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GEOLOGY OF THE STIKINE RIVER – YEHINIKO LAKE AREA, NORTHWESTERN BRITISH COLUMBIA (104G/11W AND 12E)

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KEYWORDS: Regional geology, Stikine River, Yehiniko Lake, Stikine assemblage, Stuhini Group, Hazelton Group, *Sustut Group, Sloko Group, Nightout pluton, Yehiniko* pluton.

INTRODUCTION

The second summer of 1:50 000 geological mapping for the Stikine project was completed in the Yehiniko Lake (104G/11W) and Chutine River map areas (104G/12E), to adjoin mapping of the Scud River (Brown and Gunning, 1989a, b) and Galore Creek (Logan and Koyanagi, 1989a, b) areas that were completed in 1988. The present project area, approximately 30 kilometres southwest of Telegraph Creek, lies within a northwest-trending mineral-rich belt that includes important precious and base metal deposits such as Premier, Sulphurets, Eskay Creek, Johnny Mountain, Snip, Galore Creek and Golden Bear (Figure 1-14-1). A gravel road provides four-wheel-drive access to the northwest corner of the project area and the central part can be reached by boat along the Stikine River, but practical access to much of the area is by helicopter from Telegraph Creek or Dease Lake.

Fieldwork in 1989 focused on Mesozoic stratigraphy. Preliminary results include recognition of: (1) weakly deformed Lower to Middle Jurassic, Upper Cretaceous to Eocene (?) and Eocene successions preserved in the central part of the map area and resting unconformably on more highly deformed Upper Triassic rocks; (2) four episodes of plutonism; (3) moderate mineral potential; narrow, discontinuous gold-bearing quartz veins and auriferous porphyry copper mineralization are possible exploration targets; and (4) an extensive pyritic alteration zone that trends northeast across the map area is related to a Middle Jurassic (?) dike swarm.

The project area straddles the boundary between the Coast and Intermontane belts, and is underlain by rocks of the Stikine Terrane, an integral part of the Intermontane Belt. Previous regional studies and the regional geologic framework were summarized in Brown and Gunning (1989a).

STRATIGRAPHY

The stratigraphic succession consists of: pre-Permian arc-volcanic and sedimentary rocks and Permian platformal limestone of the Stikine assemblage; bimodal, dominantly marine arc-volcanic and related sedimentary rocks of the Upper Triassic Stuhini Group; subaerial and subordinate marine Lower to Middle Jurassic volcanic and sedimentary rocks, equivalent to the Hazelton Group; nonmarine clastic rocks of the Upper Cretaceous to Eocene (?) Sustut Group; and felsic to mafic volcanic rocks of the Eocene Sloko Group (Figures 1-14-2 and 3).

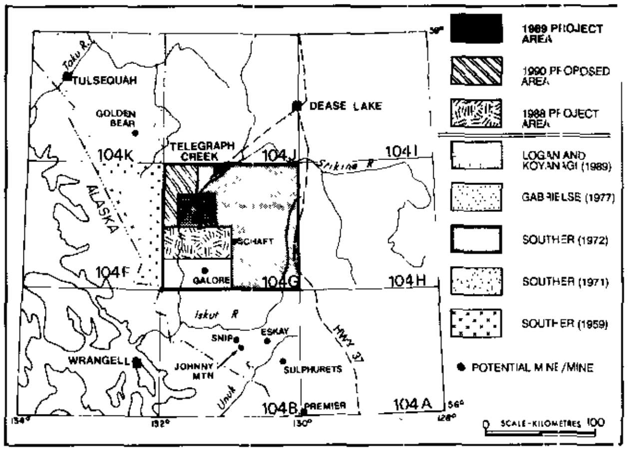

Figure 1-14-1. Location map for Stikine project with areas of previous work indicated.

PALEOZOIC STIKINE ASSEMBLAGE

(UNITS Ps & pPs)

Paleozoic Stikine assemblage rocks underlie three small areas in the western half of the map area, each distinguished by different structural trends and the presence or absence of thick Permian limestone. Comparative studies of these and more complete sections in the Scud River area are the subject of a masters thesis by M.H. Gunning being undertaken at the University of Western Ontario. Detailed discussion of several Scud River sections is found in Gunning (1990, this volume).

The oldest rocks in the map area, discontinuous Mississippian limestone lenses within pyritic metasiltstone and argillite (Kerr, 1948), are exposed in the Devils Elbow area. In contrast to Triassic and younger units, these rocks display a penetrative foliation that is commonly bedding parallel, north to northwest-trending, and moderate to steeply east-dipping. Thick and complexly deformed Permian limestone, which is missing in the Devils Elbow area, dominates exposures near Missusjay Creek and the Barrington River. In the Missusjay Creek area Permian limestone is structurally underlain by silicic metasedimentary rocks, similar to those mapped by Brown and Gunning to the south (Units A, B and C; 1989a). In the Barrington River area, the section includes minor maroon and green tuffaceous mudstone, silicic tuff and chert. In contrast to the Devils Elbow area, major structures trend northeast (Missusjay Creek) and east-west (Barrington River). The vergence, age and origin of these structures are poorly understood. An inferred north-dipping reverse fault in the Barrington River area, which juxtaposes Stikine assemblage rocks on the north with Stuhini Group volcanic rocks on the south, suggests that at least some of the deformation occurred in post-Late Triassic time.

