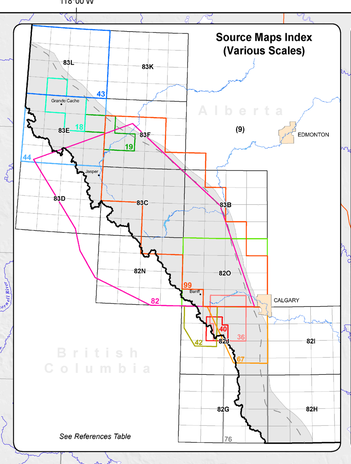
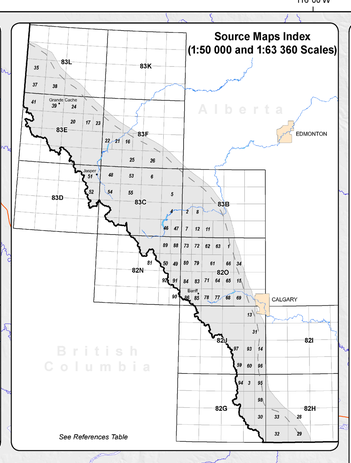
ALBERTA ROCKY MOUNTAINS AND FOOTHILLS
BEDROCK GEOLOGY

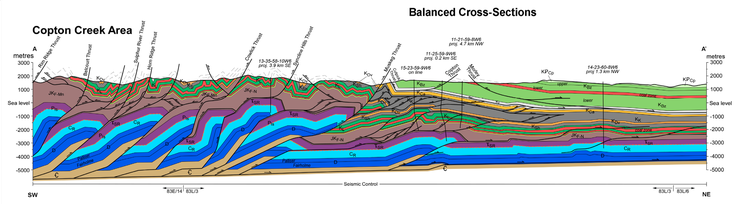
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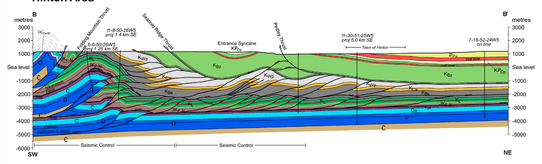
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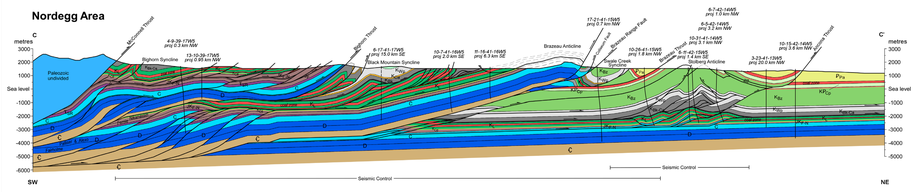


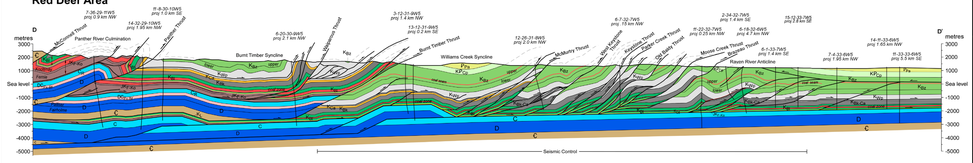


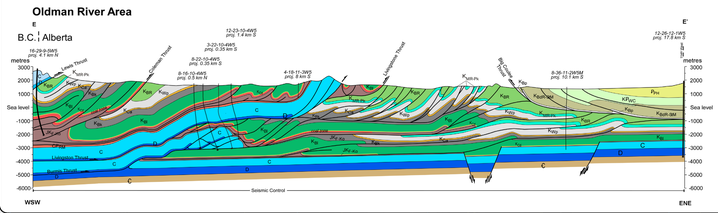
Balanced Cross-Sections











Scale of Cross-Sections

0 1 2 3 4 5 kilometres
0 1 2 3 miles

Adapted from Langenberg et al. (2002)

Approximate limit of Laramide deformation

Age Generalized Stratigraphy (Unit Name: Description)

QUATERNARY

Q — Till, alluvium, colluvium, landslide; debris of nearby bedrock
a, glacier

PALEOCENE and EOCENE

P_{PH} — **PASKAPOO FORMATION:** sandstone, fine to coarse grained, locally massive, cliff forming, buff weathering; shale; carbonaceous shale; siltstone; conglomerate; rare coal seams; shell beds

UPPER CRETACEOUS and PALEOCENE

KP_{CD} — **COALSPUR FORMATION:** shale, grey to olive-green; coaly shale, siltstone, sandstone, numerous thin bentonite beds in the lower part, and coal seams of the Coalspur Coal Zone in the upper part
Entrance Conglomerate Member: conglomerate with chert, rare volcanic, limestone, and phyllite pebbles; sandstone

UPPER CRETACEOUS

K_{BZ} — **BRAZEAU FORMATION**
Upper part: mudstone, siltstone, sandstone, greenish grey; bentonite; thin coal seams towards the top
Lower part: sandstone, siltstone, laminated mudstone, olive green; conglomeratic, granular to pebble sized, chert and quartzite, plant debris; bentonite beds towards the top

