

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Measured section of the Upper Cretaceous
Mesaverde Formation and lower part of the
lower Tertiary Wasatch Formation, Rifle
Gap, Garfield County, Colorado

By

Ronald C. Johnson

Open-file Report 82-590

This report is preliminary and has not
been reviewed for conformity with U.S.
Geological Survey editorial standards
(~~and stratigraphic nomenclature~~).

MEASURED SECTION OF THE UPPER CRETACEOUS MESAVERDE FORMATION
AND LOWER PART OF THE LOWER TERTIARY WASATCH FORMATION,
RIFLE GAP, GARFIELD COUNTY, COLORADO

By
Ronald C. Johnson

In the summer of 1978 a section was measured through the nearly vertical exposures of the Mesaverde Formation and lower part of the Wasatch Formation along the Grand Hogback at Rifle Gap on the eastern margin of the Piceance basin. The author was assisted by N. C. Dessenberger, M. P. Granica, and J. H. Whittke. The section starts approximately 50 feet above the Mancos-Mesaverde contact. The contact is below the level of Rifle Gap Reservoir and hence is not exposed. The top of the section is approximately the top of the Molina Member equivalent of the Wasatch Formation as defined by Donnell (1969, fig. 5). Nomenclature for the Mesaverde Formation is adapted from Warner (1964).

The lowest part of the Mesaverde Formation consists of the Corcoran and Cozzette Members (Young, 1955), a heterogeneous unit consisting of marginal marine blanket sandstones, probably distributary channels, marine shales containing oyster beds, carbonaceous shale, and coal. Above the Corcoran-Cozzette interval is a tongue of marine Mancos Shale about 270 feet thick. Overlying the marine tongue of the Mancos is the widespread marginal marine, regressive Rollins Sandstone Member. The Rollins or its equivalent Trout Creek Sandstone Member of the Iles Formation (Warner, 1964) are found throughout most of the Piceance basin. The Cameo-Fairfield coal zone is above the Rollins Member at Rifle Gap. Most of the coals have been clinkered. An unnamed marginal marine sandstone occurs above the Cameo-Fairfield coal zone. The sandstone is apparently found only along the southeastern margin of the basin. Above the unnamed sandstone is another clinkered coal zone about 450 feet thick. The remaining 3,000 feet of Mesaverde is thought to be largely fluvial. This part of the Mesaverde consists of a series of thick hogback-forming sandstone units containing such fluvial features as trough crossbeds, drift ripples, basal ripup zones, and large-scale lateral accretion. Intervals between the hogbacks are poorly exposed, and hence little is known about the lithologies present.

