British Columbia Geological Survey
Geological Fieldwork 1995

TATLAYOKO PROJECT UPDATE
(92N/8, 9, 10; 92O/5, 6, 12)

By Paul Schiarizza

(Contribution to the Canada - British Columbia Mineral Development Agreement 1991-1995)

KEYWORDS: Tatlayoko Lake, Niut Mountain, Fish Lake, Mount Moore Formation, Relay Mountain Group, Methow Terrane, Tyaughton-Methow basin, Skinner gold-quartz vein.

INTRODUCTION

The Tatlayoko bedrock mapping program, funded by the 1991-1995 Canada - British Columbia Mineral Development Agreement, was designed to update the geological database for the eastern Coast Belt in parts of the Mount Waddington and Taseko Lakes map areas, and to integrate the structural and stratigraphic relationships established within this area with rapidly evolving concepts regarding the tectonic and stratigraphic framework of the region. This will provide an improved geological framework for understanding the settings and controls of known mineral occurrences in the area (*e.g.*, Fish Lake, Skinner) and for evaluating the potential for additional discoveries. The program was initiated in 1992 with geological mapping of the Mount Tatlow map area (Riddell *et al.*, 1993a,b). No fieldwork was done in 1993, but the project was continued in 1994 with geological mapping of the Tatlayoko Lake map area (Schiarizza *et al.*, 1995a,b). Fieldwork was completed in July of 1995, when two and a half weeks were spent mapping in the Niut Range in the northwestern corner of the project area, and two days were spent revisiting the geology near Fish Lake. The present report summarizes the findings of this 1995 fieldwork, and also presents a simplified map, tectonostratigraphic assemblage diagram and table of mineral occurrences, which provide an overview of the geology of the entire study area (Figures 3 and 4; Table 1).

The Tatlayoko project area covers the transition from the rugged Coast Mountains in the southwest, to gently rolling topography of the Fraser Plateau to the northeast. Mount Nemaia, in the central part of the area, is 250 kilometres north-northwest of Vancouver and 155 kilometres southwest of Williams Lake (Figure 1). The eastern part of the area is accessed by an all-season road that extends southwestward from Highway 20 at Hanceville to the Nemaia valley. A seasonal road branches off it at the Taseko River and continues southward to the Taseko Lakes. Tatlayoko Lake, in the western part of the area, is accessed by an all-season road that extends south from Highway 20 at Tatla Lake. A branch from this road extends eastward to the north end of Chilko Lake, and a seasonal road crosses the Chilko River and continues southward to Tsuniah Lake and the Nemaia valley.

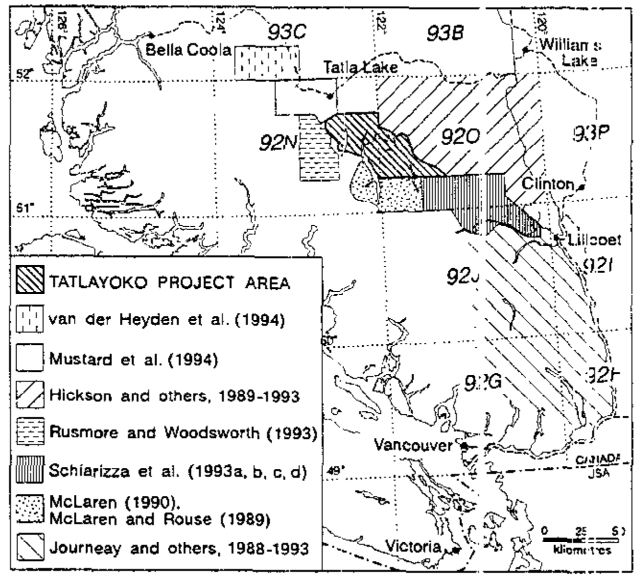

Figure 1. Location of the Tatlayoko project area. This map also provides an index to recent geological mapping by the British Columbia Geological Survey Branch and Geological Survey of Canada in adjacent parts of the southeastern Coast Belt and adjacent Intermontane Belt.

REGIONAL GEOLOGIC SETTING

The geologic setting of the Tatlayoko project area is summarized in Figure 2. It encompasses the boundary between the Coast and Intermontane morphogeologic belts. Within the Tatlayoko project area this boundary corresponds to the Yalakom fault, a major linear feature that extends for about 300 kilometres and was the locus of more than 100 kilometres of Late Cretaceous(?) to early Tertiary dextral displacement (Riddell *et al*, 1993a).

The eastern Coast Belt in the region of the Tatlayoko project area can be subdivided into the south Chilcotin, Methow and Niut domains of contrasting stratigraphy and structural style (Figure 2). The south Chilcotin domain includes Mississippian to Jurassic oceanic rocks of the Bridge River accretion-subduction complex, Upper

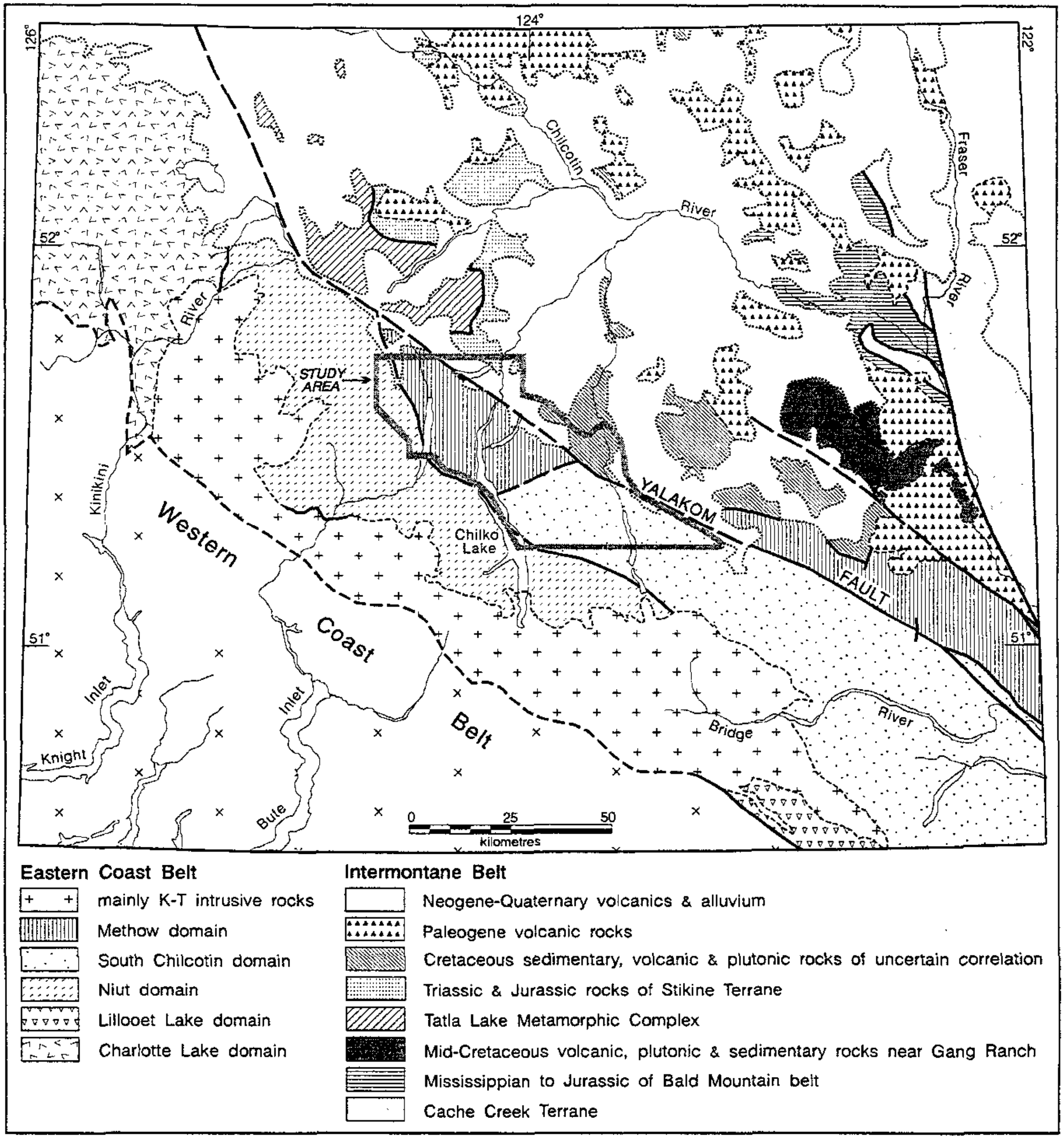

Figure 2. Geologic setting of the Tatlayoko project area.

Triassic to Middle Jurassic arc-derived volcanic and clastic sedimentary rocks of Cadwallader Terrane, Permian ophiolitic rocks of the Shulaps and Bralorne - East Liza complexes, Upper Jurassic to mid-Cretaceous clastic sedimentary rocks of the Tyaughton-Methow basin, and Upper Cretaceous subaerial volcanic rocks of the Powell Creek formation (informal). These partially coeval lithotectonic assemblages are juxtaposed across a complex network of structures that is dominated by middle to Late Cretaceous southwest-directed contractional faults, and Late Cretaceous to early Tertiary dextral strike-slip faults.

