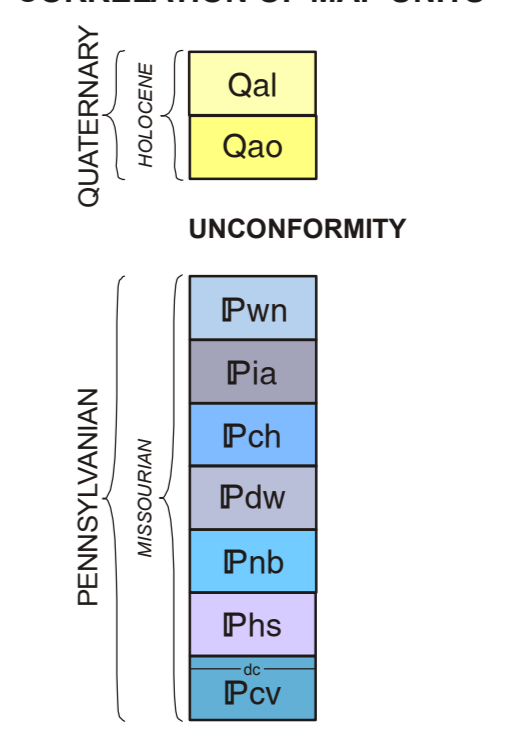
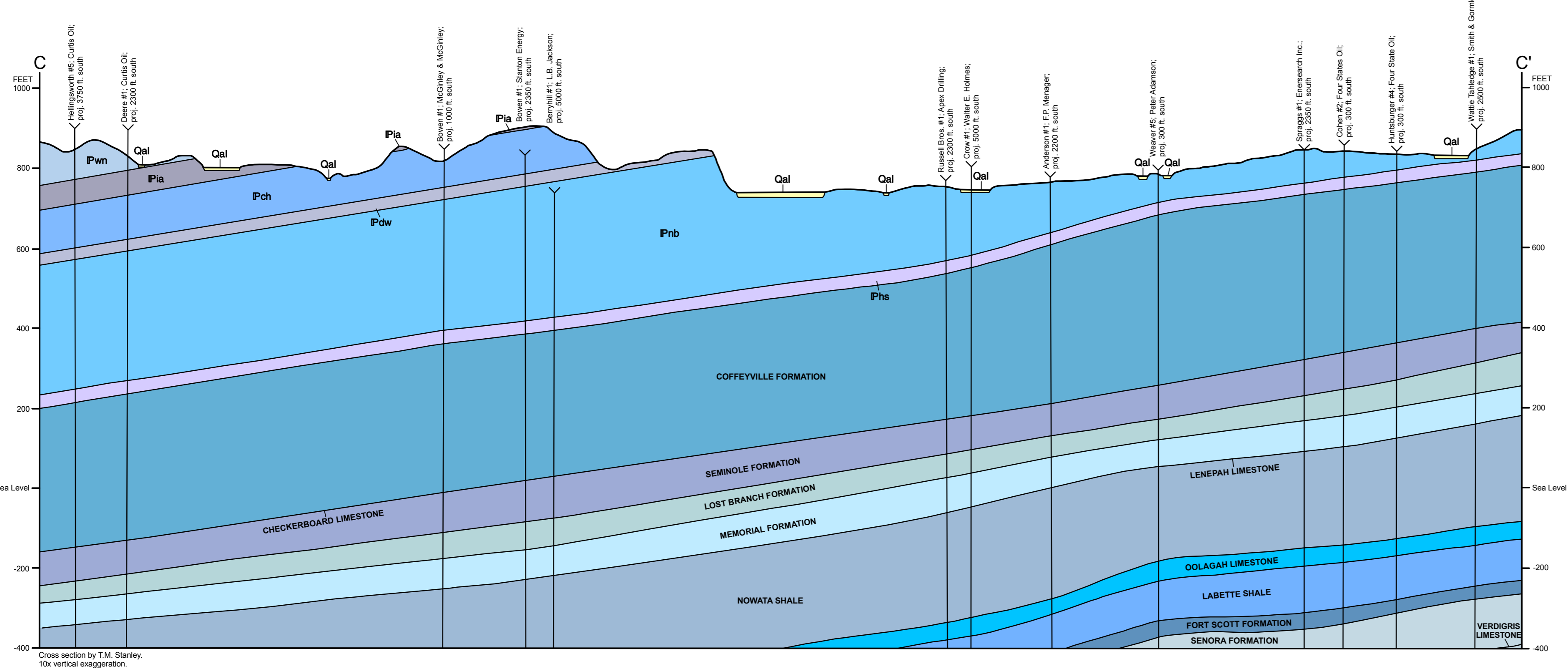
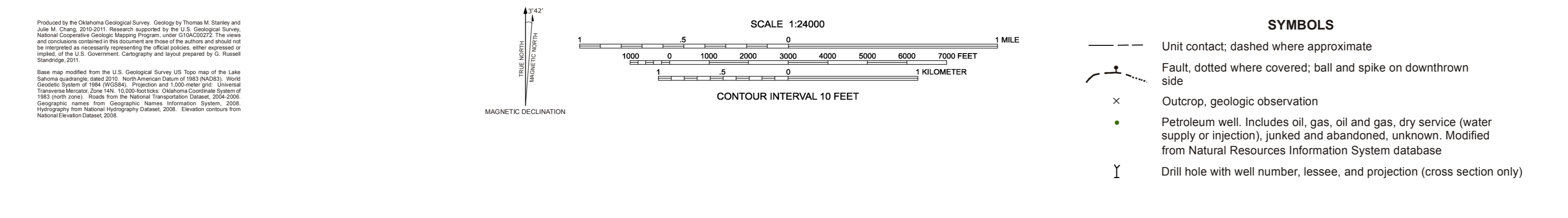


CORRELATION OF MAP UNITS

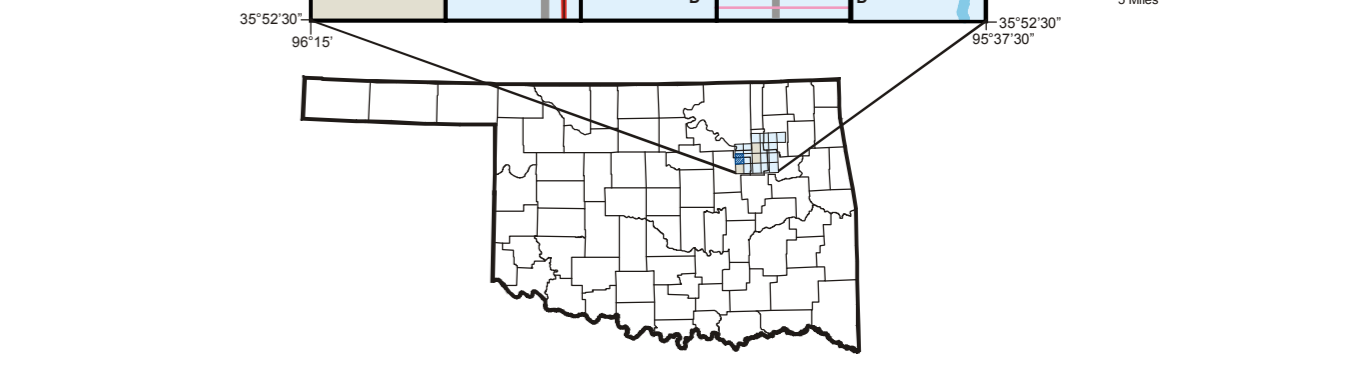


DESCRIPTION OF UNITS\*

- Qal** 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.
- Qao** OLDER ALLUVIUM (Holocene)—Mostly sand, with variable amounts of clay and silt-sized material, and little to no gravel-sized material; situated from 10 to 20 feet above modern flood plain terraces. Thickness at least 30 ft.
