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### **GEOLOGICAL AND GEOCHEMICAL REPORT**

### **ON THE**

#### **COOK PROPERTY**

**COOK 1 TO 4 MINERAL CLAIMS** 

Skeena Mining Division, British Columbia NTS 104B/7E Latitude: 56°24' North Longitude: 130°38' West

on behalf of

CANADIAN CARIBOO RESOURCES LTD. Vancouver, B.C.

by

Gary L. Wesa, B.Sc., FGAC **KEEWATIN ENGINEERING INC.** #800 - 900 West Hastings Street Vancouver, B.C. V6C 1E5

January 2, 1991

Keewatin Engineering Inc.

SUB-RECORDER RECEIVED FEB 0 4 1991 M.R. # ..... \$..... VANCOUVER, B.C.

The Cook property consists of four contiguous modified-grid claims totalling 42 units and is located approximately 80 km northwest of Stewart, British Columbia. Access to the property is by fixed-wing aircraft from Terrace, Stewart, or Smithers to various airstrips in the area and then via helicopter to the property.

The property is situated within the Intermontaine Tectono-Stratigraphic Belt, near the contact between the Stikine Terrane and the unmetamorphosed sediments of the Bowser Basin. The bedrock geology of the central portion of the property comprises Upper Triassic sediments of the Stuhini Group. The eastern and western portions are underlain by the Lower Jurassic Unuk River Formation consisting of andesitic volcanics with lesser sediments, intruded by the Tertiary King Creek Dyke Swarm on the northwestern corner of the property. Diorites of the Coast Plutonic Complex form the bedrock of a ridge in the centre of the Cook 3 and 4 mineral claims, and Pleistocene basalt flows underlie the lower reaches of the Unuk River valley.

The area has an exploration history dating back to the turn of the century when prospectors passed through the region on their way to the interior. In the 1970's, the porphyry copper boom again brought prospectors and companies into the area. The current gold exploration rush began in 1980 with the option of the Sulphurets property by Esso Minerals Canada and the acquisition of the Johnny Mountain claims by Skyline Exploration Ltd. which was brought into production in mid-1988. The adjacent SNIP property is slated for production in 1991.

At this time, the Eskay Creek deposit, located 30 km northeast of the Cook property and currently being explored by Corona and Placer-Dome, is the most significant deposit in the area. The property comprises at least eight mineralized zones occurring over a strike length of 1800 m within a sequence of felsic volcanics. The mineralization is associated with disseminated sulphides in felsic volcanic breccias and graphitic argillites in contact with overlying intermediate volcanic rocks.

A review of all the available information indicates that the entire Unuk River area was subjected to reconnaissance geological mapping and prospecting by Newmont Mines Ltd. in 1959-1962 which led to the discovery of a number of showings within or adjacent to the property boundaries. The Six Mile #2 copper showing occurs at the south end of a small lake near the northeastern corner of the Cook 1 claim. Minor chalcopyrite and up to 5% disseminated pyrite occur within and adjacent to the Flory Creek Fault Zone. Located on the same structure, directly northeast of the property boundary, is the Homer #3 copper showing. A gossanous zone within the Flory Creek Fault Zone hosts disseminations and fracture fillings of pyrite and chalcopyrite. The Canyon Creek prospect occurs adjacent to the extreme southwestern corner of the property. It consists of two showings known as the Black Bear and Daily Boy. The showings consist of mineralized quartz veins, occurring either along the selvage of a diorite porphyry dyke, or within silicified and hornfelsed sediments which are disseminated with pyrite and, on weathering, are covered by a crust of dark brown limonite.

The 1989 exploration program consisted of helicopter supported reconnaissance prospecting, geological mapping and geochemical sampling with the objective of evaluating the property's potential for hosting economic precious metals deposits.

An aerial reconnaissance of the property located a number of iron-stained areas in the western portion of the Cook 3 and 4 mineral claims. A limited amount of reconnaissance prospecting completed over this area located weak Pb and Zn mineralization in cherty silty sandstone. A number of quartz veins were located in the southwestern corner of the property, near the reported location of the Canyon Creek occurrence, however, grab samples collected here did not yield any anomalous geochemical results.

The 1990 exploration program consisted of helicopter supported contour soil sampling, stream silt geochemistry, lithogeochemical sampling and geological mapping with the objective of evaluating the property's economic potential. A total of 20 soil samples, 19 stream silt samples and four rock samples were collected from the property. These samples were obtained near the Flory Creek Fault in the central part of the Cook 1 claim and from two gossanous subparallel incised gullies near the western claim boundaries of Cook 3 and 4 claims. The highest gold-in-soil value is 54 ppb Au obtained from a soil sample in the extreme northwestern corner of the Cook 2 claim. The soil samples yielded low values for all other elements analyzed. The highest gold-in-silt value was 33 ppb Au from a small stream in the centre of the Cook 1 claim. Analysis of the silts collected from two south flowing incised drainages near the western boundaries of the Cook 3 and 4 claims failed to return anomalous gold values, however, coincident weakly elevated lead (up to 66 ppm) and zinc (up to 692 ppm) were recorded from the westerly, gossanous gully. The results of lithogeochemical sampling were disappointing and no anomalous values were recorded for any elements tested.

Results of the geochemical survey on the property were disappointing and exploration activity failed to identify any significant exploration targets. It is recommended, however, that a search be conducted for the location of the Fewright (6-Mile) showing (Minfile #097) along the west bank of the Unuk River. Constraints of time did not permit a search for this mineralized zone and old workings during the limited 1990 program.

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INTRODUCTION

Canadian Cariboo Resources Ltd. of Vancouver, commissioned Keewatin Engineering Inc. to conduct a field exploration program on the Cook property located in the Unuk River Valley of northern British Columbia. Exploration was directed by Keewatin Engineering Inc. and crews were based out of the "Doc Camp", situated on the South Unuk River approximately 14 kilometres southeast of the Cook property.

This report is based on the available published information, historical material in the assessment files plus the results of the 1990 field exploration program.

The objective of the 1990 program was to evaluate the property's economic potential through follow-up exploration as recommended in the 1989 report (Aussant and DuPre). The one day program was conducted on September 26, 1990 and included stream silt, lithogeochemical and contour soil sampling plus geological mapping. A total of 20 soil samples, 19 stream silt samples and four rock grab samples were collected from the Cook 1 to 4 mineral claims. Attention was focused on two brightly limonitic stained, incised gullies on steep forested slopes in the central and western part of the Cook 3 claim plus the area of the Flory Creek Fault on the Cook 1 claim (Map 1).

Geological and geochemical data were compiled on 1:10,000 scale contour maps enlarged from 1:50,000 scale NTS topo maps.

Geochemical samples were shipped to Bondar-Clegg and Company Ltd. in North Vancouver for geochemical analyses of Au, Ag, As, Sb, Cu, Pb, Zn, Hg and Mo. The analytical procedures are described in Appendix III and analytical results are presented in Appendix IV.

### **Location and Access**

The Cook property is located in northwestern British Columbia, approximately 80 km northwest of Stewart (Figure 1). The claims are situated within NTS map sheet 104B/7E and centred about 56°24' North latitude and 130°38' West longitude. Access to the property is by fixed-wing aircraft from Terrace, Stewart, or Smithers to various airstrips in the area and then via helicopter to the property. The claims can also be directly accessed by helicopter from Stewart.



In the fall of 1991, a 72 kilometre road over the mountains is scheduled to open, connecting the Eskay Creek area with the main Stewart-Cassiar Highway.

#### **Physiography and Climate**

The Cook property is situated within the Coast Range Physiographic Division and is characterized by northern rain forests and sub-alpine plateaux. Valleys are steep sided and U- to Vshaped. Elevations (see Figure 2) range from 120 m in the valley of the Unuk River to 1400 m in the extreme southeastern corner of the property.

A transitional treeline, characterized by dense sub-alpine scrub, occurs at approximately the 915 m elevation. The terrain above the treeline is typified by intermontane alpine flora. Permanent glacial ice is found intermittently above the 1065 to 1370 m elevations. Conifers up to 30 m tall are common below the treeline, especially in stream valleys. Water for camp and drilling purposes is generally in good supply from the numerous creeks draining the claim area.

Precipitation is heavy, exceeding 200 cm per annum, with short mild summers but very wet spring and fall periods. Thick accumulations of snow are common during winter. It is seldom possible to begin surface geological work before July and difficult to continue past September.

### **Property Status and Ownership**

The Cook property (Figure 2) consists of four modified-grid claims totalling 42 units, located within the Skeena Mining Division. Relevant claims data are tabulated below:

Table 1 - Cook Property Claim Status				
Claim Name	Record No.	No. of Units	Date of Record	Expiry Date
Cook 1 Cook 2 Cook 3 Cook 4	7050 7051 7052 7053	6 16 10 10	December 21, 1988 December 21, 1988 December 21, 1988 December 21, 1988	1991 1991 1991 1991



These claims are apparently the subject of an agreement between the claim holder (K. S. Gourley) and Canadian Cariboo Resources Ltd. The claim maps show that the outer edges of the property encompass slivers of pre-existing mineral claims.

