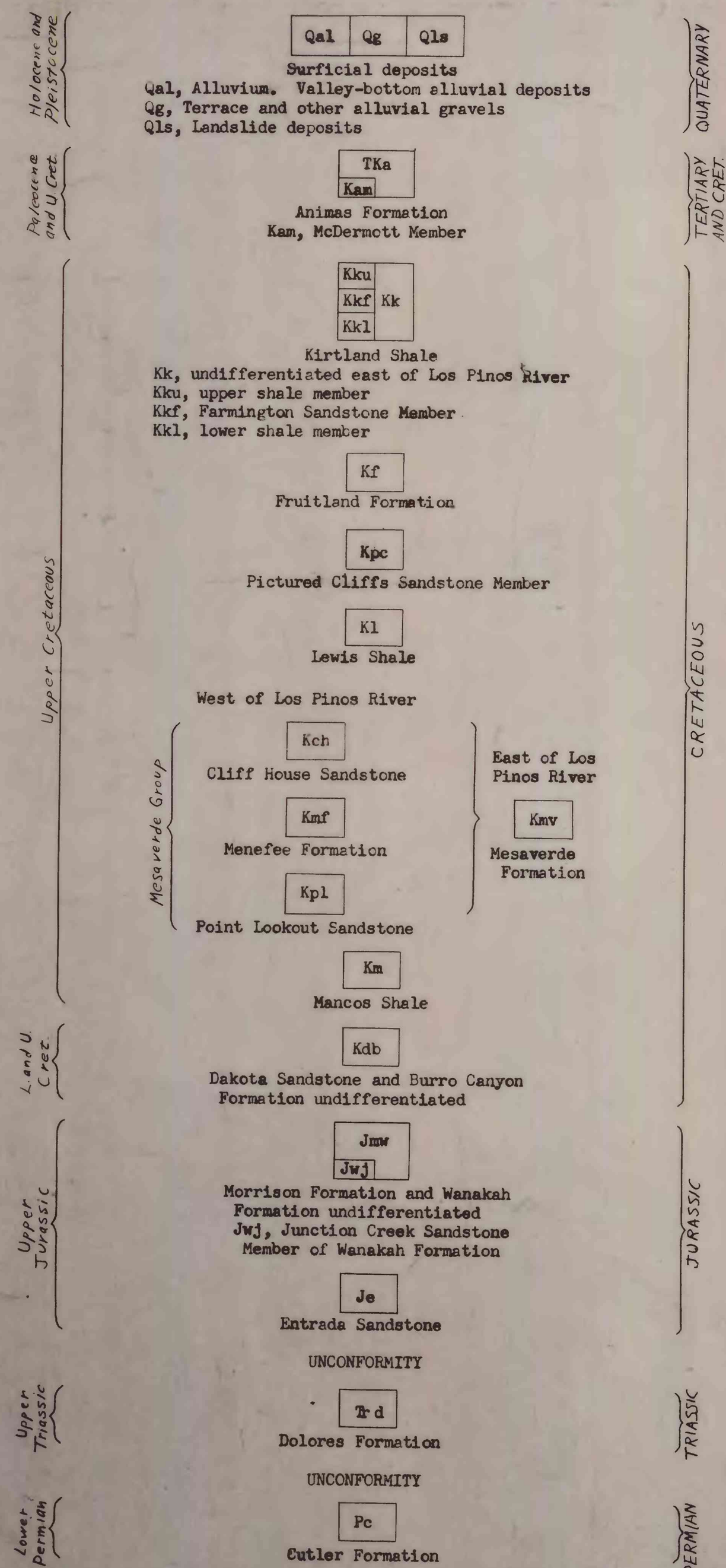


EXPLANATION FOR RULES HILL AND LUDWIG MOUNTAIN QUADRANGLES



DESCRIPTION OF ROCK UNITS

- TKa, Animas Formation. Largely detritus of andesitic volcanic rocks: dark varicolored shale, sandstone, and conglomerate.
- Kam, McDermott Member of Animas Formation. Andesitic volcanic detritus: reddish-brown to purple shale, sandstone, and conglomerate.
- Kk, Kirtland Shale. Mostly shale, sandy shale, and sandstone.
- Kku, upper shale member of Kirtland Shale. Sandy shale and light-gray sandstone.
- Kkf, Farmington Sandstone Member of Kirtland Shale. Interbedded light-gray sandstone and thin greenish shale.
- Kkl, lower shale member of Kirtland Shale. Dark sandy shale with minor sandstone, carbonaceous shale, and coal.
- Kf, Fruitland Formation. Lenticular sandstone, shale, and coal.
- Kpc, Pictured Cliffs Sandstone. Light-gray sandstone with interbedded dark shale in lower part.
- Kl, Lewis Shale. Dark-gray clay shale; contains rusty-weathering concretionary masses in lower part, thin sandstone beds near top.
- Kch, Cliff House Sandstone. Gray calcareous sandstone, argillaceous sandstone, mudstone, and silty shale.
- Kmf, Menefee Formation. Lenticular sandstone, dark shale, and minor coal and carbonaceous shale.
- Kpl, Point Lookout Sandstone. Thin sandstones interbedded with shale and sandy shale.
- Kmv, Mesaverde Formation. Light-brown sandstone interbedded with shaly sandstone and gray shale; minor carbonaceous shale and coal.
- Km, Mancos Shale. Mostly dark clay shale. Light-gray-weathering calcareous shale zone (Niobrara equivalent) within 860 ft above base; argillaceous sandstone and sandy shale zone (Juana Lopez Member) within 500 ft above base; calcareous shale and limestone zone (Greenhorn equivalent) within 110 ft above base.
- Kdb, Dakota Sandstone and Burro Canyon Formation undifferentiated. Dakota disconformably overlies Burro Canyon. Dakota Sandstone is light-gray to brown sandstone with interbedded siltstone and carbonaceous shale; commonly contains chert-pebble conglomerate or conglomeratic sandstone at base. Burro Canyon Formation is chert-pebble conglomerate and green and gray claystone.

