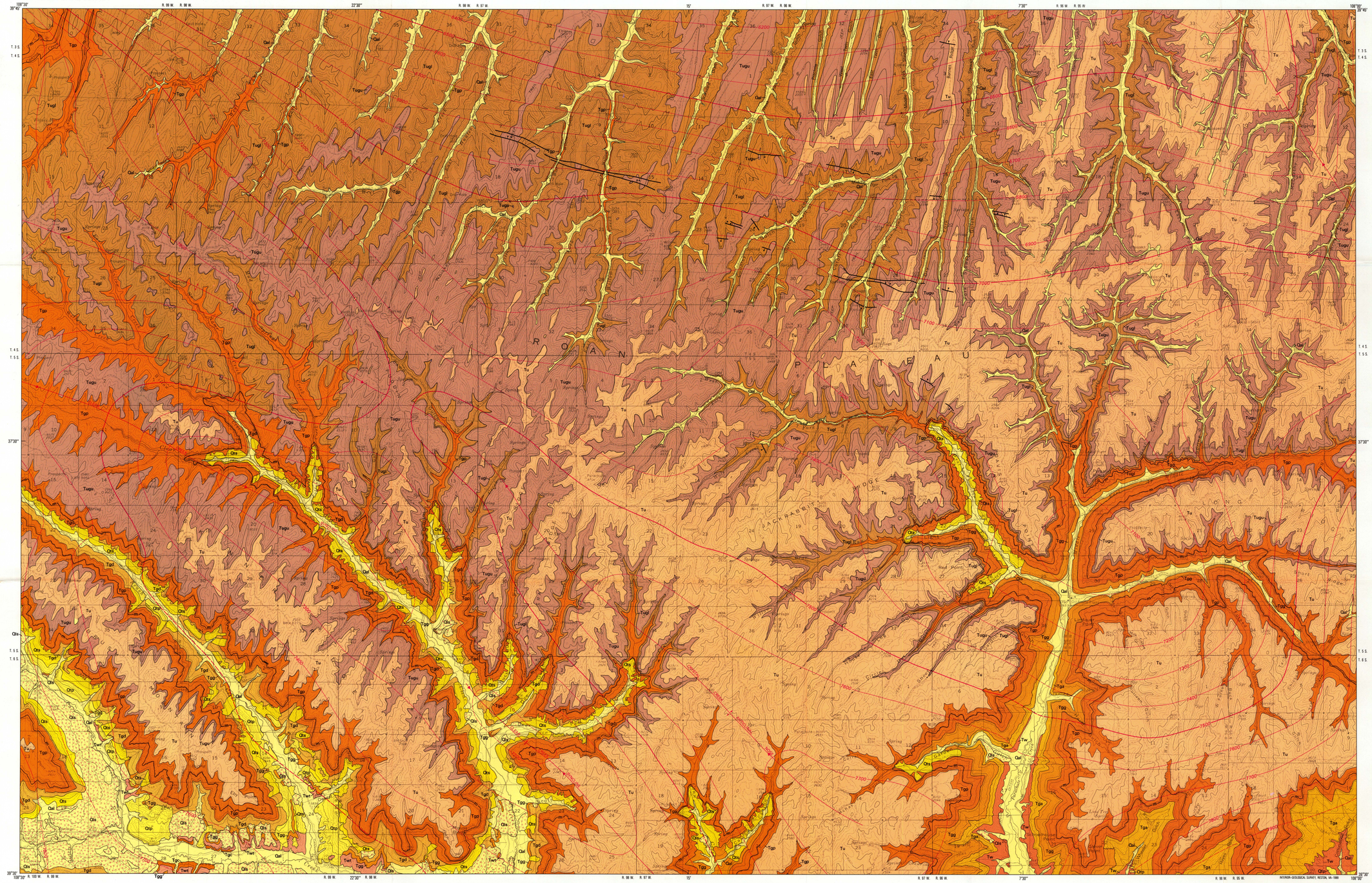
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I–1797–C



Base from U.S. Geological Survey
County Map Series, 1:50,000,
Rio Blanco and Garfield Counties, 1975

APPROXIMATE MEAN DECLINATION, 1989

SCALE 1:50 000

1 ½ 0 1 2 3 MILES
1 5 0 1 2 3 KILOMETERS

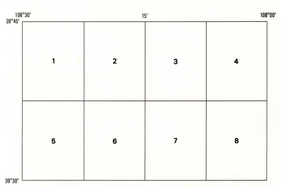
CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

COLORADO

MAP LOCATION

INTERIOR–GEOLOGICAL SURVEY, RESTON, VA–1989

Compiled in 1987. Modified from geologic maps listed in Sources of geologic data
Manuscript approved for publication, October 21, 1988