### **HISTORY OF EXPLORATION**

#### **Regional History**

The area drained by the upper reaches of the Stikine, Iskut, Unuk, Craig and Bell-Irving Rivers has been explored for gold since the late 1800's when prospectors passed through the region on their way to the interior.

Exploration to the north of Stewart in the late 1920's and early 1930's resulted in the discovery of mineralization in the vicinity of the Eskay Creek, Summit Lake and East Gold occurrences. Activity was relatively intermittent until the 1950's copper "boom" when the Granduc and Galore Creek deposits were discovered. Much of the area underwent preliminary prospecting during the 1950's and 1960's. Numerous showings and prospects were documented but the inaccessibility of the region and low metal prices resulted in limited exploration activity.

In the 1970's, the porphyry copper boom again brought prospectors and companies into the area. With the dramatic increase in precious metal prices in 1979, all prospects and former producers in the region were re-evaluated. Exploration programs focusing on potential high grade gold and silver deposits were initiated. Approximately \$140 million in exploration expenditures have been spent in the region over the last ten years. Subsequent to 1986, total annual expenditures have averaged between \$25 to \$40 million. These expenditures have pushed several prospects to the advanced stage and resulted in the discovery of over 100 new mineralized occurrences. The advanced projects include the SNIP (Cominco-Prime), Eskay Creek (Corona-Placer-Dome), SB (Tenajon-Westmin) and Sulphurets (Newhawk-Granduc) deposits. Skyline Gold's Johnny Mountain deposit and Westmin/Pioneer/Canacord's Silbak-Premier and Big Missouri deposits went into production during the late 1980's. The exploration activity has been extended north of the Iskut River where numerous gold occurrences have been reported. The most prominent include the McLymont Creek (Gulf International), Iskut J.V. (American Ore-Golden Band-Prime), KRL (Kestral) and Forrest (Avondale) properties. Major exploration programs on these properties were conducted in 1990 and the SNIP property is scheduled for production in 1991.

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The 1988 discovery of the Eskay Creek gold-silver-zinc-lead deposit demonstrates the area's potential to host world class deposits.

The recent high level of exploration activity in the area led to federal-provincial government geological mapping programs which began in 1986. These programs will continue in the 1990's.

The Unuk River area was covered by geological mapping in 1988 as part of the Iskut-Sulphurets project conducted by the B.C. Ministry of Energy, Mines and Petroleum Resources (Britton et al., 1989). The entire NTS 104B map sheet is currently being mapped by the Geological Survey of Canada (Anderson, 1989).

The results of a regional stream sediment sampling program conducted over this area were released in July, 1988 (National Geochemical Reconnaissance, 1988). Britton et al. (1989) reported that almost every known precious metal prospect in the Unuk River area is associated with high stream gold values. Known gold occurrences are also associated with high but variable values for such pathfinder elements as silver, arsenic, antimony and barium. No samples were collected from the creeks draining the property.

#### **Property History**

A review of the material in the B.C. Ministry of Energy, Mines and Petroleum Resources assessment report archives indicates that the entire Unuk River area was subjected to reconnaissance geological mapping and prospecting by Newmont Mines Ltd. during the period 1959 to 1962.

The Six Mile #2 copper showing (Minfile #225) occurs at the southern end of a narrow lake located in the northeastern corner of the Cook 1 claim. Minor chalcopyrite and up to 5% disseminated pyrite occur within and adjacent to the Flory Creek Fault Zone.

The Homer #3 copper showing (Minfile #224) occurs adjacent to the northeastern corner of the property at the northern end of the same small lake on which the Six Mile #2 copper showing is located. A gossanous zone within the fault hosts disseminations and fracture fillings of pyrite and chalcopyrite. The fault gouge is carbonatized and hosts up to 5% pyrite.

The Fewright (6-Mile) Cu-Ag-Au-Pb showing (Minfile #097) is plotted as occurring near the northwestern boundary of the property. The Minfile occurrence description states that "a 30

metre wide mineralized ledge ran the entire length of seven claims" for an estimated strike length of 300 metres. Tunnelling was performed on the claims and values for Ag, Cu, Au and Pb were reported.

The Canyon Creek prospect (Minfile #098) occurs adjacent to the extreme southwestern corner of the property. It consists of two showings known as the Black Bear and Daily Boy. The showings consist of mineralized quartz veins, occurring either along the selvage of a diorite porphyry dyke, or within silicified and hornfelsed sediments which are disseminated with pyrite and on weathering are covered by a crust of dark brown limonite.

The assessment records indicate that Granduc Mines Ltd. conducted an airborne electromagnetic and magnetic survey over McQuillan Ridge in 1968. This survey covered the Cook property east of the Unuk River.

#### **1989 Exploration Program**

The 1989 property exploration program consisted of helicopter-supported reconnaissance prospecting, geological mapping and geochemistry (lithogeochemical, stream silt and heavy mineral sampling). Areas of known mineralization and gossanous staining were investigated and sampled. The primary objective of the 1989 program was to investigate the three showings reported on the property.

Extensive investigation of the area in the vicinity of the Fewright (6-Mile) Cu-Ag-Au-Pb Showing (Minfile #097) during the 1989 exploration program did not locate any old workings or mineralization. This showing location is believed to be misplotted although it is shown as occurring near the northwestern corner of the Cook 4 claim. The Black Bear and Daily Boy showings (Minfile #098) are plotted as occurring adjacent to the southwestern corner of the Cook 3 mineral claim. Investigation of the southwestern corner of the property located a number of quartz veins. Grab samples collected here failed to yield any anomalous geochemical results.

A number of iron-stained areas were noted in the westernmost portion of the Cook 3 and 4 claims. One of these areas, located on the Cook 4 claim, was investigated and weak Pb and Zn mineralization was found occurring in cherty silty sandstone. Coincident limonitic staining associates

with weak sulphide (pyrite) mineralization within the interbedded sediments. Three grab samples yielded elevated Pb and/or Zn values.

Sample No.	Zn ppm	Pb ppm
KCR-037	1330	1802
KVR-062	2870	
KVR-063	1834	1. in

A limited amount of reconnaissance prospecting was conducted along the western side of the Flory Creek Fault Zone, however, no mineralization was located. Several gossanous zones were also noted in the eastern portion of the Cook 2 claim during aerial reconnaissance of the property.

Stream silt samples were collected whenever streams were crossed during reconnaissance prospecting traverses. The designation of anomalous values was based on regional G.S.C. survey results in Open File 1645 combined with a visual observation of data obtained during the 1989 exploration on a number of claim groups in the Unuk River area. Based on these criteria, no anomalous precious metals values were detected for any of the elements analyzed.

Heavy mineral samples were collected from parts of creeks where there was a sudden transition from high to low energy; if present, moss mat material was obtained. A total of three heavy mineral samples were collected from creeks draining the eastern portion of the Cook 2 mineral claim, however, geochemical analysis recorded background values for all the elements tested.

#### **GEOLOGY**

#### **Regional Geology**

The property lies within the Intermontane Tectono-Stratigraphic Belt -- one of five parallel, northwest-southeast trending belts which comprise the Canadian Cordillera (Figure 3). The Cook property is situated near the boundary between the Stikine Terrane, which comprises the majority of the western part of the Intermontane Belt, and the unmetamorphosed sediments of the Bowser Basin.

During Late Triassic and Early Jurassic time, the Stikine Terrain was the site of very active calc-alkaline volcanism. This volcanism was also accompanied by felsic intrusions that may have been comagmatic with the volcanic events. The sequences of rocks deposited at this time are now referred to as the Hazelton Group (Table 2). This predominantly volcanic assemblage is characterized by basal pyroclastic rocks overlain by argillites and, finally, by coarse volcanic breccia and conglomerate with interbedded tuffs, greywacke and siltstone.

At the end of Early Triassic time, this volcano-plutonic complex was uplifted to form the Stikine Arch. During Middle to Late Jurassic time, parts of the Stikine Terrain were filled with detritus shed from the Stikine Arch. The resulting, mainly sedimentary, sequences are referred to by Grove (1986) as the Betty Creek Formation, the Salmon River Formation and the Nass Formation (Table 2).

The Unuk River Valley is predominantly underlain by an Upper Triassic to Lower Jurassic section composed of miogeosynclinal volcanic and sedimentary rocks. The composition of the volcanic rocks ranges from andesitic to rhyolite. Thick layers of siltstone and greywacke are intercalated within the predominantly volcanic assemblage. Grove (1986) assigns most of these rocks to the Unuk River Formation. This formation is the oldest of the Hazelton Group and unconformably overlies older Triassic units. The Unuk River Formation includes diagnostic Hettangian, Upper Pleinsbachian and Lower to Middle Toarcian fossil assemblages. In the type area, this formation has a measured cumulative thickness of over 14,000 metres.

