

FORMATION, MEMBER, ZONE, AND BED	THICKNESS (IN FEET)	LITHOLOGY
Alburn	0-37	Qal
Richmond coal zone	0-100	Ppr
Bronx coal zone	0-45	Pbr
Peach Orchard coal zone	0-132	Ms-14 (190-440)
Heddic coal zone	0-48	PH
Maginn Member	0-36	Pp
Hyden Formation	0-200	PH
Neville Formation	0-30	PH
Williamson coal zone	0-70	PH
Upper Elkhorn 3 coal zone	0-70	Pka
Alma coal zone	0-50	Pka
Peach Orchard coal zone	0-18	Pka
Basin shale	0-24	Pka
Big Horn coal zone	0-24	Pka
Eslog coal zone	0-36	Pka
Blair coal zone	0-30	Pka
Gaymans coal zone	0-48	Pka
Hyden coal zone	0-18	Pka
Hagg coal zone	0-24	Pka
Spillars coal zone	0-36	Pka
Elkhorn coal zone	0-36	Pka

**DESCRIPTION OF MAPPED UNITS**

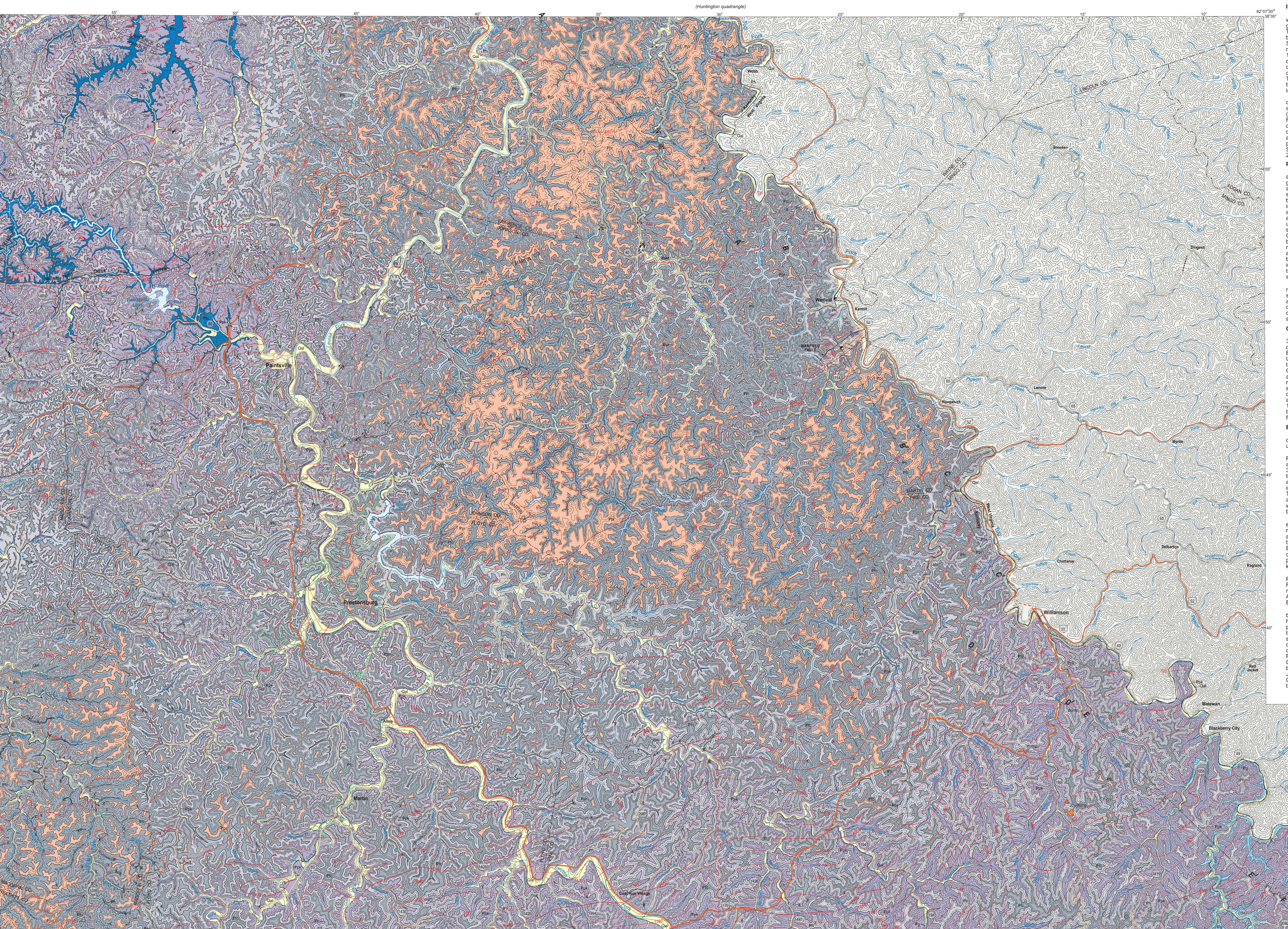
**Qal** ALLUVIUM—Sand, silt, gravel, and clay; poorly sorted. Some alluvium may have been derived from landslides or mine spoil.

