SUBCROP GEOLOGIC MAP (CRETACEOUS/TERTIARY)
JACKSON PURCHASE REGION, WESTERN KY
USGS STATEMAP Deliverable
Series XII, 2009
Version 1.0
Contract Report 34

DESCRIPTION OF MAPPED UNITS—Adapted from Martin (2004) and Martin and others (2007).

TERTIARY

Tj — JACKSON FORMATION—Sand, silt, clay, and clay. Sand, fine- to coarse-grained, poorly to well-sorted, angular to well-rounded quartz; silty, clayey, cherty, micaceous, contains heavy minerals; also contains granules and pebbles of quartz and subangular to subrounded pebbles and cobbles of clay; very thin- to thick-bedded and sometimes poorly bedded or massive, commonly crossbedded; unconsolidated, but locally cemented with iron oxide. Silt, fine- to medium-grained, consists of angular to subrounded quartz grains, clayey, sandy, micaceous, and carbonaceous; laminated to thin-bedded to massive, and commonly interbedded with sand or clay. Clay, silty and sandy, slightly lignitic, composed dominantly of kaolinite, with some illite, montmorillonite, and mixed-layer clay; thin- to thick-bedded, thinly laminated in places; contains leaf imprints, and locally contains fragments of lignitized wood; occurs as very thin to thick beds and lenses. Distribution of Jackson age sediments is irregular and thickness is variable. The distribution pattern suggests an irregular erosional surface between rocks of Claiborne and Jackson age.

Tc — CLAIBORNE FORMATION—Sand, silt, and clay. Sand, silty and clayey, fine-to medium-grained, commonly very coarse and granular near contact with underlying unit, well to poorly-sorted, angular to subrounded quartz, chert, glauconite minerals, and rare small fragments of red-like kaolinite crystals; crossbedded at places; local indurated zones cemented by iron oxide or secondary silica near lower contact; disseminated angular to well-rounded clay pebbles and cobbles at some horizons, and lenses of clay breccia and clay gravel in sand near base of unit. Silt, variably sandy and clayey, laminated, thin-to massive-bedded; commonly interbedded with sand and clay; locally micaceous. Clay, variably sandy and silty, kaolinitic, carbonaceous, and rarely lignitic; thin to thick-bedded; occurs in laminae, thin beds, and beds and lenses several feet thick, commonly interbedded with silt and sand. Marked erosional unconformity at base.

Tw — WILCOX FORMATION—Sand, clay, and silt. Sand, silty and clayey, very fine- to very coarse-grained, well- to poorly-sorted, angular to well-rounded quartz, chert, and sparse heavy minerals; also contains angular to well-rounded grains, pebbles, and boulders of silty clay derived from nearby slightly older clay bodies; thin- to thick-bedded, locally crossbedded, and cemented by iron oxide or secondary silica to form indurated layers; commonly argillaceous, locally micaceous and carbonaceous. A distinctive lithology in this unit is a "sawdust sand", which occurs as discontinuous lenses and is composed of quartz, clay, and chert grains, and sparse to moderately abundant kaolinite crystals. Clay, silty and sandy, massive to thin-bedded; carbonaceous, rarely lignitic, pyritic, and micaceous; occurs as lenses interbedded with sand and silt. Silt, clayey and sandy, commonly thinly laminated and thin to thick-bedded, and intergrades with clay; micaceous, and carbonaceous.

Tp — PORTERS CREEK CLAY—Clay and sand. Clay, sandy and silty, micaceous, glauconitic in lower part of unit, sparse iron-sulfide nodules and grains, and carbonized and pyritized wood; consists of quartz and clay minerals (calcium montmorillonite, illite, kaolinite, clinoptilolite, and gypsum). Sand, clayey, very fine- to medium-grained, quartz, sparse dark minerals, and rare fragments of lignitized plant material; micaceous, glauconitic in lower part of unit, argillaceous; occurs as thin beds in lower part and is dominant in upper part. Clastic dikes occur locally.

