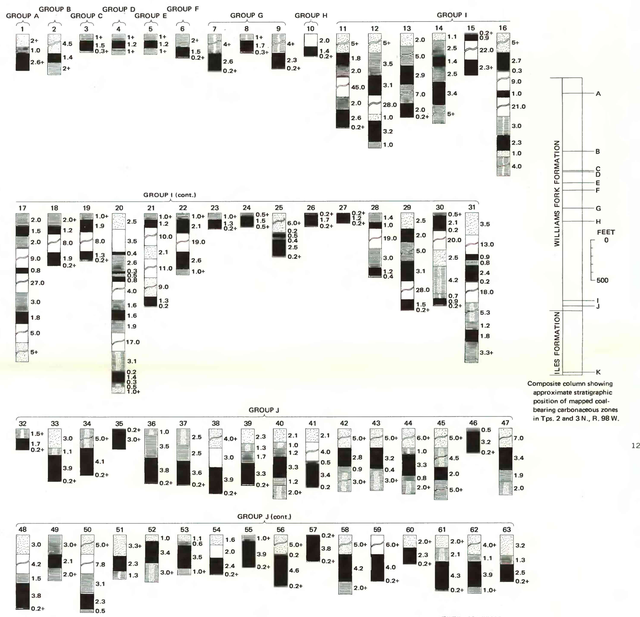
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

GEOLOGIC QUADRANGLE MAP
ROUGH GULCH QUADRANGLE, COLORADO
GQ–1195

MEASURED COAL SECTIONS IN TOWNSHIPS 2 AND 3 NORTH, RANGE 98 WEST

NOTE: Groups of measured coal sections are arranged in stratigraphic order (A is highest), and in numerical sequence generally south to north. No correlation of coal beds within groups is implied.



Composite column showing approximate stratigraphic position of mapped coal-bearing carbonaceous zones in Tps. 2 and 3 N., R. 98 W.

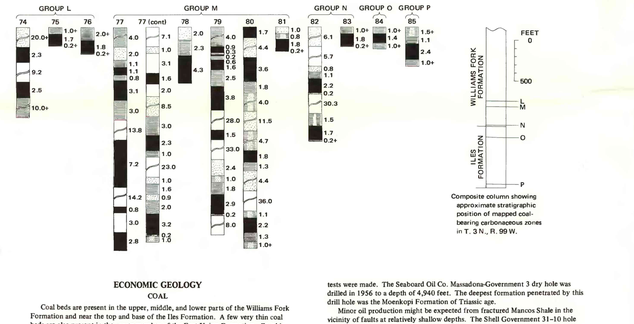
EXPLANATION

Thickness of beds shown in feet to right of lithologic columns

- Coal
- Carbonaceous shale or carbonaceous claystone
- Shale or claystone
- Siltstone
- Sandstone
- Covered interval
- Part of interval omitted

MEASURED COAL SECTIONS IN TOWNSHIP 3 NORTH, RANGE 99 WEST

NOTE: Groups of measured coal sections are arranged in stratigraphic order (L is highest) and in numerical sequence generally west to east. No correlation of coal beds within groups is implied.



Composite column showing approximate stratigraphic position of mapped coal-bearing carbonaceous zones in T. 3 N., R. 99 W.

ECONOMIC GEOLOGY

COAL

Coal beds are present in the upper, middle, and lower parts of the Williams Fork Formation and near the top and base of the Iles Formation. A few very thin coal beds are also present in the upper member of the Fort Union Formation. Graphic measured sections of the Iles and Williams Fork coal beds are shown. The coal beds occur in generally nonpersistent carbonaceous shale zones, and individual coal beds are lenticular and nonpersistent. The measured beds range in thickness from less than 1 foot to 7.2 feet. Most of the beds are less than 4 feet thick. The most important and relatively most persistent coal beds are those near the base of the Williams Fork Formation (groups I and J). These coal beds continue northward into the Elk Springs 15-minute quadrangle, where they constitute the middle Mesaverde Group coal zone as mapped by Dyni (1968). The coal beds near the base of the Iles Formation (groups K and P) correspond to the lower coal zone of the Mesaverde Group of the Elk Springs quadrangle.