The Unuk River Formation is unconformably overlain by the Middle Jurassic Betty Creek Formation which is mainly composed of clastic sediments with minor conglomerate, carbonate, chert, and volcanic rocks. Fossil collections made from the various sedimentary units have defined the age of the Betty Creek Formation as Lower to Middle Bajocian, that is, lower Middle Jurassic.

The Mount Dilworth Formation, a thin but regionally extensive blanket of felsic pyroclastics, overlies the Betty Creek Formation. Pyritiferous felsic welded tuffs, tuff breccia flows and thin lenses of siltstones, mudstones and argillites are the prevalent lithologies.

A thick sequence of Middle Jurassic, thinly bedded turbiditic siltstones (Salmon River Formation) overlies the Mount Dilworth Formation. Anderson (1990) has recently postulated that the

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AGE	GROUPS	FORMATIONS	MEMBERS	LITHOLOGIES
Bathonian	Bowser Lake	Ashman	Main Sequence	Turbidites, wackes, intraformational conglomerates
			Basal Conglomerate	Chert pebble conglomerates
Bajocian	Spatsizi(?)	Salmon River	Pyjama Beds	Thin bedded, alternating siltstones and mudstones
Toarcian			Basal Limestone	Gritty, fossiliferoius limestone
Toarcian		Mount Dilworth	Upper Lapilli Tuff	Dacitic lapilli tuff with flow-banded clasts
	·		Middle Welded Tuff	Dacitic welded ash flow and lapilli tuff
			Lower Dust Tuff	Dacitic dust tuff
Pliensbachian		Betty Creek	Sedimentary Members	Hematitic volcaniclastic sediments, and turbidites
	Hazelton		Volcanic Members	Andesitic to dacitic tuffs and flows
Sinemurian		Unuk River	Premier Porphyry	Two feldspar + hornblende porphyritic tuffs
Hettangian(?)			Upper Andesite	Massive tuffs with local volcaniclastic sediments
			Upper Siltstone	Turbidites, minor limestones
			Middle Andesite	Massive tuffs and minor volcaniclastic sediments
			Lower Siltstone	Turbidites
			Lower Andesite	Massive to bedded ash tuffs
Norian	Stuhini		Volcanic Members	Pyroxene porphyry flows and tuffs
to Carnian			Sedimentary Members	Turbidites, limestones, conglomerates

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## TABLE 2. Table of Formations - Unuk River Area



Eskay Creek deposit "appears to be stratabound within the siliceous to limey sedimentary rocks and pillowed lava sequence of the Eskay Creek facies of the Salmon River Formation".

The Hazelton Group rocks were intruded by granitic rocks of the Coast Plutonic Complex. These intrusions consist of a variety of plutons representing at least four intrusive episodes spanning late Triassic to Tertiary time. These include synvolcanic plugs, small stocks, small satellite diapirs, dyke swarms, isolated dykes and sills as well as batholiths belonging to the Coast Mountain Complex. Granodiorite is the predominant rock type, although a variety of lithotypes are recorded. The orogenic event which accompanied this intrusive phase also produced a major structural grain along the western margin of the Central Cordillera. The stratigraphic sequence has been folded, faulted and weakly metamorphosed during Cretaceous time, however, some Jurassic strata are polydeformed and may record an earlier deformational event. Regional metamorphism is classified as lower greenschist facies and is characterized by saussuritized plagioclase, chloritized mafic minerals and the conversion of clay constituents to white mica. The age of metamorphism is Cretaceous, however, near the contact of the Coast Plutonic Complex, granitic dykes thought to be offshoots of the complex have been mylonitized, indicating that deformation has also occurred after this Eocene intrusive event (Alldrick et al., 1987).

### **Regional Economic Geology**

The Iskut-Unuk River area hosts many significant gold, silver and base metal deposits (Figure 3). These deposit types include epithermal and mesothermal precious metal shear-veins and replacements, calc-alkaline and alkaline copper  $\pm$  gold porphyries, concordant massive sulphides, stratabound hydrothermal deposits and skarns. The majority of these are hosted by Upper Triassic to Lower Jurassic volcanics and sediments and display a spatial relationship with early Jurassic potassic intrusions. A brief description of some of the more important deposits in the region are as follows:

#### Eskay Creek (21 Zone)

The mineralization at Eskay Creek was discovered in 1932 and active prospecting has continued sporadically since then. Two adits were the result of limited mining activity on this prospect. In 1988, Calpine Resources Incorporated discovered high-grade gold and silver mineralization on the #21 Zone (Northern Miner, November 7, 1988). Eskay Creek appears to display characteristics of both epithermal exhalative and volcanogenic massive sulphide types of deposits. The deposit has been described as consisting of stratabound goldsilver-base metal zones, hosted by a carbonaceous mudstone unit (Salmon River Formation?) at the top of a rhyolite breccia sequence. The mudstone is overlain by andesitic pillow lavas. The rhyolite (Mount Dilworth Formation) is underlain by dacitic tuffs of the Betty Creek Formation. The southern part of the deposit (21A Zone) contains massive to disseminated stibnite-realgar mineralization with associated high grade gold and minor silver contents. This is underlain by a footwall stockwork zone in the rhyolite. The northern part of the deposit (21B Zone) is a very goldsilver rich, base metal sulphide lens, with extensive footwall stockwork mineralization. This mineralization is associated with pervasive quartz-chlorite-muscovite alteration and minor gypsum, barite, feldspar and calcite (Idziszek et al., 1990).

The 21C Zone lies 25 metres to 50 metres down section from the 21B Zone. Diamond drilling has identified the mineralized zone along a minimum strike length of roughly 600 metres. The 21C Zone is strongly mineralized with gold and silver, however, sulphide content is low compared to the 21B Zone. In addition, the Pumphouse Lake Zone has been traced by drilling over a strike length of 250 metres. There have been 665 surface diamond drill holes drilled to date plus an exploration decline has been driven to test the main contact ore lens and three mineralized horizons. Wall chip assay results indicate a grade-width return of 1.56 oz/t Au and 40.5 oz/t Ag over 10 metres. This section includes 2.51 oz/t Au and 62.6 oz/t Ag over 5.54 metres. Underground drifting, bulk sampling and drilling will continue through the winter months of 1990-91.

Exploration activity has brought the total geological reserve base to an estimated 5,300,000 ounces gold equivalent at the 0.10 oz/ton Au threshold. This high grade reserve is contained within both the 21B and 21A Deposits. The potential to significantly increase the total reserve base is considered to be excellent. Immediately apparent potential lies within the northern 21B Deposit, in the Pumphouse Lake Zone, and the 21C Deposit. Additional new zones of discovery may be forthcoming pending results of surface drilling now underway elsewhere on the Eskay Creek property (Vancouver Stockwatch, September 18 and October 1, 1990).

### Sulphurets Area

Several different deposit types are present in the Sulphurets map sheet (Open File 1988-4). A group of occurrences known as the Sulphurets Camp is located approximately 20 km southeast of Eskay Creek. Both porphyry type and mesothermal to epithermal precious metal deposits are present.

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Apparent overprinting of mineralization types and multiple generations of alteration and vein assemblages are noted. Most mineral occurrences in the area are hosted by the upper part of the Unuk River Formation or the lower part of the Betty Creek Formation (Britton et al., 1988). The Goldwedge Zone is hosted by the Betty Creek Formation. Other deposits in the camp include the Sulphurets and Snowfield Zones, the West Zone deposit and the Kerr deposit. Mineralization can be grouped into four main categories; veins, disseminations, intrusive contacts and stratabound. Extensive gossans are associated with mineralization in the area.

The mineralization of the West Zone is located in structurally controlled quartz vein stockworks within a silicified, sericitic alteration zone. The complex vein system, within the zone, is up to 40 metres thick and contains in excess of 60% vein material. The zone has been traced for over 600 metres along strike and for 500 metres at depth. Andesitic tuffs of the Unuk River Formation, near the volcanic-sediment contact, host the deposit. The mineralization consists of pyrite, electrum, native gold, argentite, galena, sphalerite, chalcopyrite, tetrahedrite, pyrargyrite, proustite, freibergite and stephanite.

### Johnny Mountain

This mine has produced 100,300 tons of ore grading 0.46 oz/t gold, 1.0 oz/t silver and 0.75% copper to the end of October, 1989 (D. Yeager, personal communications, January, 1990). The deposit comprises five sub-parallel quartz veins, hosted by interbedded andesitic to dacitic volcaniclastics and volcanic sediments (Lower Jurassic) which are cut by feldspar porphyry dykes. The veins reportedly thicken and contain higher grades at quartz-carbonate cross structures and at lithologic contacts. The northeast trending veins are generally one to two metres wide and contain pyrite and chalcopyrite with minor sphalerite, galena and pyrrhotite. Electrum and native gold have been reported. A distinctive alteration halo surrounds the veins. Outward from the vein, the alteration sequence progressively changes from massive potassium feldspar and ankerite to a quartz-pyrite stringer zone to a disseminated pyrite zone.

