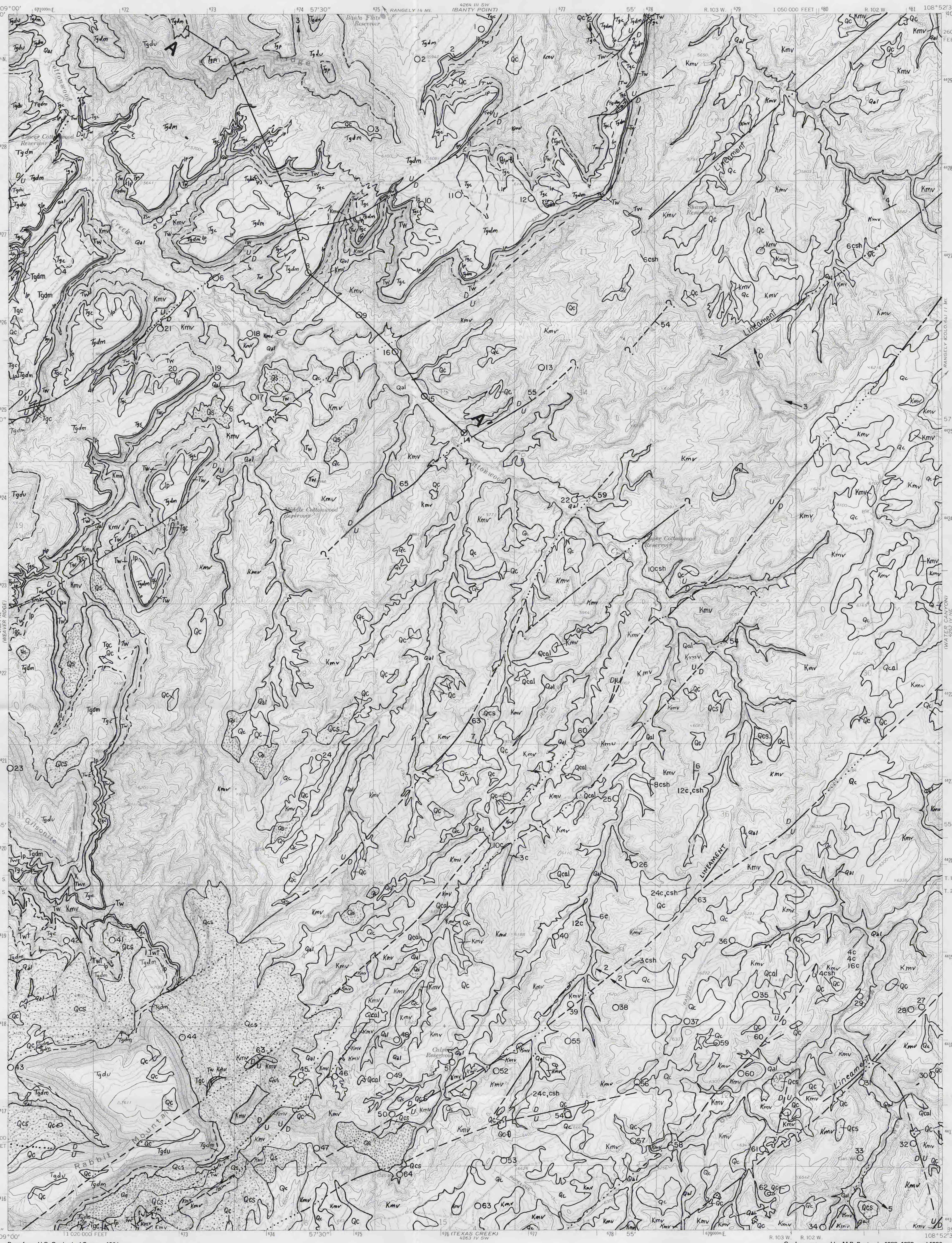

GEOLOGIC MAP OF THE BANTA RIDGE QUADRANGLE, RIO BLANCO COUNTY, COLORADO

By
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CORRELATION OF MAP UNITS

Qal, Qc, Qcal, Qs, Qcs — Holocene, Pleistocene — QUATERNARY

Unconformity

Tgp, Tgdu, Tgdm, lp, Twt, Tgc — Eocene; Tw — Paleocene (?) — TERTIARY

Unconformity

Kmv — Upper Cretaceous — CRETACEOUS

DESCRIPTION OF MAP UNITS

[1 in.=2.54 cm; 1 ft=0.305 m. All Quaternary units are approximately located]