The Methow domain occurs to the north and northeast of the south Chilcotin domain, and is distinguished by a less complex structural style dominated by widely spaced faults and broad folds. The two domains are separated in part by the Yalakom fault, and in part by an earlier structure that is offset by the Yalakom fault. This earlier structure is referred to as the Camelsfoot fault in the south (Schiarizza *et al.*, 1993b; Schiarizza and

Garver, 1995) and the Konni Lake fault in the north (Riddell *et al.*, 1993a). Methow domain is underlain mainly by Lower to Middle Jurassic sedimentary and volcanic rocks of the Methow Terrane, and overlying Upper Jurassic to mid-Cretaceous clastic sedimentary rocks of the Tyaughton-Methow basin. Older rocks are exposed locally and include Middle to Late Triassic quartz dioritic intrusions and overlying Upper Triassic sedimentary rocks that outcrop near Tatlayoko Lake. The Jurassic rocks of Methow Terrane are lithologically distinct from age-equivalent rocks found within the Cadwallader and Bridge River terranes of the south Chilcotin domain. The upper part of the Tyaughton-Methow basin, within the Methow domain (the Jackass Mountain Group), is also distinct from coeval rocks comprising the upper part of the basin in the south Chilcotin domain (the Taylor Creek Group). The lower part of the Tyaughton-Methow basin, represented by the Jura-Cretaceous Relay Mountain Group, is, however, common to both domains (Figure 3).

The Niut domain is underlain largely by Upper Triassic volcanic and sedimentary rocks of the Mount Moore and Mosley formations, associated Late Triassic plutons, and Lower Cretaceous volcanic and sedimentary rocks assigned to the Ottarasko and Cloud Drifter formations (Rusmore and Woodsworth, 1991a; Mustard and van der Heyden, 1994). Both the Triassic rocks, which have been correlated with those of the Stikine Terrane, and the Lower Cretaceous rocks are distinct from age-equivalent rocks to the east, but the Niut domain also includes middle to Upper Cretaceous rocks that correlate with the upper Tyaughton basin and Powell Creek formation of the south Chilcotin domain. The stratigraphic elements of the Niut domain are deformed by early Late Cretaceous faults of the northeast-vergent Eastern Waddington thrust belt (Rusmore and Woodsworth, 1991b; van der Heyden *et al.*, 1994a). The northeast boundary of the domain is a system of faults that juxtaposes it against the south Chilcotin domain in the area east of Chilko Lake, and against the Methow domain to the west of the lake (Figure 2).

The Intermontane Belt is characterized by subdued topography and sparse bedrock exposure. Pre-Neogene strata north of Chilko Lake comprise volcanic and volcaniclastic rocks that have been correlated with the Lower to Middle Jurassic Hazelton Group of the Stikine Terrane (Tipper, 1969a,b). To the west, these rocks are juxtaposed against penetratively deformed meta-sedimentary, metavolcanic and metaplutonic rocks of the Tatla Lake Metamorphic Complex across an east to northeast-dipping normal fault. This fault formed late in the structural history of the complex, which was ductilely sheared and exhumed in Eocene time (Friedman and Armstrong, 1988), possibly in a structural regime linked to dextral movement along the Yalakom fault (Schiarizza *et al.*, 1995a).

To the southeast is a belt of mainly Cretaceous sedimentary, volcanic and plutonic rocks that extends from the Taseko River to the Fraser River. Exposures near the Taseko River include Hauterivian sedimentary and volcanic rocks that may correlate with those of Niut domain, as well as younger Aptian-Albian conglomerates that resemble the Jackass Mountain Group of the Methow domain (Fish Lake area of Figure 3). Farther to the southeast, near the Fraser River, this belt comprises Lower Cretaceous volcanic rocks of the Spences Bridge Group and an overlying succession of middle to Upper Cretaceous sedimentary and volcanic rocks (Green, 1990; Hickson, 1992; Gang Ranch area of Figure 2). Underlying rocks are not exposed, but correlative rocks to the east of the Fraser fault overlap Quesnel and Cache Creek terranes (Monger and McMillan, 1989).

GEOLOGY OF THE FISH LAKE - CHAUNIGAN LAKE AREA

Pre-Miocene bedrock exposures on the northeast side of the Yalakom fault, near Fish Lake, are largely restricted to the steep slopes bordering the Taseko River, the Elkin Creek canyon, and a wooded ridge system to the northwest of Chaunigan Lake (Figure 4). The exposures in this area comprise sedimentary and volcanic rocks that were assigned to the Upper Cretaceous Kingsvale Group by Tipper (1978), which also included rocks now assigned to the Powell Creek formation on the southwest side of the fault. The sedimentary rocks in this area were remapped as the Lower Cretaceous Jackass Mountain Group by Riddell *et al.* (1993a,b) and Hickson and Higman (1993). The latter authors also assigned the volcanic rocks in the area an Early Cretaceous age, based on their lithologic similarity to 106 Ma (Albian) volcanics near Mount Alex, about 60 kilometres to the east. Subsequent identification of fossils collected during the 1992 field season suggests that, in addition to Aptian or Albian conglomerates (Vick Lake unit) that might correlate with the Jackass Mountain Group, the area also includes an older sedimentary succession of Hauterivian age (Elkin Creek unit). Limited data suggest that the volcanic rocks in the area may also be of Hauterivian age. The following summary of the geology in this area incorporates these new fossil data, as well as two additional days of fieldwork in 1995, into the database established by the 1992 mapping of Riddell *et al.* (1993a,b).

ELKIN CREEK UNIT

Rocks included in the Elkin Creek unit on Figure 4 consist of sandstone, siltstone, shale and local occurrences of conglomerate. These rocks are locally well exposed on the lower slopes adjacent to Elkin Creek and Elkin Lake, where they are overlain by Miocene - Pliocene plateau basalts of the Chilcotin Group. The unit is also represented by sparse exposures a short distance to the east, on the east side of Big Lake. Sandstone-dominated intervals adjacent to the Taseko River farther to the east

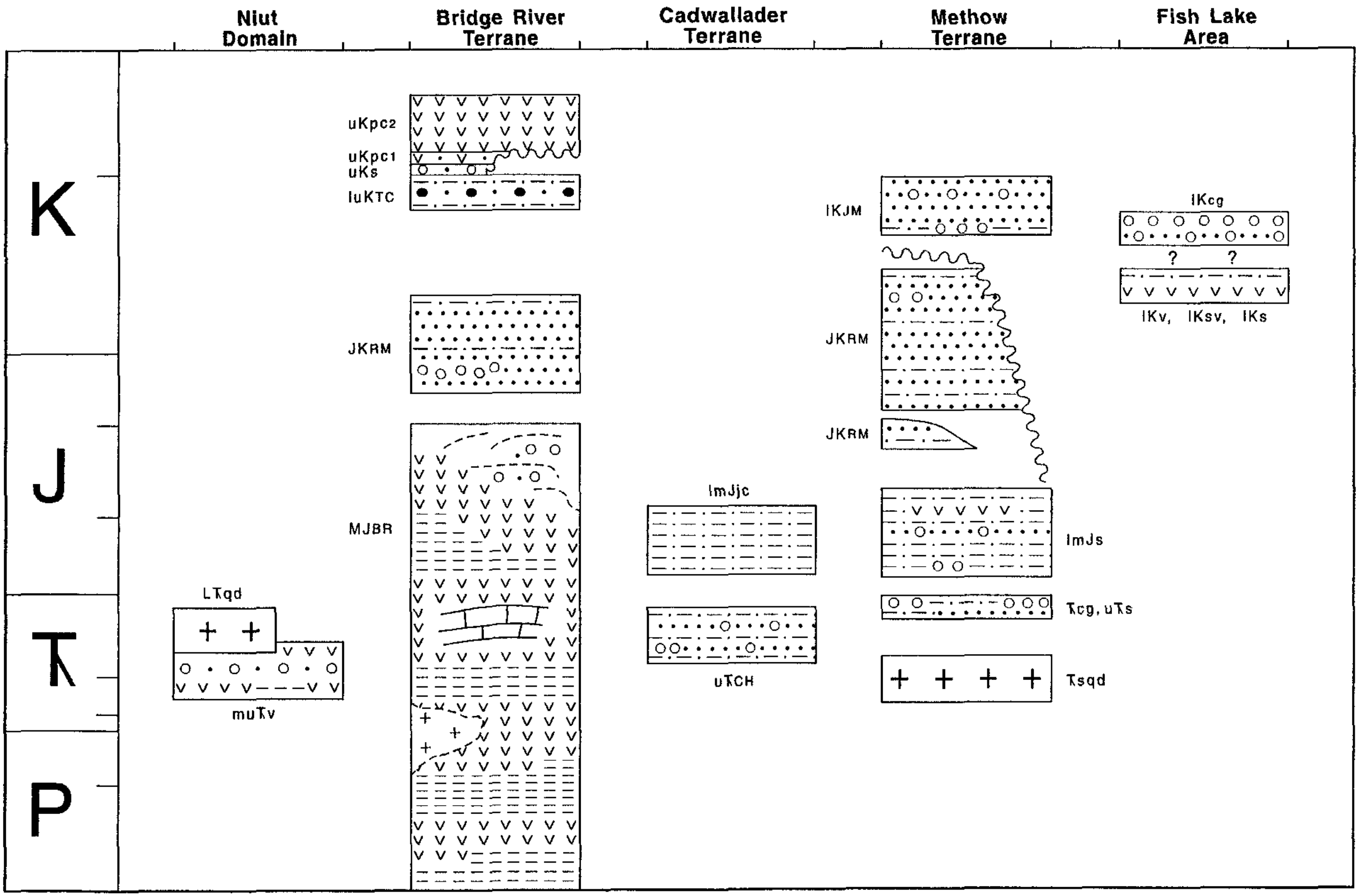

Figure 3. Main tectonostratigraphic assemblages exposed in the Tatlayoko project area. Lithologies are summarized in the legend for Figure 4. Not shown are Lower to Middle Jurassic(?) volcanic rocks of Stikine Terrane that occur northeast of the Yalakom fault in the northern part of the study area.

are also tentatively included in the Elkin Creek unit, although these may actually belong to the younger Vick Lake unit.