The coal deposits of the quadrangle are in the southeastern part of the lower White River coal field described by Gale (1910, p. 179–197). No coal has been produced in the quadrangle except for local use by ranches from two small long-abandoned mines–the Jesse Bassett mine (coal section 12) in the N½ sec. 31, T. 3 N., R. 98 W., and the W. W. McGruder mine (coal section 79) in the N½ sec. 35, T. 3 N., R. 99 W. (Gale, 1910, p. 184, 187). Gale reported the coal bed at the McGruder mine to be 8 feet thick, but only 4 feet is now exposed at the caved mine entry.

No analyses are available for coals in the area. The U.S. Bureau of Mines (Aresco and others, 1966, p. 6) reported analyses of three samples from the Staley-Gordon mine about 11 miles west of the Rough Gulch quadrangle, from probably correlative strata. The analyses range from 12,350 to 12,690 Btu per pound (dry basis) and in sulfur content from 0.4 to 0.5 percent.

Possible economic utilization of the coals in the area would appear to be restricted at the present time by the lack of continuous thick beds and by the relatively steep structural dips. Dips in the coal-bearing area of Pinyon Ridge in the northeastern part of the quadrangle range from about 6° to 18° (about 550 to 1,750 feet per mile). In this area possible strip mining beneath 100 feet or less overburden could extend only a few hundred yards from the outcrop. Furthermore, much of this overburden consists of massive resistant sandstone. The economic use of auger mining or conventional underground mining would probably depend on discovery of thicker and more widespread coal beds underground. In the Stadtman Mesa area, south of the White River, structural dips range from 30° to 45°, probably precluding any possibility of strip mining of the coal beds in that area.

OIL AND GAS

The Weber Sandstone, of Pennsylvanian and Permian age, has yielded more than 400 million barrels of oil as of Jan. 1, 1968, in the giant anticlinal Rangely oil field, 15 to 20 miles west of the Rough Gulch quadrangle, accounting for more than 95 percent of its cumulative production. Thus the Weber is a primary objective in the search for oil in northwestern Colorado. In the Rough Gulch quadrangle, closed anticlinal structure is lacking in surface outcrops, and structural entrapment of oil in the Weber would depend on possible anticlinal closure at depth, or fault entrapment. Some faults, evident at the surface, are present just north of the White River. The Shell Oil Co. Government 31–10 dry hole was drilled in 1967–68 to a depth of 15,430 feet, penetrating 1,012 feet of the Weber, but without obtaining commercial oil production. There have been no other tests of the Weber in the quadrangle.

The Trident Oil Co. Stockmar-Government 1 dry hole was drilled in 1963 to a total depth of 2,056 feet, penetrating to the main body of the Mancos Shale. No tests were made. The Seaboard Oil Co. Massadona-Government 3 dry hole was drilled in 1956 to a depth of 4,940 feet. The deepest formation penetrated by this drill hole was the Moenkopi Formation of Triassic age.

Minor oil production might be expected from fractured Mancos Shale in the vicinity of faults at relatively shallow depths. The Shell Government 31–10 hole encountered minor shows of oil and gas in the lower part of the Mancos. Oil is produced from fractured Mancos in the Rangely field to the west.

Consideration should also be given to possible stratigraphic entrapment of gas in gently to steeply dipping lenticular sandstone beds in the lower part of the Wasatch Formation, in the lower member of the Fort Union Formation, and in the Williams Fork and Iles Formations. Gas is produced from such sandstones in the White River dome area about 4 to 5 miles southeast of the quadrangle. The White River dome is not to be confused with the much larger White River Uplift further to the southeast.

