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GEOLOGY AND MINERAL POTENTIAL OF THE CHILKO-TASEKO LAKES AREA* (92O/4,5; 92J/13; 92K/16; 92N/1)

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INTRODUCTION

The Chilko-Taseko Lakes area covers a section of rugged, mountainous terrain located 230 kilometres north of Vancouver. The mineral potential of this area is largely undefined at present, but significant gold, copper, and molybdenum mineralization in adjacent areas of similar geology suggests the potential might be high. Sporadic exploration attempts have been made in the area in recent years, with localized successes. In order to better define the mineral potential, an eight-week field project, conducted in July and August 1985, consisted of 1:50 000-scale geological mapping, lithogeochemical sampling, and geochemical stream silt sampling of all minor and major drainages. A four-person crew, operating in a mobile fly camp mode and utilizing considerable helicopter time, was required to complete the project.

The stream silt sampling program covered an area of 1 200 square kilometres. Mapping and lithogeochemistry within this area varied in detail according to accessibility, complexity of geology, and indications of mineralization. All geological and geochemical data are being compiled for release as an open file series of maps as a guide to the mineral potential and future prospecting of the area.

PREVIOUS WORK AND REGIONAL GEOLOGY

Regional geologic compilations in the Taseko Lakes map sheet (92O; Tipper, 1978) and the Mount Waddington map sheet (92N; Roddick and Tipper, 1985) reveal a sequence of Middle Triassic to Upper Cretaceous volcanics and sediments lying along the northeastern margin of the Coast Plutonic Complex. The stratified rocks are cut by numerous, northwesterly trending, right lateral transcurrent faults, some of which have displacements in excess of 100 kilometres (Tipper, 1969).

Jeletzky and Tipper (1968) defined the Jurassic and Cretaceous stratigraphy in the Taseko Lakes map-area on the basis of fossil and lithologic correlations. They concluded that these rocks have been deposited in the northwest-trending Tyaughton Trough and that the trough was bounded by intermittent landmasses on the southwest and northeast. The study area is underlain by a sequence of Lower and Upper Cretaceous volcanics and sediments that accumulated on the southwestern flank of the Tyaughton Trough and that are now in contact with the Coast Plutonic Complex. The stratified rocks have been correlated in part with the Relay Mountain, Taylor Creek, and Kingsvale Groups.

Regional geochemical stream water and silt surveys, conducted by the Ministry, have been completed for map sheets 92O (1979) and 92J (1981). Sample site density of these surveys averaged one per 14 square kilometres.

GENERAL GEOLOGY

Figure 41-1 outlines the general geology in the Chilko-Taseko Lakes area mapped in this study. A limited amount of data from assessment reports and Geological Survey of Canada mapping has been incorporated into this map. In the following discussion, rock units are defined on a lithological basis alone; possible correlations are discussed afterwards. This stratigraphy may be subject to revision, pending identification of marine fossil collections obtained from at least four different units.

STRATIFIED ROCKS

UNIT 1

Exposures of Unit 1 occur in a thin, discontinuous horizon south of Rufous Mountain, where they are cut by quartz diorite of the Coast Plutonic Complex. This clastic sedimentary section consists of interbedded, dark-grey argillite, quartz-rich greywacke, and chert pebble conglomerate. The greywackes have yielded a limited collection of marine pelecypods and belemnites. The sediments are interbedded with overlying tuffs to the north and are cut by quartz diorite to the south. A sediment horizon mapped by Tipper (1978) south of Mount Goddard is likely correlative with this unit (Fig. 41-1).

UNIT 2

Conformably overlying Unit 1 is a section of volcanic pyroclastics and flows that are very poorly bedded and contain no extensive sedimentary horizons. Purple, grey, and green, generally matrix-supported fragmental tuffs containing angular to subrounded clasts up to 25 centimetres across, form massive, thick horizons that are intercalated with finer lapilli and crystal tuffs as well as some vesicular flows. Crystal-rich tuffaceous material comprises the matrix in the fragmental rocks. The pyroclastics are dominantly composed of feldspar, plus hornblende or augite, crystal tuffs of andesitic to basaltic composition. Fragmental units are intraformational. Chlorite and epidote alteration is common, often being associated with carbonate-quartz veining that weathers a distinctive brown colour. Also present in this unit are felsic tuff and dacitic-rhyolitic members, locally with quartz eyes. A prominent gossan containing considerable pyrite and pyrrhotite has developed at one such locality, 7 kilometres south of Mount Goddard.

A thrust sheet of this volcanic unit overlies Unit 5 in the Mount Goddard area. Here the fragmentals include irregular bodies of white, laharic deposits which consist of a chaotic mixture of subangular to rounded volcanic debris dispersed through a white, muddy, ash-like matrix. Horizons of well-bedded waterlain tuffs are also present in this area.

The upper contact of Unit 2 was only observed in the Tchaikazan Valley where it appears to conformably pass into clastic sediments and volcanics of Unit 5.

