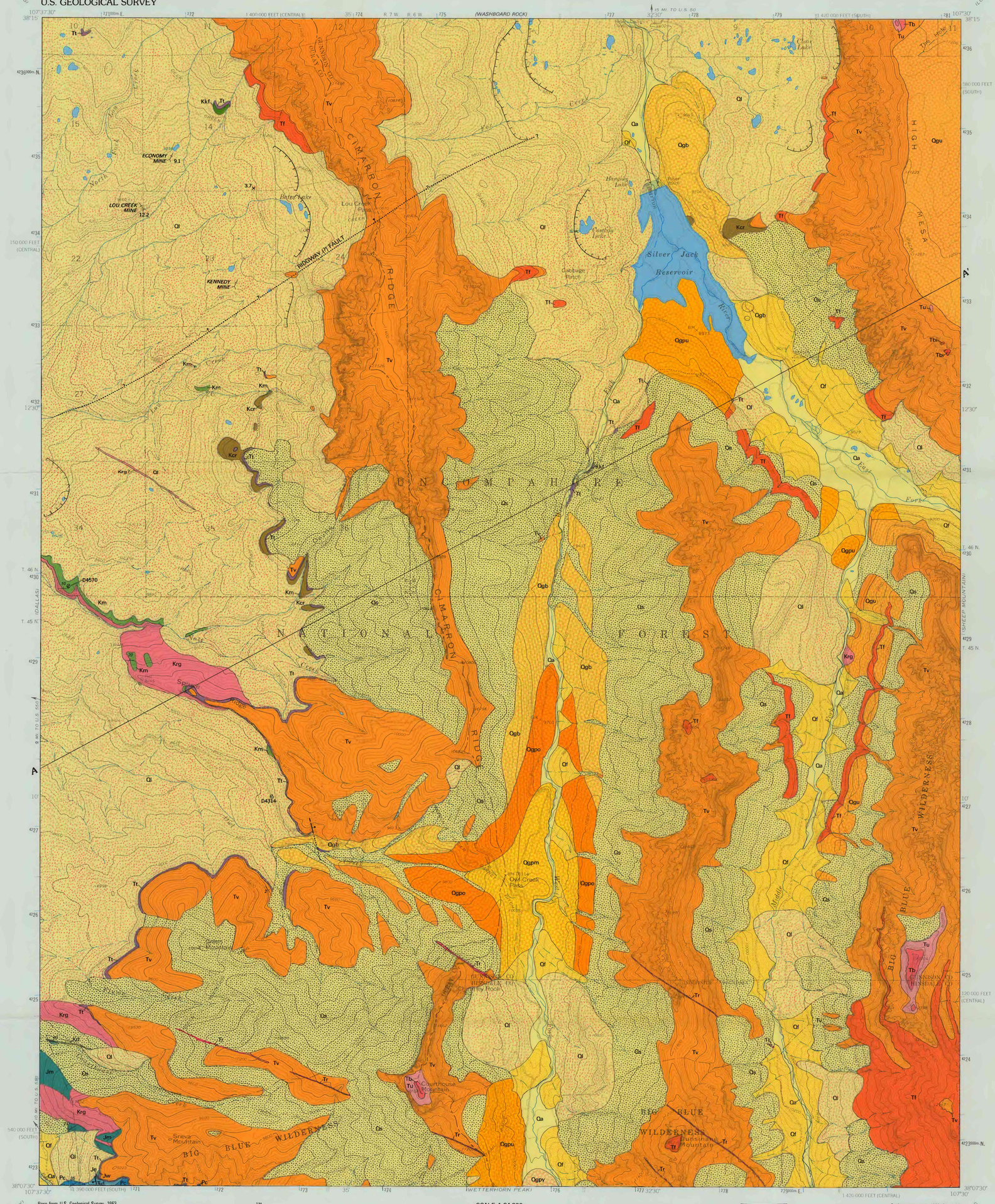
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