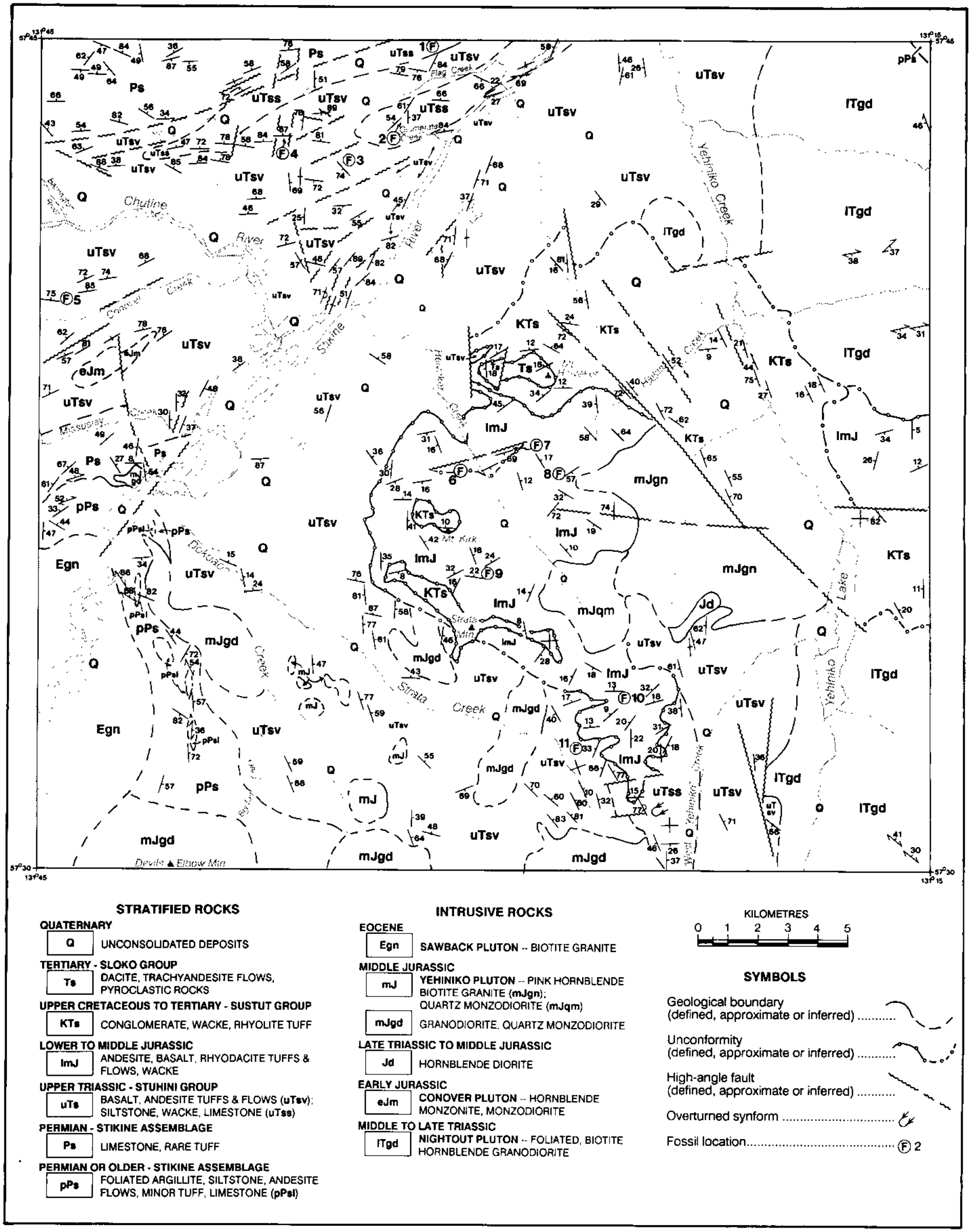

Figure 1-14-2. Simplified geology of the Stikine River – Yehiniko Lake area (104G/11W and 12E).

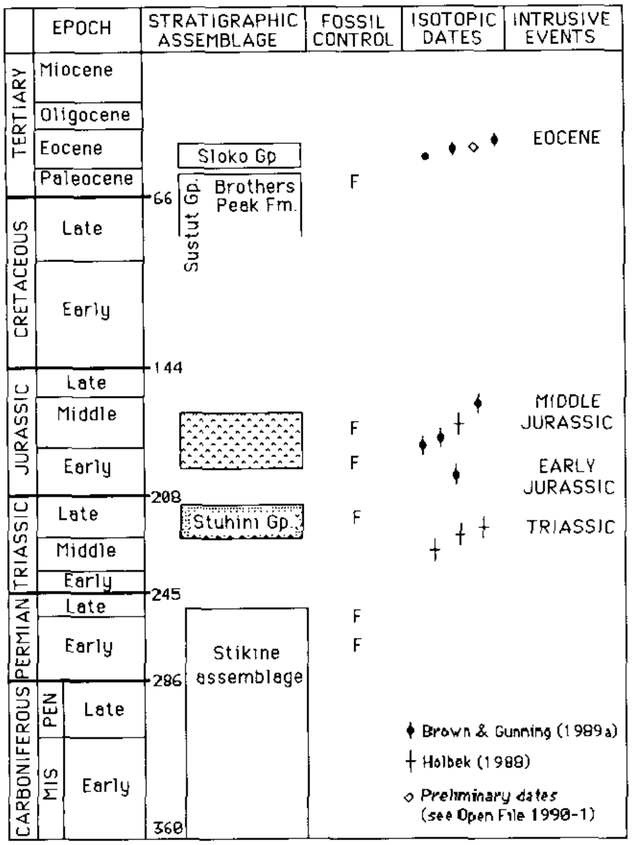

Figure 1-14-3. Schematic column of stratified rocks in the map area, with intrusive events shown.

UPPER TRIASSIC STUHINI GROUP

(UNIT uTs)

The Upper Triassic Stuhini Group is the most abundant map unit within the project area. The best exposures occur in the south near the headwaters of Dokdaon, Strata and "West Yehiniko" creeks, and in the northwest on the ridges west and northeast of the confluence of the Stikine and Chutine rivers. Much of the area underlain by Stuhini Group rocks, such as Stikine River valley, is at lower elevations and covered with unconsolidated deposits and thick vegetation. Poor exposure in these areas, a lack of marker units, and the similarity in colour and weathering characteristics of constituent lithologies, hinder both subdivision of the Stuhini Group and elucidation of its structural features.

Fossil control for the Stuhini Group in the project area is relatively good. Six new localities with Upper Triassic (probable Norian) fossils were discovered during mapping for this project (Fossils at Localities 3, 4, 5, 7, 11 identified by H.W. Tipper, personal communication, 1989; Locality 6 by T.P. Poulton, personal communication, 1989 as shown in Figure 1-14-2). In addition, two localities with fossils interpreted as Lower Jurassic by Kerr (1948) near Glomerate and Flag creeks (Localities 1, 2; Figure 1-14-2) were recollected, and also yielded Upper Triassic (probable Norian) fossils (T.P. Poulton, personal communication, 1989). This suggests that Lower Jurassic rocks mapped by Kerr (1948) and Souther (1972) in the Stikine valley are probably Upper Triassic.

Volcanic rocks of the Stuhini Group, although similar in some respects to overlying Lower to Middle Jurassic volcanic rocks, are more mafic and contain a larger component of subaqueous deposits. In addition, Upper Triassic flows, sills and beds typically dip at high angles, whereas Lower to Middle Jurassic rocks are typically gently dipping. Augite-bearing volcanic rocks, regarded as a hallmark of the Upper Triassic in British Columbia, occur in both the Upper Triassic and Lower to Middle Jurassic packages, but are more abundant and augite-rich in the Stuhini Group.

The most abundant Stuhini Group lithologies are mafic crystal-lithic lapilli tuff, ash tuff and lapilli tuff-breccia. They are typically dark green, massive and rich in pyroxene and plagioclase. Layering in tuff units is uncommon and attitudes must generally be measured on interbedded fine-grained pyroclastic or volcaniclastic units.

Dark grey-green pyroxene and plagioclase-phyric (amygdaloidal) basalt or basaltic andesite flows containing blocky pyroxene and lath-shaped plagioclase phenocrysts appear to be characteristic of the Stuhini Group in the project area. Less distinctive but perhaps more abundant Stuhini Group flows include pyroxene-phyric and plagioclase-phyric basalt or basaltic andesite. Locally, such as in the hills northeast of the confluence of the Stikine and Chutine rivers, pillowed basalt flows were recognized. On the ridges immediately south of Strata Creek, more mafic volcanic rocks are subordinate, and plagioclase-rich andesite flow-breccia and tuff-breccia dominate.

