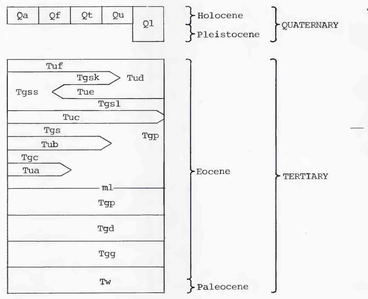
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-984

MOUNT BLAINE QUAD., CO.

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qa ALLUVIUM (HOLOCENE)--Locally derived stream deposits along larger valley floors

Qf ALLUVIAL FAN (HOLOCENE)--Flash-flood deposits at the mouths of steep drainages

Qt TALUS AND SLOPE WASH (HOLOCENE)--Gravity and sheetwash deposits on or at the base of steep cliffs

Qu QUATERNARY DEPOSITS UNDIFFERENTIATED (HOLOCENE)--Shown on cross section only

Ql LANDSLIDE DEPOSITS (HOLOCENE AND PLEISTOCENE)--Block slides and slumped ground

UINTA FORMATION (EOCENE)

Tuf Unit F--Mostly brown weathering siltstone and sandstone, lesser marlstone and silty marlstone. Contains a few thin lenses of oil shale. Top of unit is eroded. Maximum thickness about 110 m (360 ft)

Tue Unit E--Mostly light brown siltstone and marly siltstone; minor sandstone. Reaches limit of recognition southwestward and southeastward on Skinner Ridge mainly by facies change to silty marlstone. Thickness ranges from about 15 m to about 28 m (50-90 ft)

Tud Unit D--Mostly brown weathering sandstone and siltstone; lesser marlstone and silty marlstone. The marlstone contains thin lenticular oil-shale beds which increase in oil content toward the south. Part of unit D contains a considerably larger proportion of silty marlstone in the southeastern part of the quadrangle east of Clear Creek and south of Deer Park Gulch; these beds are probably equivalent to marlstone of Skinner Ridge (Tgsk) west of Clear Creek. Top of unit is eroded. Maximum thickness about 152 m (500 ft)

Tuc Unit C--Mostly brown weathering siltstone and sandstone. Siltstone predominates in the southern part of the outcrop area. Also contains marlstone and silty marlstone. Throughout most of the quadrangle unit C includes the marlstone at Barnes Ridge, which is mapped separately to the north in the Bull Fork (Hail, 1977), and the Cutoff Gulch quadrangles (Hail, 1975). The marlstone at Barnes Ridge is mostly barren in the northern part of the quadrangle, but becomes increasingly rich in oil-shale content southward, and is dominantly oil shale in the southern part of the outcrop area. Unit C tongues out in the southern part of the quadrangle. Maximum thickness about 76 m (250 ft) in the northern part of the quadrangle

Tub Unit B--Mostly brown weathering siltstone, some sandstone; minor silty marlstone. Tongues out in the northern to central part of the quadrangle. Maximum thickness about 18 m (60 ft)

Tua Unit A--Mostly brown weathering siltstone, some silty marlstone. Tongues out in the northwestern part of the quadrangle. Maximum thickness about 18 m (60 ft)

GREEN RIVER FORMATION (EOCENE)

Tgsk Marlstone at Skinner Ridge--Informally named for exposures on Skinner Ridge in the southwestern part of the quadrangle. Light-gray weathering marlstone and silty marlstone; some lean oil shale; locally contains thin papery oil-shale beds in upper part and near base. Thickness ranges from about 12 m to about 18 m (40-60 ft)

Tgsl Marlstone at Sleepy Ridge--Informally named for exposures on Sleepy Ridge in the north-central part of the quadrangle. Light-gray marlstone, including oil shale, siltstone, and sandstone. In the northern part of the quadrangle, an upper and lower marlstone, generally barren of oil shale, are separated by a southward-thinning wedge of brown-weathering sandstone and siltstone. The upper marlstone was mapped separately as the "marker bed at Bull Fork" to the north in the Bull Fork quadrangle (Hail, 1977). The sandstone-siltstone wedge is as much as 30 m (100 ft) thick at the northern quadrangle boundary, but thins abruptly and pinches out to the south. Throughout most of the outcrop area, the marlstone at Sleepy Ridge consists of several marlstone beds separated by siltstone or marly siltstone. The marlstones are mostly barren in the north but contain increasing amounts of oil shale southward. Southeast of Deer Park Gulch, the marlstone at Sleepy Ridge may locally include an equivalent of the marlstone at Barnes Ridge, as mapped to the north in the Bull Fork quadrangle (Hail, 1977). The marlstone at Sleepy Ridge merges with the main body of the Parachute Creek Member (Tgp) in the southeastern part of the quadrangle, and with the marlstone at Skinner Ridge in the southwestern part of the quadrangle. Thickness ranges from about 12 m in the north to about 61 m (40-200 ft) in the south

