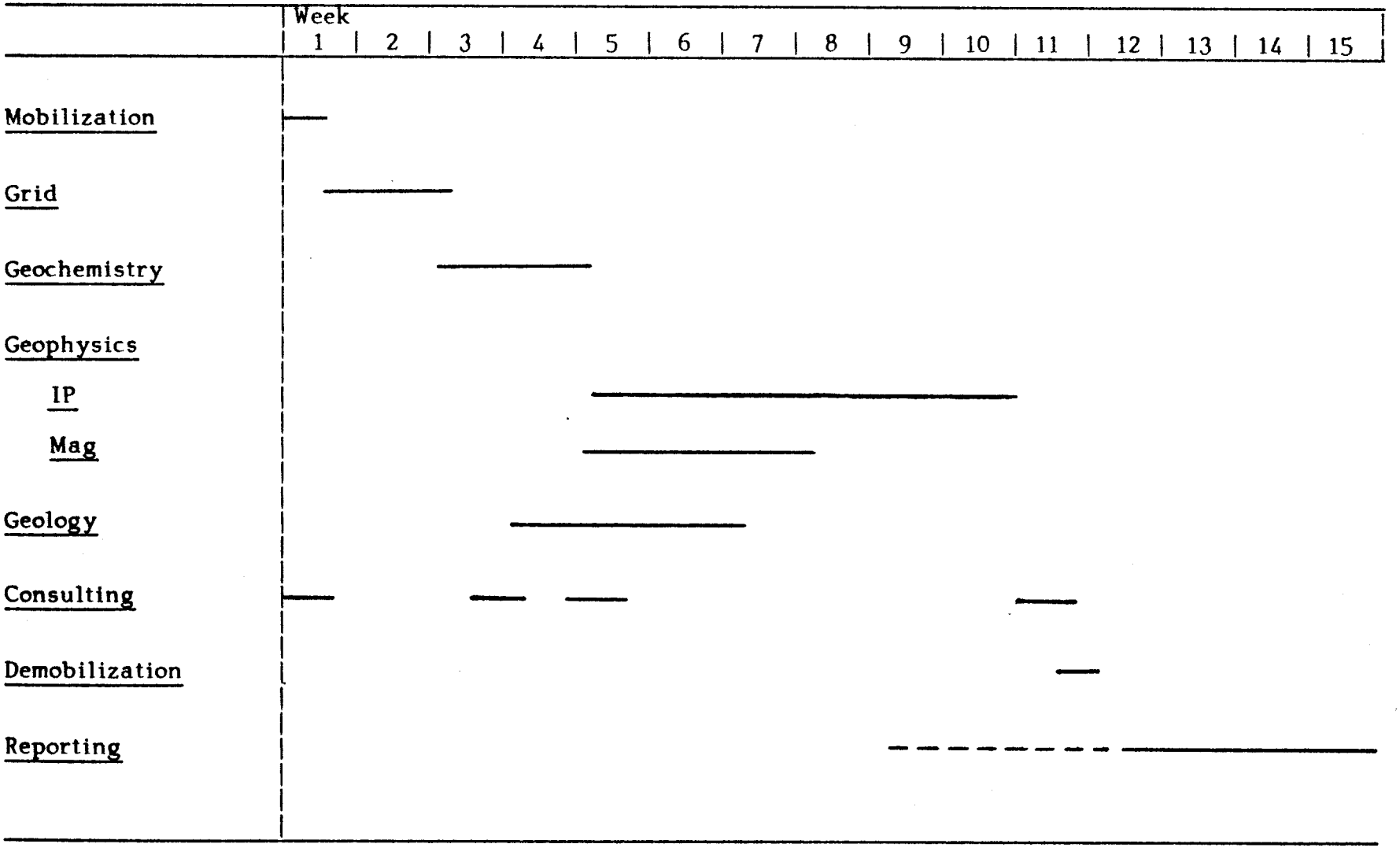
| | | | |
|---|---|---|---|
| **Mobilization/Demobilization** | | | |
| Air fare | | $2,420 | |
| Freight | | 500 | |
| Helicopter - 3 hours @ $450.00/hr. | | 1,350 | |
| 4 men - 4 days @ $750.00/day | | 3,000 | |
| | | $7,270 | $ 7,270 |
| **Grid Work** | | | |
| 42 man days @ $150.00/day | | | 6,300 |
| **Geochemistry** | | | |
| Sample collection - 42 man days @ $150.00/man day | | $ 6,300 | |
| Analyses - Soil 1200 samples @ $10.75/sample | | 12,900 | |
| | | $19,200 | 19,200 |
| **Geophysics** | | | |
| Mobilization/Demobilization | | | |
| Air fare | $1,210 | | |
| Freight | 500 | | |
| Helicopter - 2 hours @ $450.00/hr. | 900 | | |
| | $2,610 | $ 2,610 | |
| I.P. | | | |
| 2 operators and equipment - 45 days @ $600.00/day | $27,000 | | |
| 2 helpers - 90 man days @ $150.00/day | 13,500 | | |
| | $40,500 | 40,500 | |
| Magnetics | | | |
| 20 man days @ $150.00/man day | | 3,000 | |
| | | $46,110 | 46,110 |
| **Geology** | | | |
| 21 man days @ $200.00/man day | | $4,200 | |
| 50 analyses @ $25.00 average | | 1,250 | |
| | | $5,450 | 5,450 |