UNIT 3

Unit 3 occurs in a fault-bounded, northwesterly trending belt from the lower Tchaikazan River to the Yohetta Lake area. It is dominated by purple-weathering lapilli and heterolithic fragmental pyroclastics. Poorly sorted lithic fragments, up to 25 centimetres in size, include dark grey to purple, hornblende-feldspar crystal tuff, dark grey feldspar porphyry flows, green chloritic hornblende porphyry, and some green, strongly epidotized tuff. Argillaceous to arkosic sedimentary fragments and dioritic intrusive fragments are also present. The matrix material is a feldspar-rich crystal tuff containing sufficient finely disseminated hematite to give the over-

* This project is a contribution to the Canada/British Columbia Mineral Development Agreement.

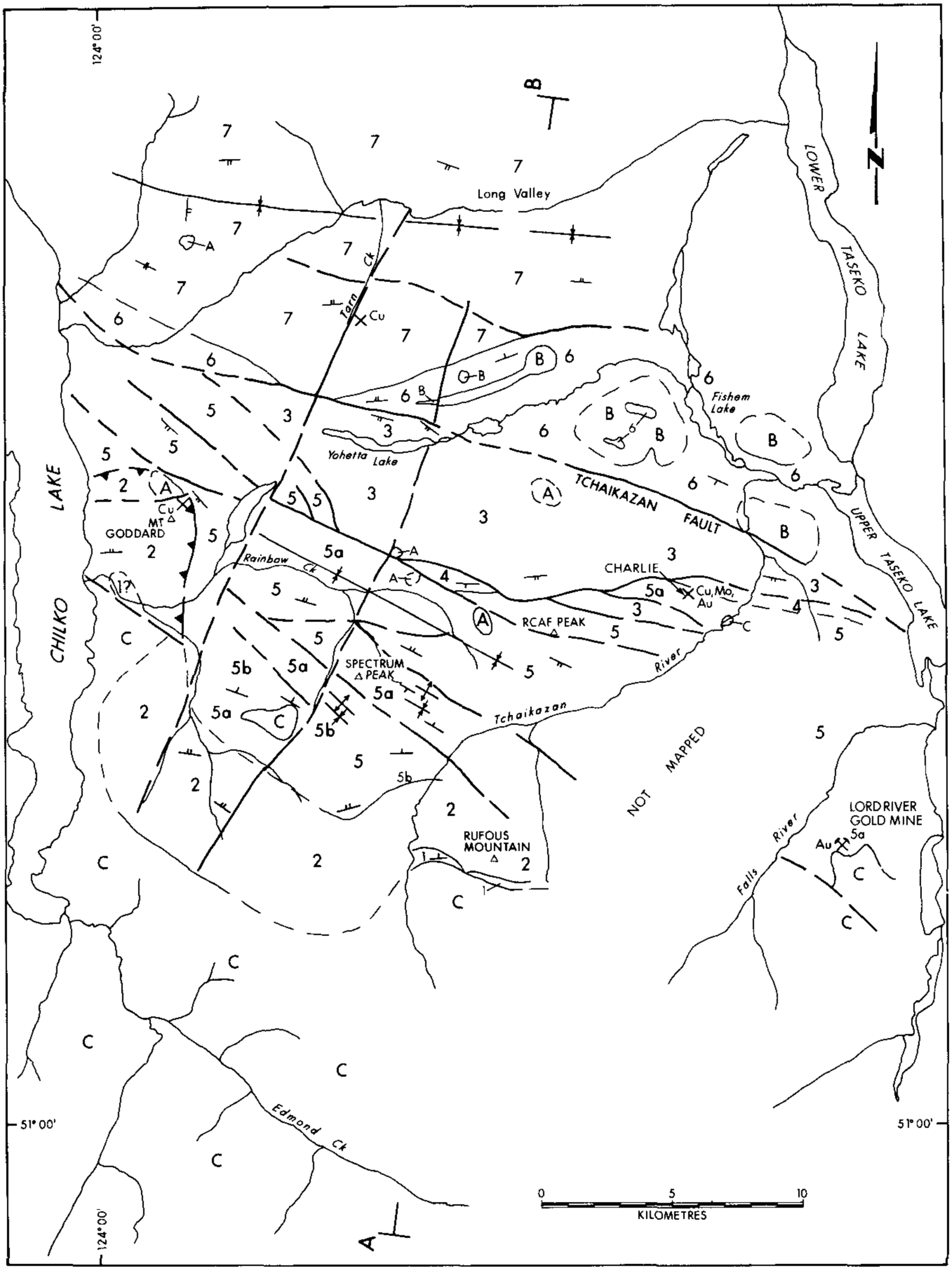

Figure 41-1. Geology of the Chilko-Taseko Lakes area (for legend, *see* Fig. 41-2).

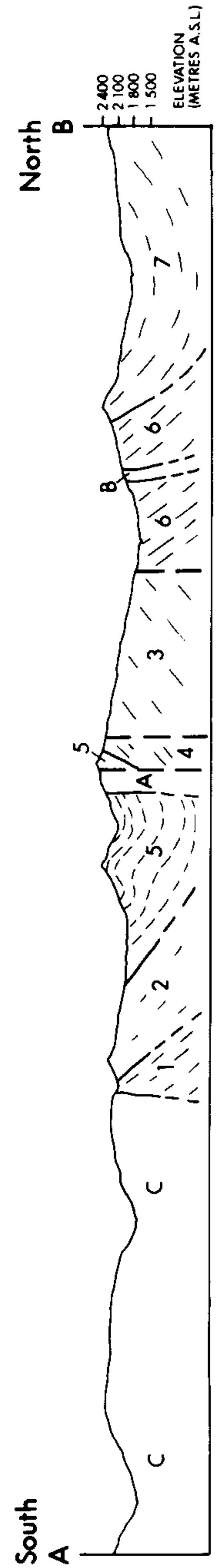

Figure 41-2. Geological cross-section, A-B, in Figure 41-1.

