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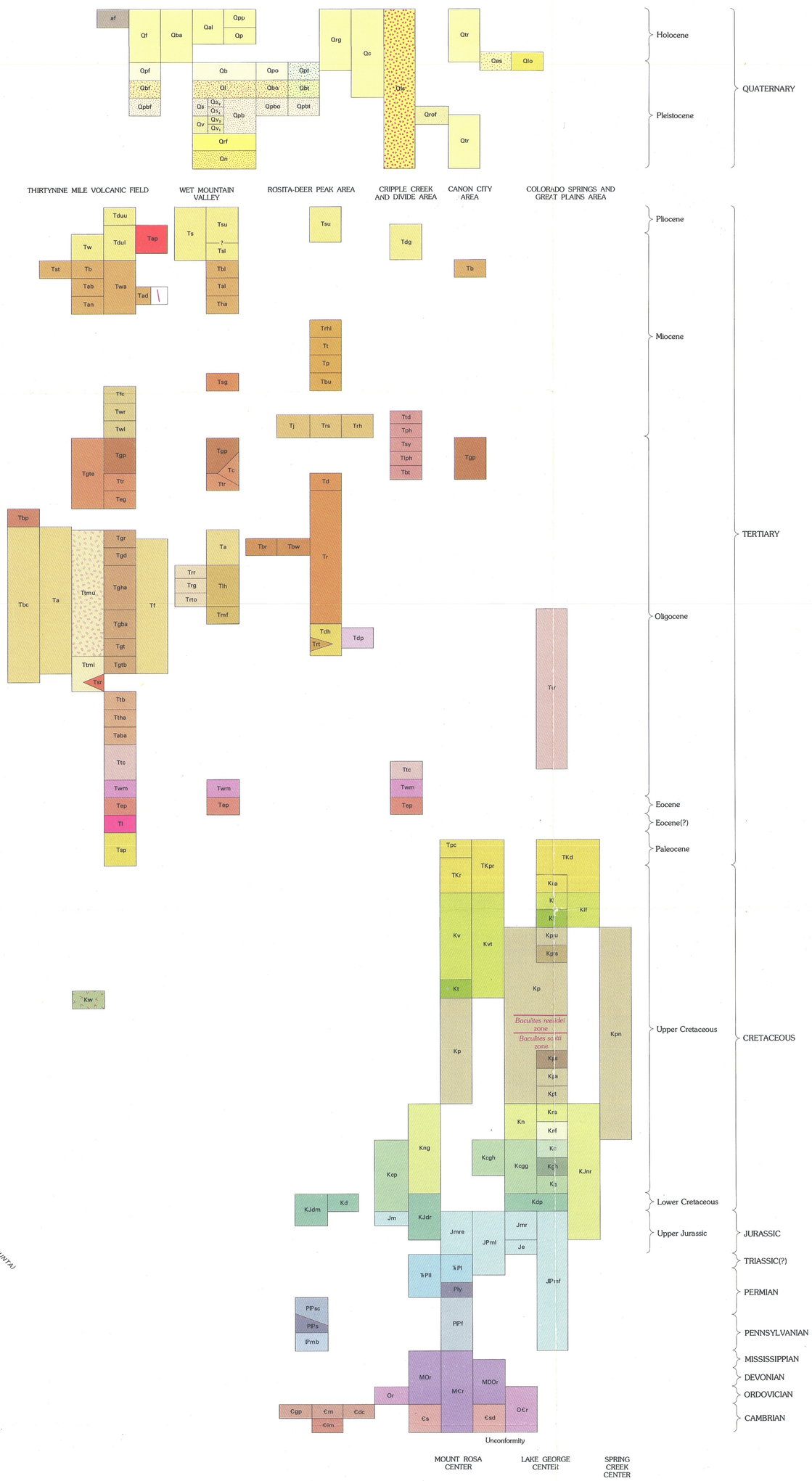
CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

[For this map the base of the Miocene is placed at 29 million years]

af — ARTIFICIAL FILL (HOLOCENE)—Mill tailings, slag, and quarry waste at Colorado Springs and along Arkansas River

Qf — FAN ALLUVIUM (HOLOCENE)—Bouldery, poorly sorted, crudely stratified, steeply sloping alluvium along mountain fronts

Qba — BASIN-FILL ALLUVIUM (HOLOCENE)—Sulfate-rich clayey to sandy alluvium in San Luis Valley

Qal — ALLUVIUM (HOLOCENE)

Qpp — Post-Piney Creek alluvium—Sandy to gravelly alluvium along all large streams; not shown where bedrock contacts are closely spaced

Qp — Piney Creek Alluvium—Silty to gravelly humus-rich alluvium along all valleys

Qrg — ROCK GLACIER (HOLOCENE TO PINEDALE GLACIATION OF THE PLEISTOCENE)—Blocks of rock in flow sheets in valleys above 10,000 feet (3,000 m) altitude