| | | |
|---|---|---|
| Other Travel | | |
| Air fares | $2,000 | |
| Helicopter - 5 hours @ $450.00/hr. | 2,250 | |
| | $4,250 | 4,250 |
| Camp Costs | | |
| Infrastructure - 90 days @ $50.00/day | $ 4,500 | |
| Supplies - 395 man days @ $25.00/man day | 9,875 | |
| Expediting | 1,000 | |
| | $15,375 | 15,375 |
| Consulting and Supervision | | |
| 30 days @ $300.00/day | | 9,000 |
| Report Costs | | 5,000 |
| | | $117,955 |
| Contingency @ 10% | | 11,700 |
| | Say | $130,000 |

## Schedule

The estimated total time of completion of the proposed work is three months. A breakdown of the timing is presented in Table III.

Depending on weather conditions the program could probably start by mid-June.




PROPOSED SCHEDULE 1982 PROGRAM

Table III

## CONCLUSIONS

(1) The Sunshine Creek property lies within a belt of favourable tin bearing differentiated intrusives.

(2) The apparent lack of similarity with other tin granite provinces is possibly related to the high level or cupola exposure of the intrusive bodies in the Mayo-McQuesten area.

(3) Given a potentially analagous situation and the fact that high grade tin/tungsten has been discovered in adjacent and similar areas (Clear Creek, Dublin Gulch, Swift River) exploration targets are projected in:

(a) Roof rocks along favourable structures (Zones A and B).

(b) Skarn zones in favourable stratigraphy (Zone B).

(c) Magmatitic disseminations in granitic rocks (at depth, Zones A, B, C).

(4) The present drill indicated zones of anomalous values require further delineation to indicate structures in depth. New structures and targets may also be indicated by this work.

(5) Diagnostic geophysical features are expected to be low resistivity, possibly high metal factors and magnetic signatures.

(6) Past geochemical surveys failed to indicate any tin/tungsten trends. Special sample treatment is required including crushing of all size fractions prior to analysis. Diagnostic geochemical trace elements include lithium/boron as well as tin/tungsten. A review of the previous sampling and

drill cores may also help further to determine anomalous values in the Sunshine Creek area.

(7) The winning of tin from hardrock deposits has not met with much economic success in other areas of the world in recent times. It is a difficult metal to explore for and to mine. In that the Canadian experience for these types of deposits is very limited there is a need for more continued experience over time. Therefore, the cost of developing the necessary geological models and exploration technology are that much greater.

## RECOMMENDATIONS

Prior to any further drilling attempts on the property, more indirect approaches to evaluation are recommended.