Felsic volcanic rocks are an important and widespread, yet volumetrically insignificant component of the Stuhini Group. Pale green to dark grey, pyritic, laminated subaqueous siliceous dust to ash tuff are most common, but siliceous lithic lapilli tuff and welded to unwelded ignimbrite are present locally. In places, mafic crystal-lithic tuff and tuff-breccia contain felsic clasts. The presence of this felsic component amid the predominantly mafic volcanic pile indicates that Stuhini Group volcanism was bimodal.

Though the bulk of the Stuhini Group consists of resistant volcanic rocks, recessive sedimentary rocks are commonly part of the section and may underlie a greater area than is apparent in outcrop (Unit uTss; Figure 1-14-2). Olive coloured mafic and lesser brown-weathering arkosic wacke, siltstone and shale, minor tuffaceous(?) and sandy limestone, limestone conglomerate/breccia, granitoid-bearing polymictic conglomerate, and black ribbon chert occur in beds that trend east-northeast from the confluence of the Barrington and Chutine rivers. In a narrow belt that trends roughly east-west across Helveker Creek, large lenses of steeply south-dipping, thick-bedded to massive limestone and minor thin-bedded, light grey chert grade upward into well-bedded, dark grey siltstone and green sandstone (Plate 1-14-1). Between Strata and "West Yehiniko" creeks a generally conformable but somewhat disrupted sedimentary package includes well-bedded tuffaceous rocks. Several horizons of pale grey weathering, thick-bedded to massive, micritic and bioclastic limestone layers (up to 20 metres thick) occur at the transition with massive flows and breccias to the southwest. Dark grey to black siltstone, green and pale grey arkose and black shale overlie the limestone. Maroon, mauve and brick-red massive lapilli tuff, tuffaceous mudstone and lesser laminated limy ash tuff lie above the sediments. The distribution of these "sedimentary belts," and the orientation of their beds relative to layered rocks in adjacent volcanic-rich parts of the Stuhini Group, suggest that the sedimentary rocks are younger and that Stuhini Group volcanism in the project area was largely pre-Norian.

Stuhini Group rocks are characterized by steep dips. Folds are recognized only within well-bedded, dominantly sedimentary sequences; more massive volcanic rocks appear unfolded and are rarely foliated. This suggests that structures are high-level and that lithology controlled structural style. A high-level structural setting is corroborated by preliminary petrographic study of metamorphic mineral assemblages, which indicates that the Stuhini Group rocks are metamorphosed only to zeolite grade. The unconformable contact between folded (steeply-dipping, northeast-verging overturned beds) and faulted Upper Triassic rocks and overlying, gently dipping Lower Jurassic flows and tuffs (Plate 1-14-2) indicates that much of this deformation occurred between Late Triassic and Early Jurassic time.

The nature of the contact between the Stuhini Group and rocks of the Stikine assemblage in the project area is uncertain. Contacts are poorly exposed and are interpreted as structural. However, near the headwaters of Conover Creek, the presence of abundant clasts typical of the Stikine assemblage within limy crystal-lithic lapilli tuff of the Stuhini Group suggests that the contact may originally have been an unconformity (M.H. Gunning, personal communication, 1989).

LOWER TO MIDDLE JURASSIC ROCKS

(UNITS lMj)

In the central part of the map area, Lower to Middle Jurassic volcanic and minor sedimentary rocks underlie much of the drainage of Helveker Creek (Figure 1-14-2). They also outcrop northeast of Yehiniko Lake along the east margin of the map area, where they were mapped as Stuhini Group by Souther (1972). Ammonite fragments, belemnites, brachiopods and scarce bivalves from three new fossil localities (Figure 1-14-2, Localities 8, 9 and 10) have been tentatively assigned Toarcian and Bajocian ages (Lower to Middle Jurassic; H.W. Tipper, personal communication, 1989). Prior to this study, fossils from one locality near Mount Kirk were interpreted to be Jurassic (Locality 28 of Kerr, 1948). Potassium-argon dating of several unaltered flows from the Jurassic map unit is in progress (Open File 1990-1).

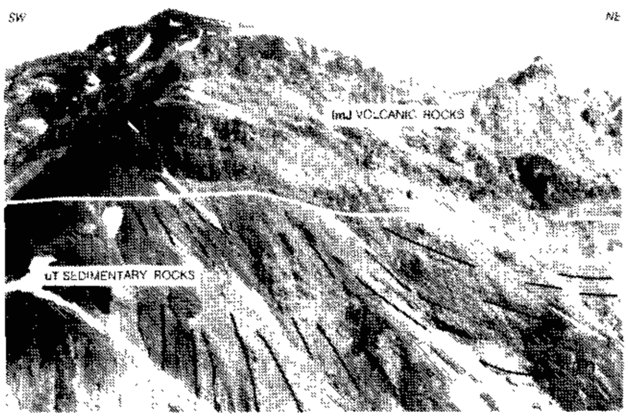

Plate 1-14-2. View northwest to folded and faulted Upper Triassic siltsone and sandstone unconformably overlain by gently dipping Lower to Middle Jurassic volcaniclastic rocks and flows; ridge between Strata and "West Yehiniko" creeks.