### <u>Snip</u>

This deposit is hosted by massive to bedded siltstone and feldspathic wacke (Upper Triassic). The ore zone ('Twin Zone') is described as a one to ten metre thick, discordant, banded shear vein which trends southeast. The zone consists of veins with alternating bands of massive, streaky calcite, heavily disseminated to massive pyrite, biotite-chlorite, quartz and pyritic to non-pyritic fault gouge.

Mineralization consists of pyrite, lesser pyrrhotite, minor sphalerite and locally abundant arsenopyrite, galena, molybdenite and chalcopyrite. The gold grades are reported to be fairly uniform throughout, although native gold has been observed locally.

#### Summit Lake (Scottie Gold)

This mine produced 160,264 tonnes of ore grading 18.6 g/t gold and 10.1 g/t silver between 1981 and 1984. Epigenetic, mesothermal veins are developed along three sub-parallel shear systems which form part of a ladder vein set. Within these structures are plunging, parallel ore shoots consisting of massive pyrrhotite and/or pyrrhotite-pyrite, up to 5 metres wide. The shoots are usually symmetrically bordered by gold-bearing, quartz-carbonate-pyrrhotite-base metal sulphide vein swarms and disseminated base metals. These are hosted by brecciated and intensely silicified, hematized, carbonatized and chloritized wallrock. The overall gold/silver ratio is 2:1.

### SIB Group

American Fibre and Silver Butte Resources have drilled 20 holes on their SIB claims and intersected mineralization contained in graphitic mudstone interbedded with felsic volcanic units. One hole returned 49.6 feet grading 0.42 oz/t Au and 30.91 oz/t Ag which includes 16.7 feet of 0.86 oz/t Au and 50.24 oz/t Ag. The geological setting is believed to be similar to the Eskay Creek deposit (The Northern Miner, October 22, 1990).

### <u>Inel</u>

Avondale Resources conducted underground drilling and drifting of the AK Zone at the Inel property which produced significant high grade assay results in 1989. The underground program comprised 1,500 feet of adit and footwall drifting. A recent 24.3 foot intercept grading 1.19 oz/t Au, 1.39 oz/t Ag and 0.87% zinc was returned from underground drilling (The Northern Miner, October 15, 1990).

Recent exploration activity north of the Iskut River has resulted in the discovery of three different styles of mineralization. Gulf International has been drilling stratabound skarn mineralization (Mississipian age) on their McLymont Creek property. The zone has been traced for some 300 metres along strike and 200 metres at depth. The best reported drill results include 3.55 oz/t gold over 6.5 feet and 0.62 oz/t gold over 10 feet (L.O.M. Western Securities Ltd., 1990).

Mineralization consists of pyrite, chalcopyrite, sphalerite and galena with a gangue of barite, calcite, gypsum, magnetite and specularite. It is believed that the formation of the deposit is due to the presence of a strong structure, chemically reactive host rocks and close proximity to intrusive bodies (Logan et al., 1990). Palaeozoic strata on Kestral's KRL property and Avondale's Forrest property are reported to host mesothermal, shear related gold mineralization. Kestral has reported that channel samples from veins graded up to 7.28 oz/t gold. Avondale has indicated that a large mineralized hydrothermal system, which has been traced for over 3 miles, hosts at least 19 precious and base metal occurrences. Rock samples grading up to 5.8 oz/t gold, 3.6 oz/t silver and 9.5% copper have been reported (L.O.M. Western Securities Ltd., 1990). The mineralization is found in quartz stockworks and veins and consists of gold and silver-bearing quartz-chalcopyrite, with or without malachite, azurite, arsenopyrite, galena, bornite and hematite. The mineralization is spatially related to granitic (Jurassic) and, locally, dioritic (Permian) intrusions. Further north, Cominco has reported polymetallic, massive sulphide float on their Fore More property. They have found more than 800 massive sulphide boulders containing fine-grained pyrite, sphalerite, galena, barite, chalcopyrite and, locally, silver minerals (Logan et al., 1989).

Britton et al. (1989) listed 55 mineral occurrences on the Unuk area map sheet. These showings are predominantly gold/silver occurrences and are hosted by a number of various lithologies. Most can be classified into one of four categories: stratabound, vein, skarn, and disseminations. Grove (1986) determined that the age of the mineralizing events is variable, and notably, can be post-Triassic.

Stratabound mineralization consists almost exclusively of pyritic zones and lenses contained within a particular stratum or restricted set of strata. The best example is the Eskay Creek deposit.

Intrusive-contact (skarn) deposits show a close spatial and temporal relationship with igneous intrusions. Three deposits in this category are the E & L nickel/copper deposit (Minfile #006), the Max copper/iron skarn (Minfile #013), and the Chris-Anne copper/iron skarn (Minfile #125). Britton et al.(1989) stated:

Mineralization at the E & L occurs within two medium- to coarse-grained, olivine-pyroxene gabbro bodies. These roughly triangular plugs are each approximately 1300 square metres in area and are probably connected. They intruded a sequence of argillites, tuffaceous siltstones, and grey dacitic ash tuffs that strike northwest with moderate to steep southwesterly dips. Mineralization consists of pyrrhotite, pentlandite, and chalcopyrite, with lesser amounts of pyrite and magnetite. In the northwestern gabbro, mineralization extends up to the contact with

the sediments, whereas in the southeastern gabbro, mineralization is confined to the pluton. Diamond drilling has delineated pipelike pods and disseminations of sulphides to a depth of 120 metres. Drill-indicated reserves are 2.8 million tonnes of 0.7% Ni and 0.6% Cu (Sharp, 1965).

The Max prospect lies on the northwest side of McQuillan Ridge, between the Unuk and South Unuk Rivers, at elevations between 455 and 1500 metres. Massive magnetite with lesser pyrrhotite and chalcopyrite occur in skarn-altered sedimentary rocks adjacent to a diorite stock. Garnet, epidote, actinolite, and diopside characterize the skarn assemblage. Drilling has indicated a reserve of 11 million tonnes at 45% iron (Canadian Mines Handbook 1973-1974, page 432).

The Chris-Anne prospect lies approximately 3 kilometres east of the Max. Skarn mineralization is reported in limestone beds which are up to 10 metres thick and that are interbedded with volcaniclastics. Magnetite and pyrrhotite-rich layers, from 0.5 to 7 metres thick, with minor chalcopyrite, extend over a distance of 1 km. There are minor intrusive bodies reported on the property. Grades range from 0.1% to 0.4% copper (Allan and MacQuarrie, 1981).

The gold potential of these skarn deposits does not appear to have been tested. Based on recent skarn studies (Ettlinger and Ray, 1988), this area has many features that are associated with gold-enriched skarns elsewhere in the province: sequences of calcareous and tuffaceous host rocks; structural deformation; intrusion by dioritic I-type granitoids; and contact metamorphism and recrystallization. Some auriferous skarns are enriched in cobalt, an element that may be a useful pathfinder.

High-grade precious metal quartz veins are the target of exploration programs at Mount Madge (Minfile #240 and #233) by Bighorn Development Corporation, and at the Doc prospect (Minfile #014) by Echo Bay Mines Limited. Britton et al.(1989) reported:

The Mount Madge prospects are located south of Sulphurets Creek near its confluence with Unuk River, on the east and west sides of Mandy Glacier. Two different targets are being evaluated (Kruchkowski and Sinden, 1988). On the west, the C-10 prospect (Minfile #240) is a stockwork of thin quartz veinlets, locally with thicker quartz lenses, in intensely altered, fine-grained tuffaceous andesite or dacite. Quartz veinlets locally form up to 30% of the rock. The alteration assemblage consists of quartz and sericite with up to 10% pyrite. Chalcopyrite and traces of sphalerite are also present. The rocks are strongly foliated to schistose and are very similar to the broad alteration zones seen at Brucejack Plateau 12 kilometres to the northeast (Britton and Alldrick, 1988). Soil samples locally return analyses in excess of 1 ppm gold.

Two kilometres to the east, Ken Konkin discovered a massive pyrite-siderite float boulder with visible gold. Prospecting uphill led to the discovery of the GFJ veins (Minfile #233), apparently flat-lying, zoned siderite-quartz-sulphide veins that returned assays up to 121 grams per tonne gold (Kruchkowski and Sinden, 1988). The veins are poorly exposed. Float blocks seen this year display symmetrical zoning from margin to core across vein widths of 10 to 15 centimetres. Vein margins are 1 to 2 centimetres of thin white quartz layers separated by hairline accumulations of

very fine-grained tin-white sulphide, probably arsenopyrite. The core is a very coarse-grained intergrowth of siderite, milky quartz, and cubes and clusters of pyrite, with lesser amounts of sphalerite and chalcopyrite as crystals and irregular masses. Rare tetrahedrite and visible gold have been observed (K.Konkin, personal communication, 1988). The veins cut variably foliated and esitic ash tuffs with thin interbeds of foliated to schistose siltstones.

