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Tertiary geology of the Takysie Lake and Marilla map areas, central British Columbia[1]

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Abstract: Takysie Lake (NTS 93 F/13) and Marilla (NTS 93 F/12) map areas are underlain by Mesozoic to Tertiary stratified and intrusive rocks segmented by Jura-Cretaceous and Tertiary faults. Heterogeneous Eocene (hornblende–) biotite–quartz–alkali-feldspar–phyric rhyolitic and rhyodacitic flows, tuff, and volcaniclastic rocks (Ootsa Lake Group) and (olivine-) clinopyroxene-plagioclase-phyric, amygdaloidal, basaltic andesite flows and hyaloclastite (Endako Group) are associated with fault-controlled aphanitic, porphyritic, and phaneritic felsic intrusions. Physiographic expression, ubiquitous olivine content, and content of ultramafic and crustal xenoliths help distinguish Neogene olivine basalt intrusive, flow, and volcaniclastic rocks from closely similar Endako Group rocks.

(?)Jurassic and (?)Late Cretaceous, porphyritic and phaneritic, mafic, intermediate, and felsic intrusions locally crosscut a pre-Eocene reverse fault, and are cut by northwest- and northeast-trending Eocene block faults.

Résumé : Les régions cartographiques de Takysie Lake (SNRC 93 F/13) et de Marilla (SNRC 93 F/12) se composent de roches stratifiées et intrusives du Mésozoïque au Tertiaire, que recoupent des failles du Jurassique-Crétacé et du Tertiaire. Des unités hétérogènes de l'Éocène formées de coulées, tufs et volcanoclastites rhyodacitiques et rhyolitiques à phénocristaux de (hornblende)-biotite-quartz-feldspath alcalin (Groupe d'Ootsa Lake), ainsi que de coulées et hyaloclastites d'andésite basaltique amygdalaire à phénocristaux de (olivine)-clinopyroxène-plagioclase (Groupe d'Endako) sont associées à des intrusions felsiques à texture aphanitique, phanéritique ou porphyrique dont la mise en place a été régie par des failles. L'expression physiographique, la présence très répandue d'olivine et le contenu en xénolites de roches ultramafiques et de matériaux crustaux d'unités de basalte à olivine du Néogène qui prennent la forme d'intrusions, de coulées et de volcanoclastites nous permettent de distinguer celles-ci de roches semblables du Groupe d'Endako.

Des intrusions de composition felsique, intermédiaire ou mafique à texture porphyrique ou phanéritique du Jurassique(?) et du Crétacé tardif(?) recoupent par endroits une faille inverse de formation anté-éocène et sont morcelées à leur tour par des failles de l'Éocène de directions nord-ouest et nord-est.

[1] Contribution to the Nechako NATMAP Project

INTRODUCTION

Ongoing revision of the Nechako River 1:250 000 scale geological map (Tipper, 1963), part of the Nechako NATMAP Project (Fig. 1; Struik and McMillan, 1996; Struik and MacIntyre, 1997, 1998, 1999a, b, 2000), included mapping in the Takysie Lake (NTS 93 F/13) and Marilla (NTS 93 F/12) map areas (Fig. 1).

This report summarizes descriptions of Tertiary sedimentary and volcanic rocks and emphasizes the new mapping of Eocene bimodal volcanic rocks, Neogene mafic volcanic and intrusive rocks, felsic (?)Eocene intrusions, and Eocene synintrusive and Jura-Cretaceous reverse fault structures in the area (Fig. 2). The work reported here builds on the excellent mapping and dating contributions by mineral exploration and provincial geological survey geologists in the area over the past 30 years (e.g. Kimura et al., 1980; Bellefontaine et al., 1995; Lane, 1995; Lane and Schroeter, 1997; T.A. Richards, unpub. data, 1998).

The map area encompasses the Interior Plateau whose physiography is characteristically low relief and entirely below treeline, although extensive logging is continually improving access to outcrop. New data reported here were based upon six weeks' work (111 traverses) in July–August 1998. The paper includes data collected for topical, baccalaureate studies summarized earlier (e.g. Barnes, 1998; Barnes and Anderson, 1999; Grainger, 1999; Grainger and Anderson, 1999; Resnick, 1999; Resnick et al., 1999; J. Resnick, unpub. data, 1999; Pint et al., 2000). The focus is on the younger, Tertiary rocks; the geology of the Mesozoic basement rocks is described elsewhere (Anderson et al., 2000). Standard geological mapping techniques described in Anderson et al. (1999) were employed in the mapping.

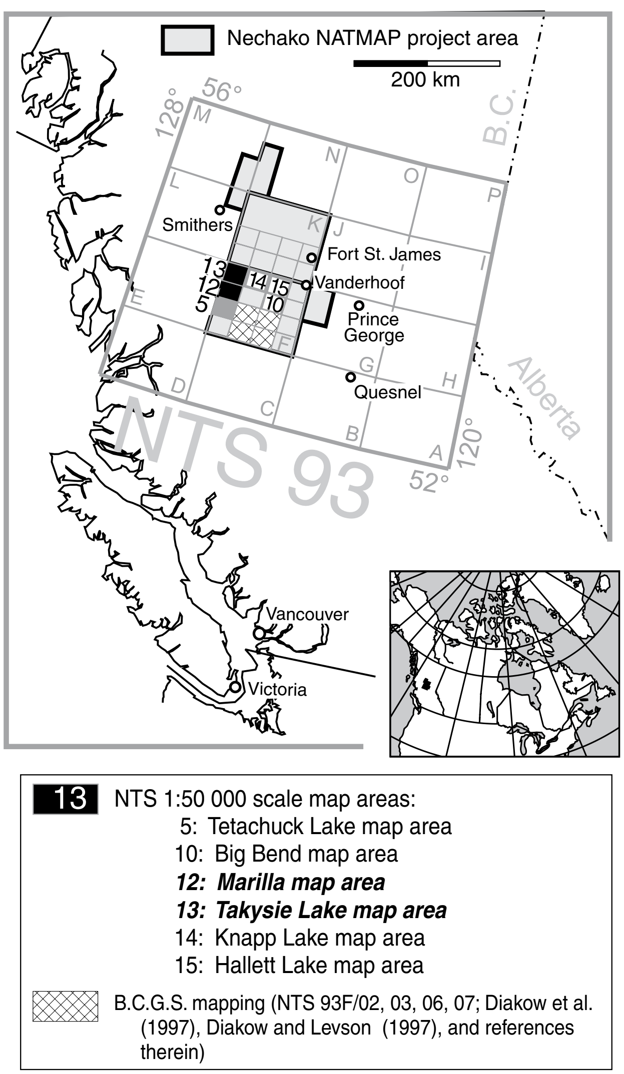

Figure 1. *Location of the Marilla (NTS 93 F/12), map area within the Nechako NATMAP project area and distribution of 1998 bedrock mapping.*

