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GEOLOGICAL SURVEY OF CANADA — COMMISSION GÉOLOGIQUE DU CANADA

TECTONIC ASSEMBLAGES AND PLUTONIC SUITES
(from Wheeler and McFeely, 1991)

Tectonic assemblages represent distinctive successions of stratified rocks, mainly bounded by unconformities or faults, deposited in specific tectonic environments during particular intervals of time. Thus they are fundamental components of Cordilleran geology that reflect its evolution and allow comparisons of the tectonic behaviour of various regions during specific intervals of time.

An assemblage may comprise one or more formations from a single region or from several separate regions. Most assemblages are named for an important constituent or group, although a few are named after the region in which the assemblage is best developed. Very few are not yet named. The age assigned to each assemblage reflects the age range of its components. Each assemblage is characterized in terms of its tectonic or depositional setting, the latter illustrated by descriptions of its principal lithologies, facies variations, source areas and other criteria.

The degrees of confidence in the identification of the associated tectonic or depositional regimes vary considerably and, in some cases are controversial. Most assemblages are categorized in terms of environments currently observable on modern continental margins, island arcs and ocean basins. Others are defined with reference to their positions relative to the orogen (foredeep clastic wedge) or to the craton (passive continental margin sediments).

The plutonic suites are defined mainly by age and subdivided on the basis of composition or other attributes. They are grouped, for the most part, into magmatic episodes (Armstrong, 1985).

REFERENCES

Armstrong, R.L.
1985: Mesozoic - early Cenozoic plutonism in the Canadian Cordillera - distribution in time and space; Geological Society of America, Abstracts and programs, 1985, v. 17, p 338

Wheeler, J.O. and McFeely, P.
1991: Tectonic Assemblage Map of the Canadian Cordillera and adjacent parts of the United States of America; Geological Survey of Canada, Map 1712A, scale 1:2 000 000

SOURCES OF INFORMATION

Geological information contained in the GIS map library and the 1:1,000,000 scale folio series is derived directly from John Wheeler's Tectonic Assemblage Map of the Canadian Cordillera (Wheeler and McFeely, 1991; Map 1712A), and is subject to all Copyright laws for distribution in either digital or hard copy form. This map is a revision of the Geological Survey of Canada Map 1505A by Tipper, Woodsworth, and Gabrielse, published in 1981. It is a compilation of published maps, thesis, and unpublished information from officers of the Geological Survey of Canada; from J.G. Abbott, G.W. Lowey, and J.A. Morin of the Geology Section, Department of Indian and Northern Affairs , Whitehorse, Yukon; from D.A. Brew, J.H. Dover, C. Dusel-Bacon, H.L. Foster, J.E. Harrison, W.J. Nokleberg, G. Plafker, and R.W. Tabor of the U.S. Geological Survey; and from R.L. Armstrong, M.T. Brandon, R.L. Brown, D.S. Cowan, P. Erdmer, J. Fillipone, R.M. Friedman, J.T. Fyles, J.M. Hamilton, C.J.R. Hart, R.A. Haugerud, C.J. Hickson, P.M. Holbek, G.A. Jilson, D.L. Jones, A. Jung, W.C. McLelland, E.W. Mountjoy, J.K. Mortensen, D.C. Murphy, J.S. Oldow, R.A. Price, P.B. Read, T.A. Richards, M.E. Rusmore, C.M. Rubin, P.S. Simony, A. Sutherland Brown, R.S. Tolbert, P. van der Heyden, and W.J. Wolfe. Geological cartography for the original version of this map was by M. Sigouin, Geoscience Information Division.