- Pwn** WANN FORMATION (Pennsylvanian, Missourian)—Consists of four predominant sandstone intervals, each separated by predominant shale intervals starting at the base of the formation. Sandstones, very pale orange (10YR8/2), pale yellowish orange (10YR8/2) to moderate orange pink (5YR8/4), grayish orange pink (5YR7/2), and yellowish gray (5Y7/2); sandstone intervals vary between 5 to 15 ft thick, consisting of weakly indurated to indurated, fine- to medium-grained, locally coarse-grained at base, calcareous to weakly siliceous, quartz-rich arenites; thin- to medium-planar bedding, locally cross-laminated at base of some intervals, with individual beds varying from 1.5' to 6' thick; clayshale partings and thin (< 5' thick) intervals occur locally near top of sandstone intervals; molds of *Linoproductid* brachiopods and fusulinids, horizontal burrows, tracks, and tool marks common in some sandstone beds in lower part of formation. The most prominent sandstone intervals are the Washington Living Sandstone, located about 50 ft above the base, and the Clear Creek Sandstone, which is usually located from 90 to 100 ft above the formation's base. Shale intervals vary from 5 ft to as much as 50 ft thick, with the thicker intervals occurring at the base and top of the formation; consists of yellowish gray (5Y7/2), dusky yellow (5Y6/4), and medium light gray (N6) hues in lower stratigraphic intervals, but grading upward into dark yellowish orange (10YR6/6) to moderate reddish brown (10R4/6) hues toward top; texturally, laminated to well-laminated, slightly silty to very silty clayshale and mudstone. Mudstone intervals more common in upper part of formation; very fine-grained sandstone and siltstone interbeds common in the upper part of each shale interval. Thin, calcareous carbonate mudstones occur near the base, and the Clear Creek Sandstone intervals. Exposed thickness of formation at least 150 ft, top not exposed.
- Pia** IOLA FORMATION (Pennsylvanian, Missourian)—Poorly exposed in quad. Consists of three members, which are, in descending order: 1) Avant Limestone; 2) Muncie Creek Shale; and 3) Paola Limestone. Total thickness of the formation varies from 25 to 63 ft, depending on the thickness of the middle clastic unit within the Avant Limestone. Avant Limestone: Consists of an upper and lower limestone, separated by and an intervening interbedded sandstone and shale interval. The Avant Limestone is typically medium gray (N5) to medium light gray (N6), medium- to locally thick-bedded, algal wackestone and carbonate mudstone; bedding is irregular and varies from 3' to as much as 4' in thickness; the upper Avant Limestone is the thicker of the two limestones and attains a thickness between 10' to 20'; the lower Avant Limestone is usually 3' thick or a little less. The intervening clastic interval is about 10' to 15' of fine-grained sandstone interbedded with slightly silty clayshale; shale is more common in the lower half of this interval. Muncie Creek Shale: Predominantly a medium gray (N5), well-laminated, slightly silty, calcareous, fossiliferous clayshale; basal 2' to 5' a dark gray (N3) to grayish black (N2), fissile, phosphatic clayshale; fossils mostly include chonetid brachiopods, ramose and fenestrate bryozoans, and crinoid debris. Thickness of the Muncie Creek about 25 ft. Paola Limestone: Usually a single bed of medium light gray (N6), sandy, skeletal wackestone to packstone; ooids and glauconite may occur locally. Thickness averages 1' or less.
- Pch** CHANUTE FORMATION (Pennsylvanian, Missourian)—Mostly a grayish orange (10YR7/4), grayish orange (5Y7/2), pale yellowish brown (10YR6/2), to medium light gray (N6), laminated to blocky bedded, weakly calcareous, very silty clayshale to mudshale; silt content and blocky nature of bedding increases toward top of formation. Locally, an 8' to 10' thick, indurated, laminated to thin-bedded, fine to very fine-grained sandstone, which may correlate with the Cottage Grove Sandstone, occurs near the top of the formation. The Thayer Coal also occurs within this unit, but was not observed in the field area. Total thickness of the formation varies from 50 to 70 ft thick.
