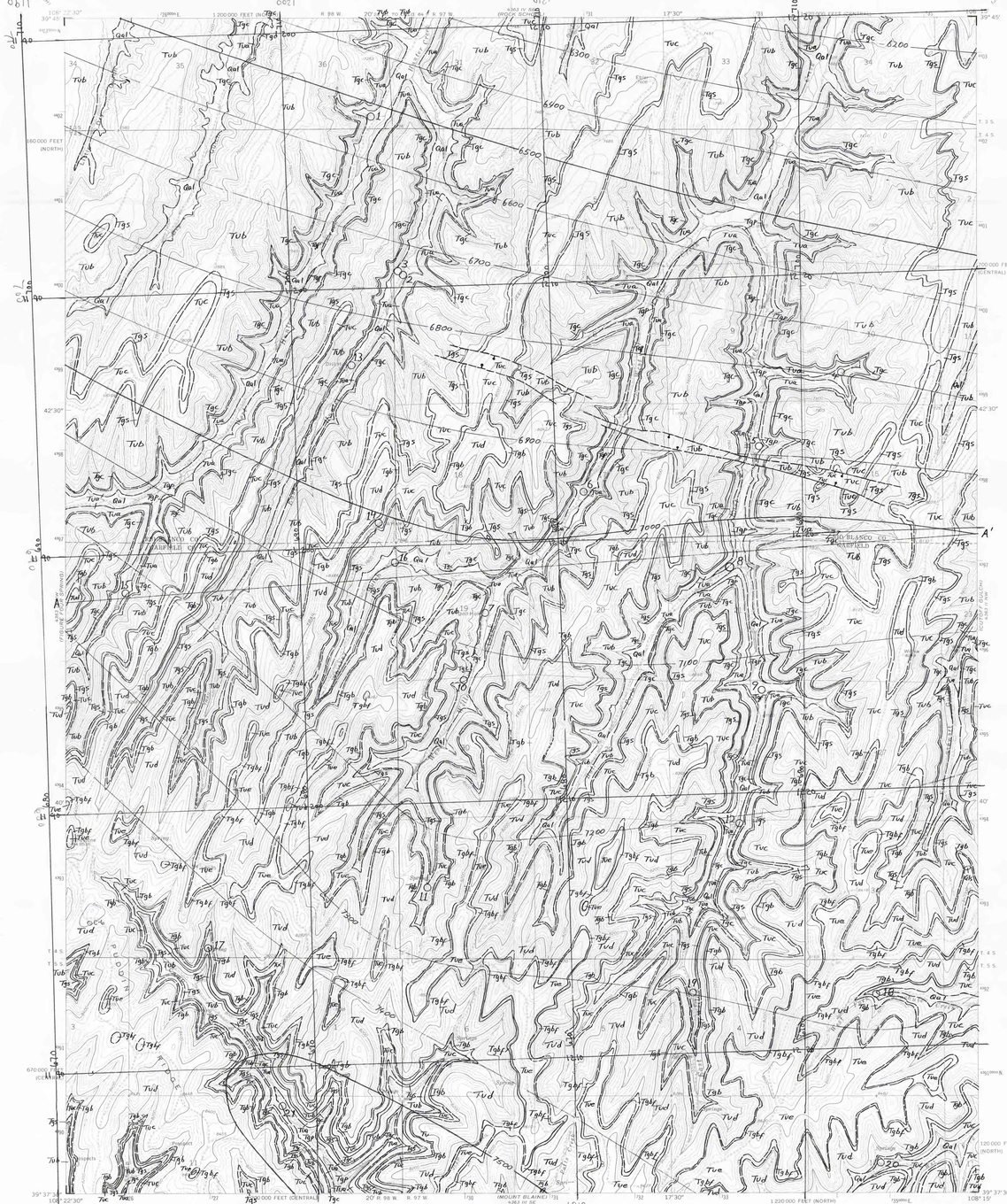
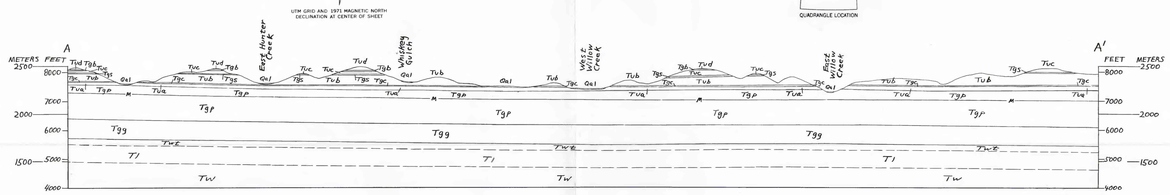


