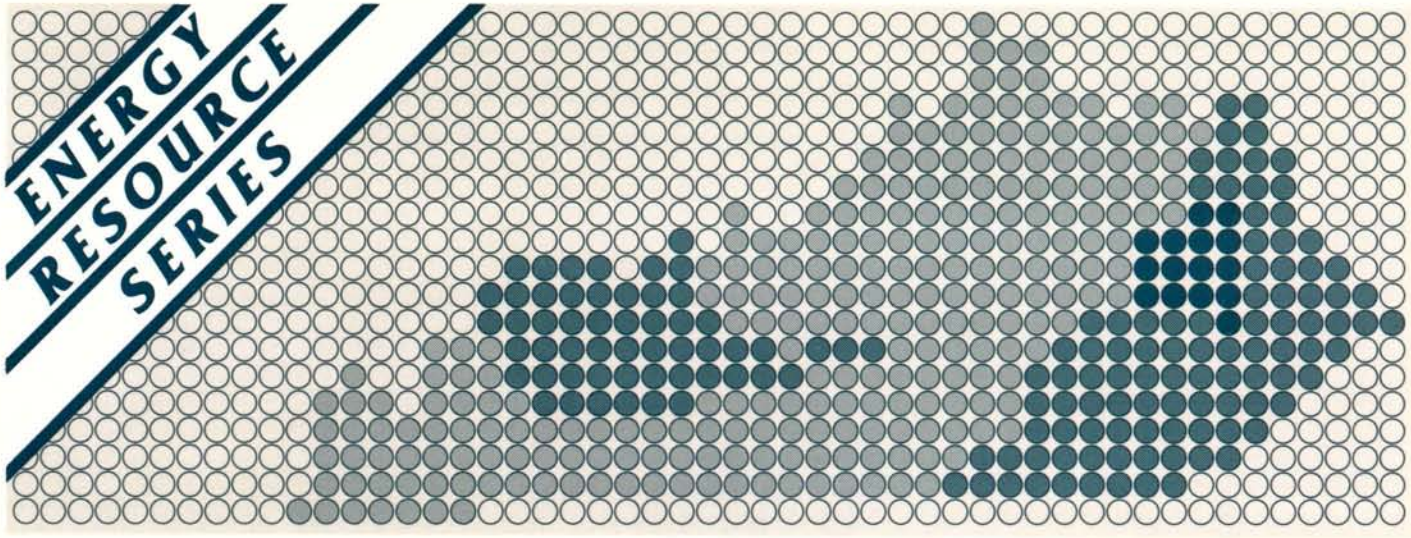

COAL RESOURCES OF THE LICKING RIVER DISTRICT, KENTUCKY

Elliott, Magoffin, Morgan, and Wolfe Counties and the coal bearing portions of Menifee and Powell Counties

Russell A. Brant, Principal Investigator

Donald R. Chesnut, Wayne T. Frankie, and Elisabeth R. Portig, Geologists
Kentucky Geological Survey

Work performed by the Kentucky Geological Survey
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COAL RESOURCES OF THE LICKING RIVER DISTRICT
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and Elisabeth R. Portig

PREFACE

"Coal Resources of the Licking River District, Kentucky," is published as part of the Commonwealth-sponsored energy research and development program under the auspices of the Kentucky Energy Cabinet (KEC). This report is the fourth in the Energy Resource Series published by the University of Kentucky Institute for Mining and Minerals Research (IMMR), with the Kentucky Geological Survey (KGS). It summarizes the coal resources of the Licking River District (Elliott, Morgan, Magoffin, Wolfe, and parts of Menifee and Powell Counties) of the Eastern Kentucky Coal Field as calculated by the Kentucky Geological Survey. Tonnage estimates for the individual coal beds in the district are presented in tabular form, along with resource maps of the major coal beds. This work represents part of an ongoing resource assessment of the coal resources of Kentucky, which began in 1976 with a grant from the Kentucky Department of Energy through the IMMR. For more information, contact:

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Donald R. Chesnut coordinated field work and maintained files after the retirement of J. Hiram Smith in 1981, and Elisabeth R. Portig supervised data processing, planimetering, and tabulation of estimates. Wayne T. Frankie supervised preparation of summary maps. The project was augmented by the services of geologists Richard Smath and Ernie Slucher and geological aides Effie Grossnickle, Ann Schreiber, and Kelly Waymire. Freda Harris, draftsperson of the Kentucky Geological Survey staff, assisted in the preparation of the summary base maps and Ralph Palumbo, project draftsman, and Sara Evans Baxter completed the final drafting, and Norma Reynolds typed the tables. James C. Cobb provided technical and editorial review and Margaret Luther edited the manuscript. Final preparation and layout work for publication were completed by Rhonda Pettit, Publications Manager; Betty Gee, Typesetter; Susan Hudak, Editor; Kathleen Sauer, Senior Graphic Artist; and Camille Weber, Graphic Artist of the University of Kentucky Institute for Mining and Minerals Research. Russell A. Brant was Principal Investigator for the project.

This work was supported in part by a grant from the Kentucky Energy Cabinet through the University of Kentucky Institute for Mining and Minerals Research. Additional support for the work was provided by the U.S. Geological Survey under U.S. Department of Interior Grant No. MOU-9420-004 as part of the National Coal Resources Data System.

CONTENTS

ABSTRACT

The Licking River District contains an estimated 3.59 billion short tons of original coal resources. Remaining coal resources (as of January 1, 1981) total an estimated 3.50 billion short tons. The coal resources are tabulated by standard U.S. Geological Survey resource classes. Of the 26 mineable coal beds (14 inches thick or greater) that are known to occur in the district, 10 contain more than 90 percent of the estimated coal. Magoffin County contains 1.92 billion tons or 55 percent of the coal estimated for the district, followed by Morgan, which contains 0.82 billion tons or 23 percent of the district total. Wolfe County contains an estimated 0.44 billion tons or 12 percent, and Elliott County 0.30 billion tons or 9 percent. Menifee and Powell Counties contain only minor amounts of coal.

INTRODUCTION

The Licking River District occupies 1,400 square miles and includes all of Elliott, Morgan, Magoffin, and Wolfe Counties and the coal-bearing portions of Menifee and Powell Counties. Small hilltop areas in Rowan, Montgomery, and Bath Counties contain Pennsylvanian rocks, but no mineable coal was found. This area is covered by all or parts of 40 7½-minute quadrangle maps (scale: 1:24,000) (Fig. 1 and Table 1). Numerous names are applied to coal beds within the district. Rice and Smith (1980) showed correlation of the principal coal beds, coal zones, and key horizons for the Eastern Kentucky Coal Field by district. Figure 2 shows the stratigraphic sequence and the generally applied names for the principal coal beds of the Licking River District. This generalized chart of the sequence depicts only the potential of coal and other rocks in the district and does not reveal the nature of the rock column for any specific locality. Detail and refinement of geologic description can be found on the geologic quadrangle map series published for the district by the U.S. Geological Survey.

Table 1. Licking River District quadrangles contained all or in part by district boundary.

Ault	Ivyton	Salyersville S.
Bangor	Jackson	Sandy Hook
Bruin	Landsaw	Scranton
Campton	Lee City	Seitz
Cannel City	Lenox	Slade*
Cobhill	Martin	Soldier*
David	Mazie	Stanton*
Dingus	Means	Tallega
Ezel	Morehead*	Tiptop
Frenchburg*	Oil Springs	West Liberty
Guage	Olive Hill	White Oak
Haldeman*	Pomeroyton	Willard
Handshoe	Redbush	Wrigley*
Hazel Green	Salt Lick*	Zachariah
Isonville	Salyersville N.	

*No coal of mineable extent found.

Regional coal resource estimates are by their nature very broad in scope, less detailed, and thus more general than are coal reserve estimates. The objective of the regional assessment is to describe the coal by mapping the coal beds, showing their areal extent and thickness variation, and estimating the quantities of coal in each bed by thickness and reliability category in each quadrangle. Data are summarized on regional maps and quantities are tabulated by county, bed, thickness, and reliability. The primary factors for these determinations are the correlation (accurate identification of beds), coal bed extent, and thickness measurements. Coal reserves, on the other hand, apply to that part of the resource or specific coal body that is economically (profitably) recoverable under prevailing market conditions. Technical factors include the character of the roof rock, thickness and range, mining method, inclination, interruption by channel cutouts, and the quality of the coal. Determination of these factors for consideration prior to mining requires an

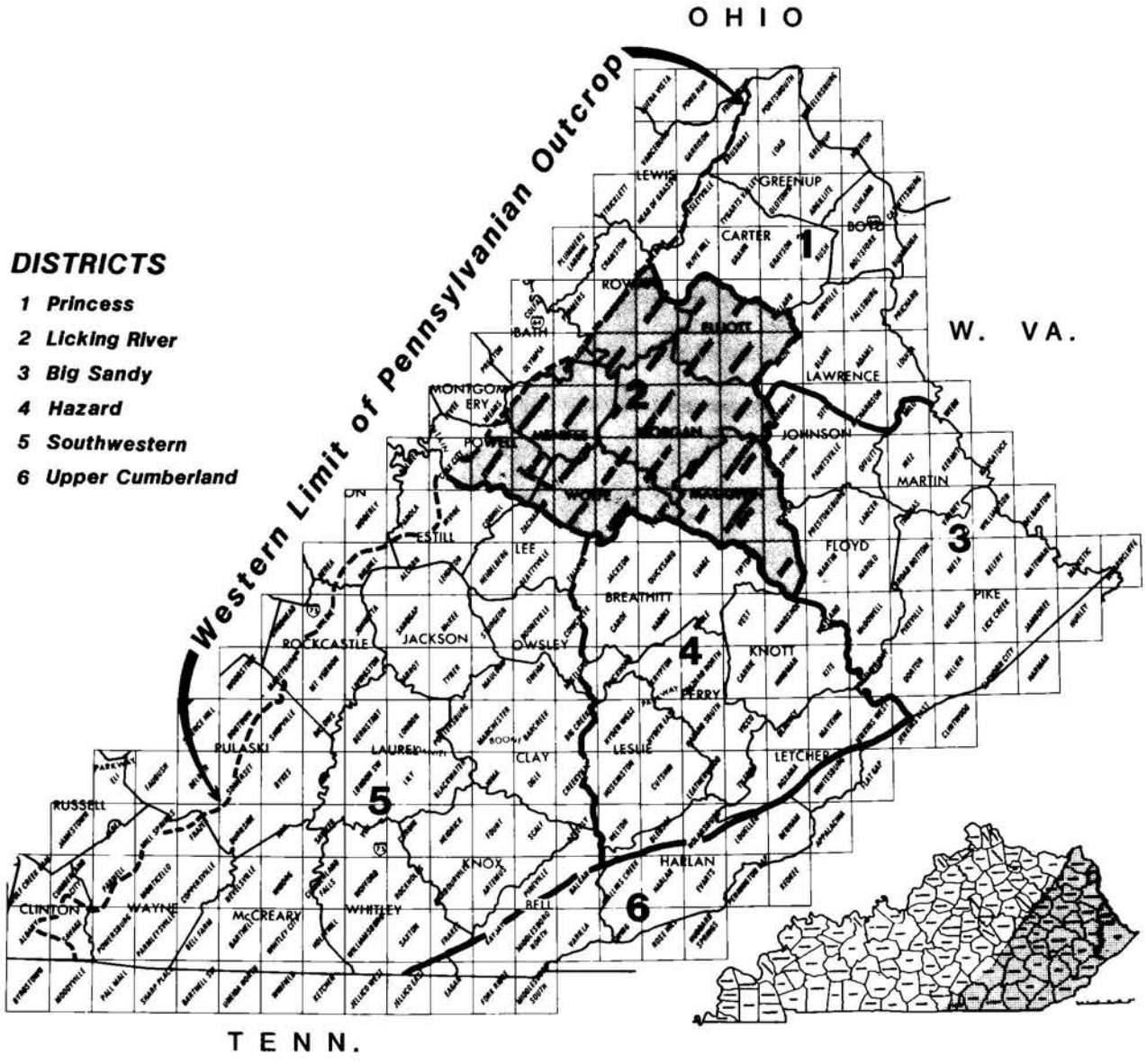

Figure 1. Coal districts in the Eastern Kentucky Coal Field. The Licking River District includes Elliott, Magoffin, Menifee, Morgan, Powell, and parts of Rowan, Montgomery, and Bath Counties.

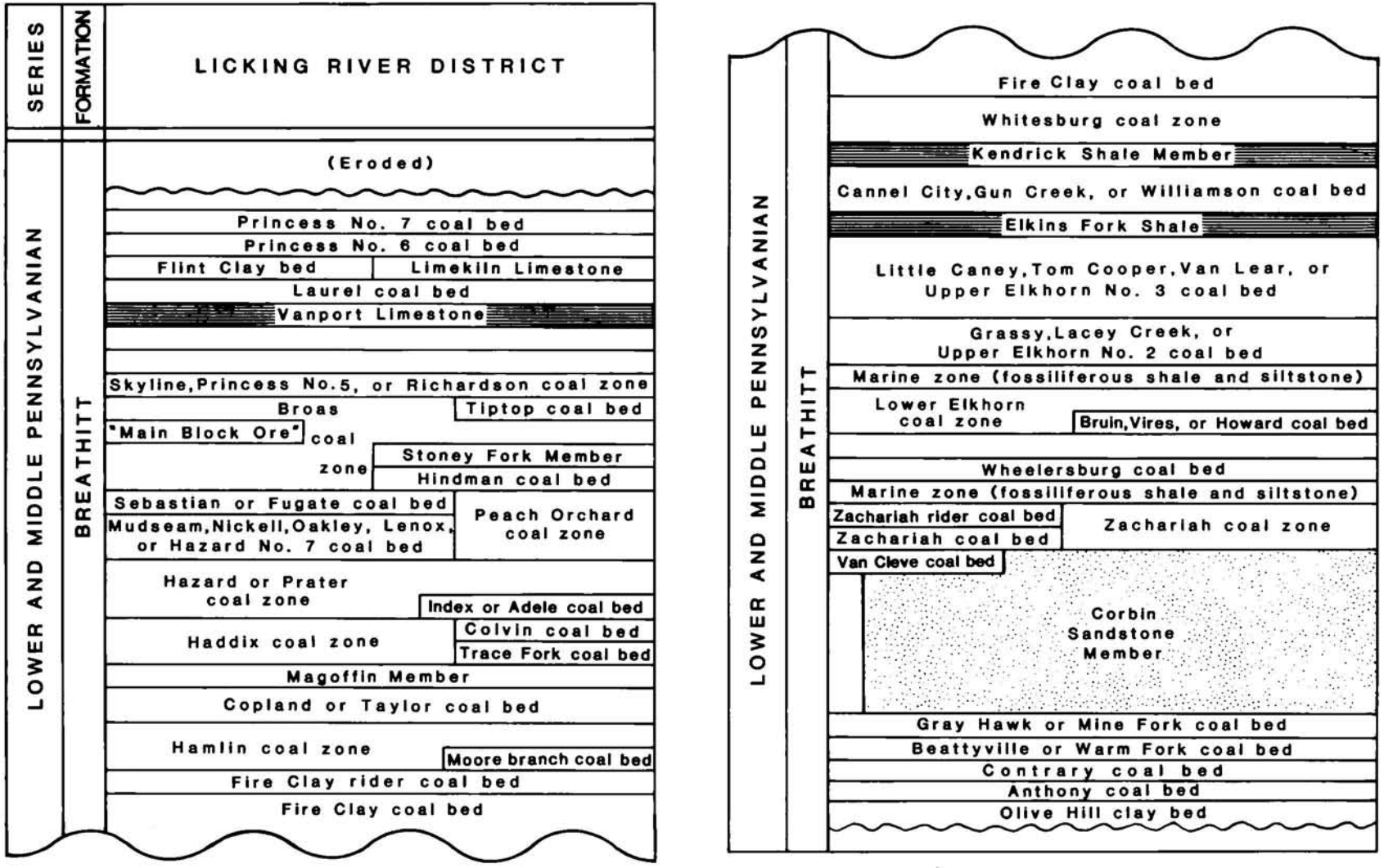

Figure 2. Key stratigraphic units of the Licking River District, from Rice and Smith (1980).

abundance of closely spaced observations of a specific coal body (and its enclosing rocks) or area, usually from drill core descriptions. Some economic factors in coal reserves consideration include costs of mining, preparation, labor, and transportation. Coal reserve considerations are focused on relatively small, specific parts of a coal bed or area in order to assess the success potential of a mining venture. Detail such as that outlined above is outside the scope of this investigation. The coal resources reported here are based on studies of individual coal beds as they occur in the district, and the data from each coal bed estimate is tabulated by bed, county, and district. These estimates are based on correlation of coal beds, extent, and thickness, and provide a regional knowledge of the occurrence and trends of each bed. Coal resource estimates are based on more widely spaced data points and fewer considerations than are needed for reserves considerations. Resource information is valuable to government, industry, business, and individuals, for planning, exploration, resource policy, and regulation decisions.