GEOLOGY

The Takysie Lake and Marilla map areas are underlain by widespread Eocene and Neogene volcanic rocks and minor Tertiary plutonic rocks and lesser Mesozoic sedimentary and volcanic rocks, and scattered Jura-Cretaceous plutonic rocks (Anderson et al., 2000; Fig. 2).

Stratified rocks

Eocene Ootsa Lake Group (unit E_{OL})

Ootsa Lake Group rocks in the map area (Fig. 2; Grainger and Anderson, 1999) are typically spherulitic, lithophysae-bearing or perlitic, quartz-, biotite-, and/or feldspar-phyric. Rhyolite flows and domes, unwelded to weakly welded rhyolitic crystal-lithic tuff (Fig. 3a), and pyroclastic and autoclastic breccia (commonly containing lapilli of intermediate to felsic flow rocks), and minor dacite and andesite flows are the main rock types. Approximately half of the Ootsa Lake Group consists of flows with subequal abundances of tuff and breccia. Ootsa Lake Group rocks described at Uncha (Barnes and Anderson, 1999) and Dayeezcha mountains and Henson Hills (Grainger and Anderson, 1999) are the best known and their characteristics are summarized below.

The predominant rock type is a generally red to white to grey, locally purple or green, flow-laminated rhyolite, which occurs as flows or less common domes and is widespread throughout the northern Nechako River map area. Outcrop-scale features include minor, locally rotated, rhyolite clasts (Fig. 3b), primary flow folding (Fig. 3c), minor vesicles, perlitic or spherulitic textures (Fig. 3d), and minor lithophysae. Textures vary abruptly; for example, a unit may change from a flow-laminated rhyolite to rhyolite autobreccia (Fig. 3e) within a few metres. Monolithic breccia containing flow-laminated clasts is generally found associated with rhyolite flows and domes. Generally the rocks are aphyric or sparsely plagioclase-phyric, and biotite, alkali feldspar, quartz, and/or rare hornblende are minor phenocryst phases.

Flow-layered or more massive rhyolite and rhyodacite flows also exhibit many of the same features in addition to microspherulites and locally abundant lithophysae. Flows are porphyritic to rarely aphyric. Several exposures of buff, flow-laminated rocks have black, glassy, perlitic flow bases which suggest the presence of shallow water at the time of extrusion.

Pyroclastic breccia units are predominantly unwelded to densely welded ignimbrite deposits, usually crystal rich, commonly containing lithic fragments and lesser portions of medium to dark grey pumiceous lapilli in a white to buff rhyolite, locally darker and glassy. Lithic fragments are angular, predominantly aphyric rhyolite and range in size from 1 cm to (more rarely) 40 cm. Black glass fragments are abundant in one locality. Autoclastic breccia units are commonly moderately silicified and composed of flow-laminated rhyolite clasts (1–8 cm) in a slightly glassy, sparsely phyric matrix.

Rhyolite hyaloclastite is found on the west flank of Uncha Mountain (*see also* Barnes and Anderson, 1999) and east of the Henson Hills area. Clasts are dark maroon to grey or black, glassy angular fragments of rhyolite, rarely exhibit a perlitic texture, and occur within a white to pale yellow rhyolitic matrix. Clast size varies from several centimetres up to 2 m at one locality. The most widespread type of breccia is a lapillistone with angular tuffaceous or flow-laminated

