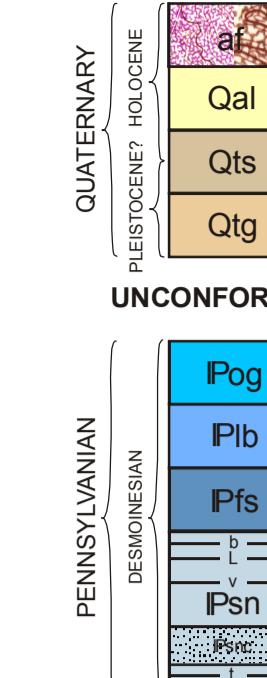


CORRELATION OF MAP UNITS



DESCRIPTION OF UNITS*

Qal ARTIFICIAL FILL (Holocene) - Natural or artificial talus, slumps, and tailings covering formally exposed areas around active and inactive mining operations.

Qts ALLUVIUM (Holocene) - Clay, silt, sand, and gravel 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. Thickness: 0 to about 30 ft.

Qtg TERRACE GRAVELS (Pleistocene(?)) - Consists mostly of unconsolidated fine- to medium-grained quartz sand, silt, and clay; little to no gravelly material observed. Silt just above modern flood plains and drainages. Thickness: 0 ft to as much as 20 ft, averages closer to 8 ft thick.

Pog COLOGAH FORMATION (Pennsylvanian, Desmoinesian) - Limestone characterized by a medium gray (N6) to medium dark gray, medium bluish gray (5B5/1), thin- to moderately bedded, wavy, skeletal and whole-fossil, algal mudstones and wackestones; bedding varies between 1"-16" thick, with thicker beds more common at the base of formation. Fossils dominated by numerous species of brachiopod, phylloid algal, and crinoid debris; fenestrate and ramose bryozoans present. May contain bedrock, bivalve, burrowing, and carbonaceous sections with a large complement of argillaceous limestone. The upper half of the Cologah tends to be more regular, thin-bedded, slightly argillaceous, fossiliferous mudstones; bedding planar to slightly wavy, ranging from 2.5"-5" thick. Fossils similar to lower part, except less of a phylloid algal content.

The Anna Shale and underlying Chidlers School Member were not observed in the quadrangle. Only near 50 ft 60 ft of the Cologah Formation exposed in quadrangle.

Pb LABETTE FORMATION (Pennsylvanian, Desmoinesian) - Medium light gray (N6) to dusky yellow (5B6/4), occasionally light olive gray (5Y5/2), laminated, very silty to sandy, micaceous, concretionary clayshale; concretions dusky red (5R4/2) to moderate red (5R5/4), composed of hematite and/or siderite(?), usually irregularly rounded to subangular, often associated with angular skeletal and/or plant debris; rhythmite, predominantly non-concretionary, although some narrow horizons are weakly calcareous (particularly those associated with abundant concretions). Locally, various non-descript very sandy shale or sandstone horizons occur; mostly these sand horizons are planar laminated to thin-bedded. Overall, formation becomes increasingly silty and sandy toward the top.

Within the upper 40 ft of the formation a series of interbedded shales and sandstones (Peru sandstone member) occurs. Thickness of bands 2 to 6" intervals of dusky yellow (5Y5/4), moderately indurated, thin- to medium- trough-cross-bedded, fine-grained, non-calcareous sandstones; sandstone intervals vary between 5" to as much as 15" thick, where the thicker intervals have been variably termed the Upper and Lower Peru sandstones by previous investigations. Each sandstone separated by 1" to 10 ft thick interval of well-laminated, flaser-bedded, calcareous, interbedded, thin-bedded sandstones.

The Sageayah limestone was not observed in this quadrangle. Formation about 220 ft thick.