The exposures along Elkin Creek and Big Lake are dominated by green to brownish grey, fine to coarse-grained sandstone containing feldspar, volcanic-lithic grains and quartz. The sandstones are typically massive, but locally occur in medium to very thick beds separated by interbeds of friable siltstone or shale. Granule to pebble conglomerate occurs locally and contains rounded clasts of mainly intermediate volcanic rocks, but also includes clasts of granitoid rock. Plant fragments are present in most exposures, and marine fossils occur locally. An ammonite collected from the east bank of Elkin Creek directly northeast of the Yalakom fault has been tentatively identified as *Olcostephanus* sp., which suggests a late Valanginian to early Hauterivian age. A nearby fossil collection includes belemnites, oyster shell fragments, scaphopod shells, and abundant shell fragments of large-valved inoceramids suggestive of the *paraketzovi* group, which also suggests a Hauterivian age (fossil identifications by J.W. Haggart, 1992).

The rocks assigned to the Elkin Creek unit on either side of the Taseko River comprise green lithic-arkosic sandstones with lesser shale and conglomerate. They are lithologically similar to the Hauterivian rocks exposed near Elkin Creek and Big Lake, but have not been dated. Their inclusion in the Elkin Creek unit is tentative, however, because they also resemble sandstones intercalated with Aptian or Albian conglomerates of the Vick Lake unit, which also outcrop in this area. The relationship between the Vick Lake conglomerates and the sandstone-dominated intervals is not exposed, and it is therefore not clear if the sandstones are actually a part of the Vick Lake unit or belong to the older Elkin Creek unit.

The nearest dated Hauterivian rocks that might correlate with the Elkin Creek unit occur in the upper part of the Jura-Cretaceous Relay Mountain Group, which is exposed about 30 kilometres to the east, on the southwest side of the Yalakom fault. The Relay Mountain Group in this area occupies a stratigraphic position between the Lower to Middle Jurassic rocks of the Methow Terrane and the Lower Cretaceous Jackass Mountain Group (Figures 3 and 4). Correlation with the Relay Mountain Group would therefore be consistent with the spatial association of the Elkin Creek unit with the Vick Lake unit, which may correlate with the Jackass Mountain Group (see later section). Alternatively, the Elkin Creek unit may correlate with the Hauterivian Cloud Drifter formation of the Niut domain (informal; Rusmore and Woodsworth, 1993; Mustard and van der Heyden, 1994), which is a lithologically similar succession of sandstones, shales and conglomerates derived from a volcanic and plutonic source area. This correlation is consistent with the 115 kilometres of dextral offset established for the Yalakom fault (Riddell *et al.*, 1993a), as a pre-Yalakom reconstruction based on removal of this offset would place the Elkin Creek exposures opposite the north end of the Niut domain (Figure 2). It is also consistent with the presence of Hauterivian(?) volcanic rocks in the Chaunigan Lake - Fish Lake area, as the Cloud Drifter formation is stratigraphically underlain by volcanic rocks of the Hauterivian (and older?) Ottarasko formation (informal; Rusmore and Woodsworth, 1993; Mustard and van der Heyden, 1994). The relationship between the Ottarasko - Cloud Drifter succession and the Hauterivian part of the Relay Mountain Group is not well established, but the two sequences may represent, respectively, a proximal volcanic facies within a west-facing Hauterivian arc and an adjacent back-arc basinal facies (Umhoefer *et al.*, 1994).

VOLCANIC ROCKS

Volcanic rocks are best exposed on an isolated ridge system northwest of Chaunigan Lake, and on a low hill west of the Taseko River along the northern boundary of the map area (Chaunigan Lake unit of Figure 4). These rocks have not been dated, and their stratigraphic relationships to the Elkin Creek and Vick Lake units have not been established. They consist mainly of andesitic flows and breccias that show varying degrees of chlorite-calcite-epidote alteration. Medium green rusty brown weathering flows include small feldspar and mafic phenocrysts, and locally quartz amygdules within a very fine grained groundmass. Breccias comprise angular to subrounded fragments of green, grey and purple intermediate volcanics, up to 30 centimetres across, in a matrix dominated by smaller volcanic-lithic grains and feldspar crystals. More felsic volcanic rocks occur locally, and dominate the unit at the east end of the ridge, north of Chaunigan Lake. They comprise maroon to mottled green/red-weathering flows containing feldspar and quartz phenocrysts, and associated breccias that contain fragments of similar quartz feldspar porphyry and, locally, a variety of other dacitic to andesitic rock fragments.

Volcanic rocks also outcrop locally along the east side of the Taseko River near the mouth of the creek that drains Fish Lake. These volcanic rocks, together with intercalated sedimentary rocks, are designated the Fish Creek succession (Unit lKsv) on Figure 4, and may correlate with the volcanic and sedimentary package (observed only in drill core) that hosts the Fish Lake porphyry copper-gold deposit a few kilometres to the east. The Fish Creek succession includes hornblende-feldspar-phyric andesite, dacite containing quartz and feldspar phenocrysts, tuffaceous sandstone, well bedded flinty siltstone, dark grey shale, and pebbly sandstone and pebble conglomerate containing volcanic and granitoid clasts. The sedimentary rocks are in part lithologically similar to the those of the Elkin Creek unit, and this correlation is supported by a single fossil collection containing *Inoceramus* bivalves, tentatively identified as *I. colonicus* which is common in Hauterivian to lower Barremian strata of the region (fossil identification by J.W. Haggart, 1992). The associated volcanic rocks are probably the same age, and a sample of columnar jointed

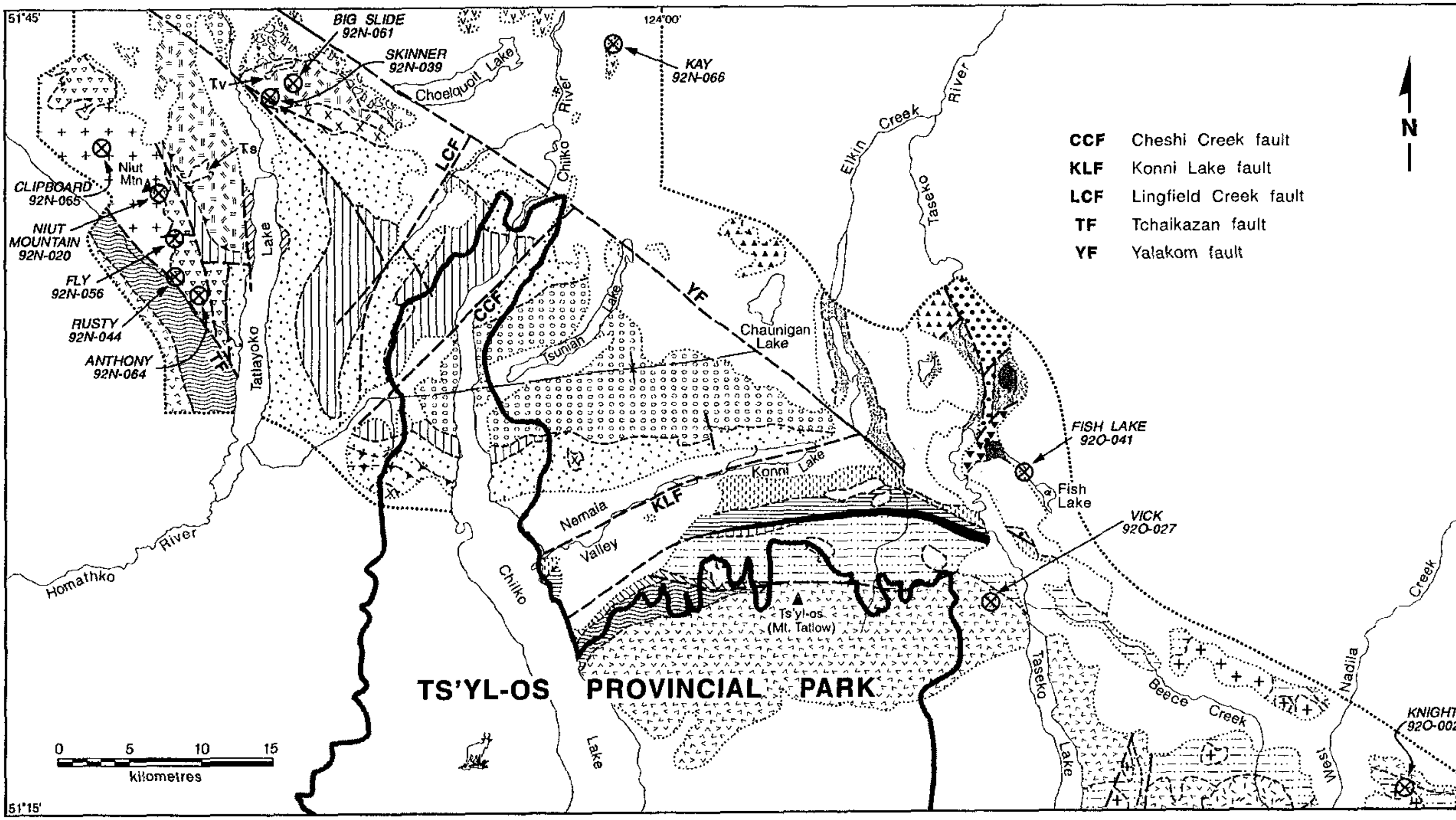

Figure 4. Generalized geology of the Tatlayoko project area, with mineral occurrences identified by name and MINFILE number. The boundary of Ts'yl-os Provincial Park is also shown.

