

The Pennsylvanian rocks of the eastern Kentucky coal field underlie an area of about 97,000 square kilometers (see index map). Largely because of the size and stratigraphic complexity of the area, Huddle and others (1963, p. 31) divided it into six coal reserve districts (unofficial), utilizing state and county lines as well as geologic features, drainage areas, and coal producing areas. This division is followed herein because, in general, each of these districts has a characteristic stratigraphic nomenclature, particularly as related to coal bed names. The six districts shown on the index map are the Princess, Licking River, Big Sandy, Hazard, Southwestern, and Upper Cumberland Rivers; the Upper Cumberland River district has been divided into the Harlan and Middleboro subdistricts.

The Pennsylvanian rocks of eastern Kentucky are divided into four formations. In ascending order, they are the Lee and Breathitt Formations of Early and Middle Pennsylvanian age, and the Conemaugh and Monongahela Formations of Late Pennsylvanian age (table 1). The Lee Formation is largely quartzite sandstone that intertongues with and locally grades into the Breathitt Formation. The Breathitt, characterized by subgraywacke, gray shale, and gray siltstone, commonly grades into the overlying red and green shale and siltstone of the Conemaugh and Monongahela Formations. (The Breathitt Formation is recognized as a group in the Upper Cumberland River district and has been divided into five formations, the Hazen, Mingo, Catron, Higgin, and Bryson Formations. Because the stratigraphic relations of the rocks in these formations do not affect the correlation of coal beds and key beds, and because the Breathitt has been mapped as a formation in most of the area of this report for convenience in discussion all strata younger than the Lee Formation in the Upper Cumberland River district are assigned to the Breathitt Formation.) Although coal occurs only in a small percentage of the total Pennsylvanian rock sequence, it is of great economic importance. Coal is present in 25 major coal zones, mainly in the Breathitt Formation; it has been prospectively and mined extensively in all parts of the coal field since the early 1900's.

In general, correlation of coal beds in eastern Kentucky depends upon demonstrated continuity. However, because single beds do not persist across the entire coal field, the recognition of key beds and their equivalents is necessary to establish a stratigraphic framework to which coal beds can be referred for purposes of correlation. Key beds are commonly massive zones of wide extent--the most important are the Kendrick Shale, Magoffin, and Stoney Fork Members of the Breathitt Formation. These stratigraphic units are above stream level over much of the coal field, and their regional continuity has been demonstrated by mapping. Key beds may also be commercial coal beds that have wide extent, such as the Princess No. 3 and its correlatives, or the Fire Clay coal bed, which contains a distinctive flint-clay parting (table 1). Finally, sandstone members of the Lee and Breathitt Formations are important stratigraphic datums for local and regional correlation. In summary, key stratigraphic units are widely distributed sandstone members all constitute the stratigraphic framework by which locally important commercial coal beds are correlated across the eastern Kentucky coal field.

Broad drainage divides between major rivers in eastern Kentucky make correlation of coal beds below the Van Lear coal bed and its equivalents difficult; few detailed drill hole descriptions are available in those areas. However, two important datums have been demonstrated in the lower part of the section: the Zachariah and Gray Hawk coal beds and their equivalents. Correlation of the Zachariah and its equivalents is based in part upon comparison of measured sections and sparse drill hole data, and in part upon the correlation of an overlying massive zone found locally along the western margin of the coal field, with the Casselman Limestone of White (1885) in the Big Sandy district. The correlation of the Gray Hawk coal bed and its equivalents is based upon the fact that these coal beds contain the stratigraphically highest observed occurrences in eastern Kentucky of the microfossil *Schizophoria* zone of Mississippian to Middle Pennsylvanian age (Robert Koenke, oral commun., 1978).

