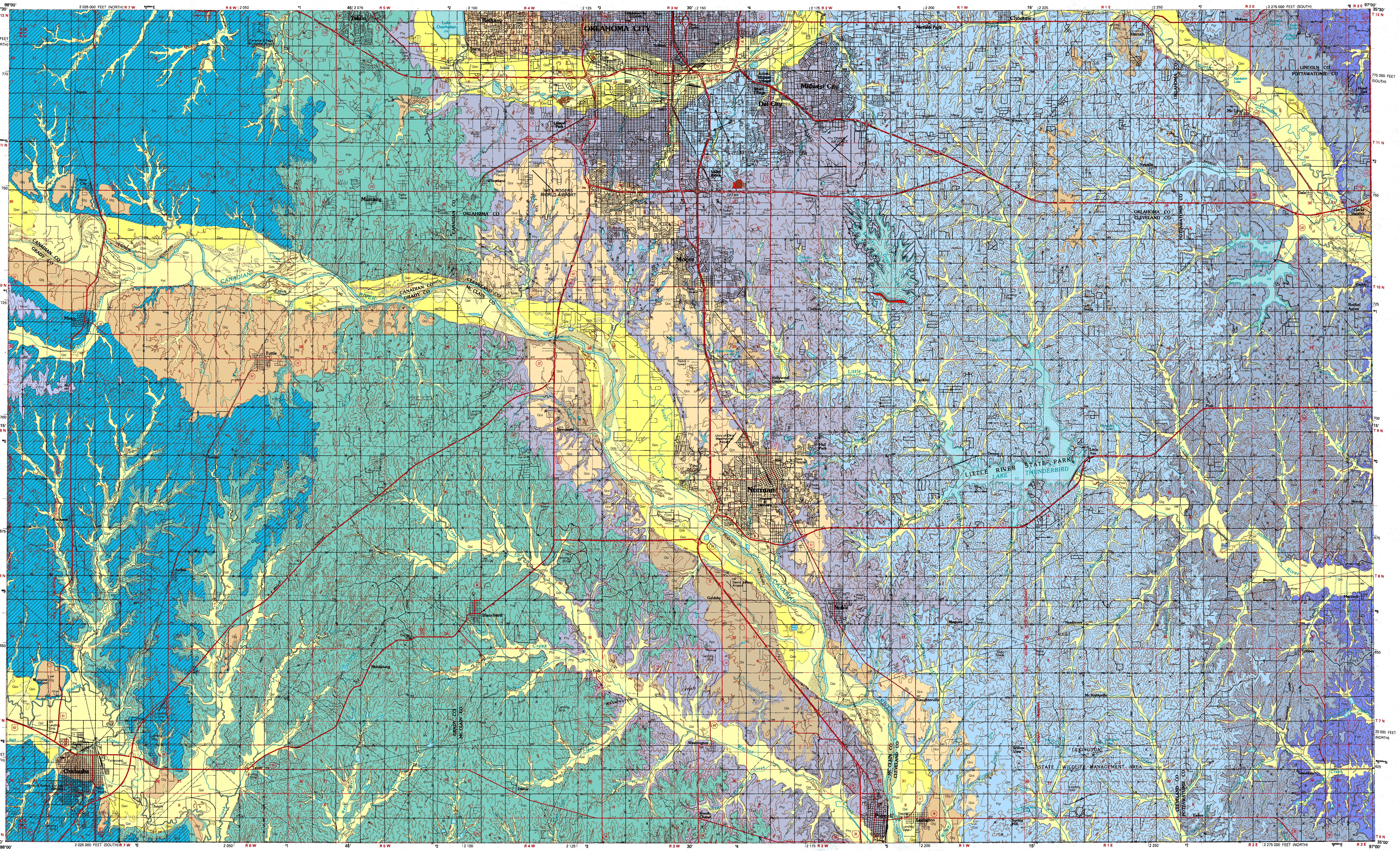
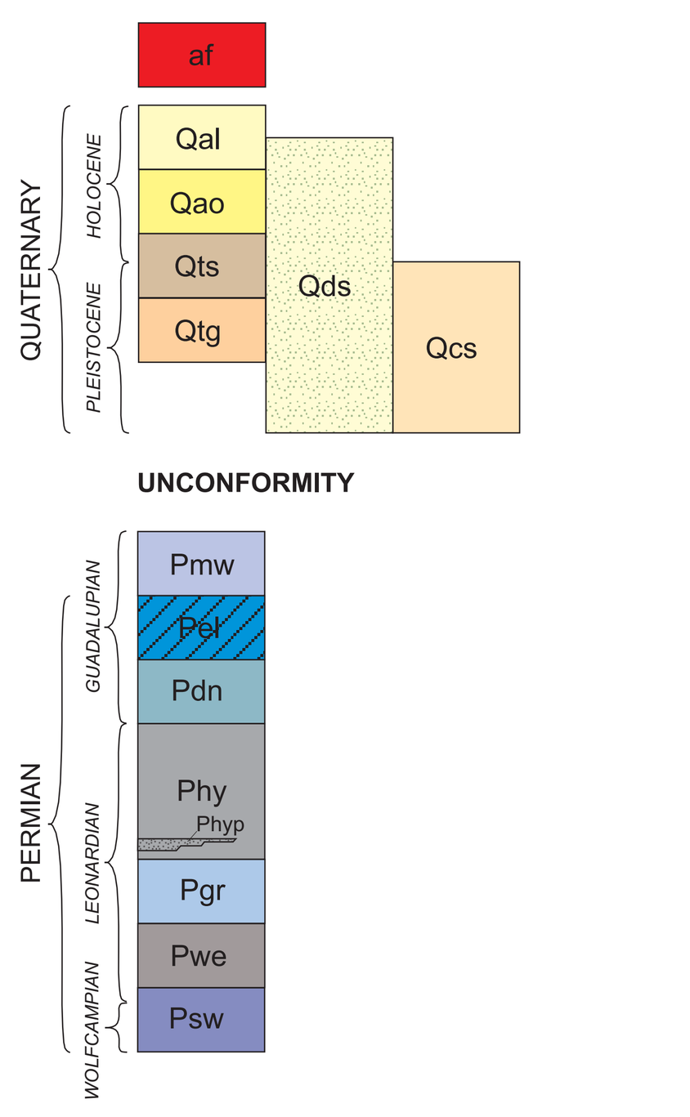
OKLAHOMA GEOLOGICAL SURVEY
Dr. Nicholas Hayman, *Director*