MIOCENE AND PLIOCENE
CHILCOTIN GROUP

MPc — *Olivine basalt flows*

Tyaughton - Methow Basin

UPPER CRETACEOUS
POWELL CREEK FORMATION (uKpc2 and uKpc1)

uKpc2 — *Andesitic volcanic breccia, lapilli tuff, ash tuff, laharic breccia, mafic to intermediate volcanic flows; volcanic conglomerate & sandstone*

uKpc1 — *Well stratified volcanic breccia and conglomerate; minor amounts of volcanic sandstone and siltstone*

uKs — *Robertson Creek unit: lithic sandstone, shale, arkosic sandstone, chert-pebble conglomerate*

LOWER AND/OR UPPER CRETACEOUS
Albian and/or Cenomanian
TAYLOR CREEK GROUP

luKTC — *Shale, siltstone, sandstone, chert-pebble conglomerate*

LOWER CRETACEOUS
Albian
JACKASS MOUNTAIN GROUP

lKJM — *Conglomerate, arkosic sandstone, gritty sandstone*

MIDDLE JURASSIC TO LOWER CRETACEOUS
RELAY MOUNTAIN GROUP

JKRM — *Lithic & arkosic sandstone, siltstone, mudstone, conglomerate, Buchia coquina*

CRETACEOUS ROCKS NORTHEAST OF YALAKOM FAULT

Aptian - Albian

lKcg — *Vick Lake unit: conglomerate; minor amounts of sandstone and shale*

Hauterivian and(?) younger

lKv — *Chaunigan Lake unit: andesitic to dacitic breccias, tuffs and flows*

lKsv — *Fish Creek succession: sandstone, shale, conglomerate, tuffaceous sandstone, andesite, dacite*

lKs — *Elkin Creek unit: sandstone, siltstone, shale, conglomerate*

Niut Domain

LATE TRIASSIC

LŦqd — *Quartz diorite, diorite*

MIDDLE AND UPPER TRIASSIC

muŦv — *Andesite, pillowed basalt, volcanic breccia, tuff, agglomerate; conglomerate, sandstone, shale*

Methow Terrane

LOWER TO MIDDLE JURASSIC

lmJs — *Huckleberry Formation: siltstone, shale, sandstone, gritty sandstone, pebble conglomerate; minor amounts of silty limestone; locally includes andesitic tuff, volcanic breccia & rare intermediate flows or sills*

UPPER TRIASSIC

uŦs — *Lithic sandstone, calcarenite, pebbly calcarenite, fossil hash, siltstone, micritic limestone, arkosic sandstone, pebble conglomerate*

TRIASSIC (?)

Ŧcg — *Pebble to cobble conglomerate; sandstone, siltstone, argillite; micritic limestone*

MIDDLE TO LATE TRIASSIC

Ŧsqd — *Mount Skinner Igneous Complex: quartz diorite, diorite & tonalite intruded by dikes of basalt, diabase, hornblende feldspar porphyry, quartz feldspar porphyry & aplite; also includes masses of fine-grained greenstone that may be dike swarms &/or screens of older volcanic rock; Ŧv-tuff & welded tuff; Ŧs-hornfelsed sandstone & siltstone*

Cadwallader Terrane

LOWER TO MIDDLE JURASSIC

lmJjc — *Argillite, cherty argillite, siltstone; minor sandstone*

UPPER TRIASSIC
CADWALLADER GROUP

uŦCH — *Hurley Formation: siltstone, shale, sandstone, calcareous sandstone, conglomerate, limestone*

Bridge River Terrane

MISSISSIPPIAN TO JURASSIC
BRIDGE RIVER COMPLEX

MJBR — *Chert, greenstone, argillite, sandstone, conglomerate, serpentinite*

Jurassic Rocks Northeast of Yalakom Fault

LOWER TO MIDDLE JURASSIC

Jv — *Andesite, volcanic breccia, tuff; local sandstone, conglomerate, diorite, gabbro*

Cretaceous and Tertiary Intrusive Rocks

EOCENE

Egd — *Granodiorite, quartz monzonite*

LATE CRETACEOUS

LKp — *Hornblende-feldspar-quartz porphyry*

LKd — *Diorite, quartz diorite, hornblende feldspar porphyry*

CRETACEOUS AND/OR TERTIARY (?)

KTqd — *Quartz diorite, granodiorite*

Legend to accompany Figure 4

quartz-feldspar-phyric dacite has been submitted for U-Pb dating of zircons in an attempt to test this assertion. A Hauterivian age is also considered most likely for the Chaunigan Lake unit, as it is compositionally similar to the volcanics of the Fish Creek succession and is also spatially associated with the Hauterivian Elkin Creek unit. As noted in the previous section, the volcanic and sedimentary rocks of the Elkin Creek, Chaunigan Lake and Fish Creek successions may correlate with the Ottarasko and Cloud Drifter formations of the Niut belt, which are part of a volcanic-bearing facies that occurs west of coeval sedimentary rocks of the Relay Mountain Group (Umhoefer *et al.*, 1994).

VICK LAKE UNIT

Rocks assigned to the Vick Lake unit outcrop east of the Taseko River, and comprise pebble to boulder conglomerates with only minor amounts of intercalated sandstone and shale. The conglomerates are massive to weakly stratified, with poorly sorted, rounded clasts that commonly range up to 20 centimetres across and locally are as large as 60 centimetres in diameter. The clasts consist mainly of intermediate volcanic rocks, together with a significant proportion of plutonic and mafic volcanic rock fragments; chert and foliated plutonic clasts occur locally. The interstitial sandy matrix is composed of feldspar, lithic grains and quartz. Plant fragments are generally common in the matrix and occur locally as carbonaceous remnants plastered to clast margins. Green coarse-grained sandstone and pebbly sandstone occur as relatively rare intervals up to at least several metres thick within the dominant conglomerates. The sandstones are locally crossbedded, and contain feldspar and lithic grains, in places accompanied by substantial quartz. Woody debris is common, and associated siltstones and shales locally contain moderately well preserved plant fragments. A Cretaceous, probably Aptian to Albian age, has been assigned to plant fossils collected from a locality 600 metres east of the mouth of Fish Creek (E. McIver, written communication, 1993).

The Vick Lake unit is lithologically very similar to parts of the Lower Cretaceous Jackass Mountain Group. In particular, it resembles conglomerates of probable Albian age that are exposed in the Noaxe Creek and Big Bar Creek map areas between 80 and 130 kilometres to the east-southeast (including the French Bar Formation of MacKenzie, 1921; unit lKJMc2 of Schiarizza *et al.*, 1993c; and the polymictic conglomerate unit of Hickson *et al.*, 1994). Correlation of the Vick Lake unit with these Jackass Mountain conglomerates is tentative, however, as no good section of the unit is exposed, and its stratigraphic context is not understood. Furthermore, associated Hauterivian rocks of the Elkin Creek, Chaunigan Lake and Fish Creek successions differ significantly from rocks which stratigraphically underlie the Jackass Mountain Group to the east, although it has not been established that these rocks are in stratigraphic contact with the Vick Lake unit, rather than being entirely in fault juxtaposition.

FISH LAKE COPPER - GOLD PORPHYRY DEPOSIT (MINFILE 92O-041)

The Fish Lake porphyry copper-gold deposit is located in an area of virtually no bedrock exposure about 5 kilometres east of the Taseko River (Figure 4). Recent summaries of the geology of the deposit are provided by Riddell *et al.* (1993a) and Caira *et al.* (1993; in press), who report geological reserves of 1148 million tonnes at an average grade of 0.22 % Cu and 0.41 g/t Au. The Fish Lake deposit is spatially and genetically related to a steeply dipping lenticular body of porphyritic quartz diorite which is surrounded by an east-west elongate complex of steep, southerly dipping, subparallel quartz feldspar porphyry dikes. These rocks, referred to as the Fish Lake Intrusive Complex, cut volcanic and volcaniclastic rocks as well as an older intrusive body of porphyritic diorite, which may be coeval with the volcanics. Mineralization occurs within both the Fish Lake Intrusive Complex and adjacent volcanic, volcaniclastic and plutonic rocks.