METHODS

Tonnage of coal in a given area is calculated by applying the following formula: area in acres multiplied by the thickness of the coal in feet times (x) 1,800 tons per acre foot. An acre foot is 1 foot of thickness over 1 acre of area. The density of bituminous coal is 1,800 tons per acre foot. Although the density of coal varies, the 1,800 tons per acre figure is considered satisfactory in estimating Kentucky coal resources. As may be seen, density and area are fixed or readily found factors, but thickness is variable and can lead to significant differences between estimated and true tonnage.

Thickness characteristics of the individual coal beds are projected by use of isopach lines. These lines are drawn through points of equal thickness. These points are determined by extrapolation or interpolation from points of measurement of the coal bed. Coal thickness data are plotted on work maps of 7.5-minute area at a scale of 1:24,000. Standard isopach lines are drawn to represent coal thickness in increments of 14 inches beginning with the 14 inch line; additional lines are drawn at 28 inches, 42 inches, 56 inches, etc., to accommodate the thickness data. Similar intervervals were employed for reporting coal resources in the district by Huddle and others (1963), but all coal estimated in categories greater than 42 inches was compiled into the 42-inch category. This report lists the thicker class of 56 inches and greater. Other reports in the district (Adkinson and Johnson, 1963; Bergin, 1962) reflect the standard usage, with thicker categories summed into the 42 inch and greater category, and conform to U.S. Geological Survey (1976a, 1976b, 1980) classification. Coal less than 14 inches thick is excluded from resource estimation. Midpoint values between standard isopachs are used for tonnage calculation (21 inches, 35 inches, 49 inches, etc.). When calculations are based on inch measurements, a factor of 150 tons per acre inch is used for density.

In preparing coal resource estimates, a system of reliability classification (U.S. Geological Survey, 1976a, 1976b, 1980; Wood and others, 1983) is used to account for the concealed portions of a coal bed between points of measured coal thickness. The degree of confidence given to a resource estimation decreases with distance from a point of measured coal thickness. Coal estimated within a ¼-mile radius of a measured thickness is considered to have the highest reliability and is termed "measured resource"; coal estimated between ¼ and ¾ mile from the point of measurement is termed "indicated resource"; and estimates of coal between ¾ mile to 3 miles are termed "inferred resource" and have the lowest reliability of the three.

The estimated original coal resource accounts for coal prior to mining. The remaining coal resource is determined by subtracting the coal produced and lost in mining from the original coal resource. Coal lost in mining is considered to equal the coal produced. This approximation is based on the premise that only half of the coal is recovered; the other half is left in the ground as pillar support or lost in the cleaning process. This factor includes losses incurred by augering and hillside strip mining. Production figures are from Currens and Smith (1976) and annual reports of the Kentucky Department of Mines and Minerals, 1976-80.

COAL RESOURCES

The Licking River District contains an estimated 3.59 billion tons of original coal resource and an estimated 3.50 billion tons of remaining resource. These resources are found in 26 beds. Table 2 presents summaries of the estimates of the individual beds in stratigraphic order by county for the district.

Table 3 is a summary of the estimated original coal resources for the Licking River District. Appendix I lists the estimated resource by county, coal bed, thickness, and reliability class.

Coal in the 14-28 inch class accounts for 75 percent of the total estimated resource; that in the 28-42 inch class constitutes 20 percent. Coal in the 42-56 inch class is 4 percent of the total and coal greater than 56 inches accounts for 1 percent. Measured coal is 7 percent of the estimate, indicated coal, 27 percent, and inferred coal is 66 percent of the estimated original coal.

Nine coal beds in the district contain nearly 90 percent of the estimated original resource. Seven of the principal beds are shown in Appendix II. The Peach Orchard, with three separate benches, is the most extensive and contains 646.50 million tons; the Hazard follows with 586.45 million tons; other beds illustrated contain from 114.71 million to 339.46 million tons of estimated coal resource.

Huddle and others (1963) estimated 2.17 billion tons of coal resources for the district. The estimate in this study reports 3.60 billion tons, an additional 1.43 billion tons, or an increase of 66 percent over the previous estimate. The major factors accounting for this difference are the availability of 7.5-minute geologic quadrangle maps, published by the U.S. Geological Survey in cooperation with the Kentucky Geological Survey, which show outcrops, and the 1,967 coal thickness measurements from recent field work. Both of these factors contributed to a more extensive estimation than was feasible in the 1963 estimate.

Table 2. Estimated Coal Resources of the Licking River District, Kentucky. (in millions of short tons)

Coal Bed	Elliott	Magoffin	Menifee	Morgan	Powell	Wolfe	Total
Princess #7	7.97						7.97
Princess #6	17.66						17.66
Unnamed				0.25			0.25
Laurel	6.09			15.40			21.49
Skyline (Princess #5)	19.14	15.91				0.22	35.27
Tiptop		20.35					20.35
Broas	27.01	49.39		33.73		4.58	114.71
Peach Orchard (Princess #3)	12.66	424.48		170.29		39.07	646.50
Hazard	113.88	270.29		148.41		53.87	586.45
Haddix		145.97		15.40		46.85	208.22
Taylor		15.67		8.68			24.35
Hamlin		310.24		14.97		2.87	328.08
Fire Clay Rider		26.95				2.71	29.66
Fire Clay	26.57	233.51		88.71		13.52	362.31
Whitesburg	2.44	82.86		10.41		54.64	150.35
Cannel City	31.86	140.09		105.34		78.22	355.51
Little Caney (Upper Elkhorn #3)	34.75	191.42		146.50		26.79	399.46
Grassy (Upper Elkhorn #2)	6.78	22.17	0.11	88.20		43.45	160.71
Upper Elkhorn #1	9.51	0.85					10.36
Lower Elkhorn (Vires)		2.05		0.02		34.52	36.59
Wheelersburg		16.06					16.06
Zachariah					0.21	32.01	32.22
Van Cleve						9.85	9.85
Gray Hawk		0.84	0.24	3.09	0.28	0.34	4.79
Beattyville			10.18		0.27		10.45
Contrary						0.41	0.41
Total Original Coal	316.32	1,969.10	10.53	849.40	0.76	443.92	3,590.03
Mined & Lost*	13.82	47.78	0.83	24.53	0.04	5.67	92.67
Remaining Coal	302.50	1,921.32	9.70	824.87	0.72	438.25	3,497.36
% Coal Remaining	96%	98%	92%	97%	95%	99%	97%

*As of January 1, 1981 (Production from Currens and Smith, 1976, and Kentucky Department of Mines and Minerals—Includes coal left in pillars and lost in cleaning.)

Table 3. Estimated Original Coal Resources of the Licking River District. (in millions of short tons)

RELIABILITY	THICKNESS CLASS (in inches)				
CLASS	14 - 28	28 - 42	42 - 56	56 +	TOTAL
Measured	136.68	71.28	21.95	7.20	**237.11**
Indicated	645.17	252.85	61.90	18.75	**978.67**
Inferred	1,916.28	393.32	59.23	5.42	**2,374.25**
TOTAL	**2,698.13**	**717.45**	**143.08**	**31.37**	**3,590.03**

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APPENDIX I:
Coal Resources of the Licking River District, Kentucky

(Elliott, Magoffin, Wolfe, and Portions of Menifee and Powell Counties)
listings by county, coal bed, and thickness and reliability categories, thickness classes in inches and tonnages in millions of short tons

Elliott County

Original Resources in Millions of Tons

PRINCESS NO. 7

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.38	0.70			1.08
Indicated	1.33	2.54			3.87
Inferred	0.32	2.70			3.02
Total	2.03	5.94			7.97

PRINCESS NO. 6

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.01	0.18	0.64	0.33	1.16
Indicated		1.57	1.00	0.23	2.80
Inferred	2.42	9.79	1.49	0.00	13.70
Total	2.43	11.54	3.13	0.56	17.66

LAUREL

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.06	0.06	0.04	0.57	0.73
Indicated	0.28	0.23	0.56	1.31	2.38
Inferred	0.55	0.47	1.07	0.89	2.98
Total	0.89	0.76	1.67	2.77	6.09

PRINCESS NO. 5

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.04				0.04
Indicated	0.51				0.51
Inferred	4.58				4.58
Total	5.13				5.13

SKYLINE

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.05				0.05
Indicated	0.04	0.61			0.65
Inferred	9.95	3.36			13.31
Total	10.04	3.97			14.01

Elliott County, continued

BROAS

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.27	0.09			0.36
Indicated	1.93	0.39			2.32
Inferred	17.42	6.91			24.33
Total	19.62	7.39			27.01

PEACH ORCHARD

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured					
Indicated	0.47	0.23			0.70
Inferred	10.92	1.04			11.96
Total	11.39	1.27			12.66

HAZARD

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	2.36	5.41	1.21		8.98
Indicated	13.64	22.03	4.04		39.71
Inferred	34.80	26.65	3.74		65.19
Total	50.80	54.09	8.99		113.88

FIRE CLAY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	2.49	0.59			3.08
Indicated	9.07	1.61			10.68
Inferred	11.54	1.27			12.81
Total	23.10	3.47			26.57

WHITESBURG

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.30				0.30
Indicated	2.14				2.14
Inferred					
Total	2.44				2.44

Elliott County, continued

CANNEL CITY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.27	0.43			0.70
Indicated	4.97	0.57			5.54
Inferred	25.62				25.62
Total	30.86	1.00			31.86

LITTLE CANEY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	2.58	0.22			2.80
Indicated	12.34				12.34
Inferred	18.93	0.68			19.61
Total	33.85	0.90			34.75

GRASSY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.77				0.77
Indicated	3.08				3.08
Inferred	2.93				2.93
Total	6.78				6.78

VIRES

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	2.10				2.10
Indicated	5.43				5.43
Inferred	1.98				1.98
Total	9.51				9.51

ELLIOTT COUNTY TOTALS

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	11.68	7.68	1.89	0.90	22.15
Indicated	55.23	29.78	5.60	1.54	92.15
Inferred	141.96	52.87	6.30	0.89	202.02
Total	208.87	90.33	13.79	3.33	316.32

Magoffin County

Original Resources in Millions of Tons

SKYLINE

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.53	0.12	0.11	0.09	0.85
Indicated	1.17	0.77	0.42	0.47	2.83
Inferred	2.35	6.12	3.63	0.13	12.23
Total	4.05	7.01	4.16	0.69	15.91

TIPTOP

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.10	0.98	0.16		1.24
Indicated	0.58	2.83	0.05		3.46
Inferred	2.06	13.59			15.65
Total	2.74	17.40	0.21		20.35

BROAS

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.71	3.18	1.66	0.43	5.98
Indicated	3.99	4.87	4.39	0.39	13.64
Inferred	22.99	5.41	1.37		29.77
Total	27.69	13.46	7.42	0.82	49.39

PEACH ORCHARD

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	8.71	14.79	5.26	0.75	29.51
Indicated	41.73	61.13	13.28	6.07	122.21
Inferred	137.76	115.82	17.70	1.48	272.76
Total	188.20	191.74	36.24	8.30	424.48

HAZARD

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	5.52	8.04	6.97	3.19	23.72
Indicated	24.87	36.34	28.01	6.28	95.50
Inferred	73.61	51.68	25.60	0.18	151.07
Total	104.00	96.06	60.58	9.65	270.29

Magoffin County, continued

HADDIX

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	3.46	0.90	1.45		5.81
Indicated	19.60	9.33	1.49		30.42
Inferred	81.08	28.63	0.03		109.74
Total	104.14	38.86	2.97		145.97

TAYLOR

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.70	0.58			1.28
Indicated	6.93	0.39			7.32
Inferred	7.07				7.07
Total	14.70	0.97			15.67

HAMLIN

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	7.77	2.30	0.27	0.20	10.54
Indicated	59.11	7.09	0.25		66.45
Inferred	229.47	3.78			233.25
Total	296.35	13.17	0.52	0.20	310.24

FIRE CLAY RIDER

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	1.19				1.19
Indicated	7.69				7.69
Inferred	18.07				18.07
Total	26.95				26.95

FIRE CLAY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	22.04	8.01	1.01		31.06
Indicated	77.47	21.64	0.26		99.37
Inferred	94.80	8.28			103.08
Total	194.31	37.93	1.27		233.51

WHITESBURG

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	7.75	2.33	0.45		10.53
Indicated	26.10	6.54	0.10		32.74
Inferred	35.49	4.10			39.59
Total	69.34	12.97	0.55		82.86

CANNEL CITY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	6.87	2.36			9.23
Indicated	26.51	5.52			32.03
Inferred	98.81	0.02			98.83
Total	132.19	7.90			140.09

LITTLE CANEY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	9.95	1.60			11.55
Indicated	44.98	4.51			49.49
Inferred	129.49	0.89			130.38
Total	184.42	7.00			191.42

GRASSY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	2.66	0.06			2.72
Indicated	10.14				10.14
Inferred	8.37	0.94			9.31
Total	21.17	1.00			22.17

UPPER ELKHORN NO. 1

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.42				0.42
Indicated	0.43				0.43
Inferred					
Total	0.85				0.85