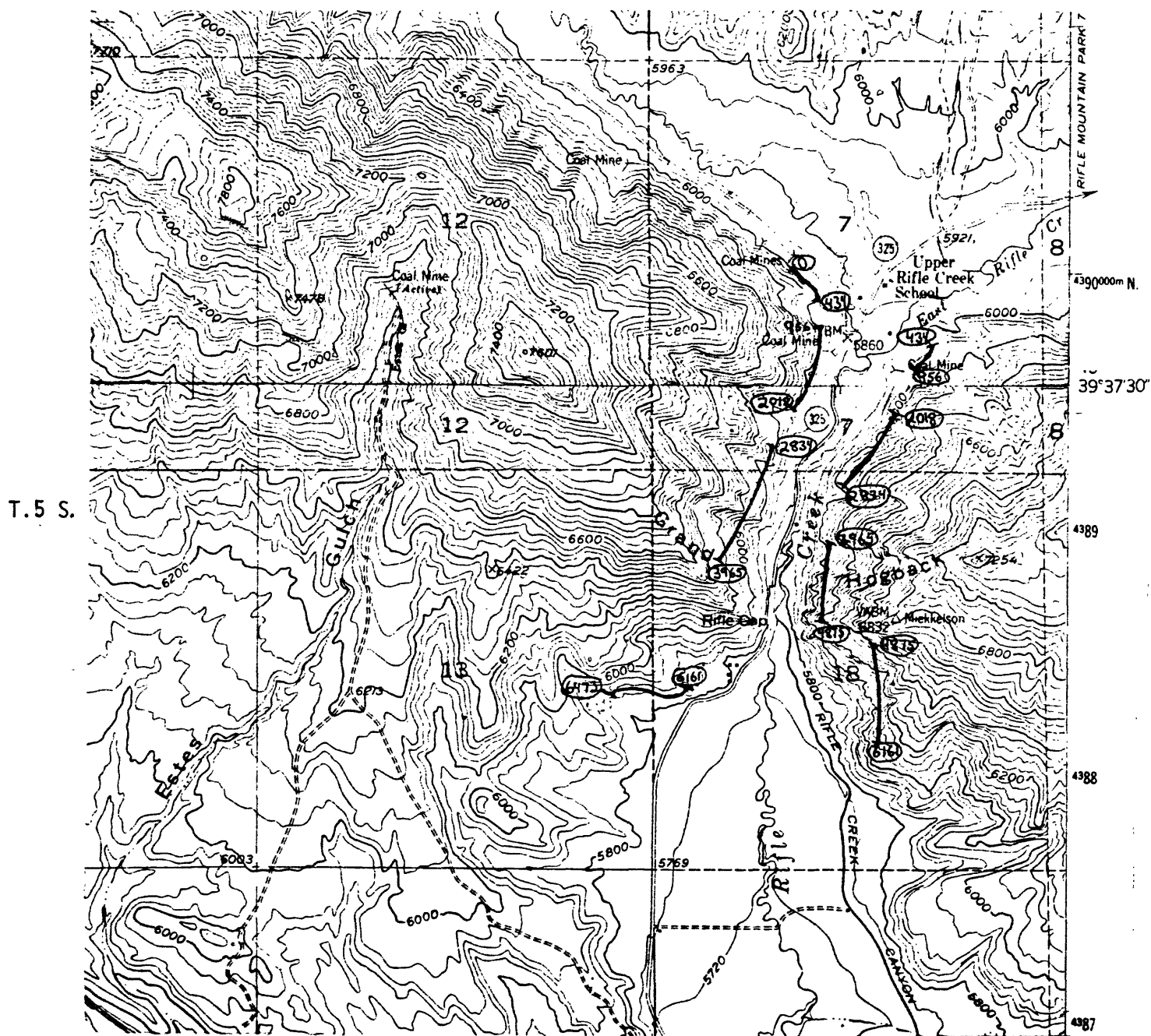
Fluvial Wasatch Formation unconformably overlies the Mesaverde. The well-developed paleoweathering profile found below the unconformity throughout much of the basin is locally absent at Rifle Gap (Hansley and Johnson, 1980). The Wasatch Formation is probably more than 5,000 feet thick in the vicinity of Rifle Gap (Donnell, 1961, p. 846). However, much of the unit is poorly exposed, and only the lower 1,550 feet was measured. The age of the Wasatch in the vicinity of Rifle Gap varies from Paleocene near the base (Gale, 1910) to middle early Eocene or late early Eocene near the top (Wood, 1962). Donnell (1969) subdivided the Wasatch into three members in the southwestern part of the basin and tentatively identified the members further to the east in the vicinity of Rifle Gap. Donnell's subdivisions are used in this report. The Atwell Gulch or oldest member consists of lenticular though crossbedded, conglomeratic sandstones and gray and maroon mudstone. The pebbles are dominantly dark volcanic and shallow intrusive rocks and minor varicolored cherts. A thin chert-pebble conglomerate found just above the unconformity was originally called the Ohio Creek Formation (Donnell, 1961) but was later found not to correlate with the type Ohio Creek (Johnson and May, 1980); hence, it is included in the Atwell Gulch in this report. Overlying the Atwell Gulch is the Molina Member. Unlike the Atwell Gulch, volcanic pebbles are not present in the sandstones. Pebbles consist of reworked sediments such as varicolored chert, quartzite, and limestone, possibly indicating a shift in source area. Molina sandstones are also more resistant and lighter colored than those in the underlying

Atwell Gulch and form a series of resistant hogbacks (Donnell, 1969). The top of the measured section is the top of the Molina.

