GEOLOGIC MAP 19
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Kentucky Geological Survey
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GEOLOGIC MAP OF KENTUCKY

Compilation by Thomas N. Sparks

SCALE 1:350,000

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

★ State Capital ⊙ County Seat

Geologic Map of Kentucky

This geologic map was compiled from 707 U.S. Geological Survey 7.5-minute geologic quadrangle maps (scale 1:24,000), which were digitized during the Kentucky Geological Survey Digital Geologic Mapping Program (1996–2006). The purpose of the map is to show, at a regional scale, as much of the detailed geology as possible from the original 7.5-minute maps. The map also illustrates regional changes in stratigraphic nomenclature that generally arise from lateral variation in the rocks, but may also be due to evolving usage during the original mapping program. During the digital compilation, every effort was made to resolve inconsistencies in stratigraphic nomenclature, to adopt recent usage, and edgematch adjoining maps. As such, this map uniquely combines the fidelity of large-scale maps with the regional perspective of a statewide compilation to illustrate the achievements of the KGS Digital Mapping Program.

This map is a culmination of work that took place over a 50-year period. The original geologic maps were prepared by 278 geologists and published between 1960 and 1978 by the USGS–KGS Mapping Program. With support from the State Geologic Mapping component of the U.S. Geological Survey National Cooperative Geologic Mapping Program, 60 earth scientists, GIS experts, technicians, and students scanned and digitized the paper maps between 1996 and 2006. The digital 7.5-minute geologic quadrangle maps were then compiled into thirty-two 30 x 60 minute maps (scale 1:100,000) prior to this final compilation at 1:350,000 scale. Only formations and faults are displayed on this map, but other features such as coal beds, mineral veins, outcrops, fossil locations, structure contours, and locations of surface mines were digitized during the program. The original maps, GIS data sets, and published compilations can be found in the KGS online publications catalog (uky.edu/KGS). KGS has also developed and made available through the Internet a geologic map service to provide interactive and customized geologic maps with links to related data (kgs.uky.edu/kgsweb/main.asp).

The geology of Kentucky consists of generally flat-lying sedimentary rocks of Ordovician through Tertiary/Quaternary age and a few igneous intrusions of Permian age. The Cincinnati Arch is a major structural uplifted feature that trends north-south through the state and exposes the oldest Ordovician rocks along the Jessamine Dome of central Kentucky. The arch separates the Appalachian Basin in the east from the Illinois Basin in the west. Both basins contain many coal beds and abundant oil and gas reserves. Surrounding the arch are outcropping organic-rich Devonian shale units that thicken into the subsurface and produce most of eastern Kentucky's natural gas resources. There are also mineral districts in central, western, and southern Kentucky that have produced commercial quantities of barite, fluorite, calcite, galena, and sphalerite. The Jackson Purchase Region in far western Kentucky is located in the northern part of the Late Mesozoic (Cretaceous) Mississippi Embayment. The region consists of a dissected coastal plain of unconsolidated Cretaceous and Tertiary sand and gravel deposits overlain by a veneer of Quaternary loess and alluvium.

Major fault systems include the Rough Creek Fault System in western Kentucky and the Lexington, Kentucky River, and Irvine–Paint Creek Fault Systems in central and eastern Kentucky. The Pine Mountain Thrust Fault is located in southeastern Kentucky and marks the boundary between the gently dipping beds of the southern Appalachian Plateau and the highly folded and faulted rocks of the Valley and Ridge Province near the Virginia state line. Three circular faulted structures are located in the state: Jeptha Knob and the Versailles structure, located in central Kentucky, and the Middlesboro structure, located in the southeastern part of the state. All three features are interpreted as meteor impact structures.