Qal — **Alluvial deposits (Holocene)**—Unconsolidated clay, silt, sand, and gravel in and along active channels. Locally includes slope wash, fan, and terrace deposits; in flat areas near heads of intermittent streams may include very fine grained eolian deposits. Gravel clasts are tabular and composed of siltstone, sandstone, and mudstone

Qc — **Colluvial deposits (Holocene)**—Unconsolidated sand, silt, and clay of alluvial, slope wash, slump, and eolian deposits derived from exposed bedrock. Locally, deposits form at base of hills, in depressions on mesa tops, and in other broad flat areas throughout quadrangle

Qcal — **Colluvial and alluvial deposits, undifferentiated (Holocene)**—Unconsolidated sand, silt, and clay occurring mostly in broad open areas associated with a drainage

Qs — **Slump deposits (Holocene and Pleistocene)**—Slumps, slump blocks, landslides, talus, and other debris of mass wasting; locally includes slope wash. Deposits commonly have hummocky topography and occur at base of steep slopes and canyon walls along (1) the Wasatch Formation–Green River Formation boundary, (2) the Mesaverde Group–Wasatch Formation boundary, and (3) in areas of faulting. Mapped beds may be displaced as slump blocks

Qcs — **Colluvial and slump deposits, undifferentiated (Holocene and Pleistocene)**—Mostly slump deposits but with local occurrences of colluvium

Green River Formation (Eocene)

Tgp — **Parachute Creek Member**—Lacustrine unit composed of gray-green dolomitic marlstone, yellow-brown siltstone, gray and dark-brown to black oil shale, green-gray silty claystone, and some light-brown to tan altered tuff beds. Where exposed along Banta Ridge, marlstone and siltstone beds weather to light-brown or light-gray slopes and ledges; oil-shale beds weather to silver-gray ledges; and tuffs weather to tan, ledge-forming beds 1 in. or less thick. Top of Parachute Creek Member is eroded; about 150 ft exposed

Douglas Creek Member—Mostly a marginal lacustrine and fluvial unit composed of brown sandstone and siltstone, light-gray and brown oolitic, ostracodal, and algal limestone, brown and gray marlstone, green and gray-green claystone, and some oil shale. Sandstone is very fine to fine grained; some beds are laterally persistent and more than 40 ft thick. Sandstone and siltstone beds weather to ledges and cliffs showing many channel-form features and local displays of lateral-accretion bedding. Limestone beds weather to white or orange cliffs and ledges. Orange weathering is most characteristic of ostracodal beds. Marlstone beds weather to gray or light-brown slopes. Claystone beds weather to slopes of clay and flaky clay shale, locally pinching out between sandstone beds. Oil shale weathers to silver-gray or black, thin, bedded ledges in area of Long Point Bed. Locally, top of Douglas Creek Member is eroded; about 800 ft exposed

To the west, in the Weaver Ridge 7 1/2-minute quadrangle, Cashion (1977) informally divided the Douglas Creek Member of the Green River Formation into upper, middle, and lower units. Cashion's divisions are maintained herein for the upper and middle units with the addition of the Long Point Bed to the middle unit. Cashion's lower unit includes but does not name, from top to bottom: local occurrences of algal limestones, the Long Point Bed, shale and sandstone beds of an unnamed tongue of the Wasatch Formation, and interbedded limestone and sandstone beds of the Cow Ridge Member of the Green River Formation. An unnamed tongue of the Wasatch Formation pinches out along the west-central margin of the Banta Ridge quadrangle. Cashion's divisions of the lower unit were not carried into the Banta Ridge quadrangle in favor of the detail provided by the more formally named beds

Tgdu — **Upper part**—Mostly gray and tan dolomitic marlstone with a few thin beds of dark-gray to black oil shale and a few thin beds of light-tan to orange-tan algal limestone. Marlstone weathers to steep slopes, oil shale weathers to silver-gray ledges as much as 1 ft thick, and algal beds weather to tan or white ledges from 0.5 to 2 in. thick. Unit weathers to a steep slope, ranging in thickness from 300 to 600 ft