(1) Geochemistry

A large grid (50 line km.) covering all of the known areas of interest is recommended as control for geochemical surveys. Special sample treatment is required in order to determine the tin and tungsten contents. The estimated cost of this work is $19,200. Close spaced follow up work is recommended in areas of interest.

(2) Geophysics

Contract IP and magnetic geophysical surveys are recommended over the 50 line km. grid. Dipole-dipole IP is recommended here although a cheaper and quicker method of pole-dipole will be tested on site prior to final surveying. All follow up work over anomalies of interest will be carried out on dipole-dipole surveys. The estimated cost for total dipole-dipole surveys is $46,110.

(3) Geology

Further geological mapping, prospecting and sampling is recommended on the proposed grid. This will include follow up of the indications provided by the stream sediment samples. The estimated cost is $57,050.

(4) The total cost of the program including camp, mobilization/ demobilization, consulting, and reporting is estimated at $130,000. The projected schedule is over a four month period.

(5) Due to the geological and geochemical similarities with other tin/tungsten environments both in the Yukon and other parts of the world, exploration should be concentrated in areas of skarn and tourmalinized breccia structures.

Respectfully submitted,

SAWYER CONSULTANTS INC.

T. Greg Hawkins, F.G.A.C.

# CERTIFICATE

I, T.E. Gregory Hawkins, DO HEREBY CERTIFY:

(1) That I am a Consulting Geologist, of Sawyer Consultants Inc., with business offices at 1201 - 675 West Hastings St., Vancouver, British Columbia, V6B 1N2.

(2) That I am a graduate in geology of The University of Alberta, Edmonton (B.Sc. 1973), and of McGill University, Montreal (M.Sc. 1979).

(3) That I have practised within the geological profession for the past twelve years.

(4) That I am a Fellow of the Geological Association of Canada.

(5) That the information and opinions contained in the attached report are based on personal observations made on the Sunshine Creek property on August 3rd and September 15th-16th, 1981, and general research of tin deposits and the Mayo-McQuesten area.

(6) That I own no interest in the shares or securities of Pacific Ridge Resources Corporation or the subject property, nor do I expect to receive any interest.

T. Greg Hawkins, F.G.A.C.

Dated at Vancouver, British Columbia, this 20th day of October, 1981.
Amended August 20, 1982.

## BIBLIOGRAPHY


Aho, A.E., 1949: Mineralogy of some heavy sands of the McQuesten River area, Yukon; unpublished thesis Univ. of Brit. Columbia.

----------, 1964: Mineral potential of the Mayo district; Western Miner V.37, pp.80-88.

Bostock, H.S., 1942: Ogilvie, Yukon; Geol. Surv. Can. Map 711A.

----------, 1964: Geology, McQuesten, Yukon Territory; Geol. Surv. Can. Map 1143A.

Cooke, D.L., 1979: Report on the Sunshine Creek A Group; Cominco Ltd. corporate file.

Hawkins, T.G., 1981: Ririwai Project 1, Final Report; Nigerian Mining Corp. corporate file.

MacLeod, W.N. et al, 1971: The Geology of the Jos Plateau; Geol. Surv. Nigeria, Bull. 52, Vols. 1 & 2.

Mulligan, R., 1975: Geology of Canadian Tin Occurrences; Geol. Surv. Can. Econ. Geol. Report No. 28.

Solomon, M., 1981: An Introduction to the Geology and Metallic Ore Deposits of Tasmania; Econ. Geol. Vol. 76, No. 2.

# APPENDIX I

## Assay Certificates

To: Sawyer Consultants Inc.