OIL SHALE

Elsewhere in the Piceance Creek basin the Parachute Creek Member of the Green River Formation contains rich zones of oil shale, but in this quadrangle the member is mostly barren of oil shale. The Mahogany ledge oil-shale unit, recognized in outcrop only in the western part of the quadrangle, is thin, and shale-oil values probably do not exceed 10 gallons per ton except in very thin beds. In outcrops near the mouth of Greasewood Creek, the Mahogany ledge cannot be identified, and there the Parachute Creek Member contains only a few very thin beds of lean oil shale in the middle and lower parts.

GRAVEL

Gravel is readily available from terrace deposits (map unit Qg) along the White River and lower Wolf Creek. Gravel deposits in sec. 3, T. 2 N., R. 98 W., and sec. 36, T. 3 N., R. 99 W., have been used for construction and maintenance of roads in the area. Terrace gravels probably underlie part of the mapped alluvial and colluvial deposits (map unit Qac) in this area. Many of these deposits are near Colorado Highway 64.

REFERENCES

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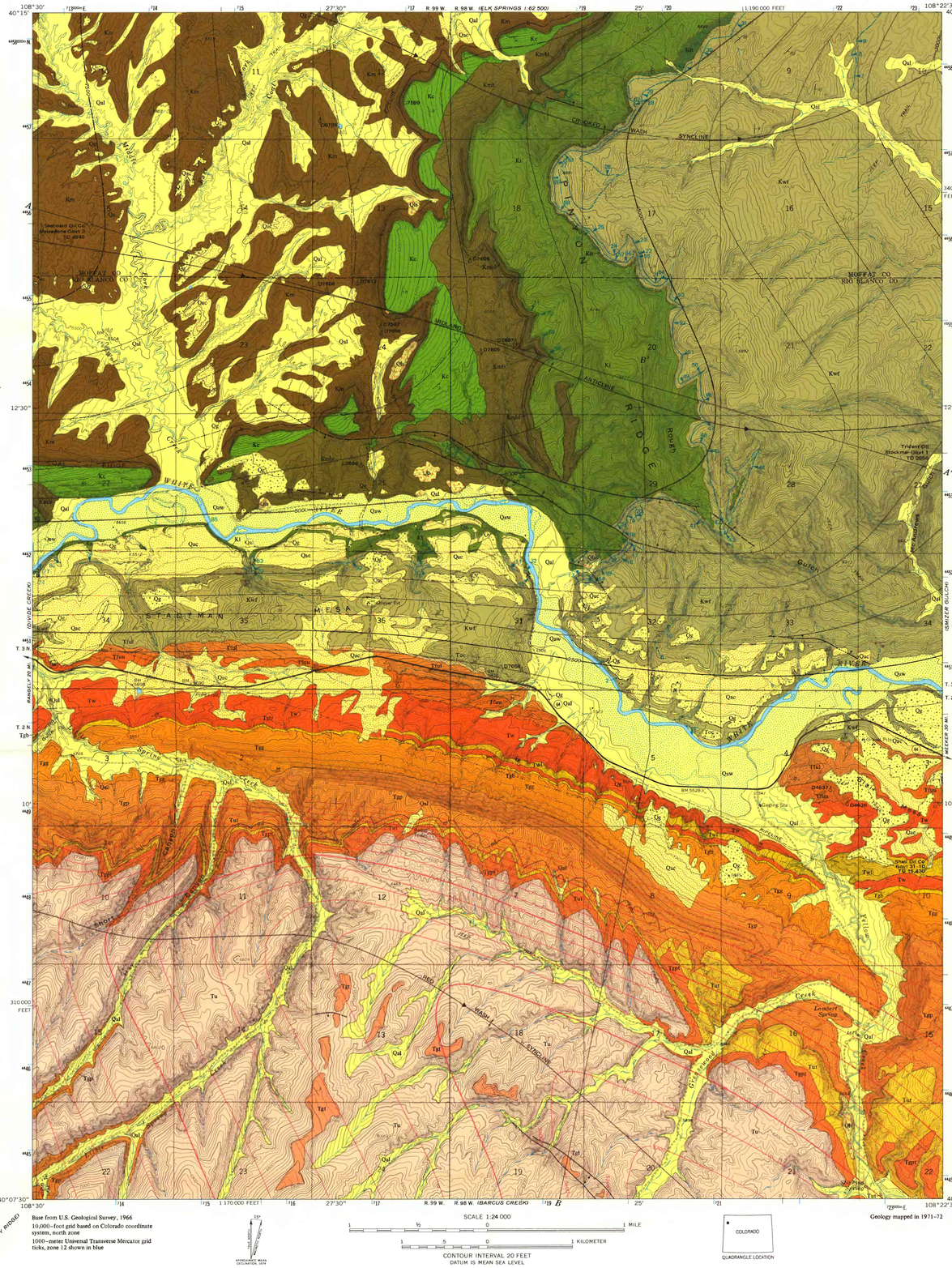