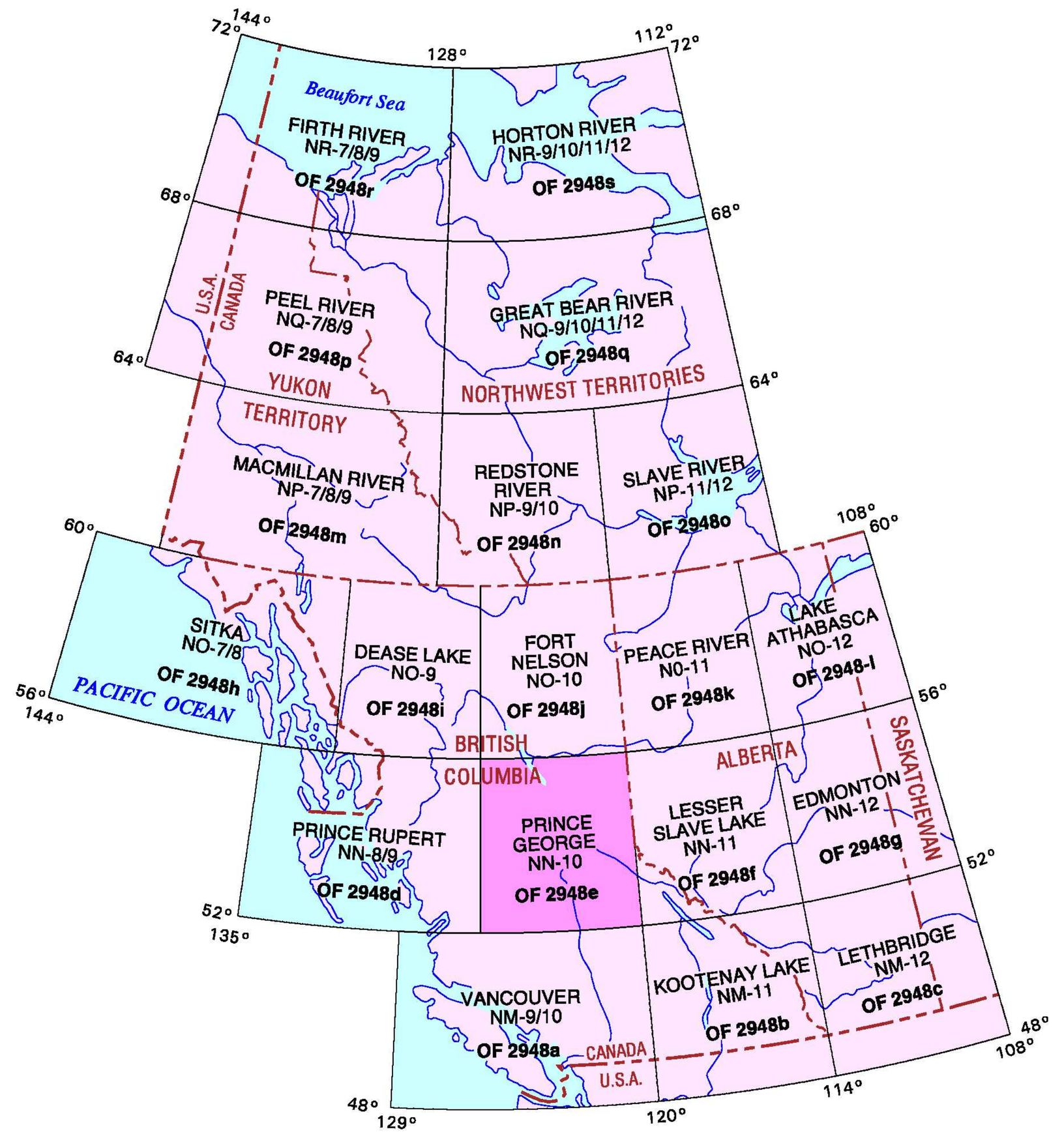
GIS MAP LIBRARY

The Cordilleran GIS Map Library was initiated in March, 1993 as a collaborative research and development project by the Pacific Division and the Geoscience Information Division (GID) of the Earth Sciences Sector (ESS). The goal is to develop an integrated 1:1,000,000 scale digital geoscience database for the Canadian Cordillera that can be used as an archive and research facility by the Geological Survey of Canada (GSC) and its clients. This map is part of a new series of 1:1,000,000 scale tectonic assemblage maps for the Canadian Cordillera based on the Wheeler and McFeely (1991) Tectonic Assemblage Map of the Canadian Cordillera (Map 1712A). It is one of 19 digital data sets derived from the Cordilleran GIS Map Library CDROM (GSC Open File 2948).