Table 1 lists most of the stratigraphic names of Pennsylvanian age used in eastern Kentucky, and is concerned principally with coal names used in publications since about 1950, especially all of the coal names that identify calculated resources and reserves. In general, coal names listed in this table represent coal beds that have been mined either commercially or for local use by residents of the area. Not every coal bed listed under a district in table 1 is found in all parts of that district, nor has every coal bed been given a name. The main source of names used in the construction of table 1 is the almost 200 geologic reports of the Geologic Quadrangle (GQ) Map Series of the U.S. Geological Survey (USGS), published as a result of the cooperative geological mapping program of the USGS and the Kentucky Geological Survey. (This endeavor was begun in 1960 and completed in 1978.) The GQs, at a scale of 1:24,000, present limited descriptions of the local stratigraphy and identify many coal beds by both local and regional names. Additional sources of stratigraphic information and coal bed names used in the construction of table 1 include USGS bulletins dealing with the coal resources of particular 7.5-minute quadrangles (England, 1955; Adkison, 1957; Welch, 1958; Bergin, 1963) and the coal resources of eastern Kentucky as a whole (Huddle and others, 1963), and USGS professional papers (Huddle and England, 1966; England, 1968) that are comprehensive reports on the stratigraphy and coal resources of significant areas in eastern Kentucky. Members of both the USGS and Kentucky Geological Survey contributed valuable information and suggestions used in compiling this report; in particular, Gary Harmed of the Kentucky Geological Survey made many helpful suggestions with respect to the coal names in the Harlan subdistrict.

Table 2 lists coal bed names that are used in relatively small areas within the coal districts. These local names are from a variety of sources, including field notes utilized in preparation of USGS Bulletin 1129 (Huddle and others, 1963), and field reports of the Kentucky Geological Survey Coal Section. The names have been used mainly in oral communication between coal specialists; their usage in published reports has been very limited.

Figure 1 illustrates representative generalized sections in different parts of the coal field that were selected to show the continuity of some coal beds as well as the thickening of Pennsylvanian strata from the northern part of the area southwestward. Because the Pennsylvanian rocks of eastern Kentucky are characterized by rapid lateral changes in lithology, single sections are representative of only small areas; descriptions of stratigraphy in given areas are published in the relevant reports of the GQ Map Series.

Sandstone members of the Lee Formation provide important stratigraphic datums for correlations. These include the Bee Rock, Nease, Rockcastle, and Corbin Sandstone Members. The continuity of the Corbin Sandstone Member of the Lee Formation has been demonstrated by mapping; however, it pinches out to the southeast and is present only in sections 1 and 2 of figure 1. The upper sandstone member of the Lee Formation in the Big Sandy district is partly or wholly equivalent to the Nease and Bee Rock Sandstone Members of the Upper Cumberland district. England (1968, p. 5) has shown by subsurface data that the Nease Sandstone Member is in part equivalent to the Rockcastle Sandstone Member of the Lee Formation. The Rockcastle Sandstone Member pinches out to the northwest, and analyses of available data suggest that it or its equivalents do not extend into the areas of sections 1 and 2 of figure 1.

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SERIES FORMATION	UPPER PENNSYLVANIAN MONONGAHELA					BREATHITT					LOWER AND MIDDLE PENNSYLVANIAN					UPPER MISSISSIPPIAN OR LOWER PENNSYLVANIAN LEE OR OLIVER ROCKS				
	PRINCESS DISTRICT	LICKING RIVER DISTRICT	HAZARD DISTRICT	SOUTHWESTERN DISTRICT	BIG SANDY DISTRICT	UPPER CUMBERLAND DISTRICT														
						Harlan Subdistrict					Middleboro Subdistrict									
(Eroded)																				
Amy Limestone Member																				
Brush Creek Limestone Member																				
Princess No. 10 or Brush Creek coal bed																				
Princess No. 7																				
Princess No. 8 or Upper Kinnaming coal bed																				
Princess No. 7 or Middle Kinnaming coal bed																				
Princess No. 6 or Lower Kinnaming coal bed																				
Hindins clay bed																				
Tompat Limestone 5																				
Princess Nos. 5A and 5B coal beds																				
Kilgore Flint 3																				
Princess No. 5, Richardson, or No. 5 Block coal zone																				
Princess No. 4, Bross, or Trenchhill coal zone																				
Princess No. 3, Madsen, or Niddall coal bed																				
Hazard coal bed																				
Haddix coal zone																				
Magoffin Member																				
Taylor coal zone																				
Hamlin coal zone																				
Fire Clay - Whitesburg coal zone																				
Kendrick Shale Member 4																				
Williamsen, Gun Creek, or Cannel City coal bed																				
Van Lear, Tom Cooper, or Little Caney coal bed																				
Grassy or Hopewell coal bed																				
Brain or Wolf Creek coal bed																				
Onyon sandstone bed																				
Wheelerburg coal bed																				
Marine zone (fossiliferous sandstone)																				
Zachariah coal bed																				
Van Clave coal bed																				
Sandstone Member																				
Gray Hawk or Mine Fork coal bed																				
Beatwell or Mam Fork coal bed																				
Anthony coal bed																				
Olive Hill clay bed 2																				