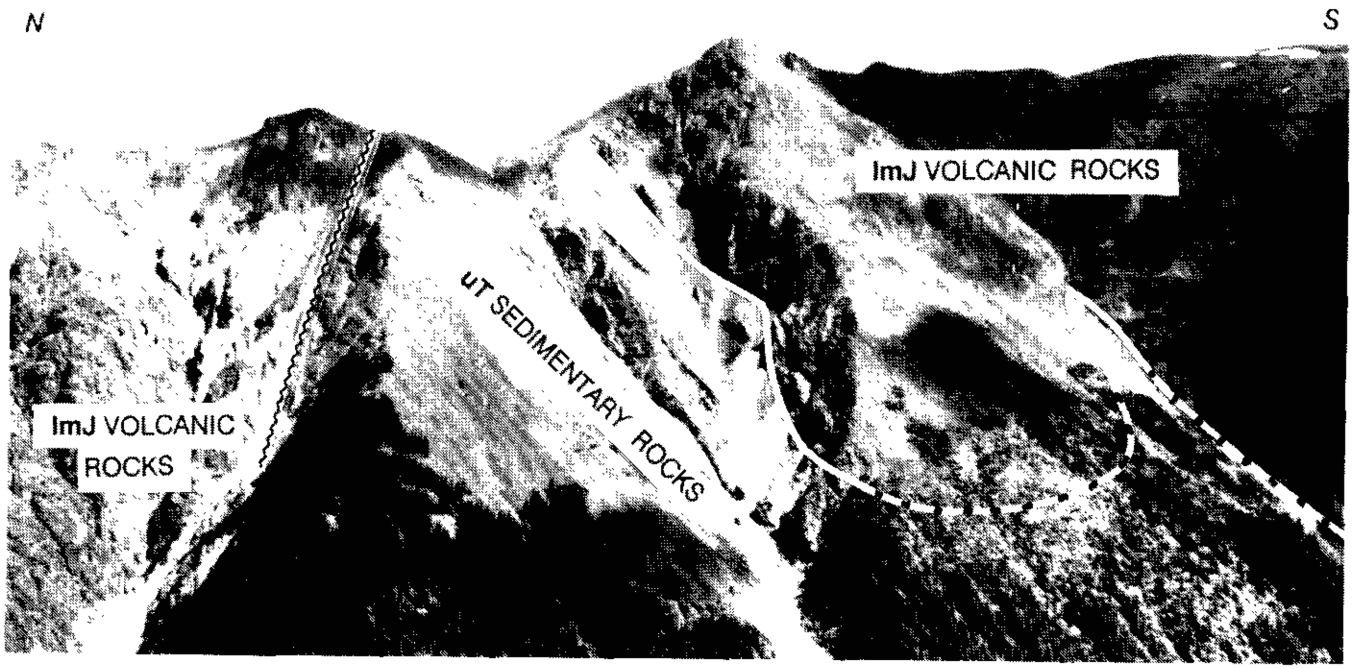

Plate 1-14-1. View northeast to steeply south-dipping Upper Triassic sedimentary rocks unconformably overlain by gently dipping Lower to Middle Jurassic volcanic rocks; northeast side of Helveker Creek.

The Lower to Middle Jurassic section is characterized by the presence of gently dipping, massive and thick (up to tens of metres), plagioclase-rich andesite flows and tuffs with maroon or purple hues. Tuffs and flows occur in subequal quantities. Crystal-lithic andesite tuff-breccia and lapilli tuff are commonly maroon to brick-red and less typically grey-green to mottled maroon and green. They contain angular volcanic country rock fragments up to 1 metre in diameter. Thin to thick-bedded units of poorly indurated, flaggy, maroon, mauve and pale green ash and fine-grained lapilli tuff are commonly interbedded with coarse-grained tuffaceous rocks. Rare pale grey grit and maroon tuffaceous grit, thought to be derived from underlying plutonic rocks, occur northeast of Yehiniko Lake and on Mount Kirk.

The most common flows are pyroxene and plagioclase-phyric andesite. They are typically grey-green with a faint dark purple or maroon hue, and are locally flow banded and amygdaloidal (zeolite, calcite, chlorite, epidote, quartz, pyrite). Subordinate flows include: buff to rusty weathering, flow-banded aphanitic rhyolite (up to 60 metres thick) that occurs at the base of the section in the southwesternmost exposures (Plate 1-14-3); pink-weathering hematitic flow-banded and locally flow-folded and autobrecciated rhyolitic ignimbrite on the southwest flank of Mount Kirk (traced over 2 kilometres along strike); and dark green, chlorite-amygdaloidal olivine basalt exposed 2 kilometres southeast of Mount Helveker and 3 kilometres east and southeast of Strata Mountain.

Facies changes within the package suggest that subaerial and marine deposition were contemporaneous. For example, on the ridge 1.5 kilometres north of Strata Mountain, a southwest to northeast facies transition occurs between maroon (subaerial) andesite flows and tuff-breccia, and pale green (subaqueous) andesite ash and dust tuff, green andesite flows with interbedded dark green siltstone and arkosic wacke containing belemnites, bivalves and rare ammonites. In turn, the marine rocks grade vertically and laterally (farther to the northeast) into maroon tuff-breccia. This suggests that contemporaneous subaerial and marine deposition occurred in an emergent island setting. Overall, subaerial rocks appear to dominate the Lower to Middle Jurassic package, but other marine rocks are exposed southeast of Strata Mountain (argillite, siltstone, fossiliferous wacke, carbonate-cemented amygdaloidal basalt pillow-breccia and rare bioclastic limestone lenses), north of Mount Kirk (mauve lapilli tuff with limestone lenses) and northwest of

