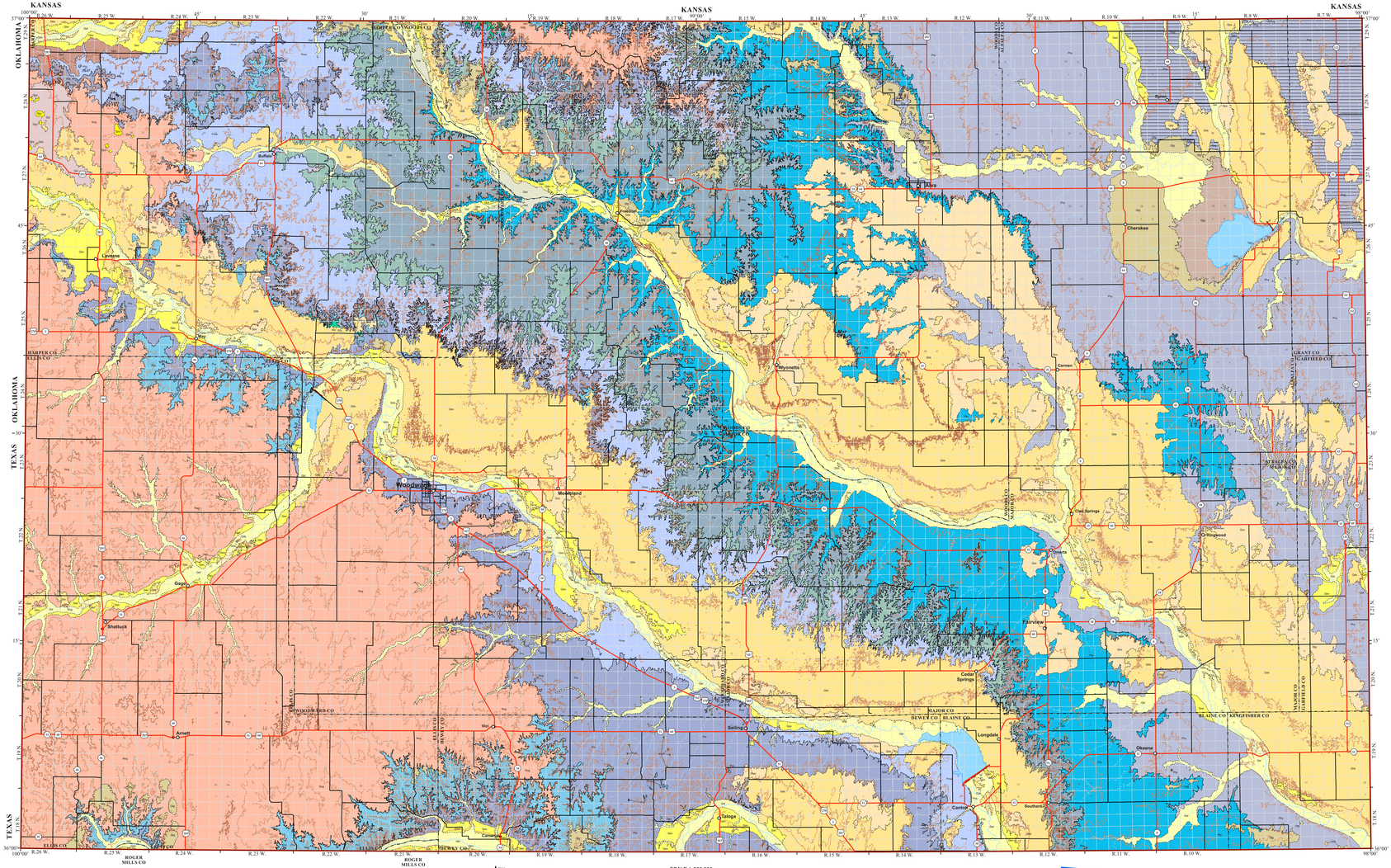
OKLAHOMA GEOLOGICAL SURVEY
Nicholas W. Hayman, *Director*

Oklahoma Geologic Quadrangle OGQ-102
Geologic Map of the Woodward 2-degree sheet



CORRELATION OF MAP UNITS

DESCRIPTION OF UNITS

Qaf ARTIFICIAL FILL (*Holocene*, Recent) — Natural or artificial talus, slumps, and mine tailings covering formally exposed areas. Most deposits of this type found around man-made earthen dams and large-scale landfills.
Thickness between 50 and 100 feet.