CRETACEOUS AND TERTIARY

TKcm — CLAYTON AND McNAIRY FORMATIONS—The Clayton and McNairy Formations are combined for mapping purposes because of the general concealment of the contact and because of lithologic similarities of the formations. The Clayton Formation is poorly to moderately consolidated, poorly exposed, and consists of sand, clay and silt. The disconformity at the base of the Clayton Formation is widespread in the Mississippian Embayment. The McNairy Formation is poorly to moderately consolidated and poorly exposed, and consists of sand, clay, and gravel. An erosional unconformity occurs at the base of the McNairy Formation. Clastic dikes occur locally.

CLAYTON FORMATION— Sand, clay, and silt, interbedded. Sand, variably clayey and silty, very fine-to medium-grained, well sorted, quartz and dark heavy minerals; micaceous, glauconitic, and carbonaceous; locally, tightly cemented by ferruginous material. Clay, silty and sandy, contains blebs of fine angular micaceous quartz sand; lignitic, and glauconitic; thinly laminated to thin-bedded and occurs as lenses. Silt, clayey, well-sorted, very fine-grained, quartz and dark heavy minerals; micaceous and locally carbonaceous.

CRETACEOUS

Km — McNAIRY FORMATION—Sand, clay, and gravel. Sand, silty and clayey, fine to medium-grained, well-sorted, quartz and sparse dark heavy minerals; contains irregular patches of chert pebbles and granules near base, and clay blebs and streaks; locally micaceous; thin- to thick-bedded, and locally well-cemented with iron oxide. Clay, variably silty, micaceous; occurs as laminae, seams, thin layers, lenses, and irregular masses. Gravel, well-rounded to subrounded chert pebbles in quartz sand matrix; occurs in thin, scattered lenses near base of section.

Kt — TUSCALOOSA FORMATION—Gravel, sand, silt, and clay. Gravel, subangular to well-rounded, poorly sorted, pebbles, cobbles, and rare boulders of chert; chert sand, silt, and clay present as interstitial matrix; chert commonly tripolitic; bedding rare or crudely crossbedding, and locally cemented with iron oxide or silica; local thin lenses of chert sand and clayey silt. Sand, silty and clayey, very fine- to very coarse-grained, dominantly chert. Silt, commonly indurated, clayey, and sandy. Clay, slightly sandy, siliceous. Formation rests unconformably on rocks of Mississippian and Devonian age.

PENNSYLVANIAN

Pca — CASEYVILLE FORMATION—Siltstone, sandstone, and shale; interbedded and in part lenticular. Siltstone, thin-bedded, micaceous, locally argillaceous; locally contains thin interbeds of silty shale. Sandstone, quartzose, micaceous, fine- to coarse-grained, thin- to thick-bedded, locally crossbedded, graded bedded and ripple-marked; subrounded to rounded chert and quartz granules and pebbles locally abundant and generally concentrated in lower parts of beds. Beds locally contain clay pellets, interstitial clay, and coal near the base; ferruginous concretions locally abundant; plant casts and molds locally present. Shale, variably silty or sandy; locally carbonaceous and contains small siderite nodules.

MISSISSIPPIAN

Mu — MISSISSIPPIAN ROCKS, UNDIFFERENTIATED—Unit equivalent to unnamed or unknown Mississippian rocks below main channel of Tennessee River (Kentucky Lake area) or Ohio River.

Mch — CHESTERIAN SERIES UNITS, UNDIFFERENTIATED— Unit equivalent to unnamed or unknown Upper Mississippian rocks (Chesterian Series) below main channel of Ohio River, mapped locally in Little Cypress quadrangle.

Mkc — KINKAID LIMESTONE, DEGONIA SANDSTONE, CLORE LIMESTONE—Combined unit mapped in isolated fault segments in Little Cypress quadrangle (See descriptions below).

KINKAID LIMESTONE—Limestone, shale, sandstone, and siltstone, interbedded. Limestone, thin- to thick-bedded, micrograined limestone and coarse- to medium-crystalline calcarenite, locally argillaceous or sandy, fossiliferous, dolomitic, and contains local chert nodules and shale partings. Shale, variably silty and sandy, calcareous, fossiliferous, and contains siderite concretions. Sandstone, fine-grained, well-sorted, locally calcareous and argillaceous; contains abundant shale partings and clay pebbles; irregular bedding planes and locally crossbedded. Siltstone, thin- to medium-bedded; argillaceous and locally very fine-grained sandstone.

