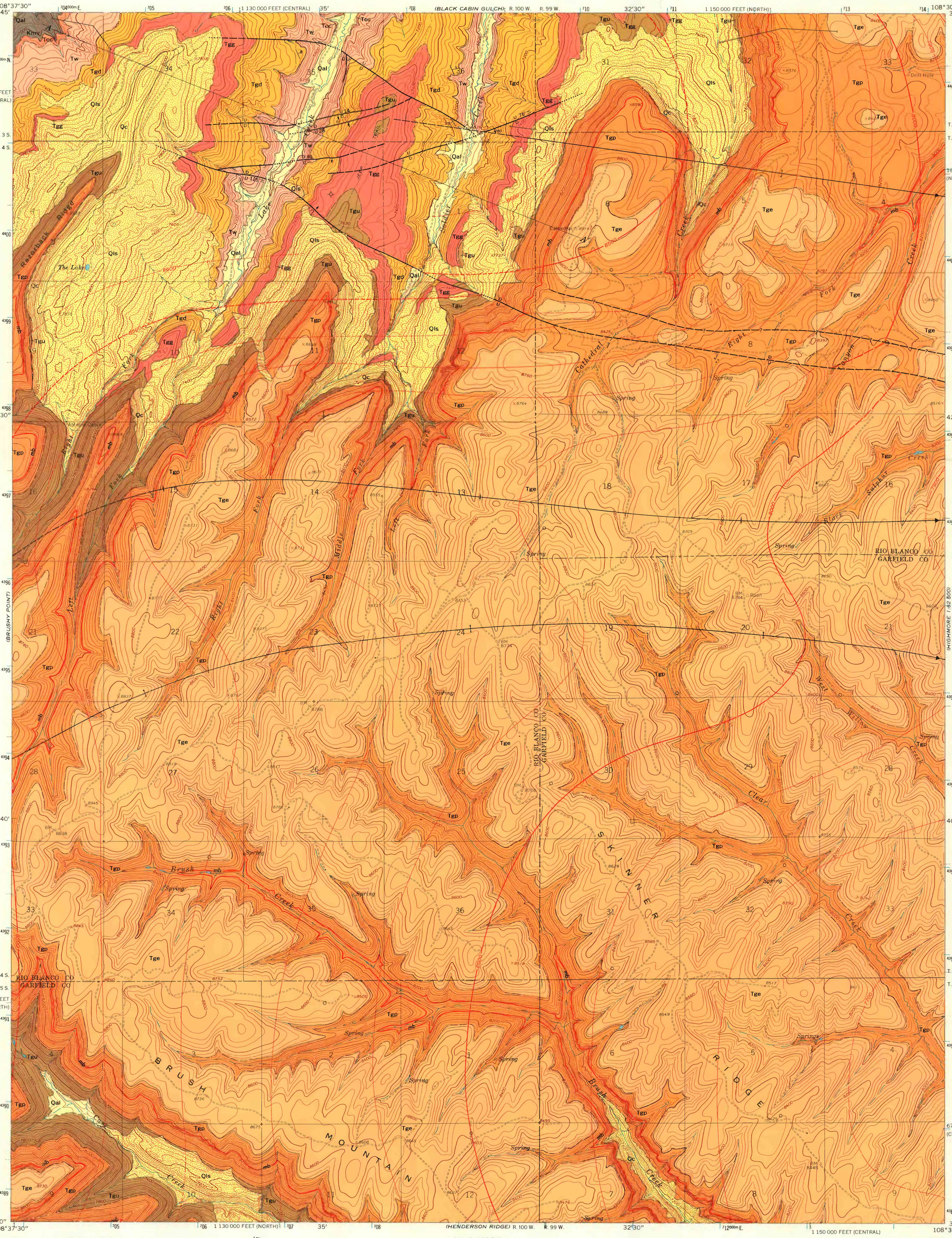
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

COMPOSITE STRATIGRAPHIC SECTION OF THE GREEN RIVER (PART), WASATCH, OHIO CREEK(?) AND MESAVERDE (PART) FORMATIONS MEASURED IN SECS. 33, 34, AND 36, T. 3 S., R. 100 W. AND SECS. 32 AND 33, T. 3 S., R. 99 W. (LINE OF SECTION SHOWN ON MAP).