PAGE No. 1

1201 The Royal Bank Building
675 West Hastings Street
Vancouver, B.C. V6B 1N2

# BONDAR-CLEGG & COMPANY LTD.

## CERTIFICATE OF ASSAY

REPORT NO. A21-1063

DATE: August 24, 1981

Samples submitted: August 7, 1981

Results completed: August 24, 1981

PROJECT: SUNSHINE

I hereby certify that the following are the results of assays made by us upon the herein described rock samples.

| MARKED | GOLD | | SILVER | | Cu | Li | Sn | W | Cb | Ta | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ounces per Ton | Grams per Metric Ton | Ounces per Ton | Grams per Metric Ton | Percent | Percent | Percent | Percent | Percent | Percent | Percent | |
| 51340 | 0.002 | | 0.38 | | 0.05 | 0.013 | 0.035 | <0.01 | <0.001 | 0.002 | | |
| 51341 | 0.002 | | 0.33 | | 0.04 | 0.003 | 0.10 | 0.02 | <0.001 | 0.002 | | |

APPENDIX I (i)

NOTE:
Rejects retained three weeks
Pulps retained three months
unless otherwise arranged.

Registered Assayer, Province of British Columbia

can test ltd.
1650 PANDORA STREET, VANCOUVER, B.C. V5L 1L6
sleph 4-72
Telex 04-54210

Sawyer Consultants Inc.
Suite 1201, 675 W. Hastings Street
Vancouver, B.C.
V6B 1N2

Attention: Mr. Greg Hawkins

# Certificate of Assay

File No. 3542E-6-1
Date Oct. 9, 1981

We hereby Certify that the following are the results of assays made by us upon submitted sand samples.

| Sample Identification | GOLD Ounces Per Ton | SILVER Ounces Per Ton | TIN Percent Sn | TUNGSTEN Percent W | Percent | Percent | Percent | Percent |
|---|---|---|---|---|---|---|---|---|
| SS 1 | L 0.002 | - | 0.12 | 0.015 | | | | |
| SS 2 | L 0.002 | - | 0.16 | 0.035 | | | | |
| SS 3 | 0.010 | - | 0.26 | 0.030 | | | | |
| SS 4 | L 0.002 | - | 0.03 | 0.005 | | | | |
| SS 6 | 0.007 | - | L 0.01 | 0.025 | | | | |
| SS 7 | L 0.002 | - | 0.01 | 0.005 | | | | |
| SS 8 | L 0.002 | - | 0.01 | 0.005 | | | | |
| SS 9 | 0.002 | - | 0.01 | 0.005 | | | | |
| SS 10 | L 0.002 | - | L 0.01 | 0.010 | | | | |
| SS 11 | 0.003 | - | 0.02 | 0.015 | | | | |
| SS 12 | 0.003 | - | 0.01 | 0.005 | | | | |
| SS 13 | L 0.002 | - | L 0.01 | 0.005 | | | | |
| SS 14 | 0.002 | - | 0.02 | 0.025 | | | | |
| SS 15 | L 0.002 | - | 0.01 | 0.015 | | | | |
| SS 16 | L 0.002 | - | 0.04 | 0.005 | | | | |
| SS 17 | L 0.002 | - | L 0.01 | 0.005 | | | | |
| SS 18 | 0.002 | - | 0.06 | 0.010 | | | | |

L = Less than

Note: Pulps retained three months.

Rejects retained two weeks.



Form No. 13-C

CAN TEST LTD.

Provincial Assayer

APPENDIX I (ii)

To:

Sawyer Consultants Inc.

Suite 1201, 675 W. Hastings Street

Vancouver, B.C.

V6B 1N2

Attention: Mr. Greg Hawkins

can test ltd.
1650 PANDORA STREET, VANCOUVER, B.C. V5L 1L6
Telephone 254-7271
Telex 04-54210

# Certificate of Assay

File No. 3542E-6-2

Date Oct. 9/81

We hereby Certify that the following are the results of assays made by us upon submitted sand samples.