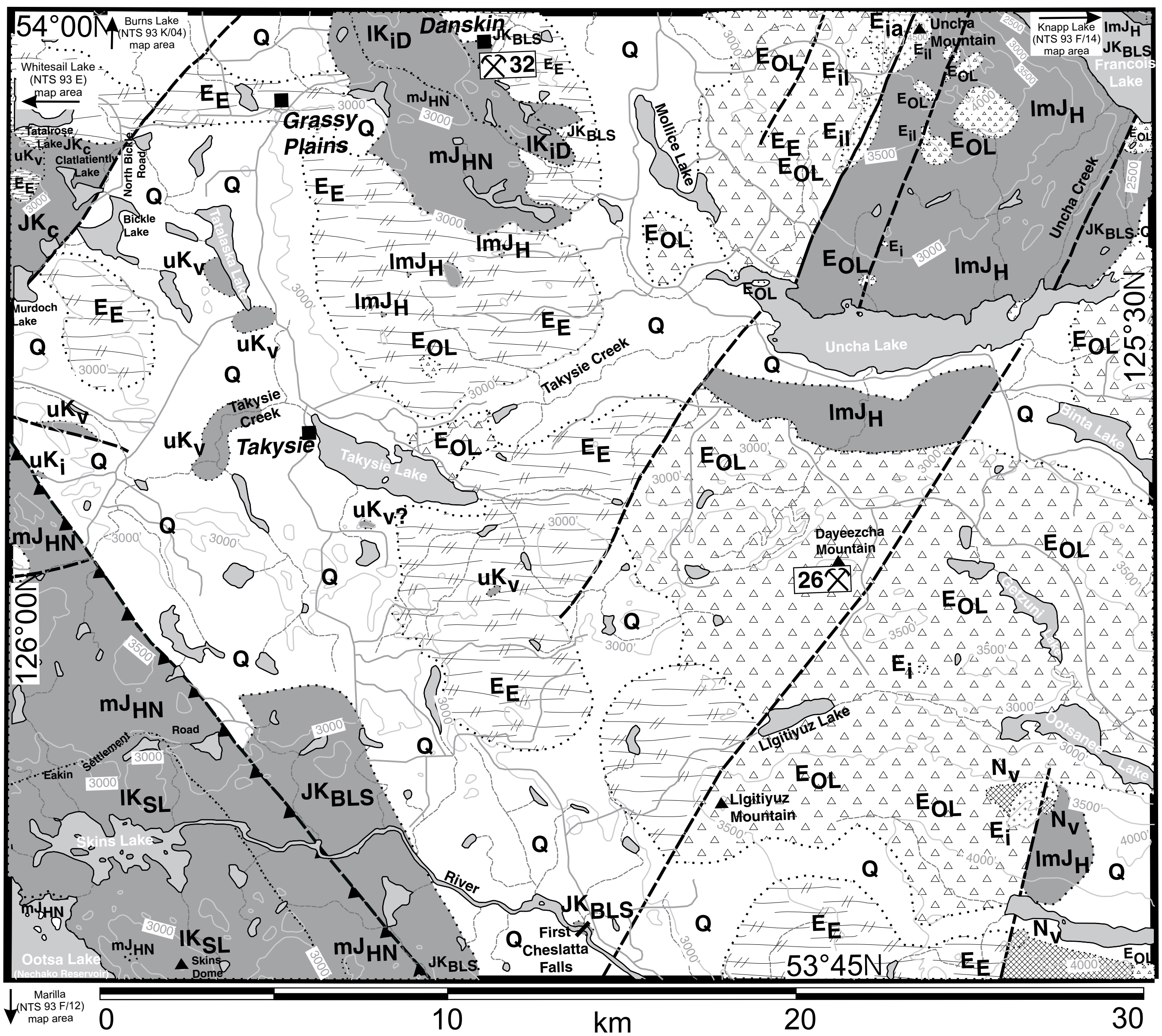

*Figure 2a. Generalized geology of the Takysie Lake area (*after *Tipper, 1963; Williams, 1997; this study).*

rhyolite clasts in a glassy grey or tuffaceous rhyolitic matrix. Similar breccia units with a tuffaceous rhyolitic matrix and a more heterolithic clast assemblage are also found in the Knapp Lake map area (NTS 93 F/14).

Rhyolitic crystal tuff is frequently 'punky' (i.e. friable, and commonly altered to clay) and may contain biotite, alkali feldspar, quartz and/or plagioclase crystals. Tuff is generally unwelded to locally partly welded. Crystal-lithic tuff resembles the crystal tuff, but contains sparse to abundant andesite or rhyolite clasts. Uncommonly, the crystal-lithic tuff exhibits bedding, likely indicating reworking (Fig. 4), and in two localities was found to contain wood fragments. North of the Ootsa Lake reservoir, an erosional contact found between a crystal tuff and an underlying lithic breccia may represent an intraformational unconformity (Grainger and Anderson, 1999). At one locality, the bedded tuff appears to underlie conformably a green vesicular andesite flow with amethyst-calcite amygdales. The andesite member is interpreted to be the basal member of the Ootsa Lake Group within the study area (e.g. Anderson et al., 1999; Grainger and Anderson, 1999).

Uncha Mountain area

Generally fine-grained to aphanitic, leucocratic felsic porphyry, rhyolite, rhyodacite, and dacite with associated autoclastic breccia and tuff, and rare andesite flows, constitute the Ootsa Lake Group. The Uncha fault (Fig. 2) separates flow-layered, spherulitic, lithophysae-bearing rhyolite and rhyodacite to the west from more massive tuff and felsic porphyry and rhyolite to dacite domes to the east.

