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GEOLOGICAL SURVEY OF CANADA | COMMISSION GÉOLOGIQUE DU CANADA

This map of the Georgie River area (parts of NTS maps 103O/9,103O16, 103P/12, and 103P/13) is a product of a multiyear regional mapping project in the Nass River (103P) map area. An overview of project goals and regional geology are in Evenchick and Mustard (1996). Other maps in the area include Evenchick (1996a, 1996b, 1996c), Evenchick et al. (1997), and Haggart (1998). The following notes give an overview of map units, as well as association of MinFile localities to geology, and new ages determined by UPb geochronology. A more thorough description of map units is in Evenchick and Snyder (1999). Previous mapping was by Grove (1986). South of 55° 33', the map overlaps with GSC Open File 3454 (Evenchick et al., 1997), and shows revisions to contacts.

Mesozoic rocks

Stratified rocks are divided into 2 broad groups. One has various proportions of volcaniclastic and volcanic flow rocks (JHvcs). It is intruded by the Outram Lake porphyry (JOqm), rhyolite (Jr), and assumed to be intruded by the Bulldog Creek pluton (JBgd). JHvcs is overlain by the second broad group, an association of rhyolite flows (JHr) with fine grained clastic rocks (JHs) and minor volcaniclastic rocks. Stratified rocks are tentatively correlated with the Lower to Middle Jurassic Hazelton Group based on lithology. They are at lower greenschist facies metamorphism; an overprint of biotite hornfels is particularly evident on Colling Ridge and north of Carr Ridge. Strata in the north are continuous with Mesozoic strata mapped by Greig et al. (1994).

Volcaniclastic and volcanic rocks (JHvcs) are light grey to green grey weathering. Exceptions are local areas of intense rusty weathering, particularly at the high peaks of Mount Brown, and dark grey green weathered pyroxene porphyry flows. Stratigraphic and facies relationships within JHvcs are unclear because the lack of markers, paucity of bedding, and presence of high strain zones have rendered the large scale structural geometry unresolvable at the scale of mapping. To describe variations within the unit, areas are discussed from northwest to southeast. In the northwest, Colling Ridge is underlain by interbedded volcanic and volcaniclastic rocks intruded by feldspar-, quartz-phyric rhyolite (Jr). Flows are pyroxene-phyric basalt or andesite, and plagioclase-phyric andesite. Most are massive, but rare pillowed plagioclase-phyric flows occur in the south. Flows are commonly <10 m thick; in the north they make up <10% of outcrop, and in the south up to 90%. Debris flow conglomerate and flow breccia derived from both types of flows are common, and in the south make up 80% of outcrop. Massive, immature feldspathic sandstone in units at least 10 m thick is common in the north and is locally interbedded on the scale of several metres with thin bedded fine grained sandstone. Fine grained sandstone and siltstone comprise less than 10% of the succession. Porphyritic rhyolite intrusions (Jr) are apparent only on Colling Ridge. They range from a few metres to tens of metres across, are common in the north, rare in the central area, and absent in the south.

East of Colling Ridge, on the western ridge of the Mount Brown massif, strata are similar to those on Colling Ridge in that pyroxene-phyric flows are abundant; rhyolite intrusions, however, are absent. The ridge is underlain by coarsely pyroxene porphyritic basalt flows and associated pyroxene-rich volcaniclastic rocks. Flow rocks dominate in the central portion of the ridge; they are commonly homogeneous and massive but are locally pillowed or crudely flow layered. Amygdaloidal varieties and flow breccia are rare. Fine grained sedimentary interbeds make up less than 1% of the flow-dominated succession. Minor amounts of andesitic flow rocks are mainly in the southwest. They are massive to rarely pillowed, and range from aphanitic to plagioclase or plagioclase and pyroxene porphyritic. Southwest of the primary volcanic succession, flow rocks are interlayered with units 5-10 m thick of boulder volcanic conglomerate, pebbly conglomerate and sandstone. Most volcaniclastic rocks are pyroxene-rich, indicating derivation directly from the adjacent flow rocks. Minor thinly bedded feldspathic volcanic sandstone and rare siliceous fine grained sandstone are also interbedded with the more mafic clastic rocks. Clastic rock in units 10-15 m thick is most abundant (at least 15% of the exposure) at the south end of the ridge; they are interbedded with mafic and intermediate flow rocks.

