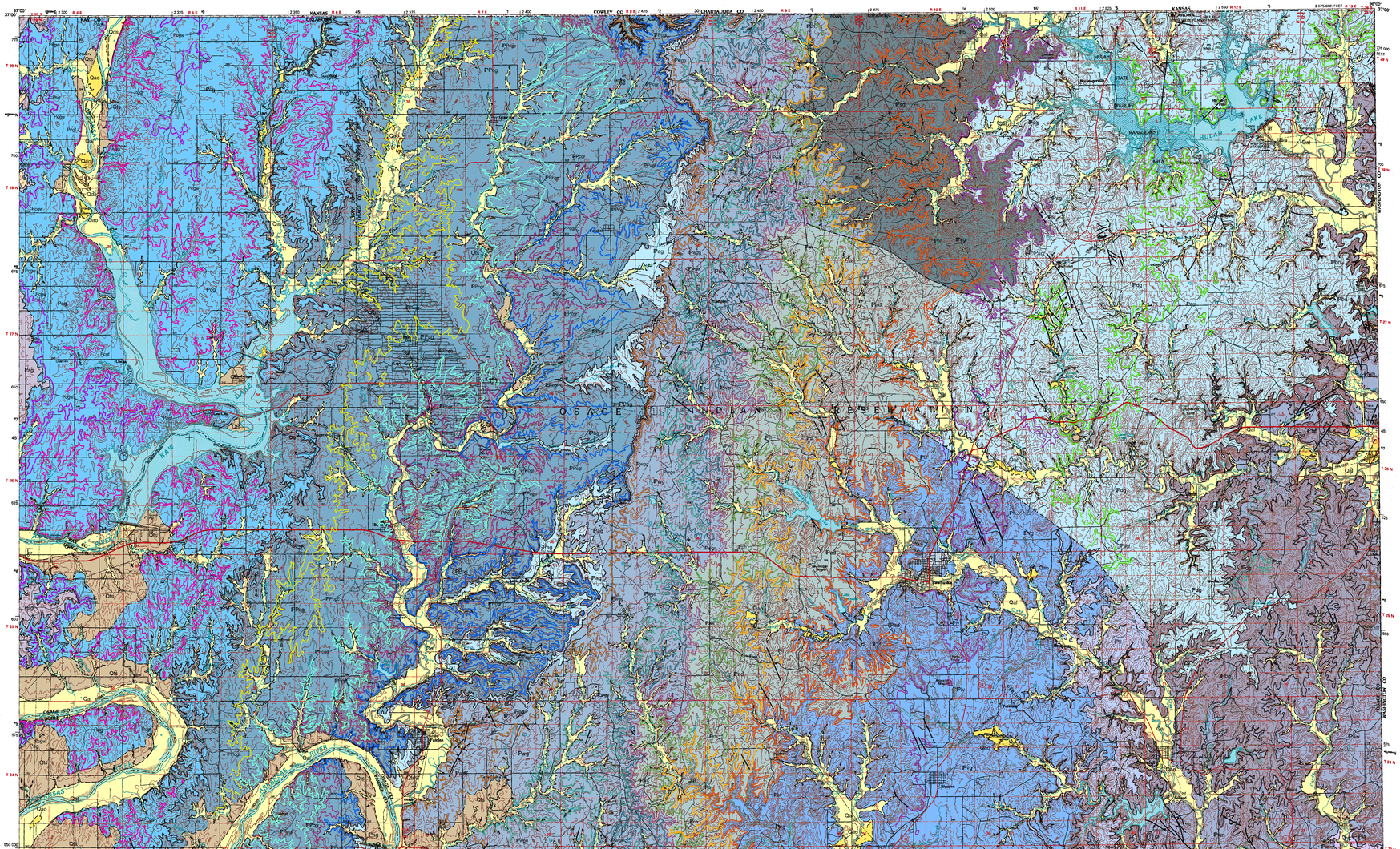
OKLAHOMA GEOLOGICAL SURVEY
Dr. Jeremy Boak, *Director*

Oklahoma Geologic Quadrangle OGQ-91
Geologic Map of the Oklahoma Part of the
Pawhuska 30X60-Minute Quadrangle



CORRELATION OF UNITS

DESCRIPTION OF UNITS

af — ARTIFICIAL FILL—Natural or artificial talus, slumps, and tailings covering formally exposed areas around active and inactive mining operations

Qal — ALLUVIUM—Clay, silt, sand, and some gravel composed of locally derived unconsolidated sediment deposited in channels and on flood plains of modern streams.

