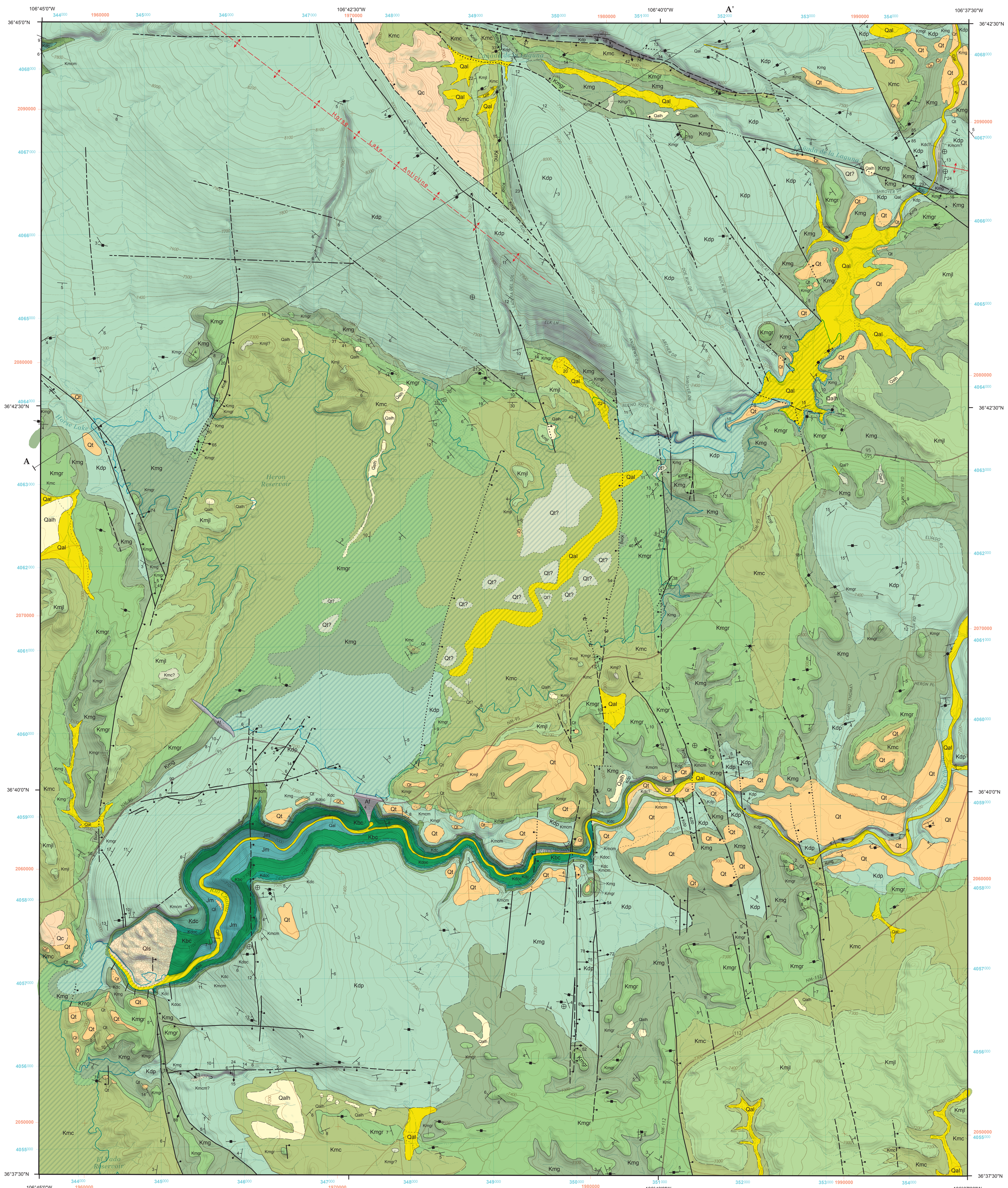
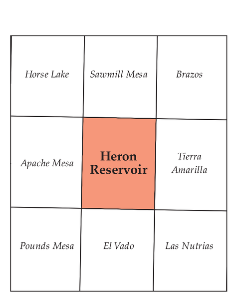
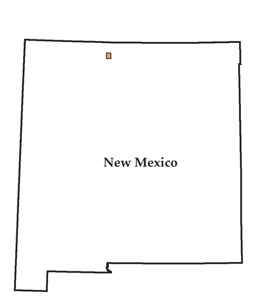
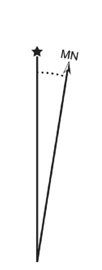


Base map from U.S. Geological Survey 2013.
North American Datum of 1983 (NAD83) World Geodetic System of 1984 (WGS84).
Projection and 1000-meter grid: Universal Transverse Mercator, Zone 13S, shown in blue.
10,000-foot ticks: New Mexico Coordinate System of 1983(west zone), shown in red.