A core sample of hornblende-quartz-feldspar porphyry from the Fish Lake Intrusive Complex was collected in 1992 and submitted to the Geochronology Laboratory at the University of British Columbia for U-Pb dating of zircons. Two zircon fractions define a discordia line with a lower intercept of about 80 Ma, which is interpreted as the probable age of the syn-mineralization intrusion (J. E. Gabites, written communication, 1993). This is consistent with a previous whole-rock K-Ar date of 77.2±2.8 Ma obtained from a hornfels containing 40% secondary biotite, which was interpreted as the date of mineralization (Wolfhard, 1976). The volcanic rocks which host the Fish Lake Intrusive Complex and associated mineralization are not dated at the deposit, but are possibly Hauterivian in age, based on correlation with volcanics of the Fish Creek succession just to the west, which are also intruded by small stocks and dikes of hornblende-quartz-feldspar porphyry that may be related to the Fish Lake Intrusive Complex (Fish Lake - Cone Hill intrusive suite of Riddell *et al.*, 1993a,b). This correlation suggests that the host volcanics and syn-mineralization intrusions represent completely different magmatic episodes separated by 40 to 50 million years, in contrast to earlier suspicions that they might be related (Wolfhard, 1976).

GEOLOGY WEST OF TATLAYOKO LAKE

Most of the effort during the 1995 field season was devoted to mapping within the Niut Range, west of Tatlayoko Lake, in order to tie in with MDA-funded mapping conducted by P. van der Heyden and P. Mustard to the northwest (van der Heyden *et al.*, 1994a; Mustard and van der Heyden, 1994; Mustard *et al.*, 1994). This mapping was concentrated in Triassic volcanic and plutonic rocks of Niut domain, although a few days were also spent within sedimentary and plutonic rocks that bound the Niut domain to the east.

NIUT DOMAIN

The Niut domain is underlain by Middle to Upper Triassic volcanic and sedimentary rocks intruded by Late Triassic quartz diorite of the Niut Mountain pluton. The supracrustal rocks within this belt were assigned to the Lower Cretaceous by Tipper (1969a), and the associated intrusive rocks were consequently thought to be Cretaceous or early Tertiary. Recently, however, sedimentary intervals within volcanic rocks just to the northwest of the present study area were found to contain Triassic fossils (Mustard and van der Heyden, 1994; Mustard *et al.*, 1994), and crosscutting intrusive rocks within and northwest of the study area have yielded Late Triassic U-Pb zircon dates (van der Heyden *et al.*, 1994a; this study). The volcanic and sedimentary rocks correlate mainly with the Middle to Upper Triassic Mount Moore formation (informal; Rusmore and Woodsworth, 1991a; Mustard and van der Heyden, 1994; Mustard *et al.*, 1994), which has been interpreted as a part of the Stikine Terrane.

VOLCANIC AND SEDIMENTARY ROCKS

Volcanic and sedimentary rocks occur as two separate pendants within the Niut Mountain pluton. The southeastern body consists mainly of massive green, greenish brown to rusty brown weathered andesitic flows, tuffs and breccias. The andesites commonly contain hornblende and feldspar phenocrysts, 1 to 2 millimetres in size, and locally are pyroxene phyric. Associated fragmental rocks typically comprise angular clasts of green to purple hornblende-feldspar and pyroxene-feldspar-phyric andesite within a matrix of smaller lithic grains and feldspar, hornblende and pyroxene crystals. Volcanic rock fragments are typically 1 to 3 centimetres or less in size, but range up to 10 centimetres in some coarse-grained units. Sedimentary intervals associated with the volcanic rocks are dominated by poorly stratified polymictic conglomerates, but also include intercalations of fine to coarse-grained lithic sandstone and shale. The conglomerates contain a wide variety of felsic to mafic volcanic rock fragments, including abundant quartz and quartz feldspar porphyries. They also include recessive weathering fine-grained sedimentary(?) clasts and uncommon medium-grained granitoid fragments. The clasts are typically angular and poorly sorted. They range up to 20 centimetres in size, and grade into a gritty sandstone matrix that includes quartz, feldspar and volcanic-lithic grains.

The rocks of the southeastern pendant are described in more detail by Schiarizza *et al.* (1995a,b), who assigned them a Triassic or Cretaceous age, based on correlation with either the Mount Moore formation (Triassic) or the Ottarasko and Cloud Drifter formations (Early Cretaceous). They are now known to be Triassic at least in part, because the Niut Mountain pluton has yielded a Late Triassic radiometric date where it intrudes the western margin of the succession (*see* next section).

The northwestern pendant of Triassic volcanic rocks was mapped in 1995. It is continuous with Middle to Upper Triassic rocks mapped as Mount Moore formation to the northwest (Mustard *et al.*, 1994), and is intruded by Late Triassic quartz diorite to the west, south and northeast (Figure 4). Within the Tatlayoko project area this pendant consists mainly of fine-grained, medium to dark green, massive to pillowed mafic volcanic rocks that weather to a grey-brown or rusty brown colour. Feldspar and pyroxene phenocrysts are commonly evident, and the phenocryst assemblage hornblende-feldspar occurs locally. Fragmental volcanic rocks appear to be less common, although textures are obscure in many places due to extensive chlorite-epidote alteration. Where observed, they comprise feldspar and mafic crystals, together with lithic fragments to several centimetres in size, within a very fine grained, commonly well indurated groundmass. The lithic fragments are mafic to intermediate volcanic rocks which range from aphyric to porphyritic, the latter containing various combinations of feldspar, pyroxene and hornblende phenocrysts. Light grey felsite, feldspar porphyry and quartz feldspar porphyry occur locally within the mafic volcanic succession. In part they occur as dikes and small irregular intrusive bodies, but some may be extrusive. Sedimentary rocks are a relatively minor component of the northwestern pendant, but narrow intervals of thin-bedded volcaniclastic sandstone and siltstone, or of interbedded chert and siliceous siltstone, were observed locally.

The volcanic and minor sedimentary rocks of the northwestern pendant have not been dated within the present study area, but are clearly intruded by the Late Triassic Niut Mountain pluton. They are continuous with Triassic volcanic and sedimentary rocks to the northwest which have been assigned to the Mount Moore formation (Mustard and van der Heyden, 1994). Corals from thin limestone beds within this succession have been tentatively assigned to the Upper Triassic (van der Heyden *et al.*, 1994a), and chert intercalated with mafic volcanic rocks only 1 kilometre northwest of the present study area has yielded Middle Triassic (Ladinian) radiolarians (F. Cordey and P.S. Mustard, personal communication, 1994). In its type area, about 12 kilometres south of Tatlayoko Lake, a limestone lens intercalated with basaltic breccias of the Mount Moore formation has yielded conodonts of latest Carnian to earliest Norian age (Rusmore and Woodsworth, 1991a).

NIUT MOUNTAIN PLUTON

The Niut Mountain pluton is a large body of predominantly quartz diorite that underlies most of the Niut domain within the Tatlayoko project area, and clearly intrudes the volcanic and sedimentary rocks within the domain. It consists mainly of massive, equigranular, medium to coarse-grained hornblende ±biotite quartz diorite, locally grading to medium-grained hornblende diorite. The pluton locally includes small bodies of mafic-poor medium-grained granitic rock, and it, together with the volcanic and sedimentary rocks of the domain, is cut by a suite of dikes and small plugs that includes fine-grained diorite, hornblende feldspar porphyry, pyroxene feldspar porphyry and lamprophyre. Most dikes strike northeast and dip steeply, although east, north and northwest strikes are locally predominant.

A sample of quartz diorite collected from the eastern margin of the pluton, 4.25 kilometres south-southeast of Niut Mountain, has yielded a preliminary U-Pb zircon age of 219.5±7.3 Ma (R. Friedman, personal communication, 1995). This compares closely with a U-Pb zircon date of 214.9+8.6/-3.1 Ma from less than 1 kilometre west of the present study area (Mustard *et al.*, 1994), and confirms that the plutonic rocks within Niut domain are a single Late Triassic unit.

STRUCTURE

Steeply dipping, east-striking faults cut volcanic and sedimentary rocks in the southeastern part of Niut domain, and two northeast-striking faults are mapped within the Niut Mountain pluton to the northwest (Schiarizza *et al.*, 1995a,b). The latter faults are marked by steeply dipping zones of fracturing and brecciation, several tens of metres wide, that are colinear with prominent topographic lineaments. The structure of the northwestern pendant is poorly understood because it contains few bedded rocks and no distinctive markers. Where observed, bedding dips at moderate angles to the north or west, and the strata are right way up, based on graded beds and pillow shapes.

The northwest-striking Tchaikazan fault bounds the Triassic rocks of Niut domain to the southwest, and separates them from Upper Cretaceous volcanic rocks of the Powell Creek formation. Tipper (1969a) interpreted the Tchaikazan fault as a right-lateral transcurrent fault, based on speculative correlation of two faults that were offset by about 30 kilometres along it. More recently Mustard and van der Heyden (1994) have postulated 7 to 8 kilometres of apparent dextral displacement based on offset of a distinctive fossiliferous limestone unit within the Mount Moore formation, a short distance to the northwest of the Tatlayoko Lake map area.

