



PRELIMINARY GEOLOGIC MAP OF THE TISHOMINGO 30'X 60' QUADRANGLE AND THE OKLAHOMA PART OF THE SHERMAN 30'X 60' QUADRANGLE, ATOKA, BRYAN, CARTER, CHOCTAW, COAL, JOHNSTON, LOVE, MARSHALL, MURRAY, AND PONTOTOC COUNTIES, OKLAHOMA
Compiled by Julie M. Chang and Thomas M. Stanley
2013

CORRELATION OF UNITS

ARBUCKLE MOUNTAINS & COASTAL PLAIN PROVINCE

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Qig	Qig

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Kef	Kef
Kwd	Kwd

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DESCRIPTION OF UNITS

- ARTIFICIAL FILL**—Natural or artificial talus, slumps, and talings covering formerly exposed areas around active and inactive quarries. Formerly called the Cherry Shale formation consists of silicified black claystone, 4 meters thick, with large sepiarian concretions, small phosphate nodules, and plant material.
- ALLUVIUM**—Unconsolidated sand, silt, clay, and gravel in stream and river channels, mostly between and above modern flood plains.
- OLDER ALLUVIUM**—Unconsolidated sand, silt, clay, and gravel in stream and river channels, mostly between and above modern flood plains. The Sycamore Limestone overlies the Woodford Shale and is a bluish gray to tan colored, silty carbonate mudstone. Thickness is between 4 and 10 meters.
- DUNE SAND**—Unconsolidated windblown sand formed into definite dune structures and ridges.
- TERRACE SAND**—Mostly unconsolidated sand, silt, and clay, with little to no gravel-sized material. Laid down at several levels along former courses of present-day rivers and streams.
- TERRACE GRAVEL**—Unconsolidated gravel, sand, silt, and clay laid down at several levels along former courses of present-day rivers and streams.
- EAGLE FORD FORMATION**—Blue-gray, yellow-weathering silty, thin-bedded, flaggy limestone interbedded with thin beds of blue calcareous siltstone and blue silty shale. Exposed thickness in quadrangle is about 8 meters.
- WOODBINE FORMATION**—Brown to tan, fine- to coarse-grained, conglomeratic, ferruginous, moderately to weakly indurated, cross-bedded sandstone interbedded with gray shale and lignite. Subdivided in descending order into the Templeton Member (Kef), which consists of shale and weakly indurated sandstone, the Red Branch Member (Kwd), which consists of indurated sandstone, shale, and lignite, and the basal Dexter Member (Kwd), which consists of weakly to moderately indurated sandstone, shale, and lignite. The Templeton and Red Branch Members are each 20-30 meters thick, and the Dexter Member is ~30 meters thick. Thickness is about 100 meters.
- GRAYSON MARLSTONE & BENNINGTON LIMESTONE**—Differentiated. The Grayson Member is a gray to light greenish gray mudstone with interbeds of gray to white nodular limestone. It contains thin bedded light gray argillaceous limestone and thin layers of olive-gray calcareous clay. The marlstone contains abundant oyster fossils. Thickness is about 7.5 meters. The Bennington Limestone is a blue-gray to yellow-green, moderately indurated, massive limestone. The Bennington is fossiliferous and is locally arenaceous. The unit commonly weathers pitted and honeycombed. Thickness is about 3 meters. The Grayson and Bennington may be thinner or absent in some areas due to pre-Woodbine erosion.
- BOCHITO FORMATION**—Mostly clay and claystone, with some tan-colored limestone and fine-grained sandstone. Subdivided in descending order into the Pawnee Clay at top, the Quarry Limestone, the Wino Clay and the Denton Clay at base. Only the lower 60 meters exposed in quadrangle.
- CADDO FORMATION**—Light gray, silty limestone and marl interbedded with blue-gray, silty claystone or mudstone. Formally subdivided into the Fort Worth Limestone at top and the Duck Creek Limestone at base, with an unnamed shale in between. Fossil Cyprina common in limestones. Thickness about 46 meters.