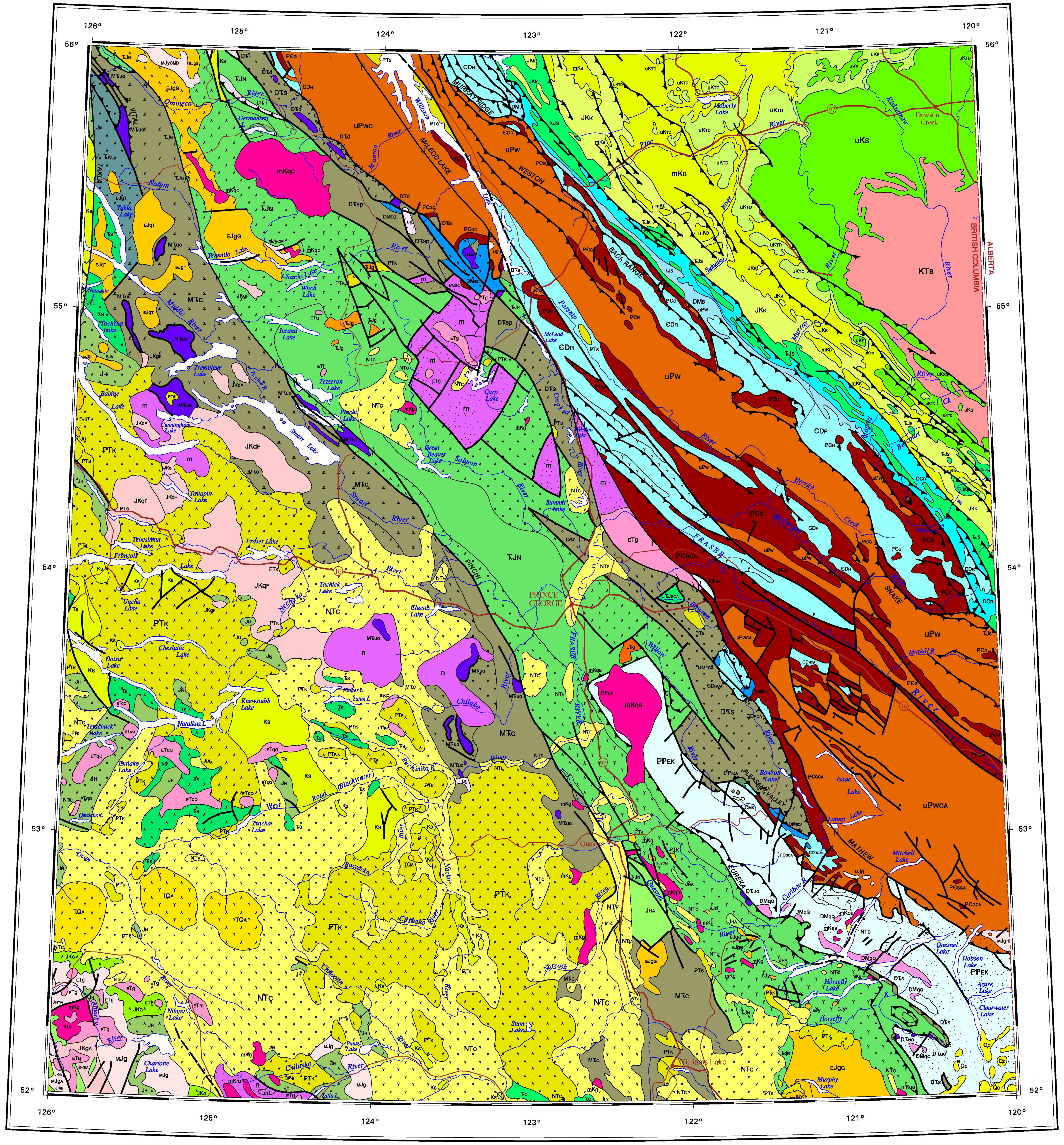
The legend which accompanies Map 1712A was converted to digital format and made available to the GSC by Doug Brownlee, and has been modified and expanded for use as a GIS database. Design and implementation of the digital GIS map library structure, final editing and attributing of all geological and geographic features and cartographic production of the 1:1,000,000 scale folio series were performed by Stephen Williams and Murray Journeay of the GSC Pacific Division, and Richard Allard of the Geoscience Information Division.