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MAPPED UNITS OF CENTRAL KENTUCKY

RECENT

af	Artificial fill (compacted rock debris from highway, railroad, and reservoir construction)

QUATERNARY

Qal	Alluvium
Qala	Alluvium and lacustrine deposits
Qao	Older alluvium
Qam	Alluvium of valley sides, meanders, and abandoned channels
Qt	Terrace deposits
Qd	Glacial drift
Qla	Lacustrine or slack water deposits
Qo	Glacial outwash
Ql	Loess
Qlc	Landslide deposits and colluvium

TERTIARY and QUATERNARY

QTlf	Lacustrine and fluvial deposits (ancestral Licking River)
QTs	Brecciated and slumped sandstone, conglomerate, and shale
QTf	High-level fluvial deposits
QTg	Gravel and sand deposits, or Terrace gravel

PENNSYLVANIAN

IPpk	Pikeville Formation
IPg	Grundy Formation
IPga	Grundy and Alvy Creek Formations
IPgc	Corbin Sandstone Member of Grundy Formation
IPgm	Marsh Creek Sandstone Member of Grundy Formation
IPbrr	Rockcastle Sandstone Member, Bee Rock Formation
IPacl	Livingston Conglomerate Member, Alvy Creek Formation
IPac	Alvy Creek Formation

MISSISSIPPIAN

Mp	Paragon Formation
Msla	Slade Formation
Mbh	Bangor Limestone and Hartselle Formation
Mmk	Kidder Limestone Member, Monteagle Limestone
Mmg	Ste. Genevieve Limestone Member, Monteagle Limestone
Msl	St. Louis Limestone
Msb	Burnside Member of Slade Formation
Mbr	Renfro Member of Slade Formation
Msw	Salem and Warsaw Limestones
Mhb	Harrodsburg Limestone
Ms	Salem Limestone
Mfp	Fort Payne Formation
rl	reef limestone of Fort Payne Formation
ss	Knifley Sandstone Member, and Jabez Sandstone Member, Fort Payne Formation
Mb	Borden Formation
Mbm	Muldraugh Member, Borden Formation

DEVONIAN and MISSISSIPPIAN

MDna	New Albany Shale (central Kentucky)
MDc	Chattanooga Shale (south central Kentucky)

DEVONIAN

Dnsb	New Albany Shale and Beechwood Limestone Member of Sellersburg Limestone
Db	Boyle Dolomite
Dsj	Sellersburg and Jeffersonville Limestones

SILURIAN

Slwl	Louisville Limestone, Waldron Shale, and Laurel Dolomite
Slv	Louisville Limestone
Slw	Louisville Limestone and Waldron Shale
Sw	Waldron Shale
Sl	Laurel Dolomite
Sbi	Bisher Limestone
Sob	Osgood and Brassfield Formations
So	Osgood Formation
Scb	Crab Orchard Formation and Brassfield Dolomite
Sb	Brassfield Dolomite

ORDOVICIAN

Od	Drakes Formation
Oc	Cumberland Formation
Oa	Ashlock Formation
Ob	Bull Fork Formation
Ogl	Grant Lake Limestone
Occ	Calloway Creek Limestone
Ole	Leipers Limestone (south central Kentucky)
Of	Fairview Formation
Og	Garrard Siltstone
Ok	Kope Formation
Okc	Kope and Clays Ferry Formations
Ocf	Clays Ferry Formation
Ocp	Point Pleasant Tongue of Clays Ferry Formation
Ol	Lexington Limestone (north central Kentucky)
Olu	Upper part of Lexington Limestone
Olt	Tanglewood Limestone Member
Olb	Brannon Member, Lexington Limestone
Ollr	Lower part of Lexington Limestone
Oto	Tyrone Limestone and Oregon Formation
Ocn	Camp Nelson Limestone

Cincinnati
Madison
Falmouth
Maysville
Ironton
Jasper
Louisville
Lexington
Morehead
Hunting-ton
West Frankfort
Evansville
Tell City
Elizabeth-town
Harrods-burg
Irvine
William-son
Beckley
Cape Girardeau
Paducah
Madison-ville
Beaver Dam
Camp-bellsville
Somerset
Hazard
Pikeville
Sikeston
Murray
Hopkins-ville
Bowling Green
Tompkins-ville
Corbin
Middles-boro
Bristol
39°
38°
37°
81°
90°
89°
88°
87°
86°
85°
84°
83°
82°

Locations of the 30 x 60 minute quadrangles covering Kentucky.

OUTER BLUEGRASS
BLUEGRASS REGION
INNER BLUE GRASS
THE KNOBS
EASTERN KENTUCKY COAL FIELD
WESTERN KENTUCKY COAL FIELD
PENNYROYAL PLATEAU
MISSISSIPPIAN PLATEAU
MISSISSIPPI EMBAYMENT
DRIPPING SPRINGS ESCARPMENT
POTTSVILLE ESCARPMENT
PINE MOUNTAIN
CUMBERLAND MT.
Ohio River

Physiographic map of Kentucky.