INDEX TO SOURCES OF GEOLOGIC DATA

SOURCES OF GEOLOGIC DATA

1. Johnson, R. C., 1978, Preliminary geologic map of the Figure Four Spring quadrangle, Rio Blanco and Garfield Counties, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–912, scale 1:24,000.
2. Hail, W. J., Jr., 1977, Preliminary geologic map of the Bull Fork quadrangle, Rio Blanco and Garfield Counties, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–830, scale 1:24,000.
3. Hail, W. J., Jr., 1975, Preliminary geologic map of the Cutoff Gulch quadrangle, Rio Blanco and Garfield Counties, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–691, scale 1:24,000.
4. O'Sullivan, R. B., Wahl-Pierce, Frances, and Arbelside, S. J., 1981, Preliminary geologic map of the McCarthy Gulch quadrangle, Rio Blanco and Garfield Counties, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–860, scale 1:24,000.
5. Johnson, R. C., 1981, Preliminary geologic map of the Desert Gulch quadrangle, Garfield County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–1328, scale 1:24,000.
6. Hail, W. J., Jr., 1978, Preliminary geologic map of the Mount Blaine quadrangle, Garfield County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–984, scale 1:24,000.
7. Hail, W. J., Jr., 1982, Preliminary geologic map of the Circle Dot Gulch quadrangle, Garfield County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–1293, scale 1:24,000.
8. O'Sullivan, R. B., and Hail, W. J., Jr., 1987, Preliminary geologic map of the Forked Gulch quadrangle, Garfield County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–1953, scale 1:24,000.

Table 1.—*Correlation of map symbols used on map of the Roan Plateau area, northwestern Colorado, with those used on constituent 7½-minute quadrangles*

[Leaders (—) indicate unit not present, not mapped, or present in subsurface only]

This map	Figure Four Spring quadrangle	Bull Fork quadrangle	Cutoff Gulch quadrangle	McCarthy Gulch quadrangle	Desert Gulch quadrangle	Mount Blaine quadrangle	Circle Dot Gulch quadrangle	Forked Gulch quadrangle
Qal	Qal	Qal	Qal	Qal	Qal, Of	Qa, Of	Qa, Of	Qa
Qts	——	Qal	Qt	——	Qts	Qt	Qt	——
Qls	——	Qls	——	——	Qs	Ql	Qt	——
Qtp	——	——	——	——	Qt	——	——	Qp
Tu	Tu	Tue	[1]Tud	Tu	Tu, Ts	Tuf, Tud	Tud	Tud
Tugu	Tgbf, [2]Tu Tgb	Tgbf, Tud Tgb, Tuc	[3]Tud, Tgb, Tuc	Tgl, [2]Tu	Tgsk, [2]Tu, Tgsl	Tgss, Tgsk, Tua, Tgsl, Tuc	Tgl, Tuc	Tgl, Tuc, Tus
Tugl	Tgba, Tgs, [2]Tu, Tgu Tgc	Tgs, Tub, Tgc, Tua	Tgs, Tub Tgc, Tua	Tgs, [2]Tu, Tgc	——	Tgs, Tgl, Tuc Tgs, Tub, Tgc, Tua	Tgs, Tub, Tgc, Tua	Tgs, Tub, Tgc, Tua
Tgp	Tgp	Tgp	Tgp	Tgp	Tgp	Tgp	Tgp	Tgp
—m—	ml	M	M	m	ml	ml	ml	m
Tgd	——	——	——	——	Tgd	Tgd	——	——
Tgg	——	——	——	——	Tgg	Tgg	Tgg	Tgg
Tga	——	——	——	——	——	——	Tga	Tga
Tgc	——	——	——	——	Tgc	——	——	——
Tw	——	——	——	——	——	——	Tw	Tw
Twt	——	——	——	——	Tw	Tw	——	——

[1]East of boundary between R. 96 W. and R. 97 W.
[2]Unnamed tongue of the Uinta Formation.
[3]West of boundary between R. 96 W. and R. 97 W.

REFERENCES CITED

Hail, W. J., Jr., 1975, Preliminary geologic map of the Cutoff Gulch quadrangle, Rio Blanco and Garfield Counties, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–691, scale 1:24,000.

———1978, Preliminary geologic map of the Mount Blaine quadrangle, Garfield County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–984, scale 1:24,000.

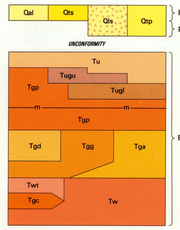
———1988, Geologic map of the Barcus Creek SE quadrangle, Rio Blanco County, Colorado: U.S Geological Survey Geologic Quadrangle Map GQ–1613, scale 1:24,000.