LEGEND

STRATIFIED ROCKS

- **7** ANDESITIC TO BASALTIC PYROCLASTICS, FLOWS, AND VOLCANIC SEDIMENTS
- **6** ARGILLITE, QUARTZ SANDSTONE, ARKOSE, CONGLOMERATE; MINOR VOLCANIC FLOWS AND TUFFS
- **5a** DACITIC TO BASALTIC PYROCLASTICS, FLOWS, BRECCIAS, AND VOLCANIC SEDIMENTS
- **5b** ARGILLITE, SILTSTONE, SANDSTONE, CONGLOMERATE
- **5** UNDIFFERENTIATED 5a, 5b
- **4** BLACK ARGILLITE, SILTSTONE, SANDSTONE, MINOR TUFFS AND FLOWS
- **3** PURPLE ANDESITIC PYROCLASTICS AND BRECCIAS; MINOR FLOWS
- **2** DACITIC TO BASALTIC PYROCLASTICS AND FLOWS; MINOR RHYOLITE TUFFS
- **1** ARGILLITE, GREYWACKE, CONGLOMERATE, MINOR TUFFS

INTRUSIVE ROCKS

- **A** DIORITE STOCKS: HORNBLENDE DIORITE
- **B** FELSITES: FELDSPAR AND BIOTITE FELDSPAR PORPHYRY
- **C** COAST PLUTONIC COMPLEX: GRANODIORITE, QUARTZ DIORITE

Plate 41-1. Volcanic breccia/conglomerate overlain by andesitic lithic fragmental tuff, Unit 5a (hammer 40 centimetres long).

Plate 41-2. Crossbedded quartzose sandstone, Unit 5b (hammer head 13 centimetres long).

all purple colour to the unit. Brown-weathering hornblende feldspar porphyry flows of andesitic to basaltic composition form resistant ridges within the pyroclastics. These flows are typically fine grained and vesicular. The faults bounding this unit appear to be major transcurrent structures. The southern boundary fault is exposed in two locations: one is a strongly sheared fault breccia consisting of altered volcanic fragments and lithic blocks set in a white carbonate matrix; the second is a gossanous shear zone 25 metres wide containing silicified and bleached volcanic fragments with vuggy quartz-carbonate veins carrying pyrite, pyrrhotite, and minor chalcopyrite. The northern bounding fault has been called the Tchaikazan fault by Tipper (1978).

Unit 3, appears to be correlative with similar Lower Cretaceous volcanics in the Mount Waddington map-area (Unit 13; Tipper 1969), however the fault-bounded and unfossiliferous nature of these rocks renders their position in the straatigraphy uncertain at present. They may represent a subaerial facies equivalent of the volcanics of Unit 2.

UNIT 4

The fine clastic sediments of Unit 4 are distinctive for their rich marine fossil fauna, evident in at least six locations within the narrow wedges of exposed strata. Sedimentary facies are closely interbedded and include thinly laminated grey siltstone to black argillite as well as concretionary brown siltstones to arkosic sandstones in beds often a few metres thick. Limy sections or impure limestones are common. Tuffaceous volcanic horizons are present, particularly adjacent to the contact with the overlying volcanics of Unit 5. Hornblende-feldspar crystal and lapilli tuffs comprise the volcanics, and epiclastic volcanic material, including volcanic derived conglomerate, is mixed with the sediments.

The contact with overlying Unit 5 rocks is seen to be a fault in some locations but elsewhere Unit 4 sediments appear to pass into a coarse volcanic conglomerate with interbedded concretionary greywacke which in turn passes into fragmental volcanics of Unit 5. Hence this unit may conformably underlie Unit 5. For the most part the contact is not exposed due to faulting. If the contact is conformable, Unit 4 would be correlative with volcanics in the upper part of Unit 2.

Unit 4 sediments are richly fossiliferous with a diversity of shelly fauna present, including brachiopods, belemnites, ammonites, and bivalves. Some fossilized wood fragments are also present.

UNIT 5

Unit 5 is composed of intimately interbedded volcanic and volcaniclastic rocks (Unit 5a) and clastic sedimentary rocks (Unit 5b). There are regular gradations from tuffaceous volcanics to epiclastics to greywackes, hence Units 5a or 5b are mapped according to the dominant lithology present. Rapid facies changes inhibit the definition of extensive stratigraphic horizons.

UNIT 5a

The volcanic members of Unit 5 comprise multi-coloured dacitic to basaltic pyroclastics, vesicular flows, and flow breccias. Crystal, lapilli, and lithic tuffs predominate. Lithic fragments are generally intraformational and are set in a fine, feldspar crystal tuff matrix. These rocks are often layered, but are generally poorly sorted. Flow rocks are fine grained, green to grey, and commonly contain calcareous or chloritic amygdules and epidote knots. Chalcedonic amygdules and red or green jasperoidal lenses are also present in some flows. A distinctive grey vesicular flow horizon, extending from the Tchaikazan Valley to southwest of Spectrum Peak, locally contains 1-3 per cent pyrite or pyrrhotite in silicified and fractured sections. Interflow breccias are common in this horizon. A prominent blocky assemblage of flows, flow breccias, and epiclastics overlies the vesicular flow unit (Plate 41-1). Felsic members of the unit tend to be fine grained, pale grey tuffs that are moderately siliceous and contain thin horizons with fine quartz eyes; however, they comprise a small proportion of the total volcanic section.