MAPPED UNITS OF NORTHEASTERN KENTUCKY

QUATERNARY

Qfm	Modern Ohio River floodplain alluvium
Qfo	Older Ohio River floodplain alluvium
Qal	Alluvium
Qlc	Landslide deposits and colluvium
Qe	Eolian sand, dune sand
Qt	Terrace deposits
Qo	Glacial outwash

TERTIARY and QUATERNARY

QTf	High-level fluvial deposits

PERMIAN

Pp	Intrusive rocks of Permian age (Elliott County kimberlite) Unweathered peridotite, oxidized and hydrated peridotite, and soil containing crystals of ilmenite and garnet

PENNSYLVANIAN

IPmc	Monongahela Formation and upper Conemaugh Formation
IPc	Conemaugh Formation
IPpr	Princess Formation
IPfc	Four Corners Formation
IPh	Hyden Formation
IPpk	Pikeville Formation
IPg	Grundy Formation
IPgc	Corbin Sandstone Member of Grundy Formation
IPbm	Middle part of Breathitt Group, undifferentiated
IPpg	Pikeville and Grundy Formations, undifferentiated
IPbl	Lower part of Breathitt Group, undifferentiated

MISSISSIPPIAN

Mc	Carter Caves Sandstone
Mpsl	Paragon and Slade Formations, undivided
Msla	Slade Formation
Mb	Borden Formation

DEVONIAN and MISSISSIPPIAN

MDsb	Sunbury Shale, Berea Sandstone, and Bedford Shale, undivided
MDna	New Albany Shale

DEVONIAN

Do	Ohio Shale
Db	Boyle Dolomite

SILURIAN

Sbi	Bisher Limestone
Scu	Upper part of Crab Orchard Group (includes Alger Shale and Estill Shale)
Scb	Lower part of Crab Orchard Group (includes Brassfield Member, Drowning Creek Formation)

ORDOVICIAN

Od	Drakes Formation
Ob	Bull Fork Formation
Oa	Ashlock Formation
Ogl	Grant Lake Limestone
Of	Fairview Formation
Occ	Calloway Creek Limestone
Ok	Kope Formation
Okc	Kope and Clays Ferry Formations
Ocf	Clays Ferry Formation

MAPPED UNITS OF WEST-CENTRAL KENTUCKY AND JACKSON PURCHASE REGION (WESTERN KENTUCKY)
(NOTE: NOT ALL UNITS LABELED)

RECENT

af	Artificial fill (compacted rock debris from highway, railroad, and reservoir construction; or mine tailings)

QUATERNARY

Qal	Alluvium
Qe	Eolian sand, dune sand
Qala	Alluvium and lacustrine deposits
Qao	Older alluvium
Qt	Terrace deposits
Qtl	Lacustrine and terrace deposits
Qlf	Lacustrine and fluvial deposits
Qcd	Glacial outwash, Cary substage
Qtd	Glacial outwash, Tazewell substage
Ql	Loess
sd	Sand and silt deposits, sand of alluvium, lacustrine, and fluvial deposits
gr	Gravel of alluvium, lacustrine, and fluvial deposits

TERTIARY and QUATERNARY

QTc	Continental deposits
QTg	Chert gravel or gravel deposits

TERTIARY

Tj	Jackson Formation
Tc	Claiborne Formation
Tw	Wilcox Formation
Tp	Porters Creek Clay

CRETACEOUS and TERTIARY

TKcm	Clayton and McNairy Formations

CRETACEOUS

Km	McNairy Formation
Kt	Tuscaloosa Formation

PENNSYLVANIAN

IPmcl	McLeansboro Group
IPm	Mattoon Formation
IPbm	Bond and Mattoon Formations
IPb	Bond Formation
IPp	Patoka Formation
IPsh	Shelburn Formation
IPsc	Shelburn and Carbondale Formations
IPc	Carbondale Formation
IPt	Tradewater Formation
IPtc	Tradewater and Caseyville Formations
IPca	Caseyville Formation