Johnson, R. C., 1981, Preliminary geologic map of the Desert Gulch quadrangle, Garfield County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–1328, scale 1:24,000.

———1984, New names for units in the lower part of the Green River Formation, Piceance Creek basin, Colorado: U.S. Geological Survey Bulletin 1529–I, 20 p.

O'Sullivan, R. B., and Hail, W. J., Jr., 1987, Preliminary geologic map of the Forked Gulch quadrangle, Garfield County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF–1953, scale 1:24,000.

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qal — **Alluvium (Holocene)**—Mud, silt, sand, and gravel. Mostly locally derived unconsolidated stream deposits on floors of larger valleys. Includes fan deposits at mouths of minor tributaries. Deposits of coalescing fans are dominant type of alluvium along several larger valleys. Also includes some slope wash along steep valley walls

Qts — **Talus and sheetwash deposits (Holocene)**—Unconsolidated poorly sorted rubble of mud, silt, sand, and gravel on or at the base of steep canyon walls. Only the thickest or most extensive deposits are shown

Qls — **Landslide deposits (Holocene and Pleistocene)**—Slide masses and slumped ground. Most common on lower slopes and at bases of steep canyon walls. Most originate in outcrops of the Douglas Creek, Garden Gulch, and Anvil Points Members of the Green River Formation, and the Wasatch Formation

Qtp — **Terrace and pediment deposits (Holocene and Pleistocene)**—Poorly sorted silt, sand, and gravel. Locally contains abundant angular pebbles, cobbles, and boulders derived from nearby high ground. Locally includes talus, slopewash, and landslide deposits

Uinta Formation (Eocene)—Formed mainly from the clastic sediments of a generally southward prograding deltaic complex that ultimately filled the Eocene lake in which sediments of the Green River Formation were deposited. Much of the Uinta consists of southward-thinning wedges composed chiefly of sandstone and siltstone that interfinger with northward-thinning tongues of marlstone of the Green River Formation. The intertonguing Uinta-Green River sequence below the main body of the Uinta is divided into two map units which are described separately below. The Uinta Formation, including its tongues, is mostly brown weathering sandstone and siltstone, but also includes marlstone, mudstone, shale, oil shale, minor limestone, and thin tuff beds. The sandstone beds, highly variable in lithology, range from very fine to very coarse grained, and are locally conglomeratic. Sandstone beds are generally massive or poorly bedded, but in a few areas are crossbedded to parallel bedded. Siltstone beds and fine-grained sandstone beds are tuffaceous, locally argillaceous, calcitic, and commonly contain fragments of carbonized fossil plants. Siltstone beds are variably marly. Mudstone and shale beds are gray to greenish-gray. The marlstone beds are light gray, variably silty, and locally contain oil shale. The lithology is similar to that of marlstone beds of the Parachute Creek Member of the Green River Formation. Minor thin limestone beds are associated with the marlstone beds. Some sandstone and siltstone beds are resistant, generally where more strongly cemented by calcite, and form prominent cliffs or ledges. Others are soft, poorly cemented, and friable, and weather to slopes. Paleo-slump blocks are fairly common, especially where resistant sandstone or siltstone bodies overlie marlstone beds

Tu — **Main body of Uinta Formation**—The uppermost part of the Uinta in the map area includes fairly abundant marlstone beds similar in lithology to the underlying tongues of the Green River Formation. Most if not all these marlstone beds are, however, lenticular and are not regarded as tongues of the Green River. The basal contact of the main body of the Uinta is placed at the top of the stratigraphically highest mapped tongue of the Green River or at the top of the Parachute Creek Member where tongues of the Green River are absent. Thus the basal contact lies at various stratigraphic horizons in the map area. The lenticular marlstone beds in the main body locally contain oil shale which is relatively rich in places, but these oil-shale beds are generally thin, and like the enclosing marlstone beds, are lenticular, and of no present economic value. In the Desert Gulch quadrangle (Johnson, 1981), map unit Ts is a paleo-slump deposit of Eocene age and includes highly contorted rocks of the Uinta Formation as well as marlstone tongues of the Green River Formation. The entire unit is here arbitrarily included in the main body of the Uinta. Smaller paleo-slump blocks are present elsewhere, especially at the basal contact of the main body