UNIT 5b

Sedimentary lithologies in Unit 5 include dark grey argillites, siltstones, brown greywackes, and chert pebble conglomerate as well as minor quartzose sandstone and impure limestone. The base of Unit 5 in the Tchaikazan Valley is marked by conglomerate and arkosic sediments from 2 to 20 metres thick that conformably overlie volcaniclastics of Unit 2. The conglomerates are white to pale grey and composed of cherty or siliceous pebbles set in a calcareous, sandy matrix. Argillaceous and volcanic pebbles become more common as this layer grades into the overlying or underlying volcanics. Carbonized tree trunk fragments have been recovered from within the conglomerate.

Elsewhere in Unit 5, dark grey argillites and grey to brown siltstone and greywacke are typically well bedded and locally display grading or cross-bedding. A cross-bedded quartzose sandstone with interbedded conglomerate layers (Plate 41-2) located 4 kilometres west of Spectrum Peak gives an upright attitude and a westerly source direction. Approximately 80 per cent of the clasts in the conglomerate are cherty or quartzose pebbles, while the remaining 20 per cent are split between other sedimentary and volcanic lithologies. This is a distinctive member of Unit 5; it is not derived locally, but likely records an erosional event to the west in the Coast Mountain plutonics.

An extensive marine fossil collection of ammonites, belemnites, brachiopods, and gastropods, plus fossilized wood fragments, were collected from Unit 5 sediments north of Mount Goddard. A solitary gastropod was collected from an argillite-felsic volcanic contact in the Tchaikazan Valley. Two thin limestone members were also sampled for microfossil analysis.

UNIT 6

Unit 6 comprises a sequence of interbedded argillite, greywacke, quartzose sandstone, and pebble conglomerate that is exposed from the lower Tchaikazan Valley to the Yohetta Valley. Impure limy sections are common and large limy concretionary boulders weather out of the sandstone and conglomerate. Conglomeratic members range from clast to matrix supported, with clasts being dominated by quartzose or cherty lithologies but argillite, greywacke, and minor volcanic pebbles are also present. The upper members of the unit in Yohetta Valley are well bedded, displaying grading, cross-bedding, and channel scour marks that indicate an upright sequence with a westerly source. A suite of marine bivalves, gastropods, and belemnites was collected from an argillaceous horizon north of Yohetta Lake. Thin volcanic horizons are present within the sediments, forming resistant ridges of grey-green feldspar-hornblende porphyry flows with minor tuffs.

This unit has an abrupt but apparently conformable contact with overlying Unit 7 rocks, however it is bounded on the south by the Tchaikazan fault. Strongly opposing dips in Units 6 and 3 across this fault suggests a significant displacement may have occurred relative to other faults in the area.

UNIT 7

Volcanic lithologies of Unit 7 include a variety of multi-coloured andesitic to basaltic pyroclastics and flows. No extensive sedimentary units were mapped, but a few layered waterlain tuffs and volcanic epiclastics are present. Andesitic volcanic breccias and tuffs, generally purple, brown, or green in colour, dominate the section. Lithic tuffs are intraformational. Flow rocks are grey to brown, massive, feldspar-hornblende porphyries of andesitic to basaltic composition. Magnetite and carbonates are common accessories. Individual flows are normally less than 5 metres thick and interflow breccias are common.

In the northwest corner of the study area, a relatively flat-lying volcanic conglomerate, with well-rounded boulders up to 1 metre across, forms a distinctive, thickly bedded member of Unit 7. The clasts are derived from the surrounding volcanics or from subvolcanic intrusives of similar composition. Interbedded tuffaceous members, including some very finely laminated waterlain tuffs, occur in discontinuous horizons.

STRATIGRAPHIC CORRELATIONS

The rocks of the Chilko-Taseko Lakes area, as previously mapped by Tipper (1978), were correlated in part with Cretaceous strata of the Relay Mountain, Taylor Creek, and Kingsvale Groups. Relay Mountain and Taylor Creek rocks are essentially sedimentary units that accumulated in the Early Cretaceous Tyaughton Trough. Extensive volcanics of the Late Cretaceous Kingsvale Group marked an end to the period of dominantly sedimentary deposition. Similar units were mapped to the northwest in the Mount Waddington map-area (Tipper, 1969).

The preponderance of volcanic lithologies interbedded with the sediments between Chilko and Taseko Lakes has long posed a problem in correlating these rocks with the dominantly sedimentary formations to the southeast that accumulated in the axial regions of the Tyaughton Trough.

Portions of the Cretaceous stratigraphy in the Chilko-Taseko Lakes area are lithologically similar to rocks exposed in the Mount Raleigh pendant, 45 kilometres to the southwest (Woodsworth, 1979). Woodsworth has suggested correlations of the Mount Raleigh area lithologies with rocks of the Chilko-Taseko area as well as with rocks of the Gambier Group (Roddick, 1965) and the Cheakamus Formation (Mathews, 1958) in the southern Coast Mountains. Even though correlations based on lithologic similarities across these distances may be tenuous, they do provide useful comparative stratigraphic frameworks.

