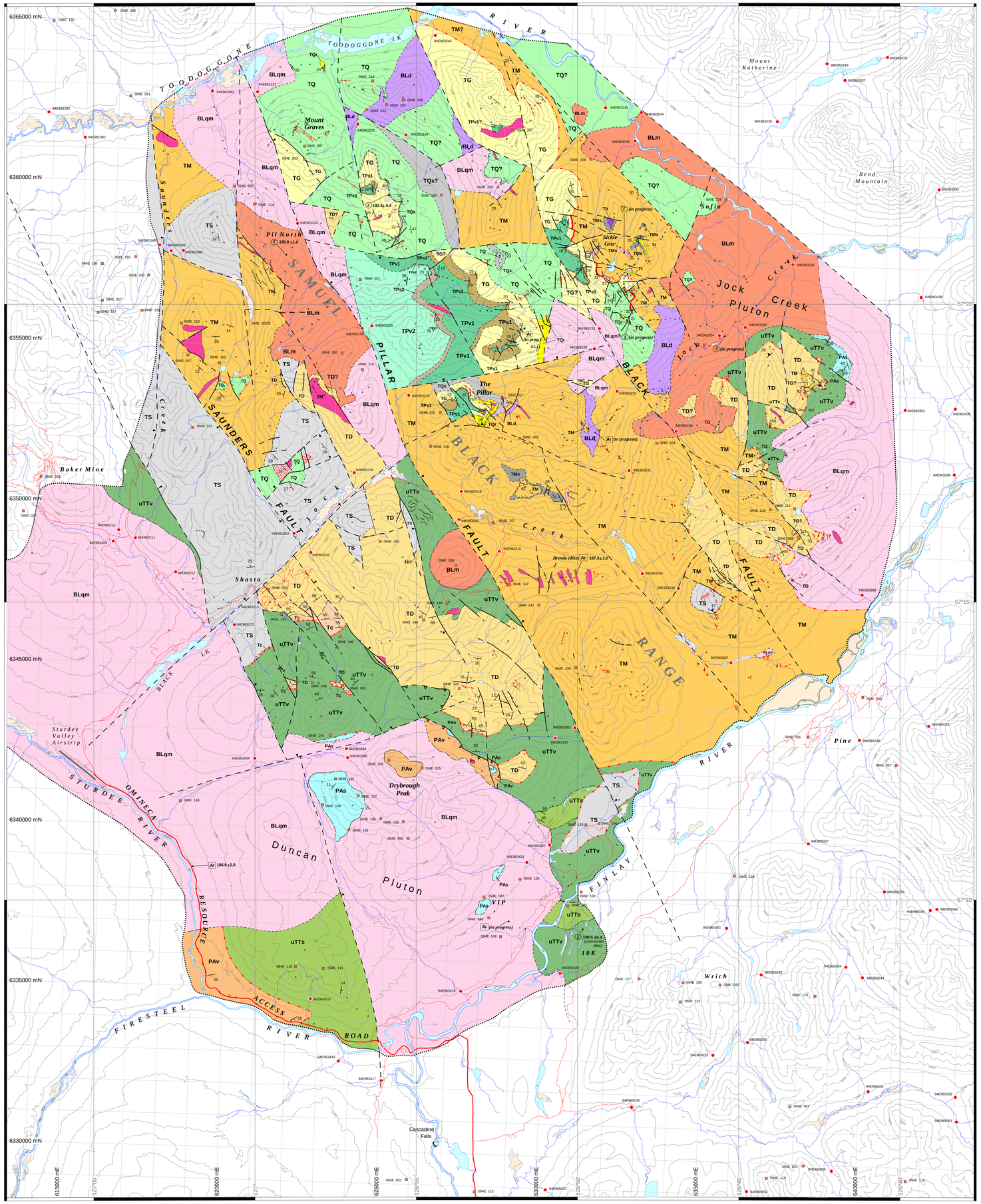


BRITISH COLUMBIA
Ministry of Energy and Mines
Mining and Minerals Division
Geological Survey Branch

Geological Survey Branch
OPEN FILE MAP 2005-3

GEOLOGY BETWEEN THE FINLAY AND TOODOGGONE RIVERS, TOODOGGONE RIVER MAP AREA, NORTH-CENTRAL BRITISH COLUMBIA (PARTS OF NTS 94E/2, 6 and 7)

Contribution to the Toodoggone Targeted Geoscience Initiative II - Mining Company Partnership

Geology by: Larry J. Diakow, Graham T. Nixon, Ryan Rhodes and Bob Lane
Geochronology by: Richard Friedman and Thomas Ullrich, The University of British Columbia

Scale 1:50 000

0 — 1 — 2
kilometres

LOWER JURASSIC - HAZELTON GROUP

TOODOGGONE FORMATION

Pillar member

- **TPv2** — Pyroxene-bearing andesite and scarce laminated dacitic flows.
- **TPs2** — Bedded lapilli tuff, lithic-crystal tuff, tuffaceous sandstone and conglomerate, minor accretionary lapilli tuff.
- **TPv1** — Basaltic andesite and andesite porphyry lava flows characterized by up to 3% subvitreous clinopyroxene phenocrysts.
- **TPs1** — Bedded fine tuffs, lapilli tuff and lesser tuff breccia, minor accretionary lapilli tuff; ubiquitous minute crystal fragments include clinopyroxene, hornblende and quartz; locally abundant granitoid fragments; tuffaceous sandstone and minor conglomerate.