ALBERTA GROUP

K_{WD} — **WAPIABI FORMATION**
Nomad Member: mudstone, dark grey; rubbly, rusty weathering; carbonaceous mudstone, greyish green; interbedded sandstone, fine grained, greyish green; thin, chert-pebble conglomerate at base
Chungo Member: sandstone, fine to coarse grained; argillaceous siltstone, dark grey; shale, greyish green, coal at top
Hanson Member: 'concretionary shale' consisting of mudstone, dark grey; argillaceous siltstone; sideritic concretions
Thistle Member: platy shale' consisting of mudstone, dark grey; interbedded with siltstone, thin, indurated; bentonite
Dowling Member: 'concretionary shale' consisting of mudstone and siltstone, dark grey; sideritic concretions, orange weathering; chert-pebble and -cobble conglomeratic at base
Marshybank Member: concretionary mudstone; sideritic concretions, isolated or horizons; sandstone, fine grained; argillaceous siltstone; massive to cross-bedded; silty concretions, orange-red weathering
Musidic Member: silty shale, dark grey, rusty weathering; siderite concretions, dark brown grey, reddish-brown weathering; chert-pebble and -cobble conglomerate at base

K_{CDL} — **CARDIUM FORMATION:** quartzitic sandstone, massive, locally burrowed, locally slightly calcareous, rusty-tan weathering; silty shale, dark grey with locally fossiliferous sideritic concretions, rusty weathering; pebble conglomerate

K_{BK} — **BLACKSTONE FORMATION**
Ospika Member: silty shale and mudstone, dark grey, rusty weathering with large sideritic concretions; massive argillaceous siltstone and sandstone at top
Moosebar Member: shale, dark grey, rusty weathering, platy to rubbly; thin siltstone bed; limestone concretions, yellowish weathering
Vimy Member: calcareous and silty shale, dark to silver grey; siltstone; thin (<0.5 m) beds of dense, argillaceous, dolomitic limestone, locally laminated, bluish grey, yellow to buff weathering; bentonitic layer near the base
Sunkay Member: silty and rarely calcareous shale and mudstone, fissile to platy, rusty weathering, large limestone concretions; thin siltstone beds; bentonite; thin horizon; pebble beds at base

K_{BK-CD} — **BLACKSTONE and CARDIUM FORMATIONS**
(some cross-sections only)

LOWER CRETACEOUS

LUSCAR GROUP

K_{GT} — **GATES FORMATION**
Mountain Park Member: sandstone and conglomeratic sandstone, greenish grey; thick to massive; siltstone; subordinate claystone and coal; rare bentonite
Grande Cache Member: thick coal seams; mudstone; siltstone; sandstone, fine to coarse grained
Torrens Member: sandstone, very fine to very coarse grained; conglomerate
Cadomin Formation: chert conglomerate; dark-olive grey; subordinate siltstone

K_{GL} — **GLADSTONE FORMATION:** sandstone, siltstone, shale, and claystone ('lower member'); argillaceous limestone, fossiliferous calcareous shale ('upper calcareous member')

K_{CD} — **CADOMIN FORMATION:** pebble to cobble conglomerate, clast supported, sandy matrix; interbeds of sandstone and siltstone; locally coal fragments; light grey weathering

JURASSIC to LOWERMOST CRETACEOUS

JK_{NBL} — **NIKANASSIN FORMATION:** carbonaceous shale, dark grey; sandstone, hard, thinly bedded; thin, impure coal layers

UPPERMOST PERMIAN and TRIASSIC

SPRAY RIVER GROUP

TR_{WH} — **WHITEHORSE FORMATION:** dolomitic siltstone and sandstone; shale and siltstone, red, green, and brown; sandy dolostone; limestone and dolostone solution breccia; anhydritic conglomerate
SULPHUR MOUNTAIN FORMATION: siltstone and sandstone, grey and brown, thinly bedded; silty or carbonaceous shale, minor dolomitic siltstone, grey, reddish brown; platy to ragay weathering

UPPER CARBONIFEROUS (PENNSYLVANIAN) and PERMIAN

ROCKY MOUNTAIN GROUP

CP_{RM} — **Quartzose sandstone, light grey; massive chert; dolomitic sandstone; silty dolomite**

LOWER CARBONIFEROUS (MISSISSIPPIAN)

RUNDLE GROUP

C_{RL} — **ETHERINGTON FORMATION:** limestone, light grey; cherty limestone and calcarenitic limestone; dolostone and cherty dolostone; locally green and red; siltstone; limestone and dolostone breccia
MOUNT HEAD FORMATION: dolostone, dense, grey to light brown; argillaceous, silty or cherty dolostone; limestone, mmicritic to medium grained, grey; anhydritic
TURNER VALLEY FORMATION: dolostone and limestone, crinoidal, medium to coarse grained, light grey; limestone, dense, cherty
SHUNDA FORMATION: limestone, dense, light to dark grey; silty and argillaceous dolostone; calcarenitic, cherty or argillaceous limestone; minor breccia
PEKISKO FORMATION: limestone, crinoidal, thickly bedded, medium to coarse grained, light grey; subordinate cherty limestone and dolostone