The Mount Eurydice Formation in the Mount Raleigh strata includes andesitic to dacitic tuff and breccia, conglomerate, and lesser pelitic schist, and feldspar porphyry. Plutonic clasts in the conglomerates record an episode of exposure and erosion of granitoid rocks to the west. The overlying Styx Formation consists of graphitic arenaceous and pelitic rocks.

The Gambier Group has been broadly divided into three units (Roddick, 1965): (1) a lowest unit of andesitic flows and pyroclastics with granitic cobble conglomerate and breccia, (2) a middle unit of argillite, slate, arkose, and quartzite, and (3) an upper unit of interbedded andesite and slaty tuff, although there is some evidence to suggest that the upper unit is a repetition, by thrusting, over the lowest (Woodsworth, personal communication). The Cheakamus Formation is a Lower Cretaceous sedimentary unit with a basal plutonic-clast conglomerate overlain by a thick succession of greywacke, sandstone, and argillite.

Proposed correlations of units mapped in the study area with Cretaceous stratigraphy elsewhere in parts of southwestern British Columbia are summarized in Table 41-1.

In the Chilko-Taseko Lakes area, the lowest exposed rocks (Units 1, 2, 3) comprise a basal clastic unit overlain by dacitic to basaltic pyroclastics and flows. Based on similar lithologies and fossil descriptions, these units appear to be correlative with Hauterivian (mid-Early Cretaceous) and (?) younger volcanics and sediments in the Mount Waddington map-area (Units 12-15; Tipper, 1969). Hauterivian fossils have previously been obtained from the clastic sedimentary rocks of Unit 4 (Jeletzky and Tipper, 1968), confirming the Early Cretaceous age of this section. Units 1-4 are possibly correlative with the lower Gambier unit and the Mount Eurydice Formation. An Early Cretaceous age (Hauterivian-Barremian) is indicated for the Cheakamus Formation (Woodsworth, personal communication), hence these clastic rocks may be correlative with Unit 4 and with the lower Gambier Group. The plutonic-clast conglomerates were not observed in the Chilko-Taseko Lakes area, however quartz-rich sandstone and chert pebble conglomerate derived from a westerly source are present. Also note that only a tiny portion of the basal clastic unit is preserved along the Coast Mountain intrusive contact in the study area.

TABLE 41-1. CRETACEOUS STRATIGRAPHIC CORRELATIONS

	Age	Lithologies	This Paper 920	Tipper 1978 920	Tipper 1969 92N	Woodsworth 1979 Mount Raleigh	Roddick 1965 (Southern Coast Mountains)	Mathews 1958 (Southern Coast Mountains)
Late Cretaceous	Cenomanian	volcanics	7	Kingsvale Group	19			
		sediments	6		18			
Early Cretaceous	Aptian Albian	volcanics and sediments	5a 5b	Taylor Creek Group	16	Styx Formation	Middle Gambier Group	
	Barremian	sediments	4	Relay Mountain Group	9			Cheakamus Formation
	Hauterivian	volcanics	2, 3	1kv	15 ↕	Mount Eurydice Formation	Lower Gambier Group	
		sediments	1		12			

Ammonites collected from Unit 5 appear to be Albian (late Early Cretaceous) in age (Tipper, personal communication) suggesting that these rocks are equivalent to the middle Gambier Group and the Styx Formation. Taylor Creek Group sediments also appear to be time equivalent with the Unit 5 lithologies. The increased proportion of volcanics of this age in the Chilko-Taseko Lakes area may represent the evolution of a volcanic island arc chain separating sedimentary basins to the east and west.

Units 6 and 7 record a progression from a marine sedimentary sequence to a terrestrial volcanic sequence and are likely correlative with the Upper Cretaceous Kingsvale Group. Jeletzky and Tipper (1968) assigned an Albian (latest Early Cretaceous) to Cenomanian (Late Cretaceous) age to these rocks in the Chilko-Taseko Lakes area. Marine fossils from Unit 6 may provide further evidence for this age. Final correlation of all units based on fossil evidence collected in this project will have to await detailed analysis of the fossil suites.

Therefore, the rocks of the Chilko-Taseko Lakes area appear to record a mid-late Early Cretaceous, dominantly volcanic and marine environment with lesser sub-aerial deposition, probably representing an intermediate volcanic island arc situation. This continued at least into early Late Cretaceous, but the beginning of extensive uplift and erosion of volcanics is indicated at this time. This environment is punctuated locally by incursions of a westerly derived, quartz-rich sediment, probably representing uplift and erosion of intrusive rocks in the continually evolving Coast Plutonic Complex.

INTRUSIVE ROCKS

UNIT A — DIORITE STOCKS

A number of hornblende diorite stocks of unknown age intrude the volcanics and sediments, generally with minimal contact metamorphic effects. The intrusives contain hornblende and plagioclase phenocrysts up to 2 centimetres across set in a fine, mottled grey-white matrix. Accessory quartz, biotite, and magnetite are common, as is chlorite-epidote-carbonate alteration. A series of these stocks follow a northwesterly trend between RCAF Peak and Mount Goddard, and may be related to the faulting in this direction. The numerous diorite dykes present in Tarn Valley north of Yohetta Lake are thought to represent the roof of a larger dioritic stock below. Copper mineralization, accompanied by fracturing, hornfelsing, and propylitic alteration of surrounding rocks, is present at this locality, and adjacent to the Mount Goddard intrusion.