Qao — OLDER ALLUVIUM—Clay, silt, sand, and some gravel composed of locally derived unconsolidated sediment located between 1.5 to 6 meters above and adjacent to modern flood plains and alluvial valleys

Qts — TERRACE SAND—Mostly unconsolidated sand, silt, and clay, with little to no gravel-sized material. Unit formed at several levels along former courses of present-day rivers and streams.

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 deposit, 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 deposits.

Psg — SUMNER GROUP—The Sumner Group includes primarily reddish-brown shales and siltstones that are stratigraphically equivalent to the Wellington Formation and the Garber Sandstone of central Oklahoma. Only the basal 10 to 15 meters exposed along the far western parts of the quad.

Pcg — CHASE GROUP—Along the Kansas-Oklahoma border, the group is comprised of four limestone and three shale members. In descending order, they are: the Nolans Limestone at top, Odell Shale, Winfield Limestone, Doyle Shale, Barneston Limestone, Matland Shale, and the Wreford Limestone at base. Only the more prominent limestone members are shown. Overall, the Chase Group consists of multicolored calcareous, silty clayshales, claystones, and mudstones interlayered with prominent, escarpment forming limestone intervals. Important limestones include, in descending order: 1) the Herington Limestone, a 1.5 meter thick, thin-bedded, argillaceous, carbonate mudstone, the top of which marks the top of the Chase Group; 2) the Winfield Limestone (Pcgw), a 3.5 meter thick limestone consisting of two thin-bedded cherty carbonate mudstones to wackestones separated by a thin shale interval; 3) the Fort Riley Limestone (Pcgf), a unit that is variable in character but is generally ~6 meters thick and consists of a lower molluscan and algal limestone interbedded with gray shale and overlain by a thick sandstone; and 4) the Wreford Limestone, which represents the base of the group, and ranges from ~12 to 5 meters thick and consists of a lower, middle, and upper zone. The lower and middle zones consist of gray, thick-bedded, algal limestone that is sandy in some areas. When sandy, the rock is brown to yellow in color and commonly weathers into large rectangular blocks. The upper zone consists of interbedded gray, thin-bedded, non-fossiliferous limestone with gray shale. Algal pellets are present within the limestone.
Total thickness of the Chase Group is ~91 meters.

PPcg — COUNCIL GROVE GROUP—Along the northern border of Oklahoma and extending south, the group is comprised of a number of thin limestone packages interbedded with shale. In descending order, they are: the Speiser Shale at the top, Funston Limestone, Blue Rapids Shale, Crouse Limestone, Easly Creek Shale, Bader Limestone, Stearns Shale, Beattie Formation, Eskridge Shale, Grenola Formation, Roca Shale, Red Eagle Formation, Johnson Shale, and the Foraker Formation at base. Only the more prominent limestone members are shown. Overall, the upper part of the Council Grove Group consists of red shales and lenticular sandstones with thin interbedded limestones. The lower part consists of fine-grained sandstones and red to gray shales interbedded with thin fossiliferous limestones. Important limestones include, in descending order: 1) the Cottonwood Limestone (PPcg) of the Beattie Formation is a 1 meter thick resistant bed of light greenish-gray limestone; 2) the Neva Limestone (PPcgn) of the Grenola Formation is 3 to 4 meters thick and consists of three limestone zones separated by and interbedded with shales. The lower zone consists of a light gray to blue-gray, dense limestone. In parts it is cherty and/or slightly fossiliferous (fusulinids). The middle zone is a light gray, argillaceous, slightly fossiliferous (fusulinids), limestone with abundant chert locally. The upper zone is a light gray to yellowish, massive to thin-bedded limestone with abundant fusulinids and locally rich in chert; 3) the Red Eagle Formation (PPcgr) constitutes the boundary between the Permian and Pennsylvanian Periods. It is poorly exposed and absent in some areas. The limestone is gray, light gray, or off-white in color and can be subdivided into a lower, middle, and upper zones, each about 1.2 meters thick. The lower and upper limestones are thin-bedded, and the middle limestone is medium- to thick-bedded; 4) the Long Creek Limestone (PPcgl) is the upper member of the Foraker Formation and is ~3.5 to 5 meters thick, poorly exposed, and thin- to medium-bedded. The limestone is chert-bearing and fusulinid-rich in some areas; 5) the Americus Limestone is the lower member of the Foraker Formation and represents the base of the Council Grove Group. It is ~3 meters thick and contains limestones separated by thin shale intervals. In particular, it contains two lower massive limestones that are gray, crystalline, dense, and fossiliferous, with abundant fusulinids, separated by a marly, extremely fossiliferous (fusulinid-rich) shale.
Total thickness of the Council Grove Group is ~145 meters.