Qal ALLUVIUM (*Holocene*, Recent) — Unconsolidated flood-plain and channel deposits composed of locally derived sand, silt, clay, and occasionally gravel found along present-day rivers and streams.
Thickness 0 to no more than 50 feet.

Qsp SALT PLAINS DEPOSIT (*Holocene*, Recent) — Extensive salt deposition on the Cimarron River flood plain. Includes the Big Salt Plain (T.27N., R.19W.) and Little Salt Plain (T.29N., R.21W.) deposits.
Thickness no more than a few inches.

Qgy GYPSITE (*Holocene*, Recent) — Unconsolidated lacustrine deposits located north and west of the Great Salt Plains Lake; consists of well-formed gypsum crystals intermixed with sand-, silt-, and clay-sized material.
Thickness no more than a few inches.

Qpd PEDIMENT DEPOSIT (*Holocene*) — Unconsolidated, locally derived sand, silt, clay, and gravel forming an immature alluvial fan or debris field that gently slopes away from bedrock escarpments; observed only in the far northwest corner of the map area.
Thickness from 0 to no more than 100 feet.

Qpy PLAYA DEPOSIT (*Pleistocene, Wisconsinan? - Holocene*) — Unconsolidated clay and silt found in shallow depressions that contain water for variable periods of time. Includes Randall and Lofton clay loam soils (Nance and others, 1960). Water in depressions not shown.
Average surficial thickness less than 5 feet but some deposits of the Randall clay may extend to a depth of 60 feet or more.

Qao OLDER ALLUVIUM (*Pleistocene, Wisconsinan?*) — Unconsolidated remnants of older channel and flood-plain deposits consisting of sand, silt, clay, and gravel; top of deposits usually positioned 5 feet to as much as 50 feet above modern alluvial deposits (Qal). Sand, fine- to coarse-grained; gravel usually in the pebble-sized fraction consisting of locally derived clasts; cross-bedded to structureless, with lenticular to tabular bedforms.
Thickness 10 - 50 feet.

Qcl COVER LOESS (*Pleistocene, Wisconsinan*) — Featureless sheet of loess and silt-sized material with minor sand; distinguishable from Qcs only on grain size differences between soil associations. Mapped as Manser-Potter soil association by Nance and others (1960), which is predominantly composed of loess and other silt-sized material. Unit may correlate to the Vanhem Formation of Kansas (Smith, 1940; Barnes, 1970), and the Blackwater Draw Formation of Reeves (1976).
Thickness from 0 to no more than 20 feet.

Qcs COVER SAND (*Pleistocene, Illinoian*) — Featureless sheet of fine- to very fine-grained sand with minor silt and clay; distinguishable from Qcl only on grain size differences between soil associations. Mapped as Manser-Dalhart and Pratt soil association by Nance and others (1960), which is dominated by sand-sized material. Unit may also correlate to the Blackwater Draw Formation of Texas (Reeves, 1976)
Thickness 0 to no more than 40 feet.

Qtg TERRACE GRAVEL (*Pleistocene, Illinoian - Holocene*) — Unconsolidated gravel-, sand-, and silt-sized material. Gravels are sandy, boardering on a matrix-supported texture, and composed of pebble- and cobble-sized clasts of quartz, metaquartzite, and caliche; sand is fine- to medium-grained.
Thickness from 0 to about 20 feet.