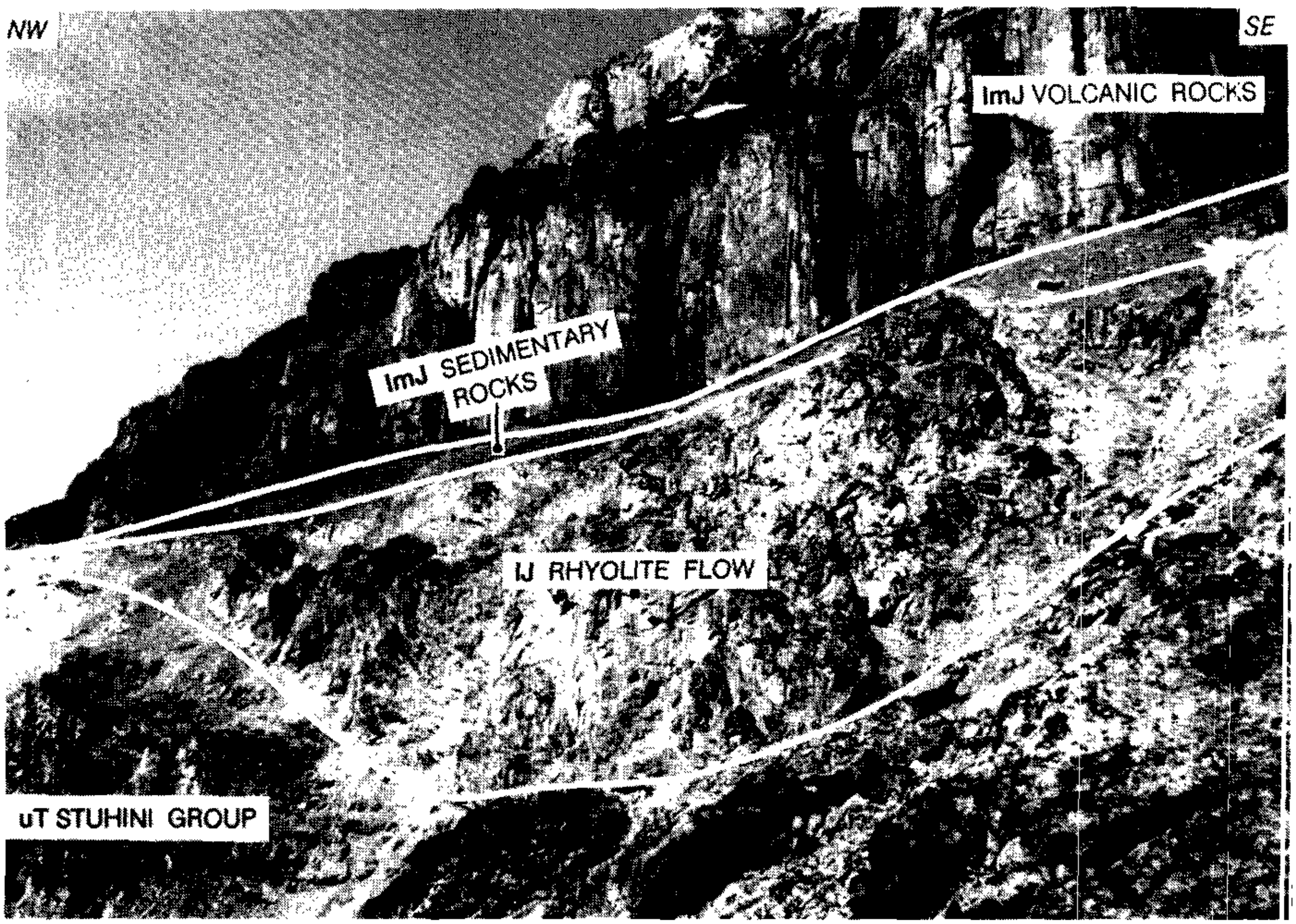

Plate 1-14-3. View northeast to Stuhini Group rocks overlain unconformably by pale-weathering rhyolite flow which is in turn conformably overlain by a relatively thin layer of gently dipping Lower Jurassic (Toarcian ?) sedimentary rocks and by prominent cliffs of columnar-jointed Lower to Middle Jurassic basaltic andesite flows; northeast of Strata Creek.

Mount Kirk (green, carbonate-cemented arenaceous sandstone, siltstone and polymictic cobble conglomerate, and pale grey massive limestone).

In the central part of the project area, Lower to Middle Jurassic rocks rest unconformably on rocks of the Stuhini Group except on their east margin, where they are intruded by the Yehiniko pluton. The unconformity is marked locally by maroon polymictic cobble to boulder conglomerate, but in most places there is an angular discordance of up to 90° (Plate 1-14-2) between Lower to Middle Jurassic lithologies and the underlying Stuhini Group. The paleosurface is commonly highly irregular (Plate 1-14-3). Relief on the unconformity is variable, but locally appears to be as much as 500 metres and quite abrupt (*e.g.* Helveker Creek). Northeast of Yehiniko Lake, maroon tuff and minor tuffaceous grit rest unconformably on the Nightout pluton.

The Jurassic package appears much less deformed relative to the underlying Stuhini Group, except for several high-angle brittle faults with minor vertical offsets. Preliminary petrographic study of the Jurassic volcanic rocks suggests that they, like the Stuhini Group rocks, have undergone zeolite facies metamorphism. Locally the zeolite assemblage is overprinted by an albite-epidote assemblage (calcite, chlorite, epidote, albite, quartz, pyrite, rare actinolite) that is spatially related to plutons and dike swarms.

UPPER CRETACEOUS TO EOCENE (?)

SUSTUT GROUP (Unit uKs)

Sedimentary and subordinate volcanic rocks correlated on a lithologic basis with the Brothers Peak Formation of the Sustut Group (Souther, 1972; Eisbacher, 1974) occur in a belt that trends northwest from the eastern boundary of the map to Mount Helveker and as outliers southwest of the belt at Mount Kirk and Strata Mountain (Figure 1-14-2; Plate 1-14-4).

Extremely poorly indurated polymictic cobble conglomerate, in places resembling Quaternary glaciofluvial deposits, characterize the Sustut Group in the project area. Sandstone and siltstone and conspicuous pale-coloured rhyolite tuff are subordinate. Basalt flows are rare. Brick-red, brown and grey conglomerates are massive to moderately well bedded and locally contain crossbeds and foreset beds. They are generally moderately sorted and clasts are well rounded, except in Yehiniko Creek valley, where debris flows or fanglomerates are common and clasts, locally up to 3 metres in diameter, vary from well rounded to subangular. Clasts are derived from all older lithologies and on Mount Kirk include distinctive pink flow-banded rhyolite derived from immediately underlying Lower to Middle Jurassic volcanic rocks. Only conspicuous white bull quartz clasts (up to 10 per cent) have an unknown provenance. Coaly plant stems, leaves and wood fragments occur locally. Sandstone lenses and beds are buff, brown, pale green, grey, maroon and olive, and locally contain fresh biotite. Thin but prominent, white, mauve and pale green, locally welded, biotite quartz-eye rhyolite to rhyodacite ash to lapilli tuff horizons, up to 10 metres thick, are sometimes interbedded with conglomerate (Plate 1-14-5).

The Sustut Group lies with angular unconformity on Lower Jurassic volcanic rocks on Mount Kirk and Mount Helveker and on Upper Triassic volcanic rocks on Strata Mountain (Plate 1-14-4). The basal contact of the Sustut Group is 350 metres higher in elevation at Strata Mountain than at Mount Helveker, suggesting either differential uplift in Tertiary time or variable relief on the Cretaceous paleosurface. East of Yehiniko Lake subhorizontal conglomerate lies unconformably on the Nightout pluton. Northwest of

Plate 1-14-4. View northwest to Strata Mountain which is underlain by Sustut Group conglomerate and sandstone lying unconformably on altered Lower to Middle Jurassic volcanic rocks cut by Middle Jurassic (?) dikes.

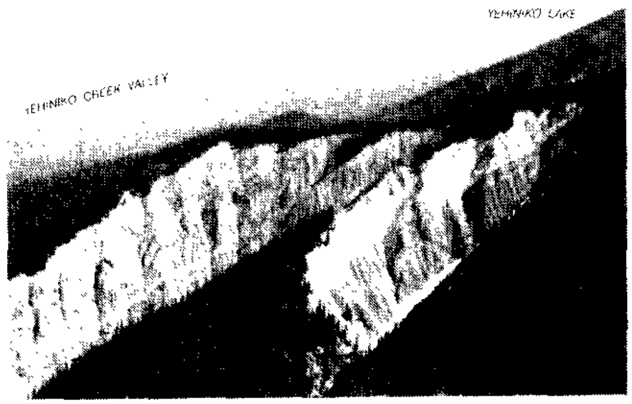

Plate 1-14-5. View southeast to bedded Sustut Group conglomerate with a prominent horizon of white rhyolite tuff.

Yehiniko Lake steeply northeast-dipping strata of the Sustut Group are faulted against the Yehiniko pluton. In the Mount Helveker area, basalt and felsite dikes, believed to be Sloko Group feeders, intrude the sediments.

The deformational style of the Sustut Group in Yehiniko Creek valley is characterized by abrupt changes in dip. Lack of evidence for folds, except for a possible dragfold on the eastern flank of Mount Helveker (R.T. Bell, written communication, 1989), and the poorly sorted nature of much of the conglomerate, suggest that dip changes may be in part related to syndepositional block faulting.

Palynomorphs from a sample collected 4 kilometres east of the map boundary indicate an Early Paleocene age, which is younger than the age of the Brothers Peak Formation in its type area (A.R. Sweet, personal communication, 1989). Fossil deciduous leaves and coaly plant stems have been submitted for identification, and biotites from rhyolite tuff and tuffaceous sandstone are being dated.

A high-energy fluvial paleoenvironment with alluvial fans feeding a fault-controlled basin that received intermittent pyroclastic deposits and rare flows is envisioned for the Sustut Group. Imbricated clasts and foreset beds at several localities suggest north to northeastward-directed paleocurrents.