**Ppr** **BREATHIT GROUP—**Replaces Breathit Formation (Chesnut, 1932). Consists of a variety of formations and members, including shales with marine fossils (as previously recognized as members) changing across the quadrangle as follows: **Princess Formation**, **Four Corners Formation**, **Hyden Formation**, **Princess Formation**, and **Princess Formation**.

**PH** **PRINCESS FORMATION—**Sandstone, siltstone, shale, and coal. Sandstone, fine to coarse grained, poorly sorted, and fossiliferous. It is silt- to clay-size quartz; cement, where present, is calcareous, silty, and clayey. Sandstone is massive bedded, as much as 200 ft thick. Forms steep slopes (Auld and others, 1989). These DVOQs are available on CD-ROM and will be released via the Internet in the near future. Lithology, petrology, and geochemistry are being analyzed by developing an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software.

**Pbr** **BRONX COAL—**Siltstone, shale, and coal. Siltstone, medium to fine grained, sandy, and clayey. It is silt- to clay-size quartz; cement, where present, is calcareous, silty, and clayey. Sandstone is massive bedded, as much as 200 ft thick. Forms steep slopes (Auld and others, 1989). These DVOQs are available on CD-ROM and will be released via the Internet in the near future. Lithology, petrology, and geochemistry are being analyzed by developing an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software.

**Pka** **PRINCESS FORMATION—**Sandstone, siltstone, shale, and coal. Sandstone, medium to fine grained, sandy, and clayey. It is silt- to clay-size quartz; cement, where present, is calcareous, silty, and clayey. Sandstone is massive bedded, as much as 200 ft thick. Forms steep slopes (Auld and others, 1989). These DVOQs are available on CD-ROM and will be released via the Internet in the near future. Lithology, petrology, and geochemistry are being analyzed by developing an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software.



The geologic map of the Williamson 30 x 60 minute quadrangle was originally compiled from U.S. Geological Survey 7.5-minute geologic quadrangle maps (GQ's) which are cited in the references. The original GQ's are products of a cooperative mapping project between the U.S. Geological Survey and the Kentucky Geological Survey from 1950 to 1976. Several more recent studies on changes in the stratigraphic nomenclature and correlation. These changes are shown on this map, and were necessary for comparison of regional maps and for stratigraphic continuity between quadrangles. The 7.5-minute quadrangles that make up the Kentucky quadrangle are the Williamson and Beckley 30 x 60 minute quadrangles are shown in a composite map (Fig. 1).

The data files resulting from the digitization of the GQ's are part of the DVOQ data set and are available on CD-ROM. These DVOQs are available on CD-ROM and will be released via the Internet in the near future. Lithology, petrology, and geochemistry are being analyzed by developing an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software.

**PROCEDURE**  
 The geologic map of the Williamson and Beckley 30 x 60 minute quadrangles was digitized using a semi-automated data capture technique to convert hard-copy geologic maps into digital format. Compiling 7.5-minute maps into a 30 x 60 minute map required the resolution of significant questions such as: (1) correlating geologic formations across quadrangle boundaries, (2) resolving nonuniform structure contour intervals, and (3) resolving discrepancies in formation boundaries. Some underlying beds of the Breathit Group, especially in the Princess Formation, are known to be good sources of freccy for the manufacture of freccy. Clay and shale are suitable for many products. Freccy and shale are suitable for many products. Freccy and shale are suitable for many products. Freccy and shale are suitable for many products. Freccy and shale are suitable for many products.

**GEOLOGIC SETTING AND STRUCTURAL GEOLOGY**  
 The Williamson 30 x 60 minute quadrangle consists of four Pennsylvania subgroups and the Allegheny Group. The Williamson 30 x 60 minute quadrangle consists of four Pennsylvania subgroups and the Allegheny Group. The Williamson 30 x 60 minute quadrangle consists of four Pennsylvania subgroups and the Allegheny Group. The Williamson 30 x 60 minute quadrangle consists of four Pennsylvania subgroups and the Allegheny Group.