Pag — ADMIRE GROUP—Consists of undifferentiated red and gray shales, fine-grained sandstones, and undistinguishable thin, fossiliferous limestones. The only prominent member is the Five Point Limestone that occurs in the middle of the group and which was unmappable at this scale. Total thickness of the group is ~43 meters.

Pwg — WABAUNSEE GROUP—Along the Kansas-Oklahoma border, the group is comprised of six limestone and six shale members. In descending order, they are: the Wood Siding Formation at top, Root Shale, Stotler Limestone, Pillsbury Shale, Zendale Limestone, Willard Shale, Emporia Limestone, Auburn Shale, Bern Limestone, Scranton Shale, Howard Limestone, and the Severy Shale at base. Only the more prominent limestone members are shown. Overall, the Wabaunsee Group consists of massive limestone beds with interbedded calcareous, argillaceous, and arenaceous shale. Important limestones include, in descending order: 1) the Brownville Limestone at the top of the Wood Siding Formation constitutes the top of the Wabaunsee Group. It is ~2 meters thick and consists of two limestone beds, both ~0.4 meters thick, separated by gray, calcareous shale. The lower limestone bed is silty, light gray to buff, and fossiliferous. Fossils include fragments of brachiopods, echinoids, and pelecypods, which are often replaced by calcite. Mudstone is also present, especially in the upper part of the lower bed. The upper bed is light gray to tan, argillaceous, and fossiliferous. Fossils include fusulinids, which increase in size upward, and crinoid stems, which are abundant on the surface of the rock; 2) the Grayhorse Limestone (Pwgg) in the middle of the Wood Siding is ~1 meter thick and consists of two light gray limestone beds separated by a greenish-gray shale with intercalated limestones. The lower limestone bed is fossiliferous, with bryozoans, echinoids, brachiopods, and mollusks, which are replaced by calcite. The upper limestone bed is well-indurated, ferruginous, and sparsely fossiliferous; 3) the Elmont Limestone (Pwge) at the top of the Emporia Limestone is ~3 meters thick and consists of two limestone beds separated by a gray shale. The lower bed is gray and contains abundant fusulinids. The upper bed is brown, irregularly-bedded, and fossiliferous; 4) the Reading Limestone (Pwgr), located at the base of the Emporia, is 6 meters thick and consists of four limestone beds separated by gray shales. The lower and upper limestones are algal pellet limestones with irregular upper surfaces. They are fossiliferous to locally fossiliferous, with pelecypod fragments in the lower limestone. The middle two limestones are gray to dark gray, dense, brittle, and fossiliferous. The upper-middle limestone contains fusulinids, algal pellets, horn corals, and gastropods locally. The shale between the lower and lower-middle limestones contains a thin coal and underclay; 5) the Wakarusa Limestone (Pwk) at the top of the Bern Limestone is 0.5 to 1.5 meters thick and consists of limestone beds separated by intervening shales. The limestone beds are dense and dark gray to steel blue in color. They are sometimes brittle and/or display conchoidal fracture. Fossils present include fusulinids, brachiopods, bryozoans, and concentrically laminated algal organisms (algal pellets) that have been called "Cryptozoon." The shales are gray, calcareous, and fossiliferous; and 6) the Church Limestone (Pcn), in the middle of the Howard Limestone, correlates with the Bird Creek Limestone of Oklahoma and stratigraphically occurs no more than 20 to 30 feet above the base of the Wabaunsee Group. It consists of a persistent ~0.5 to 1 meter thick bed of dark gray to black, dense, well-indurated, brittle limestone containing sparse fusulinids, bryozoans, and brachiopods. Subconchoidal fractures are also present.
Total thickness of the Wabaunsee Group is ~210 meters.