Base map from U.S. Geological Survey, 1971

Geology mapped in 1975



CORRELATION OF MAP UNITS

Qal, Qls	Holocene	QUATERNARY
Tue	Eocene	TERTIARY
Tgbf		
Tud		
Tgb		
Tuc		
Tgs		
Tub		
Tgc		
Tua		
Tgp, M, Tgp		
Tgg		
Twt		
Tl	Paleocene	
Tw		

DESCRIPTION OF MAP UNITS

Qal ALLUVIUM (HOLOCENE)--Unconsolidated locally derived material confined to stream valleys; includes some slopewash along base of steep valley walls, and alluvial fans at mouths of branch streams

Qls LANDSLIDE DEPOSIT (HOLOCENE)--Sandstone block slide in sec. 35, T. 4 S., R. 97 W.

UINTA FORMATION (EOCENE)--Mostly brown and gray sandstone and siltstone; also contains several beds of gray marlstone. Sandstone beds range from very fine grained to very coarse grained; some are clean quartzose; others contain abundant clay, rock grains, biotite, and other minerals. Sandstones locally contain abundant carbonized plant fragments. Siltstone beds are variably marly and locally contain abundant carbon trash. Marlstone beds are variably silty. Maximum uncroded thickness about 700 feet (210 m)

Tue Unit E--Sandstone, locally containing abundant lime-cemented spheroidal concretions, and siltstone which is variably marly, and locally biotitic and tuffaceous. Unit contains some limestone in southwestern part of quadrangle. Resistant beds form ledges and benches. Maximum uncroded thickness about 250 feet (76 m)

Tud Unit D--A heterogeneous unit consisting mostly of sandstone and siltstone, and lesser amount of marlstone. Sandstone forms conspicuous brown ledgy cliffs in southeastern part of quadrangle. Ranges in thickness from about 380 feet (116 m) near head of West Willow Creek to about 80 feet (24 m) at east boundary of quadrangle on divide between West Fork of Stewart Gulch and West Fork of Parachute Creek

Tuc Unit C--Sandstone, siltstone, and a few beds of marlstone. Sandstone is mostly fine grained, but ranges to medium grained. Siltstone predominates in southwestern part of quadrangle where unit is thin. Marlstone beds are variably silty. Resistant beds form ledges and benches. Ranges in thickness from about 360 feet (110 m) along upper East Willow Creek to about 30 feet (9 m) in southwestern part of quadrangle

Tub Unit B--Sandstone, siltstone, and a few beds of marlstone; sparse clay-pebble conglomerate and tuff. Considerable marly siltstone and silty marlstone along upper Hunter Creek. Predominantly brown siltstone in southwestern part of quadrangle where unit is thinnest. Lower part contains a persistent marlstone bed in northwestern part of quadrangle. Resistant beds form cliffs and ledges in northern part of quadrangle. Ranges in thickness from about 450 feet (137 m) in north-central part of quadrangle to about 75 feet (23 m) in southwestern part

Tua Unit A--Mostly sandstone and siltstone in northern part of quadrangle; mostly brown siltstone in southern part. Also includes some platy marlstone in lower part along East and West Willow Creeks; and silty marlstone in western part of quadrangle. Ranges in thickness from about 220 feet (67 m) in northern part of quadrangle to about 50 feet (15 m) along Camp Gulch in southern part

GREEN RIVER FORMATION (EOCENE)

Tgbf Marker bed at Bull Fork--Marlstone, light gray to white, dolomitic; locally silty, finely laminated. A probable tongue of Parachute Creek Member of Green River Formation. Ranges in thickness from about 60 to 30 feet (18 to 9 m)

Tgb Marlstone at Barnes Ridge--Marlstone, light gray to light brown. Laminar, even bedded to nonbedded. Mostly dolomitic; variably silty. Locally removed by erosional channeling near upper West Willow Creek. Relatively nonresistant. Unit merges southward with main body of Parachute Creek Member of Green River Formation; it is regarded as a tongue of the Green River. Ranges in thickness from about 40 to 15 feet (12 to 5 m)

Tgs Stewart Gulch Tongue--Marlstone, light gray to light brown. Laminar, even bedded to nonbedded. Mostly dolomitic, variably silty. Contains some marly siltstone. Disappears as a distinct unit a short distance north of quadrangle boundary where it becomes thin and silty; some siltstone near wedge edge is greenish gray. In southern part of quadrangle contains thin beds of oil shale yielding about 5-15 gallons of oil per ton; (20-60 liters per metric ton) sparse very thin beds of rich oil shale. Relatively nonresistant. Unit merges southward with main body of Parachute Creek Member of Green River Formation. Ranges in thickness from about 60 to 10 feet (18 to 3 m). Thinnest at north quadrangle boundary