CORRELATION OF MAP UNITS



DESCRIPTION OF UNITS

af — ARTIFICIAL FILL - Natural or artificial talus, slumps, and tailings covering formally exposed areas. Most deposits of this type found around man-made earthen dams and large-scale land-fills. Thickness variable.

Qal — ALLUVIUM (Holocene) - Unconsolidated deposits consisting of locally derived clay-, silt-, sand-, and rarely gravel-sized sedimentary material; found in channels and on flood plains of modern streams. Includes terrace deposits of similar composition located directly above and adjacent to modern channels and flood plains. Deposits occurring within major drainages, such as in the Canadian and North Canadian River systems, also represent areas of frequent flooding. Thickness: 0 to about 12 meters.

Qao — OLDER ALLUVIUM (Holocene) - Unconsolidated deposits consisting of locally derived clay-, silt-, sand-, and rarely gravel-sized sedimentary material; represent slightly older terrace deposits than those formed in modern flood plains; predominantly found adjacent to, or 1 to 3 meters above, modern alluvial deposits of major drainage systems. Areas rarely subject to flooding. Thickness: unknown, possibly as much as 15 meters.

Qds — DUNE SAND (Holocene and/or Pleistocene?) - Fine- to coarse-grained, moderately- to poorly-sorted, unconsolidated sand formed into definite dune and ridge structures. Consists mainly of rounded to subrounded quartz grains intermixed with silt- and clay-size material. Dune features best found on the north side or within major east-west trending drainages; probably represents aeolian reworking of Pleistocene and younger fluvial terrace deposits. Thickness: 0 to 12 meters.