Graves member

- **TG** — Dacite ash-flow tuff; light green to light mauve, lithic rich (up to 40 vol% lapilli) including diagnostic pink rhyodacite porphyry and locally abundant biotite-hornblende-bearing granitic fragments, scarce quartz and biotite crystal fragments; resistant cliff forming unit exhibiting relatively thin zones of moderate to intense welding and rare spherulitic vitrophyre.

Quartz Lake member

- **TQr** — Rhyolitic flows and related flow breccias; maroon to reddish brown, flow laminated, spherulitic devitrification widespread; thin air-fall tuff locally at the base.
- **TQ** — Basalt and andesite lava flows and flow breccia, characterized by crowded fine-grained porphyritic texture with plagioclase 2mm or less and relatively fresh pyroxene (up to 1cm), minor flow-laminated dacite.
- **TQs** — Volcanic sandstone, pebble\cobble and locally boulder conglomerate; poor to moderately well sorted; dark grey to red and grey-green subrounded to angular volcanic fragments and minor subrounded granitoid clasts (rarely 0.5m across).
- Debris flow/volcanic conglomerate, subangular to rounded boulders of monolithic medium-grained andesite porphyry, reddish oxidized muddy matrix; interbeds of sandstone and siltstone; similar conglomeratic rocks west of the Pillar Fault are unconformable on Unit TS.

Saunders member

- **TS** — Dacite ash-flow tuff; grey-green, up to 45% crystal fragments of plagioclase, quartz, hornblende and biotite; diagnostic glassy, juvenile magmatic clasts; moderate to strongly welded.

Metsantan member

- **TM** — Andesite lava flows; grey-green to light purple, 15-25% plagioclase 2-5mm long; sparse-chlorite altered hornblende and pyroxene, trace amounts of biotite and rare quartz phenocrysts.
- **TMs** — Feldspathic sandstone, coarse to medium grained, moderately well sorted volcanic conglomerate and minor mudstone.

Duncan member

- **TD** — Lapilli tuffs with volcaniclastic-epiclastic interbeds; greenish with oxidized reddish sections, pyroclasts commonly consist of reddish brown andesite porphyries mixed with plagioclase and up to 2% oxidized copper-coloured biotite and quartz crystal fragments; minor bedded sandstone, siltstone and maroon mudstone, rare boulder conglomerate near the base.
- **Tc** — Conglomerate marking the base of the Toodoggone formation; poorly sorted rounded clasts to boulder-size dominated by "crowded" fine-grained hornblende andesite porphyry, locally contains distinctive megacrystic basalt porphyry (Unit uTTv) and granitoid clasts; crudely layered thick beds interlayered with, or overlain by, suborbinate sandstone and siltstone.

UPPER TRIASSIC - TAKLA GROUP

- **uTTv** — Basalt porphyry and lesser amygdaloidal flows, dark green, blocky plagioclase and augite phenocrysts, scarce megacrystic plagioclase porphyry basalt flows with plagioclase laths up to 2cm long; rare laminated limestone lenses up to 1.5 metres thick locally.
- **uTTs** — Sandstone and lesser siltstone, generally well sorted; drab olive green, dominated by augite and plagioclase crystals.

MID-PENNSYLVANIAN TO LOWER PERMIAN - ASITKA GROUP

- **PAs** — Limestone; off white, light grey weathering, recrystallized, massive to thickly bedded; chert, light green-grey, locally interbedded with black, limey carbonaceous siltstone and mudstone; locally intruded by basaltic dikes and sills.
- **PAv** — Dacitic lapilli tuff with pale grey fragments, grey-green to dark purple; rare accretionary lapilli tuff; porphyritic andesite and dacitic lava flows; unit forms thermally altered pendants on/adjacent to the Duncan pluton.

EARLY JURASSIC - BLACK LAKE INTRUSIVE SUITE

- **BLd** — Diorite, quartz diorite, monzodiorite and quartz monzodiorite; clinopyroxene bearing with subordinate to minor hornblende and trace biotite, biotite-rich variants ocurr locally. Possibly co-magmatic with clinopyroxene bearing volcanic rocks from unit TQ and TPv1.
- **BLqm** — Quartz monzonite, medium to coarse inequigranular, subhedral plagioclase, intercrystalline light pink potassium feldspar and 10-20% anhedral quartz; medium to coarse euhedral-subhedral hornblende (10-15%) and anhedral chloritized biotite (3-5%).
- **BLm** — Monzonite; greyish pink to orange-pink; coarse inequigranular to porphyritic texture; subhedral plagioclase enclosed by fine grained interstitial potassium feldspar and typically less than 5% quartz; anhedral chloritized hornblende and biotite.