Roads............©2006-2010 Tele Atlas
Names............GNIS, 2008
Hydrography............National Hydrography Dataset, 2005
Contours............National Elevation Dataset, 2000







Magnetic Declination
July, 2016
8° 51' East
At Map Center

Quadrangle Location

New Mexico Bureau of Geology and Mineral Resources
New Mexico Tech
801 Leroy Place
Socorro, New Mexico
87801-4796

[575] 835-5490

This and other STATEMAP quadrangles are available for free download in both PDF and ArcGIS formats at:

http://geoinfo.nmt.edu

Digital layout and cartography by the NMBGMR Map Production Group:
Phil Miller
David J. McCraw
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New Mexico Bureau of Geology and Mineral Resources
Open-File Geologic Map 264

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Geologic Map of the Heron Reservior 7.5-Minute Quadrangle, Rio Arriba County, New Mexico

June, 2017

by
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1:24,000

1 0.5 0 1 Mile

1000 0 1000 2000 3000 4000 5000 6000 7000 Feet

1 0.5 0 1 Kilometer

Contour Interval 20 Feet

North American Vertical Datum of 1988

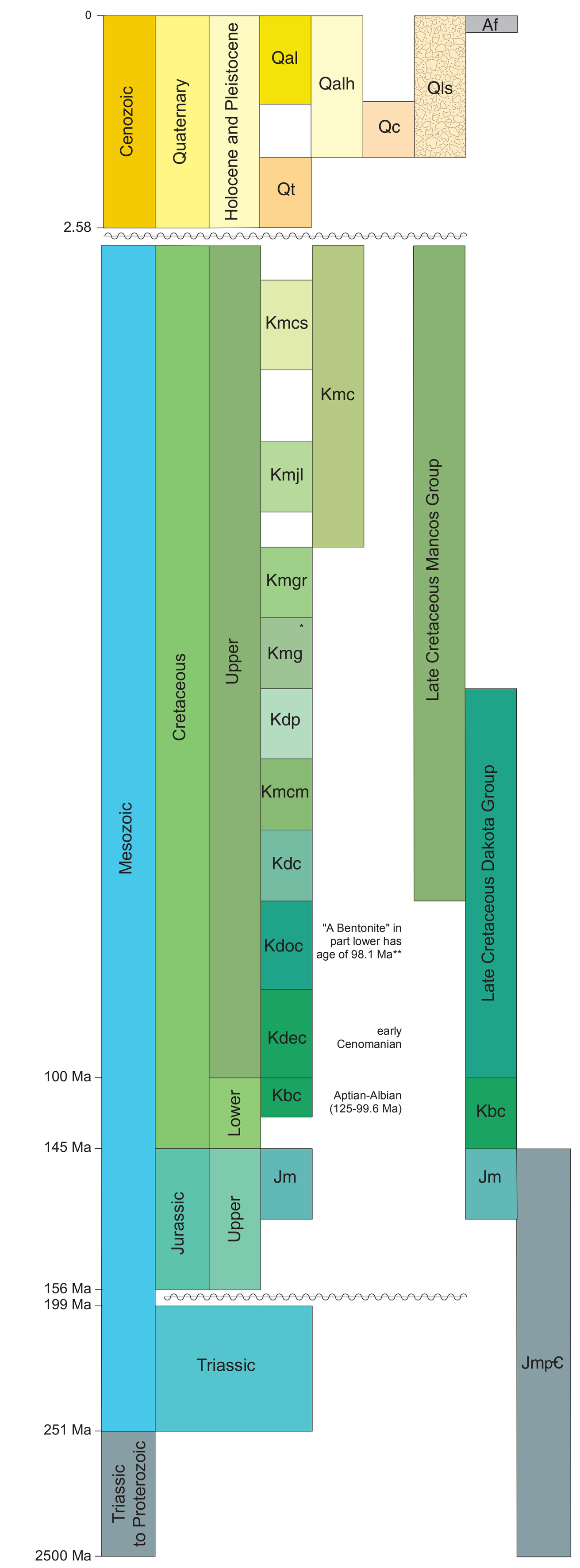
Comments to Map Users

A geologic map displays information on the distribution, nature, orientation, and age relationships of rock and deposits and the occurrence of structural features. Geologic and fault contacts are irregular surfaces that form boundaries between different types or ages of units. Data depicted on this geologic quadrangle map may be based on any of the following: reconnaissance field geologic mapping, compilation of published and unpublished work, and photogeologic interpretation. Locations of contacts are not surveyed, but are plotted by interpretation of the position of a given contact onto a topographic base map; therefore, the accuracy of contact locations depends on the scale of mapping and the interpretation of the geologist(s). Any enlargement of this map could cause misunderstanding in the detail of mapping and may result in erroneous interpretations. Site-specific conditions should be verified by detailed surface mapping or subsurface exploration. Topographic and cultural changes may not be shown due to recent development.

Cross sections are constructed based upon the interpretations of the author made from geologic mapping, and available geophysical, and subsurface (drillhole) data. Cross sections should be used as an aid to understanding the general geologic framework of the map area, and not be the sole source of information for use in locating or designing wells, buildings, roads, or other man-made structures.