UPPERMOST DEVONIAN and CARBONIFEROUS

DC_{EX-BE} — **BANFF FORMATION:** cherty and argillaceous limestone, grey, black; siltstone, shale, dolostone black; banded chert
EXSHAW FORMATION: shale, grey, brownish grey; calcareous, dolomitic shale; argillaceous siltstone; silty dolostone

C — **RUNDLE GROUP** and **BANFF and EXSHAW FORMATIONS**
(some cross-sections and western facies in NTS 82J/11-14)

DEVONIAN

D_{FA} — **PALLISER FORMATION:** dolomitic limestone, mottled, thick bedded to massive; limestone, dense, grey, micritic; dolostone, grey to brown; fossiliferous
ALEXO FORMATION: silty dolostone, thinly to medium bedded; argillaceous siltstone, grey and greenish grey, laminated; dolomitic sandstone; dolostone, ruggy, light grey; argillaceous limestone; porcelaneous chert
FAIRHOLME GROUP
Banff-Fringed Carbonate Buildup / *Basinward Off-Reef Facies*
SOUTHESK FORMATION
Arra Member: limestone, granular, light grey, thick bedded; dolostone, coarse grained, vuggy
Grotto Member: dolostone, brown, with corals, crinoids and Amphipora
Flume Member: limestone, light grey, coarsely crystalline; vuggy with some corals and Amphipora
CAIRN FORMATION: dolostone, medium crystalline, thick bedded to massive, dark brownish grey with Amphipora, stromatoporoids, limestone, light grey; dolostone in lower part; minor chert and breccia
MOUNT HAWK FORMATION: calcareous mudstone, grey to brown, limestone nodules; argillaceous limestone
MALIGNE FORMATION: argillaceous limestone, micritic, light grey; dolostone, light grey, thin bedded
PERDRIX FORMATION: bituminous, calcareous, pyritic shale, black with calcareous nodules; argillaceous limestone, dark grey, thin bedded
FLUME FORMATION: partly dolomitic, cherty limestone, micritic, grey to brown with Amphipora, stromatoporoids

ORDOVICIAN and SILURIAN

$\epsilon_{-}S_{BV}$ — **BEAVERFOOT FORMATION:** (spans the Ordovician-Silurian boundary): cherty or silty dolomite; limestone, partly fragmental; minor shale; limestone
MOUNT WILSON FORMATION: quartz sandstone and quartzite, fine to medium grained, light grey to yellowish grey
OWEN CREEK FORMATION: dolostone, olive grey, siliceous, silty, sandy; cherty shale; shale, brown, laminated
SKOKI FORMATION: siliceous dolostone, grey, partly fossiliferous; minor chert masses; sandstone
TIPPERARY FORMATION: quartz sandstone and siltstone, dolomitic; shale; argillaceous limestone
OUTRAM FORMATION: limestone, rhythmically bedded, nodular, cherty, argillaceous, dolomitic, siliceous; brown shale
SURVEY PEAK FORMATION (spans the Cambrian-Ordovician boundary): calcareous shale, grey to olive; interbedded dolostone; limestone, minor chert; flat-pebble limestone conglomeratic siltstone; greenish grey weathering; west of Saskatchewan Crossing includes at the base strata previously assigned to Chushina Formation

UPPER CAMBRIAN

LYNX GROUP

uC — **MISTAYA FORMATION:** carbonate, dense, silty, cliff forming
BISON CREEK FORMATION: shale, grey and green; argillaceous limestone interbeds; recessive
LYELL FORMATION: carbonate, massive, cliff forming
SULLIVAN FORMATION: dolomitic siltstone; shale, greenish grey and brown; thick interbeds of limestone, oolitic, fossiliferous; limestone-pebble conglomeratic dolostone, orange weathering; recessive
WATERFOWL FORMATION (spans the Middle-Upper Cambrian boundary): limestone, dolomite mottling; dolostone, silty or sandy, laminated; chert nodules; yellow, cliff forming

MIDDLE CAMBRIAN

mC — **ARCTOMYS FORMATION:** shale, red, green, grey; siltstone and dolomitic sandstone with ripple marks, mud cracks, and salt casts; minor dolostone, yellow weathering
PIKA FORMATION: limestone, thinly bedded; dolomitic partings and mottling; limestone-pebble conglomeratic oolite; subordinate shale
ELDON FORMATION: limestone, dolomitic mottling; replaced locally by secondary, coarsely crystalline dolomite
STEPHEN FORMATION: shale, grey to green; dense and oolitic limestone; limestone-pebble conglomerate
CATHEDRAL FORMATION: limestone, dolomitic mottling, massive; dolomitized equivalent
MOUNT WHYTE FORMATION: shale, grey to green; limestone, locally oolitic and fossiliferous; limestone-pebble conglomeratic at the base; argillaceous and glauconitic siltstone, green, burrowed