Qds DUNE SAND (*Pleistocene, Illinoian - Holocene*) — Unconsolidated, fine- to very fine-grained sand and silt formed into definite vegetated dunes and sand ridges; low-angle wedge crossbedding frequently observed along base of structures.
Thickness 0 to no more than 50 feet.

Nog OGALLALA FORMATION (*Miocene - Pliocene*) — Mostly friable to weakly indurated, light gray to light brown stream-laid deposits of sand, silt, clay, and gravel capped in numerous exposures by a light-colored caliche. Sand is fine- to coarse-grained mixed with silt and clay; well-developed trough crossbedding locally; a weak calcite cement common, silica cement locally. Gravel pebble- through cobble-sized; composed of exotic clasts of metamporphic rocks, felsic and mafic igneous rocks, quartzites, bull quartz, and minor chert. Where exposed, base may exhibit a relief of as much as 200 feet, and consists of a well indurated bed of conglomerate with basalt, limestone, and dolomite clasts. Some fossiliferous freshwater limestone (probably of the Laverne facies of Schoff, 1956).
Thickness ranges between 85 to 160 feet.

Kki KIOWA SHALE (Lower Cretaceous, *Albian - ?Aptian*)) — A medium- to dark gray shale in lower half while grading upward into a brownish-yellow shale toward top; texturally the unit is a fossiliferous, fissile clayshale throughout. Locally prominant, yellowish-gray, medium- to coarse-grained sandstone occurs in the middle of the unit; sandstone is well exposed around T.25N, R.22E; also, a light brown, ledge-forming limestone beds occurs near the top of the unit.
Maximum thickness about 50 feet.

Kun CRETACEOUS(?) UNKNOWN — Small outliers consisting of a chaotic mixture of large blocks of Dakota, Cheyenne, and possibly Ogallala sandstone intercalated with possible Kiowa shale, all of which collapsed into underlying formations. Mostly found in T.19 N., eastern half of R.17W. and western half of R.18W.
Thickness of outliers from 2 to 20 feet.

Pcc CLOUD CHIEF FORMATION (*Upper Permian, Guadalupian - Ochoan*) — Reddish-brown to orangish-brown, locally greenish-gray, interbedded poorly laminated clayshale and mudshale, fine- to very-fine grained, argilaceous quatrzarenite, gypsum and thin dolomite beds; gypsum and sandstone, with minor siltstone more common in middle of unit. Calcite and/or gypsum veins, oriented oblique to main bedding, common throughout. Base of formation marked at the base of the Moccasin Creek Dolomite, a light gray, fine-crystalline dolostone. The Day Creek Dolomite (which appears similar to the Moccasin Creek) is poorly exposed and stratigraphically located near the middle of formation; in some reports, the Day Creek divides the formation into two members: the lower Kiger Member and upper Big Basin Member.
Total thickness about 100 feet.

Prs RUSH SPRINGS FORMATION (*Upper Permian, Guadalupian*) — Reddish-brown to orangish-brown, fine-grained quartzarenite, commonly cross-bedded with local interbeds of reddish-brown siltstone and shale in lower half; upper half more massive bedded and has fewer fine-grained material. In areas south of T.22N.,1 to 3 foot thick gypsum beds and stringers are commonly found in the upper third of unit.
Thickness about 200 feet.

Pmw MARLOW FORMATION (*Upper Permian, Guadalupian*) — Predominantly an orangish-brown, fine-grained sandstone, with local interbeds of very sandy mudstone and siltstone. Thin gypsum beds common in top 5 to 10 feet of formation. Several prominant beds occur, and include: the Emmanuel Bed, a 1 to 7 foot thick, ledge-forming, light gray to orangish-brown, sandy dolostone at the top of the formation; the Relay Creek Bed, a pale red, 1 to 4 in thick silty dolostone with gypsum stringers located about 10 to 20 feet below the Emmanuel bed; and the Doe Creek lentil, a 0 to 65 feet thick interval consisting of fossiliferous, coarse-grained, calcareous sandstone, sandy limestone, and dolostone, the top of which occurs 20 to 30 feet below the Relay Creek bed.
Thickness about 100 feet.