Qc — COLLUVIUM (HOLOCENE AND PLEISTOCENE)—Nonsorted, nonstratified, coarse-grained slopewash in mountains and a fine-grained deposit on plains. In southeastern part of quadrangle includes some loess and residuum

Qls — LANDSLIDE DEPOSIT (HOLOCENE AND PLEISTOCENE)—Earth-flows and debris slides on steep slopes

Qtr — TRAVERTINE (HOLOCENE AND PLEISTOCENE)—Includes calcareous tufa along and south of Arkansas River

Qes — EOLIAN SAND (HOLOCENE AND PINEDALE GLACIATION OF THE PLEISTOCENE)—Fine to coarse, windblown sand

Qlo — LOESS (HOLOCENE AND PINEDALE GLACIATION OF THE PLEISTOCENE)—Windblown clayey silt east of Fountain Creek near Fountain

PINEDALE GLACIATION (PLEISTOCENE):

Qpf — Fan alluvium—Thick gravelly deposits, in part outwash, chiefly in San Luis Valley and upstream from Elevenmile Canyon

Qb — Broadway Alluvium—Thin gravelly deposits on terraces 40 feet (12 m) above streams on the plains

Qpo — Outwash—Gravelly deposits along east flank of Sangre de Cristo Range and around Pikes Peak

Qpt — Till—Terminal and lateral moraines of glaciers in the Sangre de Cristo Range and around Pikes Peak

BULL LAKE GLACIATION (PLEISTOCENE):

Qbf — Fan alluvium—Thick gravelly deposits, in part outwash, chiefly in San Luis Valley and upstream from Elevenmile Canyon

Ql — Louviers Alluvium—Thin gravelly deposits on terraces 70 feet (21 m) above streams on the plains

Qbo — Outwash—Gravelly deposits at two levels along east flank of Sangre de Cristo Range and at one level north of Pikes Peak

Qbt — Till—Terminal and lateral moraines of glaciers in the Sangre de Cristo Range and around Pikes Peak

PRE-BULL LAKE GLACIATION (PLEISTOCENE):

Qpbf — Fan alluvium—Pebbly gravel near Villa Grove

Qs — Slocum Alluvium (Sangamon Interglaciation or Illinoian Glaciation)—Weathered gravel on cut surface about 100 feet (30 m) above modern streams. Near Canon City gravel lies at two levels, 100 (Qs_2) and 120 (Qs_1) feet (30 and 36 m), above streams

Qpb — Alluvium—Includes Slocum(?) and Verdos(?) Alluviums

Qpbo — Outwash—Bouldery gravel

Qpbt — Till—Nonsorted, deeply weathered, bouldery deposit on east flank of Sangre de Cristo Range

Qrof — ROCKFALL DEPOSIT (YARMOUTH? INTERGLACIATION OF THE PLEISTOCENE)—Bouldery deposit on east flank of Cheyenne Mountain, southwest of Colorado Springs

Qv — VERDOS ALLUVIUM (YARMOUTH INTERGLACIATION OR KANSAN GLACIATION OF THE PLEISTOCENE)—Weathered gravel on cut surface 200–250 feet (60–75 m) above modern streams except near Westcliffe where it is only 20 feet (6 m) above Grape Creek. Near Canon City gravel lies at two levels, 240 (Qv_2) and 300 (Qv_1) feet (72 and 90 m), above streams. Contains Pearlette ash bed type O in Twelvemile Park and near Westcliffe

Qrf — ROCKY FLATS ALLUVIUM (AFTONIAN INTERGLACIATION OR NEBRASKAN GLACIATION OF THE PLEISTOCENE)—Weathered gravel on cut surface 350 feet (105 m) above modern streams. Near Canon City gravel lies at two levels, 320 and 360 feet (96 and 108 m), above streams

Qn — NUSSBAUM ALLUVIUM (NEBRASKAN? GLACIATION OF THE PLEISTOCENE)—Weathered gravel on pediment 450 feet (135 m) above modern streams

DRY UNION FORMATION—Fluvial deposits probably more than 5,000 feet (1,500 m) thick near Salida and Howard

Tduu — Upper part (upper Pliocene)—Conglomerate composed chiefly of Precambrian rock clasts

Tdul — Lower part (upper Pliocene to lower Miocene)—Clay, silt, sand, and conglomerate composed mainly of fragments of volcanic rocks

SANTA FE(?) FORMATION (PLIOCENE AND MIOCENE)—In Wet Mountain Valley more than 1,000 feet (300 m) thick

Ts — Upper part—Conglomerate, gravel, sand, silt, and clay. Upper part of deposit reworked in Quaternary time

Tsu — Lower part—Conglomerate and gravel

Tsl

Tw — WAGONTONGUE FORMATION[1] (MIOCENE)—Sand, gravel, and siltstone nearly 1,000 feet (300 m) thick south of Antero Reservoir