Tgdm — **Middle part**—Gray and gray-green siltstone, tan and brown sandstone, tan and orange-brown algal, ostracodal, and oolitic limestone, and gray and gray-green shale and marlstone. Sandstone is fine to very fine grained, porous, calcitic, and channel form, and shows small-scale parallel and contorted bedding. Sandstone beds weather to cliffs and ledges, some cliffs exceeding 15 ft in thickness. Siltstone beds weather to ledges and steep slopes. Limestone beds weather to cliffs and ledges. Limestone beds are mostly algal in lower part of unit, and oolitic or algal in upper part. Algal beds are abundant and laterally persistent, locally forming cliffs as much as 20 ft thick. Algal beds weather white; ostracodal and oolitic beds weather orange to red-orange. Shale and marlstone beds weather to steep slopes; marlstone beds may contain kerogen and be very low grade oil shale. Overall, unit weathers to cliffs and moderate to steep slopes that range in thickness from 200 to 500 ft

—lp— **Long Point Bed**—Light-brown to tan ostracodal limestone, and limy ostracodal sandstone. Unit commonly contains fossil gastropods and bivalves. Long Point Bed is basal bed of the Douglas Creek Member of the Green River Formation in much of the eastern Uinta Basin. Bed is described by Johnson and May (1978) and Johnson (1984, 1985) in the Piceance Creek Basin. Bed weathers to orange-brown or red-brown ledges and benches. Thickness ranges from 6 in. to 2 ft

Tgc — **Cow Ridge Member**—Mostly marginal lacustrine and fluvial unit composed of gray-green, gray, brown, and green claystone and mudstone interbedded with brown, yellow-brown, and tan sandstone, siltstone, and limestone. Mudstone and claystone weather to very steep slopes. Sandstone is very fine to fine grained and often ostracodal and limy. Sandstone and siltstone beds weather to cliffs and ledges. Limestone is mostly ostracodal, locally containing fossil gastropods and bivalves. Upper part of unit forms cliffs where exposed; lower part of unit is usually a very steep slope. Exposed unit ranges in thickness from 50 to 100 ft

Wasatch Formation (Eocene and Paleocene(?))

Twt — **Unnamed tongue (Eocene)**—Mostly fluvial unit composed of maroon, gray, gray-green, and dark-gray, flaky clay shale and clay; some brown, red-brown, light-gray to white, and maroon sandstone and siltstone, and brown and red-brown conglomeratic sandstone. Clay shale and clay beds weather to steep slopes, often with a popcorn-like appearance. Sandstone beds are channel form, very fine to fine grained, and not persistent. Sandstone and siltstone beds weather to cliffs and ledges. As much as 120 ft is exposed in southwest corner of quadrangle

Tw — **Main body (Eocene and Paleocene(?))**—Mostly fluvial unit composed of maroon, gray, gray-green, and dark-gray, flaky clay shale and clay; brown, red-brown, light-gray to white, and maroon sandstone and siltstone; and brown and red-brown conglomeratic sandstone. Clay shale and clay beds weather to steep slopes with a popcorn-like appearance; locally, beds are lenticular. Sandstone beds are channel form and very fine to fine grained. Sandstone and siltstone beds weather to cliffs and ledges, some exceeding 10 ft in thickness. Main body is probably Eocene with little to no Paleocene present in quadrangle. Locally, conglomeratic sandstone at base of Wasatch Formation is medium to coarse grained with chert and quartzite pebbles in lenticular channels or along bedding horizons. Conglomeratic sandstone bed is found in southwestern part of quadrangle. Locally, unit may contain only scattered pebbles, is unidentified, or is missing. Where found, base of conglomeratic sandstone unit is mapped as the Cretaceous-Tertiary contact. Main body of Wasatch Formation ranges in thickness from 80 to 200 ft

Kmv — **Mesaverde Group, undifferentiated (Upper Cretaceous)**—Predominantly fluvial unit composed of gray and white sandstone, gray silty carbonaceous shale, and a few thin coal beds. Sandstone beds are fine grained and mostly massive with local crossbeds or contorted bedding. Sandstone beds range from 3 to 60 ft thick and are separated locally by shale beds that may contain thin coal seams. Coal seams rarely exceed 0.5 in. in thickness. Locally, sandstone is yellow-white to white becoming more gray to gray-brown in lower part of section. White color of sandstone near the Wasatch Formation contact is thought to be caused by kaolinite produced by weathering on surface of unconformity (Johnson and May, 1978, 1980). Where present, top of topmost white or bleached sandstone is youngest Cretaceous sandstone bed and is mapped as the Cretaceous-Tertiary contact. About 500 ft of Mesaverde Group is exposed