GEOLOGIC QUADRANGLE MAP
COURTHOUSE MOUNTAIN QUADRANGLE, COLORADO
GQ–1644



Base from U.S. Geological Survey, 1963
Photorevised as of 1983
10,000-foot grids based on Colorado coordinate system, south and central zones
1000-meter Universal Transverse Mercator grid ticks, zone 13, shown in blue

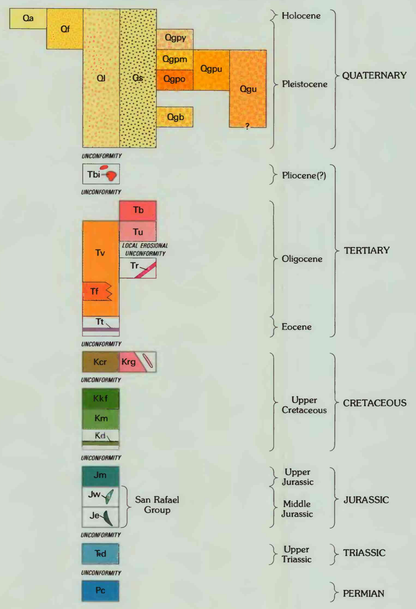
APPROXIMATE MEAN DECLINATION, 1988

SCALE 1:24 000
1 MILE
1 KILOMETER
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

COLORADO
QUADRANGLE LOCATION

Geology mapped in 1963–64, 1966, assisted by Arthur Hehl, 1964, and Roger R. Trengove, 1966

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qa **Alluvium (Holocene and Pleistocene)**—Silt, sand, and gravel deposits along streams; glaciofluvial deposits graded near level of modern streams; and local fine-grained lacustrine deposits along Cimarron River

Qf **Alluvial fan deposits (Holocene and Pleistocene)**—Coarse, poorly sorted fan deposits

Ql **Landslide deposits (Holocene and Pleistocene)**—Heterogeneous deposits of boulders, cobbles, and clay formed largely by repeated slump, mudflow, earthflow, and rockfall movements. On higher slopes includes some colluvium and deposits of possible periglacial origin

Qs **Surficial deposits, undifferentiated (Holocene and Pleistocene)**—Alluvium, colluvium, talus, till, periglacial deposits, and landslide debris undifferentiated by age or deposit type

Glacial deposits (Pleistocene, Pinedale glaciation)—Terminal and lateral moraines along West Fork Cimarron River and undifferentiated moraines along Middle and East Forks. Moraines of West Fork Glacier extend westward over Owl Creek Pass along Owl Creek

Qgpy **Younger**

Qgpm **Middle**

Qgpo **Older**

Qgpu **Middle and older glacial deposits, undifferentiated**

Qgb **Glacial deposits (Pleistocene, Bull Lake(?) glaciation)**—Terminal and lateral moraines on West Fork Cimarron River, and a large composite terminal moraine below junction of East and West Forks Cimarron River. Moraines of West Fork Glacier extend westward over Owl Creek Pass along Owl Creek

Qgu **Glacial deposits, undifferentiated (Pleistocene)**—Glacial deposits on Middle Fork Cimarron River and till capping High Mesa; age uncertain but may be as old as Bull Lake(?) age. Till on High Mesa contains locally derived basalt boulders and was deposited by a glacier that overflowed Little Cimarron River valley to east

Tbi **Basalt (Pliocene?)**—Olive-black porphyritic olivine basalt; consists of two small irregular intrusions that are possible source of a small flow just east of quadrangle. Age uncertain; younger than Blue Mesa Tuff

Tb **Blue Mesa Tuff (Oligocene)**—Nonwelded to densely welded, gray, rhyolitic crystal-poor tuff. Phenocrysts mainly plagioclase, sanidine, and biotite. At base, white to yellowish-gray, nonwelded tuff grades upward to 2- to 3-m-thick black vitrophyre. Thickness 0–100 m