DEGONIA SANDSTONE—Siltstone, shale, sandstone, and chert, interbedded. Siltstone, micaceous and locally calcareous, thin- to medium-bedded, locally grades into fine-grained sandstone, and overlies thick-bedded chert; dolomitic and siliceous. Shale, variably silty and sandy, and slightly calcareous near base of unit. Sandstone, fine-grained, medium- to thick-bedded, and argillaceous. Chert, medium- to thick-bedded; bedding planes undulate and are ripple marked.

CLORE LIMESTONE—Limestone, shale, sandstone, and siltstone, interbedded. Limestone, dense to finely crystalline, thin- to medium-bedded, some beds dolomitic, many beds argillaceous, scattered chert nodules, some beds very fossiliferous. Thin beds of sandy and silty shale and dolomitic limestone in upper part of unit. Shale, silty, commonly calcareous, fossiliferous, locally pyritic; interbeds of limestone common. Sandstone, fine-grained, medium-bedded, slightly calcareous and micaceous; crossbedding common. Siltstone, shaly, thin-bedded; calcareous cement.

Mpt — PALESTINE SANDSTONE—Sandstone, shale and siltstone. Sandstone, variably silty and shaly, fine-grained, medium- to thick-bedded, few thin beds, thinly crossbedded, ripple marks common, scattered clay pellets; micaceous, slightly calcareous. Shale, variable silty and sandy; scattered siltstone lenses and beds common, and scattered lenses of fine-grained sandstone; slightly calcareous, carbonaceous. Siltstone, variably shaley and sandy, thin-bedded, beds commonly lenticular, bedding planes commonly irregular. Mapped locally in Little Cypress quadrangle.

Mme — MENARD LIMESTONE—Limestone and shale, interbedded. Limestone, variably silty or sandy, dense to finely crystalline, thin- to thick-bedded; few dolomitic beds, locally siliceous, argillaceous, fossiliferous; chert nodules and beds. Shale, variably silty, fissile, commonly calcareous, fossiliferous; contains interbedded dolomite and limestone. Mapped locally in Little Cypress quadrangle.

Mwv — WALTERSBURG SANDSTONE AND VIENNA SANDSTONE—Mapped locally in Little Cypress quadrangle. (See descriptions below).

WALTERSBURG SANDSTONE—Sandstone, shale, and siltstone, interbedded. Sandstone, fine-grained, thin- to thick-bedded, some beds separated by thin shale laminae; crossbedded. Shale, variably sandy and silty, fissile, calcareous, fossiliferous, contains siderite nodules. Siltstone, thin- to medium bedded, even bedded; argillaceous; contains abundant interstitial chlorite, noncalcareous.

VIENNA SANDSTONE—Limestone, shale, and chert; interbedded. Limestone, dense to finely crystalline, shaly, locally siliceous and dolomitic, fossiliferous, scattered chert nodules, lenses, and beds. Shale, fissile, fossiliferous, calcareous; occurs as interbeds and laminae. Chert, as lenses and beds interlayered with limestone.

Mts — TAR SPRINGS SANDSTONE—Sandstone, shale, and siltstone, interbedded. Sandstone, generally quartzose, locally argillaceous, fine-grained, thin- to thick-bedded, ripple-marked and crossbedded; some lenticular beds; many shaly partings; locally carbonaceous; contains a few flattened clay pebbles; fossiliferous. Shale, fissile, silty, slightly calcareous, carbonaceous, fossiliferous; contains laminae and thin beds of sandstone and siltstone, and locally includes nodules and layers of siderite. Siltstone, thin-bedded, micaceous, slightly carbonaceous; some lenticular beds. Mapped locally in Little Cypress quadrangle.

Mgd — GLEN DEAN LIMESTONE—Limestone, shale, and sandstone. Limestone, fine- to coarse-grained, medium- to thick-bedded, rarely thin-bedded; thicker beds commonly separated by thin shaly partings, and a few thin beds of sandstone; fossiliferous, argillaceous, locally siliceous, slightly dolomitic. Shale, commonly calcareous; present as thin interbeds and laminae. Sandstone, fine- grained, slightly calcareous; some disseminated pyrite. Mapped locally in Little Cypress quadrangle.