Sego Sandstone (Upper Cretaceous)—Shown on cross section only. Mostly fine- to medium-grained sandstone with some silty shale. Lower part may be equivalent to the Loyd Sandstone Bed of the Buck Tongue of the Mancos Shale

Mancos Shale (Upper Cretaceous)—Shown on cross section only. Mostly gray, poorly laminated silty shale; includes the Buck Tongue of the Mancos Shale

Castlegate Sandstone (Upper Cretaceous)—Shown on cross section only. Mostly fine-grained to very fine grained sandstone; may contain some shale

12c, csh — **Coal or coaly shale**—Thickness in inches

Contact—Dashed where approximately located; all Quaternary contacts are approximately located

U/D 63 — **Fault**—*U*, upthrown side; *D*, downthrown side. Dotted where covered; dashed where approximately located; queried where inferred. Dip symbol where measured. Lineaments are so labeled

3 — **Strike and dip of beds**

2 — **Apparent dip of beds**

5 — **Drill hole**—See table 1

X — **Abandoned gilsonite site**—Sec. 31, T. 1 S., R. 103 W.

STRUCTURE

The Banta Ridge quadrangle, located along the eastern margin of the Uinta Basin and the western margin of the Douglas Creek arch, is dominated by a series of northeast-trending faults. Tracing the faults is difficult due to the lack of visible marker beds in the Mesaverde Group and the extensive ground cover produced by slumps, colluvium, alluvium, and vegetation. Drill-hole information (shown on cross section; table 1) suggests that some faults may exist in the subsurface that the authors did not find at the surface. This information also suggests a structural high in the southern half of the quadrangle.

CRETACEOUS-TERTIARY BOUNDARY

The Cretaceous-Tertiary (K-T) boundary changes character in the quadrangle, but not in a systematic way. Locally, a pebble conglomerate of varying thickness is present at the mapped base of the Tertiary in the southwestern part of the quadrangle. This zone is thinner here than at other locations south of this quadrangle (Scott and Pantea, 1990; Pantea, 1993). In the northern part of the quadrangle, a shale-shale or shale-sandstone contact is mapped as the K-T boundary. The Tertiary shale beds at and near the contact weather to hard steep slopes with a popcorn-like surface. The Cretaceous shale beds at and near the contact are commonly carbonaceous and weather to soft shallow slopes. Usually, the topmost Cretaceous sandstone contains kaolinite, producing a white color.

Locally, silicified wood is found overlying the white Cretaceous sandstone beds in the northern part of the quadrangle. This silicified wood horizon is interpreted as the remains of the pebble conglomerate zone found in the southern part of the quadrangle and in quadrangles to the south. Silicified wood is commonly found in the pebble conglomerate zone (Pantea 1993) and has not been found by the authors outside this zone in the region.

ECONOMIC GEOLOGY

OIL AND GAS

Most oil and gas production in the Banta Ridge quadrangle is derived from the Mancos Shale. Smaller amounts come from the Dakota Sandstone, Castlegate Sandstone, Niobrara Formation equivalent, and Morrison Formation.

GILSONITE

One abandoned gilsonite site was found in sec. 31, T. 1 S., R. 103 W.