MISSISSIPPIAN

Mcu	Chesterian series (upper part)
Mbw	Buffalo Wallow Formation
Ml	Leitchfield Formation
Mk	Kinkaid Limestone
Mkc	Kinkaid Limestone, Degonia Sandstone, and Clore Limestone
Mkp	Kinkaid Limestone, Degonia Sandstone, Clore Limestone, and Palestine Sandstone
Mdc	Degonia Sandstone and Clore Limestone
Mdm	Degonia Sandstone, Clore Limestone, Palestine Sandstone, and Menard Limestone
Mcp	Clore Limestone and Palestine Sandstone
Mpt	Palestine Sandstone
Mme	Menard Limestone
Mmt	Menard Limestone, Walterburg Sandstone, Vienna Limestone, and Tar Springs Sandstone
Mwv	Waltersburg Sandstone and Vienna Limestone
Mts	Tar Springs Sandstone
Mcm	Chesterian series (middle part)
Mgd	Glen Dean Limestone
Mh	Hardinsburg Sandstone
Mhgc	Hardinsburg Sandstone, Golconda Formation, and Cypress Sandstone
Mgo	Golconda Formation
Mgh	Haney Limestone Member
Mgb	Big Clifty Sandstone Member
Mgbc	Big Clifty Sandstone and Beech Creek Limestone Members
Mgcy	Big Clifty Sandstone Member and Cypress Sandstone
Mcl	Chesterian series (lower part)
Mgc	Beech Creek Limestone Member
Mgcc	Beech Creek Limestone Member and Cypress Sandstone
Mg	Girkin Formation
Me	Elwren Sandstone
Mr	Reelsville Limestone
Mrs	Reelsville Limestone and Sample Sandstone
Msa	Sample Sandstone
Mbp	Beaver Bend Limestone, Mooretown Formation, and Paoli Limestone
Mmoh	Mooretown Formation (shale member)
Mmos	Mooretown Formation (sandstone member)
Mc	Cypress Sandstone
Mcb	Cypress Sandstone, Paint Creek Shale, and Bethel Sandstone
Mpc	Paint Creek Limestone
Mpr	Paint Creek Limestone, Bethel Sandstone, and Renault Limestone
Mbe	Bethel Sandstone
Mre	Renault Limestone
Msg	Ste. Genevieve Limestone
Mssu	Ste. Genevieve Limestone and St. Louis Limestone, upper member
Mss	St. Louis Limestone and Salem Limestone
Msll	St. Louis Limestone, lower member
Ms	Salem Limestone
Msw	Salem and Warsaw Limestones
Mhb	Harrodsburg Limestone
Mw	Warsaw Formation
Mfp	Fort Payne Formation

DEVONIAN and MISSISSIPPIAN

MDc	Chattanooga Shale
Dsj	Sellersburg and Jeffersonville Limestones

SILURIAN

Slwl	Louisville Limestone, Waldron Shale, and Laurel Dolomite

ORDOVICIAN

Oc	Cumberland Formation

Jackson Purchase (Western Kentucky)
West-Central
Central
Northeastern
Eastern and Southeastern

Index to stratigraphic map units.

Central Kentucky Mineral District
Western Kentucky Fluorspar District
JACKSON PURCHASE REGION
ILLINOIS BASIN
CINCINNATI ARCH
Jessamine Dome
APPALACHIAN BASIN
South-Central Kentucky Mineral District

Structural features and economic regions of Kentucky. Major provinces in red and mineral districts outlined in magenta. Key fault zones and impact features labelled on main map.

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DISCLAIMER: This map was compiled from digital data that were successfully processed on a computer system at the Kentucky Geological Survey. KGS does not guarantee this map to be free of errors or inaccuracies. KGS disclaims any responsibility or liability for interpretations from this map, or decisions based thereon.

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MAPPED UNITS OF EASTERN KENTUCKY AND ALONG PINE MOUNTAIN (SOUTHEASTERN KENTUCKY)

RECENT

af	Artificial fill (compacted rock debris from highway construction or mine tailings)

QUATERNARY

Qal	Alluvium
Qlc	Landslide deposits and colluvium
Qaf	Alluvial fan deposits
Qt	Terrace deposits