Qcs — COVER SAND (Holocene and/or Pleistocene?) - Unconsolidated, very fine-grained sand to coarse-grained silt and clay, moderately to poorly sorted. Consists mainly of rounded to subrounded quartz grains, with abundant silt- and clay-size material. Forms extensive nearly flat topographic surfaces as much as 25 above modern alluvial valleys. Probably represents aeolian reworking of Pleistocene and younger fluvial terrace deposits. Thickness: from a thin veneer to as much as 9 meters; averages closer to 1.5 meters.

Qts — OLDER TERRACE SANDS (Holocene and/or Pleistocene?) - Unconsolidated deposits consisting mostly of locally derived sand-, silt- and clay-sized sedimentary material, with minor amounts of distally derived sand- and gravel-sized material. Sand commonly medium- to fine-grained, subangular to subrounded, poorly sorted to very poorly sorted, and usually having a light brown to reddish-brown color. Deposits typically occur 0 to 15 meters above major drainages, particularly along the Canadian and North Canadian drainage systems. Thickness: typically 0 to 11 meters, but some deposits may be as much as 30 meters thick.

Qtg — OLDER TERRACE GRAVELS (Pleistocene) - Unconsolidated deposits consisting mostly of distally derived sand- and gravel-sized sedimentary material, with minor amounts of locally derived silt-sized and rarely clay-sized material. Sand commonly medium- to coarse-grained, subangular to subrounded, and very light colored; gravel consists of concentrations of rounded to well-rounded, oblate-shaped pebbles and cobbles of quartz, chert, and meta-quartzite; basalt and gneiss clasts rare. Deposits typically occur 0 to 15 meters above the Canadian and Walnut Creek drainage systems. Thickness: typically 0 to 11 meters, but some deposits may be as much as 30 meters thick.

Pmw — MARLOW FORMATION (Permian, Guadalupian) - Orangish-brown, fine-grained, massive sandstone with local interbeds of siltstone and silty clayshale.
Only the basal 20 meters is exposed on the sheet.

Pel — EL RENO GROUP, undifferentiated (Permian, Guadalupian) - Consists of various elements of the Dog Creek and Flowerpot shales. Mostly a reddish brown to orange-brown, silty clayshale with minor interbeds of very fine-grained sandstone. Stringers of gypsum and very thin limestone beds may occur in upper half of unit.
Unit is poorly exposed. Total thickness about 70 meters.

Pdn — DUNCAN FORMATION (Permian, Guadalupian) - Mostly friable to weakly indurated sandstone, fine- to very fine-grained, rarely medium-grained, with mudstone- and siltstone-pebble conglomerates, and thin siltstone interbeds locally. Lower half of section consisting of moderate reddish orange to light red, thin- to medium-bedded, fine-grained sandstone, siltstone, and siltstone-pebble conglomerates that locally fines upward into moderate reddish brown to moderate reddish orange very fine-grained sandstones. Trough cross-laminations, parting lineations and oscillation ripple marks common in sandstones. Conglomerates are indurated to well indurated, consisting of slightly imbricated siltstone and mudstone clasts set within a fine-grained, quartz-rich sandstone matrix that is usually cemented with calcite; although, barite cement may occur locally. Upper half of unit consisting of interbedded friable to weakly indurated sandstones and moderately indurated mudstone- and siltstone-pebble conglomerates, and local occurrences of thin intervals of siltstone and mudstone. Sandstones are fine- to very fine-grained, massive, rarely exhibiting internal bedding; are moderate reddish brown, moderate reddish orange to pale brown in color; iron oxide and/or clay is predominant cement, although calcite cement does occur in patches. Sandstones may laterally grade into moderately indurated siltstone- and/or mudstone-pebble conglomerates that are similar in composition to those in lower half of formation. Interbedded siltstone and mudstone intervals lenticular shaped, average only a meter in thickness and extend only few meters along strike; mudstones blocky bedded, slickenside bedding and shrinkage cracks common; siltstone normally occurs as thin partings separating mudstone and sandstone intervals. Locally, greenish gray colored bands, beds, and irregular splotches occur in sandstones, siltstones and shales; burrows and root casts(?) Common.