Tap — ANDESITE PLUG (PLIOCENE? OR MIOCENE?)—Basaltic andesite 4 miles (6 km) northwest of Coaldale

Tdg — GRAVEL AT DIVIDE (PLIOCENE AND MIOCENE)—Bouldery gravel and crudely stratified sand, silt, and clay as much as 200 feet (60 m) thick

Tst — SILICEOUS TUFF (MIOCENE)—Quartz-rich tuff on Big Baldy Mountain about 4 miles (6 km) east of Salida

Tb — BASALT (MIOCENE)—Flows at Herring Park north of Cameron Mountain and volcanic necks south of Canon City that intrude Cretaceous and Oligocene rocks

Twa — ANDESITE OF WAUGH MOUNTAIN (MIOCENE)—Andesitic and basaltic flows, flow breccias, lahars, and tuffs

Tbl — BIOTITE LATITE (MIOCENE)—Porphyritic flow on Goat Creek south of Hillside

Tab — ANDESITE OF BIG BALDY MOUNTAIN (MIOCENE)—Autobrecciated porphyritic andesite flows and minor breccias exposed east and northeast of Salida

Tal — LAHAR (UPPER? TO LOWER? MIOCENE)—Andesitic mudflow or alluvial deposit southwest of Cotopaxi

Tad — DIKES AND SILLS (MIOCENE)—Porphyritic rhyolite to andesite near Coaldale

Tan — ANDESITE (MIOCENE)—Flows and mudflows east of Salida

Tha — HORNBLENDE ANDESITE (MIOCENE)—Dense and medium-grained porphyritic flows near Hillside and Cotopaxi

Trhl — RHYOLITE (MIOCENE)—Plugs at Mount Tyndall, Wilmer Gulch and Johnson Gulch ("Antrim Lode") near Rosita

Tt — TRACHYTE (MIOCENE)—Stocks and dikes of porphyritic trachyte near Rosita

Tp — PRINGLE LATITE (MIOCENE)—Porphyritic biotite latite forming stocks, dikes, and flows near Rosita

Tsg — SODA GRANITE (MIOCENE?)—Forms finely crystalline, shallow intrusive of Slide Rock Mountain stock near Coaldale

Tbu — BUNKER TRACHYANDESITE (MIOCENE)—Porphyritic fine-grained syenodiorite to trachyandesite in stocks, dikes, and flows at Rosita

Tfc — CONGLOMERATE OF FEAR CREEK (MIOCENE)—Conglomerate, airfall tuff, ash-flow tuff, and water-laid tuff about 200 feet (60 m) thick southeast of Waugh Mountain

Twr — RHYOLITE OF WAUGH MOUNTAIN (MIOCENE)—Tan to white porphyritic sanidine-rich dikes, plugs, and flows

Twl — LATITE OF WAUGH MOUNTAIN (MIOCENE)—Gray porphyritic sanidine-plagioclase-rich autobrecciated flows

Tj — ASH AT JOHNSON GULCH (MIOCENE)—Water-laid ash in a downdropped block, possibly 5,000 feet (1,500 m) deep, northeast of Silver Cliff

Trs — RHYOLITE (MIOCENE)—Rhyolite and glass near Silver Cliff

Trh — RHYOLITE (MIOCENE)—Flow-banded rhyolite, glass, and perlite flows near Rosita

Ttd — TRACHYDOLERITE (MIOCENE)—Sill-like mass at Bull Cliff between Cripple Creek and Victor

Tph — PHONOLITE (MIOCENE)—Dikes and plugs of dense rock having platy structure near Cripple Creek

Tsy — SYENITE (OLIGOCENE)—A stock and several dikes of medium- to fine-grained feldspar-pyroxene syenite near Victor

Tlph — LATITE-PHONOLITE (OLIGOCENE)—Dikes and irregular masses of dense rock within the breccia near Victor

Tbt — BRECCIA AND TUFF (OLIGOCENE)—Altered fragmental rock composed mostly of latite phonolite near Victor

Tgte — GRIBBLES PARK, THORN RANCH, AND EAST GULCH TUFFS (OLIGOCENE)—Exposed mostly near Waugh Mountain

Tgp — Gribbles Park Tuff—Biotite-sanidine rhyolite ash-flow tuff

Ttr — Thorn Ranch Tuff—Biotite-sanidine rhyolite ash-flow tuff

Teg — East Gulch Tuff—Sanidine-biotite-quartz rhyolite ash-flow tuff

Tc — COLLUVIUM (OLIGOCENE)—Local boulder deposit on walls of paleovalley about 20 feet (6 m) thick east of Hillside

Td — RHYODACITE (OLIGOCENE)—Porphyritic rhyodacite in plug near Rosita

Tr — ROSITA ANDESITE (OLIGOCENE)—Porphyritic andesite and trachyandesite in flows, lahars, and breccia. Bassick Agglomerate included in map unit