The geographic base for the GIS library and the 1:1,000,000 scale folio series is derived from the National Atlas Information System (NAIS) 1: 2,000,000 digital map series and is subject to all Copyright laws for distribution in either digital or hard copy form.

CORDILLERAN TECTONIC ASSEMBLAGE MAP LIBRARY



TECTONIC ASSEMBLAGES
OF THE
PRINCE GEORGE MAP AREA
1:1 000 000
GSC OPEN FILE 2948e



OPEN FILE 2948e

TECTONIC ASSEMBLAGE MAP

PRINCE GEORGE

BRITISH COLUMBIA

Scale 1:1 000 000 - Échelle 1/1 000 000

kilometres 25 0 25 50 75 kilomètres

Lambert Conformal Conic Projection
Standard Parallels 52°40′ and 55°20′

Projection conique conforme de Lambert
Parallèles d'échelle conservée 52°40′ et 55°20′

LEGEND

TECTONIC ASSEMBLAGES

QUATERNARY

Qc — *CLEARWATER: transtensional back-arc volcanics; alkaline to tholeiitic olivine basalt flows, pyroclastics, volcanoes and cones; contains lherzolite nodules; nonmarine*

TERTIARY AND QUATERNARY

TQA — *ANAHIM: plume volcanics; peralkaline basalt-comendite (quartz trachyte) shield volcanoes; alkaline olivine basalt cones; nonmarine*

NEOGENE

NTc — *CHILCOTIN: back-arc volcanics; basalt flows transitional between alkaline and tholeiitic types; nonmarine*

NTF — *FRASER: alluvial sediments; poorly consolidated alluvial conglomerate, sandstone, mudstone, with local lignite, tuff, breccia and diatomite; nonmarine*

PALEOGENE

ᵽTc — *CARMANAH: overlap assemblage; sandstone, shale, turbidite, conglomerate, conglomeratic mudstone; marine*

ᵽTK — *KAMLOOPS: transtensional arc volcanics; alkali-rich, calc-alkaline andesite, basaltic andesite, dacite, rhyolite and basalt flows, pyroclastics and epiclastic deposits. In south and southeast, highly alkaline rhomb-porphyry flows and breccia; bimodal basalt-rhyolite along Tintina Fault; includes alkaline volcanics east of Foreland Belt; all nonmarine*

ᵽTs — *SIFTON: nonmarine fault-trough clastics (locally includes upper Upper Cretaceous strata); shale, siltstone, sandstone, conglomerate, local lignite, marl and dacitic volcanics; nonmarine*

UPPER CRETACEOUS - OLIGOCENE

KTB — *BRAZEAU: foredeep clastic wedge; eastward prograding alluvial sandstone, conglomerate, shale, coal and local tuff and bentonite. In southern foredeep lower part grades eastward into marine shale; upper part nonmarine Paleocene*

UPPER CRETACEOUS

uKT — *TREVOR: southwesterly derived clastic wedge; interbedded calcareous and glauconitic sandstone and mudstone, bentonitic shale, and local ironstone lenses; also includes Dunvegan conglomerate, sandstone, siltstone and shale (**uKTD**); marine*

uKs — *SMOKY: foredeep marine shales; sideritic and calcareous shale, siltstone and sandstone forming two megacycles; marine*

CRETACEOUS

Ks — *SKEENA: easterly derived back-arc clastics; mostly easterly derived clastics; volcanic wacke, sandstone with detrital mica, siltstone, shale, conglomerate, with granitic clasts, chert-pebble conglomerate, ironstone lenses, coal; marine and nonmarine*

MID-CRETACEOUS

mKB — *BLAIRMORE: foredeep clastic wedge; mainly eastward prograding deltaic clastics: basal chert-pebble conglomerate, sandstone, locally with metamorphic, granitic and volcanic detritus, shale, coal; alkaline volcanics at top; marine and nonmarine*