- KIAMOCHI FORMATION**—Dark gray, calcareous clayshales and claystones, interbedded with local occurrences of nodular limestone and fine-grained, calcareous sandstone. Limestones are very fossiliferous. Thickness is 8 to 10 meters.
- GOOGLAND LIMESTONE AND WALNUT CLAY**—Upper 10 meters composed of the Goodland Limestone, a medium to light gray, dense, nodular limestone with thin, dark gray claystone partings. The Walnut Clay makes up the lower 1 meter of interval and consists of an olive-brown, calcareous claystone. The Walnut Clay is poorly exposed. Thickness 8 to 9 meters.
- ANILERS SANDSTONE**—White to light brownish yellow, medium-grained, poorly indurated sandstone. Red to maroon, argillaceous conglomerates occur locally. Thickness ranges from 60 to 215 meters.
- STILLWATER FORMATION**—Predominantly a reddish-brown concretionary mudstone with local interbeds of reddish-orange, fine- to medium-grained, micaceous channel sandstones, dolomite, and siltstone-pebble conglomerates are common at the base of sandstone intervals. Base of formation is mapped at the base of the Hot Limestone. Grades laterally into the Stratford Formation near the Arbuckle Mountains. Total thickness varies from 60 to 425 meters.
- VANOSS FORMATION**—Consists mainly of reddish-brown mudstone and mudstone and recrystallized limestones. Vanoss is intercalated with calcareous and noncalcareous, argillaceous sandstones and limestone-clay conglomerates set within an arkosic sandstone matrix belonging to the Stratford Formation near the Arbuckle Mountains. Only the uppermost 2 to 7 meters is exposed in quadrangle.
- STRATFORD FORMATION**—The formation consists predominantly of indurated, well-sorted, medium-grained, calcareous and noncalcareous, calcareous arkosic and arkosic conglomerates, along with local occurrences of limestone and shale. West of Stratford, it forms an apron around the northwestern and west sides of the Arbuckle Mountains. Stratford is genetically similar to the Post Oak Formation of the Wichita Mountains. Surface thickness ranges from 0 to as much as 40 meters; however, in the subsurface, the formation probably extends well into older Pennsylvanian and Permian rocks occurring at depths of 275 meters.
- HOKBAR FORMATION**—Consists of thick intervals of gray to tan-colored, calcareous claystone, thin to medium gray limestone, fine- to medium-grained sandstone beds. Base of unit is mapped at the base of the Confederate Limestone. Thickness is about 850 meters.
- DEESE GROUP**—A thick sequence of interbedded reddish-brown to gray mud-shales and mudstones, yellow to yellow-brown, fine- to coarse-grained sandstones, chert conglomerates, and thin, fossiliferous limestone beds. IPth = Nasty Limestone bed. Total thickness is about 2300 meters.
- BOGGY FORMATION**—Primarily consists of shale and sandstone, with some thin limestone and coal beds. Shales are bluish, fissile, claystones containing ironstone concretions and interbedded with thin, wavy sandstone partings and shaly sandstone. Sandstones are fine-grained, generally brownish or gray, and ferruginous. Members include Bluejacket Sandstone at base, Bluejacket coal, Iron Limestone, and Tuff Sandstone at the top. Thickness ranges from 380 to 850 meters.
- SAVANNA FORMATION**—Brown to grayish-brown sandstone and shale with several thin coal seams near middle. Sandstone is fine-grained and cherty. Thickness ranges from 340 to 460 meters.
- MOLESTER FORMATION**—Gray to dark gray shale interbedded with fine-grained buff sandstones and some prominent coal beds. Total thickness ranges from 300 to 740 meters.
- HARTSHORE FORMATION**—Gray to white, medium- to coarse-grained sandstone with interbedded gray shale and coal. Thickness ranges from 3 to 90 meters.