Tbp — BUFFALO PEAKS ANDESITE (OLIGOCENE?)—Augite-hypersthene-hornblende andesite lahar, ash-flow, and flow southwest of Antero Reservoir

Tbc — BADGER CREEK TUFF (OLIGOCENE)—Biotite-sanidine-hornblende-plagioclase latite ash-flow tuff. In Antero syncline intertongues with and is mapped with Antero Formation

Ta — ANTERO FORMATION[2] (OLIGOCENE)—Water-laid andesitic ash interlayered with air-fall and ash-flow tuff and lahar. As much as 2,000 feet (600 m) thick

THIRTYNINE MILE ANDESITE (OLIGOCENE):

Ttmu — Upper member—Stratified lava flows on the flanks of the Guffey volcanic center

Ttml — Lower member—Laharic breccia from local vents. Includes a small body of andesite in sec. 24, T. 12 S., R. 76 W. that is older than the Wall Mountain Tuff

Tsr — TUFF OF STIRRUP RANCH (OLIGOCENE)—Yellowish-gray biotite-plagioclase-sanidine rhyolite ash-flow tuff near Guffey

Tgr — RHYOLITE (OLIGOCENE)—Pink flow-banded intrusive dome near Guffey

Tgd — DIORITE (OLIGOCENE)—Greenish-gray fine-grained pyroxene diorite stock near Guffey

Tgha — HORNBLENDE ANDESITE (OLIGOCENE)—Greenish-gray flow-layered domes and domal lava flows near Guffey

Tgba — BIOTITE ANDESITE (OLIGOCENE)—Reddish-gray flow-layered domes and domal lava flows near Guffey

Tgt — TRACHYTE (OLIGOCENE)—Yellowish-pink sanidine trachyte in flows and subvolcanic intrusions near Guffey

Tgtb — TUFF AND TUFF BRECCIA (OLIGOCENE)—Bedded andesitic lapilli tuff and pyroclastic breccia near Guffey

Tf — FLORISSANT LAKE BEDS (OLIGOCENE)—Thinly stratified water-laid andesitic ash and volcaniclastic rocks less than 150 feet (45 m) thick

Tbr — RHYOLITE AT BEN WEST HILL (OLIGOCENE)—Flows and domes near Westcliffe

Tbw — QUARTZ LATITE AT BEN WEST HILL (OLIGOCENE)—Porphyritic stock near Westcliffe

RITO ALTO STOCK (OLIGOCENE)—East of Villa Grove in Sangre de Cristo Range

Trr — Rhyolite—Leucocratic dikes and small intrusive masses

Trg — Granite—Coarsely porphyritic, pink to gray, small intrusive masses

Trto — Tonalite—Medium-grained clinopyroxene-hornblende-biotite tonalite; the main rock in stock

Tlh — BIOTITE LATITE (OLIGOCENE)—Flows and fissure vent fillings of porphyritic biotite latite near Cotopaxi and Hillside

Tmf — LAHAR (OLIGOCENE)—Bouldery, andesitic to rhyolitic mudflows south of Cotopaxi

Tdh — DEVILS HOLE FORMATION (OLIGOCENE)—Pumiceous lahar, alluvium, air-fall and water-laid ash; in part deposited in paleovalley near Rosita

Trt — Ash-flow tuff—Biotite-sanidine rhyolite tuff

Tdp — DEER PEAK VOLCANICS (OLIGOCENE)—Stock, andesitic flows, lahars, and volcanic sediments from the Deer Peak volcano. More than 1,500 feet (450 m) thick between Rosita and Deer Peak

Tcr — CASTLE ROCK CONGLOMERATE (OLIGOCENE)—Cliff-forming conglomerate about 30 feet (9 m) thick composed largely of clasts of Wall Mountain Tuff. Exposed only in northeastern part of quadrangle

Ttb — BASALT (OLIGOCENE)—Black dense flows from the Thirtyone Mile Mountain volcanic center south of Guffey

Ttha — HORNBLENDE ANDESITE (OLIGOCENE)—Gray flow-layered porphyritic domes and domal lavas of Thirtyone Mile Mountain volcanic center south of Guffey

Taba — BIOTITE ANDESITE (OLIGOCENE)—Gray porphyritic flow-layered dome and domal lavas of East and West Antelope Mountains south of Guffey

Ttc — TALLAHASSEE CREEK CONGLOMERATE (OLIGOCENE)—Poorly sorted, bouldery, volcanic conglomerate more than 350 feet (105 m) thick in paleovalleys

Twm — WALL MOUNTAIN TUFF (OLIGOCENE)—Biotite-plagioclase-sanidine rhyolite ash-flow tuff. As much as 200 feet (61 m) thick

Tep — ECHO PARK ALLUVIUM (EOCENE)—Poorly sorted arkosic gravel and conglomerate more than 1,000 feet (300 m) thick in paleovalleys and grabens