UPPER JURASSIC - LOWER CRETACEOUS

JKG — *GAMBIER: arc and locally, rift volcanics; upper unit: Albian greywacke, siltstone, argillite, conglomerate with granitic clasts, minor rhyolite lower unit: Barremian-Hauterivian and older basal granitic conglomerate; calc-alkaline dacite-andesite fragmental volcanics, greywacke-argillite flysch; marine and nonmarine*

JKK — *KOOTENAY: foredeep clastic wedge; marine sandstone and mudstone grading westward and southward into northward prograding fluvial deltaic sandstone, chert-pebble conglomerate, mudstone, and coal; marine and nonmarine*

MIDDLE AND UPPER JURASSIC

JBL — *BOWSER LAKE: back-arc (?) and foredeep clastic wedge on Stikinia; upper, nonmarine crossbedded conglomerate, sandstone, siltstone, shale, marly limestone prograded over lower basinal flysch comprising marine shale, siltstone, sandstone and near-shore sandstone, conglomerate, plant fossils and coquinas, and coal. Sediments shed from uplifts to north, east and south*

LOWER AND MIDDLE JURASSIC

JH — *HAZELTON: volcanic arc complexes in Stikinia; south of Bowser Basin: low alkali calc-alkaline subaerial basalt to rhyolite, mainly andesite-dacite pyroclastics, grading northeast into more alkalic pillowed basalt and farther east into clastic volcanics. North of Bowser Basin: calc-alkaline dacite-latite porphyry, andesite, rhyolite pyroclastics and flows with basalt and basaltic andesite at the top; marine and nonmarine*

JHA — *HALL: Quesnellia arc-derived clastics; carbonaceous shale, siltstone, greywacke and conglomerate derived from volcanic and granitic rocks of Quesnellia; (**JHMA**) metamorphic equivalents in Atnarko Complex; marine*

TRIASSIC - JURASSIC

TRJs — *SPRAY RIVER: continental margin prism: **TRJsCA** in Cariboo Subterrane; Jurassic shale, organic-rich paper shale, sandstone, phosphatic and cherty limestone; Triassic shoaling-upward marine siltstone, sandstone, limestone, dolostone, collapse breccia, rare gypsum; marine*

UPPER TRIASSIC - LOWER JURASSIC

TRJN — *NICOLA: arc volcanics in Quesnellia; calc-alkaline andesite, dacite, rhyolite subaerial flows, ignimbrite, minor limestone passing eastwards into augite and feldspar porphyry, andesite and dacite flows and volcanic clastics grading further eastward into relatively alkaline augite porphyry flows, analcite trachybasalt and trachyandesite, volcanic clastics and finally into shale, siltstone, limestone and minor quartzite; marine and nonmarine*

UPPER TRIASSIC

TRc — *CADWALLADER: arc clastics and volcanics; island-arc tholeiite, felsic tuffaceous sandstone, conglomerate with clasts of rhyolite, dacite, andesite, basalt, granite and granodiorite, limestone-basalt block breccia, volcanic sandstone-siltstone turbidite, limestone, greywacke, volcanic and chert-clast conglomerate; marine*

TRs — *STUHINI: arc volcanics in Stikinia; calc-alkaline, locally subaerial, augite and feldspar porphyritic andesite and basaltic andesite flows, breccia, tuff and minor ignimbrite interbedded with more easterly volcanic clastics. Western Takla facies: more alkaline augite porphyry pillow lava, volcanic sandstone, siltstone, and local subaerial volcanic clastics; marine and nonmarine*

TRKU — *KUTCHO: arc volcanics in Cache Creek Terrane; bimodal calc-alkaline flow-banded rhyolite or rhyodacite, silicic tuff, and basalt or basaltic andesite, phyllite, greywacke and limestone, metamorphosed to greenschist; marine*

PENNSYLVANIAN - PERMIAN

PPI — *ISHBEL: faulted passive continental margin sediments; **PPICA** in Cariboo Subterrane; Permian siltstone, sandstone, chert, phosphate, siliceous mudstone; Pennsylvanian dolomitic siltstone, chert breccia, sandstone, orthoquartzite; marine*