LOWER CAMBRIAN

GOG GROUP

lCc — **HOTA FORMATION:** limestone and dolostone, massive, colour banded light and dark grey; minor sandstone
MAKTO FORMATION: quartzose sandstone, medium to thick bedded, bioturbated, laminated or cross-bedded; alternating with thin siltstone and silty shale
MURAL FORMATION: limestone, dolostone, with archaeocyathid fragments; interbeds of siltstone and calcareous or silty shale, green or grey
McNAUGHTON FORMATION: quartzose sandstone; quartzite, locally pebbly conglomeratic or feldspathic at base, cross-bedded, massive; siltstone
C — Cambrian (loosely undifferentiated
(cross sections only)

NEOPROTEROZOIC

MIETTE GROUP
Upper Part
uPt_{ET} — **EAST TWIN FORMATION:** argillite, purple, green, grey, laminated; very thin interbeds of siltstone; quartzite near top; Twin Formation
Middle and Lower Parts
McKALE FORMATION: sandstone to pebble conglomeratic; argillite grey, green, purple grey; minor micritic or silty limestone

MESOPROTEROZOIC

PURCELL SUPERGROUP*
Upper Part
mPr_{W} — **RODDYLLE FORMATION:** argillite, green and grey; siltstone and sandstone; argillaceous and stromatolitic dolostone; oolitic limestone
PHILLIPS FORMATION: quartzite, red; sandstone, siltstone interbedded with argillite and conglomerate
GATEWAY FORMATION: sandstone, yellowish grey and red, colour laminated; siltstone and sandstone, red, greenish grey; argillite, grey and maroon; dolomitic argillite, ripup clasts, mud cracks, ripple marks
SHEPPARD FORMATION: quartzitic dolostone, light grey; dolomitic siltstone and sandstone; argillite; dolomitic argillite; chloritoid and pillowed andesite
mPr_{PC} — **PURCELL LAVA:** basalt and andesite, dark green and reddish green, chloritized amygdaloidal and pillowed
Lower Part
mPr_{AV} — **SIYEH FORMATION:** dolostone and (+/-algal, oolitic) limestone, grey; argillite, green, dark grey, and red
GRINNELL FORMATION: argillite, green and red colour banding; sandstone and siltstone, red and white with mud cracks and ripple marks; quartzite and minor conglomerate
APPEKUNNY FORMATION: argillite, green, maroon, red; quartzite, white, grey, greyish green, pale red; sandy dolostone
ALTYN FORMATION: dolostone, grey, finely laminated or mottled, buff weathering; sandy and gritty dolostone, light grey; algal dolostone, massive, argillite, dark grey to black, fissile
WATERTON FORMATION: argillaceous dolostone, red, green, and grey; dolostone, algal limestone, grey; argillite, thinly bedded, green and fissile, grey
TOMBSTONE MOUNTAIN FORMATION: argillite, dark grey to black; argillaceous and silty dolostone and limestone
HAIG BROOK FORMATION: dolostone, banded and streaked limestone and dolostone; light grey to yellowish brown
* Mafic sills and dikes (diorite and gabbro), and felsic alkaline sills that intrude the Purcell Supergroup at different stratigraphic levels are not shown on map.

Facies Variations

North ◄ ► South

South of Sheep River

KP_{CD} — **COALSPUR FORMATION:** sandstone, thinly bedded to massive; siltstone; mudstone; light grey to olive green; shale; coaly shale; coal seams of the Entrance Coal Zone (mainly east of the deformation front); minor volcanic tuff in lower part

P_{PH} — **PORCUPINE HILLS FORMATION:** sandstone; cross-bedded to massive, medium to thickly bedded, friable; mudstone, massive, rubbly; pedogenic limestone; granule and pebble conglomerate

KP_{WC} — **WILLOW CREEK FORMATION:** mudstone, grey, green, pink, and red; sandstone, cross-bedded to massive, friable; calcite nodules; granule and pebble conglomerate

$K_{SMR-SSK}$ — **ST. MARY RIVER FORMATION:** shale; coal seams; sandstone; bentonite; siderite concretions
BLOOD RESERVE FORMATION: sandstone, cross-bedded to massive with siderite concretions; local shale partings; oyster coquina lenses

K_{BF} — **BEARPAW FORMATION:** basal coquina; shale, dark grey, blocky; silty shale; thin glauconitic or clayey sandstone; bentonite; sideritic concretions

K_{BR} — **BELLY RIVER GROUP**
DRYWOOD CREEK FORMATION: sandstone; shale; minor coal layers; coquina
LUNDBRECK FORMATION: shale, greenish grey and red; carbonate concretions; pedogenic limestone; channel-fill sandstone bodies
CONNELLY CREEK FORMATION: channel-fill sandstone bodies with wood, plants, and coaly fragments; shale; minor coquina

K_{MR-PN} — **MILK RIVER GROUP and PAKOWKI FORMATION**
PAKOWKI FORMATION: shale, dark grey with black chert pebbles; sandstone, rippled to hummocky cross stratified; black fossils common
MILK RIVER GROUP
DISAUCHER COULEE FORMATION: sandstone, cross-bedded to massive, fine grained; silty shale; rubbly, greenish grey; plant debris
VIRGELLE FORMATION: sandstone, cross-bedded to massive, medium grained
TELEGRAPH CREEK FORMATION: sandstone, fine grained; siltstone, tan, thick bedded to massive; bioturbated; shale, dark grey