Tl — LATITE PORPHYRY (EOCENE?)—Intruded along Trout Creek fault southwest of Antero Reservoir

Tsp — SOUTH PARK FORMATION (PALEOCENE)—Andesitic conglomerate, sandstone, siltstone, and claystone

Tpc — POISON CANYON FORMATION (PALEOCENE)—Medium-grained sandstone, and in lower part conglomerate. Partly volcaniclastic. Probably totaling 500–1,000 feet (150–300 m) thick

TKd — DAWSON FORMATION (PALEOCENE AND UPPER CRETACEOUS)—Arkosic and andesitic coarse-grained sandstone, siltstone, and claystone about 1,800 feet (540 m) thick. Contains Paleocene andesitic mixed-rock lens near middle of Dawson, but not separately mapped, extending between Kettle Creek and Corral Bluffs northeast of Colorado Springs

Kda — Andesitic lens—Conglomerate, sandstone, siltstone, and claystone in lens 185 feet (55 m) thick at the base of Dawson

TKr — RATON FORMATION (PALEOCENE AND UPPER CRETACEOUS)—Cliff-forming sandstone probably less than 500 feet (150 m) thick

TKpr — POISON CANYON AND RATON FORMATIONS

Kv — VERMEJO FORMATION (UPPER CRETACEOUS)—Cross-stratified sandstone interlayered with shale and coal about 850 feet (255 m) thick. Rockvale Sandstone Member lies 150–375 feet (45–115 m) above base

Kt — TRINIDAD SANDSTONE (UPPER CRETACEOUS)—Cross-stratified sandstone, massive in upper part and thin bedded in lower part. As much as 90 feet (27 m) thick

Kvt — VERMEJO FORMATION AND TRINIDAD SANDSTONE

Kl — LARAMIE FORMATION (UPPER CRETACEOUS)—Friable sandstone and near middle sandy shale. About 250 feet (75 m) thick

Kf — FOX HILLS SANDSTONE (UPPER CRETACEOUS)—Olive-gray thin-bedded friable fine-grained sandstone in upper 100 feet (30 m) and olive-brown massive friable sandstone in lower 150 feet (45 m). Thickness 250 feet (75 m)

Klf — LARAMIE FORMATION AND FOX HILLS SANDSTONE

Kp — PIERRE SHALE (UPPER CRETACEOUS)—Predominantly siltstone and claystone. Contains sandstone and sandy shale near top and bottom, limestone masses forming conical buttes near middle, and fossiliferous concretions throughout. *Baculites eliasi* is the uppermost faunal zone at the top of the Pierre in Canon City area. Thickness in Denver basin part of quadrangle is 3,750–5,200 feet (1,125–1,560 m); near Canon City is 3,900 feet (1,170 m)

Kptu — Upper transition member (upper part)—Sandy shale, siltstone, and friable sandstone

Kpts — Upper transition member (lower part)—Friable sandstone

Kps — Sharon Springs Member—Silty, hard, carbonaceous, gypsiferous, fissile shale

Kpa — Apache Creek Sandstone Member—Shale containing concretions and thin lenses of fine-grained sandstone

Kpt — Lower transition member—Calcareous clayey shale and platy to shaly chalk

Kpn — PIERRE SHALE AND NIOBRARA FORMATION

Kw — WHITEHORN GRANODIORITE (UPPER CRETACEOUS)—Fine- to medium-grained quartz-plagioclase-orthoclase-augite-hornblende-biotite granodiorite exposed northeast of Salida

Kn — NIOBRARA FORMATION (UPPER CRETACEOUS)—About 740 feet (220 m) thick

Kns — Smoky Hill Shale Member—Calcareous shale, ledge-forming limestone, and chalk

Knf — Fort Hays Limestone Member—Thick-bedded limestone

Kng — NIOBRARA FORMATION, CARLILE SHALE, GREENHORN LIMESTONE, AND GRANEROS SHALE

KJnr — NIOBRARA FORMATION, DAKOTA SANDSTONE, PURGATOIRE FORMATION, MORRISON FORMATION, AND RALSTON CREEK FORMATION—Along Wet Mountain fault

Kcgh — CARLILE SHALE AND GREENHORN LIMESTONE

Kcgg — CARLILE SHALE, GREENHORN LIMESTONE, AND GRANEROS SHALE

Kc — CARLILE SHALE (UPPER CRETACEOUS)—From top includes: Juana Lopez Member (calcarenite), Codell Sandstone Member, Blue Hill Shale Member, and Fairport Chalky Shale Member. As much as 230 feet (70 m) thick

Kgh — GREENHORN LIMESTONE (UPPER CRETACEOUS)—From top includes: Bridge Creek Limestone Member, Hartland Shale Member, and Lincoln Limestone Member. About 150 feet (45 m) thick

Kg — GRANEROS SHALE (UPPER CRETACEOUS)—Hard silty shale about 100 feet (30 m) thick