The New Mexico Bureau of Geology and Mineral Resources created the Open-file Geologic Map Series to expedite dissemination of these geologic maps and map data to the public as rapidly as possible while allowing for map revision as geologists continued to work in map areas. Each map sheet carries the original date of publication below the map as well as the latest revision date in the upper right corner. In most cases, the original date of publication coincides with the date of the map product delivered to the National Cooperative Geologic Mapping Program (NCGMP) as part of New Mexico's STATEMAP agreement. While maps are produced, maintained, and updated in an ArcGIS geodatabase, at the time of the STATEMAP deliverable, each map goes through cartographic production and internal review prior to uploading to the Internet. Even if additional updates are carried out on the ArcGIS map data files, citations to these maps should reflect this original publication date and the original authors listed. The views and conclusions contained in these map documents are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the State of New Mexico, or the U.S. Government.

Correlation of Map Units



*Kmg Includes Whitewater Arroyo Member of Mancos Shale and Twowells Member of Dakota Sandstone on this quadrangle.

Explanation of Map Symbols

Contact—Identity and existence are certain, querried where questionable; location accurate where line is solid, approximate where dashed, and concealed where dotted.

Fault (unspecified orientation or sense of slip)—Identity and existence certain, location accurate where solid and approximate where dashed.

Normal fault—Identity and existence are certain, querried where questionable; location accurate where line is solid, approximate where dashed, and concealed where dotted.

Reverse fault—Identity and existence are certain; location accurate where line is solid, approximate where dashed, and concealed where dotted.

Anticline—Identity and existence certain; location accurate where solid and approximate where dashed.

Lineament

Cross section line

Horizontal bedding

Inclined bedding

Inclined fault

Horizontal slickline, groove, or striation on fault surface.

Inclined slickline, groove, or striation on fault surface.

Minor vertical or near-vertical joint

Perennial lake or pond boundary

Dammed reservoir

Description of Map Units

Quaternary

Anthropogenic

Af — **Artificial Fill (dams etc.)**—Anthropogenic fill including dams on Heron Lake.

Holocene to Pleistocene

Qal — **Quaternary Alluvium**—Mostly fine-grained grayish and brownish valley-fill alluvium. Commonly developed over shale. Contact mapped from aerial imagery and presence confirmed in the field. 2–15(?) m thick.

Qalh — **Higher Quaternary Alluvium**—Reworked(?) river cobbles/pebbles and fine-grained alluvium deposited on flat areas above modern drainages. Commonly overlying shale and "benches" developed on sandstones. 1–10(?) m thick.

Qt — **Quaternary Gravel**—Coarse river cobble/pebbles commonly overlain by 1–5 m "overbank" silt and pebbly silt. Cobbles consist of Proterozoic quartzite, metaconglomerate and schistose quartzite; Tertiary volcanic rocks; Quaternary basalt; and sometimes Cretaceous sandstone.

Qc — **Quaternary Colluvium**—Poorly sorted, locally derived hillslope material.

Qls — **Quaternary Landslide Deposit**—Blocky debris composed mostly of Dakota Sandstone blocks and alluvium in poorly defined Toreva blocks.

