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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

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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.

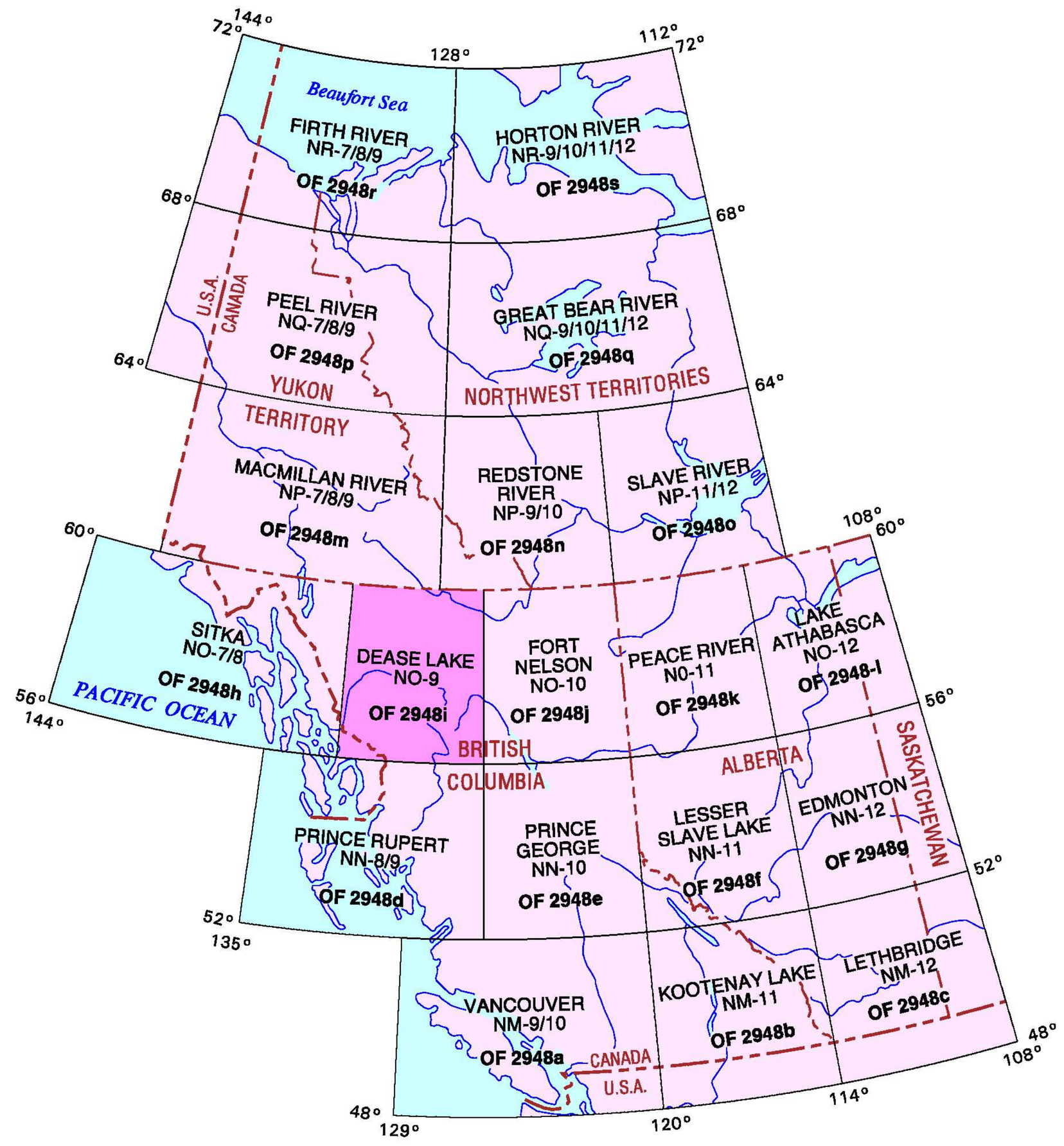
GIS MAP LIBRARY

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).

