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Yes - an excellent report!

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GEOLOGICAL SURVEY OF CANADA

TELEGRAPH CREEK MAP-AREA

BRITISH COLUMBIA

(104 G)

J. G. Souther

DEPARTMENT OF ENERGY, MINES AND RESOURCES

TABLE OF FORMATIONS

Era	Period or Epoch	Group or Formation	Map-unit	Lithology	Thickness (feet)
Cenozoic	Pleistocene and ← Recent		29	Unconsolidated glacial and alluvial deposits	
			28	Hot spring deposits, tuffa	0-15
			27	Olivine basalt, flows and tephra	0-1,500
	Tertiary and ← Quaternary Upper Tertiary and Pleistocene		26	Rhyolite and dacite flows, lava domes and pyroclastic rocks; minor basalt	0-3,000
			25	Basalt flows and pyroclastic rocks; minor rhyolite	0-5,000
	Cretaceous and ← Tertiary Upper Cret. Lower Tertiary	Sloko Group	24	Rhyolite, trachyte and dacite flows and pyroclastic rocks	0-500 +
			23	Biotite andesite lava domes, flows and sills	
			22	Biotite leucogranite intrusions	
		Sustut Group	21	Conglomerate, quartzose sandstone, arkose	1,000 +
			20	Felsite, quartz-feldspar porphyry	
			19	Biotite-hornblende quartz monzonite	
	Jurassic and/or ← Cretaceous		18	Hornblende diorite	
			17	Granodiorite, quartz diorite; minor diorite, leucogranite, and migmatite	
	Jurassic Middle ? and Upper	Bowser Group	1~~5~~6	Chert-pebble conglomerate, grit, greywacke, siltstone, and shale	5,000 +
	Middle		1~~4~~5	Basalt, basaltic andesite; mainly pillow lava	1,000 to 8,000
	Lower and Middle		1~~3~~4	Shale; minor siltstone, siliceous, calcareous and ferruginous siltstone.	3,500
	Lower		1~~2~~3	Conglomerate, grit, greywacke, basaltic and andesitic volcanic rocks; peperites	4,000
			1~~5~~2	Syenite, orthoclase porphyry, monzonite, pyroxenite	
		Hickman batholith	11	Hornblende-quartz diorite, hornblende-pyroxene diorite, amphibolite	
			10	Hornblende granodiorite; minor hornblende quartz diorite	
	Triassic Upper		9	Undifferentiated volcanic and sedimentary rocks; includes units 5 to 8	10,000 +
			8	Augite andesite flows, pyroclastic rocks and derived sediments; minor greywacke, siltstone and conglomerate	4,000 +
			7	Siltstone, siliceous siltstone, ribbon chert, calcareous and dolomitic siltstone, greywacke, volcaniclactic rocks and minor limestone.	2,300 +
			6	Limestone, fetid limestone, shale	0-300 +
			5	Greywacke, siltstone, shale; minorconglomerate, tuff and volcanic sandstone	3,000 +
	Middle		4	Shale, concretionary shale; minor calcareous shale and siltstone	600 +
	Permian		3	Limestone, minor chert and tuff	1,000-2000
laeozioc	Permian and Mississippian		2	Phyllite, argillaceous quartzite, quartz-sericite and chlorite schist, greenstone, minor chert, schistose tuff and limestone	?
	Mississippian		1	Limestone, crinoidal limestone, ferruginous limestone; tuff, chert and phyllite	2,850
		Age unknown, probably pre-Lower Jurassic	A	Amphibolite, amphibolite gneiss	
			B	Ultramafic rocks; peridotite, dunite, serpentinite	

ABSTRACT

The map-area, bounded by latitudes 57° and 58° N and longitudes 130° and 132° W includes parts of the Coast Mountains, Stikine Plateau and Hazelton Mountains. It lies across the axis of the northeasterly trending Stikine Arch, a lobe of crystalline and metamorphic rocks that remained relatively positive throughout most of Mesozoic time.

Coast Mountains in the southwestern part of the map-area are underlain mainly by granitic rocks that range in age from Triassic to Tertiary and contain pendants of metamorphosed late Paleozoic and Mesozoic sedimentary and volcanic rocks.

Mississippian and Permian strata comprising phyllite, thick limestone units, and minor volcanics outcrop in the central and western part of the map-area. They are overlain unconformably by an extremely thick succession of Upper Triassic to Middle Jurassic eugeosynclinal sediments and andesitic volcanics that underly most of the northern and eastern part of the map-area.

Late Jurassic clastic sediments, deposited in the Bowser Successor Basin are exposed in Hazelton Mountains east of Iskut River.

Cretaceous and Tertiary non-marine clastic sediments and early Tertiary volcanics are preserved in fault blocks and as erosional remnants on some of the higher peaks.

Late Tertiary, Pleistocene and Recent volcanism has produced large, complex piles of undeformed lava flows and pyroclastic rocks ranging in composition from rhyolite to basalt.

The area includes numerous mineral deposits, some of which are major potential producers of copper.

INTRODUCTION

Telegraph Creek map-area comprises about 5,200 square miles of northwestern British Columbia bounded by latitudes 57° and 58° N and longitudes 130° and 132° W.

Stikine River which flows south through the western part of the map-area has long been a major route of travel from the coast, through the Boundary Ranges, to the interior. The town of Telegraph Creek, at the northern limit of navigation, is clustered around a dock just below the rapids of Stikine Canyon. During the Klondike gold rush of 1896, Telegraph Creek and the nearby town of Glenora housed more than 5,000 persons bound for Dawson via the Telegraph Trail. The trail and historic telegraph line that linked Dawson with the outside world in 1901 runs north from Telegraph Creek to Atlin and southeast across Raspberry Pass to Stewart. It remained in use until 1933 when it was replaced by radio telephone. The town of Telegraph Creek, however, continued to flourish as a freight terminus and distribution centre for military freight during the war years and supplies for mineral exploration during the 1950's and 60's. Regular river boat service continued on Stikine River until 1969 when it was no longer able to compete with trucks hauling over improved roads and with increasing use of large freight aircraft.

The new Cassiar-Stewart Highway, scheduled for completion in 1972, follows Iskut Valley through the eastern part of the map-area, and a spur road from Telegraph Creek joins the highway at Dease Lake. Airstrips suitable for multi-engine craft have been built at Burrage Creek and Schaft Creek. These, and a smaller strip at Telegraph Creek are serviced by regularly scheduled flights from Terrace.

Today the population of Telegraph Creek has dwindled to about 200 permanent residents. The local economy is based mainly on seasonal mineral exploration programs and, to a much lesser extent, on big game hunting, trapping and tourism.

GEOLOGICAL WORK

The first systematic geological work in Telegraph Creek map-area was carried out by Forest A. Kerr (1948) of the Geological Survey, who mapped the mountains adjacent to Stikine River in the years 1924 - 1929 inclusive. In 1956 the Geological Survey of Canada (1957) carried out Operation Stikine which included a rapid, helicopter reconnaissance of Telegraph Creek map-area.

The writer spent parts of the 1957, '58 and '61 field seasons working in areas that were missed during Operation Stikine. He returned in 1965 to '67 inclusive to undertake a detailed study of Mt. Edziza, and in 1969 to study selected areas of Mesozoic rocks on Klastline Plateau and in the Ball Creek region. During this same year (1969), J.W.H. Monger studied selected areas of late Paleozoic rocks in parts of Telegraph Creek area. The present report is based on all this work. Much of Forest Kerr's mapping has been transferred directly, although, some of it has been reinterpreted by the writer.

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PHYSICAL FEATURES

Topography

The boundary between the western and central physiographic systems of the Cordillera (Holland, 1964) passes diagonally through Telegraph Creek map-area, dividing it almost equally between the Coast Mountains on the southwest and the Stikine Plateau on the northeast. A small part of the Skeena Mountains extends into the extreme southeastern corner of the map-area.

The Coast Mountains is a region of extreme topographic relief - more than 9,000 feet from Stikine Valley to the adjacent peak of Mt. Ambition. The deeply incised, glacially oversteepened valley walls rise to intervalley ridges and spurs with rounded summits at 4,000 to 5,000 feet above sea level. These in turn converge on rugged peaks and spires with elevations of 6,000 to 9,000 feet. The Coast Mountains, like the predominantly crystalline rocks from which they are made, lack any systematic fabric or trend. Instead they comprise seemingly random clusters of peaks surrounded by ridges and spurs having no preferred orientation of shape.

The northwestern margin of Skeena Mountains extends into Telegraph Creek area as far west as Iskut River and as far north as Kinaskan Lake. Unlike the Coast Mountains the summits form long linear ridges that reflect the trend of underlying sedimentary strata. Although individual, pyramidal peaks rise to elevations of more than 7,800 feet the majority of summits are below 6,500 feet. Many display flat, nearly concordant summits that represent remnants of a Tertiary erosion surface.

Two subdivisions of Stikine Plateau are present in Telegraph Creek map-area; the Tahltan Highland, and the Klastline Plateau. The latter is a moderately dissected rolling upland with many remnants of the same Tertiary erosion surface found in the Skeena Mountains.

Tahltan Highland is intermediate between the Coast Mountains and the Klastline Plateau. The summits are rounded and less precipitous than those of the Coast Mountains but lack the flat interfluvial remnants that characterize the Klastline Plateau. East of Mess Creek the Tahltan Highland is dominated by the young volcanic domes of Mt. Edziza and Spectrum Range that rise to elevations 9,143 feet and 7,897 feet respectively.