Kcp — CARLILE SHALE, GREENHORN LIMESTONE, GRANEROS SHALE, DAKOTA SANDSTONE, AND PURGATOIRE FORMATION

Kdp — DAKOTA SANDSTONE AND PURGATOIRE FORMATION (LOWER CRETACEOUS)—Sandstone, marine shale, and clay. About 220 feet (65 m) thick

Kd — DAKOTA SANDSTONE (LOWER CRETACEOUS)—About 100 feet (30 m) thick

KJdm — DAKOTA SANDSTONE, PURGATOIRE FORMATION, AND MORRISON FORMATION

KJdr — DAKOTA SANDSTONE, PURGATOIRE FORMATION, MORRISON FORMATION, AND RALSTON CREEK FORMATION

Jm — MORRISON FORMATION

Jmre — MORRISON FORMATION, RALSTON CREEK FORMATION, AND ENTRADA SANDSTONE—Locally nearly 500 feet (150 m) thick

JPml — MORRISON, RALSTON CREEK, AND LYKINS FORMATIONS

Jmr — MORRISON AND RALSTON CREEK FORMATIONS (UPPER JURASSIC) Morrison Formation—Varicolored siltstone, claystone, and sandstone containing fossil dinosaur bones. About 320 feet (97 m) thick

Ralston Creek Formation—Generally sandstone, siltstone, and gypsum beds; sandstone and conglomerate near Canon City. About 150 feet (45 m) thick

Je — ENTRADA SANDSTONE (UPPER JURASSIC)—Medium-grained cross-bedded sandstone

JPmf — MORRISON FORMATION, RALSTON CREEK FORMATION, LYONS SANDSTONE, AND FOUNTAIN FORMATION—Lyons Sandstone absent near Wetmore

TRPl — LYKINS FORMATION (TRIASSIC? AND PERMIAN)—Red siltstone, claystone, and sandstone about 180 feet (55 m) thick

TRPll — LYKINS FORMATION AND LYONS SANDSTONE

Ply — LYONS SANDSTONE (PERMIAN)—Red sandstone forming two resistant ledges 700–800 feet (210–240 m) thick

PIPsc — SANGRE DE CRISTO FORMATION (PERMIAN AND PENNSYLVANIAN)—Maximum thickness about 12,000 feet (3,600 m)

Crestone Conglomerate Member of Munger (1965)—Boulder conglomerate composed chiefly of clasts of crystalline rock including syenite

PIPs — Lower member—Red and green sandstone, conglomerate, and siltstone

IPmb — MINTURN AND BELDEN FORMATIONS (PENNSYLVANIAN)

Minturn Formation—Red, green, and gray shale, siltstone, and sandstone. Contains gypsum beds and marine limestone. About 4,000 feet (1,200 m) thick

Belden Formation—Dark-gray shale, siltstone, and sandstone. Nearly 500 feet (150 m) thick

PIPf — FOUNTAIN FORMATION (PERMIAN AND PENNSYLVANIAN)—Red conglomerate and sandstone. At the base the Glen Eyrie Shale Member composed of sandstone, sandy shale, and fossiliferous black shale. Formation as much as 4,400 feet (1,320 m) thick

MOr — MISSISSIPPIAN, DEVONIAN, AND ORDOVICIAN ROCKS—In descending order: Leadville Limestone (Lower Mississippian); Chaffee Group containing in descending order the Dyer Dolomite (Lower Mississippian? and Upper Devonian) and Parting Formation (Upper Devonian); Fremont Dolomite (Upper Ordovician); Harding Sandstone (Middle Ordovician); and Manitou Limestone (Lower Ordovician)

MCr — MISSISSIPPIAN, DEVONIAN, ORDOVICIAN, AND CAMBRIAN ROCKS—Includes in descending order: Leadville Limestone, Williams Canyon Limestone (Upper Devonian) in northeast or Chaffee Group in northwest, Fremont Dolomite in northwest only, Harding Sandstone, Manitou Limestone, Peerless Dolomite (Upper Cambrian) in northeast only, and Sawatch Sandstone (Upper Cambrian). Locally nearly 900 feet (270 m) thick

MDOr — MISSISSIPPIAN(?), DEVONIAN, AND ORDOVICIAN ROCKS—Chaffee Group, Fremont Limestone, Harding Sandstone, and Manitou Limestone

Or — ORDOVICIAN ROCKS—Fremont Limestone, Harding Sandstone, and Manitou Limestone or parts of them

O€r — ORDOVICIAN AND CAMBRIAN ROCKS—Manitou Limestone and Sawatch Sandstone

€gp — GEM PARK COMPLEX (CAMBRIAN)—Coarse- to medium-grained pyroxenite cut by dikes of syenite, pegmatite, lamprophyre, and carbonatite

€m — McCLURE MOUNTAIN COMPLEX (CAMBRIAN)—Medium-grained hornblende-biotite syenite and nepheline syenite