Tu **Ute Ridge Tuff (Oligocene)**—Nonwelded to densely welded, pinkish-gray crystal-rich tuff. Phenocrysts mainly plagioclase, sanidine, biotite, and pyroxene. About 6–10 m of white nonwelded tuff at base. K/Ar biotite age of 30.1±0.9 m.y. (H. H. Mehnert, written commun., 1969; age recalculated using decay constants of Steiger and Jäger, 1977) from a sample collected in Buckhorn Lakes 7 1/2-minute quadrangle (Dickinson, 1987a). Thickness 0–100 m

Intermediate-composition intrusive bodies, lava flows, and related rocks (Oligocene)

Tr **Rhyodacite porphyry**—Dikes of greenish-gray rhyodacite radiating from Cimarron volcano southeast of quadrangle. Phenocrysts mainly plagioclase, hornblende, biotite, and pyroxene

Tv **Volcaniclastic facies of the San Juan Formation**—Cone breccia, mudflow breccia, conglomerate, sandstone, and siltstone of andesite to rhyodacite derived from volcanoes to south. Local white tuff beds near top. Lower part shades of red to green; upper part green to light gray. Contact with underlying Telluride Conglomerate (Tt) locally gradational; lower part contains some boulders and cobbles of Precambrian igneous and metamorphic rocks typical of those in the Telluride. Upper part grades from cone breccia in Cimarron volcano near southeast corner of quadrangle to reworked alluvial facies in north. K/Ar biotite age of lower upper part 32.6±1.0 m.y. (H. H. Mehnert, written commun., 1969; age recalculated using decay constants of Steiger and Jäger, 1977). Thickness about 800 m

Tf **Lava flows**—Lava flows and associated flow breccia of andesite, rhyodacite, and quartz latite erupted mainly from Cimarron volcano near southeast corner of quadrangle. Interlayered with volcaniclastic facies of the San Juan Formation (Tv). Lower part of flow in sec. 14, T. 46 N., R. 7 W., is vesicular and contains phenocrysts of plagioclase, pyroxene, and olivine. Formerly considered Cimarron Creek Latite of Cross and others (1907, p. 11). As originally applied, the name Cimarron Creek Latite was used to describe dikes, sills, and irregular intrusive masses in Cimarron River drainage. Within mapped area, these rocks are lava flows restricted to San Juan Formation. Consequently, the name Cimarron Creek Latite is not used in this area and is hereby abandoned. Thickness 0–650 m

Tt **Telluride Conglomerate (Eocene)**—Grayish-orange to light-brown ledge-forming conglomerate composed of varicolored pebbles and cobbles set in a white to yellowish-gray calcareous sandy matrix. Clasts are Precambrian to Mesozoic igneous, metamorphic, and sedimentary rocks; includes volcanic fragments of Cimarron Ridge Formation (Kcr) and associated hypabyssal intrusive rocks. Locally discontinuous due to nondeposition over old topographic highs. Thickness 0–18 m

Kcr **Cimarron Ridge Formation (Upper Cretaceous)**—Green to gray volcaniclastic breccia and conglomerate of rhyodacite; some lava flow and flow breccia in lower part derived from intrusive body (Krg) at Spruce Ridge; occurs in discontinuous erosional remnants. Locally contains imprints of leaves and fragments of petrified wood. Age about 66 m.y. (Dickinson and others, 1968, p. 144). Thickness 0–180 m

Krg **Rhyodacite and granodiorite porphyry (Upper Cretaceous)**—Greenish-gray fine- to medium-grained intrusive rocks. Phenocrysts mainly of plagioclase, quartz, biotite, pyroxene, and hornblende. Age about 66 m.y. (Dickinson and others, 1968, p. 144). Includes a dark-gray fine-grained mafic dike of uncertain age in secs. 27, 34, and 35, T. 46 N., R. 7 W.