Tgc Coughs Creek Tongue--Marlstone, light gray, variably silty; also contains some siltstone. Locally contains channels filled by overlying sandstone in northern part of quadrangle. Contains oil shale yielding about 5-20 gallons of oil per ton (20-80 liters per metric ton) in southern part of quadrangle, and a few thin rich, blue-gray-weathering oil-shale beds; mostly lacking in oil shale elsewhere. Relatively nonresistant. Ranges in thickness from about 40 to 20 feet (12 to 6 m)

Tgp Parachute Creek Member--Marlstone, light gray, platy; minor siltstone and sandstone. Only uppermost 80 feet (24 m) is exposed in quadrangle. Exposures contain lean to rich oil shale; considerable red clinkering of unit due to burning along East Willow Creek. Mostly poorly exposed; contact generally mapped at top of highest oil-shale float. In subsurface, unit contains several rich oil-shale zones. Ranges in thickness from about 1,400 to 1,100 feet (430 to 335 m)

—M— Top of Mahogany oil-shale zone--Shown in cross section only

Tgg Garden Gulch Member--Shown in cross section only. Probably mostly dark-brown or gray clay shale, and lesser interbedded dolomitic marlstone; thin ostracodal sandstone at base. Contains at least one rich oil-shale zone. Ranges in thickness from about 650 to 580 feet (200 to 180 m)

Twt TONGUE(?) OF WASTCH FORMATION (EOCENE)--Shown in cross section only. Mostly sandstone and variicolored claystone. Thickness about 200 feet (60 m)

Tl LACUSTRINE UNIT (EOCENE)--Shown in cross section only. A possible tongue of the Green River Formation. Sandstone, dolomitic and calcareous shale; minor marlstone; abundant ostracodal beds. Thickness about 600 feet (180 m)

Tw WASATCH FORMATION (EOCENE AND PALEOCENE)--Shown in cross section only. Varicolored claystone and sandstone; lesser amounts of siltstone and carbonaceous shale; minor amounts of limestone and coal

CONTACT--Dashed where approximately located; short dashed where inferred at base of channel

FAULT--Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side. Note: Fault is locally shown along calcite-mineralized fractures in graben zone where displacement may approach zero

7000 STRUCTURE CONTOURS--Drawn on top of Mahogany zone. Approximately located. Contour interval 100 feet (30.5 m). Datum is mean sea level

5 DRILL HOLE, SHOWING MAP NUMBER--Approximately located

OIL SHALE

Rich oil shale is present in the main body of the Parachute Creek Member of the Green River Formation. Some low-grade oil shale and a few very thin beds of rich oil shale are also present in the various marlstone tongues of the Green River overlying the main body of the Parachute Creek Member. Drill-hole data indicate that the Mahogany zone and six other commonly recognized rich oil-shale zones (R1 through R6) are present in the quadrangle

For beds below the top of the Mahogany zone, Keighin (1975, p. 67, fig. 5) estimates that the aggregate thickness of oil-shale beds averaging 25 gallons or more per ton (104 liters per metric ton) in beds at least 10 feet (3 m) thick ranges from about 100 feet (30 m) in the southwest corner of the quadrangle to about 500 feet (150 m) in the northeast corner of the quadrangle.

Pitman and Donnell (1973) evaluated oil-shale resources for beds between the top of the Mahogany zone and the top of the overlying Big Three rich oil-shale beds. This sequence was divided by Pitman and Donnell into four resource units. None of these units averages more than 22 gallons per ton (92 liters per metric ton) within the quadrangle.

Fischer assays shown on the oil-yield histograms were made by the U.S. Bureau of Mines at Laramie, Wyoming.

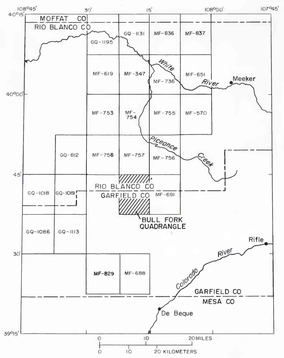
GAS

Natural gas was found in small amounts in several drill holes in the northern part of the quadrangle. Initial yield ranged from 500 to 3,000 MCF per day. The wells are presently shut in, and there has been no production. The gas is present in sandstones in the lower part of the Tertiary sequence, including the Ohio Creek Formation of Paleocene age.