The Doc prospect (Minfile #014) is located at treeline on a ridge overlooking the South Unuk River, opposite the mouth of Divelbliss Creek. The prospect consists of several west-northwest trending quartz veins up to 2 metres wide that have surface strike lengths of up to 275 metres (Gewargis, 1986). The main veins (Q17, Q22) are massive white quartz with sparse sulphide mineralization (5% to 10%) consisting of galena, pyrite, chalcopyrite, and sphalerite, with associated specular hematite and magnetite. Precious metal values are mostly confined to the sheared edges of veins and immediately adjacent wallrock. Shear zones with very little quartz may also return good values. Scraphim (1948) observed that gold was associated with either specular hematite or with galena and pyrite, but not with chalcopyrite and pyrite assemblages. The veins are a true fissure type, crosscutting folded and metamorphosed andesitic tuffs and thin-bedded sediments, including marble, that have been intruded by irregular dioritic dykes or sills and small monzodioritic plugs. The veins are different from any others seen in the Sulphurets or Unuk map areas. They have very restricted wallrock alteration aureoles, no apparent zoning, and appear to be limited to a few large fluid pathways. In this, they display characteristics of mesothermal veins. Structural control of the vein sets has not been determined but may be due to fractures related to folds in the host rocks. Total mineral inventory of the Q17 and other veins is given as 426,000 tonnes with 9.26 grams per tonne gold and 44.91 grams per tonne silver (Northern Miner, November 7, 1988).

Porphyry-type disseminated pyrite, chalcopyrite, and molybdenite mineralization occurs immediately north and south of King Creek, west of Harrymel Creek. Two properties have been worked: the VV to the south and the Cole to the north.

The VV property (Minfile #079) is the site of a heavily weathered monzonitic intrusive body in fault contact, on the east and west, with layered andesitic lapilli tuffs and tuff breccias with minor siltstone and calcareous sandstone interbeds. The stock is 250 metres wide, at least 6 kilometres long, strikes northerly, and dips steeply to the west, parallel to the country rocks. Chalcopyrite occurs in quartz stockworks and as fine disseminations within the monzonite. Molybdenite, sphalerite, malachite, and azurite have also been reported (Winter and McInnis, 1975; Mawer et al., 1977). Representative assays give 0.34% copper, 0.003% molybdenum, 2.1 grams per tonne silver, and 0.8 gram per tonne gold. Maximum gold and silver values obtained were 8.65 grams per tonne gold and 19.54 grams per tonne silver (Mawer et al., 1977).

The Cole prospect (Minfile #209) is situated approximately 4 kilometres north of the VV claims; it appears to be on strike with the same fault system and has similar intrusive and country rocks. Mineralization consists of up to 10% pyrite as disseminations and fracture fillings. Minor chalcopyrite and malachite have been reported but the bedrock source of the gold/silver soil anomalies has not been

TABLE 3: Summary of Mineral Deposits in the Golden Triangle Area	
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Deposit	Туре	Host	Ore Reserves (tous)	Grade	Comments
Silbak-Premier	epithermal/ porphyry	Unuk River Formation (Lower Jurassic)	6,100,000	0.064 oz/t Au & 2.39 oz/t Ag	production resumed 1989
Big Missouri	epithermal and stratabound	Unuk River Formation (Lower Jurassic)	1,860,000	0.091 oz/t Au & 0.67 oz/t Ag	production resumed 1989
SB	epithermal	Unuk River Formation (Lower Jurassic)	152,000	0.335 oz/t Au, 0.79 oz/t Ag, 1.42% Pb-Zn	1982 discovery
Summit Lake	mesothermal shear vein	Unuk River Formation (Lower Jurassic)	132,000	0.56 oz/t Au	closed 1985
West Zone	mesothermal shear vein	Unuk River Formation (Lower Jurassic)	854,072	0.354 oz/t Au & 22.94 oz/t Ag	feasibility stage
Granduc	concordant massive sulphide	Unuk River Formation (Lower Jurassic)	10,900,000	1.79% Cu, 0.004 oz/t Au & 0.24 oz/t Ag	closed 1984
Kerr	alkaline porphyry	Unuk River Formation (Lower Jurassic)	66,000,000	0.86% Cu & 0.010 oz/t Au	1987 discovery
Eskay Creek	stratabound hydrothermal system	Mount Dilworth Formation (Lower Jurassic)	6,035,220 (prelim.)	0.643 oz/t Au & 15.61 oz/t Ag	1988 discovery drilling still in progress
Goldwedge	mesothermal shear vein	Betty Creek Formation (Lower Jurassic)	295,000	0.63 oz/t Au & 2.44 oz/t Ag	1981 discovery
Johnny Mountain	mesothermal shear vein	Unuk River Formation (Lower Jurassic)	740,000	0.52 oz/t Au, 1.0 oz/t Ag & 0.75% Cu	production commenced 1988
Snip	mesothermal shear vein	Stuhini Group (Upper Triassic)	1,032,000	0.875 oz/t Au	feasibility stage
Galore	alkaline porphyry	Stuhini Group (Upper Triassic)	125,000,000	1.06% Cu, 0.013 oz/t Au & 0.25 oz/t Ag	1955 discovery
Shaft Creek	calc alkaline porphyry	Stuhini Group (Upper Triassic)	1,000,000,000	0.30% Cu & 0.004 oz/t Au	dormant
Red Chris	alkaline porphyry	monzonite (Late Triassic to Early Jurassic)	43,700,000	0.56% Cu & 0.010 oz/t Au	dormant
E&L	porphyry	Nickel Mountain Gabbro (Jurassic)	2,930,000	0.80% Ni & 0.62% Cu	dormant

located (Korenic, 1982; Gareau, 1983). Reported assays range up to 0.43% copper, 7.12 grams per tonne gold, and 13.03 grams per tonne silver. Gold and copper values show a positive correlation on both properties.

### **Property Geology**

The Cook property was geologically mapped by Keewatin Engineering Inc. personnel at a scale of 1:10,000 and information was recorded on contour maps enlarged from 1:50,000 NTS topo maps (Map 1). The property is approximately 85% forest covered and is bisected by the Unuk River and its broad channel of fluvial and glaciofluvial deposits (13%). Roughly 2% outcrop is exposed in drainage gullies, part of the Unuk River's Third Canyon and the eastern part of the Cook 2 claim near the treeline. Several small, isolated outcrops also occur on steep timbered slopes throughout the property.

Regional geological mapping by Britton et al. (1989) shows that the property is underlain predominantly by Upper Triassic to Lower Jurassic supracrustal rocks (Figure 3). The central portion of the property is underlain by Upper Triassic Stuhini Group sediments, and the eastern and western portions by the Lower Jurassic Unuk River Formation. In the northwestern corner of the property, the Unuk River Formation, which consists of andesitic volcanics with lesser sediments, has been intruded by the Tertiary King Creek Dyke Swarm. Pleistocene basalt flows underlie the lower reaches of the Unuk River valley. These units are described by Britton et al. (1989) below:

### **Lithologies**

#### Upper Triassic Stuhini Group

The Stuhini Group rocks occupy the nose of a north-plunging anticline, and occur as a wedge between the Harrymel-Unuk shear zone and the overlying Unuk River Formation. These rocks underlie the central portion of the property, and consist of thin bedded siltstones, immature finegrained wackes, chert, impure limestones, and andesitic tuffs that locally attain a considerable thickness. Andesitic tuffs may be laminated to massive, aphanitic to hornblende-feldspathic. Limestones occur as thin beds or discontinuous lenses that show extensive recrystallization and highly disrupted internal structure. Fossil evidence led Britton et al. (1989) to ascribe a Carnian to Norian age to these rocks.

#### Upper Triassic to Lower Jurassic <u>Unuk River Formation</u>

Britton et al. (1989) described this sequence as green and grey intermediate to mafic volcaniclastics and flows with locally thick interbeds of fine-grained immature sediments. The volcanics are reported to be dominantly massive to poorly bedded plagioclase (± hornblende)

porphyritic andesite. The sediments are predominantly grey, brown, and green thinly bedded tuffaceous siltstone and fine-grained wacke. These Norian to Sinemurian age rocks of the Unuk River Formation constitute the lowermost unit of the Hazelton Group. The basal contact with Triassic strata appears to lie near the top of a thick sequence of clastic sedimentary rocks. Neither an angular unconformity nor a widespread conglomerate marks the lower contact. Government regional geological mapping and mapping completed during the 1989 property exploration program indicate this unit underlies most of the western portion of the property and the extreme eastern part of the Cook 2 mineral claim.

#### Eccene and possibly Jurassic Coast Plutonic Complex

Britton et al. (1989) described the intrusions north of Boulder Creek as biotite-hornblende quartz diorite which probably contain many discrete stocks. The country rock contacts are reported to be sharp, discordant, and thermally metamorphosed. The age of these intrusions is Eocene, but the complex may include remnants of Jurassic granitoids. Mapping completed during the 1989 property exploration program indicates that this unit underlies a ridge located in the centre of the Cook 3 and 4 mineral claims.

