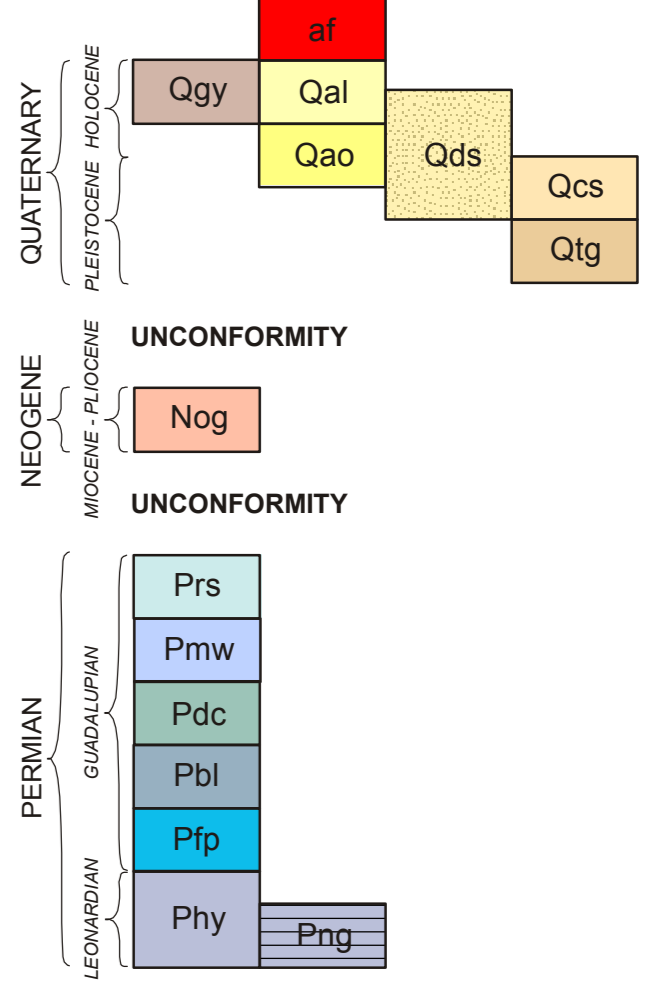


CORRELATION OF MAP UNITS

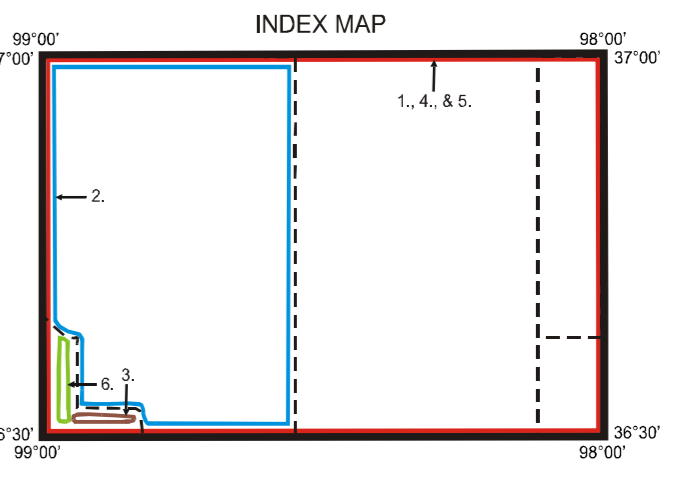


DESCRIPTION OF UNITS

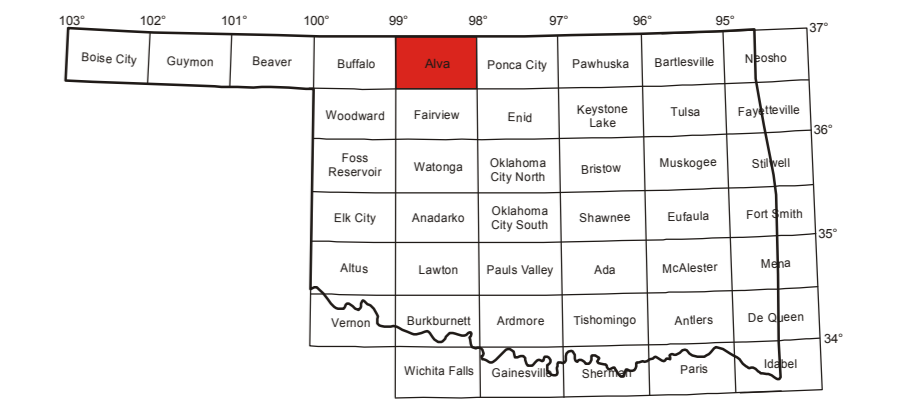
- Qal** ALLUVIUM—Clay, silt, sand, and some gravel composed of locally derived unconsolidated sediment deposited in channels and on flood plains of modern streams.
- Qgy** GYPSITE—Unconsolidated lacustrine deposits located north and west of the Great Salt Plains Lake consists of coarse-grained gypsum crystals intermixed with sand, silt, and clay.
- Qao** OLDER ALLUVIUM—Unconsolidated sand, silt, clay and gravel in stream and river channels concentrated between 0-12 m above modern flood plains.
- Qds** DUNE SAND—Generally windblown, fine- to very fine-grained, unconsolidated sand formed into definite dune structure and ridges. Deposits most likely derived from aeolian reworking of modern and older alluvial and terrace deposits, often vegetated except for most recently formed structures.
- Qcs** COVER SHEET SAND—Composed of unconsolidated windblown, very fine grained sand and silt deposited as a featureless plain. Derivation similar to that of dune.
- Qtg** TERRACE GRAVEL—Unconsolidated gravel, sand, silt, and clay deposited at several levels above and along the former courses of modern rivers and streams.
- Nog** OGALLALA FORMATION—Mostly unconsolidated to locally weakly indurated, light gray to light brown stream-laid deposits of sand, silt, clay, and gravel. Gravel clasts typically derived from far outside modern basin province. Caliche may occur locally at top of exposures. Thickness about 45 meters.
- Prs** RUSH SPRINGS FORMATION—Reddish-brown, fine-grained sandstone, commonly cross-bedded, with local interbeds of reddish-brown shale. Contact with underlying Marlow Formation placed at the top of the Emanuel Sandstone Bed. Thickness about 27 meters.
- Pmw** MARLOW FORMATION—Orangeish-brown, very fine- to fine-grained, massive sandstone with local interbeds of siltstone and mudstone. Top mapped at the top of the Emanuel Sandstone Bed. Thickness about 36 meters.
- Pdc** DOG CREEK SHALE—Reddish-brown, mudstone, mudshale and very silty claystone. Contains thin interbeds of greenish-gray shale and several thin layers of light gray dolomite, locally. Base mapped at the top of the highest massive Blaine gypsum bed. Thickness about 10 meters.
- Pbl** BLAINE FORMATION—Three to four thick beds of white, massive gypsum, each typically underlain by a thin bed of dolomite and separated by thick intervals of reddish-brown clayshale and claystone. Base mapped at lowest massive gypsum bed, which usually forms a prominent escarpment on top of underlying Flowerpot Shale. Thickness about 30 meters.