UNIT B — FELSITES

A group of distinctive white-weathering intrusive stocks occur within a fault-bounded wedge of volcanics and sediments between the lower Tchaikazan and Yohetta Valleys. These rocks include feldspar, and biotite-feldspar, porphyries with considerable variation in percentage, size, and crowding of phenocrysts. Intense quartz-carbonate alteration may be present in adjacent rocks. Tipper (1978) assigned an Eocene age to these intrusives. No mineralization was noted with them, however the government regional geochemical survey (BC RGS-3, 1979) produced a number of anomalous silt geochemistry values from creeks in this area.

UNIT C — COAST MOUNTAINS INTRUSIVES

The massive equigranular granodiorite and quartz diorite intrusives of the Coast Mountains form the southern and southwestern borders of the map-area. No attempt was made to map these in detail. Strong fracturing, often accompanied by silicification and pyrite-pyrrhotite mineralization, are locally common in the adjacent stratified rocks. An outlying stock of granodiorite, located 4 kilometres southwest of Spectrum Peak, has had minimal contact metamorphic effects on the surrounding sedimentary lithologies. No roof pendants were located during a brief reconnaissance survey of the Edmond Creek area.

UNIT D — DYKES

A wide variety of dykes are present in the map-area, but are to small to show on Figure 41-1. The most common are mafic-feldspar porphyry, often with nodular or spherulitic textures developed along chill margins, that are likely subvolcanic in origin. Pale-grey, fine-grained, feldspar and carbonate-rich dykes are also common. Brown-weathering carbonate alteration zones are often associated with these dykes. A number of biotite or hornblende-rich lamprophyre dykes are also present.

STRUCTURE

The area is dominated by a series of northwesterly trending transcurrent faults that are closely spaced and have numerous splays between them (Plate 41-3). Displacements, where visible, are right lateral. The Tchaikazan fault (Tipper 1978, 1969) is poorly exposed but is clearly present, based on the juxtaposition of rock units in the Yohetta Valley. This structure is believed to have more than 30 kilometres of right-lateral displacement in the Tatlayoko Lake area to the west.

A number of north-northeasterly trending faults form prominent lineaments on both landsat imagery and aerial photography of the area. Prominent fractures in ridge crests or silicified and quartz-carbonate-altered fault breccias attest to the presence of these faults on the ground. The felsite sill in Yohetta Valley is not truncated, but is reduced substantially in width, by a northeasterly fault, thereby suggesting a vertical motion on these structures. As these faults appear to cross the northwesterly trending transcurrent faults with little displacement, they are considered to be younger. Tipper (1969) recognized similar northeasterly trending normal faults as late structural features to the west of Chilko Lake.

In the Mount Goddard area, massive volcanics of Unit 2 have been thrust northeastward over volcanics and sediments of Unit 5 (Plate 41-4), possibly recording an episode of thrusting during emplacement and uplift of the Coast Mountains plutons. The sole of this thrust is marked, in part, by a gossanous zone directly beneath Mount Goddard. The intrusive at Mount Goddard appears to cut the thrust fault however this is uncertain at present due to the relations of topography and outcrop pattern. The sense of this thrusting is similar to that south of the Tchaikazan fault in the Tatlayoko Lake area to the west (Tipper, 1969)

Folds in the study area tend to be broad open structures, as shown by the synclinal folds with axial traces in the Rainbow and Long Valleys. These folds are only identified by opposing dips across the valleys. In the northwest border of the area mapped bedding attitudes swing from vertical to relatively flat in a short distance, and suggest a pronounced northeasterly fold vergence in this area. Further mapping is required to define this and to determine the relationship, if any, between the northeasterly directed thrust faulting and folding on the east side of Chilko Lake.

Minor folds with tighter closures are locally present in the map area, but tend to be sheared out parallel to axial planes. Southwest of Spectrum Peak, a distinct anticline-syncline pair that is cut by a shear zone illustrates this structural style.

MINERALIZATION

Copper and gold mineralization has been known within the map area since the 1930's at the Lord River Gold mine, (MI 92O-045: H. Do, Pellaire) located in Falls River, and at the Charlie (Warren) Crown grants (MI 92O-043 — Eggs, Tchaikazan, Charlie; MI 92O-076 — Warren, Charlie) in the Tchaikazan Valley (Fig. 41-1). Exploration on both these properties has continued into the 1980's