Ps FORT SCOTT FORMATION (Pennsylvanian, Desmoinesian) - In the Catoosa Quadrangle the formation consists of only two members, in descending order: 1) the Little Osage Shale; and 2) the Blackjack Creek Limestone. Thickness of the formation is about 7 to 12 ft, averaging closer to 10 ft thick.

Little Osage Shale: Similar to the Excello Shale of the Sapelo Formation, a medium dark gray (N6) to medium light gray (5B7/1) laminated to finely bedded, phosphate nodules throughout, skeletal and plant debris; some narrow horizons are weakly calcareous.

Blackjack Creek Limestone: Light gray (N7), medium light gray (N8) to pale yellowish gray (5Y6/1), to moderate orange pink (5Y8/2), thin- to wavy bedded, due (in part) to stromatolitic wackestones. Bedding ranges from 2" to 6" thick, with thinner bedding characterized by skeletal textures, some medium bedding, a characteristically whole-fossil texture. Large linoproductids, other small products (Desmoinesian) and mesolobids, the most common fossils; chonetid sponges and large crinoid stems also present. Skeletal material usually composed of sub-angular crinoid debris (ossicles and plates), and stromatoporids, locally abundant. Some excellent fossil casts of stromatoporids and crinoids, which have subsequently been replaced by either hematite or calcite. On the Blackjack till is thicker and more wavy bedded than the overlying Blackjack Creek Limestone. Thickness of the unit is about 7 to 8 ft.

Kinnison Shale: Moderate yellowish brown (5Y8/2) to medium light gray (N6), fissile to well-laminated, moderately calcareous, fossiliferous dolomite. Phosphate nodules throughout, skeletal and plant debris; some narrow horizons are weakly calcareous.

Ironstone concrations occur sporadically throughout the shale section, but concentrations may occur just above the Verdigris Limestone; concrections composed predominately of hematite, may occur as 0.5"-2" thick, dense discontinuous beds in the concentrated horizon, but normally occur as small (between 1"-2") individual, hollow, ovoid-shaped clasts; color a light red (5R6/6) to moderate red (5R6/2).

A number of prominent stratigraphic horizons occur in the Senora Formation, these are in descending order:

Excello Shale: Predominantly medium dark gray (N4) to dark gray (N6), well-laminated to fissile phosphatic clayshale; however, upper 2.5" a light brownish gray (5Y7/2) to pale brown (5Y5/2), laminated, slightly calcareous, fossiliferous dolomite. Phosphate nodules throughout, lower part of member, occurring as 0.25"-0.5" ovoid-shaped clasts. Thickness from 3.6"-6 ft, averaging about 4 ft.

Breezy Hill Limestone (b, fs, fb): Grayish orange (10Y7/4), yellowish gray (5Y7/2), pale olive (10Y6/2), to medium light gray (N6), with local dark yellow orange streaks along bedding contacts and some thin, wavy bedded dolomites. Bedding varies from 3"-16" thick, with thinner bedding characterized by skeletal textures, some medium bedding, a characteristically whole-fossil texture. Large linoproductids, other small products (Desmoinesian) and mesolobids, the most common fossils; chonetid sponges and large crinoid stems also present. Skeletal material usually composed of sub-angular crinoid debris (ossicles and plates), and stromatoporids, locally abundant. Some excellent fossil casts of stromatoporids and crinoids, which have subsequently been replaced by either hematite or calcite. On the Breezy till is thicker and more wavy bedded than the overlying Blackjack Creek Limestone. Thickness of the unit is about 7 to 8 ft.

Silver Lake Shale: Moderate yellowish brown (5Y8/2) to medium light gray (N6), fissile to well-laminated, moderately calcareous, fossiliferous dolomite. Phosphate nodules throughout, skeletal and plant debris; some narrow horizons are weakly calcareous.

Iron Post Coal: Where observed, coal is a single bed, black (N1) to grayish black (N2), having well-developed 2-directional cleats. Associated underclay is thin, black, and moderately developed. Thickness about 6 to 8 inches.