REFERENCES

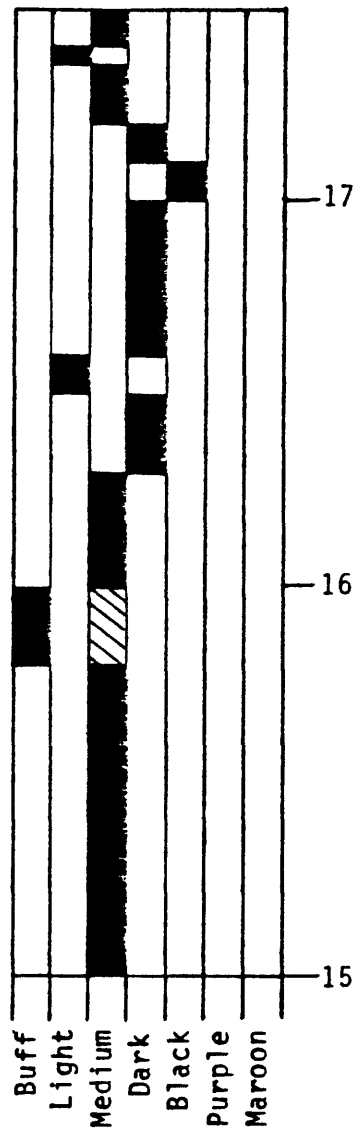
- Donnell, J. R., 1961, Tertiary geology and oil-shale resource of the Piceance Creek basin between the Colorado and White Rivers, northwestern Colorado: U.S. Geological Survey Bulletin 1082-L, p. 835-891.
- , 1969, Paleocene and lower Eocene units in the southern part of the Piceance Creek basin, Colorado: U.S. Geological Survey Bulletin 1274-M, p. M1-M18.
- Gale, H. S., 1910, Coal fields of northwestern Colorado and northeastern Utah: U.S. Geological Survey Bulletin 415, 265 p.
- Hansley, P. L., and Johnson, R. C., 1980, Mineralogy and diagenesis of low-permeability sandstones of Late Cretaceous age, Piceance Creek basin, northwestern Colorado: *The Mountain Geologist*, v. 17, no. 4, p. 88-129.
- 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-B, p. 1-27.
- Warner, D. L., 1964, Mancos-Mesaverde (Upper Cretaceous) intertonguing relations, southeast Piceance basin, Colorado: *American Association of Petroleum Geologists Bulletin*, v. 48, no. 7, p. 1091-1107.
- Wood, A. E., 1962, The early Tertiary rodents of the family Paramyidae: *American Philosophical Society Transactions*, v. 52, pt. 1, 261 p.

P. 92 W.



Index Map showing sample localities for measured section, Rifle Gap, Colorado.