K_{WD} — **ALBERTA GROUP**
WAPIABI FORMATION: shale, locally silty or calcareous, dark grey to black; sandstone, fine grained; siltstone, thin bedded; calcareous sandstone, fine grained, grey, thin bedded; limestone, contains ammonites
CARDIUM FORMATION: sandstone, fine grained, grey to dark grey, thin to medium bedded; shale, dark grey; siltstone, dark grey; coal, thin; pebble conglomerate within shale-like sandstone; minor coal seams
KASKAPAU FORMATION: shale, dark grey, fissile; siderite concretions; siltstone, thinly bedded; carbonaceous shale; tongues and lenses of clean sandstone

K_{KC-CD} — **KASKAPAU and CARDIUM FORMATIONS**

K_{DV} — **DUNVEGAN FORMATION:** sandstone, grey to yellowish buff, massive or cross-bedded, fine to medium grained; shale, dark grey; coal, thin; bentonite; thin limestone; rare lenticular coal seams; equivalent to middle part of Dunvegan Fm.

K_{BDL} — **FORT ST. JOHN GROUP**
SHAFTSBURY FORMATION (spans the Lower-Upper Cretaceous boundary): silty or clayey shale, friable, dark grey, rusty weathering; interbedded siltstone, sandstone, and bentonite; equivalent to Upper part; Thin bentonite streaks and ironstone nodules, red-brown weathering

North of Berland River

K_{BD} — **BOULDER CREEK FORMATION:** sandstone, grey, cross-bedded; granule to pebble conglomeratic; carbonaceous siltstone and shale; bentonite
HULCROSS FORMATION: shale, dark grey with ironstone concretions; siltstone, grey, brown weathering, laminated, micaceous and carbonaceous bedding surfaces; recessive, dark grey weathering
GATES FORMATION: carbonaceous sandstone, fine to coarse grained, cross-bedded, tan to red-brown weathering; carbonaceous shale, grey to brown; coal seams; bentonite; rare chert-pebble conglomerate; pebble conglomeratic basal sandstone; fine grained, resistant, brown
MOOSEBAR FORMATION: shale, dark grey with ironstone concretions; sandstone, very fine grained, laminated, thinly bedded; recessive, brown
BULLHEAD GROUP
K_{BG} — **GETHING FORMATION:** carbonaceous sandstone, grey, orange brown, cross-bedded; local, sandy pebble conglomerate; interlayered with coal and carbonaceous siltstone and shale; abundant plant debris throughout

North of Berland River and West of Cowlick Thrust

MINNES GROUP

JK_{GRL} — **GORMAN CREEK FORMATION:** argillaceous sandstone; siltstone; carbonaceous shale and thin coal layers
MONTEITH FORMATION: very fine to fine grained sandstone with interbeds of coarser grained quartzose sandstones; siltstone; shale; carbonaceous shale

North of North Saskatchewan River

ISHBEL GROUP

P_{MN} — **MONKTON FORMATION:** siliceous or calcareous sandstone; local chert and carbonate lenses; thin pebble conglomerate at base
BELCOURT FORMATION: limestone, skeletal; dolostone, finely crystalline; chert- and carbonate-pebble conglomerate at base
(Ishbel Group was subdivided into formations only northwest of Smoky River)

South of Sheep River

P_{PH} — **PORCUPINE HILLS FORMATION:** sandstone; cross-bedded to massive, medium to thickly bedded, friable; mudstone, massive, rubbly; pedogenic limestone; granule and pebble conglomerate

KP_{WC} — **WILLOW CREEK FORMATION:** mudstone, grey, green, pink, and red; sandstone, cross-bedded to massive, friable; calcite nodules; granule and pebble conglomerate

$K_{SMR-SSK}$ — **ST. MARY RIVER FORMATION:** shale; coal seams; sandstone; bentonite; siderite concretions
BLOOD RESERVE FORMATION: sandstone; cross-bedded to massive with siderite concretions; local shale partings; oyster coquina lenses

K_{BF} — **BEARPAW FORMATION:** basal coquina; shale, dark grey, blocky; silty shale; thin glauconitic or clayey sandstone; bentonite; sideritic concretions

K_{BR} — **BELLY RIVER GROUP**
DRYWOOD CREEK FORMATION: sandstone; shale; minor coal layers; coquina
LUNDBRECK FORMATION: shale, greenish grey and red; carbonate concretions; pedogenic limestone; channel-fill sandstone bodies
CONNELLY CREEK FORMATION: channel-fill sandstone bodies with wood, plants, and coaly fragments; shale; minor coquina

K_{MR-PN} — **MILK RIVER GROUP and PAKOWKI FORMATION**
PAKOWKI FORMATION: shale, dark grey with black chert pebbles; sandstone, rippled to hummocky cross stratified; black fossils common
MILK RIVER GROUP
DISAUCHER COULEE FORMATION: sandstone, cross-bedded to massive, fine grained; silty shale; rubbly, greenish grey; plant debris
VIRGELLE FORMATION: sandstone, cross-bedded to massive, medium grained
TELEGRAPH CREEK FORMATION: sandstone, fine grained; siltstone, tan, thick bedded to massive; bioturbated; shale, dark grey