Drainage

Telegraph Creek map-area lies entirely within the drainage basin of Stikine River which discharges into Frederick Strait near Wrangell, Alaska. Northeast of Telegraph Creek it plunges through the steep-walled Grand Canyon of the Stikine in a series of white-water rapids. A short distance above the town it emerges into a deep, nearly straight channel that flows with a moderate current across the Tahltan Highland to Chutine River at the eastern margin of the Coast Mountains. Through the Coast Mountains Stikine Valley is again relatively narrow. Alluvial fans, dumped by fast flowing tributary streams, have forced the main channel of the Stikine into a sinuous commonly braded course past shifting gravel bars and islands.

Iskut River is the principal tributary of Stikine River. It flows south from Kinaskan Lake through a shallow, steep-walled gorge cut into the base of a valley more than five miles in width. It seems probable that this very broad valley was the former course of a much larger river than the present Iskut. During late glacial time, when ice still occupied Stikine valley, much of the water now carried by the Stikine may have been diverted across the Morchuea Lake lowlands into Iskut Valley.

Mess Creek is a major tributary that flows north and enters the Stikine two miles below Telegraph Creek. Above Mess Lake it is a sluggish, silt-laden stream that meanders across aggrading mud flats dotted with oxbow lakes and abandoned channels. Below Mess Lake the current is swifter, but lava flows from Mt. Edziza form local barriers behind which the stream is aggrading. Seven miles above its junction with the Stikine, Mess Creek plunges into a V-shaped gorge cut into highly fractured unstable rock that includes numerous active landslide scarps.

The pattern of drainage within the Coast Mountains is random and poorly integrated with bedrock geology. In contrast, both Iskut River and Mess Creek occupy north-south fault controlled valleys and many of the smaller tributaries in the intervening area reflect this same north-south trend.

Glaciation

The bold rounded summits, U-shaped valleys and truncated spurs that characterize the mountains of Telegraph Creek map-area provide ample evidence that all but the highest peaks were once covered by continental ice. The details of this early glaciation have been largely lost through rapid erosion that has stripped away the glacial deposits and through prolonged alpine glaciation that has greatly modified the original landforms.

Drumlins and fluted ground in the major valleys indicate that the last movement of ice was everywhere in the same direction as the present drainage.

Permanent ice occupies cirques on nearly every peak above 6,500 feet in elevation and from most of these tongues of ice extend to much lower elevations. Ice fields cap the higher mountain complexes such as Hankin Peak, Hickman Peak and Mount Ambition, and from these great valley glaciers extend well below treeline. Flood Glacier is more than two miles wide and terminates in Stikine Valley at an elevation of less than 500 feet. Scud Glacier, with a length of 15 miles, is the largest valley glacier entirely within the map-area.

GENERAL GEOLOGY

Tectonic Setting

The southwestern part of the map-area is underlain by granitic and metamorphic rocks of the Coast Crystalline Complex. This forms the core of the northwesterly trending Coast Geanticline and the northeasterly trending Stikine Arch (Souther and Armstrong, 1966). The latter is a lobe of crystalline and metamorphic rocks that remained relatively positive throughout much of Mesozoic time and exerted a profound influence on Mesozoic sedimentation and structure around its margins. The Arch is bounded on the east and northeast by an extension of the Whitehorse Trough (Wheeler, 1961) in which great thicknesses of volcanic and clastic sedimentary rocks were deposited during late Triassic and early Jurassic time.

A small part of Bowser Basin extends into the southeastern corner of the map-area encompassing the Hazelton Mountains and part of Klastline Plateau. It is a successor basin in which marine sedimentation continued through late Jurassic time after the remainder of the area had become emergent. Superimposed on these major tectonic elements is a system of north-south normal faults, best developed in the east-central part of the map-area where they parallel the north-south linear distribution of Tertiary and Quaternary volcanoes.

The layered rocks may be grouped for convenience into six tectonostratigraphic packages, separated by unconformities or disconformities (Douglas, 1970). Listed from oldest to youngest these are:

1. Map-units 1, 2, 3 and 4 comprising Permocarboniferous to Middle Triassic rocks that were deformed and regionally metamorphosed during the early to mid-Triassic, Tahltanian orogeny.

2. Map-units 5, 6, 7, 8 and 9, comprising unmetamorphosed, moderately deformed Upper Triassic volcanic and sedimentary rocks. This package is separated from overlying strata by a disconformity (locally an unconformity) representing the latest Triassic to earliest Jurassic Inklinian uplift and contemporaneous emplacement of granitic rocks of map-units 10 and 11.

3. Map-units ~~12~~ 3, ~~13~~ 4 and ~~14~~ 5 comprising lower to Middle Jurassic, mainly clastic sedimentary rocks derived in part from (2) above and separated from overlying strata by a disconformity (locally an unconformity), representing the mid Jurassic Nassian uplift.

4. Map-unit ~~15~~ 6 comprising clastic sediments derived in part from 1, 2, and 3 above and separated from overlying strata by a profound angular unconformity that truncates decollement folds formed during the Columbian Orogeny.

5. Map-units 19, 20, 22 and 23, comprising acid volcanic rocks and genetically related intrusions; and map-unit 21, comprising partly contemporaneous clastic sediments separated from overlying strata by an angular unconformity related to early Tertiary extension and block faulting.

6. Map-units 25, 26, and 27 comprising undeformed late Tertiary and Quaternary lava flows and pyroclastic rocks.

DESCRIPTION OF MAP-UNITS

Mississippian

Map-Unit 1

Limestone with an abundant Mississippian fauna is exposed on cliffs near the head of Sphaler Creek and as isolated knolls on the plateau north of Arctic Lake. Lithologically similar but unfossiliferous limestone near the head of More Creek is included in the same map-unit.

The Sphaler Creek section was studied in detail by J.W.H. Monger (1970) who described two distinct limestone members. The lower member 350 feet thick, comprises pale grey coarse-grained, locally ferruginous, crinoidal calcarenite and the upper member 2,000 feet thick comprises dark grey massive to thin-bedded calcarenitic limestone. The two members are commonly separated by a wedge of chert and phyllitic volcaniclastic rocks as much as 500 feet thick. Locally the limestone contains an abundant fauna of foraminifera, corals, brachiopods and bryozoa. Large crinoid stems appear as white disks in the reddish-brown, ferruginous beds or locally they are weathered out leaving the surface pitted with cylindrical depressions as much as an inch across.

The lower limestone member rests with apparent conformity on a sequence of phyllites (part of map-unit 2) within which are a few small limestone lenses with probable Mississippian corals, bryozoa and crinoid fragments.

At Sphaler Creek the upper limestone member is overlain by pale green calcareous, crystalline tuff containing Permian corals, brachiopods and pelecypods. Three miles to the southwest the similar Permian beds lie on phyllites that are stratigraphically below the Mississippian limestone, providing evidence of a profound post-Mississippian, pre-Permian unconformity.

Permian and Older

Map-Unit 2

Map-unit 2 includes rocks that are both older and younger than map-unit 1. Intense folding and regional metamorphism make estimates of thickness extremely difficult. The age also is uncertain. Poorly preserved fossils from a few thin lenses of crystalline limestone contain probable Mississippian forms whereas others have deformed but recognizable Permian fusulinids.

Before metamorphism the rocks were mainly fine-grained quartzose sediments, tuffs and volcanic rocks of intermediate composition. In the more easterly exposures where metamorphism is least intense, primary bedding and textural features are still visible, despite pervasive metamorphism that has transformed them to slate, quartz-sericite and quartz-chlorite phyllites and schists. Farther west along Scud and Stikine Rivers the phyllites grade locally into highly crystalline schists and gneisses. Chlorite-amphibolite schist is most common, however, knotty biotite schist containing garnet, sillimanite or staurolite are present in pendants west of Stikine River.

The map-unit is overlain with apparent conformity by Permian limestone of map-unit 3.

Permian

Map-Unit 3

The Permian is represented by a limestone succession from 1,000 to 2,000 feet thick. Excellent sections are exposed along Mess Creek, south and southwest of Scud Glacier and near the mouth of Chutine River. In each of these the lower part includes relatively thin-bedded, commonly argillaceous or tuffaceous members interlayered with pure limestone beds from 1 to 6 feet thick. The upper part is massive, pure white limestone with a micritic matrix surrounding variable amounts of bioclastic debris. Chert is a minor constituent, occurring as nodules in the upper limestone and as thin-bedded members in the lower limestone. The rock contains an abundant fauna of corals, brachiopods, bryozoa and fusulinids. The latter have been studied by Rigby (1961), Pitcher (1960), and Monger and Ross (1971), who report the presence of both Middle and Late Permian forms.

Locally the Permian limestone is overlain with apparent conformity by Middle Triassic shale of map-unit 4. Elsewhere it is overlain unconformably by Upper Triassic strata.

Middle Triassic

Map-Unit 4

Middle Triassic strata were recognized at only one locality within the map-area, between Scud River and Sphaler Creek, where they outcrop in a narrow band about 7 miles long. The entire section, at least 600' thick, consists of medium grey, platy, calcareous and silty shale with numerous small elliptical concretions. Some beds contain the middle Triassic pelecypod *Daonella* in great abundance.

The relationship of the Middle Triassic shale to both older and younger strata is complicated by structure. Because of its incompetency considerable movement has taken place within the shale adjacent to the massive Permian limestone and the overlying Triassic volcaniclastic rocks. In Telegraph Creek map-area the Middle Triassic shale is structurally overlain by massive Permian limestone. Although the shale is locally sheared no evidence of a fault could be found at the actual contact and similar shale is interbedded with the limestone suggesting a conformable but overturned contact. West of Telegraph Creek map-area Daonella-bearing slates near the head of Pendant Creek overlie Permian limestone in normal stratigraphic succession (Sougher, 1959).

All observed contacts between Middle Triassic and Upper Triassic strata are faulted. In general the Middle Triassic rocks are more intensely deformed than the Upper Triassic and they exhibit an incipient metamorphism, locally approaching phyllite, that is lacking in younger strata of the same lithology. On this basis the Middle Triassic shale is assumed to lie below the Tahltanian unconformity and to have undergone folding and regional metamorphism prior to deposition of Upper Triassic map-units 5 to 9.