Tgss Marlstone at Skinner Ridge and marlstone at Sleepy Ridge--Mostly light gray weathering marlstone including minor oil shale, and silty marlstone. The combined marlstone unit is present in a small area on Skinner Ridge south of the wedge edge of unit E of the Uinta (Tue) which elsewhere separates the two units. The unit in turn merges a short distance to the southwest with the Parachute Creek Member (Tgp). Thickness ranges from about 24 m to about 46 (80-150 ft)

Tgs Stewart Gulch Tongue--Light-gray weathering marlstone and oil shale. Contains lean to good oil shale in the northern part of the quadrangle, and becomes increasingly rich in oil shale southward. At point of merger with the Parachute Creek Member (Tgp) in the central to southern part of the quadrangle it is dominantly oil shale. Thickness ranges from about 6 m to about 21 m (20-70 ft)

Tgc Coughs Creek Tongue--Light-gray weathering marlstone, including oil shale, and lesser siltstone. Commonly consists of two or three ledges of dominantly good oil shale separated by marly siltstone throughout its outcrop area. Merges with the Parachute Creek Member (Tgp) in the northwestern part of the area. Thickness ranges from about 6 m to 12 m (20-40 ft)

Tgp Parachute Creek Member--Marlstone, mostly oil shale; lesser silty marlstone, and marly siltstone; a few beds of siltstone and sandstone; some dolomitic shale and claystone in the lower part; numerous very thin beds of analcitized tuff throughout the member; a few thin algal beds in the lower part. Contains most of the potentially valuable oil shale in the quadrangle. Forms steep well-exposed cliffs along canyons. Thickness ranges from about 314 m to about 360 m (1,030-1,180 ft)

ml Mahogany ledge--A rich oil-shale zone in the Parachute Creek Member

Tgd Douglas Creek Member--Mostly gray, brownish gray, and greenish gray claystone, variably silty and dolomitic; also considerable dolomitic shale and marlstone. Carbonate content generally increases from south to north and northeast in the upper part of the member. Unit also contains several beds of siltstone, sandstone, oil shale, and a few thin algal, ostracodal, and tuff beds. Throughout most of the quadrangle the upper contact of the member is drawn at the top of a conspicuous brown-weathering cliff of silty dolomitic claystone above which lies marlstone and oil shale of the Parachute Creek Member (Tgp). Below the upper cliff the Douglas Creek is generally nonresistant and slope forming. Thickness ranges from about 195 m to about 219 m (640-720 ft). Note: The mapping of the Douglas Creek follows that in The Saddle quadrangle (Johnson, 1977) to the southwest. The equivalent of the Douglas Creek is included in the Parachute Creek Member as mapped in the Long Point quadrangle (Johnson, 1975) to the south

Tgg Garden Gulch Member--Mostly dark gray to brown kerogen-rich fissile clay shale; some siltstone, dolomitic shale, and silty claystone. Also contains several thin rich oil-shale beds. Basal part, as much as 3.7 m (12 ft) thick, is a persistent ledge-forming unit consisting of ostracodal and oolitic sandstone and limestone, silty claystone, and shale and is the sandstone bed at Long Point as mapped to the south and southwest (Johnson, 1975, 1977). Generally, the Garden Gulch Member is very poorly exposed. The thickness ranges from about 55 m to about 67 m (180-220 ft)

Tw WASATCH FORMATION (EOCENE AND PALEOCENE)--Mostly varicolored claystone; some beds of fine- to medium-grained sandstone. Only the upper part of the Shire Member (Eocene) of the Wasatch is exposed, in the southwestern part of the quadrangle. Maximum thickness of exposed rocks is about 73 m (240 ft)

——— CONTACT--Approximately located where obscured by soil cover or vegetation

—↑— FAULT--Bar and ball on downthrown side

-7000- STRUCTURE CONTOURS--Drawn on top of the Mahogany ledge oil-shale zone. Contour interval 30.5 m (100 ft)

○5 DRILL HOLE, SHOWING MAP NUMBER

ECONOMIC GEOLOGY

Oil shale

Rich oil shale is present in 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 Formation that intertongue with the Uinta Formation. A few thin rich oil-shale beds are also present in the Douglas Creek and Garden Gulch Members.

Subsurface information for evaluating oil-shale resources is mostly limited to the Mahogany and higher oil-shale zones, although some information is available for the R-6 rich oil-shale zone below the Mahogany. Rich oil-shale zones below the R-6 zone are present in the quadrangle but are unevaluated. The various rich oil-shale zones in the Piceance Creek basin are graphically depicted by Cashion and Donnell (1972), Johnson (1975, 1977), and Hail (1975).

Pitman and Donnell (1973) evaluated oil-shale resources for beds from the top of the Mahogany zone to the top of the Big Three rich oil-shale beds. Resources for this sequence range from about 76,000 m^3 per hm^2 (190,000 barrels per acre) in the southwestern part of the quadrangle, to about 116,000 m^3 per hm^2 (290,000 barrels per acre) in the northeastern part of the quaerangle. This sequence ranges from about 61 to 76 m (200-250 ft) thick in the quadrangle.