- Pdw** DEWEY FORMATION (Pennsylvanian, Missourian)—Consists of two thin, slightly sandy limestone beds with an intervening shale and sandstone interval. Limestones are moderate red (5R4/6), moderate reddish brown (10R4/6), to dusky red (5R3/4), thin-bedded to locally laminated, sandy, fossiliferous packstone to rarely grainstone; if present, grainstone textures found only in upper-most limestone bed; fossils dominated by small bivalves, high-spired gastropods, and crinoid debris. Thickness of both limestone beds average 2 ft, although upper limestone may achieve thicknesses in excess of 3 ft. Intervening clastic interval mostly dark yellowish brown (10YR6/6) to moderate reddish brown (10R4/6), laminated, calcareous, fossiliferous clayshale, grading upward into very fine-grained, laminated sandstone and siltstone; large productid brachiopods common in shale interval. Thickness of the Dewey varies considerably in the map area, attaining a thickness of 40 ft in the north, but only 25 ft thick in the southern half of the quad.
- Pnb** NELLIE BLY FORMATION (Pennsylvanian, Missourian)—Consists mostly of clayshale and mudstone, interbedded with some prominent sandstones, none of which can be easily separated into mappable units. Sandstones vary from yellowish gray (5Y7/2), dusky yellow (5Y6/4), when most), pale yellowish orange (10YR8/6), grayish orange (10YR7/4), and pale greenish yellow (10Y8/2) when fresh; commonly dark yellowish orange (10YR6/6), although it may be moderate yellowish brown (10YR4/4) or light brown (5Y6/2) weathered; all exhibit moderate to well-sorted, fine- to medium-grained, fine- to very fine-grained, and non-calcareous, although some bedding surfaces may be calcareous due to the precipitation of calcite. Fe-oxide spots, trace fossils, laminations and cross-laminations, ripple marks, and tool marks are common along bedding surfaces; mud clasts and pitting from weathering of mudstone are sometimes observed; and soil weathering deformation is rare. Some prominent sandstones do occur locally; an unnamed, 8-10 ft thick interval of thin- to medium-bedded (bedding 1-3 ft thick), homogeneous sandstone occurs between 15 to 25 ft above the Hogshooter Formation. Another prominent sandstone, called the Shell Creek Sandstone, occurs between 75 to 125 ft above the base. Good exposures of the Shell Creek Sandstone indicate a wide variety of lithologic textures, ranging from a thick-bedded with thin clayshale to a thin-bedded sandstone interval with appreciably more clayshale content. Other sandstones of even more local significance vary from laminated to medium-bedded, with planar to wavy bedding contacts. Interbedded shales are a light olive gray (5Y5/2, 5Y4/1) and consist predominantly of slightly silty claystones to mudstones, although clayshale textural bedding is not uncommon; paleosol development and curved slickenside fractures common in mudstone and claystone lithologies. Ironstone concretions layers may be present within shales; concretions commonly moderate yellowish brown (10YR5/4) to moderate brown (5Y4/4) in color. Total thickness of formation 350 ft.