The Duncan Formation now includes parts of what was previously mapped as the Chickasha Formation of Canadian, Grady, and McClain Counties (see Davis, 1955; Bingham and Moore, 1975). Where observed, contact with the underlying Hennessey Formation is sharp and planar, and placed at base of lowest mappable fine-grained sandstone bed of the Duncan. Thickness: about 450 meters in the southern part of sheet and thinning to 100 meters along the northern boundary of map.

Phy — HENNESSEY FORMATION (Permian, Leonardian) - Mostly a silty claystone or clayshale depending on whether bedding is laminated (<=1cm thick: clayshale), or thin (>1cm thick: claystone), with local intervals of fine- to very fine-grained sandstone and coarse siltstone. The Purcell Sandstone is the only mappable bed that can be traced with any certainty in the area. Overall, the thickness of the Hennessey Formation varies between 150 meters in the south part of the map to about 400 meters in the northern part.

Claystones and clayshales are silty to rarely sandy, non-calcareous, typically unstratified to fissile laminated; unstratified claystones commonly have small-scale slickensides and shrinkage cracks that are evidence of paleosol development. Color a moderate reddish brown to light brown, locally banded with yellowish gray and light greenish gray shale beds. Iron-reduction spots and bands commonly found in more indurated clayshale lithologies, less so in claystones; color of spots light greenish gray to pale green, while size of spots usually less than 5 millimeters in diameter. Interbedded siltstones moderately indurated to indurated, sandy, and non-calcareous; usually occur as thin laminated intervals of no more than 1 meter thick, or as thin partings separating predominantly shale intervals from sandstones. Sandstones are friable, silty to argillaceous, non-calcareous, usually found in thin, lenticular intervals of no more than a meter in thickness; locally contain low-angle, tabular cross-bedding with associated ripple marks along bedding surfaces, rarely find trough-cross-bedding except in the thickest intervals; the thin, lenticular geometry exhibiting little basal scouring of most sandstone intervals suggests that sand was deposited within shallow tidal channels, probably as a late depositional plug; trace fossils and shale rip-up clasts present but very rare; color same as shale intervals. Sandstone and siltstone intervals more common in middle third of formation; base of formation mapped at the stratigraphically highest occurring fine-grained, trough-cross-bedded sandstone of the Garber Formation.

Purcell Sandstone Member (Phyp): consists of a distinct tan to light brown colored, fine-grained, trough-cross-bedded sandstones with minor interbeds of siltstone and shale. Thickness varies from 0-20 meters.

Various investigators (see Bingham and Moore, 1975; Carr and Bergman, 1976; Bingham and Bergman, 1980; Morton, 1980) have attempted to elevate the Hennessey Formation to Group status, while breaking out a number of different “mappable” formations extending from the Kansas-Oklahoma border, southward. It is the current opinion that these “formations” should only be considered as members having very limited, and local, stratigraphic significance. The term “Hennessey Group” should be abandoned, while the interval that traditionally encompasses lithostratigraphic units falling between the Garber and Duncan Formations, north of the Wichita Mountain uplift, should be considered the Hennessey Formation.

Pgr — GARBER FORMATION (Permian, Leonardian) - Predominantly a friable to locally a moderately indurated sandstone, fine-grained to less commonly very fine-grained, with varying proportions of claystone, siltstone, and sandstone- and siltstone-pebble conglomerates and breccias.

Overall, color is a moderate reddish brown, moderate reddish orange, to light brown; large- and small-scale trough-cross-bedding abundant, and producing numerous outcrops characterized by inclined bedding that truncate along channel-form lower contacts; tabular cross-bedded and associated asymmetrical ripple marks, and planar lamination less common; sandstone, siltstone, and shale rip-up clasts, along with vertebrate bone-beds commonly occur as lag deposits at the base of channel-form contacts. Cement is mostly an iron-oxide and clay, although a calcite, barite, and rarely silica cement may occur locally; barite roses are also common on weathered Garber outcrops in areas south of Edmond and west of the Lake Thunderbird dam. Thickness of individual sandstone intervals vary from as little as 1 meter to as much as 20 meters thick; although most intervals average about 6 meters thick.