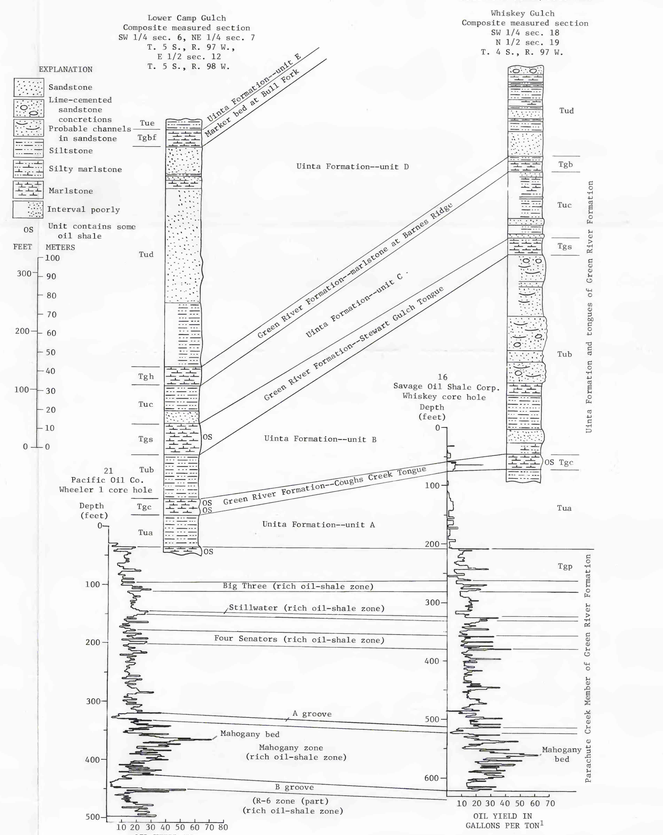
REFERENCES

Keighin, C. W., 1975, Appraisal of oil shale in the Green River Formation, Piceance Creek basin, Colorado School Mines Quart., v. 70, no. 3, p. 57-68.

Pitman, J. K., and Donnell, J. R., 1973, Potential shale-oil resources of a stratigraphic sequence above the Mahogany zone, Green River Formation, Piceance Creek basin, Colorado.: U.S. Geol. Survey Jour. Research, v. 1, no. 4, p. 467-473.



Index of recently published U.S. Geological Survey geologic maps in the Piceance Creek basin area, northwestern Colorado



[1] 1 gallon/ton = 4.17 liters/metric ton

STRATIGRAPHIC CORRELATIONS AND OIL-YEILD HISTOGRAMS OF SELECTED CORE HOLES

Drill holes (partial list) approximately located

MAP NO.	DRILL HOLE	SECTION
	T. 3 S., R. 98 W.	
1	Humble Oil Co., Hunter Creek 1 core hole	SE 1/4 36
	T. 4 S., R. 97 W.	
2	Continental Oil Co., 7-1 Federal, TD 1,004 ft (306 m)	NW 1/4 7
3	Continental Oil Co., 7-2 Federal, TD 6,306 ft (1,922 m)	NW 1/4 7
4	Gabbs Exploration Co., 2 Thurman-Gov't, TD 7,215 ft (2,199 m)	SE 1/4 10
5	F. A. Thurman, 1 Gov't, TD 6,017 ft (1,834 m)	NE 1/4 16
6	Gabbs Exploration Co., 3 Thurman-Gov't, TD 5,808 ft (1,770 m)	SW 1/4 17
7	Gabbs Exploration Co., 4 Thurman-Gov't, TD 5,541 ft (1,689 m)	SE 1/4 19
8	Wasatch Development Co., Princess Ann 1 core hole	NW 1/4 21
9	Continental Oil Co., 1-28 Gov't, TD 6,498 ft (1,981 m)	NE 1/4 28
10	Wasatch Development Co., Washington 1 core hole	NE 1/4 30
11	Wasatch Development Co., Washington 2 core hole	NE 1/4 31
12	Wasatch Development Co., Carbon 1 core hole	NE 1/4 33
	T. 4 S., R. 98 W. (unsurveyed)	
13	Lario Oil and Gas Co., 1 Willow Creek-Gov't, TD 5,760 ft (1,756 m)	SE 1/4 12
14	Shannon Oil Co., 1 Gov't, TD 6,211 ft (1,893 m)	SE 1/4 13
15	Savage Oil Shale Development Corp., Hunter core hole	NW 1/4 23
16	Savage Oil Shale Development Corp., Whiskey core hole	NE 1/4 24
17	Savage Oil Shale Development Corp., Camp core hole	SE 1/4 35
	T. 5 S., R. 97 W.	
18	Getty Oil Co. 10-3 core hole	NE 1/4 3
19	Getty Oil Co. 9-40 core hole	NW 1/4 4
20	Getty Oil Co. 13-10 core hole	NW 1/4 10
	T. 5 S., R. 98 W.	
21	Pacific Oil Co., Wheeler 1 core hole	NW 1/4 12

PRELIMINARY GEOLOGIC MAP OF THE BULL FORK QUADRANGLE, GARFIELD AND RIO BLANCO COUNTIES, COLORADO

By
W. J. Hail, Jr.

1977

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1977

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