Pdc DOG CREEK SHALE (*Upper Permian, Guadalupian*) — Poorly exposed sequence of alternating reddish-brown shale, silty shale, and siltstone, with thin gypsum beds and stringers occurring throughout. Base mapped at the top of the highest Blaine gypsum bed.
Thickness about 50 feet.

Pbl BLAINE FORMATION (*Upper Permian, Guadalupian*) — An alternating sequence of, on average, three massive gypsum beds having a thin, oolitic dolostone at their base, and each gypsum-dolostone coupling is separated by a reddish-brown claystone. Base mapped at lowest massive gypsum bed. In ascending order the gypsum beds are described as follows: 1) Shimer gypsum, where present, is 15 feet thick with the Altona Dolomite at its base, however, the Shimer has often been removed due to dissolution; 2) the Nescatunga Gypsum with the Magpie Dolomite Bed at base, thickness averages 10 Feet; and 3) the Medicine Lodge Gypsum with the Cedar Springs Dolomite represents the base of the formation, and varies between 15 to 30 feet thick. The Blaine forms a prominent escarpment on top of underlying Flowerpot Shale.
Thickness about 75 feet.

Pfp FLOWERPOT SHALE (*Upper Permian, Guadalupian*) — Reddish-brown silty clayshale; with thin interbeds and stringers of gypsum and dolostone in upper half of unit; which gives it a distinct zebra-striped appearance at a distance.
Thickness varies between 225 to 400 feet.

Phy HENNESSEY SHALE (*Lower Permian, Leonardian*) — Mostly a reddish-brown to locally a pale green silty claystone to clayshale interbedded with local intervals of fine- to very fine-grained sandstone and coarse-grained siltstone. The uppermost 30 feet consists of an orange-brown, very fine-grained sandstone called the Cedar Hills Member-- an undistinguishable suite of reddish brown, interbedded silty claystones, mudstones, and argillaceous siltstones and very fine-grained sandstones.
In areas north of the Arkansas River, the basal half of the Hennessey is mapped as the Lower Nippewalla Group of Kansas stratigraphic nomenclature.
Only the upper 100 to 120 feet of unit are exposed in the map area.

Png NIPPEWALLA GROUP (*Lower Permian, Leonardian*) — Consists chiefly of interbedded red to reddish-brown, very argillaceous siltstones, very fine-grained sandstones, and very silty claystones and mudstones. Group mapped north of the Arkansas River and correlates with the lower two-thirds of the Hennessey Formation.
Only the lower 150 meters of the group are exposed in the map area.

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MAP REFERENCES

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Produced by the Oklahoma Geological Survey. Geology by Thomas M. Stanley, 2023-2024. Base map derive from a variety of national and state data. Universal Transverse Mercator projection, zone 14, North American Datum 1983. Supported by the USGS National Cooperative Geologic Mapping Program, under G22AC00581. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government. Cartography prepared Thomas M. Stanley and G. Russell Standridge, 2024.

SYMBOLS

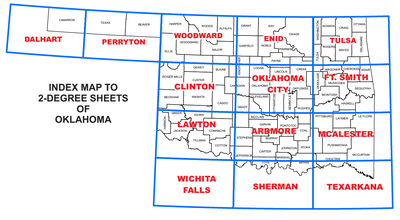
Unit contact; dashed were approximate



SCALE 1:250 000

5 0 5 10 15 20 MILES
5 0 5 10 15 20 25 KILOMETERS

CONTOUR INERVAL 100 FEET



GEOLOGIC MAP OF THE WOODWARD 2-DEGREE SHEET, ALFALFA, BLAINE, DEWEY, ELLIS, GARFIELD, GRANT, KINGFISHER, MAJOR, ROGER MILLS, WOODS, AND WOODWARD COUNTIES, OKLAHOMA

Thomas M. Stanley

2021