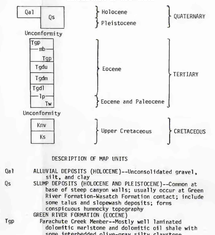
CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qal ALLUVIAL DEPOSITS (HOLOCENE)--Unconsolidated gravel, silt, and clay

Qs SLUMP DEPOSITS (HOLOCENE AND PLEISTOCENE)--Commonly at base of steep canyon walls; usually occur at Green River Formation-Wasatch Formation contact; include material that has slumped from deposits; forms conspicuous hummocky topography

GREEN RIVER FORMATION (EOCENE)

Tgp Parachute Creek Member--Mostly well laminated dolomitic marlstone and dolomitic oil shale with some interbedded olive-gray silty claystone, yellow-brown siltstone, stromatolitic limestone, and altered tuff. Top is eroded. Maximum thickness 140 ft (43 m)

mb Mahogany oil-shale bed--The richest oil-shale bed in the Parachute Creek Member; about 3-6 ft (1-2 m) thick

Tgdu Douglas Creek Member

Upper part--Mostly rust-weathering, fine-to very fine grained sandstone, rust-weathering siltstone, and olive-gray silty claystone with a few thin stromatolitic limestone beds. Sandstone and siltstone are nonlaminated to well laminated with parallel-horizontal laminae. 70-110 ft (21-34 m) thick

Tgdn Middle part--Mostly buff stromatolitic limestone interlayered with olive-gray silty claystone. A few thin, very fine grained, irregularly laminated or ripple laminated sandstone beds are also present. Stromatolites make up as much as 30 percent of the unit. Individual stromatolite beds are as much as 15 ft (5 m) thick and are composed of alternating zones of laterally linked hemispheroids and oncolites. Silty claystone is commonly rust-weathered-horizontal laminated. 225-315 ft (69-96 m) thick

Tgdl Lower part--Chiefly medium-gray, fine-to very fine grained sandstone and medium-gray to medium-olive-gray, slightly calcareous siltstone and silty claystone with some oolitic, ostracodal, and stromatolitic limestone. Sandstone units are as much as 60 ft (18 m) thick; parallel-horizontal, trough-cross, and drift-ripple laminated; contain abundant clay rip-ups; and commonly have large-scale lateral-accretion bedding. Sandstone units are traced for 3-4 kilometers. A very persistent, 15-30 ft (5-9 m) thick stromatolitic limestone occurs about 125 ft (38 m) below the top of the unit. The lower 125-150 ft (38-46 m) is interlayered, medium-to dark-gray, flaky clay shale and thin, oncolitic algal beds. 525-575 ft (160-175 m) thick

Tp Long Point Bed--A transgressive unit that forms a marker bed throughout the southwest Piceance Creek basin. In the Baxter Pass quadrangle, bed is an ostracodal limestone 3-8 ft (1-2 m) thick, which contains abundant Goniobasis and Viviparus gastropods and large bivalves

Tw WASATCH FORMATION (EOCENE AND PALEOCENE)--Mostly purple, maroon, and gray, massive mudstone with 25-75 percent lenticular, gray, fine-to coarse-grained conglomeratic sandstone units. Sandstone units are as much as 50 ft (15 m) thick; contain abundant clay rip-ups; are parallel-horizontal, trough cross and drift ripple laminated; and, in general, increase in coarseness and abundance toward the west. Clasts are as much as 8 in. (20 cm) in diameter and consist of chert and vein-quartz quartzite. Locally, sandstone near the contact with the underlying Mesaverde Group weathers white. A thin, black shale unit is also commonly found just above the contact. The Wasatch Formation is 200-400 ft (61-183 m) thick in the Baxter Pass area, thins and thickens irregularly but appears to be thinnest in the northeast corner of the quadrangle

Kmv MESAVERDE GROUP,UNDIFFERENTIATED (UPPER CRETACEOUS)--Mostly gray, fine-grained sandstone, gray silty claystone, and coal beds. Light-gray sandstone commonly is white near the contact with the overlying Wasatch Formation. It is caused by a buildup of kaolinite formed by weathering during the time interval represented by the overlying unconformity (Johnson and May, 1980). Sandstone beds are as much as 50 ft (15 m) thick; are parallel-horizontal, trough cross and ripple drift laminated; have clay rip-up zones; and have calcareous cementionary zones as much as 3 ft (1 m) thick. Three coal zones, which were originally mapped as Cameron Peak, Palisade, and Sego, 0-40 ft (15 m) of the Mount Garfield and Hunter Canyon Formations. The Palisade coal zone, which occurs just above the Sego Sandstone, is about 40 ft (12 m) thick and consists of two coal beds 1 ft (0.3 m) and 2.5 ft (0.75 m) thick; the Cameo coal zone, which is 245-310 ft (75-95 m) above the Sego, consists of several thin coal beds; and the Carbonera coal zone, which is 360 ft (110 m) above the Sego, consists of one 9 ft (2.75 m) coal bed. These thicknesses were taken from the section measured in the Mesaverde Group in this quadrangle. Coal does not appear to have been mined within the boundaries of the quadrangle but was mined in the Carbonera quadrangle to the south