SYSTEM	AGE	STRATIGRAPHIC UNIT	LITHOLOGY	DESCRIPTION
TERTIARY	Eocene — Middle	Green River Formation — Evacuation Creek Member		Tan tuffaceous argillaceous siltstone and interbedded brown dolomitic silty claystone; weathers rust brown.
				Medium-olive-gray dolomitic clay-shale and interbedded dolomitic oil shale at the base (the "big 3" oil-shale beds); one thin laminae of analcime.
		Parachute Creek Member		Dark-brown dolomitic clay-shale containing a few laminae and thin beds of black dolomitic oil shale; scattered fossil fly larvae and aquatic plant stems.
				Black dolomitic oil shale; weathers to platy ledge.
				Dark-brown dolomitic clay-shale; abundant fossil fly larvae.
				Black dolomitic oil shale.
				Dark-brown dolomitic clay-shale; a few laminae of oil shale; abundant fossil fly larvae.
				Dark-brown dolomitic platy clay-shale and a few thin beds of dark-brown to black dolomitic oil shale; abundant fossil fly larvae at the top.
				Tan-brown coarsely crystalline calcite; solution(?) zone.
				Dark-brown dolomitic platy oil shale and a few thin beds of dark-brown dolomitic clay-shale.
				Dark-brown to black dolomitic oil shale; weathers mostly silver gray.
				Tan sandy analcimized tuff; exhibits wavy bedding.
				Dark-brown to black dolomitic oil shale.
				Pods of tan calcite; pseudomorphs after nahcolite.
				Tan to brown dolomitic platy clay-shale and a few beds of dark-brown to black dolomitic oil shale; weathers to step-like slope.
				Dark-brown to black dolomitic oil shale interlaminated and interbedded with dark-brown dolomitic clay-shale; weathers to buff-tan cliff.
				Black oil shale and some interlaminated tan varved clay-shale.
				Tan to brown silty varved clay-shale finely interlaminated to interbedded with dark-brown flaky dolomitic oil shale; interval contains the "A" groove (erosional feature).
				Black flaky dolomitic oil shale; forms the top of the Mahogany ledge.
				Black flaky dolomitic oil shale; the Mahogany oil-shale bed (*mb*).
				Dark-brown dolomitic oil shale and interlaminated brown clay-shale.
				Dark-brown to black dolomitic oil shale; forms the base of the Mahogany ledge.
				Dark-brown flaky dolomitic oil shale interbedded with brown dolomitic silty clay-shale; weathers to step-like slopes; interval contains the "B" groove (erosional feature).
				Black dolomitic oil shale and thin bed of brown dolomitic clay-shale in center.
				Brown dolomitic clay-shale interbedded with dark-brown dolomitic oil shale.
	?			Dark-brown to black dolomitic oil shale; weathers silver gray in part.
	Early			Medium- to dark-brown dolomitic oil shale containing numerous thin laminae and small pods of gray-brown to dark-brown silty dolomite.
				Gray-brown silty dolomite.
				Dark-brown dolomitic oil shale.
				Olive-gray to brown dolomitic clay-shale; abundant syneresis cracks; weathers rust brown; thin interbedded oil shale at base.
				Olive-gray to brown dolomitic claystone; a few laminae of oil shale.
				Gray hard oölitic limestone.
				Olive-gray to brown silty dolomitic claystone.
				Algal limestone.
				Gray dolomitic siltstone; weathers rust brown; abundant syneresis cracks.
				Olive-gray to olive-brown silty dolomitic claystone.
				Angular claystone and limestone breccia in silty limestone matrix.
				Olive-gray dolomitic claystone.
				Gray silty dolomitic claystone interlaminated with gray dolomitic siltstone; weathers rust brown.