Base from U.S. Geological Survey, 1966
10,000-foot grid based on Colorado coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 12 shown in blue

TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1974

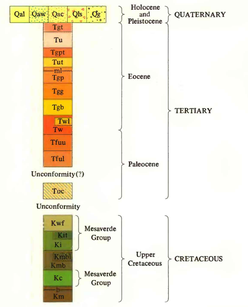
SCALE 1:24 000
1 ½ 0 1 MILE
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

COLORADO
QUADRANGLE LOCATION

Geology mapped in 1971–72

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qal ALLUVIUM (HOLOCENE AND PLEISTOCENE) – Mostly confined to stream valleys but does not include alluvium in valley of White River (Qaw); mostly of local origin; includes some slope wash along adjacent valley walls and alluvial fans at mouths of branch streams along White River

Qaw ALLUVIUM IN VALLEY OF WHITE RIVER (HOLOCENE AND PLEISTOCENE) – Includes resistant rounded gravel derived from sources far to the east, and nonresistant clay, silt, sand, and gravel derived from nearby sources

Qac ALLUVIAL AND COLLUVIAL DEPOSITS UNDIVIDED (HOLOCENE AND PLEISTOCENE)

Qls LANDSLIDE DEPOSITS (HOLOCENE AND PLEISTOCENE)

Qg TERRACE GRAVELS (HOLOCENE AND PLEISTOCENE) – Patches of gravel at various levels along White River, Wolf Creek, and Coal Creek. Gravel along White River is mostly silicified sandstone or siltstone, and quartzite; abundant basalt or other dark volcanic flow rock; sparse granite and other crystalline or metamorphic rocks. Gravel along Wolf and Coal Creeks is mostly limestone, silicified clastic rocks, lesser chert, and quartz. Maximum clast size about 1 foot; locally calcite cemented forming a resistant conglomerate. Maximum thickness about 20 feet

GREEN RIVER FORMATION (EOCENE):

Tgt Thirteenmile Creek Tongue – Very light gray dolomitic marlstone and limestone; commonly contains one or more beds of ostracodal calcarenite in middle to lower part; sandstone present locally; limestone and dolomitic marlstone, locally algal and silty, are very hard and resistant, forming isolated stripped surfaces. The tongue is the uppermost unit of the Green River Formation in this quadrangle and merges far to the southeast with the Parachute Creek Member of the Green River Formation. The Thirteenmile Creek Tongue was informally designated Barcus Creek marker bed on the preliminary geologic map of the Barcus Creek SE quadrangle (Hail, 1972). The Thirteenmile Creek Tongue has recently been named by Duncan, Hail, O'Sullivan, and Pipiringos (1974). Maximum thickness about 50 feet but top is eroded

Tggt Tongue of Parachute Creek Member – Mostly light-gray to light-brownish-gray dolomitic marlstone, locally silty. Intertongues with the Uinta Formation which overlies the main body of Parachute Creek Member. Thickness 100–150 feet