MISSISSIPPIAN - UPPER TRIASSIC

MTRc — *CACHE CREEK; oceanic volcanics and sediments and local accretionary prism mélange; mainly MORB-like tholeiitic to alkaline basalt, some alkali-enriched seamount basalt, serpentinized peridotite and dunite, gabbro, trondhjemite and diabase; most sub-greenschist, local blueschist; mélange with blocks of Upper Triassic Nicola Assemblage; radiolarian ribbon chert, argillite, volcanic sandstone, and limestone, locally as bank, reef and lagoon complexes with Tethyan fossils; includes Jurassic radiolarian east of Fraser River fault; marine*

DEVONIAN - TRIASSIC

DTRH — *HARPER RANCH: arc clastics; basement of Quesnellia; volcanic sandstone derived from andesitic and dacite volcanics and chert, minor basalt, andesite and dacite flows and pyroclastics, Devonian to Permian limestone blocks in upper Paleozoic to Triassic matrix; marine*

DTRs — *SLIDE MOUNTAIN: oceanic marginal basin volcanics and sediments; variably sheared, ophiolite-like assemblage of oceanic, alkalic to transitional pillowed basalt, tuff, breccia, serpentinized peridotite and gabbro, radiolarian chert, argillite and volcanic clastics; marine - **DTRsP** east of McLeod Lake Fault - fragmental basalt, diorite, volcanic clastics and limestone that may be a distal North American assemblage*

CARBONIFEROUS

CMK — *MILFORD: marginal basin sediments and oceanic volcanics in pericratonic Kootenay Terrane; eastern assemblage of basal conglomerate, crinoidal and coralline limestone, sandstone, shale and cherty tuff; central assemblage of conglomerate, pillowed tholeiite, tuff and volcanic clastics; and western assemblage of sandstone, conglomerate, coralline limestone, siliceous argillite and minor tholeiite. Basal conglomerate contains boulders of previously foliated Lardeau Group and of Early Ordovician granitic rocks; marine. Includes Permian limestone near Pleasant Valley thrust*

DEVONIAN - MISSISSIPPIAN

DME — *EARN: fault-trough clastic wedge: **DMEC** in Cassiar Terrane; **DMECA** in Carbioo Subterrane; westerly derived, chert-pebble conglomerate, chert-quartz sandstone, pebbly mudstone, blue-black siliceous shale, locally containing barite, brown shale, alkaline trachyte and rhyolite flows, breccia, tuff, pillow basalt and breccia; chert, and limestone; marine and nonmarine*

DMB — *BESA RIVER: most distal part of northerly derived Imperial Assemblage and westerly derived Earn Assemblage; upper Devonian shale partly derived from craton; shale, mudstone, and siltstone; marine*

DEVONIAN - CARBONIFEROUS

DCR — *RUNDLE: continental shelf carbonate and shale; Carboniferous shelf and slope limestone, lime grainstone, dolomite, sandy dolomite, crossbedded sandstone, shale, dark, locally bituminous shale, dolomitic shale; tuff in Exshaw Formation; Upper Devonian platform and reef limestone and dolomite, detrital carbonate channel deposits, grey, green and red shale, sandstone, breccia; marine*

UPPER PROTEROZOIC - PALEOZOIC

PPEK — *EAGLE BAY: clastics and volcanics of pericratonic Kootenay Terrane and Devonian and older magmatic arc rocks in Yukon-Tanana Terrane; Paleozoic phyllite, siltstone, sandstone, grit, minor limestone, which near Quesnel Lake contains fossil fragments, Devonian felsic metavolcanics and older magmatic arc rocks and fragmentals overlying black siliceous argillite, ribbon chert, quartzite, and local archeocyathid-bearing limestone in mafic metavolcanics, Proterozoic olive green and grey grit, quartzite and carbonate, and metamorphic equivalents; mainly marine*