Magoffin County, continued

VIRES

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.65				0.65
Indicated	1.37				1.37
Inferred	0.03				0.03
Total	2.05				2.05

WHEELERSBURG

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.45				0.45
Indicated	3.47				3.47
Inferred	12.14				12.14
Total	16.06				16.06

MINE FORK

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	0.51				0.51
Indicated	0.33				0.33
Inferred					
Total	0.84				0.84

MAGOFFIN COUNTY TOTALS

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56 +	Total
Measured	79.99	45.25	17.34	4.66	147.24
Indicated	356.47	160.96	48.25	13.21	578.89
Inferred	953.59	239.26	48.33	1.79	1242.97
Total	1390.05	445.47	113.92	19.66	1969.10

Menifee County

Original Resources in Millions of Tons

GRASSY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.11				0.11
Indicated					
Inferred					
Total	0.11				0.11

GRAY HAWK

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.17				0.17
Indicated	0.07				0.07
Inferred					
Total	0.24				0.24

BEATTYVILLE

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.71	0.57			1.28
Indicated	5.41	3.49			8.90
Inferred					
Total	6.12	4.06			10.18

MENIFEE COUNTY TOTALS

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.99	0.57			1.56
Indicated	5.48	3.49			8.97
Inferred					
Total	6.47	4.06			10.53

Morgan County

Original Resources in Millions of Tons

UNNAMED

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured		0.04			0.04
Indicated		0.21			0.21
Inferred					
Total		0.25			0.25

LAUREL

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.02	0.03	0.06	1.64	1.75
Indicated	0.17	0.11	0.10	4.00	4.38
Inferred	1.94	1.77	2.82	2.74	9.27
Total	2.13	1.91	2.98	8.38	15.40

BROAS

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.38	0.45			0.83
Indicated	2.32	2.27			4.59
Inferred	16.09	12.22			28.31
Total	18.79	14.94			33.73

PEACH ORCHARD

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	5.14	1.90	1.20		8.24
Indicated	24.05	8.44	5.09		37.58
Inferred	103.65	19.85	.97		124.47
Total	132.84	30.19	7.26		170.29

HAZARD

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	5.31	1.62	0.18		7.11
Indicated	23.11	4.40			27.51
Inferred	108.77	5.02			113.79
Total	137.19	11.04	0.18		148.41

Morgan County, continued

HADDIX

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured			0.07		0.07
Indicated		0.43	0.35		0.78
Inferred	8.01	6.54			14.55
Total	8.01	6.97	0.42		15.40

TAYLOR

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.60				0.60
Indicated	2.64				2.64
Inferred	5.44				5.44
Total	8.68				8.68

HAMLIN

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.62				0.62
Indicated	2.75				2.75
Inferred	11.60				11.60
Total	14.97				14.97

FIRE CLAY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	6.96	0.66			7.62
Indicated	32.77	0.65			33.42
Inferred	47.41	0.26			47.67
Total	87.14	1.57			88.71

WHITESBURG

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.69				0.69
Indicated	2.74				2.74
Inferred	6.98				6.98
Total	10.41				10.41

CANNEL CITY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	2.50	3.44			5.94
Indicated	16.66	7.59			24.25
Inferred	75.02	0.13			75.15
Total	94.18	11.16			105.34

LITTLE CANEY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	6.68	1.06			7.74
Indicated	38.26	5.74			44.00
Inferred	68.71	26.05			94.76
Total	113.65	32.85			146.50

GRASSY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	2.97	0.77			3.74
Indicated	17.94	4.38			22.32
Inferred	58.88	3.26			62.14
Total	79.79	8.41			88.20

VIRES

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured					
Indicated	0.02				0.02
Inferred					
Total	0.02				0.02

MINE FORK

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.44				0.44
Indicated	1.00				1.00
Inferred	1.65				1.65
Total	3.09				3.09

Morgan County, continued

MORGAN COUNTY TOTALS

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	32.31	9.97	1.51	1.64	45.43
Indicated	164.43	34.22	5.54	4.00	208.19
Inferred	514.15	75.10	3.79	2.74	595.78
Total	710.89	119.29	10.84	8.38	849.40

Powell County

Original Resources in Millions of Tons

ZACHARIAH

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured					
Indicated					
Inferred	0.21				0.21
Total	0.21				0.21

GRAY HAWK

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.28				0.28
Indicated					
Inferred					
Total	0.28				0.28

BEATTYVILLE

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.27				0.27
Indicated					
Inferred					
Total	0.27				0.27

POWELL COUNTY TOTALS

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.55				0.55
Indicated					
Inferred	0.21				0.21
Total	0.76				0.76

Wolfe County

Original Resources in Millions of Tons

SKYLINE

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.02				0.02
Indicated	0.06				0.06
Inferred	0.14				0.14
Total	0.22				0.22

BROAS

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.06				0.06
Indicated	0.15				0.15
Inferred	4.37				4.37
Total	4.58				4.58

PEACH ORCHARD

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.52	0.48			1.00
Indicated	3.09	0.63			3.72
Inferred	33.84	0.51			34.35
Total	37.45	1.62			39.07

HAZARD

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	1.63	1.53	0.76		3.92
Indicated	11.81	4.98	1.14		17.93
Inferred	24.52	6.87	0.63		32.02
Total	37.96	13.38	2.53		53.87

HADDIX

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.40	1.81			2.21
Indicated	3.50	6.00			9.50
Inferred	28.12	7.02			35.14
Total	32.02	14.83			46.85

Wolfe County, continued

HAMLIN

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.14	0.40			0.54
Indicated	0.69	1.64			2.33
Inferred					
Total	0.83	2.04			2.87

FIRE CLAY RIDER

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.30				0.30
Indicated	2.41				2.41
Inferred					
Total	2.71				2.71

FIRE CLAY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	1.13	0.47			1.60
Indicated	4.65	1.43			6.08
Inferred	4.68	1.16			5.84
Total	10.46	3.06			13.52

WHITESBURG

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	1.08	0.66			1.74
Indicated	6.94	3.02			9.96
Inferred	37.99	4.95			42.94
Total	46.01	8.63			54.64

CANNEL CITY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	1.03	0.81			1.84
Indicated	8.64	1.41			10.05
Inferred	65.81	0.52			66.33
Total	75.48	2.74			78.22

LITTLE CANEY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.98	0.48			1.46
Indicated	6.26	0.77			7.03
Inferred	18.30				18.30
Total	25.54	1.25			26.79

GRASSY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.95				0.95
Indicated	4.29				4.29
Inferred	37.81	0.40			38.21
Total	43.05	0.40			43.45

VIRES

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	1.55	1.17			2.72
Indicated	6.93	2.90			9.83
Inferred	21.31	0.66			21.97
Total	29.79	4.73			34.52

ZACHARIAH

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.21		0.45		0.66
Indicated	1.90	1.62	1.37		4.89
Inferred	22.28	4.00	0.18		26.46
Total	24.39	5.62	2.00		32.01

VAN CLEVE

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.54				0.54
Indicated	2.11				2.11
Inferred	7.20				7.20
Total	9.85				9.85

GRAY HAWK

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.34				0.34
Indicated					
Inferred					
Total	0.34				0.34

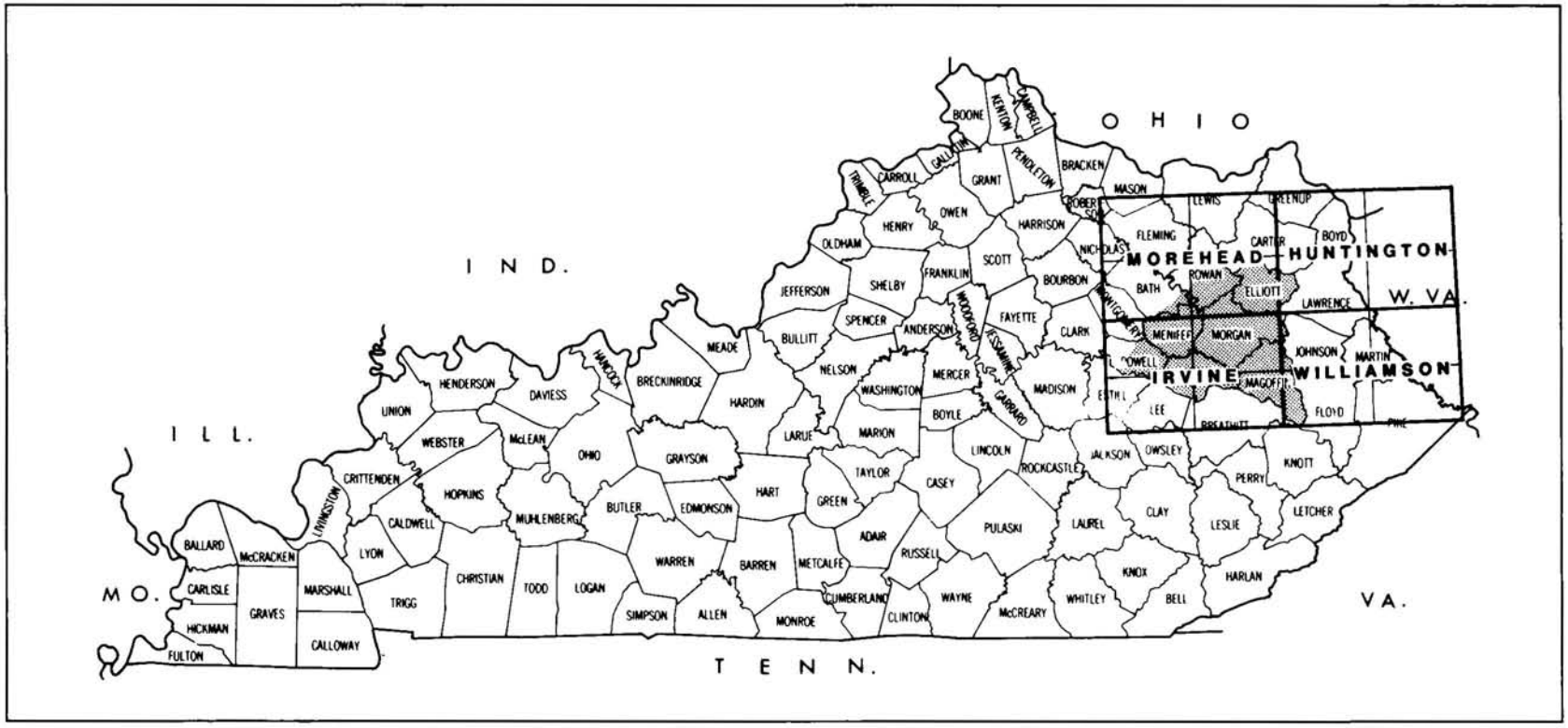
CONTRARY

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	0.28				0.28
Indicated	0.13				0.13
Inferred					
Total	0.41				0.41

WOLFE COUNTY TOTALS

Reliability Class	Thickness Class (Inches) 14-28	28-42	42-56	56+	Total
Measured	11.16	7.81	1.21		20.18
Indicated	63.56	24.40	2.51		90.47
Inferred	306.37	26.09	0.81		333.27
Total	381.09	58.30	4.53		443.92

APPENDIX II: Maps of the Principal Coal Beds of the Licking River District



Index of Licking River District, Kentucky, showing counties and areas of the 1:100,000 quadrangles. The following coal bed illustrations are on quarter segments of the named 1:100,000 quadrangles.