Tgp Main body of Parachute Creek Member – Mostly light-gray weathering, massive to platy dolomitic marlstone; also considerable silty dolomitic marlstone, dolomitic siltstone, and dolomitic shale; unit also contains a few thin sandstone beds, a few thin oil-shale beds, and several very thin tuff beds. Maximum thickness of main body of Parachute Creek Member is about 1,200 feet

ml Top of Mahogany ledge oil-shale unit – Thin beds of lean oil shale which occur about 50–100 feet below the top of the main body of the Parachute Creek Member. The Mahogany ledge (termed "Mahogany zone" in the subsurface) is recognized in most of the quadrangle west of Greasewood Creek. In the vicinity of Greasewood Creek the Mahogany may be locally scoured out and absent beneath the overlying sandstone of the Uinta Formation

Tgg Garden Gulch Member – Mostly dark-gray to brown fissile clay shale; upper part contains a ledge of dolomitic siltstone grading laterally westward to dolomitic shale; lower part contains a few thin sandstone beds and ostracodal limestone beds. Maximum thickness on outcrop about 880 feet

Tgb Basal sandstone member – Gray to brown, massive to crudely even-bedded sandstone; also contains at least one bed of gray claystone; locally contains a thin bed of gray limestone. Thickness ranges from about 10 to 35 feet

UINTA FORMATION (EOCENE):

Tu Main body – Mostly brown to brownish-gray sandstone and siltstone, locally tuffaceous, marly; sparse conglomerate; several beds of light-gray dolomitic marlstone, locally silty and grading to marly siltstone; some shale and mudstone; thin greenish-gray mudstone at top just below Thirteenmile Creek Tongue of Green River Formation. Marlstones are similar in lithology to Parachute Creek Member of the Green River Formation and may elsewhere merge with the Parachute Creek Member. The name Uinta Formation replaces the name Evacuation Creek Member of the Green River Formation for these rocks in this area. (See Cashion and Donnell, 1974.) A sequence of beds here included with the main body of the Uinta has been mapped as a tongue of the Parachute Creek Member of the Green River Formation in the Barcus Creek SE quadrangle to the southeast. The Yellow Creek Tongue of the Green River Formation, largely dolomitic marlstone, mapped in the adjoining Barcus Creek and Barcus Creek SE quadrangles, is present in part of this quadrangle but is included in this map unit (Tu) and not mapped separately. The Yellow Creek Tongue was informally designated Yellow Creek marker bed in the preliminary geologic map of the Barcus Creek SE quadrangle (Hail, 1972). The Yellow Creek Tongue has recently been named by Duncan, Hail, O'Sullivan, and Pipiringos (1974). Maximum unroaded thickness of main body of Uinta Formation about 600 feet

Tut Tongue of Uinta Formation – Brown, massive to crossbedded, locally conglomeratic sandstone; some tuffaceous sandstone and siltstone and minor marlstone. Channeling contact with underlying main body of the Parachute Creek Member of Green River Formation in area of maximum thickness. Thickness ranges from about 40 feet near Little Spring Creek to about 300 feet in the vicinity of Yellow Creek

WASATCH FORMATION (EOCENE AND PALEOCENE) – Outcrop thickness of Wasatch, including Twl unit, about 1,550 feet at east edge of quadrangle, thinning to about 1,200 feet at west edge

Tw Main body – Varicolored claystone and shale, mostly various shades of gray, lesser red, purple, and grayish green; brown to gray massive to crossbedded sandstone, mostly lenticular; minor siltstone, limestone, and carbonaceous shale. Fossil pollen from locality D4636, just above base of formation, is late Paleocene in age. In the adjoining Smizer Gulch quadrangle the Paleocene–Eocene boundary lies in the lower part of the Wasatch

Twl Unit containing some beds of probable lacustrine origin – Lacustrine beds include several thin persistent ostracodal sandstone and limestone beds; shale containing limy ostracodal beds, and some carbonaceous shale. Nonlacustrine beds predominate and are similar in lithology to main body of Wasatch. Unit is not mapped separately in western part of quadrangle although thin lacustrine beds persist to west edge of map. Maximum thickness about 340 feet, and top of unit lies about 100–200 feet below top of Wasatch