CAMBRIAN - DEVONIAN

ЄDR — *ROCKY MOUNTAINS: passive continental margin sediments; **ЄDRCA** in Cariboo displaced offshelf passive margin terrane; resistant dolomite, limestone, and local sandstone interbedded with recessive red, green, and grey shale and detrital carbonate that together form several carbonate-shale grand cycles. These pass westward into offshelf shale, siltstone and thin-bedded carbonate with minor alkalic tuff, breccia and amygdaloidal basalt of Cambrian, Cambro-Ordovician, Silurian, and Devonian ages but mainly of Ordovician age. Chert and greywacke also occur in Cariboo subterrane; marine*

UPPER PROTEROZOIC - LOWER CAMBRIAN

PЄG — *GOG: rifted and passive continental margin sediments; **PЄGC** in Cassiar Terrane; **PЄGCA** in Cariboo Subterrane; shallow-water crossbedded orthoquartzite, feldspathic quartzite, locally graded-bedded quartzite, quartz-pebble conglomerate, mafic flows, breccia and tuff overlain by interbedded quartzite, siltstone, shale, and limestone with archeocyathid reefs; metamorphic equivalents; marine*

UPPER PROTEROZOIC

uPW — *WINDERMERE: mainly clastic continental margin sediments; **uPWC** in Cassiar Terrane; **uPWCA** in Cariboo Subterrane; graded-bedded assemblage of interbedded quartz-feldspar grit, sandstone, siltstone and shale, commonly maroon and green; diamictite in Rocky Mountains, limestone in upper part, local greenstone flows, breccia and tuff, and metamorphic equivalents; marine*

PLUTONIC AND ULTRAMAFIC ROCKS

Plutonic Suite....Quanchus Pluton....(Hobson Lake)

EARLY TERTIARY (40 - 64 Ma)

ET
- **ETqQ** - *Quanchus: pink and grey hornblende-biotite granite*
- **ETg** - *undivided granodiorite and quartz diorite; commonly has concordant U-Pb and K-Ar ages in Coast Plutonic Complex*
- **ETq** - *undivided granite*
- **ETf** - *undivided felsite, quartz felspar porphyry*
- **ETm** - *undivided metamorphosed granite and granodiorite*

LATE CRETACEOUS (64 - 87 Ma)

LK — **LKg** - *undivided granodiorite, leucogranodiorite, quartz monzonite, quartz diorite, tonalite*

MID-CRETACEOUS (87 - 130 Ma)

mK
- **mKqc** - *Cassiar: mainly elongate, partly discordant plutons of grey and pinkish grey, biotite quartz monzonite and granodiorite whose western margins are sheared and altered to muscovite-quartz-feldspar mylonite*
- **mKqB** - *Bayonne: discordant, biotite and biotite-muscovite leucoquartz monzonite or granite: biotite-hornblende granodiorite and quartz monzonite; all locally porphyritic*
- **mKnT** - *orthogneiss of Tatla Lake Complex*
- **mKg** - *variably foliated hornblende quartz diorite, tonalite, and hornblende diorite intrusive into Gravina-Nutzotin rocks of S. E. Alaska and forming part of western Coast Plutonic Complex*
- **mKq** - *undivided granite, leucogranite, alaskite, quartz monzonite, monzonite, granophyre*
- **mKy** - *undivided syenite, syenodiorite, nepheline syenite, sodalite syenite, jacupirangite, ijolite, urtite*

UNCERTAIN AGE

ug — **ug** - *granodiorite, quartz diorite and quartz monzonite in Central and southernmost Cordillera*

LATE JURASSIC - EARLY CRETACEOUS (130 - 155 Ma)

JK
- **JKgF** - *Francois L.: calc-alkaline, older, hornblende-biotite quartz diorite and gabbro; younger, light to pinkish, biotite quartz monzonite and granite; and youngest, biotite - hornblende quartz monzonite and granodiorite;*
- **JKdF** - *undivided diorite, monzodiorite, gabbro, diabase, amphibolite;*
- **JKqF** - *undivided granite, leucogranite, alaskite, quartz monzonite, monzonite, granophyre*
- **JKgA** - *in Atnarko Complex*

MIDDLE JURASSIC (155 - 187 Ma)