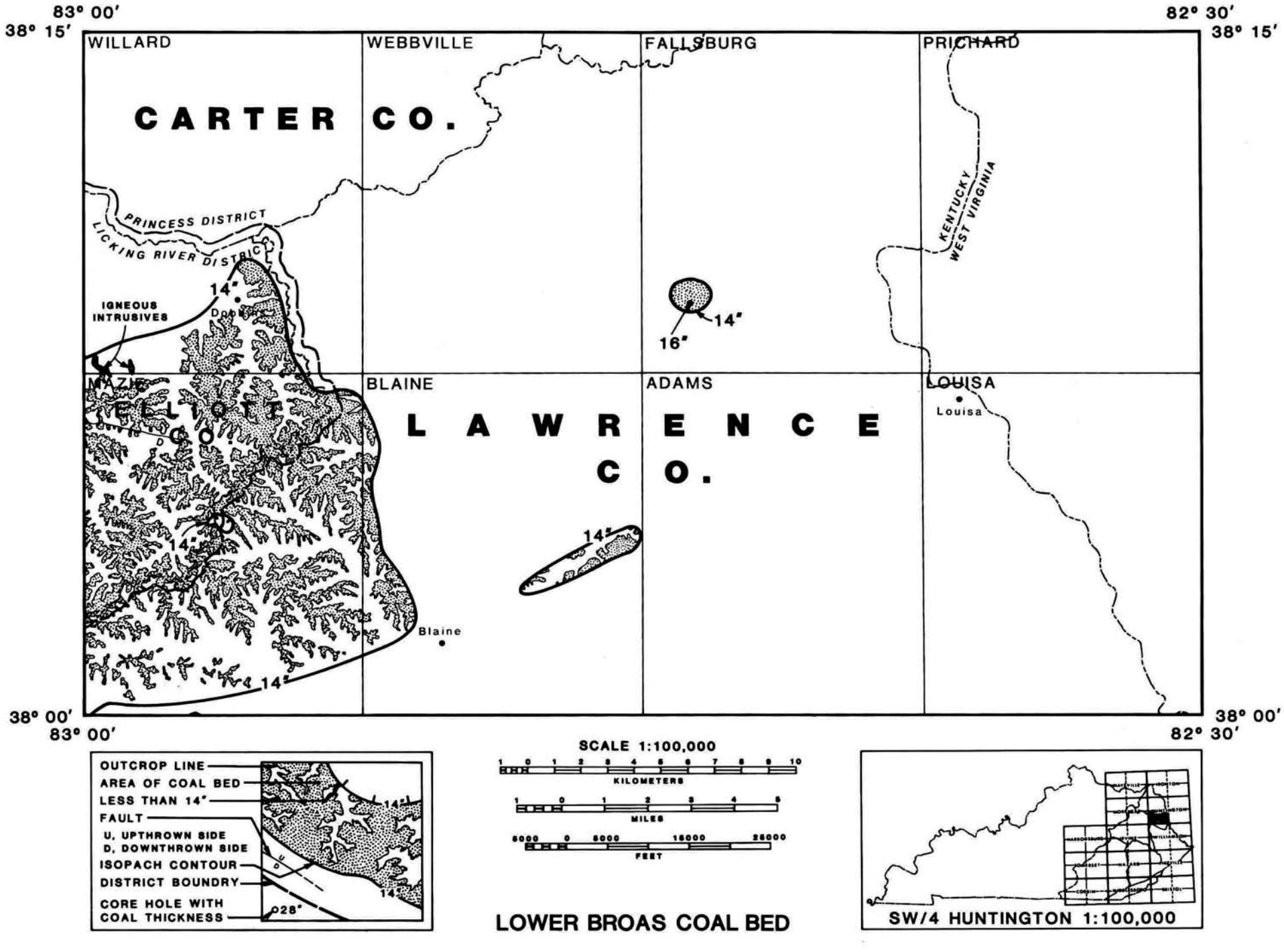
APPENDIX II

RESOURCE MAPS SHOWING AREAL EXTENT AND THICKNESS OF MINEABLE COAL BY BED IN THE LICKING RIVER DISTRICT

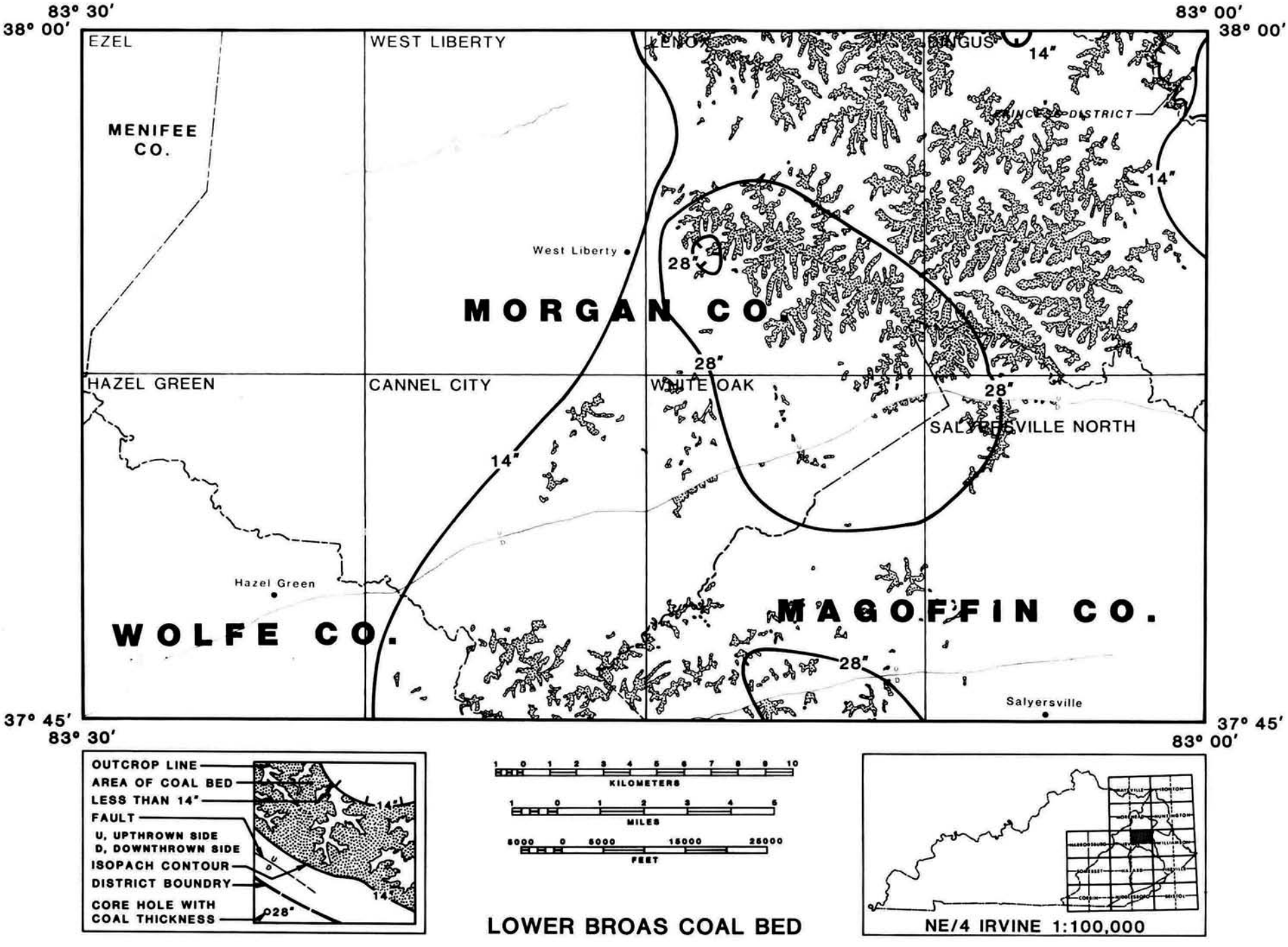
COAL BED	MAP AREA (¼ part of 1:100,000, ½ degree series)
Lower Broas	Huntington SW/4; Irvine NE/4, SE/4; Morehead SE/4
Upper Peach Orchard	Irvine NE/4, SE/4; Williamson SW/4
Lower Peach Orchard	Irvine NE/4, SE/4; Morehead SE/4; Williamson SW/4
Lower Hazard	Huntington SW/4; Irvine NE/4, SE/4; Morehead SE/4; Williamson SW/4
Fire Clay (Bed A)	Huntington SW/4; Irvine NE/4, SE/4; Morehead SE/4; Williamson SW/4
Cannel City (Bed A)	Huntington SW/4; Irvine NE/4, SE/4; Morehead SE/4; Williamson SW/4
Little Caney (Bed B)	Irvine NE/4, SE/4; Morehead SE/4; Williamson NW/4, SW/4

The coal resource maps in Appendix II are compilations from information contained in work maps constructed at a scale of 1:24,000.

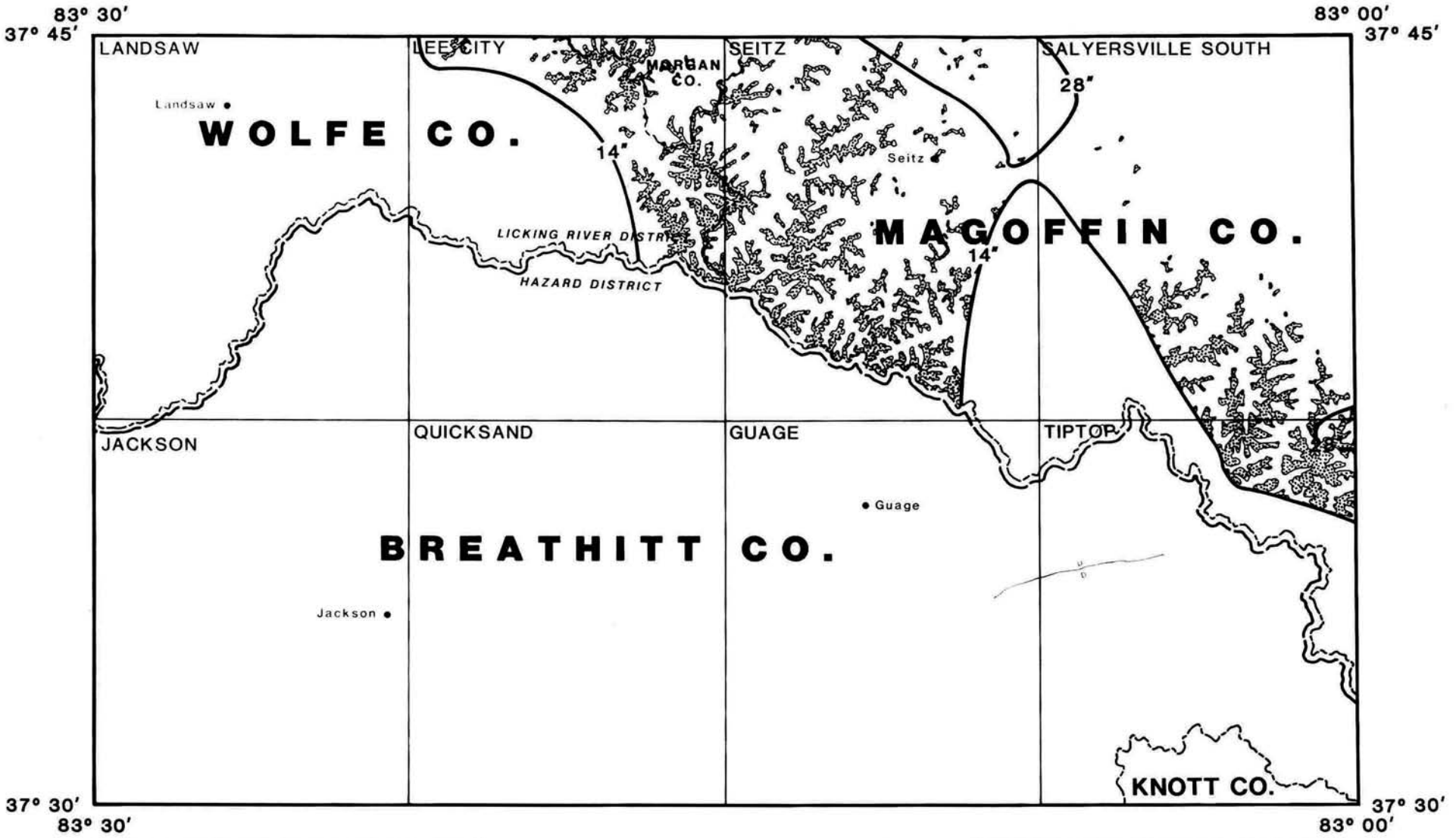
These resource maps are at a scale of 1:200,000 (approximately 3 miles to the inch).