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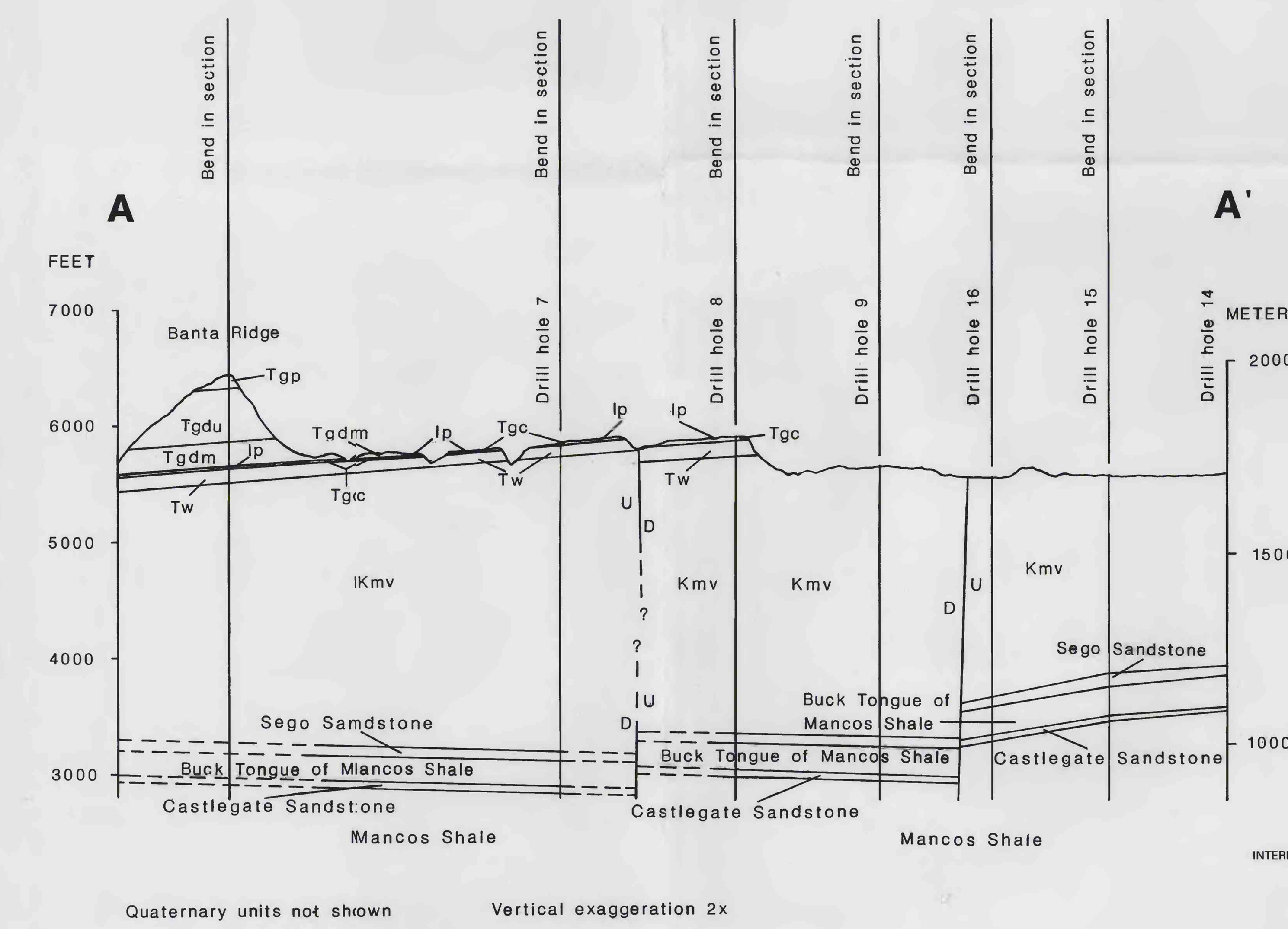
Table 1. *Drill holes in the Banta Ridge quadrangle, Colorado*
[1 ft=0.305 m; ND, no data found]