K_{WD} — **ALBERTA GROUP**
WAPIABI FORMATION: shale, locally silty or calcareous, dark grey to black; sandstone, fine grained; siltstone, thin bedded; calcareous sandstone, fine grained, grey, thin bedded; limestone, contains ammonites
CARDIUM FORMATION: sandstone, fine grained, grey to dark grey, thin to medium bedded; shale, dark grey; siltstone, dark grey; coal, thin; pebble conglomerate within shale-like sandstone; minor coal seams
BLACKSTONE FORMATION: shale and mudstone; silty, locally calcareous, dark grey to black; siderite concretions; rusty weathering; locally platy to fissile; glauconitic, grey, thin bedded; argillaceous limestone; chert-pebble conglomerate at base of unit; bentonite; contains ammonites and bivalves

South of Oldman River

K_{CY} — **BLAIRMORE GROUP**
CROWSNEST FORMATION: trachyte and phonolite volcanic breccia; crystal tuff; flows; minor sedimentary rocks; bentonite; a sample from a thick gabbro sill of igneous origin yielded a U-Pb crystallization age of 102.3 ± 1.3 Ma (Ref. 75); plants equivalent to lower Sunkay Member (Blackstone Formation) and uppermost Brazeau Creek Member (Mill Creek Formation)

South of Clearwater River

K_{MC} — **MILL CREEK FORMATION:** sandstone, grey and greenish grey; shale
Brule Creek Member: chert conglomerate; cherty sandstone, thick bedded; tuffaceous beds

Lynx Creek Member: siltstone, grey; shale, black; quartzose and cherty sandstone; mudstone, varicoloured

BEAVER MINES FORMATION: feldspathic sandstone, fine to coarse grained, greenish grey, exotic volcanic pebbles in the lower part, interbedded with mudstone, greenish grey; siltstone, dark green, laminated; caliche; subordinate conglomeratic, bentonitic, and tuffaceous beds

GLADSTONE FORMATION: sandstone, fine grained; siltstone; shale, mottled green and maroon with sideritic concretionary horizons ('lower member'); fossiliferous calcareous sandstone, fine grained, grey; green shale and coquina ('upper calcareous member')

South of Bow River

CADOMIN FORMATION: pebble conglomerate, polymictic; quartzose sandstone; coal fragments; overlain and gradually replaced eastward by the Dalhousie Formation comprising quartzose sandstone, light grey, medium to coarse grained

Pocaterra Creek Member: mudstone, green and red with calcareous nodules and caliche horizons; sandstone and pebble conglomerate

KOOTENAY GROUP

JK_{EK} — **ELK FORMATION:** interbedded sandstone, siltstone, mudstone, shale, and locally, chert-pebble conglomerate and thin coal layers
MIST MOUNTAIN FORMATION: interbedded sandstone, siltstone with shale/mudstone; dark grey to black; rare conglomeratic beds; similar to Elk stratigraphy
MORRISEY FORMATION: quartz and chert sandstone, fine to medium grained, tan to brown weathering; rare interbeds of carbonaceous mudstone, siltstone, and coal

South of Crowsnest River

WINDSOR MOUNTAIN FORMATION: dolostone; mottled dolomitic limestone
ELKO FORMATION: mottled dolomitic limestone
GORDON FORMATION: shale, micaceous, green; limestone; minor limonitic quartz sandstone
FLATHEAD FORMATION: basal quartzite and conglomerate; conglomerate, pale orange; quartz sandstone

Banff-Lake Louise Area and South

FAIRHOLME GROUP
SOUTHESK FORMATION: dolostone, bioturbinal and bioherminl, light grey and dark grey brown; coarsely crystalline
MOUNT HAWK FORMATION: argillaceous limestone, fine to very fine crystalline
BORGATO FORMATION: dolostone, grey to brownish black, fine to coarse crystalline
HOLLEBEKE FORMATION: sandy dolostone and dolomitic quartz sandstone; fine grained, quartzose sandstone; dolomitic siltstone, tan, grey, and green; argillaceous and nodular limestone; argillaceous and silty dolostone

The unit labelled "D" may locally include at its base channel-filling red beds of the Middle Devonian Yahatinda Formation comprising sandy dolostone, tan, red, and green weathering; shale, red and green; dolostone, tan

Banff-Lake Louise Area and South

FAIRHOLME GROUP
SOUTHESK FORMATION: dolostone, bioturbinal and bioherminl, light grey and dark grey brown; coarsely crystalline
MOUNT HAWK FORMATION: argillaceous limestone, fine to very fine crystalline
BORGATO FORMATION: dolostone, grey to brownish black, fine to coarse crystalline
HOLLEBEKE FORMATION: sandy dolostone and dolomitic quartz sandstone; fine grained, quartzose sandstone; dolomitic siltstone, tan, grey, and green; argillaceous and nodular limestone; argillaceous and silty dolostone

The unit labelled "D" may locally include at its base channel-filling red beds of the Middle Devonian Yahatinda Formation comprising sandy dolostone, tan, red, and green weathering; shale, red and green; dolostone, tan