				Dark-brown dolomitic oil shale; numerous laminae of tan platy dolomitic claystone; weathers light gray.
				Dark-brown, partly dolomitic, flaky hard oil shale and numerous laminae of tan silty dolomitic claystone; weathers light gray.
		Unnamed unit		Gray calcareous siltstone; ripple marked; weathers rust brown.
				Approximately 380 feet covered by Quaternary landslide material; the upper 190 feet is dominantly oil shale and sandstone in nearby exposed sections; the lower 190 feet is dominantly mudstone and sandstone containing sparse thin oil-shale beds in nearby exposed sections (Covered interval not to scale.)
		Garden Gulch Member		Offset in section
				Tan silty ostracodal limestone.
				Dark-brown to black brittle flaky oil shale containing numerous laminae of tan silty ostracodal limestone and tan-brown limy siltstone; weathers dark gray.
				Dark-gray green to gray-brown silty mudstone and numerous thin interbedded gray fine-grained calcareous sandstones; not well exposed.
				Gray fine-grained calcareous crossbedded sandstone; oil saturated.
		Douglas Creek Member		Offset in section
				Gray-green soft shale; "the orange marker" of regional subsurface electric-log correlation is located at the base.
				Gray, very fine grained, calcareous sandstone.
				Gray-green silty soft shale; poorly exposed at the base.
				Brown papery ostracodal oil shale and a few laminae of tan ostracodal limestone; weathers gray brown.
				Gray, very fine grained, crossbedded sandstone.
				Carbonaceous shale; black fossiliferous limestone at the base.
				Brown papery oil shale and a few laminae of tan ostracodal limestone.
				Brown papery oil shale; ostracodal limestone; gray silty to sandy shale; scattered *Physa pleromatis* and *Gyraulus militaris*.
				Gray soft silty shale.
				Gray-brown soft papery oil shale.
	Paleocene and Eocene	Wasatch Formation		Interbedded gray and brown soft mudstone; carbonaceous and gypsiferous at the base.
				Dark-gray-brown carbonaceous shale and coal.
				Gray limestone and siltstone containing *Physa* sp; *Viviparus* sp; *Elliptio* sp.
				Gray-green silty mudstone; dark-gray and carbonaceous in part.
				Gray-brown ostracodal limestone; abundant *Physa* sp; and *Viviparus* sp.
				Gray-green silty blocky mudstone and disseminated carbonaceous material; scattered fossil turtle bones; thin gray limestone at the base.
				Gray and green silty blocky mudstone.
				Light-gray calcareous siltstone; ripple marked.
				Red, maroon, green, and gray silty blocky variegated mudstone.
				Gray limestone; green mudstone; light-gray very fine grained sandstone.
				Gray, red, and green silty variegated mudstone.
				Light-gray fine-grained sandstone; white clay cement.
				Dark-gray to dark-gray-green silty blocky mudstone.
				Light-gray, very fine grained, calcareous sandstone; ripple marked.
				Dark-gray to dark-gray-green silty blocky mudstone.
				Light-gray, very fine grained, limy sandstone.
				Dark-gray-green silty blocky mudstone.
	Paleocene	Ohio Creek(?) Formation		Medium-gray, very fine to fine grained, poorly sorted, subangular, crossbedded sandstone; abundant colored grains; white clay cement.
CRETACEOUS	Late	Mesaverde Formation		Medium-gray silty soft shale and thin interbedded light- to medium-gray fine-grained salt-and-pepper sandstone.
				Light-gray fine-grained salt-and-pepper sandstone.
				Dark-gray to dark-gray-green soft blocky shale.
				Light-gray fine-grained salt-and-pepper sandstone.
				Gray-green soft shale.