- Pphs** HOGSHOOTER FORMATION (Pennsylvanian, Missourian)—In the northern half of quad, formation composed of an upper, thin Winterset Member and a lower, thicker Lost City Member. The Lost City member pinches out in the southern half of the map area. Total thickness of formation varies from as much as 52 ft thick to as little as 2.5 ft thick, depending on the presence or absence of the Lost City Member. The Winterset Member is usually represented by a single bed (< 3' thick) of whole fossil packstone, with lesser amounts of wackestone and carbonate mudstone textures; thin (1'-3' thick) wavy bedding may be observed in the upper half of the member, locally. Fossils include abundant crinoid stems and ossicles, brachiopods, corals, bryozoans, corals, and algae. Packstone colors include light olive gray (5Y6/1), olive gray (5Y4/1), medium light gray (N6) and medium gray (N5). Weathered surfaces include dusky yellow (5Y6/4), moderate yellowish brown (10YR 5/4), and dark yellowish orange (10YR6/6). Carbonate mudstone is light olive gray (5Y6/2), dusky yellow (5Y6/4), or gray (10Y 5/4), dark yellowish orange (10YR6/6), and light brown (5Y7/2), is well-indurated, and contains few, if any, fossils; locally, carbonate mudstones may be slightly sandy or contain carbonaceous matter. Ironstone nodules are sometimes observed where internal bedding is present in the member. The Lost City Member consists of a medium gray (N6) to medium gray (N5) fresh, locally weathered to a light brown (5YR5/6) or moderate yellowish brown (10YR5/4) color along fractures and bedding planes, whole-fossil to locally skeletal wackestone or carbonate mudstone; bedding thin to thick, varying from 1' to as much as 3' thick; thinner bedding more common in the middle third of member, where bedding is commonly wavy and varies between 1' to 2.5' thick; the upper and lower third of member is typically medium to thick bedded, with bedding varying from 2 to 3' thick. Enclosed fossil assemblages are similar to that of the Winterset Member. Overall, member thickness is between 40 to 50 ft thick.
- Pcv** COFFEYVILLE FORMATION (Pennsylvanian, Missourian)—Exposed parts of the formation include a light olive gray (5Y6/1) to medium gray (N5), well-laminated to fissile, slightly silty clayshale and the Dadds Creek Member (the base of which is denoted by 'dc'). Texturally, the Dadds Creek in the Lake Sahoma quad is similar to that observed in the Sapulpa North quad to the east. Exposed thickness of the Coffeyville about 60 ft.



- CHECKERBOARD LIMESTONE** (Pennsylvanian, Missourian)—A dense skeletal to whole-fossil carbonate mudstone to wackestone; found only in the subsurface.
- SEMINOLE FORMATION** (Pennsylvanian, Missourian)—Formation consists of a lower sandstone interval called the Tulsa Sandstone and a basal and upper suite of interbedded laminated, concretionary, silty clayshales, mudshales and siltstones. The Tulsa coal also occurs within the uppermost shale interval, just above the top of the Tulsa Sandstone; found only in the subsurface.
- LOST BRANCH FORMATION** (Pennsylvanian, Desmoinesian)—Overall, a laminated, slightly calcareous, micaceous, silty clayshale, phosphatic clayshale, and thin limestone beds; found only in the subsurface.
- MEMORIAL FORMATION** (Pennsylvanian, Desmoinesian)—Interbedded sandstones and shales with a prominent coal bed (Broken Arrow coal) at top; found only in the subsurface.
- LENAPAH FORMATION** (Pennsylvanian, Desmoinesian)—A thin, skeletal to whole fossil wackestone to packstone textured limestone; found only in the subsurface.
- NOWATA FORMATION** (Pennsylvanian, Desmoinesian)—A blocky-bedded to weakly laminated, slightly silty, concretionary clayshale; found only in the subsurface.
- OOLOGAH FORMATION** (Pennsylvanian, Desmoinesian)—A thin- to medium-bedded, skeletal carbonate mudstone to wackestone; found only in the subsurface.
- LABETTE FORMATION** (Pennsylvanian, Desmoinesian)—A laminated, very silty to sandy, micaceous, concretionary clayshale, interbedded with fine-grained sandstones near top; found only in the subsurface.
- FORT SCOTT FORMATION** (Pennsylvanian, Desmoinesian)—Thin to medium, wavy bedded whole-fossil wackestones and mudstones, interbedded with fissile, phosphatic clayshale; found only in the subsurface.
- SENORA FORMATION** (Pennsylvanian, Desmoinesian)—Complex sequence of silty and concretionary clayshale, interbedded with very fine-grained sandstones, siltstones and coal. Unit includes the Tiawah Limestone bed. Formation found only in the subsurface.



**GEOLOGIC MAP OF THE LAKE SAHOMA 7.5' QUADRANGLE, CREEK AND TULSA COUNTIES, OKLAHOMA**  
Thomas M. Stanley and Julie M. Chang  
2011