For oil-shale beds from the top of the Mahogany zone to the base of the R-6 zone, Janet Pitman (written commun., 1977) estimates that resources range from about 120,000 m^3 per hm^2 (300,000 barrels per acre) in the southwestern part of the quadrangle, to about 180,000 m^3 per hm^2 (450,000 barrels per acre) in the northeastern part of the quadrangle. The Mahogany zone is about 30 m (100 ft) thick in this area. The underlying R-6 rich oil-shale zone is about 46 m (150 ft) thick.

Gas

Gas and oil potential is virtually untested in the quadrangle. The Chevron Oil Co. 1 Pacific drill hole in sec. 13, T. 5 S., R. 98 W., yielded a minor amount of gas (175 MCFPD) from the Upper Cretaceous Mesaverde Group at a depth of 1,867-1,879 m (6,125-6,165 ft). Rocks below the Mesaverde have not been tested.

Gravel

A gravel pit in sec. 15, T. 6 S., R. 98 W., has provided base material for the county road along Clear Creek. The deposit consists of unconsolidated talus material of varying size and lithology, derived from the steep cliffsides above. Such material, in talus deposits and other surficial units, is abundant along Clear Creek and its tributaries.

References

Cashion, W. B., and Donnell, J. R., 1972, Chart showing correlation of selected key units in the organic-rich sequence of the Green River Formation, Piceance Creek basin, Colorado, and Uinta Basin, Utah: U.S. Geological Survey Oil and Gas Investigations Chart OC-65.

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.

———1977, Preliminary geologic map of the Bull Fork quadrangle, Garfield and Rio Blanco Counties, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-830.

Johnson, R. C., 1975, Preliminary geologic map, oil-shale yield histograms and stratigraphic sections, Long Point quadrangle, Garfield County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-688.

———1977, Preliminary geologic map and cross section of the The Saddle quadrangle, Garfield County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-829.

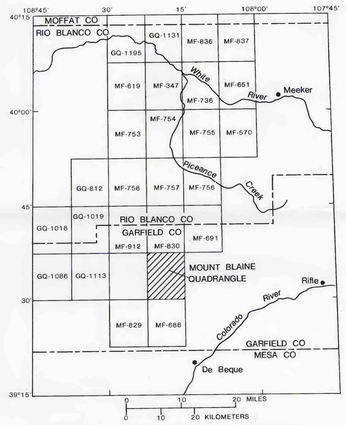
Pitman, J. K., and Donnell, J. R., 1973, Potential shale-oil resources of a stratigraphic sequence above the Mahogany zone, Green River Formation, Piceance Creek basin, Colorado: U.S. Geological Survey Journal of Research, v. 1, no. 4, p. 467-473.

Table of known drill holes in the Mount Blaine quadrangle, Colorado

[All are oil-shale evaluation core holes except no. 20]

Map no.	Drill hole	Section
	T. 5 S., R. 97 W.	
1*	Getty Oil Co. 12-9	SE¼ 9
2	Getty Oil Co. 33	SW¼ 14
3*	Getty Oil Co. 18-15	NE¼ 15
4*	Getty Oil Co. 17-16	NE¼ 16
5	Getty Oil Co. 34-14-14	SE¼ 16
6	Getty Oil Co. 16-17	NE¼ 17
7	Getty Oil Co. 3	SW¼ 19
8	Sun Oil Co. Magers Camp 2	NW¼ 20
9	Getty Oil Co. 5	SE¼ 20
10*	Getty Oil Co. 29-22	SE¼ 22
11	Getty Oil Co. 32, 32-A	NE¼ 27
12*	Getty Oil Co. 7-28	SE¼ 28
13	Getty Oil Co. 31	NW¼ 29
14	Getty Oil Co. 4	SW¼ 29
15	Getty Oil Co. 2	SW¼ 30
16	Getty Oil Co. 28-32	NE¼ 32
17	Getty Oil Co. 6	SW¼ 33
18	Getty Oil Co. 27-34	NW¼ 34
19*	Getty Oil Co. 8	NW¼ 35
	T 5 S., R. 98 W.	
20	Chevron Oil Co. 1 Pacific, T.D. 8,612 ft (2,625 m)	NW¼ 13
21	Getty Oil Co. 1	SE¼ 23
	T. 6 S., R. 97 W.	
22*	Pacific Oil Co. 2 Magor	SE¼ 7
	T. 6 S., R. 98 W.	
23	Texaco A-2 DeBeque	NE¼ 7
24	Pacific Oil Co. 1 Magor	SW¼ 14
25	Pacific Oil Co. 3 Magor	SW¼ 24

* Approximately located



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PRELIMINARY GEOLOGIC MAP OF THE MOUNT BLAINE QUADRANGLE, GARFIELD COUNTY, COLORADO

By

W. J. Hail, Jr.

1978

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