Upper Triassic

Map-Unit 5

Map-unit 5 comprises at least 3,000 feet of strata. In the southeastern part of the map-area, near Ball Creek, it consists of thick-bedded volcanic conglomerate, greywacke, grit, and chert-bearing sedimentary breccia, interbedded with massive, featureless members of fine-grained, khaki-coloured tuffaceous siltstone. Farther north, near Mess Lake, the section includes thick members of interbedded greywacke and graded siltstone.

The map-unit contains a sparse but diagnostic fauna that includes the Late Triassic (Karnian) pelecypod Halobia. Map-unit 5 is overlain conformably by map-unit 6 and/or 7.

Map-Unit 6

Discontinuous beds and lenses of Upper Triassic limestone are widespread in Telegraph Creek and adjacent map-areas. Commonly the unit is thin-bedded, flaggy, fetid limestone with much interbedded shale and siliceous silt. Locally, however, it is thick bedded or massive. The massive facies is commonly abundantly fossiliferous, containing a reefoid fauna of corals and bryozoa, as well as bioclastic beds comprising a coquina of thick-shelled pelecypods and small crinoid fragments. The thickness of the unit may range from a few feet to several hundred feet in less than a mile.

Because of their discontinuous nature there is no assurance that all lenses of limestone are correlative. In fact the fossil evidence suggests that lithologically similar limestone occurs at several horizons within the Upper Triassic succession. Fossils, including the ammonite Aulacoceras from limestone in the vicinity of Ball Creek and More Creek indicate a pre-Norian, probably Karnian age, whereas farther north in Tulsequah and Dease Lake map-areas limestone of the Upper Triassic Sinwa Formation contains the late Norian pelecypod Monotis. In the latter areas the Sinwa overlies equivalents of map-unit 8.

Map-unit 6 is overlain conformably by map-unit 7.

Map-Unit 7

Between Ball Creek and the headwaters of Little Iskut River map-unit 7 is defined by the underlying limestone of map-unit 6 and the overlying volcanic rocks of map-unit 8. Elsewhere in the map-area the limestone is missing and all thin-bedded strata beneath the volcanics of unit 8 are tentatively assigned to map-unit 7.

Near Ball Creek the section comprises at least 2,300 feet of interbedded carbonaceous shale, black ribbon chert, siliceous siltstone, greywacke and grit with discontinuous lenses of limestone and rusty weathering dolomitic siltstone. The upper part contains interbedded greywacke and volcanic sandstone.

On Klastline Plateau the assemblage of rocks is similar except that chert is absent and coarse volcanic sandstone and greywacke are more abundant than in the Ball Creek sections.

A sparse fauna, including the pelecypod Monotis, indicates a late Norian age. Map-unit 7 is overlain conformably by map-unit 8.

Map-Unit 8

Map-unit 8 comprises at least 4,000 feet of green, purple and grey augite andesite and derived volcaniclastic rocks. West of Mess Creek the unit is dominated by great thicknesses of purple and green augite andesite breccia and conglomerate that form massive outcrops in which bedding is rarely visible. A few lenses and beds of tuff and volcanic sandstone are commonly well graded but lack shallow water features such as cross-bedding or ripple marks. Pillow structures were observed near Arctic Lake and on Klastline Plateau. In general those parts of unit 8 that lie east of Mess Creek are less massive and contain more sedimentary beds than outcrops farther west. On Klastline Plateau the predominantly volcaniclastic rocks include intervals of greywacke, siltstone and minor conglomerate. The latter contains pebbles of diorite, limestone, and chert in addition to augite andesite.

The map-unit is everywhere riddled with augite andesite dykes, sills and irregular intrusive bodies that are considered to be part of the sub-volcanic feeder system. These sub-volcanic rocks are darker coloured and more uniform in colour and texture than the equivalent extrusive phases. Typically the groundmass is fine-grained to aphanitic, dark grey, dark purple or nearly black and surrounds small randomly distributed clusters of white feldspar phenocrysts.

No diagnostic fossils were obtained from unit 8, although sperical sponge-like forms were found west of Mess Lake and on Klastline Plateau. Similar forms occur in the late Norian, Sinwa limestone of Tulsequah (Souther, 1971) and Dease Lake map-areas (Gabrielse and Souther, 1962).

Map-Unit 9

Upper Triassic rocks in the western part of the map-area were not studied in sufficient detail to permit their subdivision into units 5 to 8. Moreover this western facies is predominantly volcanic and lacks the thin bedded horizons and relatively persistant limestones that facilitate subdivision of the Upper Triassic strata east of Mess Creek. Augite-andesite breccia, conglomerate and volcanic sandstone are the predominant rocks of map-unit 9, but it includes thick sections of greywacke, graded siltstone, tuff and minor black shale. The latter nearly everywhere contains fragments of the early Late Triassic (Karnian) pelecypod Halobia.

Map-unit 9 is overlain unconformably by Lower Jurassic conglomerate of map-unit 12.

Triassic and Jurassic

Map-Units 10 and 11

Hickman Batholith, a crudely zoned body ranging in composition from pyroxene diorite in the interior to biotite granodiorite in the exterior, underlies a roughly circular area about ten miles in diameter at the head of Schaft Creek. Mount Hickman in the southeastern interior is underlain partly by ultrabasic rocks (see unit A) around which the granitic rocks exhibit an outward increase in quartz, potash feldspar and biotite. The central part of the batholith (unit 11) is more mafic than the marginal phases, comprising mainly medium-grained, equigranular hornblende quartz-diorite, large areas of hornblende-pyroxene diorite and minor amounts of amphibolite with or without accessory pyroxene. The more mafic phases commonly exhibit glomero-porphyritic or pegmatitic textures and locally contain hornblende crystals up to two inches long.

The hornblende quartz-diorite of unit 11 grades outward into texturally similar but less mafic rocks of unit 10. The latter are characterized by a significant proportion of biotite relative to hornblende and by increasing proportions of quartz and potash feldspar toward the outer margins of the batholith where hornblende biotite granodiorite is the predominant phase.

Hickman batholith cuts Upper Triassic volcanic rocks of map-unit 8 and boulders of hornblende-biotite granodiorite resembling the outer phase of the batholith occur in Lower Jurassic conglomerates near Arctic Lake, east of Mess Creek Valley. If these are clasts from the batholith then it must have been emplaced and unroofed within the short span of latest Triassic to earliest Jurassic time. On the north side it is intruded by Cretaceous or Tertiary quartz monzonite of map-unit 19.

Map-Unit 12

Map-unit 16 includes a diverse group of small, equidimensional plutons characterized by a high content of potash feldspar and sodic plagioclase, and an absence of quartz. The texture is commonly porphyritic, and very coarse-grained. Most bodies contain phases that are rich in magnetite. Pyroxene is usually present in this iron-rich phase and locally it is the predominant silicate mineral.

The Galore Creek body has been studied in detail in conjunction with exploration of the Galore Creek copper deposits. According to Barr (1965) it is a syenite porphyry complex encompassing three separate but genetically related masses of syenite that intrude upper Triassic volcanic and sedimentary rocks. Porphyritic phases of the syenite contain tabular potash feldspar euhedra up to 4 inches across in a fine-grained matrix of orthoclase aegirine-augite and biotite. In addition to the large masses of syenite porphyry dykes, and highly altered equivalents of the Mesozoic assemblage. Brecciated zones within and around the margins of the complex contain most of the Galore Creek copper deposits.

Potassium-argon age dates on five samples of biotite from the Galore Creek stock range from 174 to 197 million years (White et al. 1968) suggesting a late Triassic to early Jurassic age. This is consistent with ~~Upper~~ Late Triassic ages from other mineralized stocks which Sutherland Brown (Sutherland Brown et al. 1971) assigns to the "early stage copper porphyry deposits". He points out further that, "this age corresponds very closely with the age of the copper-rich volcanic rocks in which many of the porphyry bodies are located and lends support to the theory of a mutual copper-rich subcrustal source for the volcanics and intrusions."

On the basis of the above work map-unit 12 has been assigned as upper Triassic to lower Jurassic age. It is probable, however, that some of these stocks, possibly including some phases of the Galore Creek Stock, may be younger. Many of them exhibit relatively straight, sharp contacts with highly folded upper Triassic strata. Moreover, persistent dyke-swarms which appear to be genetically related to the stocks cut complex structures in the enclosing upper Triassic rocks but are themselves little deformed.

The body on Rugged Mountain is described by Kerr (1948) as a mainly equigranular, locally porphyritic syenite consisting mainly of tabular orthoclase, probably anorthoclase. The other chief minerals are garnet aegirine-augite and bronzite. Magnetite, sphene, olivine and apatite are important accessories.

The bodies at the head of Shakes Creek and on Stikine River, north of Telegraph Creek, are notable for their high content of magnetite. The former was explored as a possible source of iron (see MH property p.). In both of these bodies the magnetite occurs as disseminated granules in fresh, black biotite-bearing pyroxenite. Sphene and apatite are important accessories.

The small body east of the toe of Scud Glacier is superficially similar to the other syenites, however the large lustrous grey phenocrusts are sodic plagioclase rather than orthoclase and occur in a matrix of potash feldspar and amphibole. The body 6 miles northeast of Galore Creek is a coarse- to medium-grained monzonite comprising about equal amounts of bright pink potash feldspar, green plagioclase and less than 5 per cent chloritized mafics and opaques.

Lower Jurassic

Map-Unit 1~~2~~3

The Lower Jurassic and Upper Triassic rocks of Telegraph Creek map-area include strata of very similar lithology and, since fossils are rare in both, it is probable that some Lower Jurassic strata have been mapped as Upper Triassic and vice versa.