Farther east, the central and eastern ridges of Mount Brown are dominantly heterolithic, poorly sorted, unbedded, matrix supported volcanic conglomerate with a matrix of coarse to medium grained sandstone consisting of angular to subangular feldspar and mafic mineral crystals and fragments, and quartz. Clasts and matrix decrease in size southward and conglomerate becomes subordinate in volume to volcanic sandstone. Feldspathic sandstones are fine to medium grained and commonly massive. Thinly bedded to laminated fine sandstone and siltstone are rare. Volcaniclastic rocks are intruded by tabular and pod-shaped bodies of porphyritic to sparsely feldspar megacrystic quartz-amphibole-plagioclase porphyry tentatively correlated with the Outram Lake porphyry (JOqm). Many clasts in the volcanic conglomerate are similar in texture and composition to the intrusive rocks, and the pluton may have been a source for extrusive rock of similar composition and texture which became fragments in the conglomerate.

Southeast-most JHvcs examined is on ridges north and northwest of Mount Guanton. Heterolithic and monolithic volcanic conglomerate forms units metres to tens of metres thick. They are interbedded with subordinate medium to coarse grained, immature, feldspathic volcanic sandstone. Sandstone is poorly- to moderately well-sorted and massive to vaguely bedded. Thinly bedded to laminated fine sandstone or siltstone with rare thin siliceous (tuffaceous?) beds are minor. Within the succession is a unit of andesitic crystal tuff at least 50 m thick. Texture and composition of the tuff are similar to some of the clasts in the volcanic conglomerate and the Outram Lake porphyry (JOqm). The volcaniclastic succession is overlain by siltstone and very fine grained sandstone of JHs.

JHvcs is dominantly volcanic flows and volcaniclastic rocks derived from primary volcanic rocks. Common flows, flow breccia, and the thick succession of immature, feldspathic, medium and coarse grained volcanic clastic rocks (debris flows) in the northwest indicate proximity to an andesitic or basaltic volcanic centre. Rare pillows indicate submarine deposition. The large volumes of coarse, poorly sorted conglomerate and coarse sandstone in the southeast represent proximal debris flow deposits. Minor interbedded fine grained clastic rocks found in all areas are distal turbidites deposited during times of relative volcanic quiescence.

Siltstone and rhyolite association (JHs and JHr) At Mount Guanton, JHs overlies JHvcs, and is at least 80% siltstone and very fine grained sandstone. Characteristic dark rusty weathering is a result of abundant disseminated pyrite which occurs as 0.5 mm euhedral cubes or amorphous blebs. Also present are minor medium grained volcanic sandstone, siliceous thinly bedded or laminated siltstone, and rare clast supported conglomerate. South of Ashwood Lake, siltstone is associated with spherulitic rhyolite. Farther southwest, the peak north of Carr Ridge is underlain by rusty weathering pyritic siltstone and rhyolite, and minor andesite flows, volcanic conglomerate, and sandstone. Based on interpretations of stratigraphic facing, and assuming that the siltstone unit is internally deformed but the overall stratigraphic succession is not disturbed, the base of the section is a mixed unit of volcanic conglomerate and siltstone, with small rhyolite domes. It is overlain by pyritic shale and siltstone (JHs) with a structural thickness of at least 200 m; these 2 lower units include thin lenses of carbonate, rare rhyolite flows(?), and felsic dykes. The siltstone is overlain by volcanic sandstone and conglomerate, and the section is capped by rhyolite (JHr) more than 1 km thick that is locally underlain by thin eutaxitic tuff. The base of the rhyolite is heterogeneous, with massive flow rocks, flow layering, monolithic breccia, and spherulites. Interbedded fine grained sediments occur higher, and the upper part is flow laminated, with lesser breccia. The rhyolite unit is inferred to represent a hyaloclastite breccia dome; Massive rhyolite from near the base yielded a preliminary UPb (zircon) age of ca. 176 Ma (Table 1, V. McNicoll, C. Evenchick, unpublished data, 1999).

Bulldog Creek pluton (JBgd) is medium grained, equigranular to slightly porphyritic, biotite-hornblende granodiorite to quartz monzonite. It is homogeneous, with minor leucocratic aplitic zones and fine grained zones, and is everywhere cut by epidote veins with chlorite and local, weak K-feldspar alteration envelopes up to several centimetres wide. Cataclastic fault zones millimetres to several metres wide are common. The pluton yielded a K-Ar date on hornblende of 181+/- 8 Ma (Greig et al., 1995). Continuation of the Bulldog Creek pluton across areas formerly considered to be Tertiary granite illustrates that strata in the Georgie River area are contiguous with those to the northeast surrounding the Cambria Icefield (Greig et al., 1995), and are not an isolated pendant as previously depicted.