MJ
- **MJyCM** - *Middle Jurassic phases of Copper Mountain suite;*
- **MJyCMD** - *(Duckling Creek): syenite*
- **MJgA** - *granitic rocks of Atnarko Complex*
- **MJg** - *foliated hornblende-biotite quartz diorite and granodiorite in Central Coast Plutonic Complex, altered to greenshist-facies along E. margin*
- **MJgH** - *(Hobson Lake): granodiorite, leucogranodiorite, quartz monzonite, quartz diorite, tonalite*

EARLY JURASSIC (187 - 214 Ma)

EJ
- **EJgG** - *Guichon: elongate, partly concordant, calc-alkaline, grey, green and pink, hornblende-biotite granodiorite and quartz diorite, lesser biotite granodiorite, quartz monzonite, leucogranodiorite, pyroxene-hornblende diorite and syenodiorite. Altered and foliated near shear zones*
- **EJyCM** - *Copper Mtn.: high-level, alkaline, syenite, syenodiorite, monzonite, pryoxene-hornblende diorite and gabbro*
- **EJqT** - *Topley: partly porphyritic, pink, biotite granite with grey diorite border phases; grey and pink, biotite soda granite with pink granite to syenite border phases;*
- **EJgT** - *undivided granodiorite, leucograndiorite, quartz monzonite, quartz diorite, tonalite*
- **EJd** - *undivided diorite, monzodiorite, gabbro, diabase, amphibolite*
- **EJgT** - *undivided granodiorite, leucogranodiorite, quartz monzonite, quartz diorite, tonalite*
- **EJy** - *undivided syenite, syenodiorite, nepheline syenite, sodalite syenite, jacupirangite, ijolite, urtite*

LATE TRIASSIC - EARLY JURASSIC

TRJ — **TRJg** - *undivided granodiorite, leucogranodiorite, quartz monzonite, quartz diorite, tonalite*

LATE TRIASSIC (214 - 235 Ma)

LTR — **LTRg** - *hornblende-biotite quartz diorite - central Coast Plutonic Complex*

DEVONIAN - TRIASSIC

DTR
- **DTRuo** - *oceanic ultramafic rocks commonly elongate plutons of reddish brown to khaki weathering dunite, olivine-orthopyroxene peridotite (harzburgite), pyroxenite; commonly serpentinized*
- **DTRd** - *diorite and amphibolite of Slide Mountain Terrane, Yukon*
- **DTRds** - *(Scovil): diorite*
- **MTRuo** - *oceanic ultramafic rocks*

DEVONIAN - MISSISSIPPIAN

DM — **DMqQ** - *(Quesnel L.): grey and pink, biotite-muscovite quartz-feldspar augen gneiss and granodiorite gneiss*

VOLCANIC ROCKS

- *Calc-alkaline volcanic rocks*
- *Tholeiitic volcanic rocks*
- *Alkaline volcanic rocks*
- *Bimodal volcanic rocks*
- *Mixed tholeiitic volcanic and sedimentary rocks*
- *Bimodal alkaline volcanic rocks*

METAMORPHIC ROCKS (protolith uncertain)

m — *metamorphic rocks (undivided); includes ductilely sheared paragneiss (**mT**) of Tatla Lake Complex*

n — *predominantly orthogneiss*

protolith metamorphosed to amphibolite facies

SYMBOLS

- *Geological contact (defined)*
- *Thrust fault (teeth on upper plate)*
- *Overturned thrust fault (teeth on upper plate, dip of fault overturned)*
- *Extension fault (solid circle indicates downthrow side)*
- *Right lateral transcurrent fault*
- *Fault of unknown displacement*
- *Submerged faults and those buried by younger strata*
- *Submerged normal fault (solid circle indicates downthrow side)*
- *Submerged thrust fault (teeth on upper plate)*

British Columbia Mineral Development Agreement Canada

Contribution to Canada – British Columbia Agreement on Mineral Development (1991 – 1995), a subsidiary agreement under the Canada – British Columbia Economic and Regional Development Agreement.
Contribution à l'Entente Canada – Colombie Britannique sur l'exploitation minérale (1991 – 1995), entente auxiliaire négociée en vertu de l'Entente Canada – Colombie Britannique de développement économique et régional.

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