- Pfp** FLOWERPOT SHALE—Reddish-brown silty clayshale, with thin interbeds of gypsum and dolomite in the upper part of formation. Basal contact with Hennessey Formation obscure or gradational. Thickness about 55 meters.
- Phy** HENNESSEY FORMATION—An undistinguishable suite of reddish brown, interbedded silty claystones, mudstones, and argillaceous siltstones and very fine-grained sandstones. In areas north and east of the Arkansas River and its tributaries, the lower part of this interval mapped as the Nippewalla Group of Kansas stratigraphic nomenclature (see below). Only the upper 160 meters are exposed in the map area.
- Png** NIPPEWALLA GROUP—In the Alva Quadrangle this unit consists chiefly of interbedded red to reddish brown mudstones, and very silty claystones and clayshales; having similar lithologically to the Hennessey Formation. Group mapped in areas north of the Arkansas River and its tributaries. Only the lower 150 meters of the group are exposed in the map area.

SYMBOLS

Unit contact, approximately located



- MAP REFERENCES
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  - Fig. R-10, 1965. Geology and mineral resources of Woods County, Oklahoma. Oklahoma Geological Survey Bulletin 106, 189p.
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  - Map J-1, 1923. Sedimentary strata of the Blaine Formation, University of Oklahoma, unpublished M.S. thesis, 132p.
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The base map was compiled by the U.S. Geological Survey from 1:24,000 scale topographic maps issued 1988-1998. The spot height data for the quadrangle were derived from 1987-1988. Map edited 1990. Universal Transverse Mercator (UTM) projection. 1987 North American Datum. 25,000-foot grid and ticks based on Oklahoma coordinate system, north zone. 10,000-meter UTM grid, zone 14.

Geologic Map Credits  
Geology compiled and field checked by Galen W. Miller and Thomas M. Stanley, 2002-2003. The spot height data for the quadrangle were derived from the spot height of former National Cooperative Geologic Mapping Program, under Assistance Award Number ON-0040022. The names and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official position, either expressed or implied, of the U.S. Government. Originally published as Open File Report OF-16-2003. Map revised and published as OGG-42. Cartography and layout prepared by G. Russell Standridge, 2003.

**GEOLOGIC MAP OF THE ALVA 30' X 60' QUADRANGLE,**  
**ALFALFA, GRANT, MAJOR, WOODS, AND WOODWARD COUNTIES, OKLAHOMA**  
Compiled by Galen W. Miller and Thomas M. Stanley  
Cartography by G. Russell Standridge  
2003