FORT UNION FORMATION (PALEOCENE):

Ttuu Upper member – Brown to gray shale, carbonaceous shale, minor coaly shale, a few thin shaly coal beds; thin, relatively persistent sandstone beds; lesser siltstone, claystone, and clay-pebble conglomerate. Fossil pollen from locality D4637, about 160 feet above base, is late Paleocene. Thickness is about 320 feet

Ttul Lower member – Olive-green to gray claystone; light-brown to light-gray lenticular sandstone, mostly crossbedded to massive; minor siltstone, mudstone, and carbonaceous shale; very sparse limestone. Map unit may locally include equivalent of Ohio Creek(?) Formation at base where not mapped separately elsewhere. Unit thins from about 800 feet at east edge of quadrangle to about 150 feet at west edge

Toc OHIO CREEK(?) FORMATION (PALEOCENE) – Light-brown to white sandstone, massive to crossbedded; locally contains very sparse chert or quartzite pebbles. Nonpersistent; cannot be recognized with certainty throughout quadrangle. Maximum thickness about 80 feet

Kwf WILLIAMS FORK FORMATION (UPPER CRETACEOUS) – Interbedded light-gray to brown, mostly fine-grained nonpersistent sandstone, and gray, greenish-gray, and light-brown shale and claystone; in Stadtman Mesa area, upper part contains abundant orange-weathering septarian concretion masses in greenish-gray shale. Considerable brown carbonaceous shale, and several lenticular coal beds in zones of carbonaceous shale; the most important coal beds are in the lower part of the formation. Fossils at locality D7058, about 250 feet below top of formation, are Late Cretaceous: *Tulotomops thompsoni* (White) and *Lioplacoides* cf. *L. nebrascensis* (Meek and Hayden). *T. thompsoni* is restricted to the Lance and equivalent formations. Thickness of Williams Fork ranges from about 2,500 to 2,950 feet

ILES FORMATION (UPPER CRETACEOUS):

Kiu Trout Creek Sandstone Member – Light-gray to light-brown, massive to crossbedded, fine- to medium-grained sandstone. Locally absent and is mapped only in extreme northern part of quadrangle, although locally present elsewhere at top of Iles. Where Trout Creek is absent, Williams Fork–Iles contact is placed at base of lowest coal bed of basal Williams Fork coal-bearing carbonaceous zone (group J or N) which is probably slightly lower stratigraphically than the Trout Creek. The Trout Creek of the mapped area is nonmarine, and is questionably correlated with the marine Trout Creek of the Danforth Hills area, about 25 miles to the east. This usage follows that of Dyni (1968) in the Elk Springs quadrangle to the north. Maximum thickness about 110 feet near north edge of quadrangle

Ki Main body – Upper part mostly massive lenticular brown-weathering sandstone and light-gray-weathering mudstone and claystone; sparse carbonaceous shale except near top, where thin coal beds are locally present. Lower part mostly mudstone, thin sandstones, abundant carbonaceous shale containing sparse thin coal beds. Basal sandstone unit, 35–65 feet thick, consists generally of a lower cliff-forming brown-weathering fine-grained sandstone and an upper white-weathering sandstone which is overlain by a thin discontinuous bed of coal. Basal unit contains stratigraphically highest occurrence of known marine rocks in mapped area and is probably equivalent to the Sego Sandstone of the Rangely area. Thickness of Iles Formation ranges from about 600 to 800 feet

MANCOS SHALE (UPPER CRETACEOUS):