Ks Sego Sandstone--Mostly fine-to medium-grained sandstone with some gray silty shale. Sandstone beds are parallel-horizontal, trough cross, and flaser laminated and contain abundant clay rip-ups throughout. Fossils found include scallops, fish bones, ophiomorph burrows, and unidentified, smooth-walled,horizontal burrows. Includes the Anchor Mine Tongue of the Mancos Shale. Exposed only along the southern margin of the quadrangle. About 250-300 ft (75-90 m) thick

MANCOS SHALE--Shown on measured section and on cross section only. Mostly gray, poorly laminated silty shale

COR ACT--Dashed where approximately located

7800 STRUCTURE CONTOURS--Drawn on base of the Long Point Bed. Dashed where projected above ground surface. Contour interval 100 feet (30.5 m)

12 DRILL-HOLE--Number refers to list of wells in table of drill-hole data

Fault--Long dashes where approximately located, short dashes where concealed beneath Quaternary sediments. Bar and ball on downthrown side

2.6 MEASURED CORE BED--Showing thickness in feet

327 485 MEASURED SECTION--Numbers are footages that correspond to the footages on the plotted sections

PROBLEMS MAPPING THE CRETACEOUS-TERTIARY BOUNDARY

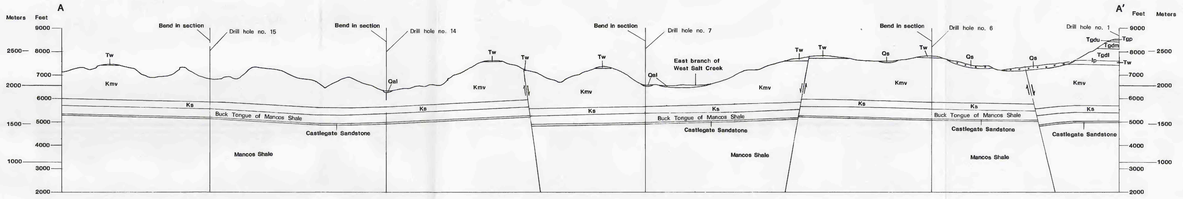
A major unconformity is believed to be present between the Upper Cretaceous Mesaverde Group and the Lower Tertiary Wasatch Formation throughout the Piceance Creek basin to the east (Johnson and May, 1980; Johnson and others, 1980). In the Baxter Pass area the unconformity has not been extensively studied on the Douglas Creek arch, which lies between the two basins, and of which the Baxter Pass area is a part; however, the unconformity is almost certainly present over the entire arch as well. A deep kaolinitic zone commonly occurs just below the unconformity in the Piceance Creek basin to the east. The zone is believed to have formed by deep weathering during the time gap represented by the unconformity (Johnson and May, 1980). The unconformity in the Baxter Pass quadrangle is very poorly exposed but primarily to extensive slumping of the overlying Wasatch Formation; hence, mapping the unconformity was very difficult. Also, a well developed kaolinitic zone is only locally present beneath the unconformity in the Baxter Pass quadrangle. Small channels filled with white kaolinitic sandstone also occur locally in the basal 20-30 ft (6-9 m) of the overlying Wasatch Formation, which add to the confusion. Similar channels were also observed in sandstones in the upper 300 ft (91 m) of the basal part of the Wasatch Formation in the Dotsero area. These channels probably derived their kaolinite from nearby outcrops of the kaolinitic weathered zone during the initial stages of Wasatch deposition in the area. Because of the lack of a well-defined, white kaolinitic zone in many parts of the Baxter Pass quadrangle, other features were needed to locate the unconformity. Conglomerate and redbeds appear to be confined totally to the overlying Wasatch Formation in the Baxter Pass area although both small pebbles and redbeds are present in the upper 300 ft (91 m) of the Piceance Creek basin to the west (Johnson and May, 1980, Johnson and others, 1980). Most importantly, however, sandstones in the upper 600-800 ft (183-183 m) of the Mesaverde have an unusual surface weathering, which abruptly disappears or nearly disappears at the contact with the overlying Wasatch Formation. Sandstone in this zone weathers into 0.25 in. (0.6 cm) diameter spheres, which form extensive talus piles beneath sandstone ledges of the Mesaverde. This surface weathering occurs in both highly kaolinitized and nonkaolinitized sandstones. It is not developed in light gray sandstone of the Mesaverde. The cause of this weathering is not known, but the lack of this feature in sandstone in the overlying Wasatch Formation suggests that sandstone in the Mesaverde may have had a different diagenetic history than sandstone in the overlying Wasatch.