- MORROWAN-ATOKAN ROCKS, UNDIFFERENTIATED**—Gray to brown, fine- to coarse-grained shale and sandstone. Thickness ranges from 1,525 to 2,745 meters.
- DORNIC HILLS GROUP**—Dark-colored shales and thin limestones. Mapped in the Ardmore Basin area.
- ATOKA & WAPAWANCA FORMATIONS, UNDIFFERENTIATED**—The Atoka Formation (IPat) consists of sandstone and dark-colored, siltstone-bearing shale. The Wapawanca Formation (IPw) consists of a partly concretionary, interbedded shale and silty sandstone, and silty sandstone. The Atoka and Wapawanca Formations are mapped together with the Mill Creek Syncline.
- JOHNS VALLEY FORMATION**—Dark gray shale with boulder conglomerate. Thickness ranges from 130 to 275 meters.
- JACKFORD SANDSTONE**—Gray, white, and tan, coarse-grained and cherty sandstone with boulders up to 2 meters in diameter. Thickness ranges from 30 to 150 meters.
- SPRINGER GROUP**—Medium to dark gray, fissile, slightly silty, locally calcareous claystone interbedded with two to three fine- to medium-grained, argillaceous sandstones. Includes the Goodland Shale at base. The Goodland Shale is a medium- to light-gray, noncalcareous, fissile claystone. Thickness is 140 meters. In the Black Knob Ridge area, the Springer consists of silicified black shale containing sepiarian concretions and small phosphatic nodules. The presence of cephalopods distinguishes the formation from the underlying Delaware Creek Shale.
- STANLEY SHALE**—The lower beds of the Stanley Shale are green to buff siltstones and shales. Some of the siltstones contain chert and siliceous cement. Green to greenish gray shales are present above the lower beds and alternate with siltstones up to 30 meters thick. Blue-gray to black siliceous shales occur throughout the formation and range from 4.5 to 23 meters thick. A red and green claystone, 4.5 meters thick, occurs in the upper part of the formation. Cone-in-cone structure is common. Conodonts, spores, sponge spicules, and plant material are also present. Thickness is 300 meters.
- DELAWARE CREEK SHALE**—Dark gray to black, fissile, calcareous claystone containing large sepiarian concretions. Formerly called the Cherry Shale. Thickness ranges from 50 to 230 meters. In the Black Knob Ridge area, the formation consists of silicified black claystone, 4 meters thick, with large sepiarian concretions, small phosphate nodules, and plant material.
- SYCAMORE LIMESTONE & WOODFORD SHALE**—The Woodford Shale is a dark gray to black, fissile, siliceous claystone and bedded argill. The Sycamore Limestone overlies the Woodford Shale and is a bluish gray to tan colored, silty carbonate mudstone. Thickness is between 4 and 10 meters.
- ARKANSAS NOVACULITE**—The Arkansas Novaculite is divided into 4 members. The lowest member makes up about half of the formation and is composed of thick-bedded, spongy novaculite interbedded with hard green shale. No fossils are found in this member. The second member constitutes half of the upper part of the formation and contains light gray to black novaculite with variable thickness intercalated with partings and beds of black paper shale. The third member makes up about a fourth of the formation and consists of red and green, micaceous shale intercalated with thin beds of novaculite and black, black shale. The upper member also makes up about a fourth of the formation and consists of 2.5 to 30 cm thick beds of green, brown, and gray novaculite. Conodonts, radiolarians, spores, brachiopods, and alveolifer sponges are common in the upper half of the formation. Total thickness ranges from 70 to 105 meters.
- HUNTON GROUP**—Light gray, fossiliferous, carbonate mudstone to graystones, yellow to buff colored carbonate limestones, and thin intervals of dark gray, fissile claystone. Consists of the Henry, Box 2, and Hunton Formations (Dev.), the Henryhouse, Clara, and Cochran Formations (Sil.), and the Keel Formation (Ord.). Thickness is about 90 meters.