Outram Lake Porphyry (JOqm) is quartz monzonite to monzodiorite with plagioclase phenocrysts and K-feldspar megacrysts,and amphibole and quartz phenocrysts. It is homogeneous, with variations in phenocryst size. Near the southeast contact numerous dykes and pod-shaped bodies of felsic and intermediate compositions and textures crosscut volcaniclastic rocks. A sample from near the mouth of Ashwood Lake yielded a UPb (zircon) age of ca. 189.5 Ma (Table 1, V. McNicoll, C. Evenchick, unpublished data, 1998).

Tertiary rocks

Hyder Pluton (ETH) and Tertiary granitic dykes (ETg) Biotite hornblende granite occupies much of the southern half of the map, and similar rock forms two stocks cutting strata of the Georgie River area. It is homogeneous, equigranular or slightly porphyritic or K-feldspar megacrystic and locally varies to granodiorite and quartz monzonite.

Granitic dykes are abundant, and range from fine to coarse grained equigranular to porphyritic biotite, hornblende or biotite hornblende granite, granodiorite, quartz monzonite and monzodiorite. Most are steeply dipping and strike northwest. Brown and green weathering mafic dykes with chilled margins are common; most strike northeast.

Structure

Pre-Tertiary rocks display brittle deformation and local ductile deformation features. Rocks are folded on mesoscopic and presumably larger scale, but the lack of bedding in most areas precludes analysis of the large scale structure, except that, in general, poles to bedding indicate west-northwest trending folding, and folds on a range of scales can be seen in JHs north of Carr Ridge and south of Mount Guanton. Also in JHs are highly chaotic fault zones subparallel with bedding. Weakly to intensely foliated rocks occur sporadically throughout the area in high strain zones tens to hundreds of metres wide, these bound regions with little or no penetrative fabric. Brittle deformation features are common, and include thin cataclasite seams to wide fault breccia zones, in addition to discrete planar faults with slickenlines. Steeply dipping, north-trending, dip-slip faults are common in the Hyder Pluton, and are inferred to be younger than 22 Ma (Evenchick et al., 1999). At the Georgia River mine on Colling Ridge, mineralization is associated with north trending faults, and gold-bearing northwest and north trending veins were speculated to be Tertiary age (Alldrick et al., 1996). Recognition that north trending faults are probably younger than 22 Ma further constrains the timing of mineralization.

Minfile

Many Minfile localities are within or marginal to the Bulldog Creek pluton. This area was formerly considered to be Tertiary granitic rock, and MinFile reports note an association of mineralization with Tertiary granitic rock of the Coast Belt. It is now clear that there is a spatial association of the Jurassic Bulldog Creek pluton with several showings, the Gold Drop and Big Mike prospects, as well as the Montana mine. The association of the Georgia River mine with structures is noted above.

LEGEND

QUATERNARY

- Q — *Glacial till, alluvium, colluvium; unit designators in parenthesis are assumed to underlie Quaternary sediments*

TERTIARY

PALEOCENE TO EOCENE

- ETg — *Granitic dykes: equigranular to porphyritic, biotite, hornblende, or biotite-hornblende granite, granodiorite, quartz monzonite and monzodiorite dykes; quartz K-feldspar porphyritic rhyolite dykes; leucocratic plagioclase-hornblende dykes similar to the Larcom dyke swarm; latter dykes and all older units are cut by mafic dykes too thin and numerous to show*
- ETH — *HYDER PLUTON: biotite-hornblende granite, locally K-feldspar megacrystic: may include minor granodiorite and quartz monzonite; minor areas may have only biotite or hornblende; sphene is common; b - biotite, h - hornblende, K - K-feldspar megacrystic*

JURASSIC

UPPER MIDDLE TO UPPER(?) JURASSIC
BOWSER LAKE GROUP (ANYOX PENDANT)

- JBt — *Siltstone, mudstone, fine and medium grained sandstone; minor coarse grained sandstone and fine pebble conglomerate; turbidites; biotite hornfels*