Psg — SHAWNEE GROUP—In the north, the group is comprised of four limestone and three shale members. In descending order, they are: Topeka Limestone at top, Calhoun Shale, Deer Creek Limestone, Tecumseh Shale, Lecompton Limestone, Kanwaka Shale, and the Oread Limestone at base. Only the more prominent limestone members are shown. Overall, the group is characterized by interbedded intervals of clayshale, silty clayshale, and mudstone of varying thickness, with predominantly yellow-brown weathering limestones. Mapped intervals with the Shawnee Group include: 1) the Turkey Run Limestone (Ptr), which represents the top of the group and correlates with the Coal Creek Limestone of the top of the Topeka Formation of Kansas, is 0.3 to 0.6 meters thick, varies in character, and is poorly exposed in some areas. It is sometimes a dark gray, shaly, fossiliferous limestone. Other times it is a pellet limestone, with light gray to blue limestone balls, 1 to 5 millimeters in diameter, in a dark gray matrix of sandy limestone; 2) the Bell Limestone (Pbl), is 2.2 to 4 meters thick, varies in character, and is poorly exposed in some areas. Where the limestone is thicker to the north, it has massive-bedding and a pitted surface. Southward, the limestone becomes thinner, wavy-bedded, and more interbedded with shales. The limestone may become a calcareous sandstone to the south as well. The limestone contains fusulinids, crinoid fragments, and coral; and 3) the Leavenworth Limestone (Plv), a single (<1 meter thick) bed of medium gray, calcareous mudstone with abundant fusulinids. The bed pinches out near the southern boundary of the Pawhuska Sheet.
Total thickness of the Shawnee Group ~70 meters.

Pdg — DOUGLAS GROUP—In the north, the group is comprised of two predominant clastic members, the upper Lawrence Formation and the basal Stanger Formation, as well as a number of minor limestone beds. Important limestones include: 1) the Labadie Limestone (Pdgl), a gray to white, wavy-bedded, fractured, brachiopod-bearing limestone. It is 1 to 3 meters thick, thinning to the north, and roughly correlates to the Haskell Limestone of the Douglas Group of Kansas nomenclature, and is found at the base of the Lawrence Formation. Other limestones include, but were not mapped, the Amazonia Limestone of the Lawrence, and the Westphalia Limestone of the Stranger Formation. The Douglas Group interfingers with the Vamoosa Group lithologies as Douglas limestones pinch out to the south.
Total thickness of the Douglas Group ~122 meters

Pad — ADA GROUP—Contains interbedded gray shales, lenticular sandstones, and limestones, and correlates with the lower part of the Wabaunsee Group and the upper part of the Shawnee Group. Important limestones include: 1) the Wakarusa Limestone (Pwk), which occurs 10 to 20 feet below the top of the group. See detailed description under the Wabaunsee Group; 2) the Church Limestone (Pch), which correlates to the Bird Creek Limestone of Oklahoma. See detailed description under the Wabaunsee Group; 3) the Turkey Run Limestone (Ptr), which correlates with the Coal Creek Limestone of the top of the Topeka Formation of Kansas. See detailed description under the Shawnee Group; and 4) the Bell Limestone (Pbl), which constitutes the base of the Ada Formation. See detailed description under the Shawnee Group. The Pawhuska Formation of Oklahoma is bounded above and below by the Turkey Run Limestone and the Bell Limestone, respectively, but is not shown on this map.
Total thickness of the Ada Formation is ~35 meters.

Pvg — VAMOOSA GROUP—On the Pawhuska Sheet, the Vamoosa Group consists of locally calcareous, gray-green, blue-green, and maroon shale; siltstone; fine- to coarse-grained sandstone; and thin limestones. It correlates roughly with the lower half of the Shawnee Group and the upper half of the Douglas Group of Kansas. The Leavenworth Limestone (Plv; see detailed description under the Shawnee Group) is the only mappable limestone found in the group. The base of the Checheualla Sandstone marks the base of the Vamosa Group; it is a ~2 to 6 meters thick, fine-grained, moderately well-cemented, and cross-bedded, argillaceous quartz arenite that roughly correlates with the Tonganoxie Sandstone of Kansas.
Total thickness ranges from ~120 to 190 meters.