| Sample Identification | GOLD Ounces Per Ton | SILVER Ounces Per Ton | TIN Percent Sn | TUNGSTEN Percent W | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Percent | Percent | Percent | Percent |
| SS 19 | L 0.002 | - | 0.03 | 0.010 | | | | |
| SS 20 | L 0.002 | - | 0.04 | 0.005 | | | | |
| SS 21 | 0.002 | - | 0.05 | 0.005 | | | | |
| SS 22 | L 0.002 | - | 0.05 | 0.010 | | | | |
| SS 23 | 0.002 | - | 0.03 | L 0.005 | | | | |
| SS 24 | 0.002 | - | L 0.01 | 0.005 | | | | |
| SS 25 | 0.004 | - | 0.01 | 0.005 | | | | |
| SS 26 | L 0.002 | - | 0.08 | 0.010 | | | | |
| SS 27 | L 0.002 | - | 0.03 | 0.010 | | | | |
| SS 28 | 0.002 | - | L 0.01 | 0.010 | | | | |
| SS 29 | L 0.002 | - | L 0.01 | 0.005 | | | | |
| SS 30 | L 0.002 | - | 0.04 | 0.030 | | | | |
| SS 31 | 0.002 | - | 0.15 | 0.050 | | | | |
| SS 32 | L 0.002 | - | 0.01 | 0.005 | | | | |
| SS 33 | L 0.002 | - | 0.02 | 0.005 | | | | |
| SS 34 | L 0.002 | - | L 0.01 | 0.005 | | | | |

L = Less than

Note: Pulps retained three months.

Rejects retained two weeks.

CAN TEST LTD.

Provincial Assayer



Form No. 13-C

APPENDIX I (iii)

# APPENDIX III

## Statement of Expense and Personnel

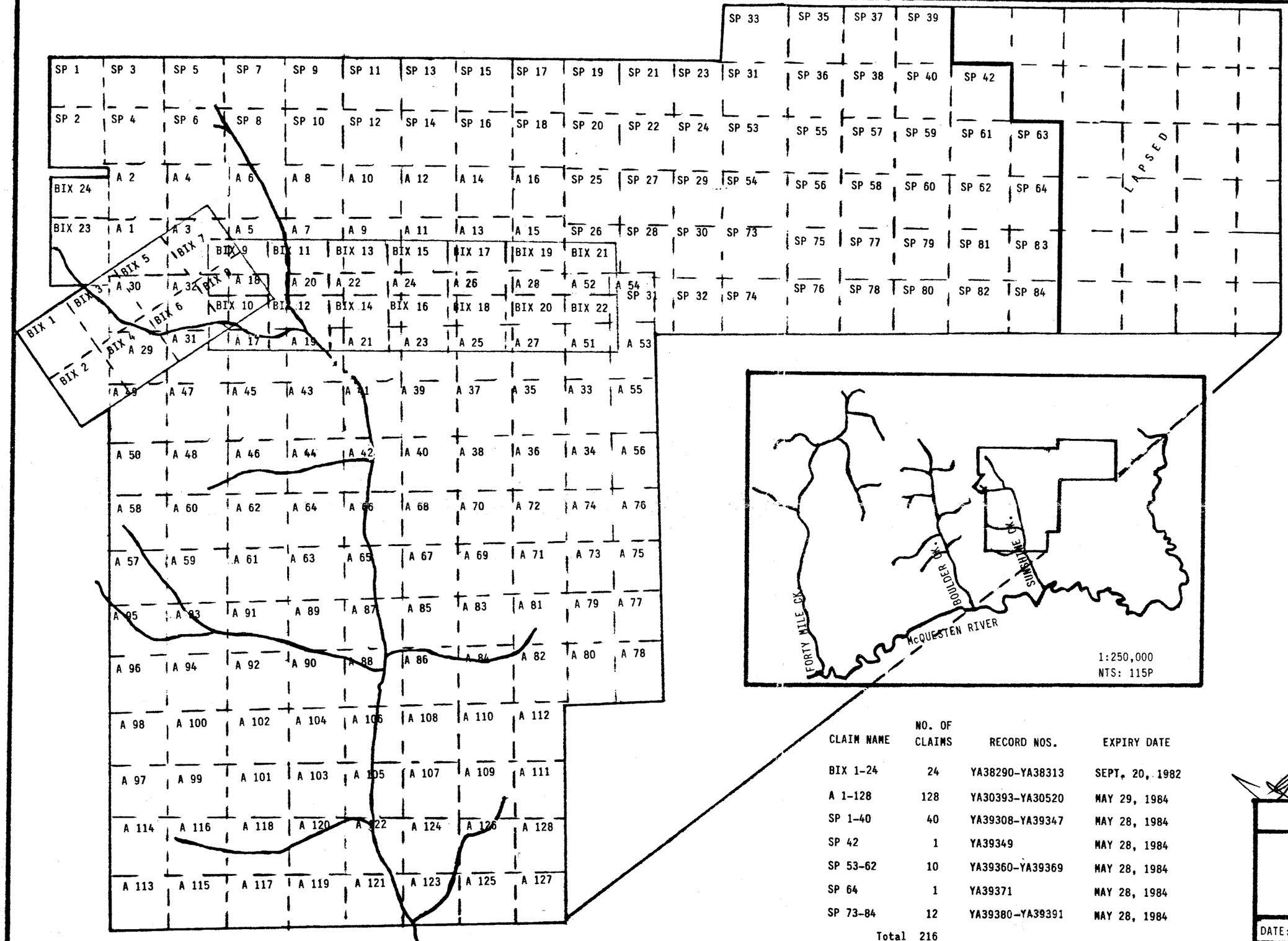
# SUMMARY OF EXPENDITURES INCURRED BY PACIFIC RIDGE RESOURCES CORPORATION SUNSHINE CREEK PROPERTY Mayo Mining District, Yukon Territory July 20, 1981 to October 20, 1981