- Name used for coal bed in adjacent areas
- As used by Phalen (1912)
- Of Cavaron and Fenn (1968)
- Formerly Kendrick Shale of Jillson (1920)
- Of Crider (1913)
- Of local usage (Johnston, 1962)
- Formerly Lost Creek Limestone of Morse (1931)
- Of Morse (1931)
- The name Hazard No. 5A was originally applied to a coal bed in the Haddix coal zone; it is generally used in most parts of the hazard coal reserve district to indicate the lowermost coal bed of the Hazard coal zone.
- Includes the Salt Lick Beds of Morse (1931)
- The name Moss has been used locally (Puffett, 1963) and regionally (Lyons, 1963) as a correlative of the Upper Elkhorn No. 3 coal bed.
- Of White (1885)
- Of Hennen and Reger (1914)
- Of White (1891)
- The Limestone and Pardoe coal beds locally come together to form a single coal bed where the Jesse Sandstone is not present.
- The Higgin coal bed has locally been called the Pewee coal bed in Tennessee; however, the Pewee is probably equivalent to the Red Springs coal bed of the Middleboro subdistrict.

Table 1.--Correlation of named coal beds, coal zones, key beds, and other selected rock stratigraphic units of Pennsylvanian age by coal reserve district and subdistrict. Sandstone members are shown in their general stratigraphic positions and may not be equivalent in age to adjacent stratigraphic units. Uncorrelated strata are left blank. Members of the Lee Formation are stippled. Key marine zones are marked by alined-dot pattern.

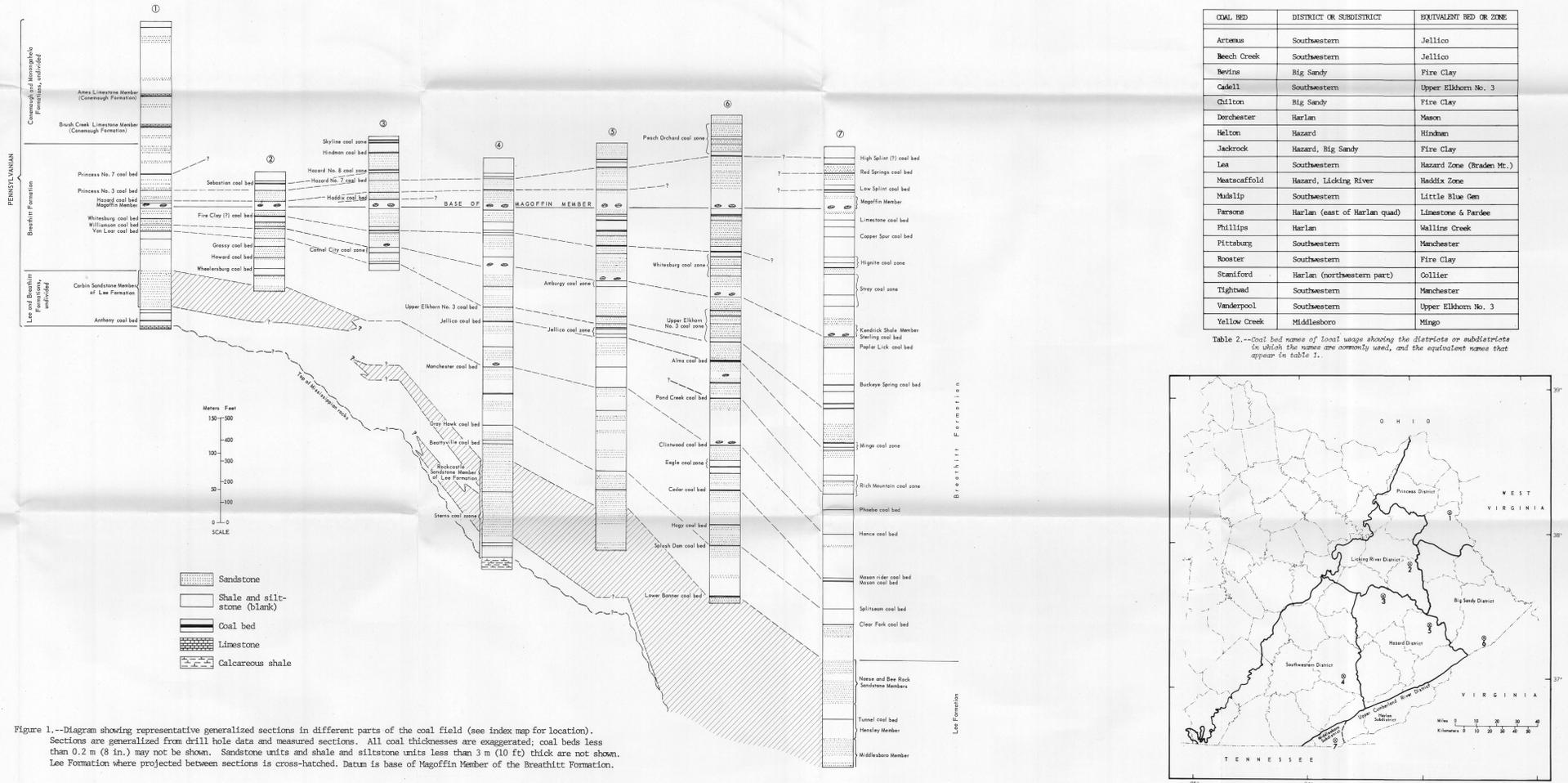
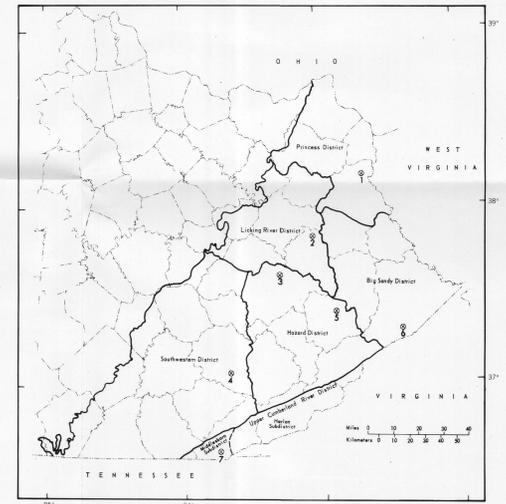