The base of the Lower Jurassic succession is exposed at several places within the map-area. On Kirk and Strata mountains granodiorite-bearing pebble conglomerate rests unconformably on Triassic sediments. Similar, but coarser, granodiorite-boulder conglomerate is preserved in fault blocks and infolded remnants in Stikine Valley between Glenora and Chutine River.

East of Mess Creek the basal Lower Jurassic conglomerate rests on Upper Triassic pillow lava and augite-andesite breccia. The lower few hundred feet contain only boulders and cobbles of volcanic rocks derived from the Upper Triassic strata. A few granite boulders appear about 500 feet above the base and become increasingly abundant higher in the section, probably reflecting progressive unroofing of Hickman batholith to the west.

In the eastern part of the map-area the distinction between Upper Triassic and Lower Jurassic rocks is not so clearly defined. Granitic clasts are sparse or absent and Lower Jurassic clastic sediments are similar to the Triassic fragmental volcanics from which they are derived. The Lower Jurassic rocks are commonly not as well indurated as the Triassic and the sands contain a higher proportion of quartz and potash feldspar. These differences are subtle and difficult to recognize in the field. On Ball Creek and the headwaters of Little Iskut River the Lower Jurassic succession comprises at least 4,000 feet of dull greenish-brown tuffaceous siltstone, sandstone and grit interbedded with fragmental volcanic rocks of which brown weathering medium grey peperite of basaltic-andesite composition is the most abundant and most distinctive. The volcanic rocks are commonly more basic and not so brightly coloured as those of the Triassic. Also they are commonly finer grained and lack the distinctive feldspar and augite phenocrysts that characterize the Triassic lavas.

Fossils from unit 13 include diagnostic ammonites and pelecypods that demonstrate the presence of the Hettangian, Upper Pliensbachian and Upper Toarcian stages of the Lower Jurassic. Unit 13 is overlain conformably by map-unit 14.

Lower and Middle Jurassic

Map-Unit 14

Map-unit 14 comprises about 3,500 feet of friable black shale, interbedded with a few thin beds and concretionary layers of rusty weathering ironstone and siliceous siltstone, minor light grey quartzose sandstone and grit. Fossils from near the base of the unit indicate an upper Toarcian (late Lower Jurassic) age whereas ammonites from the upper part are of Middle Bajocian (early Middle Jurassic) age. The shale is overlain with structural conformity by massive volcanic rocks of map-unit 15. The change is abrupt yet the contact reveals no evidence of faulting. It is concluded, therefore, that deposition of the shale was terminated by submarine eruptions that built elongate seamounts in the basin of deposition.

Middle Jurassic

Map-Unit 15

The prominent north, northwesterly-trending range of mountains that faces Iskut Valley north of Ball Creek consists entirely of submarine lavas. There the unit is at least 8,000 feet thick and comprises dark grey basaltic-andesite pillow lavas and related flows, dykes and sills. The lavas are monotonously uniform throughout, consisting of fine-grained to aphanitic basalt or basaltic-andesite with small, sparse feldspar phenocrysts, clots of chlorite, and small carbonate or zeolite-filled vesicles. Locally the lava is hydrothermally altered to a nearly white, commonly spotted rock consisting entirely of a fine-grained mozaic of secondary, hydrous minerals. This alteration is believed to be related to streaming of hot fluids and gasses through the pile during or immediately after eruption. The contact with overlying Bowser strata (unit 1~~5~~6) is obscured by faulting along Iskut Valley.

On southern Klastline Plateau unit 1~~4~~5 contains only a few small discontinuous piles of pillow lava. The remainder of the section is made up of fragmental rocks that include coarse tuff-breccia, tuffs, volcanic sandstone and conglomerate. Most of this clastic material is similar in composition to the pillow lavas and is believed to represent a marginal facies deposited adjacent to the seamounts. Near the top of the Klastline Plateau section the predominantly volcanic fragments show evidence of increased sorting and stratification and the uppermost beds include well rounded pebbles of black chert. These in turn are overlain conformably by the basal chert-pebble conglomerate of unit 1~~5~~6.

Upper Jurassic

Map-Unit 1~~5~~6

Strata of the Bowser Group within the northeastern part of Bowser Basin underlie the Hazelton Mountains east of Iskut Rover. Apparently equivalent strata extend from the south end of Kinaskan Lake west as far as Mess Creek, but these more westerly exposures are believed to be mainly fluvial and lagoonal deposits, marginal to the basin proper.

On southern Klastline Plateau the base of the Bowser is defined by an abrupt change from immature, volcaniclastic sediments derived from local sources, to mature conglomerate composed entirely of well rounded and uniformly sized chert pebbles in a sandy matrix. The chert is predominantly light to medium grey but black and bright greenish grey pebbles are also common. On Klastline Plateau pebbles in the basal conglomerate range from one-half inch to about one and one-half inches diameter.

The Bowser (unit 1~~5~~6) includes at least 5,000 feet of interbedded greywacke, grit, chert-pebble conglomerate, siltstone and shale. A partial section, 3,500 feet thick measured east of the south end of Kinaskan Lake, comprises 48 per cent greywacke, 24 per cent chert pebble conglomerate, 18 per cent siltstone and sandy siltstone and 10 per cent shale. The four major components, including conglomerate, are fairly evenly distributed throughout the section. Conglomerate beds vary from layers only a few pebbles thick to massive beds 130 feet in thickness. The coarser grained greywacke displays a similar variation, forming beds up to 190 feet thick with no visible partings. The silts and sandy siltstones are commonly flaggy, with numerous dark carbonaceous partings. Thin-bedded fissile shale occurs in well defined members from 10 to 60 feet thick.

West of Kinaskan Lake on Bourgeaux Creek a 3,100 foot section contains nearly 50 per cent conglomerate comprising chert pebbles from 1 to 4 inches in diameter in a very sparse to interstitial sandy matrix. These beds exhibit large scale current cross-bedding and channelling indicative of fluvial transport and deposition in rapidly flowing streams that carried the silt and most of the sands into quieter waters of the basin.

Pelecypods and ammonites, including the Oxfordian (early Upper Jurassic) ammonite Cardioceras, were collected in the lowerhals of the Kinaskan Lake section. Two ammonites collected near the base of the section on Armadillo Peak resemble Kosmoceratidae and suggest that Bowser strata may extend down into the Callovian (late Middle Jurassic).

Map-unit 1~~5~~6 is overlain unconformably by Sustut conglomerate of map-unit 21.

~~Jurassic and/or Cretaceous~~

Map-Unit 1~~6~~2

Map-unit 1~~6~~2 includes a diverse group of small, equidimensional plutons characterized by a high content of potash feldspar and sodic plagioclase, and an absence of quartz. The texture is commonly porphyritic, and very coarse-grained. Most bodies contain phases that are rich in magnetite. Pyroxene is usually present in this iron rich phase and locally it is the predominant silicate mineral.

The Galore Creek body has been studied in detail in conjunction with exploration of the Galore Creek copper deposits. According to Barr (1965) it is a syenite porphyry complex encompassing three separate but genetically related masses of syenite that intrude upper Triassic volcanic and sedimentary rocks. Porphyritic phases of the syenite contain tabular potash feldspar euhedra up to 4 inches across in a fine-grained matrix of orthoclase aegirine-augite and biotite. In addition to the large masses of syenite porphyry the complex includes a prominent equigranular granitized unit, a multitude of porphyry dykes, and highly altered equivalents of the Mesozoic assemblage. Brecciated zones within and around the margins of the complex contain most of the Galore Creek copper deposits.

Insert

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Jurassic and/or Cretaceous

Map-Unit 17

The principal phase of map-unit 17 is medium-grained, sparsely porphyritic hornblende-biotite granodiorite, but, hornblende quartz diorite is a major variant and lesser phases exhibit a wide variety of compositions and textures. Locally, particularly near pendants in the southwestern part of the map-area the rocks are strongly to moderately foliated and contain swarms of inclusions and schleiren, or display complex migmatitic structure in which light and dark phases are intimately mixed. Outlying stocks assigned to this map-unit are more uniform in texture and composition.

Contacts with older rocks are either gradational or sharp. At the head of Moore Creek the contact between granodiorite of map-unit 17 and phyllitic sediments and volcanics of map-unit 2 is gradational over a width of about 2 miles. Within this transitional zone granitized sediments and volcanics are intimately mixed with mafic and leucocratic phases of the granodiorite. Elsewhere, as on Mt. Pereleshin and on Dokdaon Creek the contact between the same units is sharp and the intruded rocks exhibit only slight contact metamorphism.

Much additional work is needed to subdivide the many phases of this map-unit.

Map-Unit 18

A large east-west trending body of mafic migmatite crosses Stikine Valley north of Patmore Creek. The mineralogy is uniform comprising about 50 per cent basic andesine, 30 per cent hornblende, 10 per cent biotite, 5 per cent quartz and 5 per cent magmetite and apatite. Conversely, the texture varies abruptly and apparently at random from fine to coarse equigranular, locally schistose, glomeroporphyritic, and orbicular varieties. The internal structure is a complex of streaks, swirls and blocks of one phase within another. Because of its similarity to some phases of the Triassic volcanics, Kerr (1948) considered this body to be Triassic, however it appears to be gradational with map-unit 17 on the south and it is probably a marginal variant of it. On this basis it is considered here to be post-Upper Triassic.

All other diorite bodies included in map-unit 18 are relatively small. The rock is commonly uniform, medium to fine-grained, equigranular hornblende diorite with accessory biotite and magmetite. The small pluton south of Mowdade Lake and the tabular, sill-like bodies at the head of Little Iskut River have a diabasic texture and contain accessory pyroxene. They are considered to be subvolcanic intrusions, genetically related to the Jurassic volcanics in which they occur.

The pluton at the south end of Tahltan Lake is notable for the well developed garnetiferous skarn developed along its contact with Triassic limestone.