LOWER AND/OR MIDDLE JURASSIC
HAZELTON GROUP
AND RELATED EARLY TO MIDDLE JURASSIC INTRUSIVE ROCKS

- ImJu — *Undivided volcanic, clastic and intrusive rock of the Georgie River area. Most is probably Jurassic volcanic, clastic, and lesser intrusive rock but minor outcrops of Tertiary granitic rock may be present, as may minor Triassic rocks*
- JHr — *Rhyolite flow rock; massive, flow layered, spherulitic, or brecciated; white and rusty weathering; aphyric to weakly porphyritic; ca. 176 Ma*
- JHs — *Rusty weathering siltstone and fine grained sandstone; minor medium grained feldspathic sandstone beds up to 1 m thick (turbidites) and rare felsic lithic pebble conglomerate*
- Jr — *Rhyolite; K-feldspar megacrystic to quartz- K-feldspar porphyritic; bodies several meters to tens of meters wide (only largest are shown); Intrusive contacts with JHvcs*
- JBgd — *BULLDOG CREEK PLUTON: hornblende-biotite granodiorite to quartz monzonite; epidote veins and chlorite and K-feldspar alteration; pink and green weathering; common fault breccia (181 +/- 8 K-Ar on hb)*
- JOqm — *OUTRAM LAKE PORPHYRY: plagioclase, amphibole, and quartz porphyritic quartz monzonite to monzodiorite; plagioclase porphyritic, locally K-feldspar megacrystic; found as dykes within a few km of the large body near Outram Lake; dykes have intrusive contacts with JHvcs; ca. 189.5 Ma*
- JHvcs — *Undivided volcanic conglomerate, volcanic sandstone, and intermediate to mafic aphyric to porphyritic flows: volcaniclastic rocks are unbedded, poorly sorted, matrix supported, heterolithic and monolithic volcanic conglomerate interbedded with immature, massive or poorly bedded sandstone and rare, thin sandstone/siltstone turbidite units; C - dominantly volcanic conglomerate and sandstone; F - dominantly intermediate and mafic flows; Ft - feldspar-phyric flows; Fp - pyroxene-pyric flows; T - tuff*
- JHv — *Metavolcanic rock; volcanic breccia, pillowed volcanic rocks, massive volcanic flows, chorite schist; minor siliceous volcanic and/or sedimentary rock, including metachert; thin mafic dykes; minor sills of diorite, gabbro and pyroxenite (Anyox Pendant)*

TRIASSIC OR EARLY OR MIDDLE JURASSIC

- TrJss — *Siliceous (tuffaceous?) siltstone and sandstone (Pendant in Bulldog Creek pluton)*

DEVONIAN TO JURASSIC

CLASHMORE COMPLEX (ANYOX PENDANT)

- DJCg — *Cataclastic to mylontic biotite granite (ca. 177 Ma); includes tectonic lenses of strained mafic rock*
- DJCsvm — *Highly strained complex of metasedimentary, metavolcanic and metaplutonic rock; includes volcanic breccia, pillowed volcanic rocks, massive flows, chlorite schist, psammitc schist, siliceous metavolcanic or metasedimentary rock, grit, conglomerate, mafic intrusive rock, minor marble*
- DJCu — *Ultramafic rock; fine tectonic(?) layering, and common fault breccia; age and correlation uncertain*
- DJCmp — *Mafic intrusive rocks, diorite to gabbro; massive to gneissic, and locally mylonitic; U-Pb age on zircon of 364 +/- 4 Ma*

- Geological contact (defined, approximate, assumed)
- Lineaments
- Bedding traces
- Faults (defined, assumed)
- Limit of mapping
- Bedding (inclined and top unknown, upright, overturned)
- Volcanic layering
- Foliation (undivided, transposition, mylonitic)
- Fracture (inclined)
- Fault (displacement sense unknown, dextral, sinistral, contractional, extensional)
- Shear zone (hanging wall up)
- Axial surface of fold (generation unknown, second generation)
- Fold axis (generation unknown, 's' fold generation unknown, 'z' fold generation unknown, first generation, second generation, third generation, crenulation)
- Lineations (stretching, slicken line)
- Dyke (inclined)
- Joint (inclined)
- Fault, contractional (teeth on upthrust side; defined)
- Anticline (trace of axial surface; defined)
- Syncline (overturned)
- Geochronology sample site number; refer to table 1 below
- BC MINFILE occurance and map reference number. Refer to table 2 below for deposit name, BC MINFILE number, deposit status and commodities