Map No.	Location Sec.	T.	R.	Operator and well name	Total depth (ft)
1	3	1 S.	103 W.	Chandler & Associates, Southwest Rangely	4556
2	3	1 S.	103 W.	Coseka Resources, Taiga Mountain #4-3-15	7792
3	4	1 S.	103 W.	Alta Energy, Banta Ridge #2	7886
4	7	1 S.	103 W.	Beartooth Oil & Gas, Federal #7-10	3070
5	8	1 S.	103 W.	Arch Oil & Gas, Taiga Mountain Federal #11-8-1-103	7210
6	8	1 S.	103 W.	Coseka Resources, Banta Ridge #1	7304
7	9	1 S.	103 W.	Alta Energy, Southwest Rangely #1-9	7750
8	9	1 S.	103 W.	Coseka Resources, Taiga Mountain #7-9-1-103	7546
9	9	1 S.	103 W.	Coseka Resources, Taiga Mountain #1-9-1S-103W	2880
10	10	1 S.	103 W.	Coseka Resources, Federal #14-10-15-103	3200
11	10	1 S.	103 W.	Coseka Resources, Federal #15-10-15-103	7593
12	11	1 S.	103 W.	Chandler & Associates, Southwest Rangely	ND
13	14	1 S.	103 W.	Coseka Resources, Taiga Mountain #12-14-1S-103	6898
14	15	1 S.	103 W.	Alta Energy, Taiga Mountain #2-15-15-103	6515
15	15	1 S.	103 W.	Coseka Resources, Federal #6-15-1S-103	3487
16	15	1 S.	103 W.	Coseka Resources, Federal #13-15-15-103	7305
17	16	1 S.	103 W.	Coseka Resources, Federal #5-16-1S-103	ND
18	16	1 S.	103 W.	Arch Oil & Gas, Taiga Mountain #13-16-1-103	7075
19	17	1 S.	103 W.	Alta Energy, Taiga Mountain #9-17-1S-103	4045
20	17	1 S.	103 W.	Coseka Resources, Taiga Mountain #6-17-1S-103	ND
21	17	1 S.	103 W.	Alta Energy, Banta Ridge #3	7315
22	23	1 S.	103 W.	Coseka Resources, Taiga Mountain #11-23-1S-103	3347
23	31	1 S.	103 W.	Mitchell Energy, G.H. Federal #1-31-1-103	ND
24	33	1 S.	103 W.	Beartooth Oil & Gas, Federal #33-2	6500
25	35	1 S.	103 W.	ND	ND
26	35	1 S.	103 W.	Coseka Resources, Federal #1-35-1-103	3277
27	6	2 S.	103 W.	Monterey Mohawk, Douglas Creek Rio Blanco Government #1	3208
28	6	2 S.	102 W.	Conoco, Government #6-3	ND
29	6	2 S.	102 W.	Jack Greyberg, Federal #24-6	2950
30	7	2 S.	102 W.	Chandler & Associates, Dragon Trail Federal #8-7	3262
31	7	2 S.	102 W.	Chandler & Associates, Dragon Trail Federal #6-7	3012
32	7	2 S.	102 W.	Chandler & Associates, Government B-1	ND
33	7	2 S.	102 W.	Chandler & Associates, Government B-2	ND
34	18	2 S.	102 W.	Beardmore Oil, Government #18-7	ND
35	1	2 S.	103 W.	Piute Energy, Lower Horse Draw, Government #1-4	ND
36	1	2 S.	103 W.	Piute Energy, Lower Horse Draw, Government #1-1	ND
37	1	2 S.	103 W.	Piute Energy, Lower Horse Draw, Government #1-2	ND
38	2	2 S.	103 W.	Piute Energy, Lower Horse Draw, Government #2-4	3152
39	2	2 S.	103 W.	Northwest Exploration, Cottonwood Creek #1	ND
40	2	2 S.	103 W.	Northwest Exploration, Cottonwood Creek #2	ND
41	5	2 S.	103 W.	Mountain Fuel Supply, Federal #5-1	4166
42	6	2 S.	103 W.	Celsius Energy, Rabbit Mountain #6-1	ND
43	7	2 S.	103 W.	Wexpro, Mountain Fuel Federal #7-1	ND
44	8	2 S.	103 W.	Wexpro, Mountain Fuel Federal #8-1	4325
45	9	2 S.	103 W.	Willard Pease Oil & Gas, Government #2.9	3259
46	9	2 S.	103 W.	Willard Pease Oil & Gas, Federal #3.9	ND
47	9	2 S.	103 W.	Willard Pease Oil & Gas, #3-9	ND
48	10	2 S.	103 W.	J.B. Gould, Lower Horse Draw #10-12	ND
49	10	2 S.	103 W.	J.B. Gould, Lower Horse Draw #10-11	ND
50	10	2 S.	103 W.	Wexpro, Federal #10-1	3277
51	10	2 S.	103 W.	ND	ND
52	10	2 S.	103 W.	Willard Pease Oil & Gas, Standfird #1	ND
53	10	2 S.	103 W.	Wexpro, Federal #10-2	3100
54	11	2 S.	103 W.	Wexpro, Federal #11-4	3175
55	11	2 S.	103 W.	Mountain Fuel Supply, Lower Horse Draw #11-2	2835
56	11	2 S.	103 W.	Wexpro, Lower Horse Draw #11-1	3026
57	11	2 S.	103 W.	Mountain Fuel Supply, Federal #11-3	3130
58	12	2 S.	103 W.	J.B. Gould, Phillips Lower Horse Draw #1	ND
59	12	2 S.	103 W.	Wexpro, Mountain Fuel Federal #12-2	3187
60	12	2 S.	103 W.	Lower Horse Draw D-18	ND
61	12	2 S.	103 W.	Wexpro, Lower Horse Draw #12-1	2852
62	13	2 S.	103 W.	Wexpro, Lower Horse Draw Unit #24	ND
63	15	2 S.	103 W.	Wexpro, Lower Horse Draw Unit #25	3200
64	15	2 S.	103 W.	Wexpro, Lower Horse Draw Unit #1	ND



INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1996