Map-Unit 19

Medium- to coarse-grained quartz monzonite of map-unit 19 underlies some of the most rugged terrain in Telegraph Creek map-area. It is extremely massive, commonly with widely spaced vertical rectangular joint sets that facilitate the formation of great monoliths bounded by shear faces many hundreds of feet high.

The rock contains about equal amounts of flesh-coloured potash feldspar and white to light grey plagioclase. The former gives the rock a characteristic pink colour that makes it easily distinguishable from other crystalline rocks, even at a distance. Clear, colourless, or smoky quartz occurs as interstitial grains and subhedral crystals lining miarolitic cavities. Biotite and hornblende form small unaltered euhedral crystals with random orientation. Accessory minerals are apatite, magnetite and allanite.

Contacts with older rocks are invariably sharp and commonly very steep. Dykes and apophyses are abundant, particularly in the vicinity of Yehiniko Lake where east-west trending swarms of quartz monzonite dykes interdigitate with screens of Triassic and Jurassic volcanic rocks and are themselves cut by dark andesite dykes having the same east-west trend. This extremely complex region is believed to be near the roof of the batholith.

Map-unit 19 intrudes Lower Jurassic and older rocks and occurs as clasts in late Cretaceous to early Tertiary Sustut conglomerate.

Map-Unit 20

The rocks assigned to this map-unit are concentrated in the eastern part of the map-area where they form small tabular bodies with a north-south orientation. Most outcrops are highly fractured and deeply oxidized to bright rusty yellow and red hues resembling large gossans.

The unweathered rock is white to light grey with a fine grained slightly porphyritic, locally orbicular texture. Phenocrysts of sodic plagioclase and rounded blebs of quartz are surrounded by a fine-grained groundmass of intergrown quartz, albite and potash feldspar. Mafic minerals, biotite and blue-green hornblende, rarely form more than one or two percent of the rock and may be completely absent. Tiny, uniformly disseminated cubes of pyrite are ubiquitous, both within the felsite and the adjacent wall rock, however no other sulphides were noted, in most of the bodies.

Included in the map-unit are several bodies that differ from the norm. Dykes in the large swarm northeast of Arctic Lake are coarsely porphyritic, with tabular potash feldspar phenocrysts up to 1 1/2 inches across. Superficially they resemble some porphyritic phases of the Galore Creek syenite complex, but as they are structurally continuous with other felsite bodies of map-unit 20 they are included with the latter.

The circular stock on Armadillo Creek is surrounded by ring dykes and fractures and is considered to be a sub-volcanic, cauldron subsidence feature.

The tabular bodies on Mt. Polzer consist of fine-grained aplitic rock that lacks the disseminated pyrite of other felsite bodies.

Map-Unit 21

SUSTUT GROUP

Remnants of Sustut Group sediments are preserved on the mountains east and west of Yehiniko Lake and in down-faulted blocks along Mess Creek valley where they are preserved beneath late Tertiary lavas.

In Telegraph Creek map-area rocks assigned to the Sustut Group are entirely sedimentary. At the mouth of Mess Creek and west of Yehiniko Lake the section is at least 1,000 feet thick and comprises moderately to poorly indurated, interbedded conglomerate, sandstone, carbonaceous siltstone and minor black shale. Conglomerate in this northwestern facies is extremely coarse, containing boulders as much as 1 foot across and including granitic clasts derived from map-units 17 and 19 as well as numerous clasts from Triassic and Jurassic volcanic and sedimentary rocks. East of Mess Creek the maximum size of clasts in the conglomeratic units is about 4 inches and nearly all the pebbles are chert, probably derived from reworked Bowser conglomerate.

The base of the section is exposed on Taweh Creek where a chert-pebble conglomerate rests with profound angular unconformity on folded and deeply weathered Lower Jurassic tuffs. Locally the unconformity is marked by a thin coaly layer containing flattened plant stems. The Taweh Creek section is nearly 500 feet thick and includes about 15 per cent chert-pebble conglomerate, 70 per cent thick-bedded sandstone and grit, 10 per cent flaggy, laminated siltstone and 5 per cent friable carbonaceous shale containing seamlets of coal.

Map-unit 21 is overlain conformably by tuffaceous rocks of map-unit 24.

Map-Units 22 and 23

A group of acid, leucocratic intrusive and extrusive rocks is well exposed in the canyon of Elwyn Creek and on small isolated hills in the predominantly drift covered area north of Elwyn Creek. The main intrusive (unit 22) is a fine-grained, slightly porphyritic leucogranite with phenocrysts of sodic plagioclase, tiny needles of hornblende and small euhedral crystals of biotite. The rock has a uniform, closely spaced rectangular joint system which, near contacts, resembles columnar jointing at right angles to the cooling surface. It is clearly intrusive into the surrounding rocks, including conglomerate of map-unit 21 which occurs as small pendants within the stock. Peripheral to the main body the country rock is cut by a network of dykes, sills and apophyses with well developed rectangular jointing at right angles to their contacts. This is well displayed in Mess Creek canyon where thick sills and thinner connecting dykes have invaded gently tilted Sustut strata (unit 21). These peripheral intrusions are believed to be part of a distributary system to overlying volcanic rocks. They are commonly finer grained than the parent body but contain about the same size and amount of biotite and hornblende crystals.

Genetically related extrusive rocks (unit 23) vary in texture from aphanitic to porphyritic and, like their intrusive equivalents, they are characterized by the presence of small hornblende and biotite euhedra. Most of the rocks included in map-unit 23 display flow banding or pyroclastic textures and their volcanic origin is reasonably certain. Where these features are absent, however, the distinction between extrusive and near-surface intrusive phases is conjectural.

The stock on Elwyn Creek is bevelled off by a gently sloping Tertiary erosion surface overlain by the basal (Pliocene ?) flows of Mt. Edziza.

Map-Unit 24

SLOKO GROUP

On Helveker Mountain granite-boulder conglomerate at the top of the Sustut Group is overlain conformably by 40 feet of fine, white, sandy tuff. Above this are about 500 feet of acid to intermediate, mainly pyroclastic rocks and derived volcaniclastic sediments which Kerr (1948) called the Helveker Volcanics. They are lithologically similar to the Sloko Volcanics of Atlin and Tulsequah areas (Aitken, 1959; Souther, 1971) and since both are of approximately the same age the Helveker Volcanics are included here in the Sloko Group. In Telegraph Creek map-area the distinction between Sustut (map-unit 21) and Sloko (map-unit 24) strata is based on the presence of primary, acid volcanic material in the latter. On this basis most of the flat lying beds on Strata Mountain and many smaller remnants are considered to be Sloko equivalents. The amount of volcanic material varies from one section to another. The Helveker Mountain and Stikine Valley sections are predominantly fine-grained, vari-coloured pyroclastic rocks including green and purple welded ash-flows, bedded tuffs and thick flows of greenish-grey to white, fine-grained andesite, dacite and rhyolite. On Strata Mountain the section is predominantly sedimentary, comprising interbedded red, limonite-stained conglomerate, tuffaceous sandstone and bedded tuff. The two small outlyers near the head of Little Iskut River include about 400 feet of evenly bedded sedimentary breccia, grit, conglomerate and minor tuff. Most of the clasts are chert but fragments of fine-grained acid volcanic rocks including white to pale green flow banded rhyolite are also abundant. In Stikine Valley near Brewery Creek small remnants of mainly acid volcanic rocks and derived sediments contain fossil wood and leaves which are reported to be of about Eocene age (Kerr, 1948, p. 9).

The Sloko volcanics were emplaced by the explosive eruption of acid to intermediate lavas from numerous isolated centres along the eastern flank of the Coast Crystalline Belt during early Tertiary time. The piles of poorly consolidated pyroclastic debris were rapidly eroded and the reworked ejecta deposited in local basins. The most complete chronology of Sloko volcanism may be represented far to the east, where airborne ash settled to form tuff layers in the main Sustut Basin. On Spatzizi Plateau, 100 miles east of Telegraph Creek, Eisbacher (1971) has subdivided the Sustut into a lower sedimentary part and an upper part, the Brothers Peak Formation, which is characterized by numerous thick beds of acid tuff. Two potassium argon ages on the tuffs (Eisbacher, pers. comm.) gives ages of 53 and 49 m.y., corresponding with the Eocene age of Sloko rocks in the Telegraph Creek map-area.

Sub volcanic equivalents of the Sloko are probably represented by the stock (map-unit 22) and distributary dyke system that cuts Sustut rocks near Elwyn Creek. Some bodies of felsite (map-unit 20) such as the cauldron subsidence feature on Armadillo Peak are lithologically similar to Sloko volcanics and may be genetically related to them.

Map-Units 25 and 26

Throughout late Tertiary and Pleistocene time lava has issued periodically from many separate vents within and surrounding Telegraph Creek map-area. The first flows spread out as flat sheets on a gently rolling Tertiary erosion surface whereas later ones were diverted into deeply incised valleys to form intracanyon flows. Remnants are preserved on flat topped interfluves in the Hazelton Mountains and on Klastline Plateau and on terraces in Stikine and Klastline valleys. In addition, the huge volcanic complexes of Mt. Edziza and Spectrum Range were initiated at this time.

The Edziza and Spectrum piles cover an area of nearly 600 square miles and include lavas and pyroclastic rocks of basaltic to rhyolitic composition. The lower part is a basaltic shield about 15 miles wide that extends south from Klastline River for 40 miles. Superimposed on its northern end the composite cone of Mt. Edziza rises to a circular summit crater nearly 2 miles across and 9,000 feet above sea level. On the southern part of the shield deeply dissected rhyolite lava domes and ash flows form the brightly coloured, pyramid shaped peaks of Spectrum Range. Throughout its long history (Souther, 1966, 1967, 1970) lavas of extremely varied composition have issued from a multitude of vents within the complex. Although it has been mapped in detail this cannot be resolved at the present scale. Map-units 25 and 26 are lithological units with no stratigraphic connotation. They indicate those parts of the pile that are mainly basaltic (map-unit 25) and those parts that are mainly rhyolitic (map-unit 26) but each includes areas where the two types are intimately mixed.