Lagonda Sandstone (L): Grayish orange (10Y7/4), dark yellowish orange (10Y8/2), to pale orange (5Y6/2), friable to moderately indurated, thin- to medium-bedded; sometimes wavy laminated, trough-cross-bedded, fine- to very fine-grained, slightly siliceous sandstone; shale partings may occur between cross-bed sets; sandstone mostly very clean, with rounded to subangular skeletal and plant debris; some thin, wavy bedded dolomites. Bedding varies from 1/8" to 3" thick, with thinner bedding characterized by skeletal textures, some medium bedding, a characteristically whole-fossil texture. Large linoproductids, other small products (Desmoinesian) and mesolobids, the most common fossils; chonetid sponges and large crinoid stems also present. Skeletal material usually composed of sub-angular crinoid debris (ossicles and plates), and stromatoporids, locally abundant. Some excellent fossil casts of stromatoporids and crinoids, which have subsequently been replaced by either hematite or calcite. On the Lagonda till is thicker and more wavy bedded than the overlying Blackjack Creek Limestone. Thickness of the unit is about 6 to 8 ft.

Verdigris Limestone: Moderate yellowish brown (5Y8/2) to medium light gray (N6), fissile to well-laminated, moderately calcareous, fossiliferous dolomite. Phosphate nodules throughout, skeletal and plant debris; some narrow horizons are weakly calcareous.

Black Jack Creek Limestone: Moderate yellowish brown (5Y8/2) to medium light gray (N6), fissile to well-laminated, moderately calcareous, fossiliferous dolomite. Phosphate nodules throughout, skeletal and plant debris; some narrow horizons are weakly calcareous.

McNaab Limestone: Moderate yellowish brown (5Y8/2) to medium light gray (N6), fissile to well-laminated, moderately calcareous, fossiliferous dolomite. Phosphate nodules throughout, skeletal and plant debris; some narrow horizons are weakly calcareous.

Tiawah Limestone: Moderate yellowish brown (5Y8/2) to medium light gray (N6), fissile to well-laminated, moderately calcareous, fossiliferous dolomite. Phosphate nodules throughout, skeletal and plant debris; some narrow horizons are weakly calcareous.

Chelsea Sandstone (c, c'): Variable sandstone unit that can be loosely segregated into two zones. Lower zone well exposed, consisting of a pale yellowish brown (10Y4/2), dark yellowish brown (10Y7/4), grayish orange (5Y7/2), to locally moderate yellow (5Y7/6), pale greenish yellow (10Y8/2), or pale olive (5R4/2) underclay. Represented either by a single massive bed, or by a couple of 9"-12" thick, wavy, skeletal mudstone beds; top 3"-4" becoming a wavy laminated whole-fossil mudstone to wackestone, with large produced brachiopods and large crinoid stems. Chert pods, or silica replacement of limestone along bedding surfaces common. Thickness ranges from 20 to 40 ft, averages closer to 35 ft. Upper zone of the Chelsea poorly exposed, evidenced often times only by the presence of a sandy loam soil as opposed to a clay loam soil, with some thin, wavy bedded dolomites. Bedding thicknesses from 0.5" to 3" thick, average 5" thick, locally graded, with siltstone, sandstone, and limestone pebbles conglomerate set in a medium-grained sand matrix at the base; that grades upward into a fine-grained sandstone. Thickness varies from 20 to 60 ft, but averages closer to 35 ft. Upper zone of the Chelsea base 20-25 ft above the Tiawah Limestone; locally it may be as high as 30 ft above. Where the Chelsea has stepped in close proximity to the Tiawah, base of the sandstone labeled with a c'.

Average thickness of the Chelsea is 20 ft. Thickness of the Tiawah is 24-24.4 ft thick.