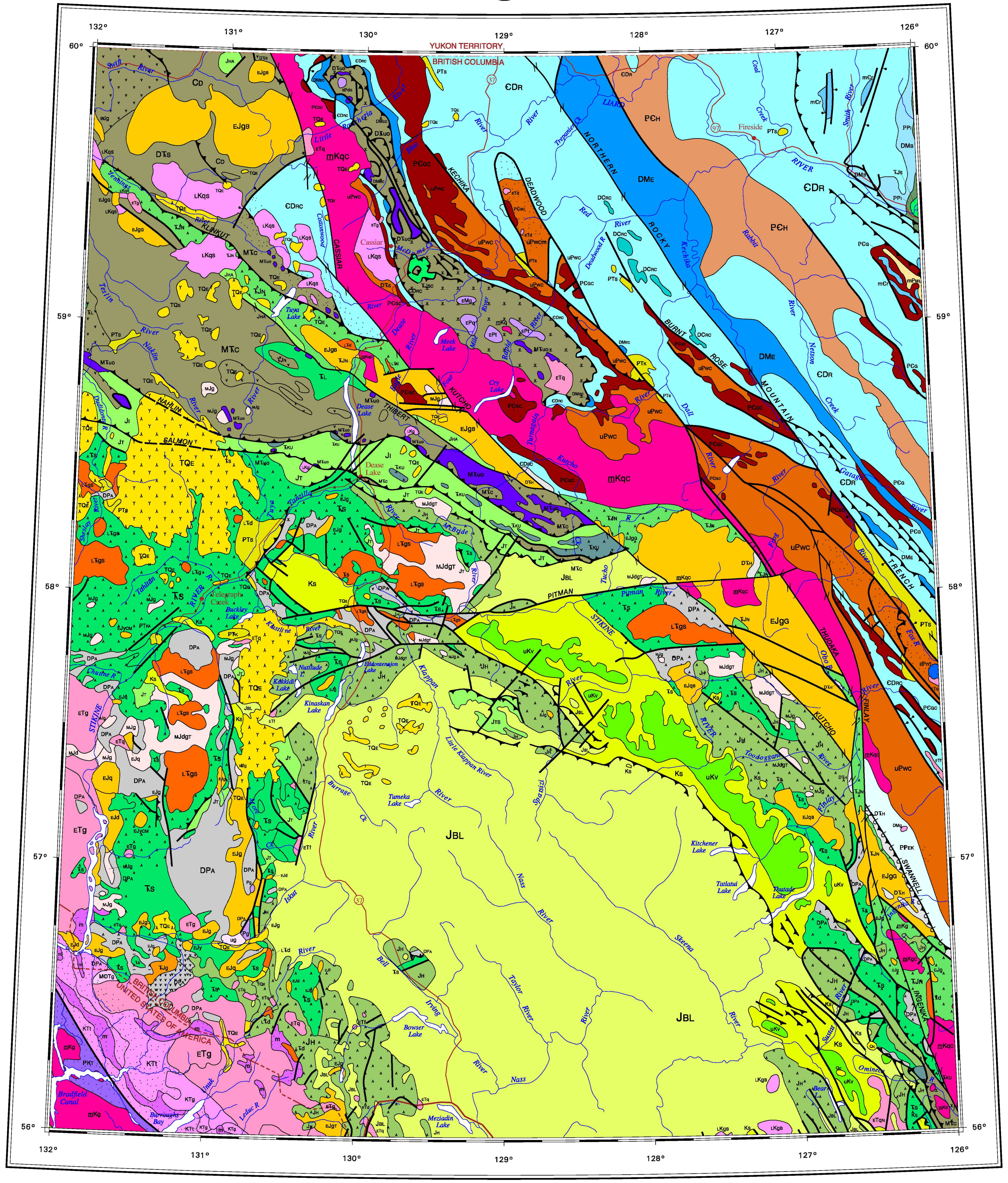
The legend which accompanies Map 1712A was converted to digital format and made available to the GSC by Doug Brownlee, and has been modified and expanded for use as a GIS database. Design and implementation of the digital GIS map library structure, final editing and attributing of all geological and 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
DEASE LAKE MAP AREA
1:1 000 000
GSC OPEN FILE 2948i



OPEN FILE 2948i

TECTONIC ASSEMBLAGE MAP

DEASE LAKE

BRITISH COLUMBIA - U.S.A.

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

kilometres 25 0 25 50 75 kilomètres

Lambert Conformal Conic Projection
Standard Parallels 56°40′ and 59°20′

Projection conique conforme de Lambert
Parallèles d'échelle conservée 56°40′ et 59°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

- **TQe** — EDZIZA: transtentional rift volcanics; alkali basalt and peralkaline trachyte-comendite shield volcanoes; alkali olivine basalt cones with lherzolite nodules; flows and tuyas; nonmarine

PALEOGENE

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

UPPER CRETACEOUS

- **uKv** — VIRGINIAN RIDGE: westerly derived clastic wedge; westerly derived chert-clast conglomerate, sandstone in Methow and Tyaughton troughs; westerly derived conglomerate, pebbly sandstone, mudstone, and tuff in Sustut Basin; nonmarine