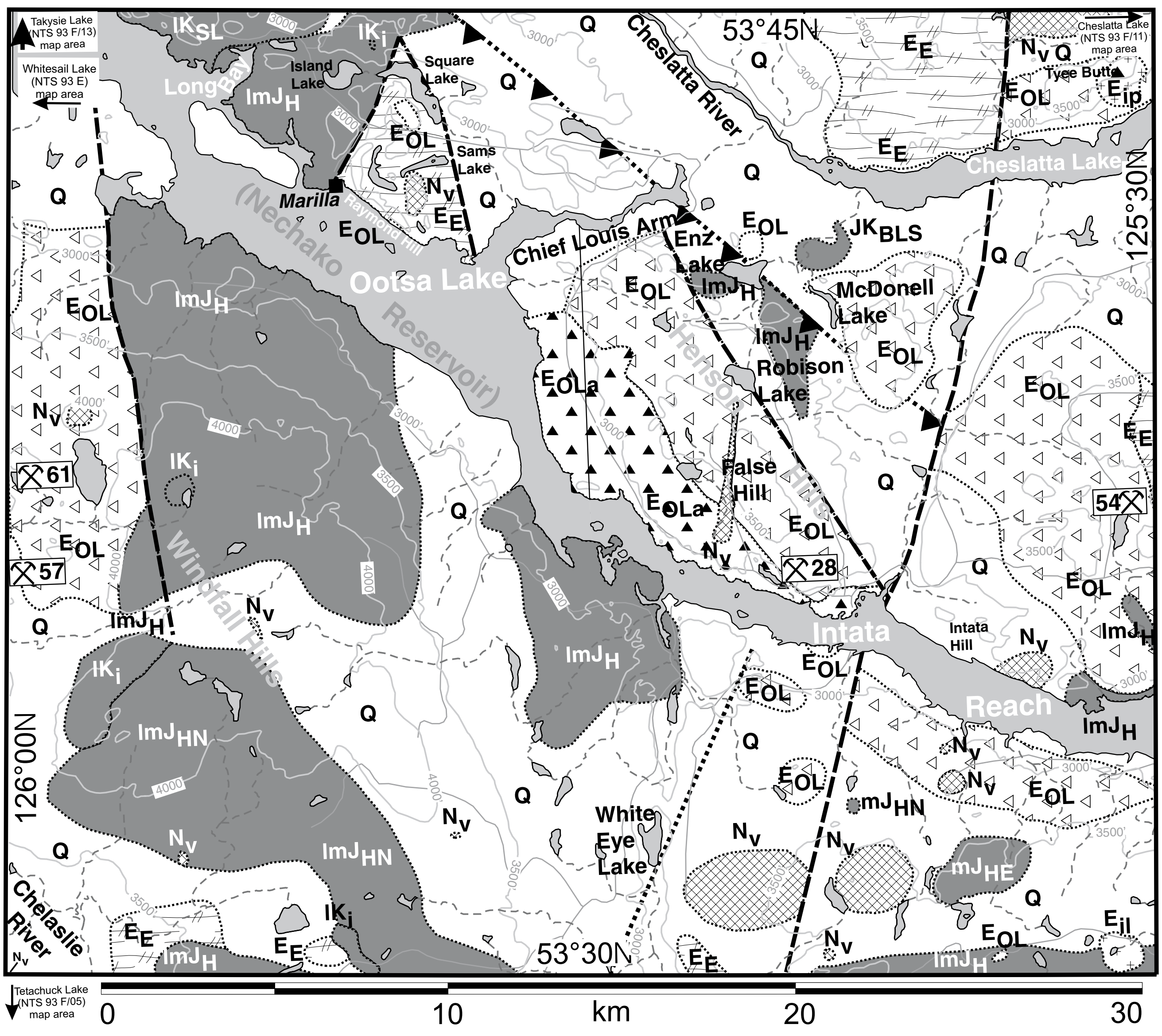

*Figure 2b. Generalized geology of the Marilla map area (*after *Tipper, 1963; Williams, 1997; this study).*

Dayeezcha Mountain area

Dayeezcha Mountain is underlain by a glassy, biotite-plagioclase-bearing, dacitic crystal ignimbrite containing partly welded clasts of flow-laminated rhyolite and tuffaceous rhyolite (Fig. 5). Locally pyroclastic rocks include welded ignimbrite, silicified green ash, tuffaceous rhyolite lapillistone, rhyolitic tuff, and crystal tuff.

Rhyolitic to dacitic flows, 5–20 m thick, interlayered with pyroclastic breccia and tuff occur nearby. Outcrops distal from Dayeezcha Mountain include white and red or light grey, flow-laminated and layered porphyry flows and minor lithic tuff. Flows contain spherulites, microspherulites, and/or lithophysae, vesicles, primary folding of flow laminae, and associated autoclastic breccia, as well as common quartz, plagioclase, alkali feldspar, and biotite phenocrysts.

Henson Hills area

Ootsa Lake rocks in the Henson Hills area vary from east to west from a sequence of tuff to pyroclastic breccia to flows. Rhyolitic biotite–alkali-feldspar–quartz porphyry crystal tuff is likely conformably overlain by a series of pyroclastic breccia units. The rocks are in fault contact with Lower to Middle Jurassic sedimentary rocks to the east and (?)unconformably overlain by a series of (hornblende-) plagioclase-phyric andesite, basalt breccia, and vesicular basalt flows to the west.

Legend for Figure 2a and b

Stratified rocks

Quaternary

Q Pleistocene glaciofluvial and glaciolacustrine sediments.

Neogene

N_V Dark grey, vesicular, olivine basalt flows and volcanic centres; contains clinopyroxene, olivine and plagioclase megacrysts, and ultramafic nodules

Eocene

E_E **Endako Group:** vesicular and amygdaloidal, plagioclase-phyric basalt to andesite volcaniclastic and flow rocks; associated minor intrusions

E_{OL} **Ootsa Lake Group:** rhyolitic and dacitic tuff, and pyroclastic, volcaniclastic and flow rocks;
Eola: vesicular andesite, hornblende-plagioclase porphyry andesite flows and breccia (upper Ootsa Lake Group in Henson Hills)

(?)Upper Cretaceous

uK_V Reddish-grey or brown hornblende-plagioclase-phyric andesitic volcanic breccia

Jurassic or Cretaceous

JKBLS **Bowser Lake (or (?) Skeena Group):** tan heterolithic pebble conglomerate, greywacke, and minor grit and siltstone

Lower to Middle Jurassic

Hazelton Group

mJ_{HN} / mJ_{HE} **Naglico formation:** maroon and green, clinopyroxene-plagioclase-phyric, laharic volcanic breccia and conglomerate
Entiako formation: rhyolitic crystal-lithic tuff, sandstone, minor ash; vesicular andesite and purple basaltic pillowed lavas

lmJ_{HG} **Hazelton Group (undivided):** maroon and green, heterolithic fine- to coarse-grained, basaltic, andesitic and rhyolitic volcaniclastic and epiclastic volcanic rocks

Intrusive rocks

(?)Eocene

E_i felsic intrusions undivided; Eia: aphanitic; Eip: porphyry; and Eil: miarolitic leucogranite

Late Cretaceous

lK_i / lK_D / lK_{SL} Undivided: fine- to medium-grained diorite and granite
lK_D: Danskin andesitic and dacitic plagioclase porphyry
lK_{SL}: Skins Lake andesitic and dacitic hornblende-plagioclase porphyry; minor alkali feldspar megacrystic biotite quartz monzonite and biotite hornblende diorite

Jurassic–Cretaceous

JK_{CL} **Clatlatiently Lake pluton:** alkali-feldspar megacrystic biotite-hornblende quartz monzonite

SYMBOLS

Geological contact (inferred)
Block fault (approximate, inferred)
Reverse fault (teeth on hanging wall; approximate, inferred)
Lakes
Rivers and creeks
Contours (contour interval: 500 feet)
28 MINFILE locality and number

Marilla map area (NTS 93 F/12)

28: HENSON HILLS (perlite)
54: RHUB (Cu-Au-Ag)
57: UDUK LAKE (Au)

Takysie Lake map area (NTS 93 F/12)

61: LOON (Au-Ag)
26: UNCHA LAKE (perlite)
32: BOSS (WEE McGREGOR)

The pyroclastic breccia varies in content from rhyolite tuff clasts in a glassy matrix, and minor crystal ash layers, to a partly welded rhyolite breccia with glassy, dark maroon to grey biotite rhyolite which locally contains green tuffaceous clasts (Fig. 6).