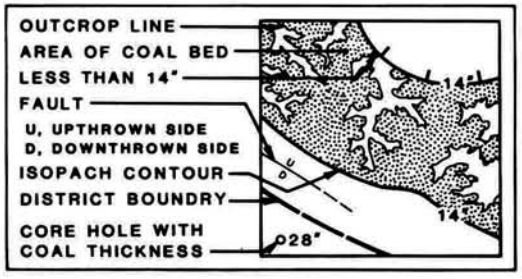


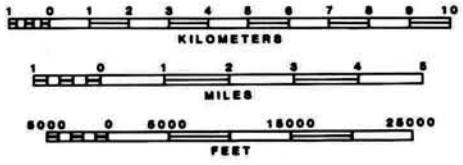
LOWER BROAS COAL BED



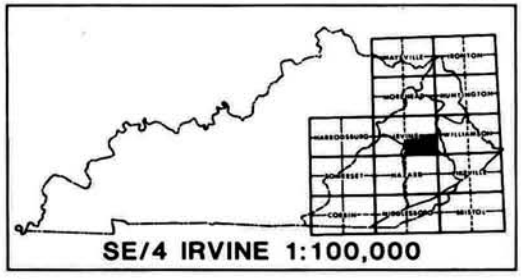
LOWER BROAS COAL BED

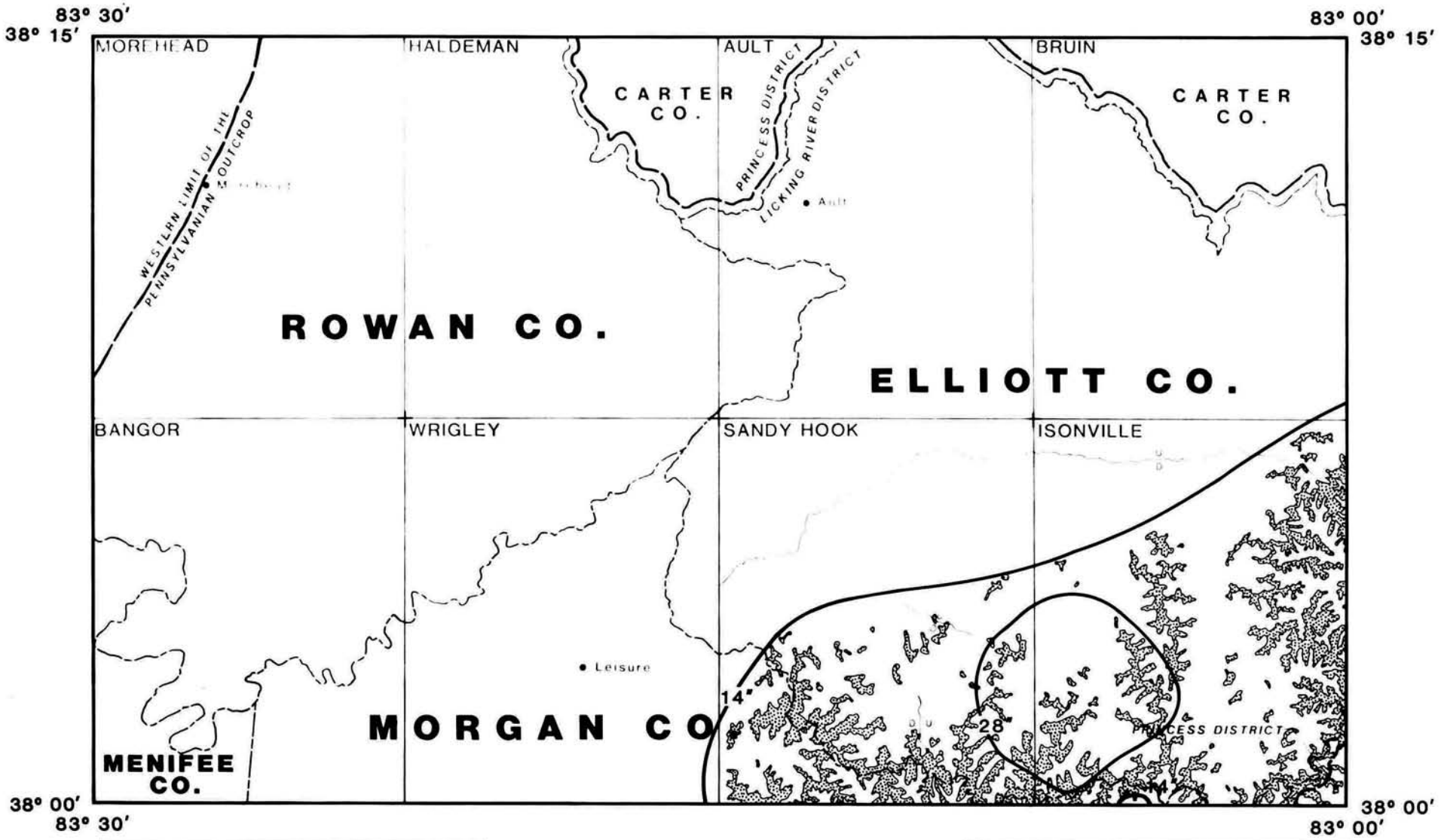


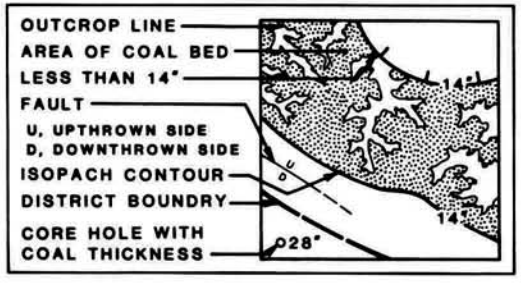


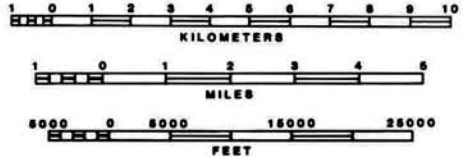


LOWER BROAS COAL BED

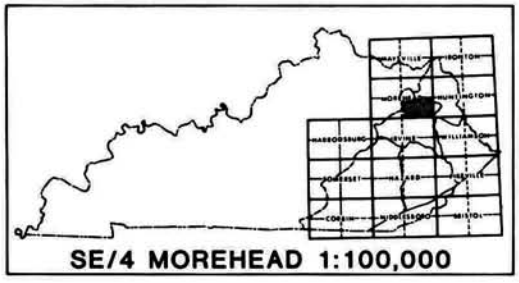


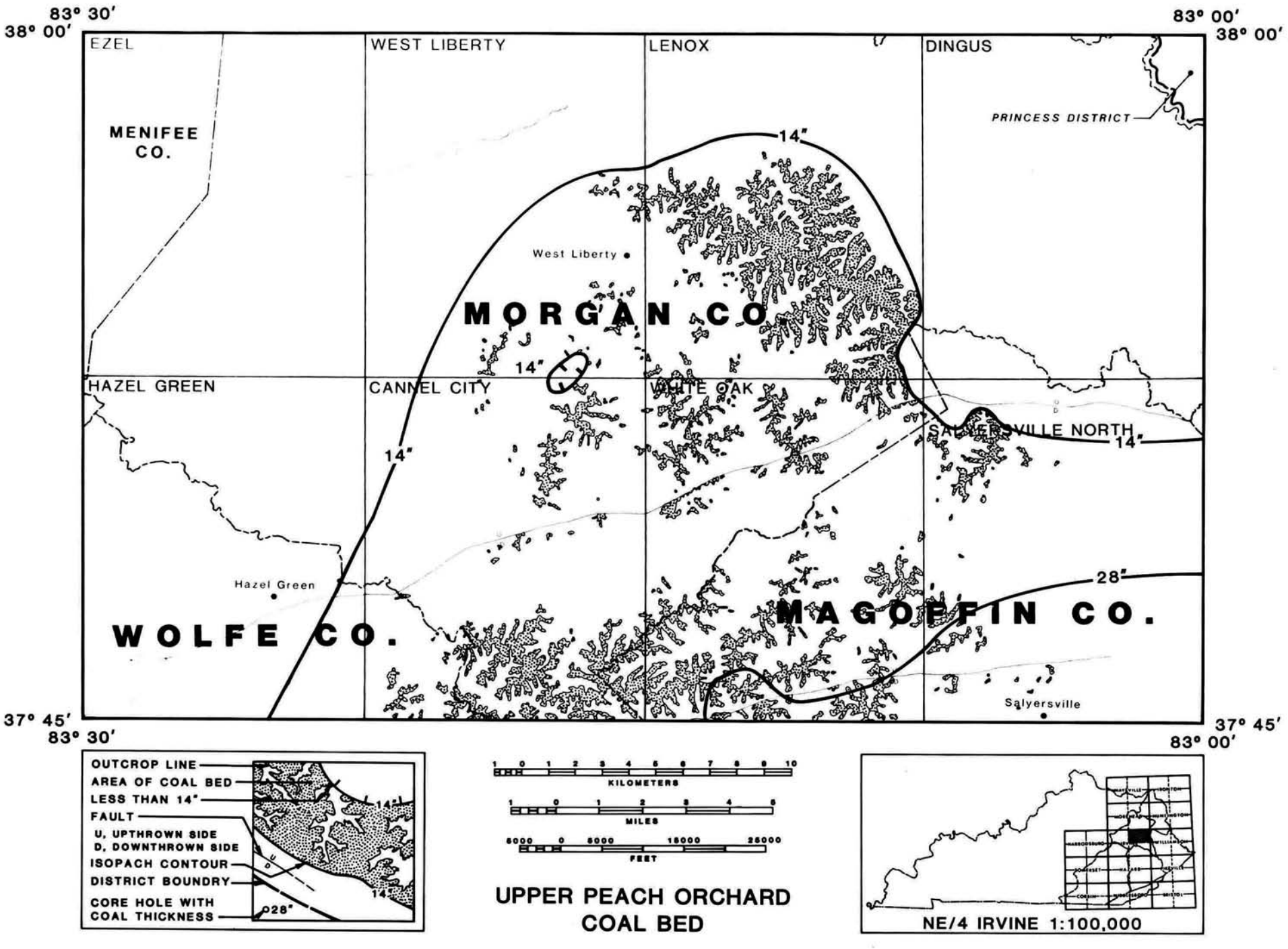




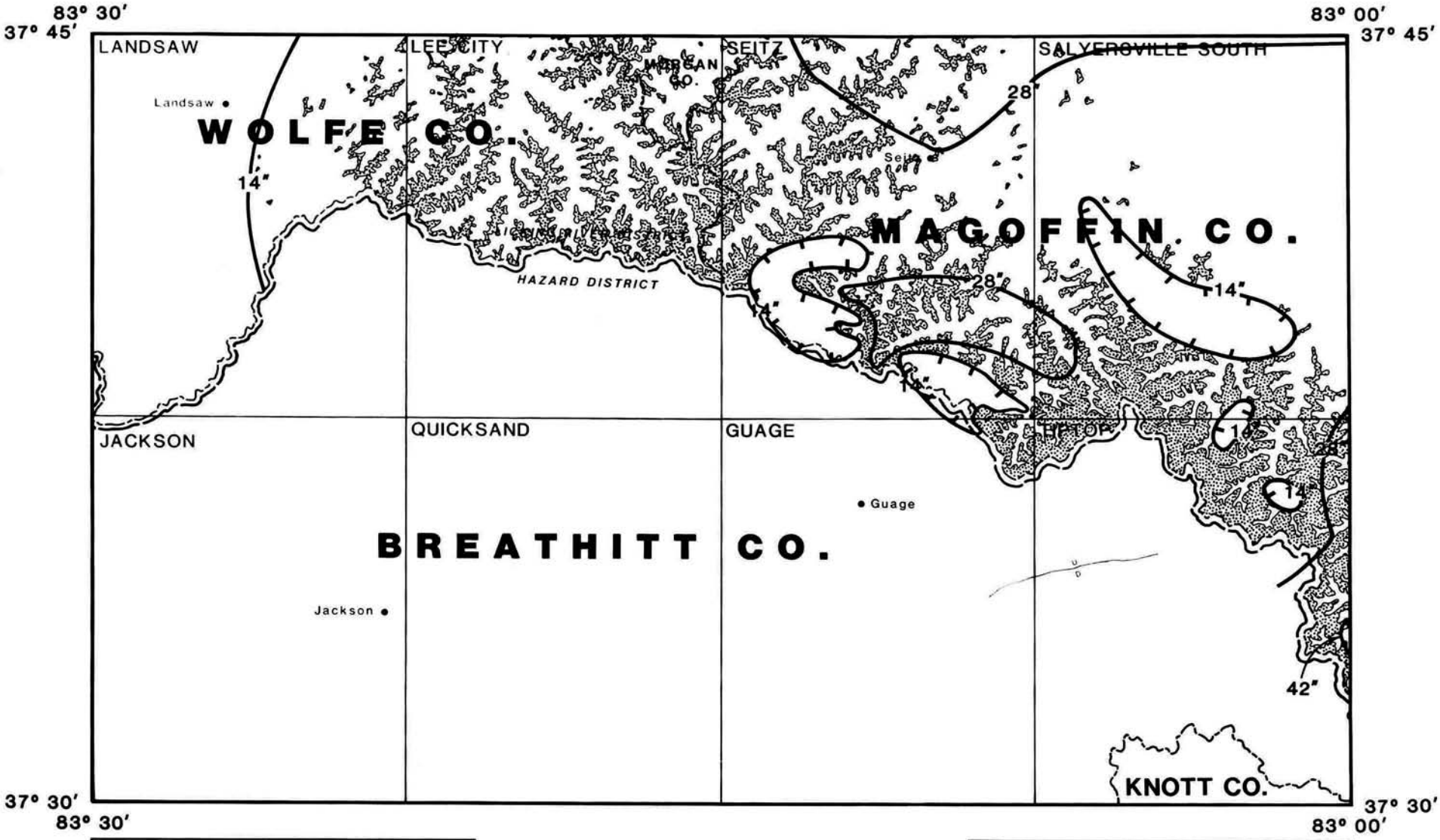


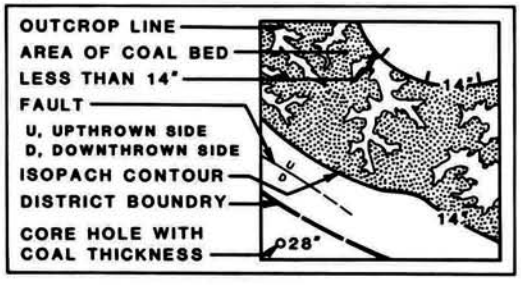
LOWER BROAS COAL BED

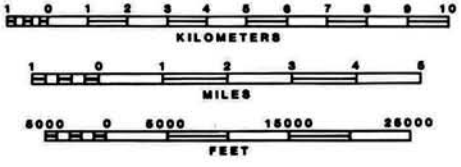




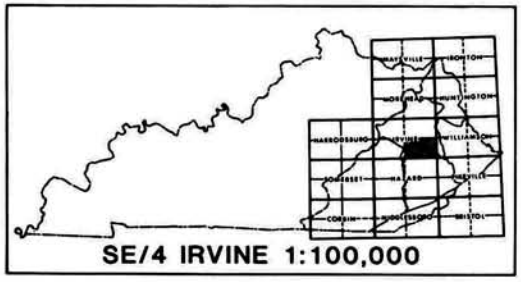