Tawh Limestone (t, t'): Similar to the Verdigris Limestone in texture and thickness, usually a grayish orange pink (5Y7/2) to pale orange (10Y7/2), locally light brownish gray (5Y8/2) color, but may weather to a medium light gray (N6), grayish red (5R4/2), or orange (10Y8/4) color. Represented either by a single massive bed, or by a couple of 9"-12" thick, wavy, skeletal mudstone beds; top 3"-4" becoming a wavy laminated whole-fossil mudstone to wackestone, with large produced brachiopods and large crinoid stems. Chert pods, or silica replacement of limestone along bedding surfaces common. Thickness ranges from 20 to 40 ft, averages closer to 35 ft. Average thickness of the Tawh is 24-24.4 ft thick.

Upper Taft sandstone: Overall, light orange (10Y7/4), becoming dark yellowish orange (10Y8/2), to pale yellowish brown (5Y8/2), to pale yellowish orange (10Y8/6) color. Some massive bedded dolomites in lower part of the unit. Thickness ranges from 20 to 40 ft, averages closer to 35 ft. Average thickness of the Taft is 24-24.4 ft thick.

Upper Taft sandstone: Overall, light orange (10Y7/4), becoming dark yellowish orange (10Y8/2), to pale yellowish brown (5Y8/2), to pale yellowish orange (10Y8/6) color. Some massive bedded dolomites in lower part of the unit. Thickness ranges from 20 to 40 ft, averages closer to 35 ft. Average thickness of the Taft is 24-24.4 ft thick.

Chesapeake Shale: Rarely observed, black (N1) to grayish black (N2), 1"-2" thick coal seam, with a 2"-3" thick interclay immediately below.

White Oak Shale: Moderate yellowish gray (5Y7/2) to pale greenish yellow (10Y8/2) color, but can be a very pale orange (10Y8/2), or pale olive (5R4/2) color. Deeply weathered, moderately indurated, fine- to medium-bedded, fine-grained, slightly micaceous, siliceous sandstone. Bedding plane, medium, varying from 1"-16" thick, some tabular cross-bedding observed at the base of in some exposures. Thickness ranges from 2-4 ft thick.

Upper Taft sandstone: Overall, light orange (10Y7/4), becoming dark yellowish orange (10Y8/2), to pale yellowish brown (5Y8/2), to pale yellowish orange (10Y8/6) color. Some massive bedded dolomites in lower part of the unit. Thickness ranges from 20 to 40 ft, averages closer to 35 ft. Average thickness of the Taft is 24-24.4 ft thick.

Upper Taft sandstone: Overall, light orange (10Y7/4), becoming dark yellowish orange (10Y8/2), to pale yellowish brown (5Y8/2), to pale yellowish orange (10Y8/6) color. Some massive bedded dolomites in lower part of the unit. Thickness ranges from 20 to 40 ft, averages closer to 35 ft. Average thickness of the Taft is 24-24.4 ft thick.