Flow units comprise flow-laminated rhyolite, some with black glassy flow bases up to 1 m thick. Some flows display primary folding. They are generally aphyric or contain sparse biotite, plagioclase, and/or quartz phenocrysts. Minor flow-layered, massive rhyolite and rhyodacite flows north of flow-laminated rhyolite contain vesicles, primary folding, sparse plagioclase, and rare quartz and biotite phenocrysts, and rhyolitic clasts with minor perlitic textures.

A crystal-rich, rhyolitic ignimbrite which contains abundant coarse-grained biotite, quartz, and plagioclase phenocrysts underlies an area of 1.3 km^2 and at least 80 m of vertical exposure. The ignimbrite typically contains light grey, aphyric, tuffaceous rhyolite clasts but to the north becomes glassy and includes cleaved biotite andesite clasts. The unit may represent the site of an eruptive centre.

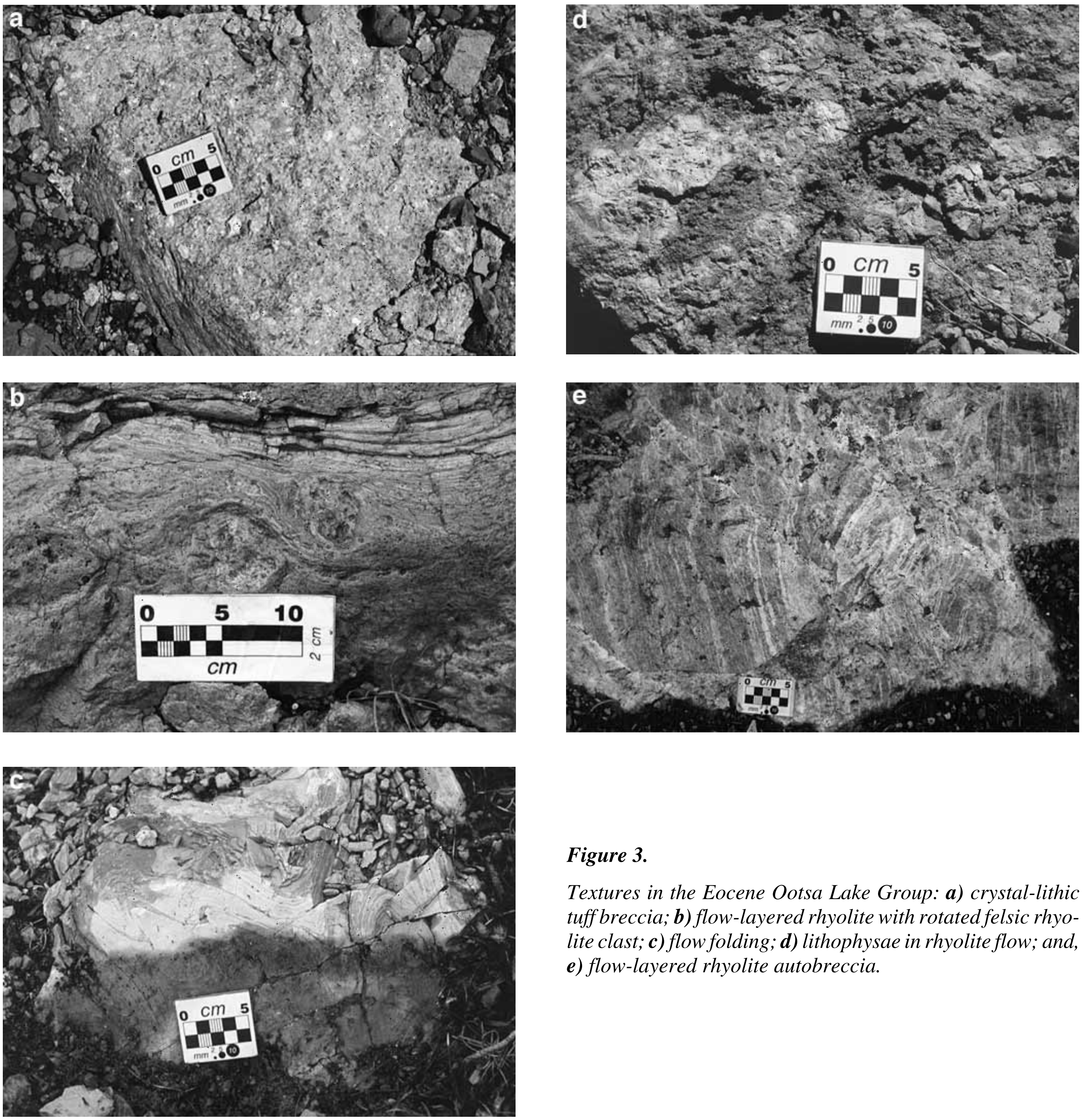

Figure 3.

Textures in the Eocene Ootsa Lake Group: ***a)*** *crystal-lithic tuff breccia;* ***b)*** *flow-layered rhyolite with rotated felsic rhyolite clast;* ***c)*** *flow folding;* ***d)*** *lithophysae in rhyolite flow; and,* ***e)*** *flow-layered rhyolite autobreccia.*

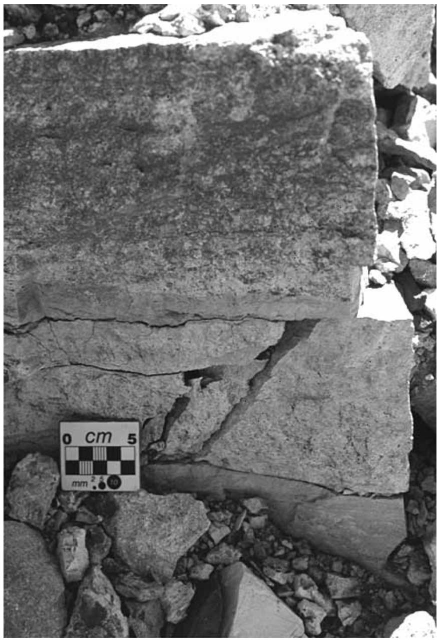

Figure 4. *Thin-bedded, reworked crystal-lithic tuff of Eocene Ootsa Lake Group.*