Silty and sandy claystones and sandy siltstones more common near base and top of formation; color similar to sandstones; typically unstratified, blocky bedded, with slickenside fracture surfaces, curved shrinkage fractures and calcareous nodules (calcrete) suggesting paleosol development common.

Conglomerates and breccias occur as well defined beds more commonly found in the lower parts of the formation. Both textures are predominantly cemented by calcite, or rarely by a weak silica cement. Breccias are usually moderately indurated, consist of angular sandstone clasts set within a sandstone matrix; they are most likely formed by incipient paleosol development on an exposed sand or sandstone surface. Conglomerates are sedimentary in origin, indurated, consisting of fine- to medium-pebble sized, rounded, sandstone, siltstone, shale, limestone, and dolomite clasts set within a medium- to coarse-grained sandstone matrix; color usually a distinct moderate red to pale red. Thickness of conglomerate and breccia beds from 0.1 to 1.0 meter thick.

Base of the Garber mapped at the stratigraphically lowest occurring conglomerate of definite sedimentary origin, or the lowest Garber sandstone that occurs in conjunction with the stratigraphically highest occurrence of a Wellington concretionary shale. Thickness of the Garber Formation about 425 meters.

Pwe — WELLINGTON FORMATION (Permian, Leonardian) - Formation mostly an interbedded sandstone, claystone and concretionary clayshale, with minor siltstone and sandstone breccias locally.

Sandstones similar to those of the Garber Formation, except Wellington sandstones tend to be slightly finer grained, and exhibit fewer channel-form lower contacts; most are friable, fine- to very fine-grained, slightly argillaceous and calcareous; color a moderate orange pink to moderate reddish brown; large- and small-scale trough-cross-bedding common; most basal sandstone contacts planar, although some outcrops do show scoured and channel-form lower contacts; cement generally an iron-oxide, with some local patches of calcite cement. Basal third of formation consists of thicker intervals of friable, trough-cross-bedded, fine- to locally medium-grained sandstone belonging to Fallis Sandstone Member; texturally, Fallis sandstones are somewhat coarser grained than those sandstone intervals of upper Wellington, and they are slightly more friable due to lack of calcite cement.

The base of the Wellington Formation coincides in most places with a 5 to 7 centimeter thick dolomite conglomerate bed (Patterson, 1933). Often the top of the Wellington Formation is marked by a 5 to 10 meters thick concretionary shale interval that has a well-developed paleosol horizon. Total thickness of the formation about 75 to 250 meters, and thinning to the north and south.

Psw — STILLWATER FORMATION (Permian, Leonardian and Wolfcampian?) - Consists of a series of moderate red to moderate reddish brown silty, non-calcareous claystones interbedded with orangish brown to moderate reddish brown, fine- to medium-grained sandstones and very thin discontinuous beds of fine-crystalline limestones and nodular dolostones. Claystones non-laminated, massive to blocky in appearance; sandstones commonly trough-cross-bedded.
Only the upper 30 to 40 meters are exposed in the map area.

TEXT REFERENCES

Bingham, R.H.; and Bergman, D.L., 1980, Reconnaissance of the water resources of the Enid Quadrangle north-central Oklahoma: Oklahoma Geological Survey Hydrologic Atlas 7, 4 sheets, 1:250,000 scale.

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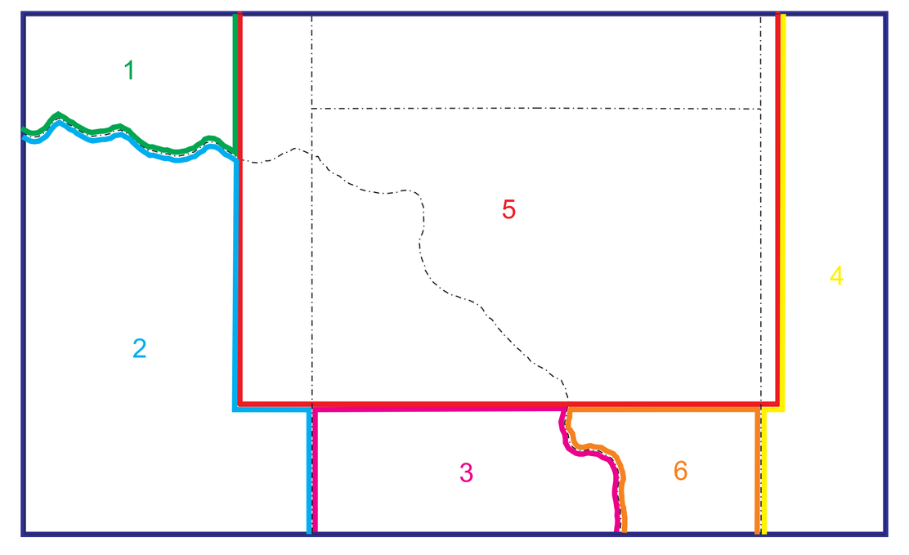