Intertongued Uinta and Green River Formations (Eocene)—The thick stratigraphic sequence overlying the Parachute Creek Member of the Green River Formation and underlying the unit here designated as the main body of the Uinta Formation consists of complexly intertongued units of both formations. On the constituent 7 1/2-minute maps, tongues of the Uinta are unnamed. Some are designated by letter in ascending alphabetical order; others are designated simply as Tu. Tongues of the Green River include two formally named tongues, and several informally named tongues. The Green River tongues merge laterally, generally southward, with other Green River tongues or with the Parachute Creek Member of the Green River Formation. Owing to limitations of map scale, individual tongues are not shown on this map. The intertongued Uinta-Green River sequence is here divided into two map units: upper group (Tugu) and lower group (Tugl). The Uinta tongues are generally as described above: mostly brown weathering sandstone and siltstone, lesser marlstone including oil shale, mudstone, shale, and minor limestone. These tongues gradually become thinner, finer grained, and more marly toward their southward termination. The Green River tongues are mostly marlstone, including oil shale, of essentially the same lithology as the Parachute Creek Member of the Green River Formation into which they merge. In general, oil-shale beds become thicker and oil-shale values increase to the south. Some of the Green River tongues are largely oil shale where they merge with the Parachute Creek Member. The Green River tongues locally include sandstone and siltstone beds

Tugu — **Upper group of tongues of Uinta and Green River Formations**—Includes as many as ten tongues of the Uinta and Green River as mapped separately on the constituent 7 1/2-minute maps (table 1). No formally named tongues are included. Informally named Green River tongues in the sequence are the marlstones at Skinner Ridge, Sleepy Ridge, Bull Fork, Barnes Ridge, and Jackrabbit Ridge (table 1, map units Tgsk, Tgsl, Tgbf, Tgb, and Tgl). The stratigraphically highest part of the upper group is the marlstone at Skinner Ridge (table 1, map unit Tgsk), present only in the southwestern part of the map area. In much of the area, the basal contact of the upper group is placed at the base of a widespread Uinta tongue which overlies the Stewart Gulch Tongue of the Green River Formation, or laterally equivalent strata. Where this Uinta tongue is absent or was not mapped separately, the contact is arbitrarily moved to a different stratigraphic horizon

Tugl — **Lower group of tongues of Uinta and Green River Formations**—Includes as many as six tongues of the Uinta and Green River as mapped separately on the constituent 7 1/2-minute quadrangle maps (table 1). Includes two formally named tongues of the Green River Formation, the Stewart Gulch and Coughs Creek Tongues; both are widespread and distinctive in the map area. The Stewart Gulch Tongue consists mainly of light-gray dolomitic, variably silty marlstone, including oil shale which increases in oil content to the south; it also includes some fine-grained sandstone. The Coughs Creek Tongue is mostly light-gray marlstone but it commonly contains beds of siltstone, sandstone, and locally oil shale. The base of the lower group is placed at the base of the lowermost Uinta tongue which generally is the tongue underlying the Coughs Creek Tongue of the Green River Formation

Green River Formation (Eocene)—Sediments deposited in a variety of depositional environments, mostly lacustrine and marginal lacustrine to fluviatile

Tgp — **Parachute Creek Member**—Mostly dolomitic marlstone, oil shale, and some dolomitic shale and claystone in the lower part. Also contains several beds of gray to light-brown siltstone and sandstone, and numerous very thin beds of analcimized tuff. Sparse algal beds present in lower part. Marlstone is massive to platy, gray to light grayish brown. Oil shale is thin, parallel bedded to fissile, medium to dark brown. Both the marlstone and oil shale weather light gray. The richest oil-shale beds weather light bluish gray. Clay shale is brownish gray, very thin bedded to thinly laminated, locally papery weathering. Potentially valuable oil shale is present mostly in oil-shale zones R3, L3, R4, L4, R5, L5, R6, Mahogany zone (Hail,1975, 1988; Johnson, 1981; and O'Sullivan and Hail, 1987), and a sequence of mostly leaner oil shale as much as 300–400 ft (90–120 m) thick above the Mahogany zone. The marlstone and oil shale are relatively resistant and form steep cliffs capping canyon walls. Thickness of the Parachute Creek Member in outcrops ranges from about 900 to 1,200 ft (270–370 m)

—m— — **Mahogany ledge**—Top of a rich oil-shale zone in the Parachute Creek Member. The term Mahogany ledge is used for outcropping Mahogany zone. Thickness ranges from about 60 ft (18 m) in the southwest part of the map area to about 130 ft (40 m) in the northeast part

