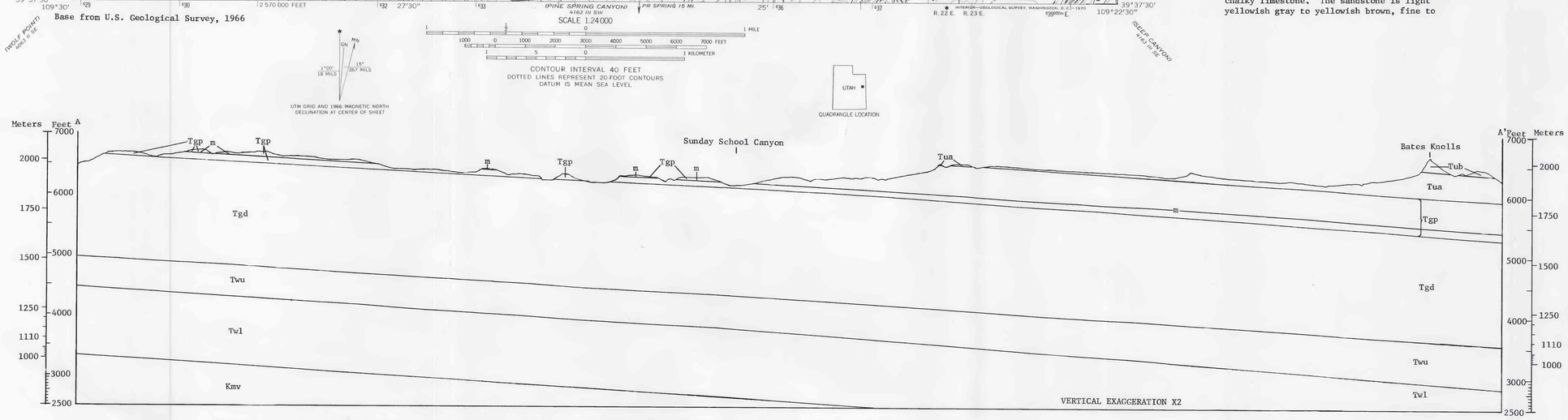
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



PRELIMINARY GEOLOGIC MAP OF THE BATES KNOLLS QUADRANGLE, UINTAH COUNTY, UTAH

By
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1978

CORRELATION OF MAP UNITS

Qal	Holocene	QUATERNARY
Tub	Eocene	TERTIARY
Tua		
—t		
Tgp		
—m		
Tgd		

DESCRIPTION OF MAP UNITS

[Most of what follows is based on a stratigraphic section measured in the Cooper Canyon quadrangle starting in sec. 20, T. 13 S., R. 23 E., continuing in the W 1/2 NW 1/4 sec. 33, and the N 1/2 sec. 29, T. 12 S., R. 23 E. and ending in the Buck Camp Canyon quadrangle in the S 1/2 sec. 13, T. 12 S., R. 22 E. The rest is based on observations made while mapping, and reconnaissance estimates of unit thicknesses in a stratigraphic section examined in the northeastern part of the Agency Draw NE quadrangle]

Qal ALLUVIAL DEPOSITS (HOLOCENE)--Unconsolidated silt and sand

UINTA FORMATION (EOCENE)

Tub Unit B--Dominantly yellowish to grayish-brown fine- to coarse-grained sandstone, tuffaceous, contains minor thin beds of yellowish- to grayish- brown siltstone. Unit B occurs only in the northern part of the area as outliers capping Bates Knolls. The Uinta remnants are 65-250 ft (20-76 m) thick

Tua Unit A--A sequence of alternating Uinta and Green River Formation lithologies. The Uinta lithologies are like those described above. The sandstone beds in the middle third of the unit are conspicuously planar cross-stratified in sets 1-12 ft (0.3-3.7 m) thick. The sandstone beds in the upper and lower parts of the unit are obscurely crossbedded to massive and attain thicknesses as much as 100 ft (30 m). The Green River lithologies consist principally of light greenish-gray barren marlstone and light brownish-gray low-grade oil shale (marlstone whose kerogen content is less than 10 gal/ton (42 L/metric ton)) with minor amounts of siltstone, tuff and white chalky oolitic, and ostracodal limestone beds. A grayish-white marlstone bed about 13 ft (4 m) thick is at the top of unit A in this area. There is but one conspicuous tuff bed in the sequence; it is about 15 ft (4.6 m) thick and makes a conspicuous orange-weathering ledge 185 ft (56 m) below the top of unit A. This bed was not mapped in the Bates Knolls quadrangle. It is in the same stratigraphic position and probably is equal to tuffaceous bed "a" of Cashion (1974) and of Keighin (1977). Two white chalky oolitic and ostracodal limestone beds each about 1 ft (30 cm) thick occur 78 ft (24 m) and 158 ft (48 m) below the top of unit A. Along the northeastern margin of the area, sandstone comprises about 63 percent and carbonates and tuff beds 37 percent of the unit. These proportions appear roughly reversed in the Agency Draw NE quadrangle adjacent to the northwestern part of the area. Unit A is about 520 ft (158 m) thick along the eastern margin and seems to thin to about 380 ft (116 m) at the western margin