MT. EDZIZA

The basal, shield portion of Mt. Edziza is exposed in an escarpment along its western side and cross-sections of the entire pile may be seen in steep-walled radial valleys cut ceeply into the eastern side. The lower part comprises a succession of very uniform dark grey fine-grained basaltic flows containing sparse phenocrysts of plagioclase, pyroxene and olivine. Individual columnar-jointed flows from 5 to 20 feet thick are separated by layers of loose reddish brown scoria and ash. The absence of interlayered colluvium indicates that these lower flows were poured out in rapid succession. They are overlain by a thick bed of unconsolidated rhyolitic airfall pumice above which the section is extremely complex (Souther, 1966) and variable. Basalt, rhyolite and dacite flows, domes and pyroclastic deposits are interlayered with fluvial and glacial deposits. The acid phases occur as bulbous lava domes, thick stubby flows and both welded and unwelded ash-flow sheets. Basaltic phases, erupted during non-glacial periods, form relatively thin flows that surround and engulf the piles of acid ejecta. During the Pleistocene, subglacial eruptions of basalt formed thick piles of sideromelane tuff-breccia and pillow lava. Rocks within the central conduit have been intensely altered by late solfataric action to a bleached, white, carbonitized rock containing from 5 to 50 per cent finely disseminated pyrite.

SPECTRUM RANGE

A succession of fine-grained uniform basaltic flows similar to that forming the basal shield of Mt. Edziza extends south beneath the Spectrum Range. Overlying the basaltic flows is a predominantly rhyolitic complex, comprising overlapping lava domes, thick stubby flows and pyroclastic deposits, most of which are intensely welded. The rocks are fine grained, with sparse phenocrysts of plagioclase, sanadine, quartz and minor pyroxene. Most of them are chalky white but light green and purple varients are common and many exhibit intricate multi-coloured flow banding. Massive black, locally spherulitic, obsidian is present along the base of most of the flows and domes. Solfataric alteration has produced bright red and yellow patches and streaks from which the Range derives its name.

HAZELTON MOUNTAINS

Three large remnants of flat-lying basalt flows are preserved in the Hazelton Mountains north of Burrage Creek. The basal flow rests on a nearly flat erosion surface that cuts across older Bowser strata at an elevation of about 6,000 feet. Where observed the contact is marked by a thick mat of basaltic scoria and cinders resting directly on the underlying bedrock with no intervening layer of colluvium or till. Eight to twelve massive, crudely jointed flows are present. They are separated by layers of dark grey to black scoria and have a composite thickness of about 600 feet. The rock is fine grained basalt with abundant phenocrysts of plagioclase and pyroxene. They do not resemble the basal flows of the Edziza shield and are more probably related to a source east of Telegraph Creek map-area.

STIKINE RIVER FLOWS

Remnants of at least three thick intracanyon flows are preserved on terraces along Stikine River almost as far south as Yehiniko Creek. They rest on river gravels and each flow was deeply incised by the river before the next one was erupted. Cross-sections of the old channels exposed in steep cliffs facing the river, provide a spectacular display of curved and radiating columns formed at right angles to the old river channels. The rock is a coarsely porphyritic olivine basalt with large phenocrysts of plagioclase, lustrous black pyroxene and olivine in a medium-grained matrix of the same minerals. Some of the flows are composite and exhibit a change from abundantly porphyritic rock at the base to sparsely porphyritic rock at the top. The remnants north of Telegraph Creek are probably from flows that entered the Stikine along Tahltan valley from a source related to the Level Mountain shield volcano in Dease Lake map-area (Gabrielse and Souther, 1962).

The remnants at and downstream from Telegraph Creek are finer-grained basalt similar to two small patches at an elevation of about 4,000 feet near the head of Hyland Creek. It seems probable that all of these remnants may be part of a flow that issued from a source northwest of Telegraph Creek and entered the Stikine along Hyland and Telegraph creeks.

<u>Map-Unit 27</u>

Quaternary flows of olivine basalt have issued from more than thirty satellitic vents around the flanks of Mt. Edziza. Many separate flows have coalesced to form extensive fields of rough blocky lava on the northern and southern slopes of the mountain. Tongues of lava projecting below treeline near Buckley Lake appear to post-date the surrounding forest. Small, stunted trees on the lava, however, are the same age as mature trees beyond the flow. Charred twigs from beneath cinder beds on the northeastern slope of Edziza give a ^{14}C age of 1300 ± 130 years B.P., but at least three undated eruptions are younger.

Small pyroclastic cones from 100 to 1500 feet high have been built above most of the vents. The older ones have been reduced to rounded mounds of cinders while others have sharp crater rims that show no evidence of erosion. One of the cones at an elevation of 7,000 feet on the southwest slope of Mt. Edziza was erupted beneath the central ice cap. Both the cone and the short flow issuing from it are composed entirely of highly vesicular pillow and pahoehoe toes.

In addition to the satellitic vents on Mt. Edziza a group of five small pyroclastic cones lie along a north-south linear belt east of Mess Creek valley and eruptions from at least six vents on Klastline Plateau have produced a cluster of prominent black linear ridges. The latter are subglacial piles of frothy pillow lava and sideromelane tuff-breccia. Castle rock, the largest in this group, is a small volcanic neck from which the surrounding pyroclastic debris has been stripped away.

The lava from these centres is remarkably similar. Beneath the frothy, oxidized surface it is a medium grey fine-grained to glassy basalt with ragged white 2 - 5 mm. phenocrysts of plagioclase, small light green olivine and sparse black pyroxene. The Klastline centres, particularly Castle Rock are notable for their numerous rounded inclusions of fresh peridotite, dunite, gabbro and partly fused granitic rocks.

Map-Unit 28

About 20 small hot springs are known in Telegraph Creek map-area. All of these lie within a north-south linear belt that includes the upper part of Mess Creek valley and the western flanks of Mt. Edziza and Spectrum Range. Water temperatures vary from 50° to more than 160° F. but none are boiling and there are no associated fumaroles. Carbon dioxide gas is being liberated from all the springs and some are issuing traces of hydrogen sulphide. Deposits of calcareous tuffa, (map-unit 28) are present around all the active springs and similar deposits elsewhere mark the location of springs that have ceased to flow. Locally, as on Elwyn Creek, the tuffa deposits are as much as 15 feet thick and the lower, older layers, have recrystallized to radiating sheaths of aragonite in which individual crystals are up to 4 inches long and 1/4 inch in diameter.

The largest deposit of tuffa is near the south end of Mess Lake where intricately terraced deposits underlie an area of several acres. The Mess Lake springs issue from a number of round, tubular orifices of about 6 inches in diameter and 18 inches higher than the smaller terraced pools surrounding it. The springs on Taweh Creek have also built several natural basins that project from the banks of the creek. Unlike the other springs those on Taweh support a luxuriant growth of bright red, green and blue algae.

Map-Unit A

ULTRAMAFIC ROCKS

The largest body of ultramafic rock in Telegraph Creek map-area occurs on a northeasterly spur of Mt. Hickman. It is completely surrounded by granitic rocks of Hickman Batholith with which it is apparently gradational. Preliminary study based on only two traverses across it suggests that it is a complex, zoned body that has undergone little serpentinization. The central part is a fine, granular dunite in which the olivine is highly fractured but extremely fresh. This is surrounded by an envelope of equally fresh granular periditite and pyroxenite. The ratio of olivine to pyroxene varies from nearly pure dunite containing 5 to 10 per cent pyroxene to nearly pure clinopyroxenite with only a trace of olivine and a little interstitial biotite. A few laths of plagioclase and hornblende occur in the outer part of the pyroxenite zone and increase rapidly outward until the rock becomes a pyroxene-bearing, hornblende diorite that appears to be an integral part of Hickman Batholith.

The zonal arrangement is interrupted on the east side by a body of fine grained, very dense, dark grey rock characterized by rough, solution pitted surface. In this section it is seen to comprise a fine interlocking mosaic of termolite crystals, minor melilite, muscovite and whisps of antigorite. These minerals enclose ragged grains of pyroxene and a little olivine. The relationship of these rocks to feldspathic rocks of Hickman Batholith was not observed, but, the mineralogy suggests that they may represent a contact metamorphic zone between the batholith and the ultramafic rocks.

Six other small bodies of ultramafic rock have been found in Telegraph Creek map-area. All of these are highly sheared, serpentinized peridotite, in which the original pyroxene and olivine have been completely or partially replaced by antigorite and the structureless minerloid serpophite. The smaller bodies lie on or near major fault zones.

Map-Unit B

Massive, black, amphibole-rich rocks form the precipitous upper spires of Endeavour and Dokdaon mountains. Similar rocks with a phyllitic to schistose fabric outcrop on the east side of Scud Glacier where they grade, on the one hand into ultramafic rocks (unit A) and on the other into Permian limestone (unit 3). The latter contact is sinuous and along it the limestone and amphibolite interdigitate in a complex manner. The proximity of the amphibolite to map-unit 3 suggests that it was derived, at least in part, from metamorphism of dolomitic limestone.

In thin section the rock is seen to comprise a granular aggregate of tremolite with minor forsterite, melilite and interstitial phlogopite. Altered pyroxene is present in some sections and two specimens from Endeavour Mountain contain abundant euhedral crystals of leucite, suggesting that they are of volcanic origin. Hornblende is locally present in the Endeavour and Scud occurrences and is the dominant amphibole in the occurrence at the head of Tahltan River in the northwest corner of the map-area. The latter is part of an amphibolite complex that extends into Tulsequah map-area (Souther, 1971) where it is in contact with massive Permian limestone.