#### Tertiary King Creek Dyke Swarm

The limits of the unit, as shown on Figure 4, roughly indicate where the dykes exceed 50% of the exposed bedrock. This north trending belt of dykes range compositionally from rhyodacite to andesite, and texturally from aphanitic to holocrystalline. Britton et al. (1989) has classified individual dykes as feldspar porphyry dacites, andesite, diabases, and hornblende to quartz diorites. They are reported to be up to 10 m wide and are anastomose, cross-cutting one another at oblique angles. Most of the dykes are described as white-weathering medium-grey andesite to dacite with fine to coarse feldspar phenocrysts in an aphanitic groundmass.

#### Pleistocene to Recent <u>Basalt Flows and Tephra</u>

Britton et al. (1989) mapped these flows along the valleys of the Unuk River and Canyon Creek. They are reported to commonly display columnar jointing.

Minimal geological mapping, conducted concurrent with lithogeochemical and stream silt sampling, near the western boundary of the Cook 3 claim, confirms that the bedrock of the western half of the Cook 3 and 4 claims consists of dark green, siliceous andesitic tuffs and volcaniclastics sandwiched between weakly pyritic black argillite. This volcanic-sedimentary package of Unuk River Formation rocks was traced up steeply incised, gossanous gullies from Canyon Creek to approximately the 1,700 foot elevation. Several precipitous and rusty weathering cliffs characterize these drainages above the 800 foot elevation. The valley floors of Canyon Creek and the Unuk River are composed of Recent flood basalts which originated from a volcano near the headwaters of Canyon Creek (Figure 4, Map 1).



#### Structure

Britton et al. (1989) report that actual fault surfaces and zones are rarely seen in the Unuk River area. The gossanous west fork of the western drainage gully in the Cook 3 claim is interpreted from air photographs as a major linear, which continues northwesterly for a considerable distance. The bedrock within this gully is siliceous, intensely gossanous and pervasively sulphidized suggesting the probability of structurally controlled alteration and pyritic mineralization. Observations made during the 1990 exploration program indicate that the two drainages in the western half of the Cook 3 claim represent the surface traces of two northerly trending fault zones with splays to the east and west.

The Flory Creek Fault bisects the property in a northeast-southwest direction on the Cook 1 and 2 claims. This fault is displaced by a subsequent north-south trending fault which offsets the Flory Creek Fault in the northwestern corner of the Cook 2 claim (Figure 4).

### Alteration

The sedimentary and volcanic strata within the westerly drainage gully in the Cook 3 claim exhibits a strongly siliceous and limonitic character. The bright limonitic staining on the canyoned walls of the gully results from the weak to moderately pyritzed argillic sediments and tuffaceous volcanics.

Elsewhere on the property, the Stuhini Group interbedded lapilli tuffs, volcaniclastic and sedimentary rocks are weakly chloritized. This is particularly evident in the vicinity of the Flory Creek Fault from the central to the northeastern corner of the Cook 1 claim.

#### **Mineralization**

Available information (Minfile, assessment reports, geological maps, reports, etc.) indicates that one mineralized occurrence is known within the area currently covered by the Cook property. The Six Mile #2 copper showing (Minfile #225) occurs on the Cook 1 claim at the southern end of a narrow lake. Minor chalcopyrite and up to 5% disseminated pyrite occur within and adjacent to the Flory Creek Fault Zone in chloritized andesitic flows and tuffs of the Upper Triassic Stuhini Group.

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Geological mapping and lithogeochemical sampling failed to identify any areas of significant economic mineralization. Weak (<1%) pyritic sulphide mineralization occurs ubiquitously throughout the property, however, higher concentrations of disseminated pyritic sulphides, up to 3%, are contained within the siliceous argillites and tuffs examined in the western drainage gully on the Cook 2 claim.

### **1990 EXPLORATION PROGRAM**

### **Geological Mapping**

Approximately 7% of the property was examined during the 1990 program and work performed consisted of contour soil sampling, stream silt sampling, lithogeochemical sampling and limited geological mapping. This activity was directed primarily toward the Cook 1 and 3 claims with minor sampling in the southwestern corner of the Cook 4 claim and the northwestern corner of the Cook 2 claim (Maps 1-3). Mapping was performed concurrent with stream silt sampling and lithogeochemical sampling in the two south-flowing drainages in the western half of the Cook 3 claim and southwestern corner of the Cook 4 claim. These gullies were sampled from approximately the 1,700 foot elevation to Canyon Creek. A single 950 metre soil line was established, commencing near the southwestern tip of the long narrow lake in the east-central part of the Cook 1 claim. The line roughly follows the 750 foot contour southwestward for 550 metres before changing to a westerly course and terminating near the Unuk River. A minimal amount of geological mapping was conducted in the northeastern corner of the Cook 1 claim in the vicinity of the Flory Creek Fault and the Six Mile #2 copper showing (Minfile #225). Examination of this area failed to detect any significant economic sulphide mineralization hosted within the altered volcanics. Analytical results will be discussed in the following sections.

### **GEOCHEMISTRY**

#### Sampling Procedure

A total of four rock samples, 19 stream silt samples and 20 contour soil samples were collected during the 1990 reconnaissance survey. Rock grab samples were collected from outcrops exhibiting favourable characteristics such as sulphide content, alteration and shearing. Lithogeochemical samples were placed in marked plastic sample bags accompanied with a numbered tag for sample

identification purposes. All sample sites were marked with a tyvek tag and fluorescent ribbon coded with the corresponding sample number.

Soil samples were collected from an average depth of 25 cm at 50 metre slope corrected intervals from a single soil line commencing near the top of a ridge west of the southern tip of a long narrow lake on the Cook 1 claim. This line trends southwest and west through the central Cook 1 claim and into the northwestern corner of the Cook 2 claim.

Twenty soil samples were collected from sample pits dug with a long handled mattock from which good representative  $B_1$  horizon soils were obtained. Soil profiles are well developed on the timbered slopes and soils are reddish-brown sandy clays and silts. Soil samples were placed in numbered, large gusseted kraft paper soil bags and the sample sites were correspondingly identified with a coded fluorescent ribbon and tyvek tag.

Stream silt samples were collected, concurrent with mapping and lithogeochemical sampling, from the two active, sub-parallel drainage gullies in the western half of the Cook 3 claim. Nineteen stream silt samples were collected at 50 metre intervals along these two drainages and placed in marked kraft paper sample bags. Sample sites were correspondingly marked with a tyvek tag and fluorescent ribbon. The two drainages were extensively sampled, at close intervals, to better detect the sources of any mineralization within these two fault zones.

Detailed notes were recorded for all of the samples and these are incorporated in Appendix V. Analytical results are presented in Appendix IV and geochemical values are plotted on Maps 2 and 3. Ground control for the contour lines, mapping and stream silt sampling was provided by altimeters, compass and topo chain. All crews were supplied with 1:10,000 and 1:50,000 scale topo maps for plotting geological and geochemical data.

Geochemical samples were subsequently shipped to Bondar-Clegg and Company Ltd. in North Vancouver for geochemical analysis/assay. The analytical techniques are described in Appendix III.

### **Rock Geochemistry**

Reconnaissance mapping and lithogeochemical sampling were completed over selected parts of the property. This work was concentrated, on the steep slopes, within the two drainage courses in the western Cook 3 claim, where gossanous rock exposures were most abundant. Four rock grab samples were obtained from rusty weathering cliffed exposures between the 1,000 and 1,700 foot elevations. The rock sample locations are plotted with the geology on Map 1 and the geochemical values are plotted on Maps 2 and 3. Analytical results are presented in Appendix IV and rock sample descriptions are recorded in Appendix V.

The rock grab samples selected were pyritic and characterized by intense quartz-limonite alteration. Analysis for gold and base metals failed to record any anomalous values.

### Soil Geochemistry

Twenty contour soil samples were collected at 50 metre intervals along a 950 metre soil line. Good quality soil samples were obtained from well developed, rusty orange to reddish brown  $B_1$  horizons at an average depth of 25 cm. Soil composition varies from silty to sandy clays and includes 5-10% organics and chip fragments. Analytical results are low, recording weakly elevated gold-insoil values up to 54 ppb Au. No anomalous values were returned for the other elements tested (Maps 2 and 3).

### Stream Silt Geochemistry

Nineteen stream silt samples were collected at roughly 50 metre intervals along the two steep drainage courses in the western half of the Cook 3 claim (Map 1). Analytical results for gold were low, however, elevated zinc values (up to 692 ppb Zn) are recorded for 16 of the 19 silt samples collected from the two gullies. Sphalerite mineralization was tentatively identified during the mapping and lithogeochemical sampling of the western gully, and appears to be confirmed in the analytical results. Coincident weakly elevated lead values are recorded in the silts collected from the two gullies.