GREEN RIVER FORMATION (EOCENE)

Tgp Parachute Creek Member--Oil shale, barren marlstone, and many tuff beds. The oil shale is dusky brown to pale yellowish and gray brown and generally is laminated to varved. It weathers to lighter shades of the same colors. The Mahogany zone (Mahogany ledge on outcrop) is a sequence containing rich oil shale about 82 ft (25 m) thick whose top is about 453 ft (138 m) below the top of the Parachute Creek Member. The Horse Bench Sandstone Bed (Cashion, 1967, pl. 3) is present in the Bates Knolls quadrangle, but is inconspicuous and was not mapped. It is about 10 ft (3 m) thick, and in three places where it was observed its base is 6.5-11.5 ft (2-3.5 m) above a very thin rich oil-shale bed that weathers blue and orange. The base of the Horse Bench is about 170-180 ft (52-55 m) below the top of the Parachute Creek Member. Tuff beds 0.5 in. (13 mm) to as much as 2.1 ft (0.6 m) are common throughout the member. The thickness of the member ranges from 1035 to 1090 ft (315-332 m) and averages about 1,070 ft (326 m)

-t- Two pairs of persistent tuffs underlie gently dipping flatirons in the southeastern and west-central parts of the area--Both tuffs of one pair were mapped locally in the west-central part of the area. The lower tuff is about 2 ft (0.6 m) thick, breaks into angular cobbles, is even bedded and occurs about 100 ft (30 m) above the top of the Mahogany bed (m) and about 35 ft (11 m) below the upper tuff. It probably correlates with the single tuff mapped locally in the southeastern part of the area which is about 2 ft (0.6 m) thick, weathers into spheroidal cobble-size blocks, is even bedded, and occurs about 75-90 ft (23-27 m) above the top of the Mahogany bed (m). The upper tuff was not mapped in the southeastern part of the area

-m- Mahogany bed--The richest oil-shale bed in the Mahogany ledge is about 6 ft (1.8 m) thick. Its top is about 26 ft (8 m) below the top of the Mahogany ledge. It rests directly on an irregularly bedded lumpy tuff about 0.1 ft (3 cm) thick. The Mahogany bed weathers to a brownish-black ledge. The overlying rich oil-shale sequence 3-6 ft (0.9-1.8 m) thick makes a dark silvery gray slope; this is in sharp contrast to the overlying barren marlstone and low grade oil-shale slope which weathers light dusky yellow to grayish orange. Five feet (1.5 m) above the base of this marlstone there is an even bedded tuff (probably the Mahogany marker bed about 0.1 ft (3 cm) thick. The basal 5 ft (1.5 m) of this marlstone also contains at least one light-brown chert bed 2-3 cm thick that weathers into light yellowish- to orange-brown plates that litter the top of the ledge generally formed by the Mahogany bed. These lithologic and stratigraphic features are persistent and diagnostic of the Mahogany bed throughout the Bates Knolls quadrangle. In this area the top of the Mahogany bed occurs 90-110 ft (27-34 m) above the base of the Parachute Creek Member

Tgd Main body of the Douglas Creek Member--Comprises the following lithologies listed in order of abundance: Sandstone, mudstone, siltstone, stromatolites, and chalky limestone. The sandstone is light yellowish gray to yellowish brown, fine to medium grained, poorly sorted, frequently contains algal fragments and nearly always is oil stained; makes ledges. The mudstone is greenish gray, consists of silt, clay, and floating quartz grains; makes reentrants. The siltstone is yellowish gray, and sandy; makes slopes. The stromatolites are yellowish gray and make ledges; some of them are brecciated and oil stained. Four thin layers of chalk-like dolomitic limestone occur within a stromatolite sequence 39-43 ft (12-13 m) below the top of the member. The top of the member is here considered to be the top of a stromatolite 2 ft (0.6 m) thick that overlies a moderately rich brown oil-shale bed about 1 ft (0.3 m) thick that weathers bluish gray; which overlies another stromatolite about 1.5 ft (0.46 m) thick. This stromatolite zone locally makes prominent ledges that underlie gentle slopes. Only about the upper 460 ft (140 m) of the Douglas Creek is exposed in the southwest corner of the mapped area. In wells drilled in various parts of the area, the thickness of the main body of the Douglas Creek ranges from 1,480 to 1,800 ft (451-549 m) and averages about 1,625 ft (495 m)

WASATCH FORMATION (EOCENE AND PALEOCENE)

Twu Upper part--Dominantly red beds of fluviatile origin with several tongues of lacustrine rocks in the upper part. Shown only in cross section. Ranges from 500 to 855 ft (152-261 m) and averages about 681 ft (208 m) thick in the subsurface