- Jmw, Morrison Formation and Wanakah Formation undifferentiated. Morrison conformably overlies Wanakah. Morrison Formation comprises two members: upper is Brushy Basin Member consisting mostly of varicolored claystone and mudstone; lower is Salt Wash Member consisting of sandstone with interbedded claystone and mudstone. Wanakah Formation comprises three members: Junction Creek Sandstone Member at top, a middle member, and the Pony Express Member. Junction Creek Sandstone Member is light-gray cross-bedded sandstone; middle member is limy shale, siltstone, and sandstone; Pony Express Member is dark-gray bituminous limestone, locally containing gypsum.
- Jwj, Junction Creek Sandstone Member of Wanakah Formation. Shown separately west of Red Creek.
- Je, Entrada Sandstone. Light-gray cross-bedded sandstone.
- Td, Dolores Formation. Mostly red beds - shale, siltstone, sandstone, and limestone-pebble conglomerate.
- Pc, Cutler Formation. Mostly red beds - shale, siltstone, mudstone, arkosic grit and conglomerate.

W.J. Hail: Reconnaissance mapping, 1966

A.D. Zapp 1/  
Harley Barnes 2/

Index to sources of mapping

- 1/ Zapp, A.D., 1949, Geology and coal resources of the Durango area, La Plata and Montezuma Counties, Colo.: U.S. Geol. Survey Oil and Gas Inv. (Prelim.) Map OM-109. Planimetric.
- 2/ Barnes, Harley, 1953, Geology of the Ignacio area, Ignacio and Pagosa Springs quadrangles, La Plata and Archuleta Counties, Colo.: U.S. Geol. Survey Oil and Gas Inv. Map OM-138. Planimetric.

Note: OM-109 and OM-138 contain measured stratigraphic sections and descriptions of the Dakota Sandstone and younger strata, as well as graphic sections of coal beds in the Fruitland and Menefee Formations

U.S. Geological Survey  
OPEN FILE REPORT

This map is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.

GEOLOGIC RECONNAISSANCE MAP OF THE RULES HILL AND LUDWIG MOUNTAIN QUADRANGLES, LA PLATA COUNTY, COLORADO

By  
W. J. Hail Jr., Harley Barnes, and A. D. Zapp