Cretaceous

Mancos Group

Kmcs — **Cooper Arroyo Sandstone of the Mancos Shale**—Tan, fine-grained, glauconitic, trough-cross-bedded quartz sandstone found within the Carlile Shale. 1–2 m thick.

Kmjl — **Juana Lopez Member of Manco Shale**—Yellow/reddish, weathering gray, thinly bedded, shelly, recrystallized limestone with shale interbeds. Approximately 3–10 m thick. Lower and upper contacts on this quad are first and last localy continuous limestone beds. Thin limestone beds and lenses sometimes found up to 15 m above and below. Weathers to distinctive platy fragments containing sparce to common shell fragments, burrows, and ripple marks. Shaly fragments sometimes cover slopes below outcrops.

Kmc — **Carlile Member of the Mancos Shale**—Dark- to light-grey, sometimes shelly, laminated to very thin-bedded shale and locally(?) hard, platy-weathering siltstone. Between 120–150 m thick. The lower contact is top of uppermost continuous limestone of Kmgr, upper contact not exposed on this quadrangle. Sometimes contains up to 2 m diameter septarian concretions that weather to distinctive, reddish to yellowish prismatic fragments.

Kmgr — **Greenhorn Member of the Mancos Shale**—Light- to dark-gray, weathering very light-gray to whitish; very thin- to medium-bedded; dense, finely crystalline, recrystallized; ridge forming limestone with relatively thin interbedded shale. Lower contact sharp. Upper contact with overlying Carlile Shale commonly not exposed. 10–25 m thick.

Kmg — **Graneros Member of the Mancos Shale**—Dark-gray to black; laminated to medium bedded; somewhat friable; slope forming shale containing locally abundant concretions. 40–50m thick. *Includes Whitewater Arroyo Member of Mancos Shale and Twowells Member of Dakota Sandstone on this quadrangle.

Kmcm — **Clay Mesa Member of the Mancos Shale**—Very dark-grey to light-bluish-gray; somewhat friable laminated to thinly bedded; slope forming shale. Upper and lower contacts sharp. Approximately 6-18 m thick, thinning from north to south.

Dakota Group

Kdp — **Paguate Member of the Dakota Sandstone**—Yellowish to tan; moderately strong to strong; moderately well-sorted; subrounded; medium- to thick-bedded; very fine-grained; commonly burrowed; arkosic-quart sandstone. 2–18 m thick.

Kdc — **Cubero Member of the Dakota Sandstone**—Yellowish to tan; moderately strong to strong; moderately well- to well-sorted; subrounded to rounded; medium- to thick-bedded; very fine- to fine-grained; commonly burrowed; quartz sandstone and minor silt and shale. 15–20 m thick.

Kdoc — **Oak Canyon Member of the Dakota Sandstone**—Gray to blackish, sparsely fossiliferous, mostly non-limey; laminated to medium-bedded shale and silty shale and yellowish to tan, moderately strong, moderately well-sorted, subrounded, very thin- to medium-bedded, very fine- to fine-grained, sometimes bioturbated, sometimes ripple laminated, quartz dominated sandstone with characteristic, plant fragments. 12–20 m thick.

Kdec — **Encinal Canyon Member of the Dakota Sandstone**—Very light-tan to whiteish; moderately strong to strong; moderately well- to well-sorted; subrounded; thin- to thick-bedded; sometimes weakly bioturbated; very fine- to medium-grained sandstone. Approximately 8 m thick.

Burro Canyon Formation

Kbc — **Burro Canyon Formation**—Whitish to tan; moderately strong to strong; poorly to moderately sorted; subrounded; medium- to thick-bedded; fine- to medium-grained, sometimes pebbly; cross- and plane-laminated sandstone and red and/or green; sometimes mottled; laminated or massive clay and siltstone. Regionally 35–55 m thick.

Jurassic

Morrison Formation

Jm — **Morrison Formation**—Red and sometimes green, poorly exposed mudstone, buff to light green sandstone and conglomeratic sandstone.

Jurassic to Proterozoic

Jmp€ — **Jurassic to Proterozoic undivided**—On cross section only.

FIGURE 1—Limestone Concretion in Carlile Shale exposed in cliffs near Salmon Run Campground in Heron Lake State Park (see Narrative Description for further details).

Geologic Cross Section A–A'

Vertically Exaggerated 4x