TERTIARY and QUATERNARY

QTf	High-level fluvial deposits

PENNSYLVANIAN

IPpr	Princess Formation
IPfc	Four Corners Formation
IPh	Hyden Formation
IPpk	Pikeville Formation
IPg	Grundy Formation
IPgc	Corbin Sandstone Member of Grundy Formation
IPbm	Middle part of Breathitt Group, undifferentiated
IPbd	Breathitt Group, intensely deformed
IPbl	Lower part of Breathitt Group, undifferentiated
IPbr	Bee Rock Sandstone
IPac	Alvy Creek Formation
IPah	Hensley Member, Alvy Creek Formation
IPsw	Sewanee and Warren Point Sandstones
IPss	Sewanee Sandstone
IPbcd	Dark Ridge Shale Member, Bottom Creek Formation
IPwp	Warren Point Sandstone

MISSISSIPPIAN

Mp	Pennington Group
Mn	Newman Limestone
Msla	Slade Formation
Mb	Borden Formation
Mg	Grainger Formation

DEVONIAN and MISSISSIPPIAN

MDsb	Sunbury Shale, Berea Sandstone, and Bedford Shale, undivided
MDc	Chattanooga Shale

DEVONIAN

Do	Ohio Shale
Db	Boyle Dolomite

SILURIAN

Sbi	Bisher Limestone
Scb	Crab Orchard Formation and Brassfield Dolomite

ORDOVICIAN

Od	Drakes Formation
Oa	Ashlock Formation
Occ	Calloway Creek Limestone
Og	Garrard Siltstone
Ocf	Clays Ferry Formation

0 10 20 40 60 80 Kilometers
0 5 10 20 30 40 50 Miles
N
W
E
S
OHIO
INDIANA
ILLINOIS
MISSOURI
TENNESSEE
WEST VIRGINIA
VIRGINIA
OHIO RIVER
MISSISSIPPI RIVER
BOONE
KENTON
CAMPBELL
GALLATIN
CARROLL
GRANT
PENDLETON
BRACKEN
MASON
LEWIS
GREENUP
BOYD
TRIMBLE
OWEN
HARRISON
ROBERTSON
FLEMING
CARTER
OLDHAM
HENRY
SCOTT
NICHOLAS
BATH
ROWAN
ELLIOTT
LAWRENCE
JEFFERSON
SHELBY
FRANKLIN
WOODFORD
FAYETTE
BOURBON
MONTGOMERY
MENIFEE
MORGAN
JOHNSON
MARTIN
BULLITT
SPENCER
ANDERSON
JESSAMINE
CLARK
POWELL
WOLFE
MAGOFFIN
FLOYD
PIKE
MEADE
HARDIN
NELSON
WASHINGTON
MERCER
BOYLE
GARRARD
MADISON
ESTILL
LEE
BREATHITT
KNOTT
LETCHER
PERRY
OWSLEY
JACKSON
ROCKCASTLE
LINCOLN
CASEY
MARION
LARUE
HANCOCK
BRECKINRIDGE
DAVIESS
HENDERSON
UNION
WEBSTER
McLEAN
OHIO
GRAYSON
HART
GREEN
TAYLOR
ADAIR
RUSSELL
PULASKI
LAUREL
CLAY
LESLIE
HARLAN
BELL
KNOX
WHITLEY
McCREARY
WAYNE
CLINTON
CUMBERLAND
MONROE
METCALFE
BARREN
ALLEN
WARREN
EDMONSON
BUTLER
MUHLENBERG
HOPKINS
CRITTENDEN
LIVINGSTON
CALDWELL
LYON
CHRISTIAN
TODD
LOGAN
SIMPSON
TRIGG
MARSHALL
CALLOWAY
McCRACKEN
BALLARD
CARLISLE
GRAVES
HICKMAN
FULTON
JEPTHA KNOB STRUCTURE
VERSAILLES STRUCTURE
MIDDLESBORO STRUCTURE
LEXINGTON FAULT SYSTEM
KENTUCKY RIVER FAULT SYSTEM
IRVINE-PAINT CREEK FAULT SYSTEM
ROUGH CREEK FAULT SYSTEM
PENNYRILE FAULT SYSTEM
PINE MOUNTAIN OVERTHRUST FAULT
Frankfort
Covington
Newport
Louisville
Lexington
Paducah
Owensboro
Henderson
Bowling Green
Ashland
Middlesboro
Lake Cumberland
Kentucky Lake
Lake Barkley
Dale Hollow Lake
39°
38°
37°
89°
88°
87°
86°
85°
84°
83°
82°