Twl Lower part--Shown only in cross section. The top and bottom of this unit are picked at persistent changes in the configuration of curves in the electric logs of holes drilled in this and adjacent areas. The upper one may mark the boundary between the Eocene and Paleocene parts of the Wasatch. This unit ranges in thickness from about 1,120 to 1,450 ft (341-442 m) and averages about 1,320 ft (402 m). Total thickness of the Wasatch Formation ranges from about 1,640 to 2,230 ft (500-680 m) and averages about 2,000 ft (610 m)

Kmv MESAVERDE FORMATION--Upper part shown only in cross section. Base picked at about the top of the Buck Tongue of the Mancos Shale. The thickness of the Mesaverde ranges from about 1,765 to 2,100 ft (538-640 m) and averages about 1,920 ft (585 m)

——— CONTACT--Quaternary alluvium (Qal) contacts approximately located; other contacts dashed where approximately located

—6000— STRUCTURE CONTOURS--Drawn on top of the Mahogany bed; dashed where bed is eroded. Contour interval is 50 ft (15 m). Datum is mean sea level

• CONTROL POINT--Used in constructing structure contour map; established by altimeter, plane table and telescopic alidade; probably accurate to within 10 ft (3 m)

○3 CORE HOLE--Drilled to evaluate oil-shale beds or bituminous sandstone. Bituminous sandstones described by Peterson (1975). Number keyed to table

⊙5 DRY HOLE--Oil and gas test. Number keyed to table

✳8 PRODUCING GAS WELL--Number keyed to table

⊙1 SHUT-IN GAS WELL--Number keyed to table

[19] CORE HOLES--Too closely spaced to show separately. Number keyed to table

REFERENCES

Cashion, W. B., 1967, Geology and fuel resources of the Green River Formation, southeastern Uinta Basin, Utah and Colorado: U.S. Geological Survey Professional Paper 548, 48 p.

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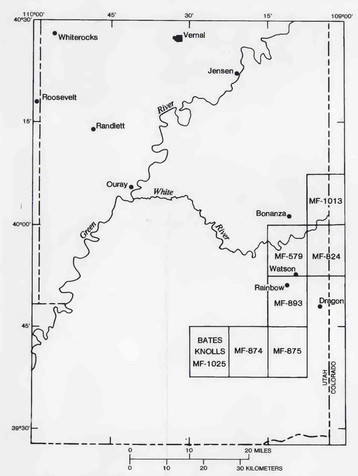
Keighin, C. W., 1977, Preliminary geologic map of the Rainbow quadrangle, Uintah County, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-893.

Peterson, P. R., 1975, Lithologic logs and correlation of coreholes, P. R. Spring and Hill Creek oil-impregnated sandstone deposits, Uintah County, Utah: Utah Geological and Mineral Survey Report of Investigations 100, 30 p.

LIST OF HOLES DRILLED IN BATES KNOLLS QUADRANGLE

[ERDA/LERC denotes U.S. Energy Research and Development Administration/Laramie Energy Research Center]

Map No.	Operator	Hole name and No.	Total depth Feet	Meters
1	Texaco Inc. - Skyline Oil Co.	S. A. Chorney - Govt RCT-1	12,073	3,680
2	ERDA/LERC	SUB 11	581	177
3	ERDA/LERC	SUB 3	350	107
4	Sinclair Oil and Gas Co.	Uintah No. 1 Federal-122	6,500	1,981
5	Sinclair Oil and Gas Co.	Uintah No. 1 Federal-171	6,600	2,012
6	Texaco, Inc.	Seep Ridge Unit No. 8	10,782	3,286
7	Texaco, Inc.	Seep Ridge Unit No. 3	10,537	3,212
8	Texaco, Inc.	Seep Ridge Unit No. 1	13,123	4,000
9	Texaco, Inc.	Seep Ridge Unit No. 4	10,757	3,279
10	Texaco, Inc.	Seep Ridge Unit No. 5	10,220	3,115
11	ERDA/LERC	SUB 6	236	72
12	Geokinetics, Inc.	E 32-1	60	18
13	Geokinetics, Inc.	E 32-2	130	40
14	Utah Geological and Mineral Survey	FR 6	423	129
15	ERDA/LERC	SUB 4	217	66
16	ERDA/LERC	SUB 5	137	42
17	Geokinetics, Inc.	E 1	79	24
18	Geokinetics, Inc.	E 4	50	15
19	Geokinetics, Inc.	L2-L8 average:	41	13
20	Geokinetics, Inc.	L1	20	6
21	Texaco, Inc.	Seep Ridge Unit No. 2	12,154	3,705
22	Geokinetics, Inc.	E2	80	24
23	Geokinetics, Inc.	E5	70	21
24	Geokinetics, Inc.	E6	75	23



Index of geologic maps recently published by the U.S. Geological Survey in the eastern part of the Uinta basin, Uinta County, Utah, and Rio Blanco County, Colorado

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MISCELLANEOUS FIELD STUDIES
MAP MF-1025
BATES KNOLLS QUAD., UTAH