Kmb Buck Tongue – Upper part mostly brown-weathering marine shale containing abundant orange-weathering limy septarian concretions; locally silty to sandy; contains a few thin sandstone beds near top. Lower part, 50–100 feet below the Loyd Sandstone Bed, is mostly gray-weathering marine shale. Fossils from locality D7606 in upper part of Buck Tongue are Late Cretaceous: Pyriporoid bryozoan, *Inoceramus subcompressus* Meek and Hayden, *Cymella montanensis* (Henderson), *Baculites perplexus* Cobban, and *Placenticeras* aff. *P. planum* Hyatt. Fossils from locality D7607 in middle of Buck Tongue are Late Cretaceous: *Inoceramus subcompressus* Meek and Hayden and *Baculites perplexus* Cobban. Fossils from locality D7595 in middle of Buck Tongue are Late Cretaceous: *Inoceramus subcompressus* Meek and Hayden, *Ostrea* sp., *Pholadomya* sp., *Baculites perplexus* Cobban, *Hoploscaphites* n. sp., and *Placenticeras* aff. *P. planum* Hyatt. Fossils from locality D7605 in basal part of Buck Tongue are Late Cretaceous: Pyriporoid bryozoan and *Baculites perplexus* Cobban. Overlies the Castlegate Sandstone. Thickness ranges from about 440 to 560 feet

Kmbl Loyd Sandstone Bed of the Buck Tongue – Massive to thin-bedded sandstone and lesser sandy shale; nonpersistent; resistant to nonresistant. Top of Loyd about 130 feet below top of Buck Tongue. Locally present westward but mapped separately only along west flank of Pinyon Ridge. In this quadrangle, the Loyd is assigned the rank of a bed within the Buck Tongue. Farther east where the Buck Tongue has merged with the main body of the Mancos, the Loyd is considered a member of the Mancos (Dyni and Cullins, 1965, p. 4–6). Maximum thickness about 70 feet

Km Main body – Brown to gray marine shale containing sparse orange-weathering limestone concretions; a few thin nonresistant sandstone or siltstone beds; nonresistant, forms slopes and lowlands. Fossils from locality D7597, about 350 feet below Castlegate Sandstone, are Late Cretaceous: *Baculites mclearni* Landes? (juvenile). Fossils from locality D7598, about 450 feet below Castlegate Sandstone, are Late Cretaceous: *Inoceramus* sp. and *Baculites mclearni* Landes? Fossils from locality D7612 (mapped location approximate), about 600 feet below Castlegate Sandstone, are Late Cretaceous: *Inoceramus* sp., *Pteria* sp., and *Baculites obtusus* Meek. Fossils from locality D7608 (mapped location approximate), about 840 feet below base of Castlegate Sandstone, are Late Cretaceous: *Baculites* sp. (weak flank ribs). Fossils from locality D8789, about 900 feet below base of Castlegate Sandstone, are Late Cretaceous: *Inoceramus balticus* Boehm, *Cymbophora canonensis* (Meek), *Baculites* sp. (probably the weakly ribbed species), and *Hoplitoplacenticeras* aff. *H. vari* (Schluter). Maximum thickness about 4,800 feet; maximum exposed thickness about 2,200 feet

b Top of b sandstone of Dyni (1968) – In main body of Mancos Shale about 150 to 200 feet below Castlegate Sandstone; consists of light-brown to light-gray medium-grained massive to poorly bedded sandstone. Fossils from locality D7599 are Late Cretaceous: *Baculites mclearni* Landes? (juvenile), and lobster. Sandstone is 10–35 feet thick

Kc CASTLEGATE SANDSTONE (UPPER CRETACEOUS) – Light-brown to gray, brown-weathering thin-bedded to massive fine-grained sandstone; interbedded shale, mostly in lower part; resistant, forms strong persistent cliffs and dip slopes. The Castlegate, an eastward-thinning sandstone tongue of the Mesaverde Group, separates the overlying Buck Tongue of the Mancos from the underlying main body of the Mancos. Thickness of Castlegate about 40 to 60 feet

CONTACT – Dashed where approximately located. Contacts between or bounding Quaternary deposits are also approximately located