EOCENE SLOKO GROUP

(UNIT Ts)

Sloko Group volcanic rocks, the youngest stratified rocks in the map area, cap weathered, limonitic Sustut Group conglomerate on Mount Helveker. The exposed section is about 330 metres thick and comprises flat-lying tuff, breccia, and dacite and trachyandesite flows.

The base of the section (at 1740-metre elevation) consists of pale green to white, laminated welded tuff with prominent eutaxitic textures. On the west side of Mount Helveker, welded tuff is overlain by brick-red volcanic breccia and well-bedded lithic lapilli tuff (pyroclastic surge and flow deposits) which is in turn overlain by light grey weathering hornblende and plagioclase-phyric dacite flows and sills. Lithologically similar dikes cut Sustut Group rocks on Mount Kirk, 6 kilometres to the southwest. Overlying the dacite flows near the top of the south side of Mount Helveker are resistant, dark brown weathering, columnar-jointed plagioclase-phyric trachyandesite flows 2 to 3 metres thick. The top of Mount Helveker is capped by poorly indurated, light grey weathering, andesitic volcanic breccia and hornblende crystal lithic lapilli tuff. Tuff contains fresh hornblende in grey to olive lithic fragments and as crystal fragments. Tuff was collected for K-Ar age determination.

The Sloko Group sequence is somewhat disrupted by north-trending, high-angle normal faults with displacements of at least 30 metres. It is also cut by northeast to east-trending columnar-jointed basalt dikes.

Overall there is a subtle angular discordance (<10°) between the Sustut and Sloko groups, however, beds are locally conformable. The contact marks an abrupt change from largely high-energy fluvial deposition with intermittent volcanism, to mainly subaerial felsic to intermediate volcanism.

INTRUSIVE ROCKS

Intrusive rocks underlie roughly 25 per cent of the project area. This is in sharp contrast to the adjacent Scud River area, of which approximately 75 per cent is underlain by intrusive rocks. Preservation of Lower Jurassic, Upper Cretaceous and Eocene stratified rocks in the current map area and their absence in the Scud River area suggests that uplift and erosion were greater to the south. Age assignments in the following section are based on field relationships or lithologic similarity with nearby dated intrusions. Potassium-argon dating is in progress for several of the suites. Compositions of intrusive rocks were determined from slabbed and stained hand specimens utilizing the classification scheme of Streckeisen (1976). Four plutonic episodes are tentatively defined: Middle to Late Triassic, Early Jurassic, Middle Jurassic and Eocene.

MIDDLE TO LATE TRIASSIC

NIGHTOUT PLUTON (UNIT lTgd)

The Middle to Late Triassic (Holbek, 1988) Nightout pluton, consisting of foliated to massive medium-grained biotite hornblende granodiorite that grades locally to tonalite, quartz monzonite, monzodiorite and diorite, underlies much of the eastern margin of the study area. It is continuous with exposures of Nightout pluton to the south, described by Brown and Gunning (1989a). In the present study area the pluton is characterized by a widespread magmatic foliation and by coarse-grained (up to 2 centimetres) poikilitic potassium feldspar grains.

In the northeast corner of the project area, the Nightout pluton intrudes Stuhini Group mafic volcanic rocks on its west margin, and mylonitic Stikine assemblage rocks on its northeast margin. Foliation in the pluton parallels the contact and the foliation in the country rocks. Along the east-central margin of the study area, the Nightout pluton is overlain unconformably by both Lower to Middle Jurassic volcanic rocks and by Upper Cretaceous to Eocene (?) conglomerate of the Sustut Group. A sample of biotite hornblende granodiorite collected near the pre-Lower Jurassic unconformity is being processed for K-Ar dating.

In the southeast corner of the study area, along the southwest side of Yehiniko Lake and farther to the south, unfoliated, medium-grained equigranular (biotite) hornblende tonalite, possibly a marginal phase of the Nightout pluton, intrudes and hornfelses mafic volcanic and volcaniclastic rocks of the Stuhini Group.

EARLY JURASSIC (?)

CONOVER PLUTON (UNIT eJm)

West of the confluence of the Stikine and Chutine rivers, Stuhini Group rocks are intruded by distinctive seriate to plagioclase-porphyritic ("crowded") hornblende monzonite to monzodiorite. The intrusions, including the Conover pluton and numerous associated sills, though texturally heterogeneous, typically contain blocky to lath-shaped, locally trachytic plagioclase phenocrysts 3 to 5 millimetres long, in a groundmass of hornblende, potassium feldspar, plagioclase and quartz. Based on compositional and textural similarities with alkaline plutons to the south, the Conover intrusions are assigned an Early Jurassic age. The alkaline plutons to the south, however, are potassium feldspar megacrystic. Hornblende from the Conover pluton is being processed for K-Ar dating.

LATE TRIASSIC TO PRE-MIDDLE JURASSIC

DIORITE AND QUARTZ MONZODIORITE (UNIT Jd)

Roughly 5 kilometres west of Yehiniko Lake, along the southern margin of the Yehiniko pluton, fine to medium-grained, unfoliated hornblende diorite intrudes and hornfelses Stuhini Group rocks and is itself intruded by granite and quartz monzonite apophyses of the Yehiniko pluton.

Southeast of Strata Mountain, on both sides of Strata Creek, Stuhini Group rocks are intruded by texturally heterogeneous hornblende diorite and subordinate leucodiorite. On the south side of Strata Creek, this intrusion varies from fine to coarse grained, is locally foliated and, in places, weak gneissic banding is developed. On the steep slopes north of Strata Creek, it is cut by numerous dikes, is intensely altered and, as a result, contact relationships with Lower to Middle Jurassic rocks to the north are uncertain. Pink, fine to medium-grained (biotite) hornblende granite to syenite dikes, thought to be comagmatic with the Yehiniko pluton, intrude the diorite.

On the northeast side of Strata Creek, west of Strata Mountain, medium-grained biotite-hornblende quartz monzodiorite intrudes rocks of the Stuhini Group. As with the pluton southeast of Strata Mountain, contact relationships with Lower to Middle Jurassic volcanic rocks to the north are uncertain.

MIDDLE JURASSIC

YEHINIKO PLUTON (UNIT mJgn)

West of Yehiniko Lake, distinctive pink, medium and locally fine-grained hornblende biotite granite to quartz monzonite and subordinate pale grey quartz monzodiorite and quartz monzonite comprise the Yehiniko pluton. It has a somewhat more limited distribution than shown by Souther (1972) and is more compositionally and texturally heterogeneous than Middle Jurassic plutons to the south, with which it has been correlated (Unit 9 of Brown and Gunning, 1989a, b).

On its northeast margin, the Yehiniko pluton is interpreted to be in fault contact with conglomerate of the Sustut Group. Contacts with Upper Triassic volcanic rocks and post-Late Triassic hornblende diorite on the south, and with Lower to Middle Jurassic volcanic rocks on the west, are intrusive and country rocks are strongly hornfelsed.