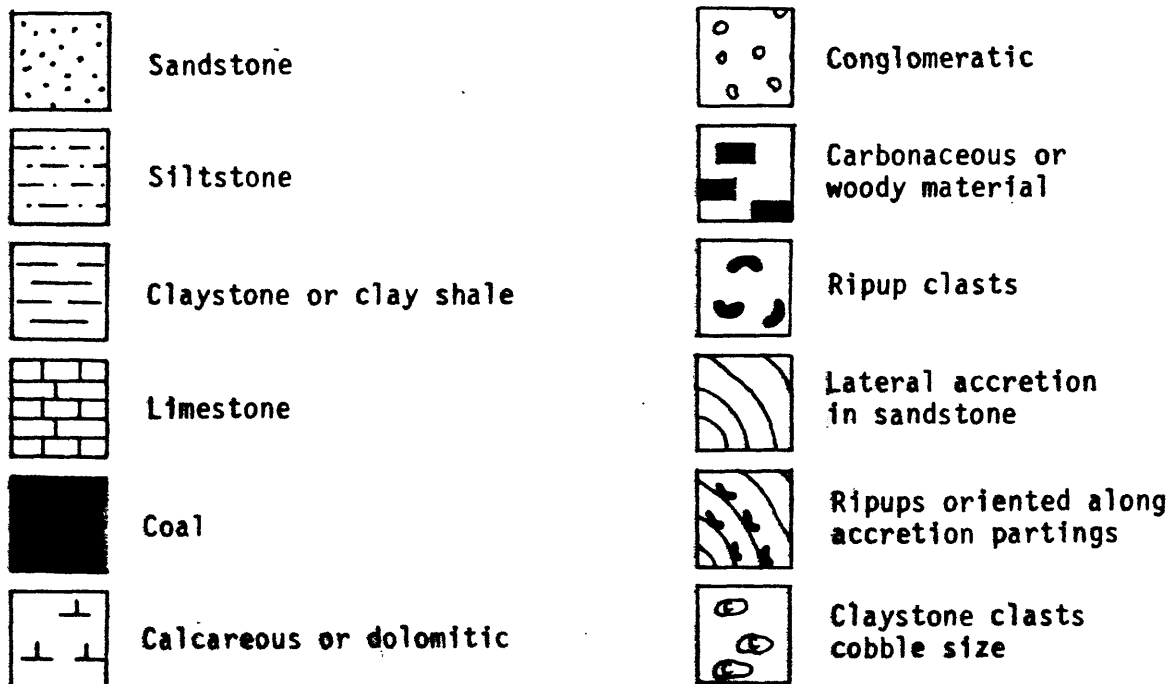
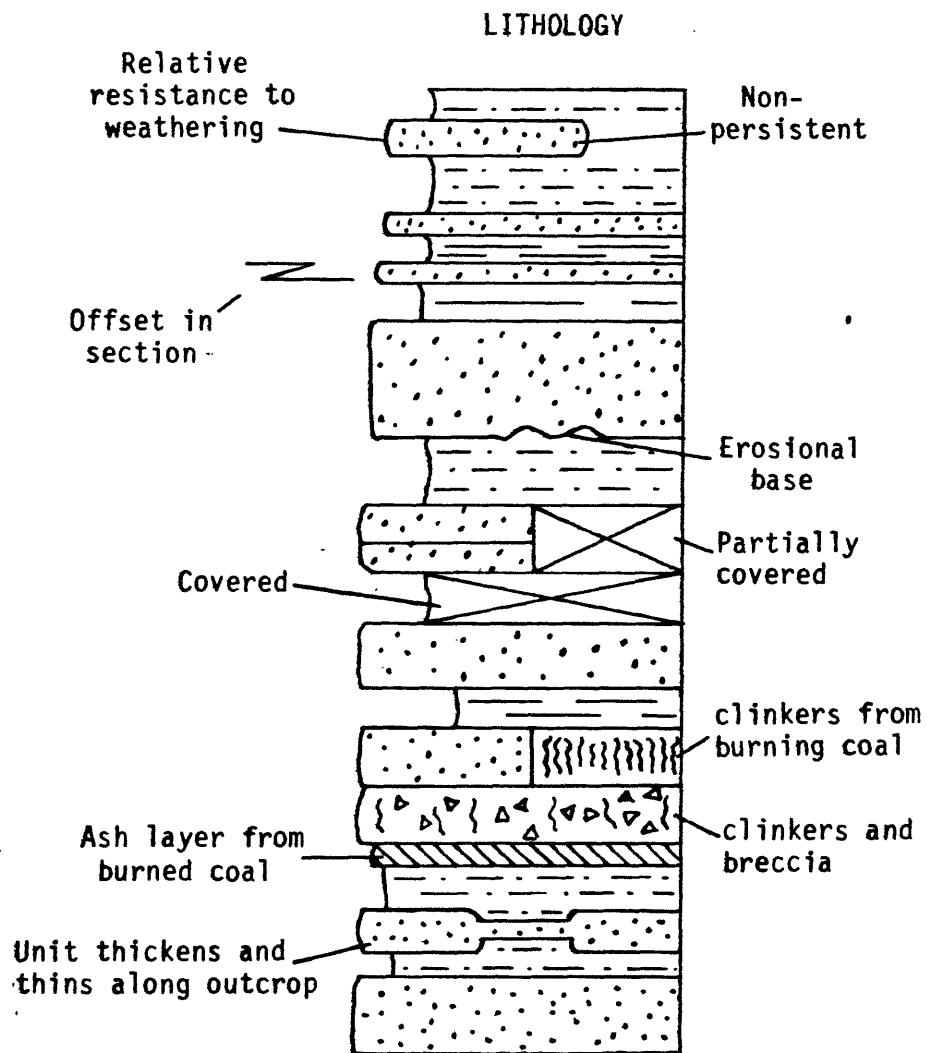
UNWEATHERED
COLOR