The northeastern limit of plutonic, volcanic and sedimentary rocks of the Niut domain is a system of north to northwest-trending faults that separates them from Jurassic and Cretaceous sedimentary rocks to the northeast. The oldest of these faults is an unexposed north-striking structure that separates a panel of sedimentary and volcanic rocks, tentatively included within Niut domain, from Jurassic rocks of the Methow Terrane a short distance west of Tatlayoko Lake (Figure 4). This fault is truncated by an east-striking fault to the north, which in turn is truncated by a northwest-striking fault to the west. The latter structure forms the northeastern boundary of Niut domain east of Niut Mountain, and juxtaposes it against a narrow lens of Relay Mountain Group (Figure 4). Where exposed, this fault dips steeply east to east-northeast, and is commonly marked by a metre-wide zone of brittle faults and fractures; Niut domain rocks are typically silicified and quartz veined along the fault whereas the adjacent Relay Mountain Group is not. Locally, the rocks on both sides of the main fault are slivered into several parallel fault strands, resulting in a fault zone several hundred metres wide. This fault is truncated by, or merges with, the Tchaikazan fault to the south. It is a relatively young structure because, in addition to the east-striking fault on its east side, it also truncates a northeast-dipping thrust fault within the Relay Mountain Group and east-striking faults within Niut domain to the west (Schiarizza *et al.*, 1995b). It is suspected that it may be a splay from the dextral-slip Tchaikazan fault, which was active mainly in Eocene time (Umhoefer and Kleinspehn, 1995). Neither the age nor the sense of movement are known for the older north-striking fault segment that forms the domain boundary to the south.

MINERAL OCCURRENCES

The rocks of the Niut domain contain a higher density of mineral occurrences than rocks elsewhere in the Tatlayoko project area (Figure 4). They host five known occurrences that contain disseminated or fracture-controlled pyrite, chalcopyrite and malachite, either within the Niut Mountain pluton or in bordering volcanic and sedimentary rocks. Four other occurrences are within the same belt, 1 to 7 kilometres northwest of the Tatlayoko project area, and other malachite occurrences are scattered throughout the Niut Mountain pluton and bordering volcanic rocks. These showings probably represent a series of porphyry-style mineralizing systems within and adjacent to the Niut Mountain pluton. The Mount Moore formation, which hosts the pluton and much of the mineralization, is correlated by Rusmore and Woodsworth (1991a) with the Upper Triassic Stuhini Group, which comprises part of the Stikine Terrane in northern British Columbia. This correlation is strengthened by the association of the Niut Mountain pluton with the Mount Moore formation, as plutons of similar age intrude the Stuhini Group and are locally responsible for porphyry-style mineralization. This relationship is exemplified by the Hickman batholith, which was emplaced into the Stuhini Group at about 220 Ma, and is genetically related to the Schaft Creek porphyry deposit which is hosted mainly in Stuhini volcanic rocks (Spilsbury, in press). This correlation also sheds a favourable light on the mineral potential of the Niut domain, as Schaft Creek is one of the largest calcalkaline porphyry deposits known within the Canadian Cordillera (McMillan *et al.*, in press).

TABLE 1. SUMMARY OF MINFILE OCCURRENCES IN THE TATLAYOKO PROJECT AREA.

MINFILE No.	NAME	COMMODITY	CAPSULE DESCRIPTION
092N-020	Niut Mountain	Cu, Au	A gossanous zone within pyritized volcanic rock of unit muTv locally contains malachite, chalcopyrite and traces of gold.
092N-039	Skinner	Au, Cu	Northeast-striking gold-quartz veins, of Eocene age, occur within Triassic diorite and quartz diorite of the Mount Skinner Igneous Complex. A 170-tonne bulk sample extracted from the Victoria vein in 1992 and 1993 produced over 11 000 grams of gold and 8000 grams of silver.
092N-044	Rusty	Cu	Disseminated chalcopyrite occurs in faulted sedimentary rocks of unit muTv.
092N-056	Fly	Cu	Disseminated malachite, azurite, pyrite and chalcopyrite occur within quartz-epidote-carbonate veins and fracture fillings hosted in quartz diorite of unit LTqd and an associated body of hornblende feldspar porphyry.
092N-061	Big Slide	Au, Cu	Gold and copper mineralization occurs within a number of subparallel northwest-striking sheeted quartz veins hosted in Triassic quartz diorite of the Mount Skinner Igneous Complex.
092N-064	Anthony	Cu, Zn, Ag	Malachite, pyrite, chalcopyrite and sphalerite occur in quartz veins and silica-flooded andesite of unit muTv
092N-065	Clipboard	Cu	Disseminated malachite occurs in a small stock of granite porphyry that intrudes quartz diorite of unit LTqd.
092N-066	Kay	Cu	Disseminated malachite and azurite occur in calcite veinlets within a mafic porphyry of unit lmJv
092O-002	Knight	Au, Ag	Gold and silver occur within silicified and pyritized sedimentary rocks of the Taylor Creek Group which are intruded by dikes and stocks of Late Cretaceous diorite and hornblende-feldspar porphyry
92O-027	Vick	Au, Cu, Ag	Pyrite, chalcopyrite, malachite, azurite and iron carbonates occur within quartz veins that follow a northeast-striking shear zone cutting volcanic rocks of the Upper Cretaceous Powell Creek formation.
92O-041	Fish Lake	Cu, Au, Ag, Mo, Zn	Porphyry Cu-Au mineralization occurs within and adjacent to a Late Cretaceous quartz diorite stock and associated quartz feldspar porphyry dikes, which intrude Lower Cretaceous(?) andesitic volcanic rocks and a pre-mineralization diorite plug. Geological reserves are 1,148 million tonnes averaging 0.22 % Cu and 0.41 g/t Au.

SEDIMENTARY AND PLUTONIC ROCKS EAST OF NIUT DOMAIN

The geology east of the Niut domain is dominated by a large body of quartz diorite and tonalite that is informally referred to as the Crazy Creek pluton. These plutonic rocks are provisionally included in the Mount Skinner Igneous Complex, which apparently forms the basement to the Methow domain to the east (Figures 3 and 4). Also present in this area are Jura-Cretaceous sedimentary rocks of the Relay Mountain Group, which comprise a narrow, northwest-trending, fault-bounded belt between the Crazy Creek pluton and volcanic and plutonic rocks of the Niut domain to the southwest.

RELAY MOUNTAIN GROUP

The Relay Mountain Group outcrops as a narrow fault-bounded belt of conglomerates, sandstones and shales that are cut by numerous faults and intruded by abundant sills and plugs of quartz diorite. Where best exposed, about 3.5 kilometres west of Tatlayoko Lake, the relatively wide southern part of the belt comprises two main fault panels. A younger-over-older relationship across the intervening northeast-dipping fault suggests that it accommodated reverse movement, as does a tight syncline within the footwall rocks directly beneath it. The northeastern panel is a coherent, northeast-dipping section that includes two distinct units. The lower unit is about 300 metres thick and consists mainly of arkosic lithic sandstone. Conglomerate dominates about 100 metres in the central part of the unit, and contains rounded pebbles and cobbles of felsic to mafic volcanic rocks together with a smaller proportion of granitoid rock. *Buchia* fossils collected from near the base of the unit, as well as from the upper part of the conglomeratic interval, have been identified as Upper Jurassic (Tithonian) forms (T.P. Poulton, written communication, 1995), confirming an earlier fossil report by Tipper (1969a). The base of the upper unit comprises several tens of metres of a dark grey shale containing *Inoceramus* and belemnite fragments. These rocks abruptly overlie sandstones of the lower unit and pass up-section into about 100 metres of thin to medium-bedded, locally crossbedded arkosic sandstone intercalated with siltstone and friable shale. The upper unit is assumed to be Hauterivian in age, based on the presence of *Inoceramus* fossils and its strong lithologic similarity to the Hauterivian and(?) Barremian rocks of the upper part of the Relay Mountain Group where it is well exposed and dated in the adjacent Potato Range (Tipper, 1969a; Schiarizza *et al.*, 1995a).

The coherent section described above rests structurally above a southwestern fault panel that consists of faulted and folded shale containing intercalations of arkosic and lithic sandstones. The bounding fault was observed in several places and dips between 35° and 75° to the east-northeast. It is generally parallel to bedding in the footwall rocks, and commonly places them against small bodies of quartz diorite that intrude the base of the Jurassic section in the immediate hangingwall. The lower fault panel is, for the most part, lithologically similar to the Hauterivian strata of the Relay Mountain Group, and this correlation is confirmed by the presence of Hauterivian *Inoceramus* fossils in the central part of the panel (fossil identification by T. P. Poulton, 1995). Local fault slivers of chert-pebble conglomerate occur within the upper part of the panel, however, and were probably derived from the mid-Cretaceous Taylor Creek Group, which overlies the Relay Mountain Group south of the Nemaia valley (Figure 4).

The belt of Relay Mountain Group rocks narrows to the northwest, where it becomes a series of fault-bounded slivers of sedimentary rock interleaved with quartz diorite. The sedimentary rocks include conglomerates and sandstones similar to those of the Jurassic section to the south, as well as local shale-dominated lenses that resemble the Hauterivian interval to the south. A single fossil collection from shales in the northern part of the belt contained *Inoceramus* pelecypods of Hauterivian age (identification by T.P. Poulton, 1995).