#### **CONCLUSIONS**

Contour soil sampling, stream silt sampling, lithogeochemical sampling and geological mapping was the focus of exploration activity on the Cook property during the 1990 program. Mapping has confirmed that the property bedrock geology consists of an assemblage of interbedded black argillite, tuffs and andesitic flows of the Lower Jurassic Unuk River Formation, and interbedded sediments, andesitic lapilli tuffs, flows and fragmental flows of the Upper Triassic

Stuhini Group. These rocks are commonly silicified, chloritized and pyritized. Silica-sulphide alteration occurs predominantly within the western gully near the western boundary of the Cook 3 claim. Chloritized, weakly to moderately sulphidic volcanic tuffs and fragmental flows occur along the northwestern side of the Flory Creek Fault Zone.

A total of four rock grab samples, 20 contour soil samples and 19 stream silt samples were collected for analysis with the objective of evaluating the property's economic potential plus examining target areas recommended for follow-up work in the 1989 report. Low gold values were recorded for all samples. Coincident, weakly elevated lead (66 ppm) and zinc (692 ppm) values are recorded from stream silts obtained from the two gossanous gullies in the western half of the Cook 3 claim. These drainages probably represent the surface traces of two major structural linears as evidenced by the presence of intense silicification, sulphide mineralization and gossanous surface weathering within the incised gullies.

#### **RECOMMENDATIONS**

Analytical results from the 1990 geochemical sampling program were low and exploration activity failed to detect any mineralized targets worthy of merit. A review of old assessment records and a B.C. Minister of Mines report, dated 1911, indicates that the Fewright (6-Mile) showing (Minfile #097) remains a worthwhile mineralized target and warrants further investigation. It is recommended that this showing and old workings be located and lithogeochemically sampled. This search should be conducted along the forested northwestern side of the Unuk River within the Cook 3 and 4 claims. Coincident with this search, it is recommended that two to three soil lines be established between the 500 foot and 1,000 foot contour levels along the slopes on the western side of the Unuk River in the eastern half of the Cook 4 claim. Positive analytical results from this survey may better delineate the location of the Fewright (6-Mile) showing.

Respectfully submitted,

KEEWATIN ENGINEERING INC.



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Report on Business Magazine, November, 1990.

Vancouver Stockwatch, September 18 and October 1, 1990.

### **STATEMENT OF QUALIFICATIONS**

I, GARY L. WESA, of #309 - 6669 Telford Avenue in the Municipality of Burnaby, in the Province of British Columbia do hereby certify that:

- 1. I am an independent consulting geologist under subcontract to Keewatin Engineering Inc. with offices at Suite 800 - 900 West Hastings Street, Vancouver, B.C.
- 2. I am a graduate of the University of Saskatchewan (1974) with a B.Sc. degree in Geology and I have practised my profession continuously since graduation.
- 3. I have been employed in mineral exploration since 1970 in Canada and the U.S.A.
- 4. I am a Fellow of the Geological Association of Canada.
- 5. I am the author of the report entitled "Geological and Geochemical Report on the Cook Property, Skeena Mining Division, British Columbia", dated January 2, 1991.
- 6. I have personally performed or supervised the work referenced in this report and I am familiar with the regional geology and geology of nearby properties.
- 7. I do not own or expect to receive any interest (direct, indirect or contingent) in the property described herein nor in the securities of Canadian Cariboo Resources Ltd. in respect of services rendered in the preparation of this report.

Dated at Vancouver, British Columbia this \_\_\_\_\_ day of January, 1991.

Respectfully submitted, Gary L. Wesa, B.Sc., FGAC

## **APPENDIX I**

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## **Itemized Cost Statement**

## **ITEMIZED COST STATEMENT**

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COOK SUMMARY - 285e October 29, 1990			
1.	Domicile	\$ 225.00	
2.	Wages	1,080.00	
3.	Equipment Rental	90.00	
4.	Helicopter	827.48	
5.	Assays: Rocks - 4@\$13.50 Soils - 20@\$11.00 Silts - 19@\$11.00	54.00 220.00 209.00	
6.	Demobilization	194.52	
7.	Post Field/Report	1,300.00	
	TOTAL	\$4,200.00	

## **APPENDIX II**

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## Summary of Personnel

## **SUMMARY OF PERSONNEL**

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COC	K PROPERTY	7 - 285e	
Employee	Days	Day Rate	Total
Colin Anderson	1	\$250.00	\$ 250.00
Robert Viens	1	\$200.00	200.00
Aaron Wardwell	1	\$190.00	190.00
Pat Wilson	1	\$250.00	250.00
Heath Whittam	1	\$190.00	190.00
TOTAL			\$1,080.00

## **APPENDIX III**

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## **Analytical Procedure**

#### ANALYTICAL PROCEDURE

The Bondar-Clegg analytical methods are described as follows:

#### Sample Preparation

Silt & Soil:

Rocks:

**Geochemical Analysis:** 

**Fire Assay Procedure for Au:** 

**Comments:** 

Dry and sieve through 80 mesh screens. Gold values are determined on 30 gram, representative sample of minus 80 fraction by fire assay with AA finish; remaining elements are determined using 0.6 gram sample of minus 80 fraction by hot aqua regia digestion followed by ICP.

Dry and crush to minus 150 mesh; analysis made on minus 150 fraction by methods described above.

Gold is determined on a test sample of 30 g using Fire Assay Lead Collection pre-concentration. The bead is dissolved in nitric acid and hydrochloric acid and run by Atomic Absorption.

Mercury is determined on a test sample of 0.6 g. The sample is digested by aqua regia and bulked to 12 ml. The solution is then run by Cold Vapour Atomic Absorption.

All other elements are determined on a test sample of 0.6 g. The sample is digested by aqua regia and bulked to 12 ml. The solution is then run by ICP.

A prepared sample of one assay ton (29.166 grams) is mixed with a flux which is composed mainly of lead oxide. The proportions of the flux components (the litharge, soda, silica, borax glass, and flour) are adjusted depending upon the nature of the sample. Silver is added to help collect the gold. The samples are fused at 1950 F until a clear melt is obtained. The 30-40 gram lead button that is produced contains the precious metals. It is then separated from the slag. Heating in the cupellation furnace separates the lead from the noble metals. The normal-sized precious metal beads that are produced are transferred to test tubes and dissolved with aqua-regia. This solution is analyzed using Atomic Absorption by comparing the absorbance of these solutions with that of standard solutions. In the case of high grade samples, the precious metal bead is parted to separate the silver and the remaining gold is weighed.

As part of the routine quality control we run a duplicate analysis for about 12% of the samples. Also, all samples which are over 0.20 opt on the original fusion are run again to verify the results. If a sample gives erratic results, such as 0.10, 0.020, 0.30, we will indicate this on the report. We suggest that a new split should be taken from the reject for preparation and analysis by our metallics sieve procedure. These assay results will always be signed by the registered assayer.

#### **Contamination Prevention:**

The test tubes and cupels are used only once so that there is no possibility of cross contamination. The fusion crucibles are cleared before re-use by discarding any which had high samples in them. During the analysis a blank solution is run between each sample to ensure that there is no carry over.

#### Determination of Arsenic by Borohydride Generation:

Samples of 0.5 grams in weight are digested in borosilicate glass test tubes, with concentrated nitric and hydrochloric acids. These tubes are heated in a 90 degree Celsius water bath for two and one-half hours. The sample is then diluted with 14% HCl and mixed. A 0.5 ml aliquot is taken from this solution and HCl, deionized water, and potassium iodide are added. The resulting mixture is allowed to sit for one hour, after which it is run through a hydride generation system. In this system, the solution is reduced with sodium borohydride, releasing arsenic as arsine gas. The arsine gas is then swept into a quartz furnace mounted on a flame AA unit. The absorbance is recorded and compared to a standard series to determine the amount of arsenic present.

Quality Control:

Standards, repeats, and blanks are run with each batch of samples. These are carefully checked, and reweighs of samples are ordered if necessary. High arsenic results are also checked by running the original solution by flame AA and comparing the results from the two procedures.