STRUCTURAL GEOLOGY

The pre-Tertiary rocks of Telegraph Creek map-area have undergone multiple deformations but it is difficult to separate early structures from those that were overprinted on them during later stages of deformation. Analysis of the structure is further complicated by contrasting competence of adjacent volcanic and sedimentary units and their different response to the same stresses.

Folds

In general Permian and older pelitic rocks are characterized by moderately tight, symmetrical, upright folds in which the platy phyllitic fabric conforms to the original bedding throughout. Deformation of Mississippian and Permian limestones is variable. Large sections, such as those south of Scud Glacier have been little deformed, whereas others exhibit complex flow-folds with greatly attenuated limbs and thickened crests. Locally, at the head of Sphaler Creek and west of Scud Glacier, Permian limestone displays diapiric folds in which the thickened fold crest is detached from its limbs. The regional trend of folds in Permian and older rocks is reflected by the limestone members which trend north to northwesterly in the southern and eastern parts of the map-area and east-west along Chutine Valley farther north.

The Triassic and Lower to Middle Jurassic terrain is broken into a mozaic of fault-bounded blocks between which there is little structural continuity. The structural style in any given block is determined largely by the competency of the rocks within it. Thick-bedded volcanic units rarely display linked folds. They are characterized instead by segments of open folds cut by a multitude of minor faults and fractures, suggesting that initial warping was followed by fracturing before deformation was complete. In contrast, thin-bedded units exhibit moderate to tight folding. On Klastline Plateau, for example, bedded sediments of map-unit 7 display tight chevron folds that are not reflected in the conformably overlying volcanics of map-unit 8. Similarly, the thick plate of Middle Jurassic pillow basalt (map-unit $1\overset{5}{4}$) west of Iskut River is tilted 45° toward the east but exhibits no internal folding, whereas the underlying shale of map-unit 13 exhibits tight easterly overturned folds.

Evenly bedded, Upper Jurassic Bowser strata east of Iskut Valley are deformed into long curvilinear folds whose axis conform roughly to the margins of the basin itself. The major folds have amplitudes of one to two miles and limbs facing the interior of the basin are generally steeper than those facing its margins. Much of this folding has taken place along decollement surfaces, either bedding planes or gently west dipping thrusts within the Bowser succession, suggesting that none of these structures persist to any great depth.

Sustut strata have been faulted, tilted and locally folded. Broad open folds such as the east-west trending syncline on Mt. Helveker are the rule, but adjacent to faults in Mess Creek valley thin-bedded Sustut sandstones and siltstones are intensely folded.

No folds were observed in rocks younger than the Lower Tertiary Sustut Group.

Faults

The north-south trending valleys of Iskut River and Mess Creek are believed to be controlled by major fault zones that have undergone repeated movement. A parallel fault zone runs north from the head of Sphaler Creek to Scud Glacier and lesser faults in the southeastern part of the map-area refelct this same north-south trend. A set of northwesterly trending faults is well developed in the region between Iskut River and Mess Creek. Some of these are clearly truncated by younger movement on the north-south faults, whereas others change direction and merge with the north-south set. Both sets comprise predominantly steep, normal faults, although reverse faults were noted locally. At the head of More Creek pre-Permian phyllite occupies the western, hanging-wall side of a steep westerly dipping fault bounded on the east by upper Triassic volcanics. South of Scud Glacier overturned Permian and Middle Triassic strata are thrust west over upper Triassic volcanics. An anomalous, but well exposed, east-west fault across Klastline Plateau also exhibits reverse movement in which bedded sediments of map-unit 7 are thrust north over volcanics of map-unit 8.

Extensive early Tertiary faulting has effectively masked the pattern of earlier faults. It is probable that the present distribution of major faults was established at least as early as late Jurassic and that many were reactivated during late Jurassic and early Tertiary uplift. Some of them remained active into Quaternary time (Souther, 1970). Of these the best documented are north-south faults along the east side of Mess Creek Valley, which cut Pleistocene and younger Edziza flows. Several of these faults show progressively greater offset of older Edziza flows, indicating that periodic movement on the Mess Creek fault zone may also explain the abrupt termination of the early Tertiary erosion surface. Remnants of this gently west-sloping surface can be traced from an elevation of 6,000 feet in the Hazelton Mountains to an average elevation of about 4,000 feet on the east side of Mess Creek Valley. No remnants are present in rugged mountains that rise to over 7,000 feet on the west side of the valley, suggesting that it was uplifted and eroded west of the Mess Creek fault zone.

ECONOMIC GEOLOGY

The discovery of fine gold in Stikine River gravel bars below Telegraph Creek brought the first rush of prospectors to Telegraph Creek map-area in 1861. Active prospecting for placer gold continued through the Cassiar rushes of 1873 to 1875 and the Klondike rush of 1896 to 1900, when thousands of prospectors followed the Stikine River

Route to the interior. By 1900 the emphasis had shifted from placer exploration to exploration for load deposits, and in 1902 the first copper prospect was recorded ten miles below Glenora. Early exploration was confined mainly to areas accessible from the river and resulted in the discovery of many small showings along Stikine Valley (Kerr, 1948).

It was not until 1955 that systematic exploration of the more remote parts of the map-area was begun. In that year saturation prospecting employing large helicopter-supported parties was initiated by Hudson Bay Mining and Smelting Company. Since that time many parts of the map-area have undergone intensive exploration by geophysical and geochemical as well as conventional prospecting methods. A large number of prospects have been explored by trenching and diamond drilling and at least two of these (Galore Creek and Liard Copper) have proven reserves in excess of 200 million tons of + 0.50 per cent copper equivalent.

Only a few of the properties are listed below. In addition to these numerous small showings have been noted in the course of geological mapping. A purely subjective analysis of metal distribution suggests that Triassic volcanic rocks of map-units 5, 7, 8 and 9 are the most favourable hosts for copper and copper-molybdenum, particularly where they are intruded by granitic plutons. Mineralization is most intense in highly fractured zones adjacent to or within the intrusive rock. A particularly high concentration of copper showings occurs in volcanic rocks peripheral to Hickman Batholith.

The alkaline intrusions (unit 16), including the Galore Creek body, that occupy a broad north-south belt through the west central part of the map-area exhibit many features in common with porphyry copper stocks. Traces of copper are present in all the mapped bodies, particularly where the rock is highly fractured. The possibility that other alkaline stocks are present in this zone makes it particularly interesting for further exploration. The parallel, and in part chemically similar, plutons (unit 20) that occupy a north-south zone through the east central part of the map-area are pyritiferous but rarely contain other sulphides. Preliminary geochemical analysis suggests that they have a relatively high silver background. This, plus the proximity of the SF silver property to one of these bodies suggests that the region may have silver potential.

Molybdenum occurrences are most abundant in the northeast part of the map-area. This region appears to be the extension of a molybdenum province that lies mainly to the west of the map-area and includes the Balsam property at the head of Barrington River (Souther, 1959).

North-south trending fault zones also appear to have influenced the distribution of mineral occurrences. Large alteration zones containing traces of copper are present along faults of the Mess Creek Fault Zone, in the upper part of both forks of Yehiniko Creek, in the Ball Creek Region, and along the eastern flank of Mt. Edziza where Triassic rocks beneath the Tertiary lavas are intensely pyritized.

Mineral Properties

Descriptions given below are brief summaries of published reports. For more detailed accounts of these properties the reader is referred to the references listed.

1. Liard Copper (SNO, BIRD)

References: Minister of Mines and Petroleum Resources, B.C. Ann. Repts.: 1959, p. 7; 1964, p. 17; 1965, p. 40; 1966, p. 26-29; 1967, p. 29; 1968, p. 39; 1969, p. 46; 1970 (in press).

The property is a large copper-molybdenum deposit in Triassic volcanics near the eastern contact of Hickman Batholith. The host rocks comprise east-dipping andesitic tuffs, breccias and flows cut by pyroxene basalt and east-dipping quartz-feldspar porphyry dykes. Rocks in the mineralized zone are intensely altered. Plagioclase is extensively sericitized or altered to potash feldspar whereas mafic minerals are chloritized and carbonatized. The altered rocks also contain secondary tourmaline, apatite and epidote, as well as significant amounts of sulphides. The sulphides display a zonal relationship with pyrite forming an outer halo surrounding an inner zone with chalcopyrite and molybdenite. The latter is concentrated near quartz-feldspar porphyry dykes.

2. Galore Creek (Stikine Copper Ltd.)

References: Barr, D.A., 1965, pp. 251-263. Minister of Mines and Petroleum Resources, B.C. Ann. Repts.; 1961, p. 7; 1962, p. 7; 1963, p. 8; 1964, p. 15; 1965, p. 19-29; 1966, p. 25.

The Galore Creek deposits occur in highly fractured zones within and adjacent to a complex syenite body (map-unit 16) that cuts upper Triassic sedimentary and volcanic rocks (map-unit 9). The syenite and the surrounding rocks are intensely altered. The original mafic constituents and feldspars are replaced by hydrothermal biotite, potash feldspar and epidote with minor gypsum and anhydrite, garnet, chlorite and carbonate.

According to Barr (1965, p. 261) "The copper deposits at Galore Creek share many of the characteristic features common to both the porphyry copper type of mineralization and that of pyrometasomatic deposits. Features common to porphyry copper deposits include the disseminated character of much of the mineralization, and its relationship to hydrothermal biotite and potash feldspar alteration in shattered and brecciated areas. The prevailing linearity, in plan, of the deposits and their proximity to contacts of porphyritic masses with attendant skarn mineral assemblages are features indicative of a pyrometasomatic origin. The relationships of the deposits to intrusive contacts and zones of weakness indicate the importance of structural controls." He describes ten mineral deposits within the complex. In each the principal ore minerals are calcopyrite and bornite, while calcocite and secondary cuprite, covellite and copper carbonate are present locally. These are commonly but not always associated with pyrite and magnitite. Mineralization occurs as disseminations, coarse replacements and fracture fillings.

