

- ### DESCRIPTION OF UNITS
- Qal** ALLUVIUM—Unconsolidated sand, silt, clay, and gravel in stream and river channels on modern flood plains
 - Qsp** SALT PLAINS DEPOSITS—Extensive salt deposition on the Cimarron River flood plain. Includes the Big Salt Plain (T.29N., R.19W.) and Little Salt Plain (T.29N., R.21W.)
 - Qpy** PLAYA DEPOSIT—Unconsolidated clay and silt in shallow depressions that contain water for variable periods of time. Includes Randall clay loam soil of Nance and others (1960)
 - Qao** OLDER ALLUVIUM—Unconsolidated sand, silt, clay, and gravel in stream and river channels mostly between 0 and 12 m above modern flood plains
 - Qao2** OLDER ALLUVIUM—Unconsolidated sand, silt, clay, and gravel in stream and river channels mostly between 12 and 24 m above modern flood plains
 - Qpd** PEDIMENT DEPOSIT—Unconsolidated sand, silt, clay, and gravel forming an immature alluvial fan or debris field that gently slopes away from bedrock escarpments
 - Qds** DUNE SAND—Unconsolidated windblown sand formed into definite vegetated dune structures and ridges
 - Qcs** COVER SAND—Featureless sheet of windblown sand and minor silt distinguishable from Qds only on the basis of soil association. Mapped as Mankier-Gahart and Pratt soil associations by Nance and others (1960). May correlate to the Blackwater Draw Formation of Reeves (1976)
 - Qcl** COVER LOESS—Featureless sheet of windblown silt and minor sand distinguishable from Qcs only on the basis of soil association. Mapped as Mankier-Potter soil association by Nance and others (1960). May correlate to the Blackwater Draw Formation of Reeves (1976)
 - Qtg** TERRACE GRAVEL—Unconsolidated gravel, sand, silt, and clay laid down at several levels along former courses of present-day streams and rivers

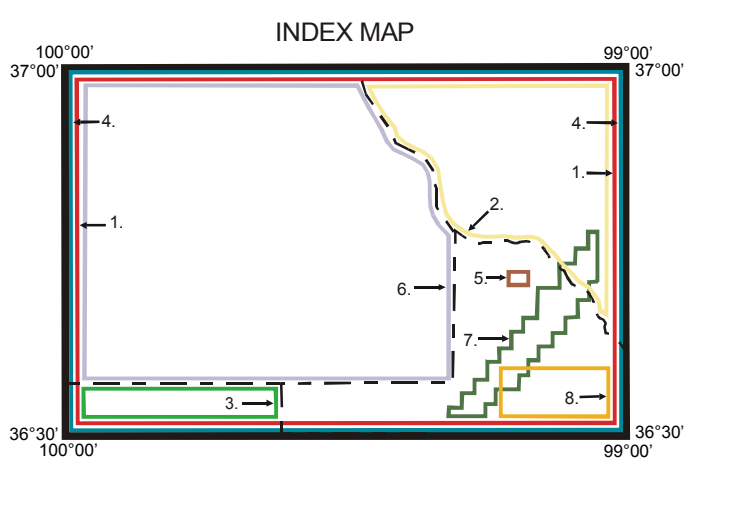
- ### UNCONFORMITY
- Nog** OGALLALA FORMATION—Mostly unconsolidated to moderately cemented, light gray to light brown stream-laid deposits of sand, silt, clay, and gravel capped by light-colored caliche. Uncommon fossiliferous freshwater limestone and rare volcanic ash
- ### UNCONFORMITY
- Kki** KIOWA SHALE—Dark gray, fossiliferous shale in lower part, grading upward into yellowish-brown fossiliferous shale. A buff to light gray, ledge-forming sandstone bed occurs toward middle, and a light brown, ledge-forming limestone bed occurs near top of exposures
- ### UNCONFORMITY
- Pcc** CLOUD CHIEF FORMATION—Reddish-brown to orange brown, locally greenish-gray shale; interbedded with thin, reddish-brown fine-grained sandstone and siltstone. Bedding locally chaotic due to slumping; caliche vening common. Base mapped at base of the Moccasin Creek Gypsum Bed
 - Prs** RUSH SPRINGS FORMATION—Reddish-brown, fine-grained sandstone, commonly cross-bedded, with local interbeds of reddish-brown shale. Upper third is massive sandstone
 - Pmw** MARLOW FORMATION—Usually a soft-weathering, orange-brown, fine-grained sandstone with local interbeds of very sandy shale and siltstone. Relay Creek Dolomite occurs 15 - 20 ft below top; top of formation locally mapped at base of Emanuel Bed
 - Pdc** DOG CREEK SHALE—Poorly exposed sequence of alternating reddish-brown shale, silt shale, and siltstone, with thin gypsum beds and stringers occurring throughout. Base mapped at the top of highest massive Blaine gypsum bed
 - Pbl** BLAINE FORMATION—Alternating sequence of three massive gypsum beds, each separated by intervals of reddish-brown shale. Each gypsum with a thin dolomite bed at base. Units form prominent escarpment above the Cimarron River
 - Pfp** FLOWERPOET SHALE—Reddish-brown silty shale; upper part with alternating thin gypsum beds that give unit a characteristic striped pattern at distance