Ptl — TALLANT FORMATION—Consists of greenish-gray and grayish-blue shale, sandstone, and thin limestone beds. It correlates with the Weston Shale of the Stanger Formation at the base of the Douglas Group of Kansas. The Bigheart Sandstone marks the base of the Tallant Formation. Thickness ranges from ~30 to 75 meters.

Pbn — BARNSDALL FORMATION—Consists of blue-gray shale, buff siltstone and fine-grained sandstone, and thin limestone beds. Total thickness of formation ranges from ~40 to 50 meters, increasing northward.

Pwn — WANN FORMATION—Consists of shale and fine- to medium-grained sandstone with many thin layers of fossiliferous limestone. Total thickness of formation ranges from 15 to 122 meters.

Pia — IOLA FORMATION—Consists of interbedded limestone, calcareous sandstone, and shale. Only the upper 5 to 10 meters exposed on the sheet.

MAP REFERENCES

1. Bingham, R.H. and Bergman, D.L., 1980, Reconnaissance of the Water Resources of the Eastern Osage Reservation, Osage County, Oklahoma: Oklahoma Geological Survey Hydrologic Atlas 7, Scale 1:250,000.

2. Bryant, G.G., 1957, Geology of the Gray Horse area, Osage County, Oklahoma: [M.S. Thesis], University of Oklahoma, Norman, 115p.

3. Carter, J.A., jr., 1954, Geology of the Pearsonia area, Osage County, Oklahoma: [M.S. Thesis], University of Oklahoma, Norman, 114p.

4. Fisher, W.C., jr., 1956, Surface geology of the Ballard area, Osage County, Oklahoma: [M.S. Thesis], University of Oklahoma, Norman, 84p.

5. Gardner, W.E., 1956, Geology of the Barnsdall area, Osage County, Oklahoma: [M.S. Thesis], University of Oklahoma, Norman, 103p.

6. Greig, P.B., 1959, Geology of Pawnee County, Oklahoma: Oklahoma Geological Survey Bulletin 83, 169p.

7. Russell, O.R., 1955, Geology of the Hominy area, Osage County, Oklahoma: Master's Thesis, University of Oklahoma, Norman, 84p.

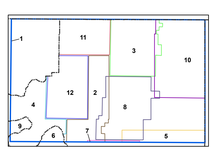
8. Shannon, P.J., 1954, The geology of the Pawhuska area, Osage County, Oklahoma: Master's Thesis, University of Oklahoma, Norman, 98p.

9. Shelton, J.W., 1979, Geology and mineral resources of Noble County, Oklahoma: Oklahoma Geological Survey Bulletin 128, 651p.

10. Tanner, W.F., 1956, Geology of Northeast Osage County, Oklahoma: Oklahoma Geological Survey Circular 40, 78 p.

11. Taylor, R.C., 1953, The geology of the Foraker area, Osage County, Oklahoma: Master's Thesis, University of Oklahoma, Norman, 108p.

12 Wellborg, O.L., 1954, Geology of the Burbank-Shidler area, Osage County, Oklahoma: [M.S. Thesis], University of Oklahoma, Norman, 112p.



SYMBOLS

Unit contact; dashed where approximate

Normal fault; dashed where approximate, dotted where concealed; bar and ball on downthrown side

Facies contact; approximately located

Produced by the Oklahoma Geological Survey. Geology by Thomas M. Stanley and Julie M. Chang, 2014-2015. Base map from USGS topographic map of the Pawhuska quadrangle. Map projection: Lambert conformal conic projection; NAD North American Datum. Research supported by the USGS, National Cooperative Geologic Mapping Program, under G014AC00329 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 Jefferson Chang, Julie M. Chang, and G. Russell Standridge, 2015.

SCALE 1:100 000
1 0 1 2 3 4 5 6 7 8 9 MILES
1 0 1 2 3 4 5 6 7 8 9 10 KILOMETERS
CONTOUR INTERVAL 10 METERS

UTM GRID AND 1999 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



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

GEOLOGIC MAP OF THE PAWHUSKA 30X60-MINUTE QUADRANGLE, KAY, NOBLE, OSAGE, AND PAWNEE COUNTIES, OKLAHOMA

Thomas M. Stanley and Julie M. Chang

2015