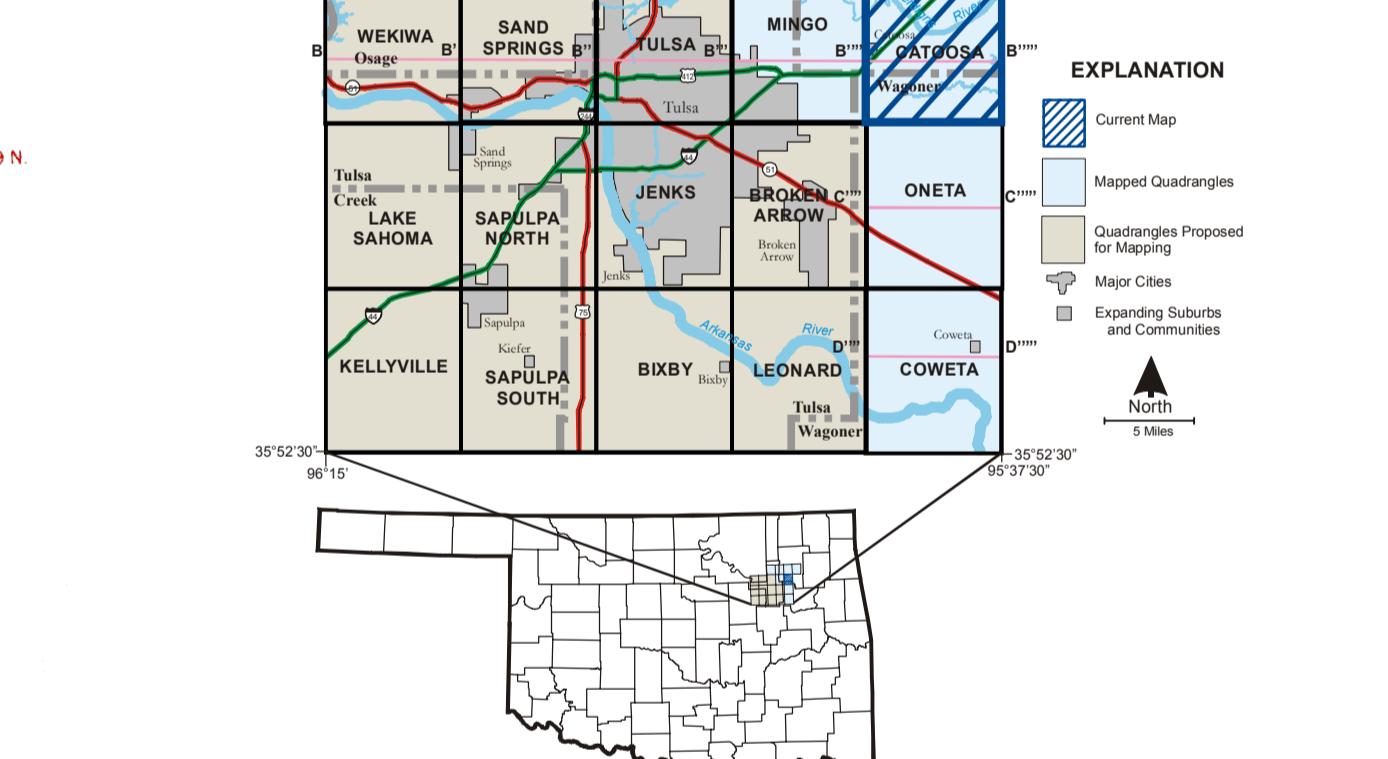
*Detailed descriptions only include map-scale units observed in the field. Formal member and bed names are indicated by capitalization (i.e., Chelsea Sandstone), while informal names are given in lowercase (i.e., Peru sandstone). Color of units based on fresh samples, unless stated otherwise.

**Base map compiled by the U.S. Geological Survey. Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1963. Projection from state plane coordinates to Universal Transverse Mercator (UTM) projection. 1927 North American datum. 10,000-foot grid ticks based on Oklahoma coordinate system. Geologic Map Credits

Geology by Thomas M. Stanley and Galen W. Miller, 2005-2006. Research supported by the Oklahoma Geological Survey, the University of Tulsa, and the University of Arkansas. Award Number OGQAG048. The views and conclusions contained herein do not necessarily reflect those of the Oklahoma Geological Survey, the University of Tulsa, or the University of Arkansas. This report does not necessarily represent the official position of either organization or of the U.S. Government. Cartography and layout prepared by G. Russell Standridge, 2006.

EXPLANATION

- [Blue Box] Current Map
- [Light Blue Box] Mapped Quadrangles
- [Light Green Box] Quadrangles Proposed
- [Yellow Box] Major Cities
- [Light Blue Box] Expanding Subsidiaries and Affiliates



GEOLOGIC MAP OF THE CATOOSA 7.5' QUADRANGLE, ROGERS AND WAGONER COUNTIES, OKLAHOMA

Thomas M. Stanley and Galen W. Miller

2006