Tgd — **Douglas Creek Member**—Mostly gray, brownish-gray to greenish-gray variably silty calcareous and dolomitic claystone and mudstone; lesser marlstone and dolomitic shale. Also contains several beds of siltstone, sandstone, and oil shale. Includes some thin beds of ostracodal, oolitic, and algal limestone, and several thin tuff beds. In the Brush Creek and Roan Creek drainages, the base of the member is the base of the Kimball Mountain Tuff Bed (Johnson, 1984, p. 14–19). In most of the Clear Creek drainage, the upper contact of the member is the top of a cliff-forming brown-weathering silty dolomitic claystone. Elsewhere the unit is mostly nonresistant and slope forming. Much of the dolomitic claystone or mudstone grades eastward to clay shale where it is included in the Garden Gulch Member. Thickness about 600–750 ft (180–230 m)

Tgg — **Garden Gulch Member**—Mostly dark gray to brown claystone, locally fissile kerogen-rich clay shale, dolomitic shale, and marlstone. Contains silty marlstone and claystone, several thin oil-shale beds, a few brown-weathering siltstone and sandstone beds, and several thin limestone beds. In much of the map area, where the Garden Gulch Member lies directly on the Wasatch Formation, the basal bed is the Long Point Bed (Johnson, 1984, p. 11–16), a widespread transgressive lacustrine unit; which has a maximum thickness of as much as 12 ft (3.7 m); it includes gastropods, ostracodal and oolitic limestone and sandstone, and locally silty claystone, and shale. The Garden Gulch Member grades eastward into the upper part of the Anvil Points Member (**Tga**). This gradation is characterized by an increase in the number and thickness of sandstone beds, and the Garden Gulch is abruptly terminated along a facies boundary in Wheeler Gulch in the southeastern part of the map area. The Garden Gulch is mostly nonresistant and forms slopes. Thickness of the Garden Gulch in Parachute Creek drainage in the southeastern part of the area about 680–750 ft (210–230 m). Thickness in Clear Creek, Brush Creek, and Roan Creek drainages in the southwestern part of the area about 180–220 ft (55–67 m)

Tga — **Anvil Points Member**—In the extreme southeastern part of the area, where the Garden Gulch Member is absent, the Anvil Points Member is mostly light gray to brown fine- to coarse-grained locally conglomeratic sandstone, and interbedded siltstone and shale; also contains minor light-brown and yellowish-gray ostracodal limestone, and a few beds of gray marlstone in the upper part; maximum thickness about 1,200 ft (370 m). In the drainage of Parachute Creek and elsewhere where the Garden Gulch Member is present, the Anvil Points is mostly gray to brown-weathering kerogen-rich shale and lesser brown-weathering fine- to medium-grained sandstone; thickness about 300–400 ft (90–120 m). The abrupt eastward thickening of the Anvil Points is at the expense of the Garden Gulch Member which grades laterally eastward into the upper part of the Anvil Points. The basal unit of the Anvil Points Member is the Long Point Bed, a widespread transgressive lacustrine unit (Johnson, 1984, p. 11–16) which consists mostly of ostracodal and oolitic sandstone in the map area

Tgc — **Cow Ridge Member**—Mostly dark gray clay shale, dark-brown carbonaceous shale, very thin coal beds, and a few thin beds of sandstone and limestone. Gastropods and pelecypods are locally abundant. Exposed only along Roan Creek in the southwestern part of the map area. Basal part of member covered. Thickness of exposed beds about 200 ft (60 m)

Wasatch Formation (Paleocene and Eocene)—Rocks of fluvial and paludal origin. Exposed rocks are probably Shire Member of the Wasatch. Rocks of Paleocene age present only in subsurface in the map area

Tw — **Main body**—Varicolored red, purple, lavender, gray and grayish-yellow claystone, shale, silty shale, and siltstone; brown and gray fine-to coarse-grained lenticular channel-filling sandstone. Only upper part exposed. Nonresistant; forms gentle slopes; tends to slump. Maximum thickness of exposed beds about 300 ft (90 m)

Twt — **Tongue of Wasatch**—Mostly varicolored red, purple, maroon, yellowish-gray, and gray claystone and mudstone. Also contains some beds of fine- to medium-grained lenticular sandstone. Thickness of exposed beds about 240 ft (73 m)

——— **Contact**—Approximately located where obscured by soil cover or vegetation

Facies boundary—Arbitrarily placed between laterally gradational map units

Fault—Dotted where covered by Quaternary deposits. Bar and ball on downthrown side

Major fold axes—Showing trace of axial plane and direction of plunge

Anticline

Syncline

—7000— **Structure contour**—Approximately located. Drawn on top of Mahogany ledge (Mahogany zone in subsurface) showing elevation in feet above mean sea level. Contour interval 100 ft (30.5 m). Dashed where eroded

GEOLOGIC MAP OF THE ROAN PLATEAU AREA, NORTHWESTERN COLORADO

By

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1989

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