The intact section of Relay Mountain Group rocks exposed in the upper fault panel in the southern part of the belt differs from sections in the Potato Range, directly east of Tatlayoko Lake, in two main aspects. First of all, the thick interval of Jurassic conglomerates found in this belt does not occur to the east. Secondly, the apparent absence of Berriasian and Valanginian rocks in the Niut Range belt suggests that, here, the disconformity beneath the Hauterivian section represents much more missing stratigraphy than the disconformity beneath Hauterivian rocks in the Potato Range, where there is a thick interval of Berriasian and Valanginian rocks (Tipper, 1969a). These relationships suggest that the Niut Range section originated near the margin of the Relay Mountain basin, as proposed by Jeletzky and Tipper (1968). A further difference relates to the rocks that overlie the Relay Mountain Group. In the Methow domain, east of Tatlayoko Lake, the Relay Mountain Group is stratigraphically overlain by arkosic sandstones and granitoid-bearing conglomerates of the Albian Jackass Mountain Group (Figure 3). The fault-bounded slivers of chert-pebble conglomerate imbricated with Hauterivian rocks of the Relay Mountain Group in the Niut Range, however, suggest that the Relay Mountain Group here was overlain by the Albian Taylor Creek Group. This suggests that the Relay Mountain Group in the Niut Range relates more closely to that part of the group exposed in the south Chilcotin domain, and occurs within the Tyaughton, rather than the Methow sub-basin, as defined by Garver (1989, 1992).

CRAZY CREEK PLUTON

The Crazy Creek pluton consists mainly of massive, medium to coarse-grained hornblende biotite quartz diorite and tonalite. However, easternmost exposures, adjacent to the Homathko River and northern Tatlayoko Lake, include abundant diorite, as well as tabular to irregular bodies of fine-grained greenstone that may be dike complexes and/or screens of older volcanic or dike rock within the plutonic rock. These eastern exposures strongly resemble the Mount Skinner Igneous Complex, which outcrops in an east-west belt centred near Mount Skinner, east of the Homathko River valley (Schiarizza *et al.*, 1995a,b). Samples of quartz diorite and tonalite from the Mount Skinner Complex have yielded zircon U-Pb radiometric dates of 226.7+8.1/-0.5 and 230±6.0 Ma respectively (R. Friedman, written communication, 1995). Although contact relationships with adjacent rock units are not well defined, the Mount Skinner Complex is interpreted to form the basement to the Upper Triassic and Jurassic sedimentary and volcanic rocks of Methow Terrane that outcrop east of Tatlayoko Lake (Figure 3).

The southwestern margin of the Crazy Creek pluton is a system of faults that juxtaposes the plutonic rocks, together with a pendant of hornfelsed metasedimentary rocks, against unmetamorphosed sedimentary rocks of the Relay Mountain Group. This fault contact was observed locally, where it is vertical to steeply east or northeast dipping. Although no movement sense was established along it, a component of northeast-side-up movement is suspected. The eastern contact of the pluton was not observed, but is suspected to be a northerly striking fault or shear zone, as easternmost exposures of plutonic rock west of the north end of Tatlayoko Lake display a steeply east dipping mylonitic foliation and an associated stretching lineation that plunges 45° to the south-southeast. This fault system is inferred to truncate the belt of Relay Mountain Group to the south and from there extend into Tatlayoko Lake (Figure 4). Its presence there is suggested by a zone of steeply east dipping brittle faults and fractures within Jurassic sedimentary rocks of the Methow Terrane along the lake shoreline. The northern boundary of the Crazy Creek pluton is a northwest-striking fault that places it against unmetamorphosed sedimentary rocks of the Jackass Mountain Group near the northern boundary of the map area. This fault has been traced from near Lingfield Creek, and is thought to be a component of the Yalakom dextral strike-slip fault system.

It is suspected that the entire Crazy Creek pluton correlates with the Mount Skinner Igneous Complex, and is therefore of Middle to Late Triassic age. In this interpretation, a pendant of hornfelsed sandstone and siltstone that occurs within quartz diorite along the southwestern margin of the pluton (Unit Ts of Figure 4) would be Triassic or older. An alternative interpretation, suggested by Schiarizza *et al.* (1995a,b), is that only the eastern, heterogeneous part of the pluton correlates with the Mount Skinner Complex, and most of the pluton is Cretaceous or Tertiary quartz diorite to tonalite related to the Coast Plutonic Complex. In this interpretation, the main part of the pluton might be the same age as the small quartz diorite bodies that intrude the Relay Mountain Group to the west, and the pendant of hornfelsed sedimentary rocks might have been derived from the Relay Mountain Group. A sample of quartz diorite from near the southwestern boundary of the pluton has been submitted for U-Pb dating of zircons in an attempt to discard one or both of these interpretations.

AGE AND STRUCTURAL CONTROL OF THE SKINNER GOLD-QUARTZ VEIN SYSTEM

The Skinner gold-quartz vein system occurs within early Late Triassic quartz diorite and diorite of the Mount Skinner Igneous Complex, 5 kilometres north of the north end of Tatlayoko Lake (Figure 4). It is a system of en echelon veins within a presumably structurally controlled lineament that trends 070° (Berniolles, 1991). Work to date has been concentrated on the Victoria vein, at the southwest end of the system, which strikes between 050° and 060° and dips steeply to the northwest. A 170-tonne bulk sample extracted from the vein by Ottarasko Mines Limited in 1992 and 1993 produced over 11 000 grams of gold (average grade 65.83 g/t) and 8000 grams of silver (Meyers, 1993, 1994; Schroeter, 1994).

The Victoria vein has been traced for more than 130 metres. It pinches and swells, locally attaining a thickness of 1.4 metres. The vein walls are defined by slickensided faults, and the veins themselves are cut by parallel faults, at least some of which accommodated sinistral movement. Clay gouge commonly occurs along the vein walls, and sericite and chlorite occur locally along fault surfaces. The vein consists almost entirely of quartz, with minor amounts of pyrite, chalcopyrite, malachite and rare visible gold. Gold values are variable, and concentrations as high as 136 grams per tonne across 0.65 metre have been recorded (Berniolles, 1991). Copper shows little relationship to gold, and is locally concentrated in the wallrock adjacent to the vein.

White mica locally lines vugs and open fractures in quartz of the Victoria vein. A sample provided by Louis Berniolles in 1994 was submitted to the Geochronology Laboratory at the University of British Columbia for K-Ar dating of the mica. The mica separate has recently yielded a preliminary Early to Middle Eocene date of 50 to 54 Ma (J. Mortensen, personal communication, September 1995). This provides a minimum age for the vein and most likely dates the late stages of the hydrothermal system responsible for the veining. If this interpretation is true, then the veining was coincident with dextral movement along the Yalakom fault, which is just 5 kilometres northeast of the Skinner occurrence. This suggests that the Skinner vein system formed along an antithetic sinistral fault system related to the Yalakom fault, although its orientation is slightly more easterly than would be expected for antithetic riedel shears in an ideal simple shear model (*e.g.* Wilcox *et al.*, 1973). The Lingfield Creek and Cheshi Creek faults to the southeast may have had a similar origin, but are likewise oriented slightly more easterly than would be expected. These departures may reflect varying degrees of clockwise rotation in the structural blocks southwest of the Yalakom fault, as is suggested by the structural analysis of Umhoefer and Kleinspehn (1995), who relate this block rotation to the area's position between the Tchaikazan and Yalakom faults.

ACKNOWLEDGMENTS

I would like to thank Roger White for his enthusiastic and very capable assistance during our 1995 fieldwork, and Mike and Audrey King of White Saddle Air Services for their generous hospitality and for safe and reliable helicopter transportation. I also thank J.W. Haggart, T.P. Poulton, H.W. Tipper, M.J. Orchard and F. Cordey for their fossil identifications, and R. Friedman, J. Gabites and J. Mortensen for their radiometric dating. Verna Vilkos prepared the figures for this report, and John Newell and Brian Grant improved the manuscript through their editorial efforts.

REFERENCES

Bernoilles, L. (1991): Prospecting Report - Skinner Group; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Assessment Report 22007.

Caira, N., Findlay, A. and Riddell, J. (1993): The Fish Lake Porphyry Copper-Gold Deposit; *in* Exploration in British Columbia 1992, *B.C. Ministry of Energy, Mines and Petroleum Resources*, pages 57-67.

Caira, N.M., Findlay, A. and Rebagliati, C.M. (in press): Taseko Mines Limited's Fish Lake Porphyry Copper-Gold Deposit; *in* Porphyry Deposits of the Northwestern Cordillera of North America, Schroeter, T.G., Editor, *Canadian Institute of Mining, Metallurgy and Petroleum*, Special Volume 46.

Friedman, R.M. and Armstrong, R.L. (1988): Tatla Lake Metamorphic Complex: An Eocene Metamorphic Core Complex on the Southwestern Edge of the Intermontane Belt of British Columbia; *Tectonics*, Volume 7, pages 1141-1166.

Garver, J.I. (1989): Basin Evolution and Source Terranes of Albian-Cenomanian Rocks in the Tyaughton Basin, Southern British Columbia: Implications for Mid-Cretaceous Tectonics in the Canadian Cordillera; unpublished Ph.D. thesis, *University of Washington*, 227 pages.

Garver, J.I. (1992): Provenance of Albian-Cenomanian Rocks of the Methow and Tyaughton Basins, Southern British Columbia: a Mid-Cretaceous Link between North America and the Insular Terrane; *Canadian Journal of Earth Sciences*, Volume 29, pages 1274-1295.

Green, K.C. (1990): Structure, Stratigraphy and Alteration of Cretaceous and Tertiary Strata in the Gang Ranch Area, British Columbia; unpublished M.Sc. thesis, *University of Calgary*, 118 pages.

Hickson, C.J. (1992): An Update on the Chilcotin-Nechako Project and Mapping in the Taseko Lakes Area, West-central British Columbia; *in* Current Research, Part A, *Geological Survey of Canada*, Paper 92-1A, pages 129-135.