€dc — SYENITE COMPLEX AT DEMOCRAT CREEK (CAMBRIAN)—Stock of medium-grained syenite and mafic variants east of Hillside

€lm — MAFIC-ULTRAMAFIC COMPLEX AT IRON MOUNTAIN (CAMBRIAN)—Dark-gray clinopyroxene-olivine gabbro and variants northeast of Hillside

€s — SAWATCH SANDSTONE (UPPER CAMBRIAN)—Red and green sandstone, chiefly near Colorado Springs

€sd — SANDSTONE DIKE (CAMBRIAN?)—Brown hard quartzitic sandstone filling fractures along Ute Pass fault west of Colorado Springs

Yk — PORPHYRY AT THE KEETON RANCH (PRECAMBRIAN Y)—Brown quartz monzonite porphyry south of Cheyenne Mountain

PIKES PEAK BATHOLITH (PRECAMBRIAN Y):

Ywp — Windy Point Granite—Fine-grained porphyritic granite or quartz monzonite

Ypp — Pikes Peak Granite—Pink coarse-grained biotite or biotite-hornblende granite; the predominant rock type of the Pikes Peak batholith; for position of unit in the intrusive sequence at individual centers see Correlation of Map Units diagram

Mount Rosa intrusive center:

Ymr — Mount Rosa Granite—Light-gray riebeckite granite

Ync — Granite of Nelson Camp—Tan medium-grained biotite granite containing minor riebeckite

Yam — Granite of Almagre Mountain—Pink medium-grained biotite granite

Yfg — Fayalite granite—Dark-green coarse-grained ferrohornblende biotite-fayalite granite

Lake George pluton:

Yqs — Quartz-bearing syenite—In part fayalite granite. Forms partial ring dike

Ysy — Syenite—Fine-grained hornblende syenite near margin ranging to coarse-grained augite-hornblende syenomonzonite (Stewart, 1964) near center. Forms small stock

Ypf — Fine-grained Pikes Peak Granite—Has equigranular texture

Ypm — Medium-grained Pikes Peak Granite—Locally porphyritic

Ygb — Gabbro—Fine-grained gabbro composed of andesine-labradorite, augite, and biotite. Included as blocks in pluton near Lake George

Spring Creek pluton:

Ypg — Gabbro—Fine to medium-grained olivine gabbro at margin of pluton

Yps — Syenite—Medium- to coarse-grained olivine syenite

Ycc — CRIPPLE CREEK QUARTZ MONZONITE (PRECAMBRIAN Y)—Medium-grained biotite-muscovite quartz monzonite

Yqm — QUARTZ MONZONITE (PRECAMBRIAN Y)—Fine- to medium-grained biotite-muscovite quartz monzonite

Ysi — SAN ISABEL GRANITE OF BOYER (1962) (PRECAMBRIAN Y)—Coarse-grained porphyritic biotite granite

Yem — QUARTZ MONZONITE OF ELEVENMILE CANYON (PRECAMBRIAN Y)—Medium-grained porphyritic biotite quartz monzonite

Xqm — QUARTZ MONZONITE (PRECAMBRIAN X)—Gray fine- to medium-grained slightly foliated body

Xgd — GRANODIORITE (PRECAMBRIAN X)—Pinkish-gray, massive to foliated, medium- to coarse-grained hornblende or biotite granodiorite; locally an augen gneiss

Xmgd — GRANODIORITE OF METHODIST MOUNTAIN (PRECAMBRIAN X)—Gray massive fine- to medium-grained granodiorite exposed south of Salida

Xqd — QUARTZ DIORITE (PRECAMBRIAN X)—Dark-gray massive to foliated hornblende-biotite quartz diorite. Forms borders of plutons composed largely of granodiorite

Xg — METAGABBRO (PRECAMBRIAN X)—Dark-greenish-gray massive to foliated metamorphosed gabbro and ultramafic rocks

Xgn — MIGMATITIC GNEISS (PRECAMBRIAN X)—Layered gneiss, chiefly feldspathic biotite-quartz-plagioclase gneiss, and garnetiferous, hornblendic, and sillimanitic varieties. Formed from sedimentary and volcanic rocks that were metamorphosed to the amphibolite facies except at Boneyard Gulch west of Ilse where granulite facies is locally developed

Xgnb — BIOTITE GNEISS (PRECAMBRIAN X)—Layered biotite-quartz-plagioclase gneiss, locally migmatitic or sillimanitic

Xvs — METAVOLCANIC AND METASEDIMENTARY ROCKS (PRECAMBRIAN X)—Chiefly muscovite-rich feldspathic gneiss, biotite-plagioclase metarhyodacite tuff, metabasalt, and metamorphosed sedimentary breccia and tuff. Original rock textures well preserved; metamorphic facies ranges from higher to lowermost amphibolite