VERTICAL SCALE: 1 INCH=100 FEET



Base by U.S. Geological Survey, 1964
10,000-foot grids based on Colorado coordinate system, north and central zones
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue.

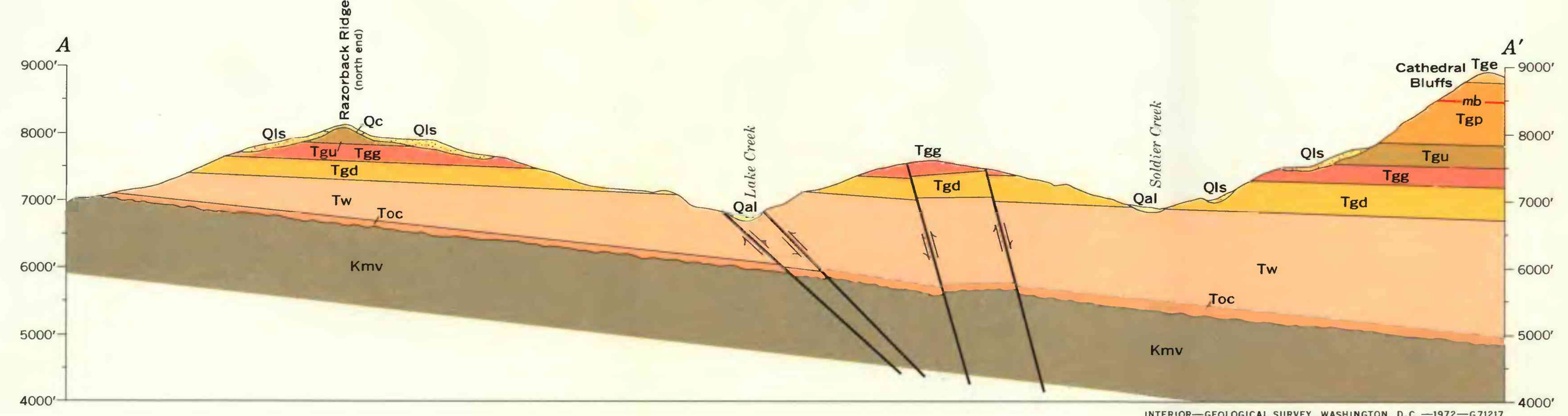
APPROXIMATE MEAN DECLINATION, 1972

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

Geology mapped in 1967



INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1972—G71217

GEOLOGIC QUADRANGLE MAP
RAZORBACK RIDGE QUADRANGLE, COLORADO
GQ-1019

EXPLANATION

QUATERNARY — Pleistocene and (or) Holocene

Qal — Alluvium
Unconsolidated gravel, silt, and clay

Qls — Landslide deposits
Rock and soil debris at base of steep slopes

Qc — Colluvium
Talus and slopewash deposits

UNCONFORMITY

TERTIARY — Eocene

Tge, mb, Tgp, Tgu, Tgg, Tgd

Green River Formation

Tge, *Evacuation Creek Member: gray to brown dolomitic claystone, dark-brown papery oil shale, and tan-brown dolomitic siltstone and sandstone. Weathers to tan-gray rounded hills. Only the lower 400 feet is present. The lower part intertongues with the Parachute Creek Member. The contact is arbitrarily placed at the base of the lowermost tan-weathering siltstone or sandstone bed overlying gray-weathering dolomitic oil-shale and clay-shale beds that comprise the upper part of the Parachute Creek Member*

Tgp, *Parachute Creek Member: chiefly dolomitic oil-shale deposits. Dark-brown to black dolomitic oil shale interbedded with brown to olive-gray dolomitic clay-shale. Sparse beds of gray siltstone, algal limestone, and analcimized tuff. Two thin oil-shale beds contain rounded calcite pseudomorphs of the saline mineral, nahcolite. Weathers to chalky-gray cliffs and steep slopes. Contains the Mahogany oil-shale bed (*mb*). The lower part intertongues with and is replaced to the southwest by the unnamed unit of the Green River Formation. 500–1,100 feet thick*