Figure 5. *Glassy, dacitic crystal ignimbrite of Ootsa Lake Group at Dayeezcha Mountain contains partly welded clasts of tuffaceous rhyolite.*

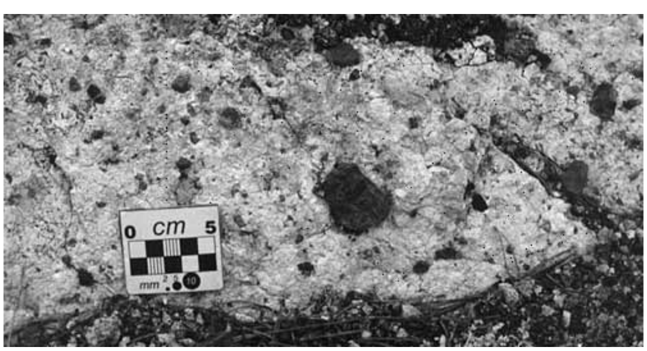

Figure 6. *Partly welded rhyolite breccia of Ootsa Lake Group with glassy, dark biotite rhyolite fragments.*

Eocene Endako Group (unit E_E)

Brown, grey, and reddish-brown weathering, light to dark grey, amygdaloidal basalt to basaltic andesite volcaniclastic and less common flow rocks of the Endako Group are extensive in the Takysie Lake and Marilla map areas. Mafic volcaniclastic and flow rocks in the area are most easily correlated with well studied Endako Group (e.g. Haskin et al., 1998; Anderson et al., 1998b; Anderson, 1999) where they overlie felsic tuffaceous rocks of the Ootsa Lake Group (Fig. 2). Unlike the type areas, however, volcaniclastic rocks are more common and extensive than flow rocks. Commonly, as near Takysie Lake and in the southeastern Takysie Lake and northern Marilla map areas, the mafic to intermediate flow and volcaniclastic rocks are distinguished from the Neogene mafic volcanic rocks based on the absence of characteristics which appear to characterize the Neogene rocks (Resnick et al., 1999).

An extensive unit of hackly to rubbly weathering, penetratively jointed, mafic to intermediate, aphyric to pyroxene- and plagioclase-phyric monolithic lapilli breccia (likely hyaloclastite) and flow rocks occurs along Raymond Hill north of Ootsa Lake and east along the north shore of Cheslatta Lake. Angular, monolithic basalt fragments, accounting for 30–50% of the rock and ranging in size from 2–7 cm, are set in a tan sand matrix of similar composition to the fragments (Fig. 7a). Associated flow rocks are rare and vary from typically aphyric, dense, and vitreous to scoriaceous (10–20% vesicles, 10% iron oxide- or quartz-filled amygdales). Pyroxene microphenocrysts are sparse (1–2%) and small (1–2 mm) and are set in a distinctive dense to glassy looking groundmass; olivine is rare (1–2%, 2–4 mm) or absent. Amygdales account for 5–15% of the rock, are 4–10 mm, and are filled with dark green chlorite and iron oxide. The correlation of the aphyric, dense, and vitreous basalt flow rocks and their fragmental equivalents to the Neogene volcanic unit or the Eocene Endako Group is particularly difficult to apply objectively.

A similar unit of intermediate and mafic flow and volcaniclastic rocks occurs north, northwest, and south of Takysie Lake (Fig. 7b). Basaltic andesite flows are dun-brown weathering and amygdaloidal (2–10%, round to oval, 2–10 mm). Amygdales contain quartz, chlorite, and unidentified white minerals. Phenocrysts of euhedral plagioclase (10–25%; 2–5 mm in length) and clinopyroxene (1–5%; 2 mm) are typical. Hyaloclastite breccia, as well as (?flow) breccia, lesser, tan greywacke channel deposits, and monolithic conglomerate, are typical. An abundance (10%) of medium-grained (3 mm) clinopyroxene phenocrysts and plagioclase phenocrysts and microphenocrysts of variable abundance and size are ubiquitous in the greywacke and conglomerate matrix. Uncommon olivine microphenocrysts locally occur. All are set in a distinctive, usually dark grey and very dense or vitreous groundmass. South of Takysie Lake, the unit occurs at higher elevations than (and may be overlying) very altered felsic volcanic rock, perhaps related to the (?) Upper Cretaceous volcanic unit recognized in the Knapp Lake area (Anderson et al., 1999).

In northwestern Takysie Lake map area south of Francois Lake, the MacDonald rock pit quarry locality described by Resnick et al. (1999) encompasses a distinctive porphyritic basalt flow member now considered a basal member of the Endako Group. The unit occurs at the base of a volcanic neck and overlies saprolite developed in the Clatlatiently Lake pluton. A cliff face approximately 70 m high exposes subvertical, continuous columnar joints 40–50 cm in width (Fig. 8). The basalt contains distinctive, common (5–10%), coarse-grained (2–5 cm long), euhedral plagioclase phenocrysts, minor phenocrysts of pyroxene and olivine, and olivine glomerocrysts in a black vitreous groundmass. To the east, in the Takysie Lake map area, lava flow(s) are poorly exposed and are less porphyritic than the neck. A 5 m thick, dense, basalt lava flow, with poorly developed tortoise-back joints, contains rare phenocrysts of plagioclase, pyroxene, and olivine within a vitreous groundmass. A 6 m thick vesicular to amygdaloidal basalt, locally pervasively oxidized, with minor black glass amygdales underlies the dense basalt. The unit had been included with the Neogene intrusions and flows described by Resnick et al. (1999) but its textures, mineralogy, and chemical composition much more strongly resemble the ca. 50–49 Ma Goosly formation and intrusions described in the Buck Creek area (Church and Barakso, 1990) across Francois Lake to the north of the Takysie Lake area. As well, the unit strongly resembles basal “bladed” plagioclase porphyry described in the Knapp Lake (Anderson et al., 1999) and Hallett Lake (Anderson and Snyder, 1998) areas to the east.