**ECONOMIC GEOLOGY**  
 Coal, gas, and oil are the principal developed mineral resources of the Williamson quadrangle. Other resources of potential economic value include sand, gravel, clay, shale, and sandstone. The Williamson quadrangle is primarily in the Big Sandy Coal Reserve District, but includes small parts of the Boone and the Princess Districts. The 50 known coal beds in the quadrangle are generally of moderate thickness and are economically important. Coal, gas, and oil are the principal developed mineral resources of the Williamson quadrangle. Other resources of potential economic value include sand, gravel, clay, shale, and sandstone.

**ENGINEERING GEOLOGY**  
 Landslides are a common problem throughout the area because of the steep slopes. Landslides are a common problem throughout the area because of the steep slopes. Landslides are a common problem throughout the area because of the steep slopes. Landslides are a common problem throughout the area because of the steep slopes.

**REFERENCES CITED**

Auld, D.C., and Trent, V.A., 1962. Geologic map of the Williamson quadrangle, Kentucky. U.S. Geological Survey Geologic Quadrangle Map GQ-37A, scale 1:240,000.

Anderson, W.H., Spotts, T.N., Patton, J.A., Yang, X.Y., and Singler, R.E., 1989. Interpretation of geologic maps. U.S. Geological Survey Bulletin 1525.

Beckley, R.P., and Auld, D.C., 1963. Geologic map of the Beckley 30 x 60 minute quadrangle, eastern Kentucky. U.S. Geological Survey Geologic Quadrangle Map GQ-37B, scale 1:240,000.

Chesnut, E.S., 1932. Geologic map of the Richmond, Lexington, and Beckley 30 x 60 minute quadrangles, eastern Kentucky. U.S. Geological Survey Geologic Quadrangle Map GQ-37, scale 1:240,000.

Chesnut, E.S., and Miller, R.H., 1935. Geologic map of the Hyden, Richmond, and Beckley 30 x 60 minute quadrangles, eastern Kentucky. U.S. Geological Survey Geologic Quadrangle Map GQ-37C, scale 1:240,000.

Chesnut, E.S., and Miller, R.H., 1935. Geologic map of the Hyden, Richmond, and Beckley 30 x 60 minute quadrangles, eastern Kentucky. U.S. Geological Survey Geologic Quadrangle Map GQ-37C, scale 1:240,000.

Chesnut, E.S., and Miller, R.H., 1935. Geologic map of the Hyden, Richmond, and Beckley 30 x 60 minute quadrangles, eastern Kentucky. U.S. Geological Survey Geologic Quadrangle Map GQ-37C, scale 1:240,000.

**COAL BED NAMES IN THE WILLIAMSON QUADRANGLE**

List is in stratigraphic order, youngest beds at the top of the list. Beds within zones are in all capital letters and italic style. Beds within zones are in all capital letters and italic style. Beds within zones are in all capital letters and italic style.

**FOUR CORNERS FORMATION**  
 Sandstone, siltstone, shale, and coal. Sandstone, medium to fine grained, sandy, and clayey. It is silt- to clay-size quartz; cement, where present, is calcareous, silty, and clayey. Sandstone is massive bedded, as much as 200 ft thick. Forms steep slopes (Auld and others, 1989). These DVOQs are available on CD-ROM and will be released via the Internet in the near future. Lithology, petrology, and geochemistry are being analyzed by developing an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software.

**PRINCESS FORMATION**  
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**GRUNDY FORMATION**  
 Sandstone, siltstone, shale, and coal. Sandstone, medium to fine grained, sandy, and clayey. It is silt- to clay-size quartz; cement, where present, is calcareous, silty, and clayey. Sandstone is massive bedded, as much as 200 ft thick. Forms steep slopes (Auld and others, 1989). These DVOQs are available on CD-ROM and will be released via the Internet in the near future. Lithology, petrology, and geochemistry are being analyzed by developing an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software.

**CORBEN SANDSTONE MEMBER OF GRUNDY FORMATION**  
 Sandstone, siltstone, shale, and coal. Sandstone, medium to fine grained, sandy, and clayey. It is silt- to clay-size quartz; cement, where present, is calcareous, silty, and clayey. Sandstone is massive bedded, as much as 200 ft thick. Forms steep slopes (Auld and others, 1989). These DVOQs are available on CD-ROM and will be released via the Internet in the near future. Lithology, petrology, and geochemistry are being analyzed by developing an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software. KGS has also developed an Internet map server when users can prepare similar maps without purchasing DVOQs by using the interactive Geographic Information System (GIS) CD-ROM software.

**DUMP**  
 Mine dump, mine tailings, and displaced overburden.

**EXPLANATION**

Structure contour boundary

Datum horizon, foot

Active stone quarry or mine

Abandoned stone quarry or mine

City boundary

City boundary

Normal fault (U, left; downthrown side; D, downthrown side)

Concealed fault

Active mine shaft

Contact

Concealed contact

Inferred contact