Tgu, *unnamed unit: chiefly shoreline deposits generally barren of oil-shale beds. Brown to gray-green dolomitic claystone and algal limestone. Some gray siltstone, gray fine-grained sandstone, and tan oolitic limestone. Sparse very thin dark-brown oil-shale beds are present at some localities. Weathers to steep gray slopes interrupted by tan-brown-weathering siltstone and sandstone benches. Comprises a stratigraphic unit that is laterally equivalent to the lower part of the Parachute Creek Member. The unnamed unit was traced in outcrops for 8 miles southwestward from the quadrangle to where it comprises the upper part of the type section of the Douglas Creek Member. This unit was included in the upper part of the Garden Gulch Member in mapping of the adjoining Black Cabin Gulch quadrangle (Cashion, 1969). Thickens southwestward across the mapped area from about 200 to 650 feet*

Tgg, *Garden Gulch Member: the upper part is dark-brown to black brittle flaky oil shale and has laminae of tan ostracodal limestone and tan-brown limy siltstone. The lower part is gray-green to gray-brown mudstone and gray fine-grained sandstone. Weathers dark gray. The lower contact is at the base of a 15- to 25-foot-thick ledge-forming oil-saturated sandstone. Thins southwestward across the mapped area from about 275 to 200 feet thick*

UNCONFORMITY

Tgd, *Douglas Creek Member: chiefly soft-brown papery ostracodal oil shale but includes thin beds of tan ostracodal limestone, gray very fine grained sandstone, gray silty shale, gray carbonaceous shale, and dark-gray to black mollusk-bearing limestone. Weathers to gray-brown slopes interrupted by sandstone and limestone benches. Thins southwestward. 220–480 feet thick*

UNCONFORMITY

Paleocene

Tw

Wasatch Formation

Gray and green silty mudstone, gray-brown carbonaceous shale, coal, light-gray fine-grained sandstone, and light-gray calcareous siltstone. A few thin beds of gray to gray-brown ostracodal or mollusk-bearing limestone. Weathers to drab-gray slopes interrupted by tan to gray sandstone benches. Thins westward. 240–400 feet thick (on outcrop)

Toc

Ohio Creek(?) Formation

Gray, very fine to fine grained, crossbedded sandstone; locally coarse-grained and containing thin lenses of conglomerate. Weathers to a tan or gray bench, or series of benches. 60–75 feet thick (on outcrop)

UNCONFORMITY

CRETACEOUS — Upper Cretaceous

Kmv

Mesaverde Formation

Medium-gray silty shale and light-gray fine-grained salt-and-pepper sandstone. Weathers to dark-gray slopes interrupted by gray or tan sandstone benches. Only the upper part is exposed

Contact
Dashed where approximately located

Fault, showing dip and displacement, in feet
Dashed where approximately located; dotted where concealed; queried where probable. U, *upthrown side;* D, *downthrown side*

Anticline
Showing crestline and direction of plunge. Dashed where approximately located

Syncline
Showing troughline and direction of plunge. Dashed where approximately located

Strike and dip of beds

Structure contours
Drawn on top of the Mahogany oil-shale bed. Dashed where approximately located; short dashed where datum is eroded. Contour interval 100 feet.

Core hole
Cored for oil shale

Dry Hole
Drilled for oil and gas

Line of measured stratigraphic section

REFERENCE
Cashion, W. B., 1969, Geologic map of the Black Cabin Gulch quadrangle, Rio Blanco County, Colorado: U.S. Geol. Survey Geol. Quad. Map GQ-812.

GEOLOGIC MAP OF THE RAZORBACK RIDGE QUADRANGLE, RIO BLANCO AND GARFIELD COUNTIES, COLORADO

By
Henry W. Roehler
1972

For sale by U.S. Geological Survey, price $1.00