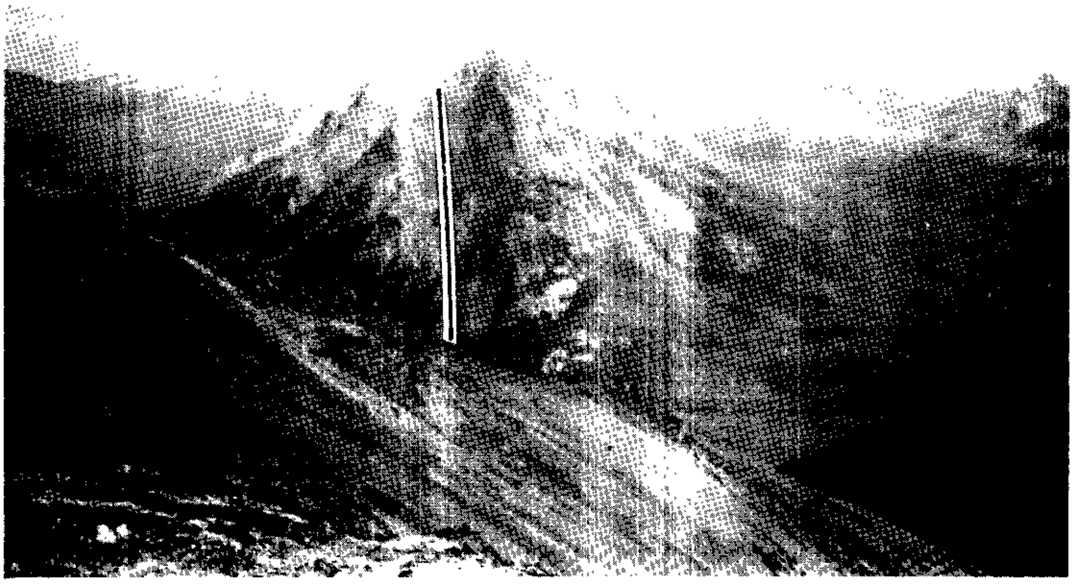

Plate 41-3. Northwest-trending transcurrent fault (looking east from Mount Goddard).

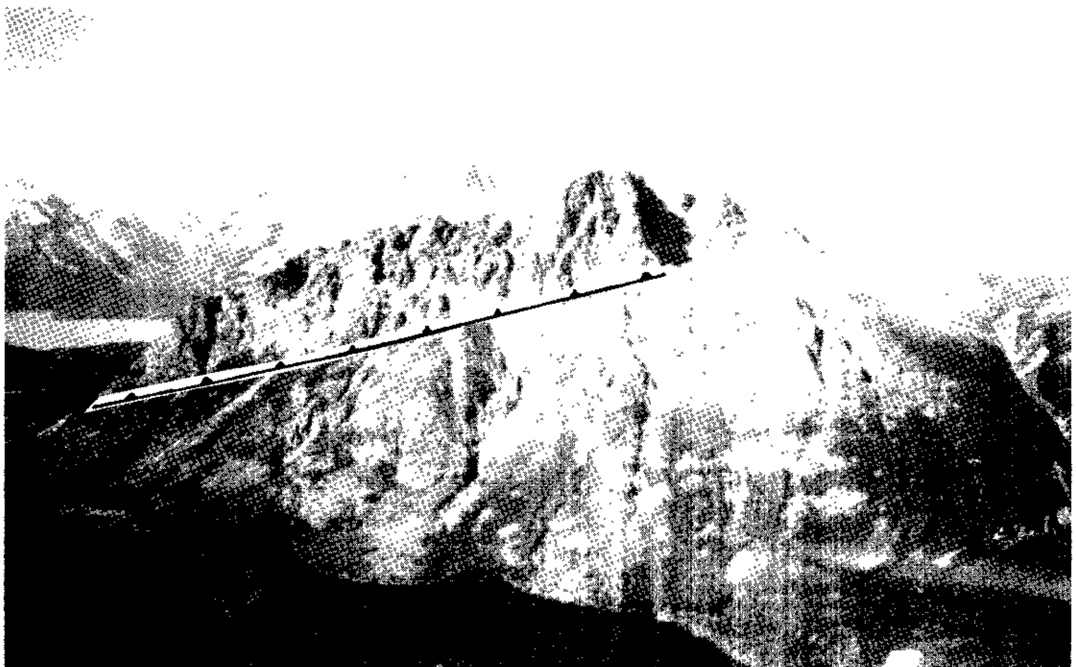

Plate 41-4. Mount Goddard thrust fault; Unit 2 volcanics thrust over Unit 5 sediments and volcanics (looking west, Chilko Lake in background).

with inconclusive results. Twenty kilometres to the northeast, the Fish Lake porphyry copper deposit (MI 92O-042 — Fish Lake), with inferred reserves of 180 million tonnes grading 0.24 per cent copper, 0.57 gram per tonne gold, and 1.25 grams per tonne silver (Northern Miner, February, 10, 1983), provides a further model for the style of mineralization that might be found in the Chilko-Taseko Lakes map-area.

The Lord River deposit consists of a series of quartz veins cutting Unit 5 metavolcanics where they form a sizeable, fault-controlled embayment into granodiorite of the Coast Plutonic Complex. High gold values are associated with limonitic, brecciated quartz veins, and silicified wallrocks. Reserves are reported to be 31 000 tonnes grading 25 grams per tonne gold plus approximately 75 grams per tonne silver (George Cross Newsletter, No. 183, September 22, 1980).