3. QC, QCA

References: Minister of Mines and Petroleum Resources, B.C. Ann. Rept.: 1965, p. 41; 1969, p. 45.

This property is on a prominent, rusty gossan on the south side of Quash Creek on Klastline Plateau. It is surrounded by bedded Triassic, volcanic greywacke of map-unit 7 which, near the gossan, contains abundant pyrite and is deeply iron stained. The rocks of the gossan are bleached, finely shattered, and deeply weathered. Although no intrusive contacts were observed leucocratic crystalline rock (granodiorite ?) near the centre of the gossan is believed to be part of an underlying stock, probably related to the pyritiferous felsite of map-unit 20. Mineralization is apparently of the porphyry copper type, with disseminated pyrite, calcopyrite and molybdenite in altered granodiorite and volcanic sediments.

4. Nabs

References: Minister of Mines and Petroleum Resources, B.C. Ann. Repts.: 1966, p. 29; 1967, p. 30.

The property adjoins the northern edge of Liard Copper property and is in a similar geological setting, near the eastern margin of Hickman Batholith. The southern part covers a low-lying area that is almost entirely drift covered. Outcrops of crackled monzonite near the northern end of the property contain a stockwork of quartz veinlets associated with chlorite and finely disseminated calcopyrite. Volcanic rocks near these outcrops also contain small amounts of calcopyrite and green copper oxide stains. The crystalline rocks associated with this mineralization are probably a phase of the late Cretaceous to early Tertiary quartz monzonite of map-unit 19, rather than a phase of Hickman Batholith.

5. Bam (Arctic, Ann)

References: Minister of Mines and Petroleum Resources, B.C. Ann. Repts.: 1964, p. 18; 1966, p. 31; 1967, p. 30.

This property is near the southern end of a long, iron-stained, alteration zone that outcrops intermittently for 15 miles along the eastern side of upper Mess Creek. The zone is almost certainly related to a system of north-south faults that cut late Cretaceous and older strata. The Bam showings are in lower Jurassic sandstones (map-unit 1~~2~~3) that rest unconformably on dolomitized Permian limestone (map-unit 3). In the mineralized zone rocks are intensely shattered and charged with finely disseminated pyrite and small amounts of disseminated tetrahedrite. In addition the sandstone contains secondary malachite and azurite.

6. Gordon

References: Minister of Mines and Petroleum Resources, B.C. Ann. Rept.: 1966, p. 22.

7. Limpoke

References: Minister of Mines and Petroleum Resources, B.C. Ann. Rept.: 1965, p. 18.

8. Poke

References: Minister of Mines and Petroleum Resources, B.C. Ann. Repts.: 1965, p. 18; 1963, p. 7.

The Gordon, Poke and Limpoke properties are related to the marginal phase of a large granodiorite stock (map-unit 17) that cuts upper Triassic volcanics (map-unit 9) on the north slope of Mt. Barrington. Near contacts the granitic rock and intruded volcanics have undergone intense potash metasomatism with formation of biotite and potash feldspar. The marginal phases of the intrusion are complex and exhibit evidence of multiple intrusion. On the Gordon property the mineralized rock is a syenite porphyry with potash feldspar phenocrysts in an aggregate of altered feldspar, aegirine-augite, chlorite and green biotite. The Limpoke showings are in altered granodiorite whereas mineralization on the Poke property extends into syenitized volcanics near the contact. All three properties contain dispersed and disseminated chalcopyrite. In addition the Limpoke showings contain pyrrhotite and molybdenite.

9. MH (Stikine Iron Mines Ltd.)

References: Minister of Mines and Petroleum Resources, B.C. Ann. Repts.: 1965, p. 18, 1966, p. 23.

The MH group of 70 claims is on a rolling, overburden-covered upland north of Mt. Rowgeen. The surrounding terrain is underlain by Triassic volcanic rocks (map-unit 9) and around the periphery of the property, a few isolated outcrops of pink, porphyritic syenite suggest that the volcanics are intruded by a roughly circular syenite stock about 2 miles in diameter. Bulldozer trenches near the centre of the stock expose a suite of coarse-to fine-grained basic rocks comprising mainly biotite bearing pyroxenite and minor peridotite. The pyroxene and olivine are extremely fresh and show no evidence of serpentinization. The basic rocks are cut by veinlets and irregular masses of potash feldspar. Iron mineralization is magnitite, which occurs interstitially throughout the rock as grains and blebs. Two assays published in the 1966 Minister of Mines Annual Report give magnitite iron contents of 6.51 and 8.25 per cent.

10. BIK (Silver Standard Mines Ltd.)

References: Minister of Mines and Petroleum Resources, B.C. Ann. Repts.: 1964, p. 13; 1965, p. 29-31; 1966, p. 25.

The BIK claims adjoin the Galore Creek (Stikine Copper Ltd.) property on the north and east. They are underlain by Triassic andesitic flows and breccias cut by small bodies of syenite similar to that associated with mineralization on the adjoining Stikine Copper property. Disseminated pyrite is widespread but evidence of copper mineralization is limited. Sparsely disseminated chalcopyrite occurs in some of the syenite and copper stain was noted on isolated outcrops of volcanic rock.

11. JW (Kennco Explorations (Western) Ltd.)

References: Minister of Mines and Petroleum Resources, B.C. Ann. Rept.: 1965, p. 32.

This property lies entirely within granitic rocks (map-unit 17) in the headwaters of Jack Wilson Creek, a westerly flowing tributary of Stikine River. The mineralized zone outcrops along the north fork of the creek where a small gorge exposes fine grained monzonite with screens or small pendants of altered volcanic rock. In addition to feldspar the monzonite contains abundant epidote, amphibole, biotite, chlorite, apatite, magnetite and some zoisite. It is highly fractured and carries both veins and disseminations of pyrite accompanied by disseminated chalcopyrite. One sample reported in Minister of Mines Annual Report of 1965 contains 0.76 per-cent copper.

12. Copper Canyon (Amax Explorations, Inc.)

References: Minister of Mines and Petroleum Resources, B.C. Ann. Repts.: 1957, p. 5; 1965, p. 34.

The Copper Canyon Showings are located about 4 miles east of the Stikine Copper property and, like the latter, they are associated with a syenite intrusion. This body occurs along a major reverse fault bounded on the northeast by overturned middle Triassic and Permian rocks (map-units 4 and 3) and on the southwest by upper Triassic volcanics (map-unit 9). The syenite body is layered and is apparently structurally conformable with the overlying Permian and Middle Triassic sediments. In the mineralized zones the syenite has undergone extensive potash metasomatism. The rock is bleached and pyritized and contains abundant epidote, biotite, muscovite, and chlorite, together with magnetite, garnet and apatite. Copper mineralization with gold and silver values occurs as disseminated chalcopyrite and minor bornite.

13. Ann, Su (Julian Mining Co. Ltd.)

References: Minister of Mines and Petroleum Resources, B.C. Ann. Repts.: 1964, p. 15; 1965, p. 38.

This property extends along the valley of Split Creek, a tributary of Porcupine River. Steeply dipping Upper Triassic volcanics and interbedded sediments are intensely altered and pyritized in a roughly circular zone near the headwaters of the creek. Outcrops of coarse-grained monzonite are exposed in Split Creek both above and below the main area of investigation. Bulldozer trenches on the south slope of Mt. Scott Simpson, near the northwest side of the altered zone, reveal alternate bodies of fine grained porphyritic granodiorite and fine to medium grained greenstone. The granodiorite contains highly altered feldspar phenocrysts surrounded by masses of epidote and clots of green biotite in a fine, feldspathic matrix. Disseminated pyrite mineralization is abundant in the granodiorite porphyry and the volcanic rocks, however, surface showings of copper mineralization are sparse. Diamond drill core contains sparsely disseminated chalcopyrite in both the granodiorite and the volcanics. Copper values are reported to range from 0.10 to a maximum of 0.32 per cent copper.

14. SF (Conwest Exploration Company Ltd.)

References: Minister of Mines and Petroleum Resources, B.C. Ann. Rept.: 1965, p. 41.

The SF property is on Klastline Plateau 4 miles east of Nuttlude Lake. The showings are in interbedded red and green volcanic conglomerate and sandstone of probable Late Triassic age (map-units 7 and 8). The sediments are cut by 4 rhyolitic sills that dip north into the hill and are probably satellitic to the felsite body (unit 20) exposed north of the property. Stockworks of barite occur chiefly in the red conglomerate and are associated with sulphides including galena, sphalerite, chalcopyrite, and tetrahedrite. Native silver is also reported.

15. Goat (Kennco Explorations (Western) Ltd.)

References: Minister of Mines and Petroleum Resources, B.C. Ann. Repts.: 1963, p. 8; 1964, p. 17.

This property is on the precipitous north side of Sphaler Creek, 10 miles above its junction with Porcupine River. Disseminated copper minerals occur in altered and brecciated Upper Triassic volcanic rocks (map-unit 9) along a northerly trending zone of small felsite (in part monzonite) intrusives.

16. Mary

References: Minister of Mines and Petroleum Resources, B.C. Ann. Rept.; 1963, p. 9.

The Mary claims are on the western contact of a large quartz diorite to monzonite stock (map-unit 17) that cuts Upper Triassic volcanic and sedimentary rocks (map-units 5 to 8) on lower Ball Creek. The margin of the stock is porphyritic, highly fractured and iron stained. Small quantities of molybdenite occur with pyrite in quartz veinlets and on fracture surfaces in the porphyry and the adjacent Triassic rocks.

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