Kkf **Kirtland Shale and Fruitland Formation (Upper Cretaceous)**—Forms bedrock in northwest corner of quadrangle and near mouth of West Fork Cimarron River. Mostly covered by landslide debris. Kirtland Shale is olive mudstone interbedded with fine-grained yellow sandstone. Fruitland Formation is white to yellow fine-grained sandstone interbedded with subbituminous coal, brown carbonaceous shale, and olive to black shale. Kirtland Shale faulted and eroded; thickness not determined. Fruitland thickness about 60 m

Pictured Cliffs Sandstone (Upper Cretaceous)—Not shown on map because concealed by surficial deposits. In adjoining quadrangle to north, lower part is fine-grained pale-olive sandstone and olive-black shale; upper part is massive-bedded fine-grained white to gray sandstone. Projected thickness about 60 m

Km **Mancos Shale (Upper Cretaceous)**—Dark-gray to black shale, in part sandy, silty, and calcareous; mostly covered by landslide debris (Ql). Thickness about 1,300 m

Kd **Dakota Sandstone (Upper Cretaceous)**—White fine-grained sandstone. Poorly exposed in steeply dipping ledge on Courthouse Creek. Exposed thickness about 3 m

Jm **Morrison Formation (Upper Jurassic)**—Variegated red, green, purple, and gray mudstone and interbedded sandstone and conglomeratic sandstone. Poorly exposed in southwest corner of quadrangle. Thickness about 190 m

San Rafael Group (Middle Jurassic)

Jw **Wanakah Formation**—Thin-bedded reddish-brown and green mudstone. Small exposure in southwest corner of quadrangle. Section incomplete, thickness 0–3 m

Je **Entrada Sandstone**—White fine-grained ledge-forming quartzite. Small exposure in southwest corner of quadrangle. Section incomplete, thickness 0–10 m

Trd **Dolores Formation (Upper Triassic)**—Red, purple, and gray interbedded sandstone and mudstone; about 1 m of pebble conglomerate at base; about 21 m above base, about 6 m of ledge-forming, yellow, fine-grained sandstone is overlain by 0.6 m of black shale. Small exposure on Red Creek. Thickness about 55 m

Pc **Cutler Formation (Permian)**—Red micaceous shale, siltstone, and coarse sandstone and some beds of light-green sandstone. Small exposure on Red Creek. Section incomplete, exposed thickness about 40 m

×3.7 **Coal outcrop**—Thickness of coal in meters

Contact—Approximately located. Dotted where concealed

Fault—Approximately located. Dashed where inferred; dotted where concealed; dotted and queried where evidence indicates a fault must be present but location is inferred. Bar and ball on downthrown side

10 **Strike and dip of beds**

D4314 **Mesozoic invertebrate fossil locality**—Showing USGS Denver catalog number

12.2 LOU CREEK MINE **Caved adit**—Showing reported mine name and thickness of coal bed in meters

Landslide scarp—Hachures on down side; drawn at approximate base of scarp. Only prominent scarps shown

GEOLOGIC HIGHLIGHTS

The Courthouse Mountain 7 1/2-minute quadrangle lies on the northwest flank of the middle Tertiary San Juan volcanic field. Deep glacially sculpted canyons separated by sharp jagged ridges provide spectacular scenery in the eastern part of the quadrangle. Bedrock consists of upper Paleozoic, Mesozoic, and Tertiary sedimentary rocks, and Mesozoic and Tertiary igneous rocks. Quaternary deposits are widespread; landslide, colluvial, and glacial deposits predominate.

Coal-bearing rocks of the Fruitland Formation (part of map unit Kkf) underlie the area near three abandoned coal mines west of Cimarron Ridge and north of Ridgway(?) fault. East of Cimarron Ridge and north of this projection of the fault, the Fruitland Formation and the overlying Kirtland Shale are apparently missing. Near the mouth of the West Fork Cimarron River, a small Fruitland outcrop and coal fragments and sandstone in landslide debris indicate coal-bearing Fruitland rocks are present in the subsurface.