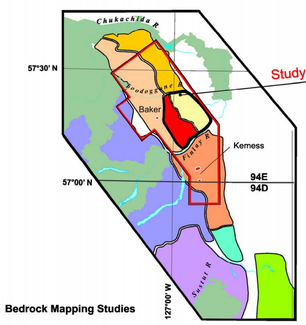
MINOR INTRUSIONS

- Undifferentiated monzonite and quartz monzonite; plagioclase, potassium feldspar ± quartz phyric in an oxidized light pink to orange groundmass; chloritized hornblende and biotite are common; includes less common undifferentiated mafic dikes, dark green aphanitic to sparsely amygdaloidal.
- **Tb** — Basaltic sill, aphanitic.
- **Tr** — Dacite to rhyolite sills, locally flow laminated.

SYMBOLS

- Limit of mapping
- Geological contact (defined, approximate, inferred, inferred from aeromag)
- Unconformity (defined, inferred)
- Normal Fault (Ball on down-dropped side; defined, inferred)
- Reverse Fault (defined, inferred)
- Wrench Fault (defined, inferred)
- Regional Geochemistry Survey site (RGS). — 94E963432
- MINFILE occurrence and reference number. — 094E 131
- Age determination
  - Ar/Ar (cooling date) — Ar 195.9 ± 0.6 Ma
  - U/Pb (crystallization date) — Z 201.3 ± 0.5 Ma
- Field station
- Quartz (discontinuous vein segments)
- Bedding — 20
- Welded fabric — 17
- Flow lamination — 33
- Road (all weather, seaonal)
- Landslide
- Flooded land

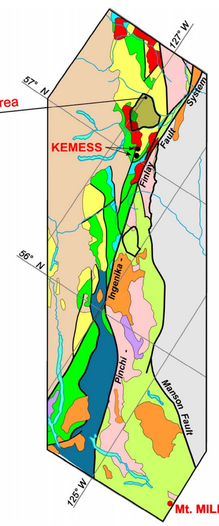
MAPPING STUDIES



Bedrock Mapping Studies

- 2005 proposed mapping
- Diakow *et al.*, this study
- Diakow, 2004
- Diakow, 2001
- Diakow *et al.*, 1993 and 1985
- Schiarizza, 2004
- Legun, 2001
- Monger, 1977
- Eisbacher, 1974
- Provincial Park
- **Airborne Magnetic-Radiometric Survey** Shives *et. al.*, 2004

REGIONAL TECTONIC SETTING



Layered Rocks

Sedimentary Overlap Assemblages
- Undivided Jurassic Bowser Lake & Late Cretaceous Sustut groups

Stikine Terrane - Island Arcs
- Early Jurassic Hazelton Group
- Late Triassic Stuhini Group
- Carboniferous to Permian Asitka Group

Quesnel Terrane - Island Arcs
- Late Triassic Takla Group

Cache Creek Terrane - Ocean Floor
- Paleozoic to M. Jurassic Cache Creek Group

Cassiar Terrane - Ancestral Continental Margin
- Proterozoic and younger strata

Intrusive Rocks

- mid-Cretaceous
- Middle Jurassic
- Early Jurassic (Stikine Terrane)
- Late Triassic and Early Jurassic (Quesnel Terrane)
- **Au-Cu Porphyry Deposits**

Acknowledgments

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Diakow, L.J., Nixon, G.T., Rhodes, R. and Lane, B. (2005): Geology Between the Finlay and Toodoggone Rivers, Toodoggone River Map Area, North-central British Columbia (Parts of NTS 94E/2, 6 and 7); B.C. Ministry of Energy and Mines, Open File Map 2005-3, 1:50 000 scale.

Supplementary Datasets

Jackaman, W. (1997): British Columbia Regional Geochemical Survey NTS 94E-Toodoggone River, Stream Sediment and Water Geochemical Data; B.C. Ministry of Employment and Investment, BC RGS 46.

Jackaman, W. (1997): British Columbia Regional Geochemical Survey NTS 94D-McConnell Creek, Stream Sediment and Water Geochemical Data; B.C. Ministry of Employment and Investment, BC RGS 45.

(1999): Aeromagnetic Residual Total Field Survey of Toodoggone River (NTS 94E) and Ware (NTS 94F); Geological Survey of Canada, Open File 3495, 8 sheets at 1:100 000 scale.

Map Base Information

1:50 000 base produced from TRIM 1:20 000 scale topographic database supplied by LandData B.C.
North American Datum (NAD) 83, Latitude/Longitude Projection, UTM Zone 9. Approximate mean magnetic declination (2004) between magnetic north and grid north is 23 4' east, decreasing about 17' annually. Elevations in metres above sea level.

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