Mh — HARDINSBURG SANDSTONE—Sandstone, shale, siltstone, and coal, interbedded. Sandstone, quartzose, silty, variably micaceous, locally calcareous, fine-grained, thin- to thick-bedded; ripple marks and crossbedding common; few clay pellets; shaly partings and laminae; some interstitial dolomite cement. Shale, silty and sandy, locally carbonaceous; shaly coal underlain by underclay; abundant plant impressions; thin laminae of shale common in sandstone and siltstone. Siltstone, thin-bedded, even-bedded, micaceous, argillaceous, rarely carbonaceous. Coal bed near base of unit, underclay with scattered carbonaceous material is overlain by shaly coal with abundant leaf impressions. Mapped in isolated fault segments in Little Cypress quadrangle.

Msg — STE. GENEVIEVE LIMESTONE—Limestone, sandstone, shale, and siltstone, interbedded. Limestone, variably sandy and slightly argillaceous, finely to coarsely crystalline; some beds are dolomitic; some beds shaly, medium- to thick-bedded; crossbedded, fossiliferous, oolitic, cherty. Sandstone, fine-grained, thin- to thick-bedded, calcareous cement; commonly crossbedded, locally ripple-marked; commonly interbedded or associated with silty calcareous shale. Shale, variably sandy and silty, calcareous; occurs as thin interbeds. Siltstone, medium-bedded, calcareous, discontinuous. Mapped locally in Calvert City quadrangle

Mss — ST. LOUIS AND SALEM LIMESTONES—Limestone and chert. Limestone, argillaceous, partly silty; fine- to coarse-grained, medium- to thick-bedded; interbedded thin shaly beds; dolomitic; petroliferous odor, oolitic, cherty, fossiliferous. Chert occurs as sparse to common spheroids, discoids, irregular knobby bodies, and discontinuous layers; some shows wavy laminations.

Mw — WARSAW LIMESTONE—Limestone and chert, interbedded. Limestone, fine- to coarse-grained, medium- to thick-bedded, fossiliferous, rarely oolitic; argillaceous, some beds separated by thin shale laminae; chert nodules common; crossbedded. Chert occurs as nodules, irregular beds, and discontinuous layers in finer-grained limestone.

Mfp — FORT PAYNE FORMATION—Limestone and chert; interlayered. Limestone, variably silty and clayey, micrograined to fine-grained, siliceous, argillaceous, locally shaly, fossiliferous. Chert present in beds and lenticular masses.

Mnp — NEW PROVIDENCE SHALE—Shale, thinly laminated; contains greenish-gray siltstone lenses; glauconitic clay at base. Mapped in isolated fault segments in Birmingham Point, Briensburg, and Fenton quadrangles.

DEVONIAN

Dc — CHATTANOOGA SHALE—Shale, carbonaceous, fissile, pyritic; contains thin beds of micaceous silt. Mapped in isolated fault segments in Briensburg and Calvert City quadrangles.

Dcc — CHERT AND CLAY DEPOSITS—Chert, fossiliferous, granular texture, thin-bedded, interbedded with layers of silty clay; probably residum from limestone. Mapped in isolated fault segment in Birmingham Point quadrangle.

EXPLANATION

- Contact
- Approximate contact
- Inferred contact
- Concealed contact
- Fault
- Inferred fault
- Concealed fault
- Unconformity contact
- Unconformity concealed
- Bedrock topographic contour (Jackson Purchase) Structure contour (Mississippi Plateau)
- Index contour (200 foot)
- State boundary
- County lines

GEOLOGIC SETTING

The Jackson Purchase Region of western Kentucky is located in the northeastern part of the Mississippi Embayment. Rocks and sediments exposed in this region range in age from Devonian to Holocene. The Mississippi Embayment, an area known as the Jackson Purchase in Kentucky, is a broad, south-plunging syncline whose axis coincides with the Mississippi River. Deeper Paleozoic rocks dip northward toward the Illinois Basin, whereas most Upper Cretaceous and Tertiary formations strike parallel to the margin of the embayment and dip uniformly toward the embayment axis. This map displays the the subcrop geology of the area below the mapped Quaternary/Tertiary section along the top of the Cretaceous/Tertiary unconformity.