Xq — QUARTZITE (PRECAMBRIAN X)—Gray crossbedded quartzite, quartzite conglomerate, and quartz-muscovite-biotite schist north of Canon City

[1]The Wagontongue Formation was named in an abstract by Johnson (1937) for outcrops along Wagon Tongue Creek, in the southern part of South Park, Park County, Colorado and is herein adopted. The two best outcrops are in secs. 31 and 32, T. 14 S., R. 75 W., the type locality (Stark and others, 1949, p. 69, where the type locality was mistakenly shown in secs. 29 and 30). The formation consists of fluviatile, cross-stratified, brown, calcareous, clayey, and arkosic siltstone, sandstone, and conglomerate deposited as a basin-fill. The Wagontongue overlies the Antero Formation or the Gribbles Park Tuff and is overlain by Quaternary alluvium. It occupies a northwest trending belt 30 miles (48 km) long and as much as 5 miles (8 km) wide. Fossil vertebrates of several genera from secs. 31 and 32 show that the greater part of the formation is late Miocene in age; scarce fossil vertebrate remains from the SE¼SW¼ sec. 14, T. 13 S., R. 76 W. suggest that the basal part of the formation is early Miocene in age. The Trump Conglomerate, also named by Johnson (1937) is a coarse facies of the Wagontongue Formation and this name is unnecessary and should be abandoned.

[2]The Antero Formation was named in an abstract by Johnson (1937) for beds of mixed lithology and origin near Antero Reservoir in the southern part of South Park, the type locality. A more complete description of the Antero was published by Stark and others (1949). The lower part of Johnson's Antero has been renamed by Epis and Chapin (1974) the Tallahassee Creek Conglomerate; we retain and adopt the name Antero Formation for the middle part composed of lacustrine sediments; the upper part in the Antero syncline was mapped as Trump Conglomerate by DeVoto (1971) and is mapped by us as Wagontongue Formation. The Antero Formation as used here consists of white, yellowish-gray, and gray platy siltstone, paper shale, and algal limestone. Part of the algal limestone is agatized. The lacustrine sediments in the Antero syncline are interlayered with numerous air-fall and ash-flow beds of Badger Creek Tuff (Epis and Chapin, 1974) as described in the redefined Antero of DeVoto (1971, p. 45). The intertonguing extends through so much of the formation in the Antero syncline that the Antero and Badger Creek could not be mapped separately; however, in another syncline to the east in T. 12 S., R.74 W. where Johnson mapped Balfour (equals Antero) Formation, the Badger Creek Tuff is lacking and the lacustrine Antero Formation is well developed and preserved. The Antero overlies the Tallahassee Creek Conglomerate and is overlain by the Wagontongue Formation. The Antero crops out in an area greater than 30 miles (48 km) by 25 miles (40 km). Vertebrate fossils show that the Antero Formation is Oligocene in age and a part of it is equivalent to the Florissant Lake Beds. The Balfour Formation of Johnson (1937) is equivalent in lithology, origin, and age to the Antero Formation and the Balfour name should be abandoned.

Since this map was prepared, the age of the Williams Canyon Limestone has been changed from Mississippian to Devonian. Therefore, the strip of rocks labeled MOr northwest of Canon City should be labeled DOr.

CONTACT—Dotted where concealed

FAULT—Dotted where concealed. Bar and ball on downthrown side

THRUST FAULT—Sawteeth on upper plate

FAULT ZONE

ANTICLINE OR ANTIFORM—Showing direction of plunge. Dotted where concealed

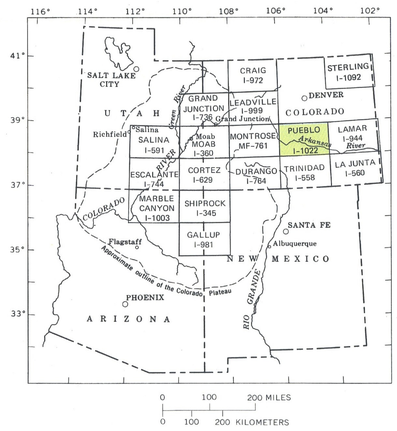
OVERTURNED ANTICLINE OR ANTIFORM

SYNCLINE OR SYNFORM—Showing direction of plunge. Dotted where concealed

OVERTURNED SYNCLINE OR SYNFORM—Showing direction of plunge. Dotted where concealed

MONOCLINE—Axis drawn along anticlinal crest

Baculites scotti — FAUNAL HORIZON IN PIERRE SHALE—Horizon of principal fossil ammonite collections from within faunal assemblage zone; zone is wider than the horizon line; dotted where concealed. Faunal horizons are plotted only in the Denver basin part of the quadrangle; for locations of horizons in the Canon City-Florence basin see Scott and Cobban (1975)



INDEX MAP SHOWING AREA OF PUEBLO QUADRANGLE AND OTHER PUBLISHED 1°×2° QUADRANGLE MAPS