UPPER PEACH ORCHARD COAL BED

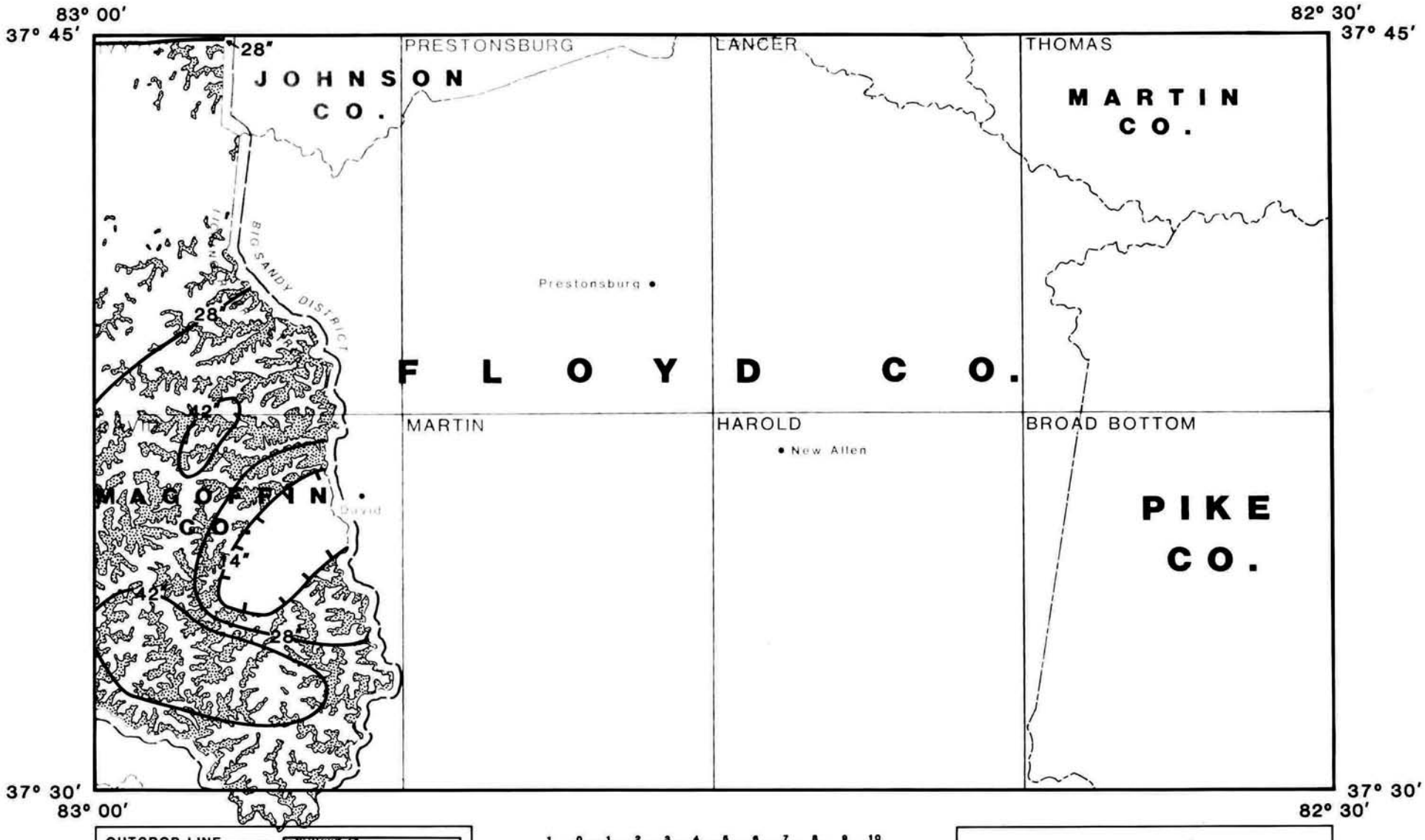


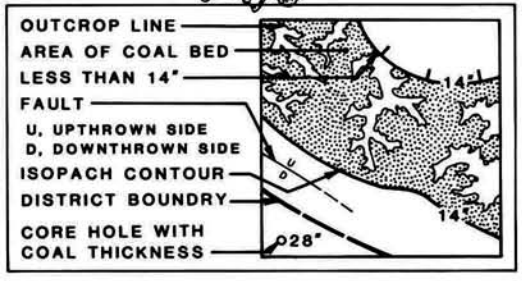


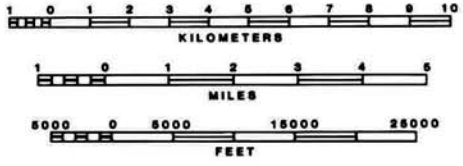


UPPER PEACH ORCHARD COAL BED

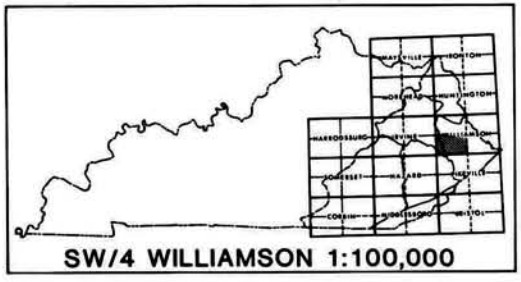


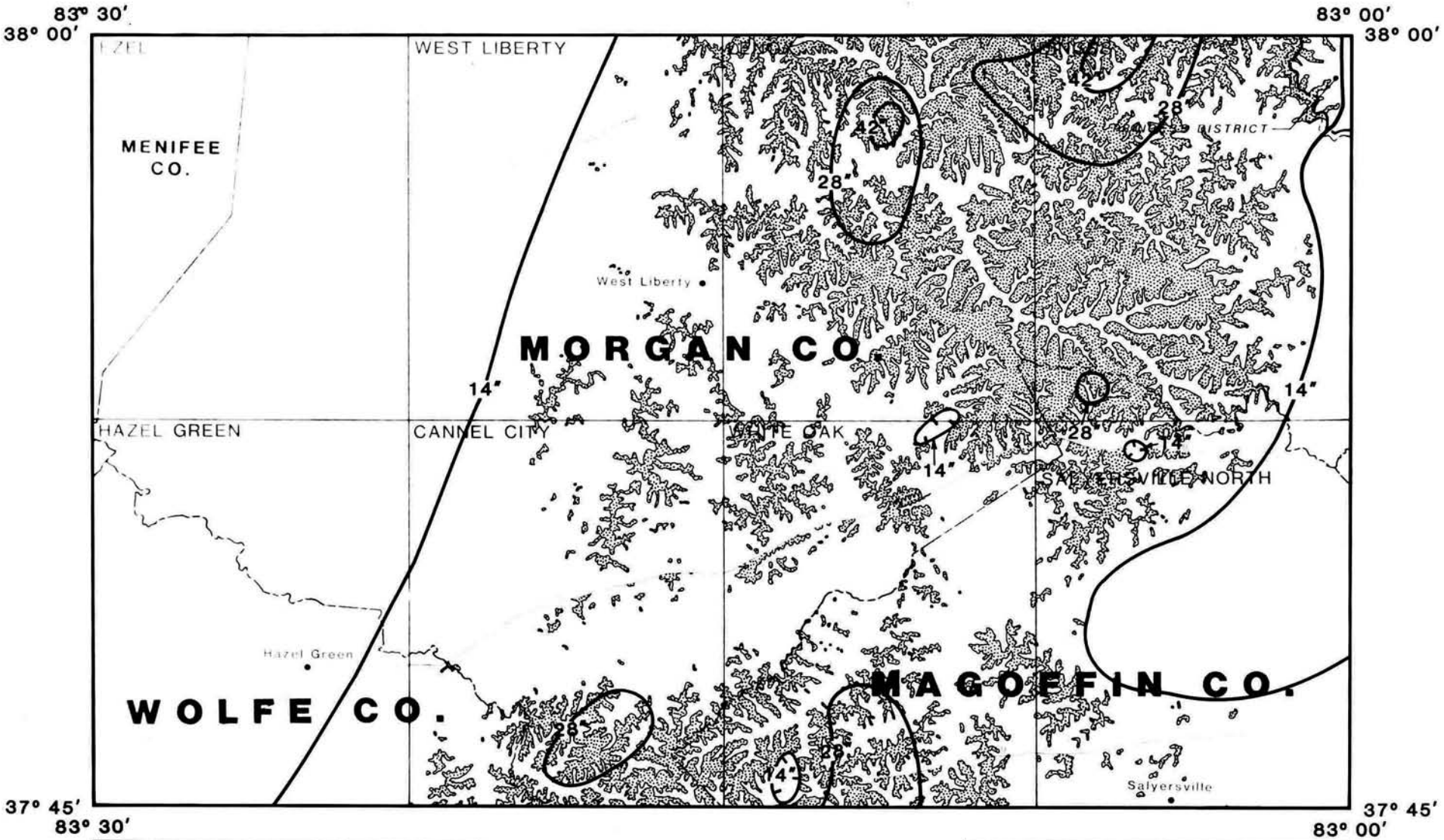


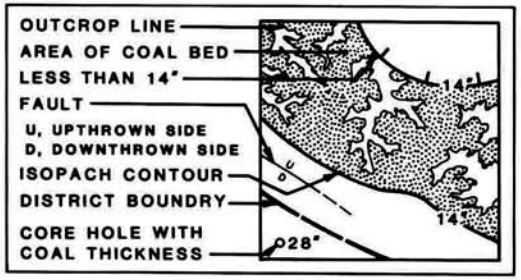


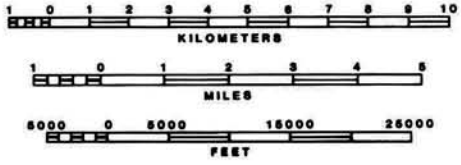


UPPER PEACH ORCHARD COAL BED

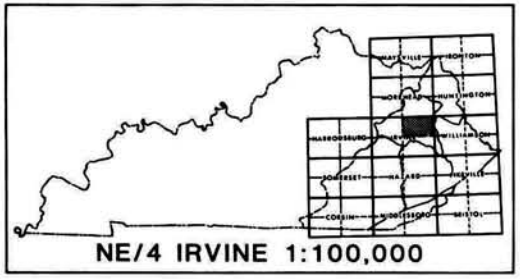


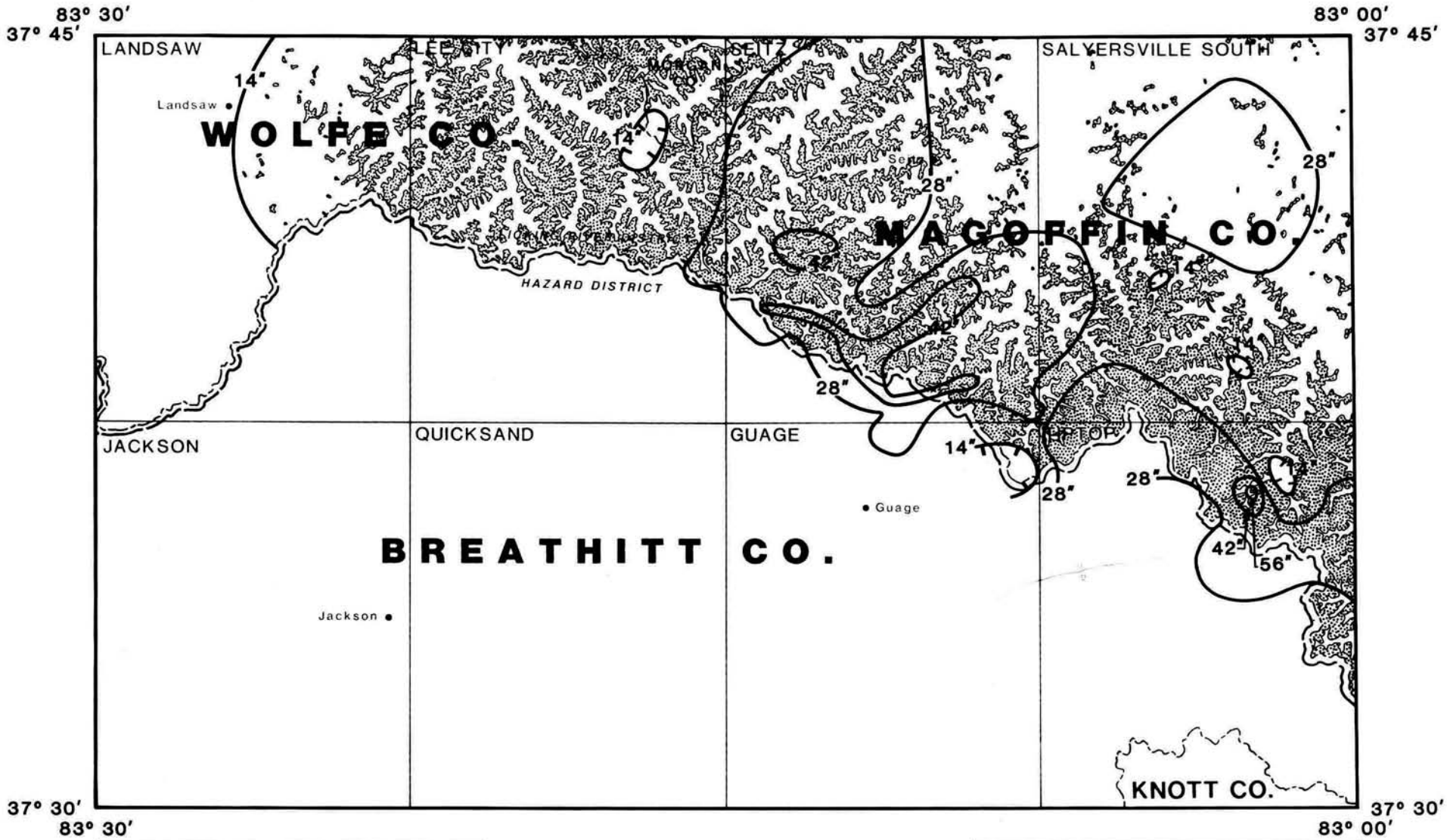


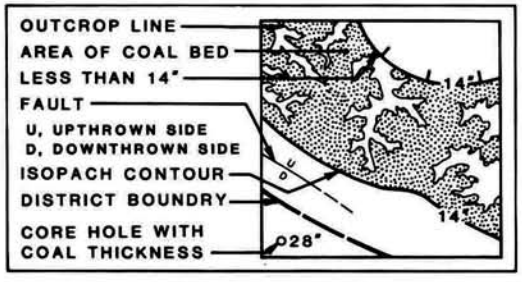


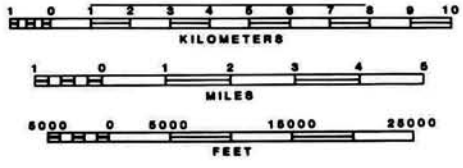


LOWER PEACH ORCHARD COAL BED

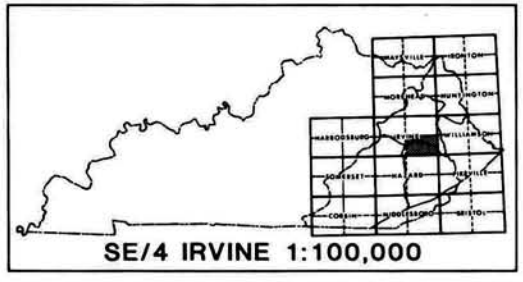