- MISSOURI MOUNTAIN SHALE**—The Missouri Mountain Shale consists primarily of green claystone intercalated with siliceous shale, laminated chert, sandy shale, sandstone, and lenses of hard lenses of well-indurated conglomerate. In some areas, the shale is variegated red and green. Dendritic manganese oxide is common. The conglomerates contain coarse grained and pebbles up to 2.5 cm in diameter of indurated green and black shale clasts and chert with a yellow, siliceous matrix. Fossils in the Missouri Mountain Shale include conodonts, sponge spicules, brachiopods, and bryozoans.
- SYLVAN SHALE & VIOLA GROUP**—The Sylvan Shale is a yellow to dark greenish gray, silty claystone, minor interbeds of fine-grained sandstone and siltstone may occur in the upper part of the shale. The Viola Group is a light gray to yellowish, silty limestone, interbedded with thin bedded sandstone in texture called the Welles Limestone, and a lower, interbedded, cherty limestone called the Viola Limestone. The Viola Group is a light gray to yellowish, silty limestone, interbedded with thin bedded sandstone in texture called the Welles Limestone, and a lower, interbedded, cherty limestone called the Viola Limestone. Total thickness ranges from 125 to 375 meters.
- POK CREEK SHALE**—The Pok Creek Shale consists of hard, black, paper shale in the lower part, grading upward to soft, brown, gray shale with yellow clay pellets. In one location, the Pok Creek Shale is brown with chert nodules. Graptolites are common. The formation varies in thickness from 0 to 2 meters.
- BIGFOK CHERT**—The lower part of the Bigfork Chert is 125 to 155 meters thick, consisting of light gray to light brown chert intercalated with gray limestone beds, shingles, and lenses. Chert primarily occurs in even-bedded layers 5 to 15 cm thick and can be up to 30 cm thick, but also occurs as nodules flattened parallel with bedding. The limestone is finely crystalline and siliceous. The upper part of the Bigfork Chert is 30 to 58 meters thick and consists of very dark brown to dull chert intercalated with black paper shale. The Bigfork Chert contains graptolites, conodonts, chitons, sponges, radiolarians, penicillariae, brachiopods, and bryozoans. The total thickness of the unit is about 175 meters.
- BROMIDE, TULIP CREEK, & MCLISH FORMATIONS**—The Bromide Formation is predominantly a tan to yellowish-gray, very fossiliferous, white fossil, carbonate mudstone to sandstone, with occasional gray claystone and very fine-grained sandstone interbeds. Classic material is more common in the upper half of the unit. The Tulip Creek Formation consists of a red, reddish-brown, weakly indurated, medium-grained sandstone, and an upper, olive-green, mudstone to claystone with thin interbeds of limestone. The Mclish Formation is similar to the Tulip Creek Formation, with a lower light gray, fine-grained sandstone and an upper greenish-gray claystone with limestone interbeds. Thickness of total interval ranges from 230 to 425 meters.
- WOMBLE SHALE**—The lower part of the Womble Shale consists of brown to green claystone with thin lenses of sandstone. It is at least 50 meters thick, but the base is a fault contact with younger units. As such, the total thickness cannot be determined. The upper part of the Womble Shale consists of 25 to 30 meters of brown to black, cherty shale containing well-sorted quartz sand grains. The formation is fossiliferous, containing mostly graptolites but also conodonts, chitons, sponges, radiolarians, and penicillariae. brachiopods. The total thickness of the Womble Shale is 75 to 80 meters, with the base also present. Estimated thickness is 300 meters or more.
- OIL CREEK & JOHNS FORMATIONS**—The Oil Creek Formation consists of a lower white to very light gray, fissile to weakly indurated, featureless, fine- to medium-grained sandstone, and an upper interbedded olive-green claystone and thin-bedded, fossiliferous limestone. The Johns Formation consists of alternating light to medium gray, thin-bedded and sandstone, and thin-bedded intervals of greenish-gray to dark gray claystone. Interval thickness varies from 160 to 300 meters.