Hickson, C.J. and Higman, S.(1993): Geology of the Northwest Quadrant, Taseko Lakes Map Area, West-central British Columbia; *in* Current Research, Part A, *Geological Survey of Canada*, Paper 93-1A, pages 63-67.

Hickson, C.J., Mahoney, J.B. and Read, P. (1994): Geology of Big Bar Map Area, British Columbia: Facies Distribution in the Jackass Mountain Group; *in* Current Research 1994-A; *Geological Survey of Canada*, pages 143-150.

Jeletzky, J.A. and Tipper, H.W. (1968): Upper Jurassic and Cretaceous Rocks of Taseko Lakes Map Area and their Bearing on the Geological History of Southwestern British Columbia; *Geological Survey of Canada*, Paper 67-54, 218 pages.

MacKenzie, J.D. (1921): A Reconnaissance between Taseko Lake and Fraser River, British Columbia; *in* Summary Report, 1920, Part A, *Geological Survey of Canada*, pages 70-81.

McLaren, G.P. (1990): A Mineral Resource Assessment of the Chilko Lake Planning Area; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Bulletin 81, 117 pages.

McLaren, G.P. and Rouse, J.N. (1989): Geology and Geochemistry of the Taseko Lakes Area (92O/3,4,5,6); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Open File 1989-25.

McMillan, W.J., Thompson, J.F.H., Hart, C.J.R. and Johnston, S.T. (in press): Regional Geological and Tectonic Setting of Porphyry Deposits in British Columbia and Yukon Territory; *in* Porphyry Deposits of the Northwestern Cordillera of North America, Schroeter, T.G., Editor, *The Canadian Institute of Mining, Metallurgy and Petroleum*, Special Volume 46.

Meyers, R.E. (1993): South-Central District; *in* Exploration in British Columbia 1992, *B.C. Ministry of Energy, Mines and Petroleum Resources*, pages 35-44.

Meyers, R.E. (1994): South-Central Region; *in* Exploration in British Columbia 1993, *B.C. Ministry of Energy, Mines and Petroleum Resources*, pages 43-46.

Monger, J.W.H. and McMillan, W.J. (1989): Geology, Ashcroft, British Columbia (92I); *Geological Survey of Canada*, Map 42-1989, sheet 1, scale 1:250 000.

Mustard, P.S. and van der Heyden, P. (1994): Stratigraphy and Sedimentology of the Tatla Lake - Bussel Creek Map Areas, West-central British Columbia; *in* Current Research 1994-A, *Geological Survey of Canada*, pages 95-104.

Mustard, P.S., van der Heyden, P. and Friedman, R. (1994): Preliminary Geologic Map, Tatla Lake - Bussel Creek (East Half), NTS 92N/15, 92N/14 (East Half); *Geological Survey of Canada*, Open File 2957, 1:50 000 scale.

Riddell, J., Schiarizza, P., Gaba, R.G., Caira, N. and Findlay, A. (1993a): Geology and Mineral Occurrences of the Mount Tatlow Map Area (92O/5, 6, and 12); *in* Geological Fieldwork 1992, Grant, B. and Newell, J.M., Editors, *B.C. Ministry of Energy, Mines and Petroleum Resources*, Paper 1993-1, pages 37-52.

Riddell, J., Schiarizza, P., Gaba, R., McLaren, G. and Rouse, J. (1993b): Geology of the Mount Tatlow Map Area (92O/5, 6, 12); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Open File 1993-8.

Rusmore, M.E. and Woodsworth, G.J. (1991a): Distribution and Tectonic Significance of Upper Triassic Terranes in the Eastern Coast Mountains and adjacent Intermontane Belt, British Columbia; *Canadian Journal of Earth Sciences*, Volume 28, pages 532-541.

Rusmore, M.E. and Woodsworth, G.J. (1991b): Coast Plutonic Complex: A Mid-Cretaceous Contractional Orogen; *Geology*, Volume 19, pages 941-944.

Rusmore, M.E. and Woodsworth, G.J. (1993): Geological Maps of the Mt. Queen Bess (92N/7) and Razorback Mountain (92N/10) Map Areas, Coast Mountains, British Columbia; *Geological Survey of Canada*, Open File 2586, 2 sheets, 1:50 000 scale.

Schiarizza, P. and Garver, J.I. (1995): Guide to the Geology and Tectonic Evolution of the Bridge River Area, Southeastern Coast Belt, Southwestern British Columbia; a guide to accompany days 2 and 3 of Field Trip A5, *Geological Association of Canada - Mineralogical Association of Canada*, Annual Meeting, Victoria, B.C., 87 pages.

Schiarizza, P., Gaba, R.G., Garver, J.I., Glover, J.K., Macdonald, R.W.J., Archibald, D.A., Lynch, T., Safton, K.E., Sajgalik, P.P., Calon, T., Malpas, J. and Umhoefer, P.J. (1993a): Geology of the Bralorne (North Half) and Northeastern Dickson Range Map Areas (92J/14, 15); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Geoscience Map 1993-7.

Schiarizza, P. Gaba, R.G., Coleman, M.E., Glover, J.K., Macdonald, R.W.J., Garver, J.I., Archibald, D.A., Lynch, T. and Safton, K.E. (1993b): Geology of the Bridge River Map Area (92J/16); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Geoscience Map 1993-8.

Schiarizza, P., Glover, J.K., Garver, J.I., Umhoefer, P.J., Gaba, R.G., Riddell, J.M., Payne, D.F., Macdonald, R.W.J., Lynch, T., Safton, K.E. and Sajgalik, P.P. (1993c): Geology of the Noaxe Creek and Southwestern Big Bar Creek Map Areas (92O/1, 2); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Geoscience Map 1993-9.

Schiarizza, P., Glover, J.K., Umhoefer, P.J., Garver, J.I., Handel, D., Rapp, P., Riddell, J.M. and Gaba, R.G., (1993d): Geology and Mineral Occurrences of the Warner Pass Map Area (92O/3); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Geoscience Map 1993-10.

Schiarizza, P., Melville, D.M., Riddell, J., Jennings, B.K., Umhoefer, P.J. and Robinson, M.J. (1995a): Geology and Mineral Occurrences of the Tatlayoko Lake Map Area (92N/8, 9 and 10); *in* Geological Fieldwork 1994, Grant, B. and Newell, J.M., Editors, *B.C. Ministry of Energy, Mines and Petroleum Resources*, Paper 1995-1, pages 297-320.

Schiarizza, P., Melville, D.M. and Jennings, B.K. (1995b): Geology, Mineral Occurrences and Geochemistry of the Tatlayoko Lake Map Area (92N/8, 9, 10); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Open File 1995-7, 2 sheets, 1:50 000 and 1:100 000 scale.

Schroeter, T.G. (1994): British Columbia Mining, Exploration and Development, 1993 Highlights; *in* Exploration in British Columbia 1993, *B.C. Ministry of Energy, Mines and Petroleum Resources*, pages 1-29.

Spilsbury, T.W. (in press): The Schaft Creek Porphyry Copper-Molybdenum-Gold-Silver Deposit, Northwestern British Columbia; *in* Porphyry Deposits of the Northwestern Cordillera of North America, Schroeter, T.G., Editor, *The Canadian Institute of Mining, Metallurgy and Petroleum*, Special Volume 46.

Tipper, H.W. (1969a): Mesozoic and Cenozoic Geology of the Northeastern Part of Mount Waddington Map Area (92N), Coast District, British Columbia; *Geological Survey of Canada*, Paper 68-33.

Tipper, H.W. (1969b): Geology, Anahim Lake; *Geological Survey of Canada*, Map 1202A.

Tipper, H.W. (1978): Taseko Lakes (92O) Map Area; *Geological Survey of Canada*, Open File 534.

Umhoefer, P.J. and Kleinspehn, K.L. (1995): Mesoscale and Regional Kinematics of the Northwestern Yalakom Fault

System: Major Paleogene Dextral Faulting in British Columbia, Canada; *Tectonics*, Volume 14, pages 78-94.

Umhoefer, P.J., Rusmore, M.E. and Woodsworth, G.J. (1994): Contrasting Tectono-stratigraphy and Structure in the Coast Belt near Chilko Lake, British Columbia: Unrelated Terranes or an Arc - Back-arc Transect?; *Canadian Journal of Earth Sciences*, Volume 31, pages 1700-1713.

van der Heyden, P., Mustard, P.S. and Friedman, R. (1994a): Northern Continuation of the Eastern Waddington Thrust Belt and Tyaughton Trough, Tatla Lake - Bussel Creek Map Areas, West-central British Columbia; *in* Current Research 1994-A; *Geological Survey of Canada*, p. 87-94.

van der Heyden, P., Calderwood, A. and Huntley, D.H. (1994b): Preliminary Geologic Map, Charlotte Lake - Junker Lake (East Half), NTS 93C/3, 93C/4 (East Half); *Geological Survey of Canada*, Open File 2919, scale 1:50 000.

Wilcox, R.E., Harding, T.P. and Seely, D.R. (1973): Basic Wrench Tectonics; *American Association of Petroleum Geologists*, Bulletin, Volume 57, pages 74-96.

Wolfhard, M.R. (1976): Fish Lake; *in* Porphyry Deposits of the Canadian Cordillera, Sutherland Brown, A., Editor, *Canadian Institute of Mining and Metallurgy*, Special Volume 15, pages 317-322.

NOTES