FAULT – Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side

ANTICLINE – Showing crestline and direction of plunge. Approximately located

SYNCLINE – Showing troughline and direction of plunge. Approximately located

STRIKE AND DIP OF BEDS

6000 STRUCTURE CONTOURS – Drawn on top of the Mahogany zone or ledge (arbitrarily projected where Mahogany is not recognized), showing elevation above mean sea level. Approximately located; dashed where datum is projected above land surface. Contour interval 100 feet

5000 STRUCTURE CONTOURS – Drawn on top of the Castlegate Sandstone, showing elevation above mean sea level. Approximately located; dashed where datum is projected above land surface. Contour interval 500 feet

48 COAL BED – Dashed where approximately located. Line represents outcrop of uppermost coal bed in a carbonaceous zone that may contain several coal beds. Arrow indicates locality of measured coal section, and number refers to section shown graphically:

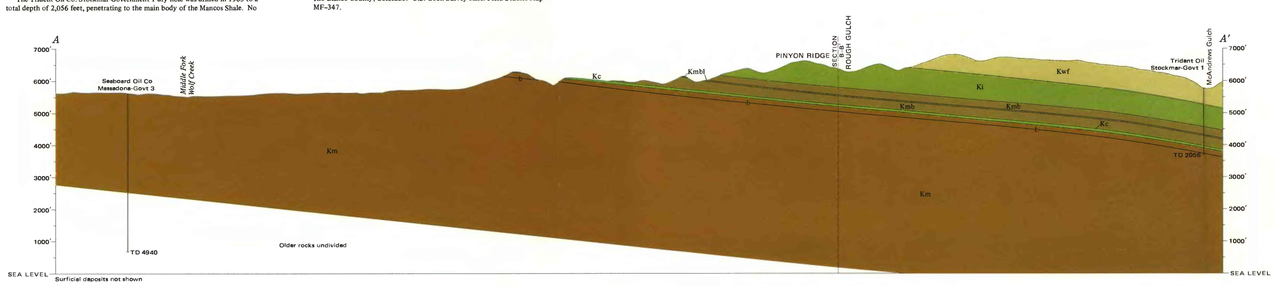
6 Isolated measured-thickness locality of coal bed shown by dot and number. Coal beds less than 1.2 feet thick generally were not mapped

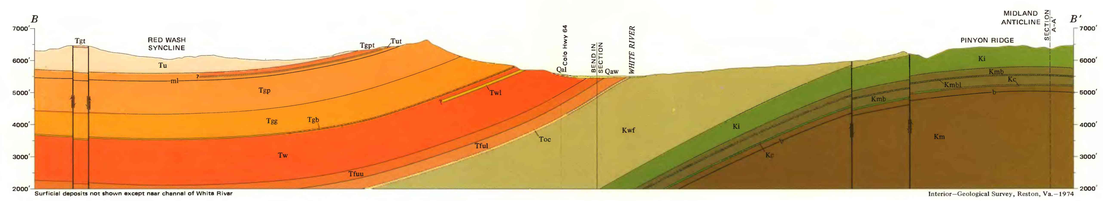
ABANDONED COAL MINE

DRY HOLE DRILLED FOR OIL OR GAS – Showing operator, lease name, and total depth in feet

D7605 FOSSIL LOCALITY – Showing USGS Denver catalog number

NOTE – Robert H. Tschudy identified fossil pollen and made age assignments of collections from localities D4636 and D4637. William A. Cobban identified fossil mollusks and made age assignments of collections from localities D7058, D7595, D7597, D7598, D7599, D7605, D7606, D7607, D7608, D7612, and D8789. James K. Gill collected the fossils from localities D7595, D7597, D7598, D7599, D7605, D7606, D7607, D7608, and D7612.





GEOLOGIC MAP OF THE ROUGH GULCH QUADRANGLE, RIO BLANCO AND MOFFAT COUNTIES, COLORADO

By
W. J. Hail Jr.

1974

Interior—Geological Survey, Reston, Va.—1974

For sale by U. S. Geological Survey
Denver, Colo. 80225 and Reston, Va. 22092, price $1.00