SASSENACH FORMATION: calcareous or phosphatic sandstone and quartzose sandstone, fine grained, grey or greenish grey; silty or dolomitic shale, dark grey to greenish grey; argillaceous limestone; partly equivalent to the upper part of Alexo Formation

Jasper Area and North

SNAKE INDIAN FORMATION: alternating units of limestone and shale; limestone, micritic with parts calcarenitic; shale, grey, green, and red; siltstone, red and green; equivalent to the Mount Whyte, Cathedral, and Stephen formations of the platformal facies

Banff-Lake Louise Area

PEYTO FORMATION: limestone, micritic, in part, nodular; grainstone, oolitic and skeletal; packstone, with oncolites, in part; quartz sand, thrombolites, and stromatolites; equivalent to Hota Formation

South of Crowsnest River

WINDSOR MOUNTAIN FORMATION: dolostone; mottled dolomitic limestone
ELKO FORMATION: mottled dolomitic limestone
GORDON FORMATION: shale, micaceous, green; limestone; minor limonitic quartz sandstone
FLATHEAD FORMATION: basal quartzite and conglomerate; conglomerate, pale orange; quartz sandstone

Jasper Area and North

JASPER FORMATION: interbedded sandstone, siltstone, and argillite; pebble- to cobble-conglomeratic, brown to light grey
MIETTE GROUP
DYNG FORMATION: dolostone, finely crystalline, massive, light brown to grey, locally Ediacaran fossils, stromatolites, and psoliites; equivalent to upper East Twin Formation
OLD FORT POINT FORMATION: slate with siltstone, grey, green, purple; quartzite, fine grained, brecciated, calcareous sandstone, rippled; equivalent to middle McKale Member and correlative to the lower part of Hector Formation, Ref. 10

Banff-Lake Louise Area

Middle Part
HECTOR FORMATION: slate, grey or purple to green; feldspathic grity sandstone; quartz-pebble conglomerate; quartz sandstone and siltstone; flat-pebble conglomerate and diamictite at base
CORRAL CREEK FORMATION: slate, green and purple; limestone beds

Notes

1. The left-most column is the general legend for the Alberta Rocky Mountains and Foothills and includes the Purcell Supergroup, which is present only south of the Crowsnest River; columns to the right include facies variations and name changes or constitutive units along strike.
2. Not all rock units present in the source materials could be represented on this regional-scale map; units were required for the correct representation of rock distribution and contact relationships, many structural elements have been eliminated:
   - linear structural elements (faults, synciline and anticline axes) shorter than 5 km
   - intraformational thrusts and minor displacement thrusts in areas of high density (too closely spaced for the map scale)
3. Due to the scale difference and representation needs, selected stratigraphic units may not match the stratigraphic charts in some sections, and not all structural elements from cross sections are shown on the map.
4. Due to the scale of the map, the thicknesses of the geologically significant Rocky Mountain/Ishbel groups and Cadomin/Dalhousie formations were locally exaggerated.
5. The source map for a relatively large area centred on Saskatchewan River Crossing (NAD83/Z-7 and NAD83/Z-10, 14, and 15) consists of a reconnaissance-level map (Ref. 82) and includes much less detail and resolution than the rest of this map.
6. Milk River Group and Pakowki Formation are represented only on source maps published after 1993; on this map, they are arbitrarily traced throughout the southern Alberta Plains to the Cypress Hills Formation, Ref. 77, to the international boundary.
7. Quaternary deposits are shown selectively along major river valleys.
8. Only glaciers larger than 2.5 km² and lakes larger than 1 km² are shown.

Symbols

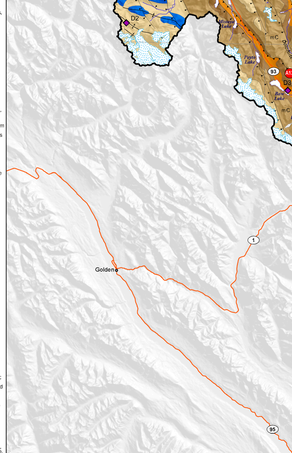
- Thrust fault
- Inferred thrust fault
- Zone of two or more closely spaced parallel thrusts
- Thrust shear zone
- Normal fault
- Transverse fault (strike and/or dip slip)
- Anticline; overturned anticline
- Syncline; overturned syncline
- Coal zone (cross-sections)
- Coal seam (cross-sections)

- A — $^{40}Ar/^{39}Ar$ age of authigenic illite from thrust-fault gouge
- Trachyte, syenite, latite, felsite dike, and sill, intrusion breccia
- Trachyte sill from Clark Range yielded U-Pb crystallization ages of 105.8 ± 4.7 Ma from zircon oscillatory zoned overgrowths and 102.4 ± 0.5 Ma from titanite (Ref. 75)
- Minor mafic intrusion of unknown age
  - D1 - Yoke-head dike
  - D2 - Pipe-like intrusion
  - D3 - Dowfoot dike
  - D4 - Blackseat dike
- Purcell mafic sill (diorite and gabbro)
- Purcell biotite-olivine gabbroic sill at the Appekunny-Grinnell contact yielded a U-Pb isotope-dilution crystallization age of 1439.2 ± 1.1 Ma (Ref. 76)