The Charlie (Warren) showings have been included in extensive claim holdings recently being explored for a possible porphyry system containing copper, molybdenum, and gold mineralization. The area between Yohetta and Tchaikazan Valleys and RCAF Peak to Fishem Lake contains numerous small copper and molybdenum showings in a well-fractured sequence of volcanics and sediments. Anomalous gold values have been located as well. Gold-bearing tellurides in quartz veins carrying relatively small percentages of metallic minerals were the original prospecting target in this area (Warren, 1947). Granodiorite intrusives exposed in the Tchaikazan Valley may underlie other portions of the stratigraphy and may be responsible for the widespread zone of porphyry style mineralization.

Alternately, the Charlie area may be viewed as a precious metal epithermal vein system related to the predominantly volcanic lithologies and the large area of fracturing. Rocks in the vicinity of the prospect have been juxtaposed along numerous splays of an extensive northwesterly trending fault. Silicification and mineralization have developed in the fractures, possibly due to the underlying intrusive. However traces of mineralization have been located over an area that is significantly broader than that near the intrusive, and the main northwesterly fault contains traces of silicification and mineralization up to 10 kilometres away. Considerable work is required to evaluate such dispersed showings over this large area.

A previously undocumented zone of mineralization was located during this project in Tarn Creek, 4 kilometres north-northeast of the west end of Yohetta Lake (Fig. 41-1). In this area numerous dykes and irregularly shaped intrusive bodies of hornblende diorite porphyry have intruded and hornfelsed the enclosing volcanic fragmentals and flows. All rocks are intensely fractured and veined by quartz. A gossanous zone extending approximately 400 metres by 150 metres contains chalcopyrite, bornite, pyrrhotite, and pyrite mineralization in veinlets and as disseminations through both the volcanics and intrusives. Magnetite and chlorite alteration is also present. Elsewhere in this valley, pockets of skarn-type mineralization, including bornite, epidote, garnets, and hematite, have developed within calcareous tuffs along intrusive contacts. The area is interpreted as being the roof of an intrusive porphyry system and at present has a significant untested potential.

In the Mount Goddard area, copper mineralization is present adjacent to another hornblende diorite intrusive in an area of complex faulting. A number of pyrite-pyrrhotite-bearing gossans related either to hornfelsed contacts or faults are present.

Traces of copper mineralization in calcareous nodules were noted within black argillites adjacent to the granodiorite stock southwest of Spectrum Peak. A float sample containing sphalerite, galena, chalcopyrite, and pyrite was located on the south side of this intrusive stock, but no source of the mineralization was found.

A prominent gossan is well exposed on a ridge crest, 7 kilometres south of Mount Goddard. A fine-grained highly siliceous (possibly rhyolitic) volcanic unit contains extensive pyrite and pyrrhotite mineralization at this locality. The sulphides occur as fine disseminations, in veinlets, and surrounding fragments in what appears to be a tuff with indistinct crystal and fragmental textures. Rocks immediately adjacent to the gossan are felsic tuffs, hosted within a broader assemblage of intermediate volcanics.

Numerous other gossans of limited extent occur in the study area and are generally related to hornfels or fracture zones. Zones of brown-weathering carbonate alteration are also common but are generally devoid of any significant sulphide mineralization.

GEOCHEMISTRY

A total of 355 stream sites were silt sampled during the project covering a drainage area of approximately 1 200 square kilometres. The density of sampling within the volcanic and sedimentary units is approximately 1 sample site per 2.5 square kilometres. All samples are being analysed for 30 elements using an inductively coupled plasma (ICP) technique, as well as for gold using a fire assay and neutron activation analysis. These analyses will provide quantitative data for 15 elements and semi-quantitative results for the remainder.

Rock chip samples were collected from all locations found that contain mineralization or alteration assemblages potentially related to mineralization. A total of 131 rock samples are being analysed for 14 elements, including base metals, precious metals, and precious metal indicators.

All of the geochemical data is being compiled in conjunction with the geological mapping to produce a mineral potential map of the study area. The data will be released in an open file series, with the geology and geochemistry coordinated on 1:50 000-scale topographic base maps.

SUMMARY: MINERAL POTENTIAL

The rocks of the Chilko-Taseko Lakes area comprise a Lower to Upper Cretaceous sequence of volcanics and sediments that likely accumulated in an island arc type setting bordering a sedimentary trough to the east. Coast Mountain intrusives have truncated these rocks on the southwest. The stratified rocks are known to contain significant indications of gold and copper mineralization, but have undergone little intensive prospecting, largely due to the relative inaccessibility of the area in the past

This survey has identified one new zone of mineralization related to intrusive activity and has documented the presence of a number of previously unmapped intrusive stocks. The possibility for further intrusive/hydrothermal systems being present beneath the extensive talus and glacial drift covering the area is high.

If the volcanic stratigraphy in this area is in part correlative with Gambier Group stratigraphy in the southern Coast Mountains, the potential for volcanic related sulphide deposits must be considered. The Britannia mine, that produced 50 million tonnes of ore grading 1.1 per cent copper, 0.65 per cent zinc, 7.5 grams per tonne silver, and 0.75 gram per tonne gold between 1905 and 1974, is hosted by rocks correlated with the Gambier Group (Payne, *et al.*, 1980). Gossanous zones related to felsic volcanism are present in the Chilko-Taseko Lakes area, however in field observations mineralization appears limited to pyrite and pyrrhotite.

Any further encouragement for mineralization must come from the compilation of analyses of the lithogeochemical and stream silt geochemical samples. A final mineral potential map will be drawn when this compilation is complete.

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