- WEST SPRING CREEK & KIRKLAND FORMATIONS UNDIFFERENTIATED**—The West Spring Creek Formation (IPw) is a medium gray carbonate mudstone and limestone, and an upper greenish-gray claystone with limestone interbeds. Interval thickness ranges between 570 and 915 meters.
- COOL CREEK & MCKENZIE HILL FORMATIONS**—The Cool Creek Formation is a variable mixture of medium gray carbonate mudstones, intercalated limestones, argillaceous sandstones, oolitic limestones, and pure quartz sandstones. A prominent quartz sandstone called the Thatcher Creek Member occurs at the base of the unit. The McKenzie Hill Formation is an interbedded medium gray carbonate mudstone and intralaminar limestone, chert beds and nodules are common in the upper half, and minor amounts of glauconite occur in the lower half of the formation. The basal contact with older formations is ambiguous at best. Total interval thickness varies between 450 and 700 meters.
- BUTTERLY DOLMITE, SIGNAL MOUNTAIN FORMATION, & FORT SILL LIMESTONE**—The Butterly Dolomite is a tan to pink colored, usually fine-crystalline dolomite. It becomes coarsely crystalline to the eastern part of the quadrangle. The Signal Mountain Formation is dark gray, dolomite bedded at the base but becomes thicker bedded toward the top. It is highly fossiliferous and composed of interbedded carbonate mudstones, sandstones, graystones, and intercalated limestones. The Fort Sill Formation is a light gray, thick-bedded to massive carbonate mudstone, thin-bedded claystone, siltstones are common in the middle third of the formation, while argillaceous sandstones are common in the upper third. A conspicuously coarsely crystalline dolomite interval (the Bally Dolomite) locally occurs near the top of the Fort Sill Limestone. Total interval thickness ranges from 175 to 400 meters.
- TIMBERED HILLS GROUP**—The Timbered Hills Group consists of the Henry Creek Formation, a medium gray, cross-bedded, skeletal sandstone and the basal Reagan Sandstone, a tan to brown, coarse-grained, cross-bedded, glauconitic sandstone. Group thickness varies from 45 to 113 meters.
- TISHOMINGO GRANITE**—Coarse-grained granite containing large pink phenocrysts of perthite, microcline, quartz, and biotite. Accessory minerals include plagioclase, and clear quartz. mafic minerals include biotite and rare hornblende. Accessory minerals include ilmenite, zircon, apatite, and magnetite. The granite has a chilled western margin where in contact with the Troy Granite and Burch Granodiorite. A contact of the red neck of the Blue River Gneiss and cuts the Blue River Gneiss on its eastern margin. The Tishomingo has a 1003 ± Ma U/Pb zircon age.
- TRIOY GRANITE**—Fine to medium-grained, equigranular granite containing perthitic microcline, plagioclase, quartz, biotite, and rare hornblende. Accessory minerals include ilmenite, zircon, apatite, and magnetite. The TrioY Granite intrudes the Burch Granodiorite and has a 1368 ± 3 Ma U/Pb zircon age. The estimated thickness of the Tishomingo and TrioY Granites is 16 kilometers.
- BURCH GRANODIORITE**—Medium-grained, gray, equigranular granodiorite containing plagioclase, K-feldspar, quartz, hornblende, and biotite. Accessory minerals include ilmenite, zircon, apatite, and magnetite. The composition can range from granodiorite to quartz monzonite and tonalite. The Burch Granodiorite has a 1359 ± 7 Ma U/Pb zircon age.
- BLUE RIVER GNEISS**—Includes a medium-grained granitic gneiss, a granodioritic to quartz dioritic gneiss, and a fine-grained granitic gneiss. The Blue River Gneiss has a 1381 ± 10 Ma U/Pb zircon age. The Precambrian units are cut by a variety of dikes, including diabase, amphibolite, pegmatite, apatite, and rhyolite.