Near the west and southwest contacts of the Yehiniko pluton, abundant and distinctive pink dikes of biotite-hornblende-plagioclase (rarely potassium feldspar) porphyritic (quartz) syenite, granite and (quartz) monzonite intrude Lower to Middle Jurassic and Upper Triassic country rocks within an irregular north-northeast to northeast-trending zone of intense diking and alteration. This suggests that the dikes, and in part, the alteration, are genetically related to the Yehiniko pluton, and together with the prominent hornfels zone, suggest that the pluton is epizonal. Farther southwest along the trend of this zone, on the ridge between Dokdaon and Strata creeks, hornblende granite to quartz monzonite stocks and hornblende-plagioclase-porphyritic (quartz) syenite and (quartz) monzonite dikes have been tentatively correlated with the Yehiniko pluton. The stocks, which are associated with mineralization on the Dok claims (Ulrich, 1971), were formerly assigned to the Early Jurassic (Souther, 1972).

GRANODIORITE AND QUARTZ MONZODIORITE

(UNIT mJgd)

Along the southern edge of the project area, from the headwaters of Strata Creek west to Devils Elbow, five intrusions of unfoliated, medium-grained (biotite) hornblende granodiorite to quartz monzodiorite intrude rocks of the Stuhini Group or Stikine assemblage. The three southernmost plutons are continuous to the south with intrusions assigned to the Middle Jurassic suite by Brown and Gunning (1989a, b). A pluton continuous with that exposed along Dokdaon Creek, near the southern boundary of the present project area, yielded a Middle to Late Jurassic K-Ar hornblende date (158 ± 6 Ma; Brown and Gunning, 1989b). Other dates for their Middle Jurassic suite are somewhat older (hornblende: 182 ± 7 Ma; biotite: 163 ± 6 Ma; Brown and Gunning, 1989b).

EOCENE

SAWBACK PLUTON (UNIT Egn)

In the southwestern corner of the study area, massive (hornblende) biotite granite, characterized by its medium to coarse grain size, well-developed but widely spaced joints and relatively unaltered nature, comprises the Sawback pluton. Brown and Gunning (1989b) obtained a Middle Eocene K-Ar date (48.0 ± 1.7 Ma; biotite) on a sample collected approximately 8 kilometres southwest of the present study area.

MINERAL OCCURRENCES

The 13 mineral occurrences recorded in MINFILE for the area can be subdivided into veins, volcanic-hosted porphyry copper occurrences and skarns (Table 1-14-1, Figure 1-14-4). None of them have defined reserves and most are apparently small, but exploration to date has been limited.

The Dok claims (MINFILE 104G 038, 43, 74) cover large limonitic and pyritic alteration zones which contain minor malachite, azurite and rare chalcopyrite and chalcocite. Irregular mineralized veins are associated with northeast-trending, pink granite to (quartz) syenite dikes that intrude Stuhini Group volcanic rocks.

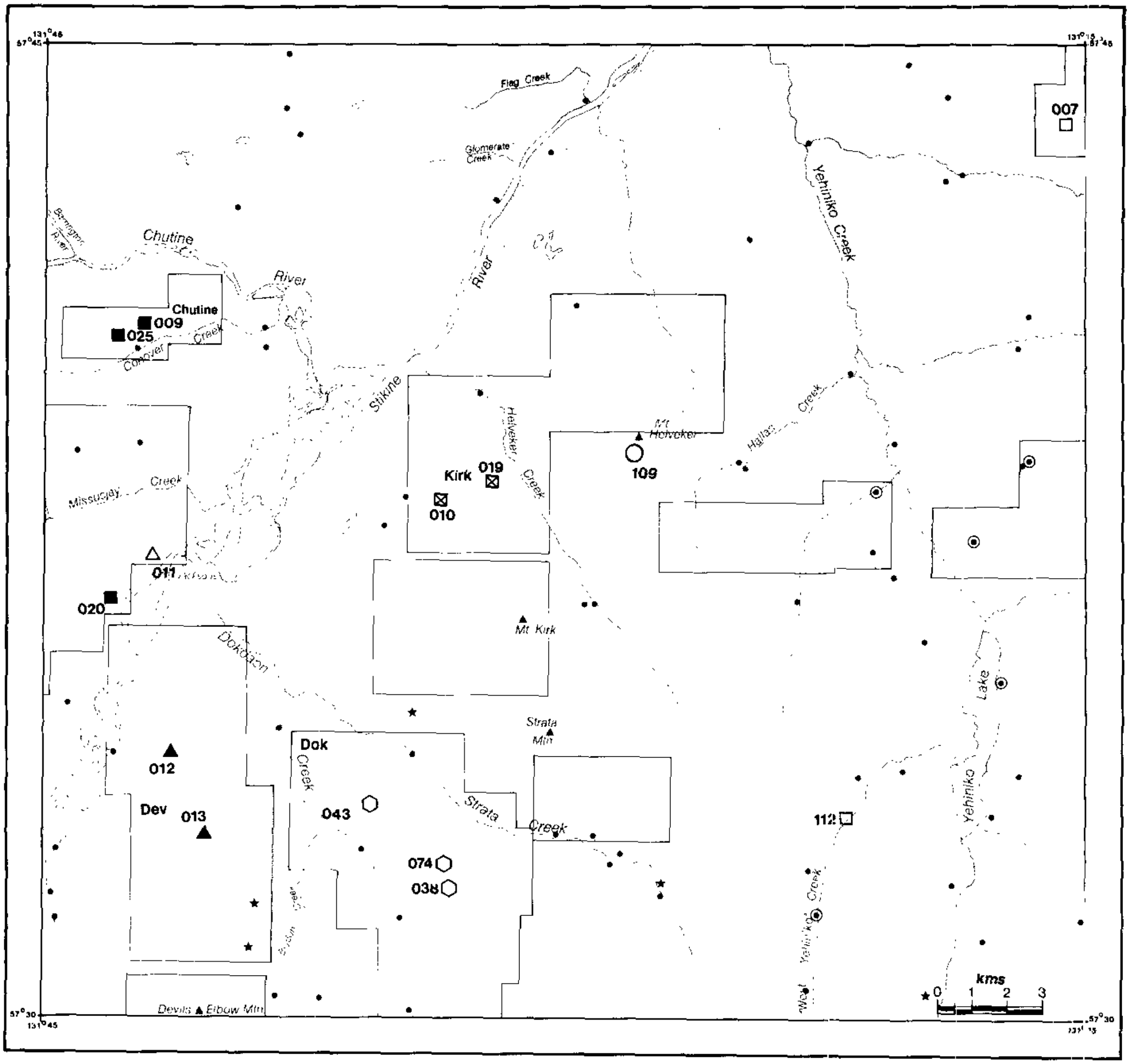

Figure 1-14-4. MINFILE occurrence localities, current claim locations (October, 1989), and RGS sample locations in the Stikine River – Yehiniko Lake area. Solid circles denote RGS silt sample locations, stars indicate multi-element anomaly sites and circled dots are single element gold anomaly sites. MINFILE occurrences are grouped according to Table 1-14-1: solid rectangles = Au-Ag base metal veins; crossed-rectangle = Au-Cu quartz veins; open rectangle = base metal veins; open hexagon = volcanic-hosted porphyry Cu; solid triangles = Ag-Au base metal skarn; open triangle = base metal skarn; open circle = stratabound U.