A saprolite horizon (Fig. 9), developed in the alkali-feldspar megacrystic biotite-hornblende quartz monzonite of the Clatlatiently Lake pluton (Anderson et al., 2000), is exposed in northwestern Takysie Lake map area about 4 km southeast of the Macdonald rock pit neck on North Bickle road (Resnick et al., 1999). A 1.8 m thick basalt lava flow unconformably overlies a 3 m thick exposure of saprolite of the Clatlatiently Lake pluton and accounts for the preservation of the deposit from erosion. The exterior of the saprolite is light coloured and resistant to weathering but its interior is dark and friable. Alkali-feldspar megacrysts are resistant to weathering and stand out relative to the weathered groundmass. Undisturbed, irregularly oriented veins of (?)quartz up to 3 cm thick crosscut the pluton and saprolite and indicate isovolumetric weathering. Boulder-size (30 cm)

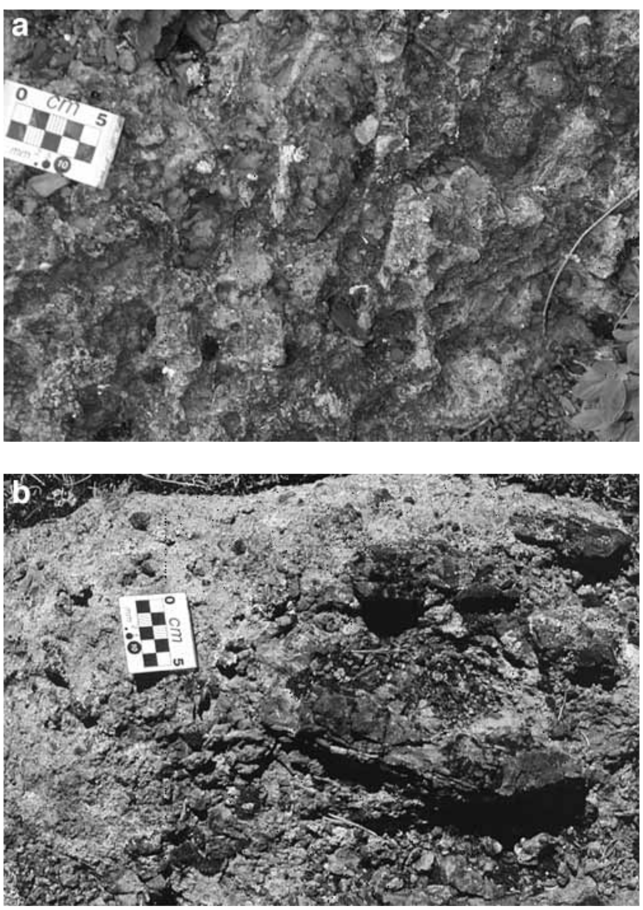

Figure 7. *Basaltic hyaloclastite of the Eocene Endako Group:* ***a)*** *at Raymond Hill, and* ***b)*** *south of Takysie Lake.*

Figure 8. *Columnar jointed olivine-plagioclase phyric basalt of Eocene Endako Group at Macdonald rock pit.*

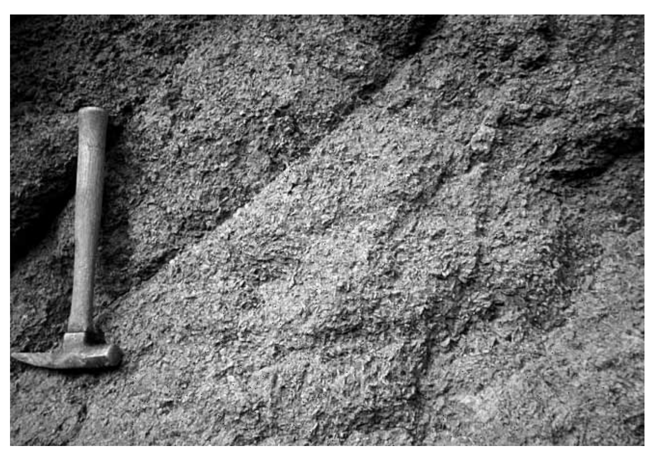

Figure 9. *Saprolite developed at nonconformable contact between Jura-Cretaceous Clatlatiently Lake pluton and Eocene Endako Group.*

clasts of porphyritic basalt (similar to the Macdonald rock pit) occur within the lava flow. The lava flow is intensely oxidized near the unconformity surface.

Neogene volcanic rocks and intrusive centres (unit N_V)

Basaltic centres at Ootsa Main road (Tipper, 1963) and Ootsanee Lake, a diabasic centre near Table Bay road, and rare lava flows north of Tyee Butte were recognized by Resnick et al. (1999) as representatives of the Neogene intrusive and extrusive rocks in the Takysie Lake and Marilla map areas. Typical of the basaltic centres, the Ootsa Main road and Ootsanee Lake centres comprise brown- or black-weathering olivine basalt with well developed columnar jointing and uncommon but widespread ultramafic and crustal xenoliths (*see* Table 1 *in* Resnick et al. (1999) for details). Rhyolite of the Eocene Ootsa Lake Group occurs topographically below the neck 100 m to the north. The ultramafic xenoliths, comprising medium- to coarse-grained lherzolite containing olivine, chromian diopside, and orthopyroxene, make up 1–5% of the rock and vary in size between 1–15 cm. Crustal xenoliths are rare. Disaggregated xenocrysts of olivine and chromian diopside occur in the friable and otherwise aphyric groundmass.

The Table Bay road diabasic centre occurs 1 km east of a spur road (485 road) of Table Bay road and comprises a circular, 1 km diameter, xenolith-poor diabase intrusion which displays well developed, vertical columnar jointing and crosscuts Jurassic Hazelton Group volcanic rocks (Fig. 2). Plagioclase, pyroxene, and olivine phenocrysts define an ophitic texture and, although the rock is generally fresh, some plagioclase crystals are altered to epidote.