- ### SYMBOLS
- Unit contact; approximately located

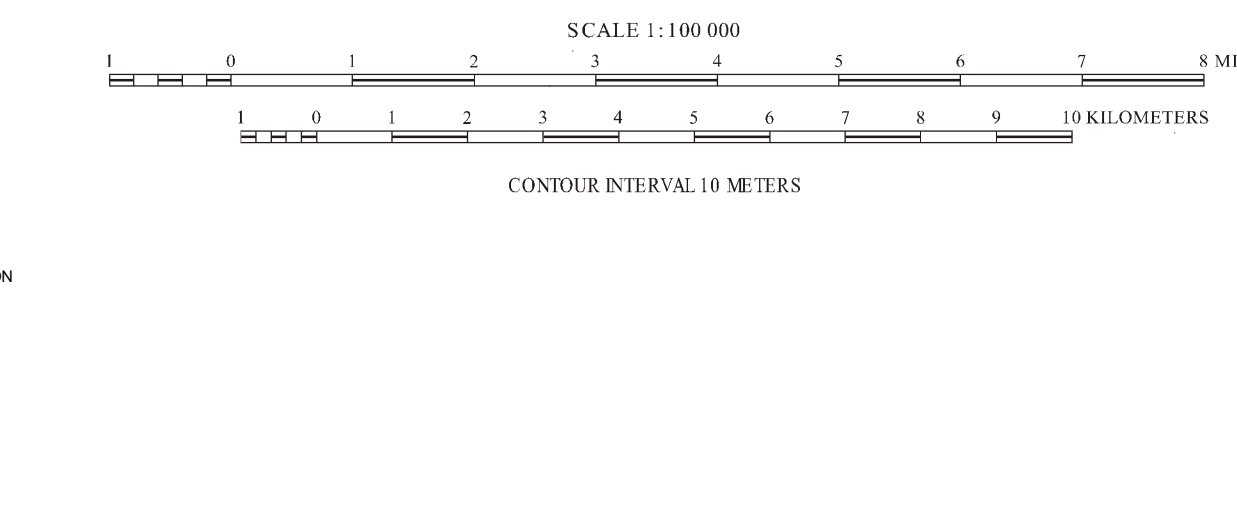
TEXT REFERENCES

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- Cokerstrand, J.R., 1998, Digital geologic map of the Woodward quadrangle, south-central Oklahoma: U.S. Geological Survey Open-File Report OFR 98-381, scale 1:50,000.
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The base map was compiled by the U.S. Geological Survey from 1:24000-scale topographic maps dated 1910-1911. The base map was revised from photorecognition maps 1964. Map edited 1995. Universal Transverse Mercator (UTM) projection, 1627 North American Datum, 20,000-foot grid. The map is based on the Oklahoma coordinate system, north zone and Kansas coordinate system, south zone. 10,000-meter UTM grid, zone 14. The upper northeast part of the map contains part of the projection 30' X 60' quadrangle of southern Kansas to the Oklahoma border.

Geologic Map Credits
Geology compiled and field checked by Thomas M. Stanley and Neil H. Suneson, 2002. The northern part of this quadrangle includes the southern part of Clark and Comanche Counties, Kansas. Research supported by the U.S. Geological Survey, 99HQAG0137. The views and conclusions contained in this document are those of the authors and should not be construed as necessarily representing the official position either expressed or implied of the U.S. Government. Originally published as Open-File Report OF12-2003. Map revised and published as OGG-39. Cartography and layout prepared by G. Russell Standridge, 2002.

Map of Oklahoma showing the locations of the 30' X 60' quadrangles. Red shaded quadrangle represents the current map.

GEOLOGIC MAP OF THE BUFFALO 30' X 60' QUADRANGLE, ELLIS, HARPER, WOODS, AND WOODWARD COUNTIES, OKLAHOMA

Compiled by Thomas M. Stanley and Neil H. Suneson
Cartography by G. Russell Standridge
2002