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

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

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
- **JT** — TAKWAHONI: Stikinia arc-derived clastics; interbedded conglomerate, greywacke, siltstone and shale derived from Triassic volcanics and granites in Stikinia; marine and nonmarine JTs (Spatsizi Gp.) basinal shale south of Stikine Arch
- **JI** — INKLIN: arc clastics above Cache Creek Terrane; siltstone-shale-greywacke turbidite, minor conglomerate, derived from Cache Creek and Quesnel terranes; limestone; marine
- **JHA** — HALL: Quesnellia arc-derived clastics; carbonaceous shale, siltstone, greywacke and conglomerate derived from volcanic and granitic rocks of Quesnellia; marine

TRIASSIC - JURASSIC

- **ƮJs** — SPRAY RIVER: continental margin prism; ƮJsc in Cassiar Terrane; 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

- **ƮJn** — 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

- **Ʈs** — 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
- **Ʈl** — LEWES RIVER: arc clastics, in part in Cache Creek Terrane; mainly westerly derived breccia, tuff, volcanic sandstone and siltstone, and limestone, locally interbedded with radiolarian chert above Cache Creek Group; marine
- **Ʈku** — 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
- **PKt** — Undivided TAKU assemblage; carbonaceous shale, mudstone, greywacke and lesser limestone, chert and conglomerate; andesitic and basaltic and minor felsic volcanics; and metamorphic equivalents. Carbonaceous slate and limestone associated with volcanics have yielded Middle to Late Triassic fossils; crinoidal limestone contains Permian fossils; greywacke and conglomerate probably belong to the Gravina-Nutzotin (Gambier) assemblage; marine

PENNSYLVANIAN - PERMIAN

- **PPi** — ISHBEL: faulted passive continental margin sediments; Permian siltstone, sandstone, chert, phosphate, siliceous mudstone; Pennsylvanian dolomitic siltstone, chert breccia, sandstone, orthoquartzite; marine

MISSISSIPPIAN - UPPER TRIASSIC

- **MƮc** — 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; marine

DEVONIAN - TRIASSIC

- **DƮh** — 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
- **DƮs** — 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 - east of McLeod Lake Fault - fragmental basalt, diorite, volcanic clastics and limestone that may be a distal North American assemblage

DEVONIAN - PERMIAN

- **DPa** — ASITKA: arc volcanics and platform carbonates; basement of Stikinia; calc-alkaline basalt to rhyolite flows and pyroclastics interbedded with limestone, shale, volcanic sandstone, minor chert; more tuff and less rhyolite in western Stikinia; includes Lower Devonian; marine and nonmarine

CARBONIFEROUS

- **Cd** — DORSEY: marginal basin chert and clastics; upper unit of chert, quartzite, slate-clast conglomerate, grit, quartzite, ribbon chert and slate and a lower unit of quartzite, argillite and chert interbeds separated by crinoidal and chert-nodule limestone; marine

DEVONIAN - MISSISSIPPIAN

- **DMe** — EARN: fault-trough clastic wedge: DMec in Cassiar Terrane; 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; DCrc in Cassiar Terrane; 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

- **€Dr** — ROCKY MOUNTAINS: passive continental margin sediments; €Drc in Cassiar displaced 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; marine

MIDDLE CAMBRIAN

- **m€r** — Rift assemblage; fanglomerate, block breccia, conglomerate, brick-red sandstone, limestone, siltstone, sandstone; marine and nonmarine

UPPER PROTEROZOIC - LOWER CAMBRIAN

- **P€h** — HYLAND: mainly clastic offshelf passive continental margin sediments; upper unit: blue-grey, apple-green and maroon slate with minor siltstone and sandstone; lower unit: interbedded graded sequence of sandstone, locally conglomeratic, and shale with limestone in upper part; marine
- **P€g** — GOG: rifted and passive continental margin sediments; P€gc in Cassiar Terrane; 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; 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 (uPwcm); marine

MIDDLE PROTEROZOIC

- **mPmu** — MUSKWA: passive continental margin sediments; silty, sandy, calcareous, dolomitic and chamositic mudstone, pebbly mudstone, slate, carbonaceous shale, crossbedded and turbiditic quartzite, argillaceous and stromatolitic dolomite; marine

PLUTONIC AND ULTRAMAFIC ROCKS

Plutonic Suite....Tkope Pluton....(Texas Cr.)