REFERENCES CITED

Erdmann, C. E., 1934, The Book Cliffs coal field in Garfield and Mesa Counties Colorado: U.S. Geological Survey Bulletin 851, 150 p.
Johnson, R. C., and May, Fred , 1980, A study of the Cretaceous-Tertiary unconformity in the Piceance Creek Basin, Colorado--The underlying Ohio Creek Formation (Upper Cretaceous) redefined as a member of the Hunter Canyon or Mesaverde Formation: U.S. Geological Survey Bulletin 1482-D, 15 p.
Johnson, R.C., May, Fred , Hansley, P. L., Pitman, J. K., and Fouch, T. D., 1980, Petrography, X-ray mineralogy, and paleology of a measured section of the Upper Cretaceous Mesaverde Group in Hunter Canyon, western Colorado: U.S. Geological Survey Oil and Gas Investigations Chart OC-91.

List of drill holes in Baxter Pass quadrangle
[Leaders (--) indicate that data not available; T.S., Township South; R.W., Range West]

Map no.	Location Sec.	T.S.	R.W.	Name	Total depth Ft	M
1	13	5	103	Beartooth Oil and Gas Co. Federal 13-16	7943	2421
2	20	5	102	Argo Oil Co. Federal 2-20	7575	2309
3	23	5	103	----------	----	----
4	25	5	103	Pan American Petroleum Co. Baxter Pass South K-25	9860	3006
5	30	5	102	Argo Oil Co. Federal 1-30	6455	1967
6	30	5	102	Rex-Lewis Fleifield Co. Baxter Pass South 1-30	7500	2286
7	5	6	103	Belco Petroleum Co. Atchee 9-5 Federal	6120	1865
8	4	6	103	Tenneco Oil Co. Douglas Pass 4-1D	6855	2089
9	7	6	103	Belco Petroleum Co. West Salt Creek Federal 1-7	5702	1738
10	12	6	104	Fuelco Grassy Mountain 8-12-6-104S	5392	1643
11	1	6	104	Beartooth Oil and Gas Co. Young Cattle Co. Fed. 1-13	5639	1719
12	3	6	104	Belco Petroleum Co. Rattlesnake Canyon 3-3	3273	998
13	13	6	104	Beartooth Oil and Gas Co. Atchee Federal 13-1	6470	1972
14	17	6	103	Belco Petroleum Co. West Salt Creek Federal 4-17	5857	1785
15	20	6	103	Beartooth Oil and Gas Co. Atchee Federal M-20-6-103-S	6112	1863
16	24	6	104	American Metal Climax Co. Federal 1	6710	2045
17	24	6	104	Fuelco Federal J-24-6-104-S	5142	1567
18	24	6	104	Beartooth Oil and Gas Co. Young Cattle Co. 24-12	5164	1574
19	27	6	104	Fuelco Fuelco-Hanlil-Rainbow 1-27	4289	1307
20	35	6	104	Fuelco Fuelco-Hanlil-Rainbow 1-26	4350	1326
21	25	6	104	Fuelco J-25-6-104-S	5397	1645
22	36	6	104	Fuelco Fuelco-Hanlil-Rainbow 36	5404	1647
23	29	6	104	Beartooth Oil and Gas Co. Federal 29-13	5936	1808
24	29	6	104	Fuelco South Canyon P-29-6-103-S	4841	1476