TABLE 1-14-1
SUMMARY OF MINERAL OCCURRENCES (104G/11W AND 12E)

Minfile (104g)	Name	Host	Economic Minerals	Alteration	Orientation	Work Completed	Possible Age	Reference
Au-Ag base metal quartz veins								
009	Jackson, BlK,	Stuhini vol.	cpy,gln,sph,py	Sil, py	NE to NW trending	trenching	Post-Tri	1,#591, 14,216
025	Lady Jane	Stuhini vol.	cpy,gln,sph,py	Sil, py	180°/60° W	trenching	Post-Tri	1,#591, 14,216
020	Lucky Strike,	Stikine assem.	Au,gln,cpy,sph,pyr	—	NW-trending	?	?	
Au-Cu quartz veins								
010	August	Stuhini vol.	cpy,bo,py	—	Steep SE-dipping	adit	Post-Tri	1,#13,662
019	Mt. Goat, Kirk Cu	Stuhini/Lower Jur?	cpy,bo	—	Flat pods	trenching	Post-Tri	1,#13,662
Base metal veins								
007	Callbreath	Nightout pluton	cpy,bo	ep, ch	240°/steep	trenching	Late Tri?	#4717
112	Yehiniko West	Stuhini vol.	cpy?	—	0°/steep E	none	Post-Tri	Souther (1972)
Volcanic-hosted porphyry Cu								
038	LLK	Stuhini vol.	cpy,cc,mo	propylitic		m,ss,tr	Mid Jur?	#3029
043	Dok	Stuhini vol.	cpy	propylitic		m,ss,tr,dr	Mid Jur?	#3029,3238
074	PR	Stuhini vol.	cpy	propylitic		m,ss,tr	Mid Jur?	#3029,#3846
Cu skarn								
011	Drapich	Stikine assem.	cpy,spy,gln,mag,py	calcsilicates	steep, irregular	none	Jur?	1
Ag-Au base metal-W skarn								
012	Devils Elbow	Stikine assem.	mag,pyr,gln,cpy,sph	calcsilicates	variable	3 adits	Mid Jur?	1,#11,262
013	Apex	Stikine assem.	gln,spy,mag,cpy,sph	calcsilicates	irregular	unknown	Mid Jur?	1
Stratabound U								
109	Hel	Sustut Group	Saleeite,torbernite	none	—	m,ss,tr	Tertiary	Bell (1981), #7708

Abbreviations: Au = native gold; bo = bornite; cc = chalcocite; ch = chlorite; cpy = chalcopyrite; ep = epidote; gln = galena; m = mapping; mo = molybdenite; mag = magnetite; py = pyrite; pyr = pyrrhotite; sch = scheelite; sil = silicification; sph = sphalerite; ss = soil sampling; tr = trenching; 1. = Kerr (1948); # = Assessment Report number.

Showings on the Kirk claims (MINFILE 104G 010, 19) are narrow, discontinuous, northeast-trending auriferous quartz veins with minor chalcopyrite and bornite that are hosted in sheared Stuhini Group volcanic rocks (Kerr, 1948). The Chutine claims (MINFILE 104G 009, 025) cover a 500-metre-long pyritic, siliceous alteration zone within Stuhini Group volcanic rocks and include the Lady Jane and Jackson quartz veins, which contain minor chalcopyrite, galena and sphalerite (Kerr, 1948). The Dev claims and claims at Jacksons (MINFILE 104G 011, 12, 13) cover precious and base metal skarn showings hosted in the Stikine assemblage.

Uranium mineralization on the Hel claims (MINFILE 104G 109) is hosted in Sustut Group conglomerate and sandstone. It occurs as secondary minerals in conglomerate, as radioactive coaly fragments in sandstone, and as radioactive Sloko Group trachyte talus (Bell, 1981). The source of the uranium is thought to be Sloko Group volcanic rocks which lie 20 to 30 metres above the main showing. Uranium may have been leached from the Sloko Group by migrating groundwater and precipitated on organic-rich material as secondary uranium minerals (Bell, 1981; Salat and Noakes, 1979).

NEW SHOWINGS

New showings are concentrated in four parts of the map area (Figure 1-14-4). Most are narrow (<5 cm) and discontinuous veins. Veins with massive pyrite, and chalcopyrite-bornite quartz-carbonate veins, occur in the headwaters of Strata Creek. Quartz-carbonate veins containing chalcopyrite, galena and pyrite outcrop northeast of Strata Creek and southwest of Strata Mountain. The fault zone southwest of Yehiniko Lake is erratically mineralized with pyrite. Sample locations and geochemical results for 90 grab samples collected during the study are available in Open File 1990-1.

GEOCHEMISTRY

Regional stream sediment sampling data (Regional Geochemistry Survey; B.C. RGS 20) for the Telegraph (104G) map sheet were released in July 1988 and included analyses of 75 stream sediment and water samples collected from the study area (Figure 1-14-4; Open File 1990-1). Numerous sample sites yielded anomalous geochemical results (*i.e.* 90th percentile based on the entire 104G population).

Multi-element anomalies occur in several places. Anomalies west of Brydon Creek are probably related to skarn mineralization along Devils Elbow ridge (MINFILE 104G 013). North and east of Strata Creek anomalies occur near galena-bearing quartz veins. Anomalies south of Yehiniko Lake occur close to north-trending faults that are erratically mineralized with pyrite. Coincident tungsten, molybdenum, uranium and fluorine anomalies at the southwest edge of the map area correlate with biotite granite of the Sawback pluton and may be derived from local greisen zones. Single element gold anomalies in Yehiniko Creek valley have no obvious source. Nickel and cobalt anomalies are scattered throughout the map area and appear to be associated with mafic Stuhini Group volcanic rocks.

EXPLORATION ACTIVITY

Exploration activity was moderate in 1989. Preliminary property work and regional prospecting were done by Cominco Exploration Limited, Homestake Mineral Development Company, Equity Engineering Limited and Coast Mountain Geological Services Limited.

MINERAL POTENTIAL

Several areas of RGS anomalies and new small showings remain unstaked and deserve further exploration and evaluation. The syenite dike swarm and associated limonitic alteration zones hold potential for disseminated and vein mineralization. Prominent rusty pyritic alteration zones north of Devils Elbow Mountain warrant more evaluation. The local areas of Stuhini Group felsic submarine volcanism are an appropriate setting for massive sulphide deposits. Epithermal, structurally controlled alteration and mineralization associated with Eocene felsic dikes and volcanism are potential targets, however, no mineralization has yet been identified.

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