The potential for coal resources in the quadrangle is difficult to assess because the coal-bearing rocks are mostly covered by surficial debris and because subsurface data are lacking. Coal thickness at the mines is reported to be from 9.1 to 12.2 m. The coal rank ranges from subbituminous B to subbituminous C. More importantly, faults have sufficiently disrupted the continuity of the coal beds to make mining difficult. The precise location and amount of displacement on the faults cannot be established by surface mapping because of extensive landslide cover.

Late Cretaceous folding and faulting formed a structural high that extends from the southwest corner of the quadrangle northwestward to Spruce Ridge. The deformation was in conjunction with uplift of the San Juan dome and faulting along the southeast end of the Uncompahgre uplift (Dickinson and others, 1968, p. 146).

Before the end of the Cretaceous, erosion reduced this uplifted area to a low plain over which volcaniclastic debris was spread. Rhyodacitic rocks were emplaced as a dike at Spruce Ridge. The granodiorite intrusions occurring in the southwest corner of the quadrangle and along the Middle Fork Cimarron River probably are related to eruptive centers at this time.

The fluvial Telluride Conglomerate, located at the base of the Tertiary section, was deposited on a pediment around the northwest flank of the ancestral San Juan Mountains. The sediment source appears to have been to the southeast, based on analyses of imbricate disk-shaped pebbles (A. Hohl, unpub. data, 1964), but the Telluride now has a gentle dip to the south and east. This reversal of original dip probably is a reflection of regional deformation that occurred sometime after the major ash-flow eruptions in the San Juan volcanic field in late Oligocene time.

The Oligocene volcaniclastic rocks are poorly bedded and therefore minor faults are difficult to recognize. However, several minor faults cut the volcaniclastic rocks along Cimarron Ridge to the north in the Washboard Rock 7 1/2-minute quadrangle (Dickinson, 1987b); similar, but unrecognized minor faults may cut the volcaniclastic rocks in the Courthouse Mountain quadrangle.

REFERENCES

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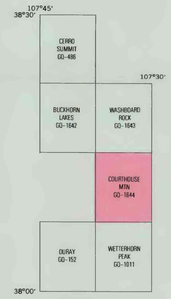
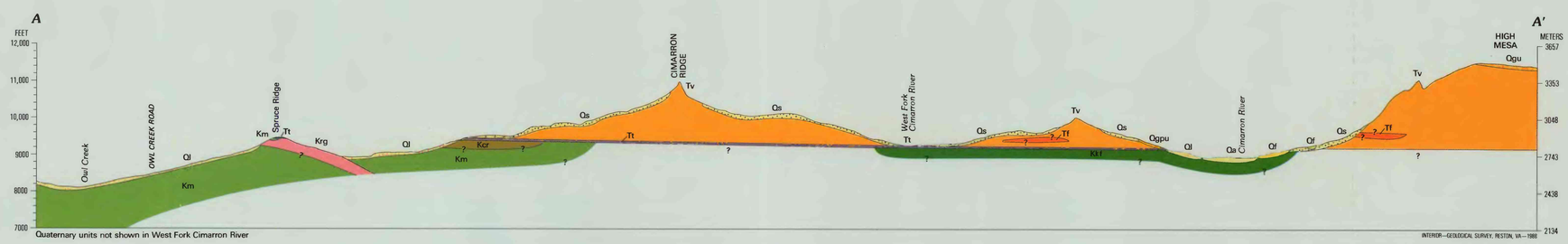


INDEX SHOWING LOCATION OF COURTHOUSE MOUNTAIN QUADRANGLE AND OF ADJACENT PUBLISHED U.S. GEOLOGICAL SURVEY 1:24,000-SCALE GEOLOGIC QUADRANGLE (GQ) MAPS



INTERIOR—GEOLOGICAL SURVEY, RESTON, VA.—1988

GEOLOGIC MAP OF THE COURTHOUSE MOUNTAIN QUADRANGLE, GUNNISON, HINSDALE, AND OURAY COUNTIES, COLORADO

By
Robert G. Dickinson

1988

For sale by U.S. Geological Survey, Map Distribution, Box 25286, Federal Center, CO 80225