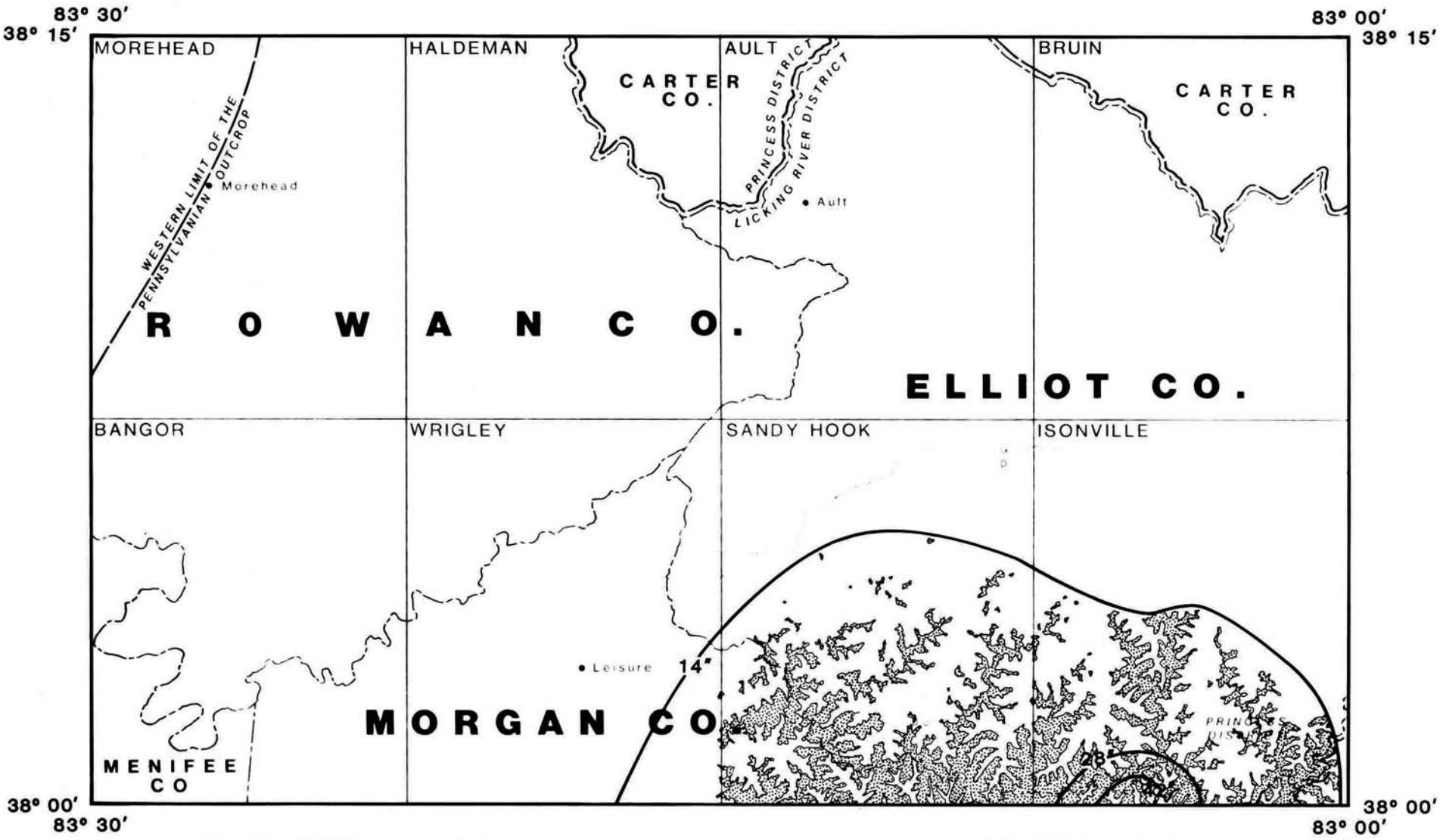


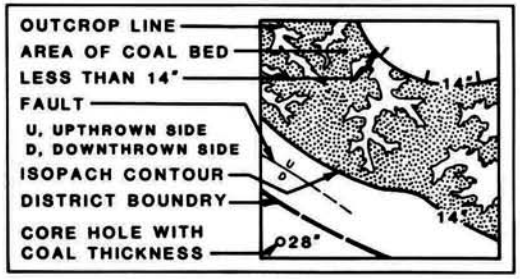


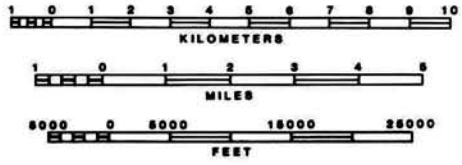


LOWER PEACH ORCHARD COAL BED

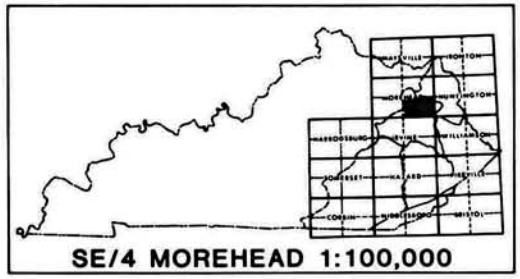


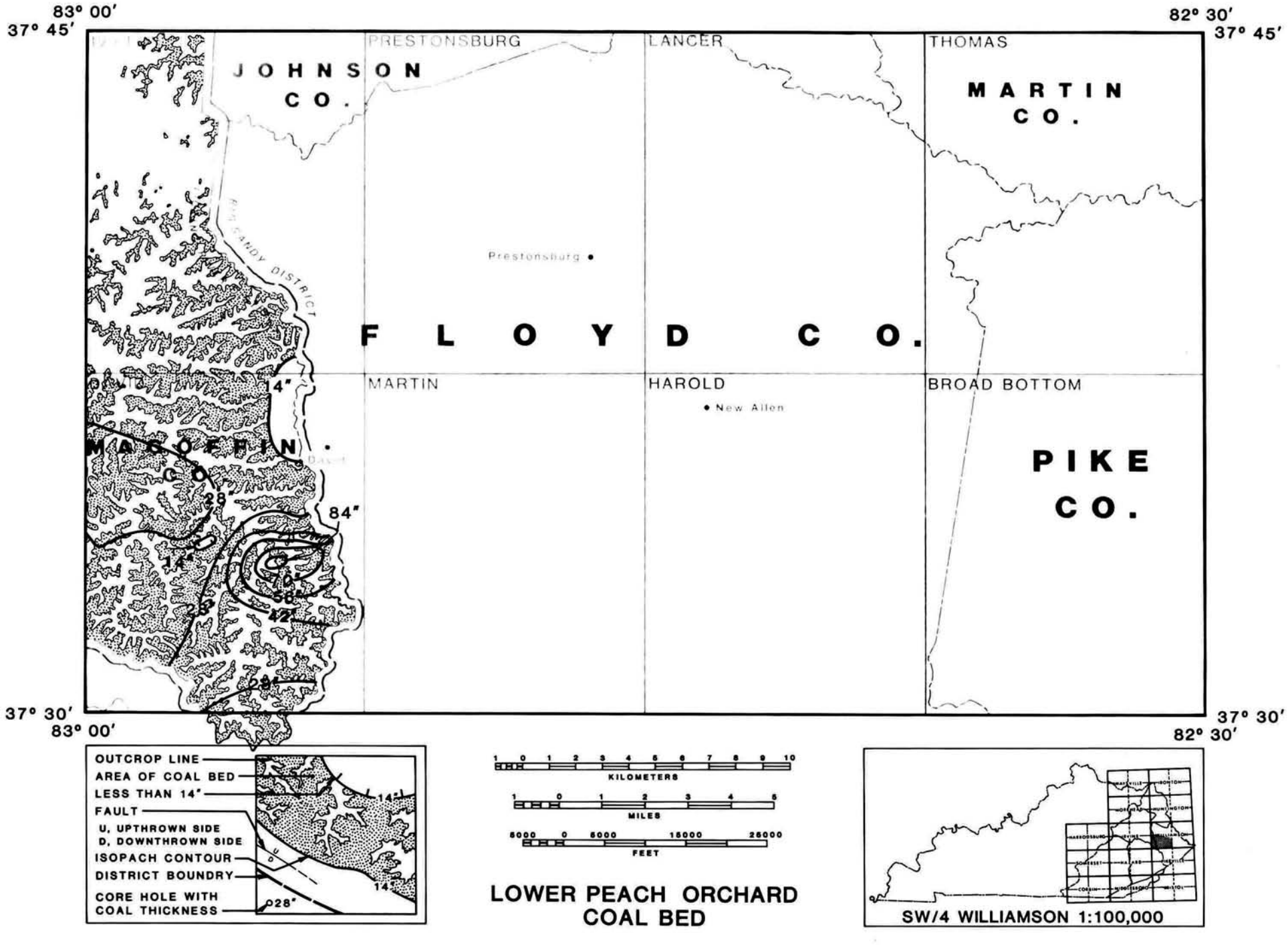




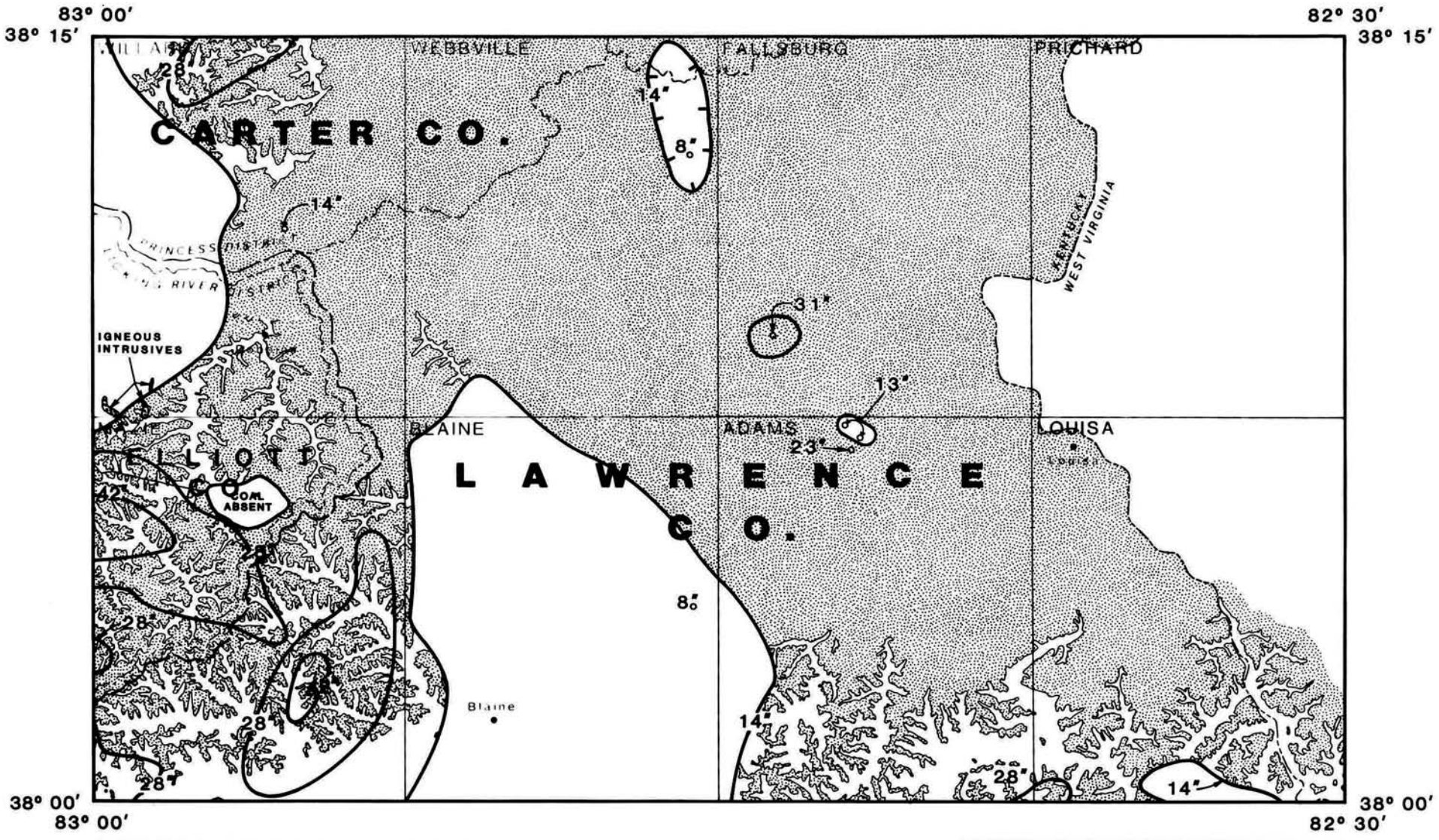


LOWER PEACH ORCHARD COAL BED





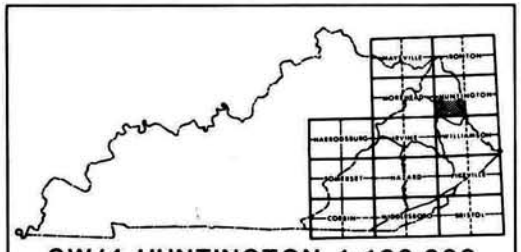
LOWER PEACH ORCHARD COAL BED



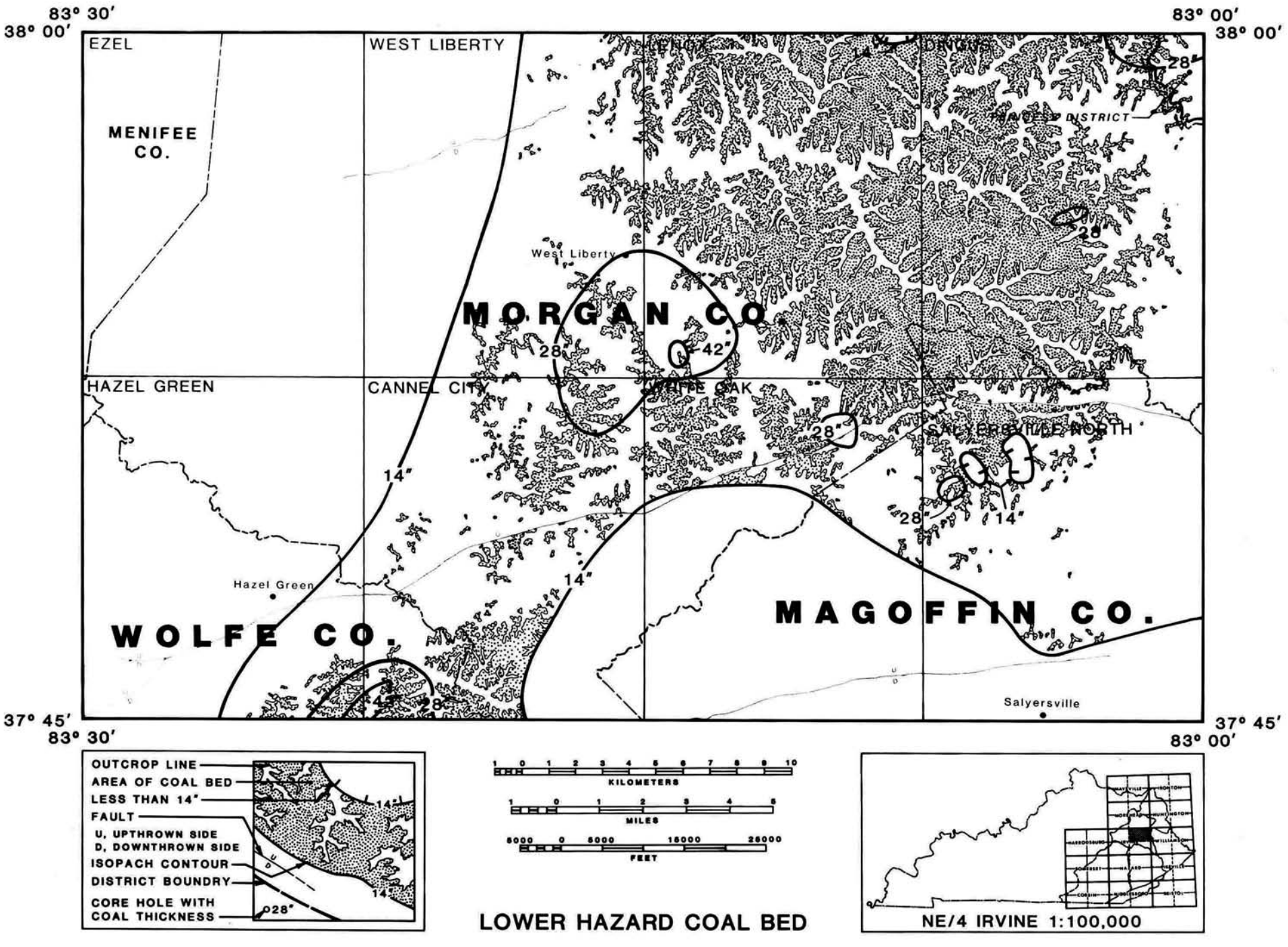
OUTCROP LINE
AREA OF COAL BED
LESS THAN 14"
FAULT
U, UPTHROWN SIDE
D, DOWNTHROWN SIDE
ISOPACH CONTOUR
DISTRICT BOUNDRY
CORE HOLE WITH COAL THICKNESS