MAP REFERENCES

1. Armstrong, B.D., 1958. Areal geology of southeastern Canadian County, Oklahoma: University of Oklahoma unpublished M.S. thesis, 64 p.

2. Davis, L.V., 1955. Geology and ground-water resources of Grady and northern Stephens Counties, Oklahoma: Oklahoma Geological Survey Bulletin, 73, 73 p.

3. Markas, J.M., 1965. Geology of northern McClain County, Oklahoma: University of Oklahoma unpublished M.S. thesis, 128 p.

4. Miser, H.D., and others, 1954. Geologic map of Oklahoma: U.S. Geological Survey and Oklahoma Geological Survey, scale 1:500,000.

5. Stanley, T.M., and Standridge, G.R., 2008. Geologic map compilation of the Oklahoma City Metro Area, Central Oklahoma: Oklahoma Geological Survey, OGQ-74, Scale 1:100,000.

6. Wood, P.R.; and Burton, L.C., 1968. Ground-water resources in Cleveland and Oklahoma Counties, Oklahoma: Oklahoma Geological Survey Circular, 71, 75 p.

SYMBOLS

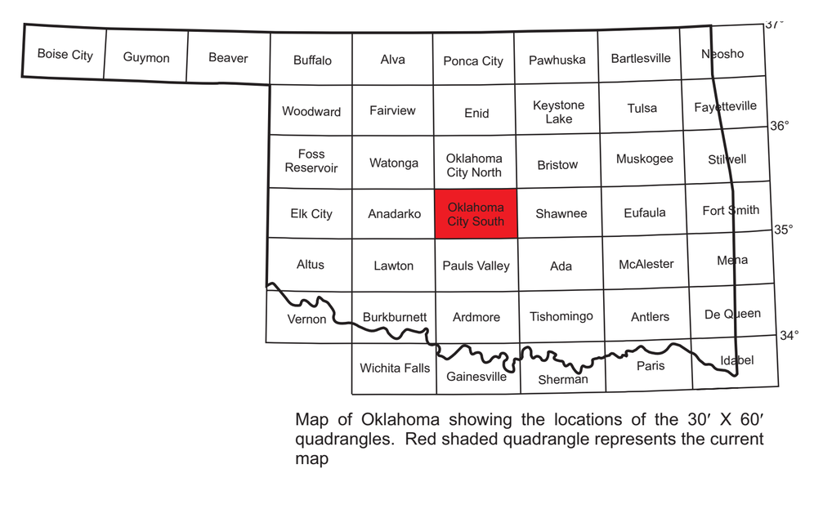
Unit contact; dashed were approximate

Dome, position infered

Produced by the Oklahoma Geological Survey. Geology by Thomas M. Stanley, 2020-2021. Base map from USGS topographic map of the Oklahoma City South quadrangle, dated 1990. Universal Transverse Mercator projection 1927 North American Datum. Research supported by the USGS, National Cooperative Geologic Mapping Program, under G20AS00006. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government. Cartography prepared by Thomas M. Stanley, 2021.

SCALE 1:100 000

CONTOUR INTERVAL 10 METERS



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

GEOLOGIC MAP OF THE OKLAHOMA CITY SOUTH 30X60-MINUTE QUADRANGLE, CANADIAN, CLEVELAND, GRADY, LINCOLN, McCLAIN, OKLAHOMA, AND POTTAWATOMIE COUNTIES, OKLAHOMA

Thomas M. Stanley

2021