PRODEDURE

This map was generated from edited portions of the original compilation of fifty-five 1:24,000-scale Digitally Vectorized Geologic Quadrangle (DVGQ) maps from the Murray, Paducah, Sikeston, and Cape Girardeau 30 x 60 minute quadrangles. The original dataset was compiled and published by Steven L. Martin (2000a,b, 2004) and Martin and others (2007). In addition to the Jackson Region, the new map includes a portion of the Mississippi Plateau east of the Tennessee River along the eastern map border. The map illustrates faults, bedrock topography, and structure contours from the original geologic maps along with newly mapped (inferred) formation areas. The compilation dataset was edited for this contract deliverable by mapping the exposed and concealed bedrock contacts, approximating their subsurface extent where covered by Quaternary sediments and not mapped, and excluding all mapped Quaternary and Quaternary/Tertiary surficial units (i.e., Qal–alluvium, Ql–loess, QTu/QTg–continental deposits and gravel). Additional subsurface contact information was inferred from available U.S. Geological Survey map data (Olive, 1980).

Kentucky Single Zone: North American Datum of 1983 (NAD83)
Lambert Conformal Conic map projection with double standard parallels at
38 deg 40 min Latitude North and 37 deg 05 min Latitude North

REFERENCES

Martin, S.L., 2004, Geologic map of the Murray and part of the Sikeston 30 x 60 minute quadrangles, western Kentucky: Kentucky Geological Survey, ser. 12, Geologic Map 8, scale 1:100,000.

Martin, S.L., 2000a, Digital geologic map of the Jackson Purchase Region, western Kentucky , *in* Soller, D.R., ed., Digital Mapping Techniques '00—Workshop Proceedings: U.S. Geological Survey Open-File Report 00-325, p. 177.

Martin, S.L., 2000b, Geologic map of the Jackson Purchase Region, western Kentucky , *in* Smath, R.A., and Davidson, B., eds., Economic and engineering geology of the Jackson Purchase Area, Kentucky: Year 2000 Annual Field Conference of the Kentucky Society of Professional Geologists, plate 1, scale 1:200,000.

Martin, S.L., Anderson, W.H., and Sparks, T.N., 2007, Geologic map of part of the Paducah and Cape Girardeau 30 x 60 minute quadrangles, western Kentucky: Kentucky Geological Survey, ser. 12, Geologic Map 14, scale 1:100,000.

Olive, W.W., 1980, Geologic maps of the Jackson Purchase Region, Kentucky, U.S. Geological Survey Miscellaneous Investigation Series Map I-1217, scale 1:250,000.

SUBCROP GEOLOGIC MAP OF CRETACEOUS/TERTIARY SECTION, JACKSON PURCHASE REGION, WESTERN KENTUCKY

Compiled by Thomas N. Sparks
Modified from compilations by Steven L. Martin, Warren H. Anderson, and Thomas N. Sparks

2009

SCALE 1:125 000

2 0 2 4 6 8 10 Miles
2 0 2 4 6 8 10 12 14 16 Kilometers

DISCLAIMER

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ACKNOWLEDGMENTS

This map was generated using previously published data from 1:24,000-scale Digitally Vectorized Geologic Quadrangle (DVGQ) maps of the Murray, Paducah, Sikeston, and Cape Girardeau 30 x 60 minute quadrangles completed by KGS personnel (1999–2004) and compiled by Steven L. Martin (2000a,b, 2004) and Martin and others (2007). This work was funded in part by the U.S. Geological Survey National Cooperative Mapping Program under the STATEMAP Program authorized by the National Geologic Mapping Act of 1992, Grant No. 08HQPA0003, and by the Kentucky Geological Survey.

Digital mapping for the bedrock topographic and structure contours was initially completed by Steven L. Martin from the original geologic maps.

Subsurface information was used from data on file at the Kentucky Geological Survey as well as map data contributed by the U.S. Geological Survey (Olive, 1980).