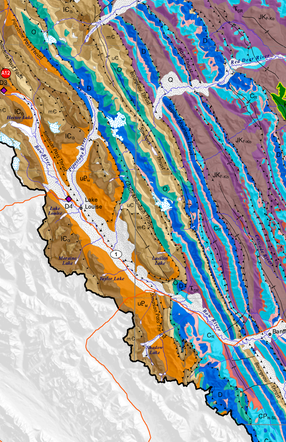
Summary of Authigenic Illite $^{40}Ar/^{39}Ar$ Ages Obtained from Thrust Fault-Gouge Samples
(Samples are listed in geographic sequence from north to south)

Label	Thrust Name	Hangingwall	Footwall	Age ± 2σ Error (Ma)	Source
A1	Muskeg	Gates sandstone (Lower Cretaceous)	Kaskapau shale/siltstone (Upper Cretaceous)	61.9 ± 1.7	Ref. 101
A2	Broadview	Whitehorse silty dolomite (Triassic)	Fernie shale (Jurassic)	97.2 ± 3.3	Ref. 101
A3	Rocky Pass	Rundle carbonate (Mississippian)	Nikanassin shale/siltstone (Upper Jurassic-Lower Cretaceous)	75.0 ± 3.4	Ref. 101
A4	Brule	Palliser carbonate (Upper Devonian)	Nikanassin shale/siltstone (Upper Jurassic-Lower Cretaceous)	56.6 ± 1.2	Ref. 101
A5	Greenock	Lower Rundle carbonate (Mississippian)	Fernie shale (Jurassic)	103.9 ± 0.3	Ref. 101
A6	Nikanassin	Palliser carbonate (Upper Devonian)	Nikanassin shale/siltstone (Upper Jurassic-Lower Cretaceous)	53.2 ± 0.5	Ref. 101
A7	Pyramid	Miette grit (Neoproterozoic)	Perdrix/Sassenach shale (Upper Devonian)	158.0 ± 2.3	Ref. 101
A8	Sulphur Mountain	Rundle carbonate (Mississippian)	Fernie shale (Jurassic)	72.4 ± 0.7	Ref. 101
A9	McConnell	Eldon carbonate (Middle Cambrian)	Luscar shale/siltstone (Lower Cretaceous)	53.6 ± 1.1	Ref. 101
A10	Johnston Creek	Miette sandstone/siltstone/grit (Neoproterozoic)	Eldon carbonate (Middle Cambrian)	148.6 ± 2.9	Ref. 101
A11	Clearwater	Banff carbonate (Mississippian)	Kootenay shale/siltstone (Upper Jurassic-Lower Cretaceous)	74.2 ± 6.7	Ref. 101
A12	Simpson Pass	Gog quartzite/quartz sandstone (Lower Cambrian)	Pika carbonate (Middle Cambrian)	155.4 ± 4.2	Ref. 101
A13	McConnell	Eldon carbonate (Middle Cambrian)	Belly River shale/siltstone (Upper Cretaceous)	51.0 ± 3.5	Ref. 100
A14	Rundle	Palliser carbonate (Upper Devonian)	Kootenay shale/siltstone (Upper Jurassic-Lower Cretaceous)	72.7 ± 6.1	Ref. 100
A15	McConnell	Palliser carbonate (Upper Devonian)	Belly River shale/siltstone (Upper Cretaceous)	54.0 ± 1.6	Ref. 100
A16	Sulphur Mountain	Palliser carbonate (Upper Devonian)	Fernie shale (Jurassic)	68.4 ± 13.0	Ref. 100
A17	Lewis	Rundle carbonate (Mississippian)	Fernie shale (Jurassic)	72.3 ± 2.3	Ref. 100
A18	Lewis	Palliser carbonate (Upper Devonian)	Belly River shale/siltstone (Upper Cretaceous)	51.5 ± 2.2	Ref. 100

Total-Field Magnetic Map



Location Map



References (Map scales are 1:50 000 unless otherwise specified)*

1	Beach, H.H. (1942): Bearberry, Alberta; GSC, Map 670A, scale 1:63 360.	NTS 82O/15 W
2	Crombie, G.P. and Erdman, O.A.(1947): Aleso, West of Fifth Meridian, Alberta; GSC, Map 884A, scale 1:63 360.	NTS 83B/5 W
3	Douglas, R.J.W. (1949): Gap, West of Fifth Meridian, Alberta; GSC, Map 978A, scale 1:63 360.	NTS 82G/16 W
4	Douglas, R.J.W. (1956): Nordegg, Alberta; GSC, Paper 55-34, scale 1:63 360.	NTS 83C/8
5	Douglas, R.J.W. and Mackay, B.R. (1958): Chungo Creek, West of Fifth Meridian, Alberta; GSC, Preliminary Map 6-1958, scale 1:63 360.	NTS 83C/9
6	Douglas, R.J.W. and Lebel, D. (1993): Geology, Cardinal River, West of Fifth Meridian, Alberta; GSC, Map 1828A.	NTS 83C/15
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