## **APPENDIX IV**

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## Soil, Stream Silt and Rock Geochemical Lab Reports

Bondar-Clegg & Company Ltd. B0 Pemberton Ave. North Vancouver, B.C. V7P 2R5 (604) 985-0681 Telex 04-352667

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Geochemical Lab Report

A DIVISION OF INCHCAPE INSPECTION & TESTING SERVICES

Γ.			A DIVIS	ON OF INCH	CAPE INSPE	CHON& TES	DA	TE_PRINTE	D: 12-00	T-90	
Ĺ	REPORT: V90-02268.0			]			PR	OJECT: 28	5E		PAGE 1
	SAMPLE ELEMEN NUMBER UNIT	T Au 30g S PPB	Ag PPN	Cu PPM	Pb Ppm	Zn PPN	As PPM	Sb PPM	No PPN	Hg PPM	
<u>Т</u>	S1 90 AW 285E S-001	<5	2.3	34	4	65	19	<5	2	0.224	
ί,	SI 90 AW 285E S-002 SI 90 AW 285E S-003	<5 <5	1.1	20 25	4	52 43	13 24	<5 <5	2	0.135	
$\bot$	S1 90 AW 285E S-004	34	1.2	21	10	79	25	<5 <5	5	0.163	
; }	S1 90 AW 285E S-005	39	0.9	21	6	59	14	<5	2	0.181	
$\int$	S1 90 AW 285E S-006	<5	1.8	24	5	45	17	<5	2	0.329	
	S1 90 AW 285E S-007 S1 90 AW 285E S-008	40	U./ 1 A	20	19 14	58 117	9 21	<5 <5	4		
1	S1 90 AW 285E S-009	9	1.4	52	8	81	14	<5 <5	2	0.184	
ـلــ <sub>-</sub>	S1 90 AW 285E S-010	17	1.2	27	20	51	12	<5	3	0.250	
	S1 90 AW 285E S-011	5	1.4	34	16	89	18	<5	3	0.253	
_1	S1 90 AW 285E S-012	28	1.0	58	72	133	11	<5 <5	3	0.198	
	SI 90 AW 2055 S-013 SI 90 AW 2855 S-014	25 36	1.0	07 46	10	104	20 18	<5 <5	2	0.215	
	S1 90 AW 285E S-015	29	1.5	56	9	111	20	<5	2	0.332	
	S1 90 AW 285E S-016	21	0.7	97	29	131	30	<5	4	0.076	
	S1 90 AW 285E S-017	41	0.4	78	19	107	24	<5	2	0.073	
	S1 90 AW 285E S-U18 S1 00 AW 285E S-010	22	1.4	33	11	56	14	<5 ⁄5	2	0.079	
1	S1 90 AW 285E S-019	35	0.9	42 79	29	108	33	<5 <5	2	0.108	
	T1 90 AW 285E (PRE)										
ł	T1 L-001 1+75	33	0.4	59	13	164	<5	<5	17	0.084	
	T1 90 CC 285E L-001	27	0.8	69	51	441	17	<5	4	0.030	
	11 90 CC 285E L-002 T1 90 CC 285E L-003	<5 6	U.6 0.8	62 65	48 47	468 453	18 18	<5 <5	4 A	0.049	
L					۲ <i>۲</i>			· <b>J</b>			
. <u> </u>	T1 90 CC 285E L-004	<5	0.9	67	63	580	11	<5	5	0.049	
I	11 90 UL 205E L-005 T1 90 CC 285E L-006	0 <5	1.U N Q	۲) ۲۵	60 62	642 692	20 16	<5 <5	ט ג	0.041	
	T1 90 CC 285E L-007	6	0.9	63	56	679	26	<5	5	0.033	
	T1 90 CC 285E L-008	6	0.8	61	62	632	20	<5	7	0.031	
ſ	T1 90 CC 285E L-009	11	0.8	69	54	557	11	<5	5	0.051	
	T1 90 JJ 285E (PRE)	<u>ر ۲</u>	0 6	22	27	224	22	⁄E	4	0 050	
1	T1 1-001 0+00 T1 1-002 1+00	<5 <5	0.0	33 43	14	2.54 1.96	20 35	\0 <5	4	0.059	
_	T1 L-003 2+00	<5	0.7	45	13	211	43	<5	3	0.047	
1	T1 L-004 3+00	<5	0.5	35	14	205	34	<5	4	0.038	
.	T1 L-005 4+00	<5	1.0	83	21	367	30	<5 .5	3	<0.010	
	11 L-UUD 5+00 T1 Q0 11 2055 1_007	6 ⁄⊑	U./ 0.7	/6 97	32 -	295	21 17	<5 25	3	0.052	
	T1 90 JJ 285E L-008	30	0.7	83	33	256	18	<5	2	0.020	
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Bondar-Clegg & Company Ltd.
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V7P 2R5
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# Geochemical Lab Report

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	REPORT: V9	0-02268.0						PR	OJECT: 28	5E		PAGE 2	····
	SAMPLE NUMBER	ELEMENT Units	Au 30g PPB	Ag PPN	Cu PPN	Pb PPN	Zn PPN	As PPN	SĐ PPN	No PPM	H9 PPM		
	T1 90 JJ 2	85E L-009	6	0.6	85	28	277	14	<5	3	0.037		
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Geochemical Lab Report

A DIVISION OF INCHCAPE INSPECTION & TESTING SERVICES

	REPORT: V90-02	263.0						PR	IE PRINTE OJECT: 28	<u>D: 12-00</u> 15E	<u>.</u>	PAGE 1	
	SAMPLE NUMBER	ELEMENT Units	Au 30g PPB	Ag PPN	Cu PPM	Pb PPM	Zn PPN	As PPN	Sb PPM	Ho PPM	Hg PPM		
	R2 90 CC 285E R2 90 CC 285E R2 90 CC 285E R2 90 CC 285E R2 90 CC 285E	R-3748 R-3749 R-3750 R-3751	8 <5 8 7	0.8 0.8 1.1 0.5	112 87 124 14	3 4 7 14	201 135 274 112	8 7 10 5	<5 <5 <5 <5	16 7 6 2	0.010 <0.010 <0.010 0.011		
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## **APPENDIX V**

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## Soil, Stream Silt and Rock Data Sheets

Project:	ock 285 E			KE	EEW -		N E ROCK	SAMPLES	ING INC. Results Plotted By:	
Area (Grid): Collectors:	Cock 3 western Trib into	<u>c Conyon</u> E	Cree	ek_					Map: NTS: <u>JQ 4 B/ /</u> Date: <u>Sept 26 190</u> Surface <u></u> Undergr	ound
		REP	SAN	IPLE	TYPE	(LEN	GTH)			
SAMPLE NUMBER	LOCATION NOTES	SAMPLE NUMBER	GRAB	CHIP	HANNEL	CORE	FLOAT	ROCK TYPE	SAMPLE DESCRIPTION	MAP Sheet
R 3749	1100" on western Trib inte Conyon creek							sediment	Block argillite, 1-3% sulphides disseminated pyrite, pyrchatite	1048/7
A 3749	1640 "							Sectiment	Black argillite 1-3% sulphides pyrite stringers	iv46/7
R3750	1660° on cost arm of creek							r. v	1/ I/	
<u> 13751</u>	1300° on same creets						/	Volcanic	1-2% pyrite, very siliceous, sphalerite?	
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roject: <u>C</u>	ook *385 E	STREAM SE	DIM	ENTS	Res	uits F	Plotte	d By:	:								
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ollectors	Culia Anderson 9000285E				Date	a: 50	rt.	26	190				/				
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Sample	NOTES		1		100	1 2		<u> 91 nc</u>		<u> </u>	1.	92					
Number	NUTES	Grav	Sand	Silt	Clay	Orga	Bank	Activ	vidr	Dept	city city	SPAI	DRY GUL	1			
001	Sak rounded boulders	i sh	45	6 10%					5m	Gar.	mod		/				
002		15%	43	140%		·	<u>  </u>		H.5m	7004	mod		/_				
003		30%	50	2202					Gm	40c.	mal	· ·	1/				
004	Sab rounded a sub gray lar boulders	25%	50	6258	1				3m	100.	max		2			•	
005		2 <i>0</i> 6	Bok	50%	1	L	<u>  </u>	1/	9m	2000	mal		<u> </u>	1			
006	1/ //	40%	40%	6 201		<u> </u>			3m	200~	mad		/		<u> </u>	<u> </u>	
007	()	306	50	6 306			∥	1	3~	2000	med						
008	11 11	10%	501	6406		· · ·	ļ	1	5m	30cm	mod						
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oject:	COOK 285E STREAM	A SEC	DIME	NTS	Resu	ults P	lotte	d By:		L	iai	<u>Ţ.</u>	<u>M</u>	H	am	L.	
rea (Grid):	Cook 3 East Cruk				Мар	:	03	k,		<u> </u>	I.T.S.	:	34	1.	\$/	7	
ollectors :	Steath Whittam + For WILSON				Date	:	Sept	×t_	21	4	10.						
	· · · · · · · · · · · · · · · · · · ·		SED	IMEN	T DA	TA	<b>_</b>	STRE	AM D	ATA		0				1	
Sample Number	NOTES	Gravel	Sand	Silt	Clay	Organic	Bank	Active	Width	Depth	Celo. Cit∕	SPAIN	DRY				
(22)	Bar	C	10	Qx.	6	6		4	Tim	15	5					<u> </u>	
1007	12/07	20	70	155	a	15	1	7	Vm	2.0	m	1	1	∦		<u> </u>	<u> </u>
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1004	1140'	0	40	60	P	0		J	h	20	m					1.	
1225	1050'	20	2.0	1/0	Ø	2.0		4.	m	20	M						
1006	920' MOSS MATT	ø	40	45	Ø	15	<u> </u>	4	m	20	m						
1.007	800' MOSS MATT	20	20	30	9	30	ļ	F	ZM	12	m						
LODE	650'	20	20	40	Į,	205	<u> </u>	y,	Im	20	M	<u> </u>		<b> </b>	<u> </u>	<u> </u>	
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