MIOCENE - OLIGOCENE (17 - 29 Ma)

- **MOT** — MOTg - hornblende-biotite tonalite and granodiorite

EARLY TERTIARY (40 - 64 Ma)

- **eT** — 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 feldspar porphyry; eTqn - Nanika: biotite, locally hornblende, quartz monzonite porphyry stocks; eTd - undivided diorite, monzodiorite, gabbro, diabase, amphobolite

CRETACEOUS - TERTIARY

- **KT** — diverse suite of generally foliated and layered granodiorite and quartz monzonite; includes KTt - hornblende-biotite tonalite and quartz monzonite of "tonalite sill" of Western Coast Plutonic Complex; KTg - undivided granodiorite, leucogranodiorite, quartz monzonite, quartz diorite, tonalite

LATE CRETACEOUS (64 - 87 Ma)

- **lK** — lKqs - Surprise Lake: discordant, locally foliated, grey and light brown, smoky quartz- and fluorite-bearing, miarolitic leucocratic alaskite, hornblende granite and quartz monzonite temporarily equivalent to Carmacks assemblage; lKgb - Bulkley: high-level, calc-alkaline, grey and pinkish grey, porphyritic hornblende-biotite granodiorite and quartz monzonite, hornblende and hornblende-quartz porphyry; 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; mKgc - undivided granodiorite, leucogranodiorite, quartz monzonite, quartz diorite, tonalite; 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; mKd - undivided diorite, monzodiorite, gabbro, diabase, amphibolite

UNCERTAIN AGE

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

MIDDLE JURASSIC (155 - 187 Ma)

- **mJ** — mJdgt - Three Sisters: tholeiitic to calc-alkaline, heterogeneous hornblende-biotite diorite and quartz monzodiorite; more homogeneous, fine-grained hornblende-biotite granodiorite; mJd; mJg - foliated diorite, diorite-tonalite complex; foliated hornblende-biotite quartz diorite and granodiorite, respectively in Central Coast Plutonic Complex, altered to greenschist-facies along E. margin

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; eJgb - Black L.: discordant, grey, hornblende-biotite granodiorite to quartz monzonite; grey biotite-hornblende quartz diorite in marginal phases; plugs of pink leucocratic hornblende monzonite; eJqb - undivided granite, leucogranite, alaskite, quartz monzonite, monzonite, granophyre; eJg - older partly foliated and altered hornblende granodiorite and quartz diorite in E. Coast Plutonic Complex; includes Texas Creek Pluton eJgt; eJd - undivided diorite, monzodiorite, gabbro, diabase, amphibolite; eJf - undivided felsite, quartz feldspar porphyry; eJq - undivided granite, leucogranite, alaskite, quartz monzonite, monzonite, granophyre; eJy - undivided syenite, syenodiorite, nepheline syenite, sodalite syenite, jacupirangite, ijolite, urtite

LATE TRIASSIC - EARLY JURASSIC

- **ƮJ** — ƮJg - undivided granodiorite, leucograndiorite, quartz monzonite, quartz diorite, tonalite

LATE TRIASSIC (214 - 235 Ma)

- **lƮ** — lƮgs - Stikine: subalkaline, calc-alkaline, foliated, older, biotite-hornblende diorite; younger, more extensive, foliated, white to mottled pink, hornblende quartz monzodiorite, granodiorite, quartz monzonite; few inclusions; lƮd - undivided diorite, monzodiorite, gabbro, diabase, amphibolite; lƮg - hornblende-biotite quartz diorite - central Coast Plutonic Complex

PERMIAN

- **P** — ePt, ePq - greyish green, foliated , hornblende tonalite; pinkish grey biotite-hornblende granite in Sylvester Allochthon south of lat. 60°N; ePdg - gabbro - granodiorite complex; Pg - undivided granodiorite, leucograndiorite, quartz monzonite, quartz diorite, tonalite

DEVONIAN - TRIASSIC

- **DƮ** — DƮuo - oceanic ultramafic rocks commonly elongate plutons of reddish brown to khaki weathering dunite, olivine-orthopyroxene peridotite (harzburgite), pyroxene; commonly serpentinized; MƮuo - oceanic ultramafic rocks

DEVONIAN - MISSISSIPPIAN

- **DM** — DMg - Granite rocks in Coast Plutonic Complex; eMg - foliated, mylonitic hornblende tonalite to granodiorite in Sylvester Allochthon

EARLY PROTEROZOIC

- **eP** — ePnt - (Tochieka): partly mylonitic potash feldspar augen orthogneiss

VOLCANIC ROCKS

- Calc-alkaline volcanic rocks
- Tholeiitic volcanic rocks
- Bimodal volcanic rocks
- Mixed calc-alkaline volcanic and sedimentary rocks
- Mixed tholeiitic volcanic and sedimentary rocks
- Bimodal alkaline volcanic rocks

METAMORPHIC ROCKS (protolith uncertain)

- **m** — metamorphic rocks (undivided)
- 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
- Left lateral transcurrent fault
- Fault of unknown displacement
- Submerged faults and those buried by younger strata

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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