Figure 10. *Contact between Eocene Endako Group basaltic hyaloclastite (below) and dark grey, rubbly but coherent basalt flow of the Neogene volcanic rocks.*

Outcrops of related Neogene lavas are scattered between Takysie Lake and Raymond Hill (*see* Pint et al., 2000) where they are difficult to differentiate from rocks included with the Endako Group (*see* above); as well, they underlie a 4 km long ridge north of Tyee Butte (Fig. 2). North of Raymond Hill, the olivine basalt flows rest on hyaloclastite of the (?) Endako Group with a sharp contact (Fig. 10). They comprise columnar jointed basalt which contains subhedral plagioclase (25%, 1–8 mm in size) and olivine (1–2%, 2 mm) phenocrysts in a vitreous groundmass; minor (3%) lherzolite xenoliths up to 1 cm in size, olivine megacrysts, and common, fused crustal xenoliths also make up the rock.

Plutonic rocks

(?)Eocene intrusive rocks (unit E_i)

At Uncha Mountain, Tertiary faulting and associated small-scale deformation was important in the localization of small, synkinematic, high-level aphanitic porphyry and miarolitic leucocratic, felsic (?)Eocene granite intrusions and associated hydrothermal alteration (Barnes and Anderson, 1999). Tertiary intrusions include rhyolite, dacite, andesite, basalt, syenite, and granite. Pale grey, generally featureless aphanitic to fine-grained intrusive rocks are likely subvolcanic intrusions related to the Ootsa Lake Group felsic volcanic rocks. The rock commonly has no fabric but locally there is weak to strong alignment of mafic minerals. An autoclastic breccia with angular lapilli-sized clasts, is common in areas of intense fracturing and may result from volcanic doming, associated with the emplacement of subsequent intrusions. Rare, subvertical dark grey- to dark brown-weathering, fine-grained, aphanitic to porphyritic basaltic dykes strongly resembling the regional Endako Group flow rocks and dykes are likely fault controlled as their trend parallels that of the principal fracture cleavage.

The coarser grained phases, including dark grey to very pale lilac grey, fine- to medium-coarse-grained, seriate to equigranular, leucocratic hornblende-bearing syenite, quartz syenite, granite, and alkali-feldspar granite, are distinctively miarolitic and closely associated with the north-northeast-trending Uncha fault. In particular, the miarolitic leucogranite intrusions strongly resemble those described by Sellwood et al. (1999) in the Knapp Lake and Hallett Lake map areas to the east. The leucocratic alkali-feldspar granite intruded one of the aphanitic felsic intrusions on the southwestern flank of Uncha Mountain summit (Barnes and Anderson, 1999).

STRUCTURES

Flow-laminated rhyolite of the Ootsa Lake Group throughout the area has dip ranging from 3–90°. Field evidence for synvolcanic faulting or fault control of Eocene magmatism is less obvious in the map area than for areas to the east (Anderson and Snyder, 1998; Anderson et al., 1998a; Sellwood et al., 1999); an exception is the structural control for the emplacement of high-level, cogenetic intrusions at Uncha Mountain (Barnes and Anderson, 1999).

The protracted history and rejuvenation of Tertiary structures is best known from the Uncha Mountain area (Barnes and Anderson, 1999). The Uncha fault mapped in previous work (e.g. Tipper, 1963) apparently localized Tertiary intrusions and associated hydrothermal alteration and veining. The elongate nature of the intrusions which run parallel to the Uncha fault suggests emplacement facilitated by extensional movement. Principal fracture cleavage or closely spaced joints parallel the north-northeast-trending Uncha fault. The Uncha fault and the widespread planes of weakness resulting from intense fracturing associated with the faulting had a long history as guides for broadly synkinematic intrusions.

MINERAL OCCURRENCES

At least six MINFILE mineral occurrences are known from the Takysie Lake–Marilla map area (Bailey et al., 1995): HENSON HILLS (perlite; NTS 93 F/12, MINFILE number 28); RHUB (Cu-Au-Ag; NTS 93 F/12, MINFILE number 54); UDUK LAKE (Au; NTS 93 F/12, MINFILE number 57); LOON (Au-Ag; NTS 93 F/12, MINFILE number 61); UNCHA LAKE (perlite; NTS 93 F/13, MINFILE number 26); and BOSS (WEE McGREGOR) (Cu-Ag-Au-Pb-Zn, NTS 93 F/13, MINFILE number 32). The HENSON HILLS and UNCHA LAKE perlite occurrences occur within the Ootsa Lake Group rocks in Henson Hills and on the south flank of Dayeezcha Mountain but were not revisited. Similarly the UDUK LAKE, LOON, and RHUB epithermal base- and precious-metal occurrences (Lefebure and Höy, 1996) were not revisited but plot within or near the poorly exposed belt of Middle Jurassic Naglico formation (Hazelton Group) rocks (UDUK LAKE, LOON) and Eocene Ootsa Lake Group rocks (RHUB). The mineralization style of the BOSS (WEE McGREGOR) associated with the Danskin pluton is described in Anderson et al. (2000).

At Uncha Mountain, mineralization and alteration includes disseminated pyrite (1 mm, <1%) localized to the area around the summit. Glass devitrification, sericite, iron oxidation, intense silicification, and locally pervasive chlorite are alteration products of the rock, locally attributable to hydrothermal activity, and are especially widespread east of the Uncha fault (Barnes and Anderson, 1999).

CONCLUSIONS

Tertiary volcanic rocks in the Takysie Lake and Marilla map areas include felsic tuff, breccia, and flows of the Ootsa Lake Group, best exposed at Dayeezcha Mountain and Henson Hills which underlie extensive hyaloclastite and flow rocks of the Endako Group; a basal member of the Endako Group overlies a saprolite developed in a Jura-Cretaceous quartz monzonite pluton. Physiographic expression, olivine content, and ultramafic and crustal nodules help characterize Neogene mafic intrusive and extrusive rocks. Locally the correlation of Tertiary mafic volcaniclastic rocks with Eocene Endako Group or Neogene volcanic rocks is difficult.

The structural style in the area is dominated by northeast- and subordinate northwest-trending Eocene block faults. (?) Jurassic–Cretaceous and (?)Late Cretaceous porphyritic and phaneritic, mafic, intermediate, and felsic intrusions locally crosscut a pre-Eocene reverse fault, and are cut by northwest- and northeast-trending Eocene block faults.

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