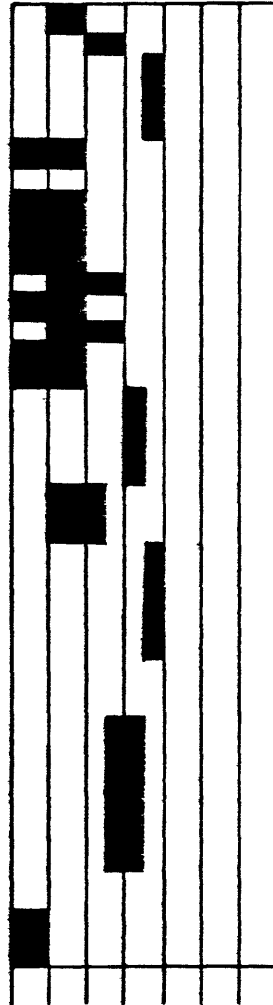
Thickness in
hundreds of feet

Gray or
green

Hatched pattern
indicates olive
green



GRAIN
SIZE
RANGE



Clay to fine silt
Medium to coarse silt
Very fine sand
Fine sand
Medium sand
Coarse sand
Small pebbles

PRIMARY BEDDING FEATURES



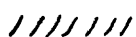
Climbing ripples



Symmetrical ripples



Ripples nonspecific



Medium scale crossbeds (.3-1 m)



Small scale crossbeds (<.3 m)



Subhorizontal laminae



Parallel laminae, indistinct



Parallel laminae, distinct



Massive or indistinct laminae



Lenticular beds



Irregular laminae

OTHER FEATURES


Ls. Limestone pebbles

cht. Chert pebbles

 Limestone concretion

 Bedding features shown are cyclic

Clink. Clinker

 Gyp Gypsum veinlets

 Ammonite

 Gastropod


 Bivalve

 Fossil wood

 Leaf

 Root casts

 Branching burrows


 Oblique burrows

 Horizontal burrows

 Vertical burrows

 Burrows nondescriptive

 Contorted laminae

 Dolomite concretion

1

LIST OF ABBREVIATIONS

abnd-abundant
 bdg-bedding
 bds-beds
 biot-bioturbated
 brn-brown
 calc-calcareous
 carb-carbonaceous
 cgl-conglomerate
 cht-chert
 cly-claystone
 conc-concretion
 darks-biotite and other dark
 colored minerals
 dia-diameter
 frags-fragments
 gn-green
 gy-gray
 gyp-gypsum
 hem-hematite
 ig-igneous
 interbed-interbedded
 irreg-irregular
 lam-laminated
 lent-lenticular
 mot-mottled
 nods-nodules
 olv-olive
 oph-Ophiomorpha
 org-organic
 oyst-oysters
 pbls-pebbles
 persist-persistent
 porc-porcelaneous
 poss-possible
 prob-probably
 ptgs-partings
 purp-purple
 sh-shale
 sl-slightly
 sltst-siltstone
 strigs-stringers
 thk-thick
 vns-veins
 volc-volcanic