The results are documented in Sawyer Consultants Inc. Report "Preliminary Geochemical and Geological Assessment Report on the BIX, A and SP Claims, Mayo Mining District, Yukon Territory, dated October 20, 1981, amended August 20, 1982.

| | | |
|---|---|---|
| **Personnel** | | |
| T.E.G. Hawkins, F.G.A.C., Project Consultant | $ 3,090.00 | |
| J.B.P. Sawyer, P.Eng., Consulting Geologist | 420.00 | |
| F. Yacoub, Geologist | 175.00 | |
| R. Paeseler, Field Technician | 3,325.00 | |
| B. Hyde, Field Technician | 3,325.00 | |
| | $10,335.00 | $10,335.00 |
| **Transportation** | | |
| Commerical (air fare) | $4,065.40 | |
| Private (helicopter) | 3,781.00 | |
| | $7,846.40 | 7,846.40 |
| **Chemical Analyses and Freight** | | 1,351.54 |
| **Camp Costs** | | |
| Infrastructure | $1,250.00 | |
| Supplies | 820.53 | |
| Mobilization/demobilization, expediting | 897.38 | |
| | $2,967.91 | 2,967.91 |
| **Report Costs** | | |
| Draughting, copying, typing | | 1,918.84 |
| **Miscellaneous** | | |
| Disbursements, charges, courier, telephone | | 1,086.85 |
| TOTAL | | $25,506.54 |

## STATEMENT OF PERSONNEL

| | |
|---|---|
| T.E.G. Hawkins, F.G.A.C.<br>Consulting Geologist<br>Property visits, report preparation<br>July 20 to October 19, 1981<br>7.5 days @ $300.00/day<br>14 hours @ $60.00/hour | $3,090.00 |
| J.B.P. Sawyer, P.Eng.,<br>Consulting Geologist<br>Report preparation assistance<br>October 9 to 19, 1981<br>7 hours @ $60.00/hour | 420.00 |
| F. Yacoub<br>Geologist<br>Report preparation assistance<br>October 19, 1981<br>1 day @ $175.00/day | 175.00 |
| Robert Paeseler<br>Field Technician<br>Sample collection<br>September 6 to 25, 1981<br>19 days @ $175.00/day | 3,325.00 |
| Brian Hyde<br>Field Technican<br>Sample collection<br>September 6 to 25, 1981<br>19 days @ $175.00/day | 3,325.00 |
| TOTAL | $10,335.00 |