Figure 1.--Diagram showing representative generalized sections in different parts of the coal field (see index map for location). Sections are generalized from drill hole data and measured sections. All coal thicknesses are exaggerated; coal beds less than 0.2 m (8 in.) may not be shown. Sandstone units and shale and siltstone units less than 3 m (10 ft) thick are not shown. Lee Formation where projected between sections is cross-hatched. Datum is base of Magoffin Member of the Breathitt Formation.

COAL BED	DISTRICT OR SUBDISTRICT	EQUIVALENT BED OR ZONE
Artemus	Southwestern	Jellico
Beech Creek	Southwestern	Jellico
Berine	Big Sandy	Fire Clay
Cadell	Southwestern	Upper Elkhorn No. 3
Chilton	Big Sandy	Fire Clay
Dorchester	Harlan	Nease
Helton	Hazard	Hindins
Jackrock	Hazard, Big Sandy	Fire Clay
Lea	Southwestern	Hazard Zone (Bradon Mt.)
Meatscaffold	Hazard, Licking River	Haddix Zone
Mabilip	Southwestern	Little Blue Gem
Farnsons	Harlan (east of Harlan quad)	Limestone & Pardoe
Phillips	Harlan	Wallins Creek
Pittsburg	Southwestern	Manchester
Roostar	Southwestern	Fire Clay
Stanford	Harlan (northwestern part)	Gollier
Tighnand	Southwestern	Manchester
Vanderpool	Southwestern	Upper Elkhorn No. 3
Yellow Creek	Middleboro	Mingo

Table 2.--Coal bed names of local usage showing the districts or subdistricts in which the names are commonly used, and the equivalent names that appear in table 1.



Index map showing the coal reserve districts and subdistricts of the eastern Kentucky coal field. Numbers indicate locations of measured sections and drill hole sections shown in figure 1.

CORRELATION OF COAL BEDS, COAL ZONES, AND KEY STRATIGRAPHIC UNITS IN THE PENNSYLVANIAN ROCKS OF EASTERN KENTUCKY

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