Table 1

GEOCHRONOLGY FILE						
MAP No.	SAMPLE NUMBER	METHOD	UTM EAST	UTM NORTH	ROCK	AGE
1	EP-98-145-2	U-Pb	438580	6181840	Tertiary rhyolite dyke	*
2	EP-98-25-2	U-Pb	440710	6165030	Tertiary biotite hornblende granite (Hyder Pluton)	*
3	EP-98-186-1	U-Pb	435250	6171860	Mesozoic rhyolite flow	ca.176 Ma
4	EP-98-185-1	DetZirc	442630	6172570	Mesozoic sandstone	*
5	EP-98-129	DetZirc	440780	6173140	Mesozoic conglomerate	*
6	EP-98-184	U-Pb	441830	6173770	Mesozoic tuff	*
7	EP-98-181	U-Pb	438640	6186800	Mesozoic granodiorite intrusion (Bulldog Pluton)	*
8	EP-98-104	U-Pb	434720	6183970	Mesozoic rhyolite intrusion	*
9	EP-98-114	U-Pb	440140	6176200	Mesozoic granodiorite intrusion (Outram Lake Porphyry)	189.5 Ma

* in progress

Table 2

MINERAL OCCURANCES						
MAP No.	NAME	MINFILE NUMBER	UTM EAST	UTM NORTH	STATUS	COMMODITIES
3	Glory Extension	103O 006	437300	6187125	Showing	Zn,Pb
4	Emma Gordon	103O 010	436000	6191820	Showing	Au,Ag,Cu,Zn,Pb
5	Big Mike	103O 011	434600	6189350	Prospect	Ag,Cu,Pb,Zn,Au
6	B.C. Verde	103O 012	435750	6187450	Showing	Cu,Ag,Au,Zn
7	Georgia River	103O 013	434360	6183340	Past Producer	Au,Ag,Pb,Zn,Cu
8	JO	103O 014	432175	6178750	Showing	Cu,Au,Ag
9	Pedro Georgia	103O 015	434828	6178900	Prospect	Ag,Au,Pb,Zn,Cu
10	Black Knight	103O 016	432590	6174980	Showing	Pb,Zn,Ag,Cu
11	Saddle	103P 012	446850	6164100	Past Producer	Au,Ag,Cu,Pb,Zn
12	Elkhorn	103P 013	448000	6163500	Showing	Au,Ag,Pb,Zn
13	Ashwood	103P 247	443475	6177690	Prospect	Cu,Zn,Pb,Au,Ag
14	Monday	103P 002	441000	6185230	Showing	Pb,Ag,Au,Zn
15	Gloria	103P 011	437635	6187785	Showing	Pb,Zn,Cu
16	Gold Drop	103P 100	439060	6191370	Prospect	Au,Ag,Pb,Cu,Zn
17	Patricia	103P 101	442000	6190790	Showing	Au,Zn,Pb,Cu
18	Montana	103P 129	443050	6189810	Past Producer	Ag,Zn,Pb,Au,Cu
19	Glory Extension	103P 184	437620	6185225	Showing	Au,Ag,Zn,Pb
20	N	103P 248	442460	6179570	Prospect	Cu,Zn,Pb,Au,Ag
24	Wire Gold	103P 096	439300	6192150	Showing	Au,Ag,Pb

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LOCATION MAP

Digital cartography by K.A. Buddell

Approximate magnetic declination 1998 24° 26' East, decreasing 9.3' annually

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Elevations in feet above sea level

Contour lines and drainage have been modified from NAD83 to NAD27

Some icefield limits have been modified to 1998 extents based on airphoto interpretation and ground observation

OPEN FILE 2996

Geology

HASTINGS ARM WEST HALF

British Columbia (103P/12)

Scale 1:50 000 - Échelle 1/50 000

Kilometres 1 0 1 2 3 4 Kilometres

Universal Transverse Mercator Projection
CM 129 45, Scale Factor 0.9996
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Projection Universel Transverse de Mercator
M.C. 129 45, facteur d'échelle 0.9996
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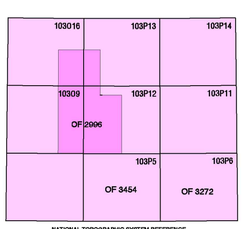
Geology by C.A. Evenchick and L.D. Snyder.

Map compilation by C.A. Evenchick, 1998
Reviewed by C.J. Hickson, 1999

Digital base map assembled and modified by the Geoscience Information Division from digital bases supplied by Geomatics Canada



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING MAPS

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