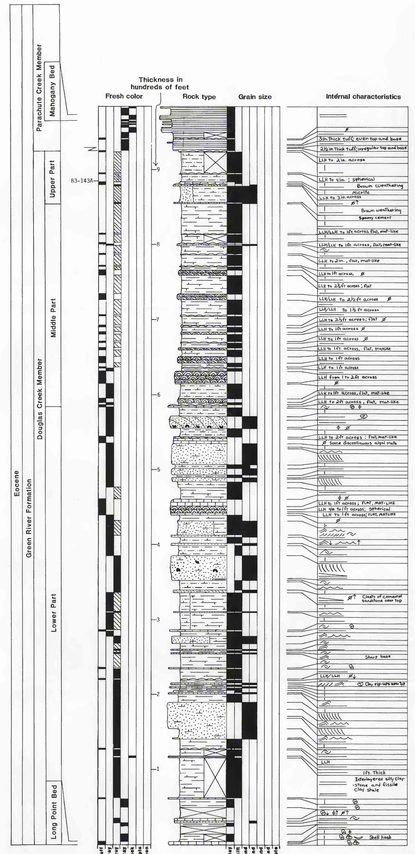


PRELIMINARY GEOLOGIC MAP OF THE BAXTER PASS QUADRANGLE, GARFIELD COUNTY, COLORADO

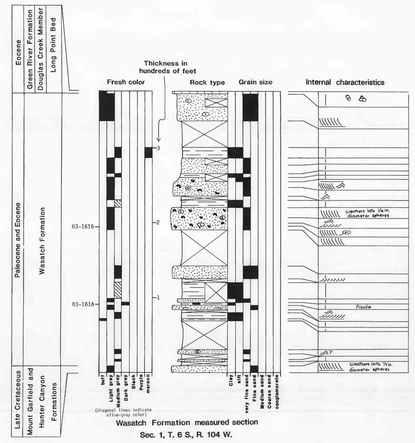
By

Ronald C. Johnson

1985



Green River Formation measured section
Sec. 18, T. 5 S., R. 102 W., and
Secs. 13, 24, T. 5 S., R. 103 W.



Wasatch Formation measured section
Sec. 1, T. 6 S., R. 104 W.

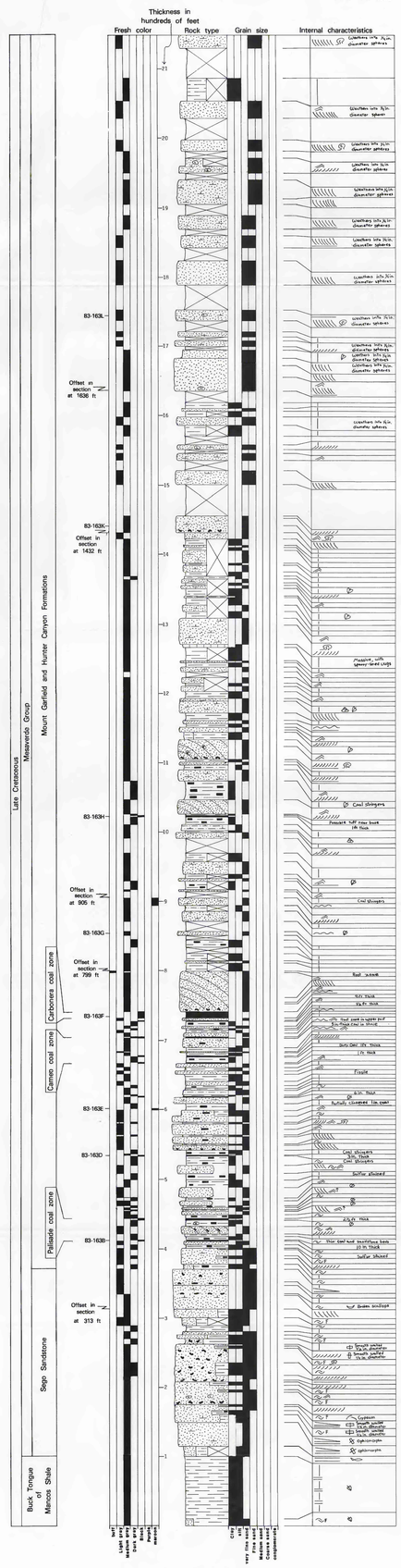
EXPLANATION FOR MEASURED SECTIONS

LITHOLOGY

Sandstone
Siltstone
Claystone or clay shale
Oil shale
Limestone
Coal
Calcareous or dolomitic
Stromatolites
Rip-up clasts
Carbonaceous or woody material
Concretions; H=hematitic, C=calcareous or dolomitic
Large-scale lateral accretion in sandstone

INTERNAL CHARACTERISTICS

Climbing ripples
Symmetrical ripples
Crossbeds, less than 1 ft high
Crossbeds, from 1 to 3 ft high
Cross laminae, less than 15°
Parallel horizontal laminae
Indistinct parallel horizontal laminae
Indistinct laminae
Irregular laminae
Contorted laminae
Ripples, nonspecific
Feature near top of bed
Feature near base of bed
Flaser bedding
Ostracodes
Gastropods
Oncolites
Oolites
Horizontal burrows
Vertical burrows
Oblique burrows
Veinlets
Leaves
Bivalves
Fish bones or fish scales
LLH Laterally linked hemispheroids (stromatolites)
LLH/LLH Laterally linked hemispheroids that internally have small-scale laterally linked hemispheroids



Mesaverde Group measured section
Secs. 22, 23, 27, 34, 35, T. 6 S., R. 104 W.

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1985

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