| CLAIM NAME | NO. OF CLAIMS | RECORD NOS. | EXPIRY DATE |
|---|---|---|---|
| BIX 1-24 | 24 | YA38290-YA38313 | SEPT. 20, 1982 |
| A 1-128 | 128 | YA30393-YA30520 | MAY 29, 1984 |
| SP 1-40 | 40 | YA39308-YA39347 | MAY 28, 1984 |
| SP 42 | 1 | YA39349 | MAY 28, 1984 |
| SP 53-62 | 10 | YA39360-YA39369 | MAY 28, 1984 |
| SP 64 | 1 | YA39371 | MAY 28, 1984 |
| SP 73-84 | 12 | YA39380-YA39391 | MAY 28, 1984 |
| Total | 216 | | |

To accompany report by
T. Greg Hawkins, F.G.A.C.,
Amended August 20, 1982.

0910-0

PACIFIC RIDGE RESOURCES CORPORATION

DETAILED CLAIM MAP
SUNSHINE CREEK PROJECT
Mayo Mining District, Yukon Territory

| | |
|---|---|
| DATE: AUGUST 1982 | SCALE: 1:31,680 1" = ½ mile |
| DRAWN BY: G.H. | COMINCO 1979 REF: NTS. 115P |
| SAWYER CONSULTANTS INC. | FIGURE NO. 6 |

## LEGEND

**CRETACEOUS OR LATER**

12 BRECCIA: Tourmalinized, silicified, minor tin mineralization

**CRETACEOUS**

11 APLITE

10 SERPENTINIZED ULTRAMAFIC

9 QUARTZ-FELDSPAR PORPHYRY: Non-foliated, discordant

8 GREISEN (Quartz, muscovite, tourmaline)

7 QUARTZ MONZONITE, PORPHYRITIC QUARTZ MONZONITE

**PROTEROZOIC**

6 QUARTZ-FELDSPAR PORPHYRY: Concordant

5 PHYLLITE

4 QUARTZ-MUSCOVITE SCHIST, FOLIATED QUARTZITE AND LIMESTONE

3 QUARTZ-BIOTITE SCHIST AND MINOR SPOTTED BIOTITE SCHIST

2 LIMESTONE, CALC-SILICATE, MINOR SKARN

1 QUARTZ-MUSCOVITE SCHIST, QUARTZ-CHLORITE SCHIST, MINOR GRAPHITIC SCHISTS WITH QUARTZITE

## SYMBOLS

- FOLIATION (inclined)
- JOINT (inclined)
- OUTCROP, AREA OF OUTCROP
- GEOLOGICAL CONTACT (known, approximate)
- FAULT (known, assumed)
- DIAMOND DRILL HOLE
- CLAIMPOST
- ASSUMED TRACE OF BRECCIA
- PROPOSED PANNED CONCENTRATE LOCATION
- L 280 PROPOSED GRID 1982
- PANNED CONCENTRATE LOCATION
- Au oz/ton ; Sn %/cu yd. ; W %/cu yd.
- FOLD AXIS TRACE (Mulligan 1975)

'B' ZONE

'A' ZONE

SOUTH ZONE

Sunshine Creek

DDH SC79-1

DDH SC79-2

DDH SC79-3

DDH SC79-4

DDH SC79-5

BASE LINE

TIE LINE 150 N

TIE LINE ZONE E

0 100 200 300 400 500 1000 meters

ELEVATIONS ARE IN FEET

To accompany report by
T. Greg Hawkins, F.G.A.C.
dated October 20th, 1981.

PACIFIC RIDGE RESOURCES INC.

# PROPERTY PLAN AND SUMMARY
## SUNSHINE CREEK PROSPECT
MAYO MINING DISTRICT 091070

| | |
|---|---|
| DATE: OCTOBER, 1981 | SCALE: 1:10.000 |
| DRAWN BY: K.D.H. HOLDINGS LTD. | REFERENCE: COMINCO LTD. SEPT, 1979 MULLIGAN, 1975 |
| SAWYER CONSULTANTS INC. | FIGURE No. 5 |