KILOMETERS
MILES
FEET

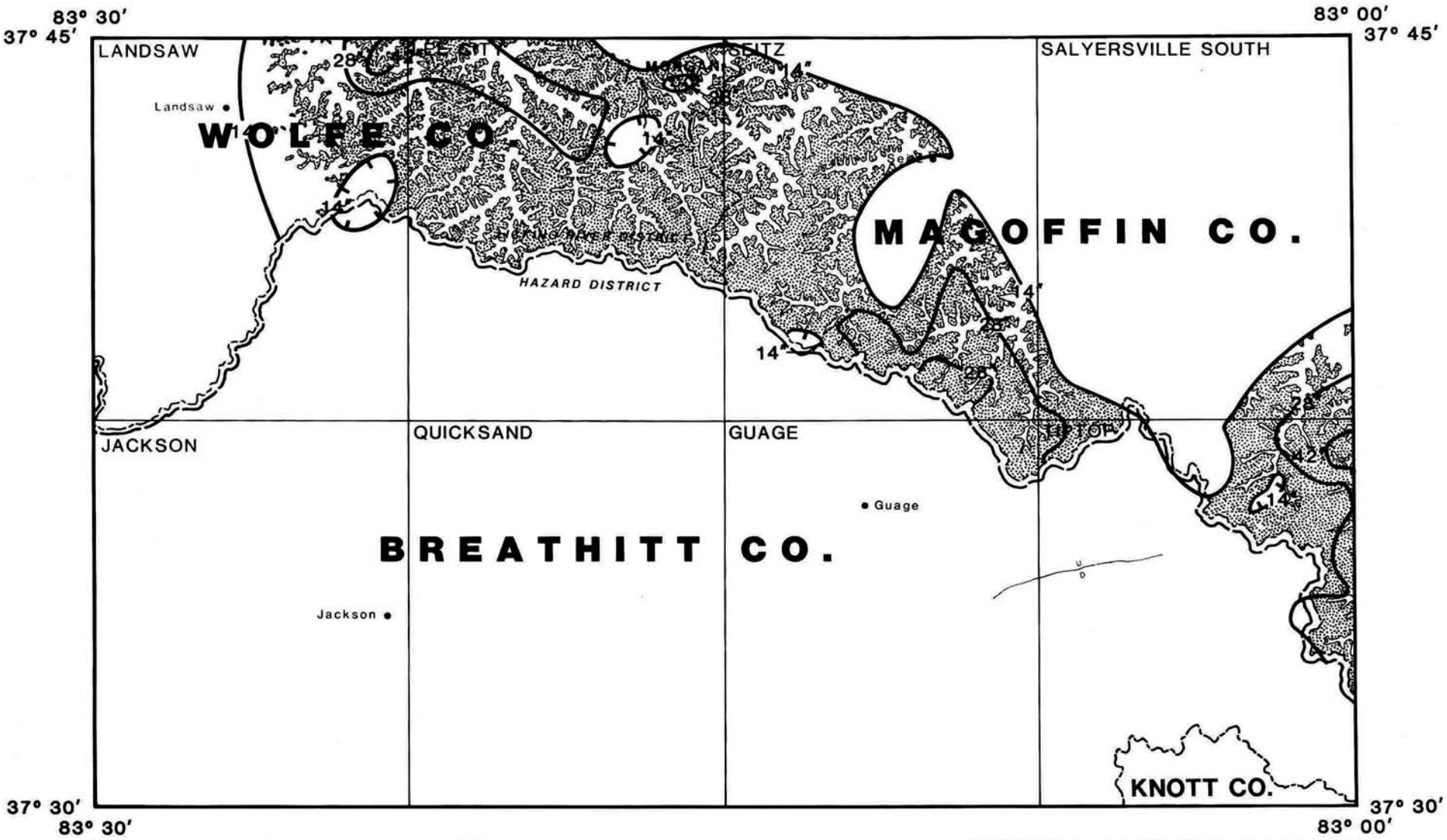
LOWER HAZARD COAL BED

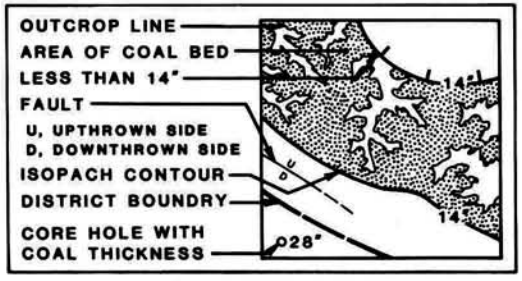


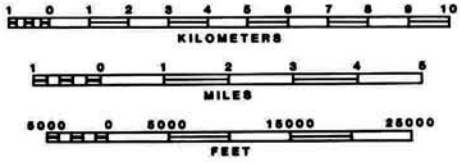
SW/4 HUNTINGTON 1:100,000



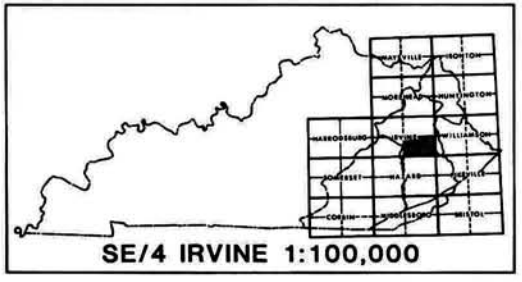
LOWER HAZARD COAL BED

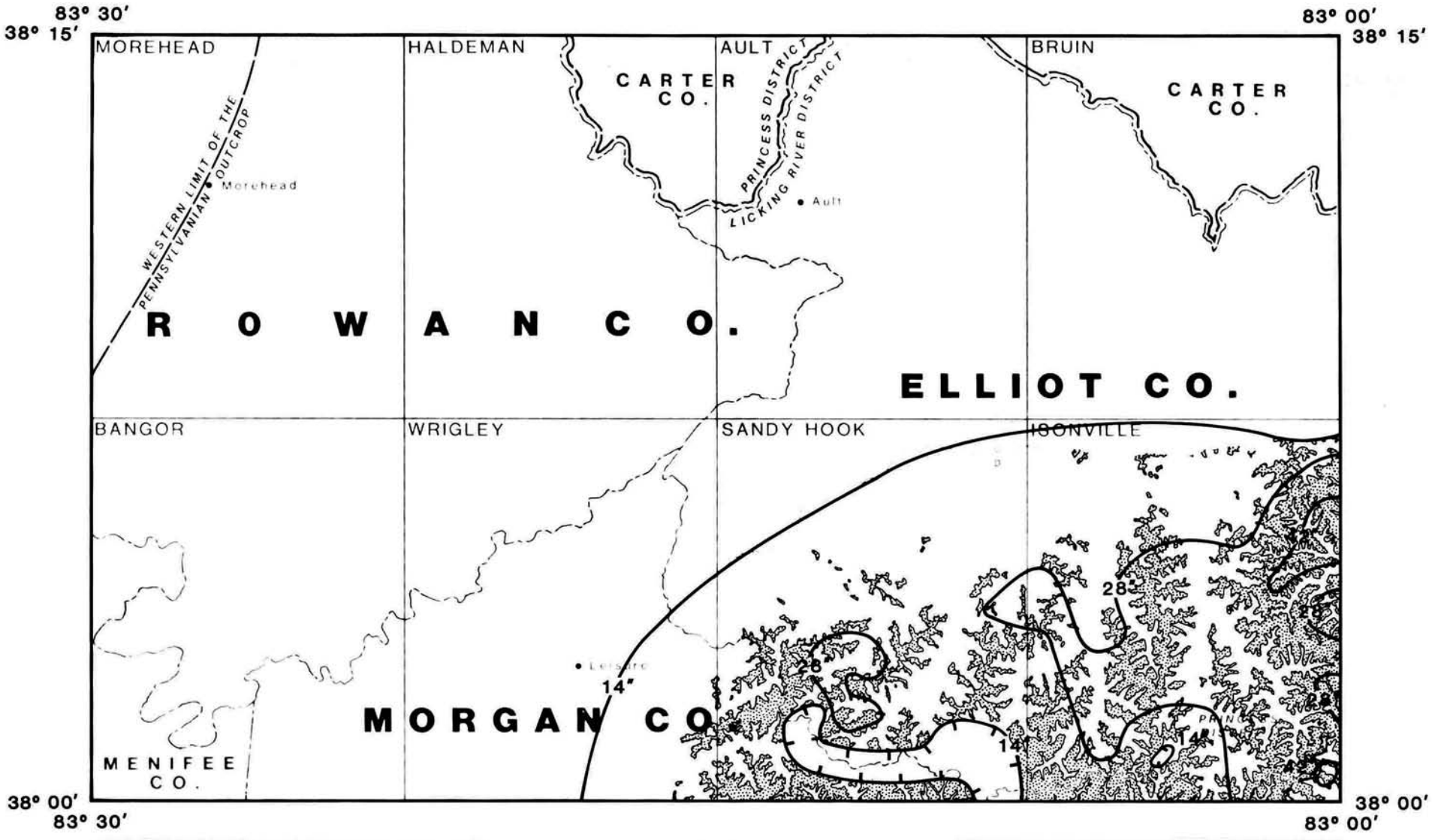


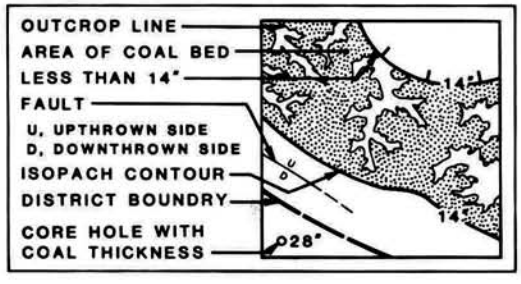


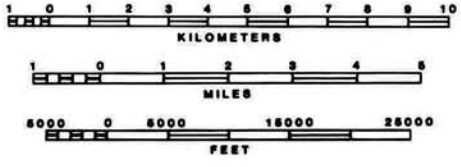


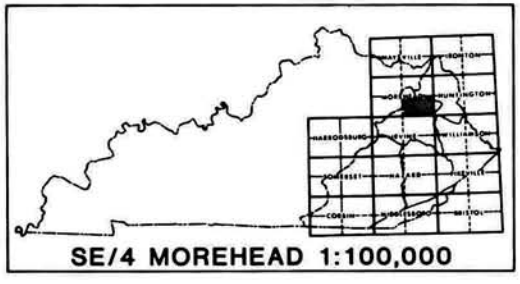
LOWER HAZARD COAL BED



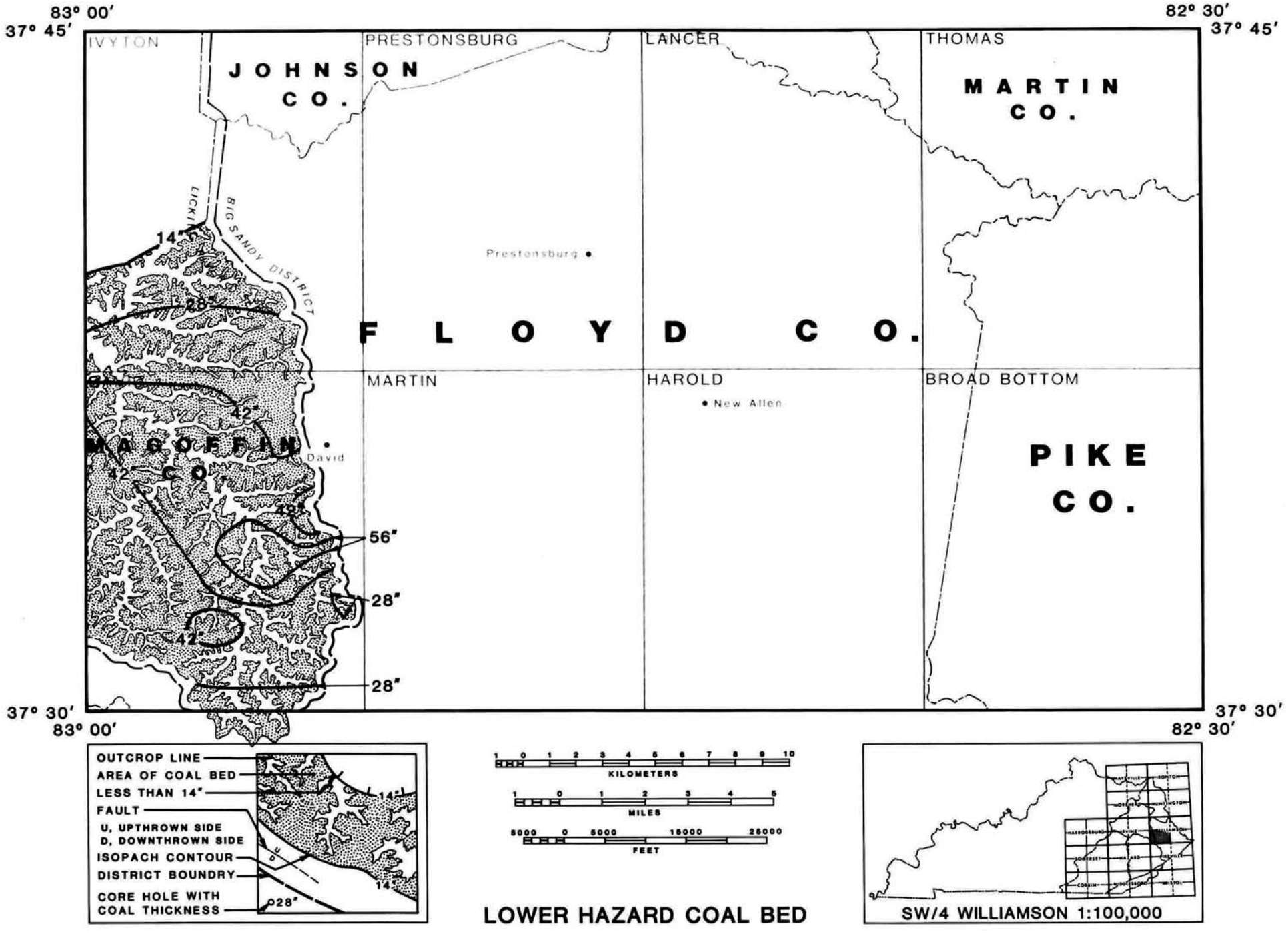




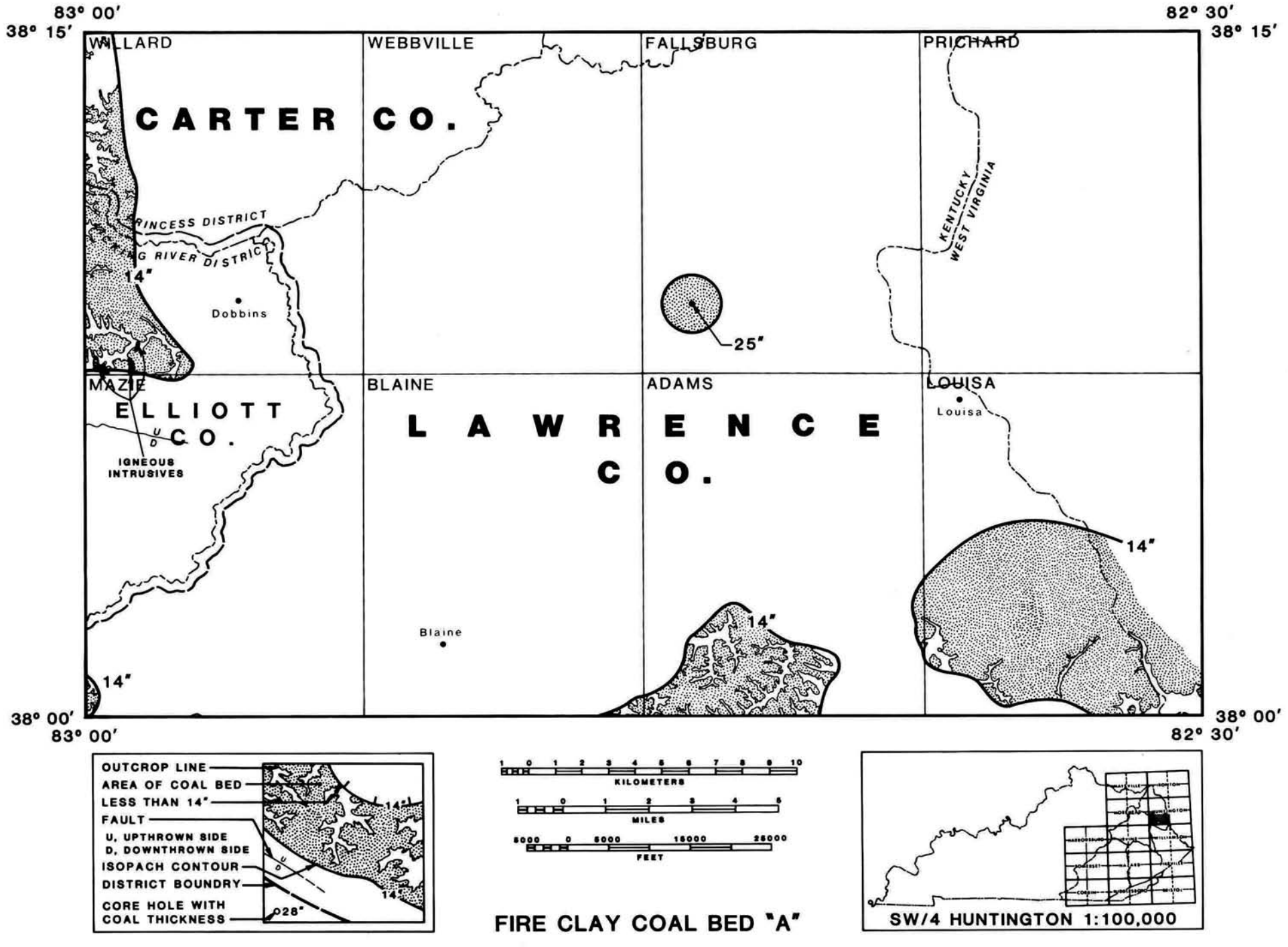




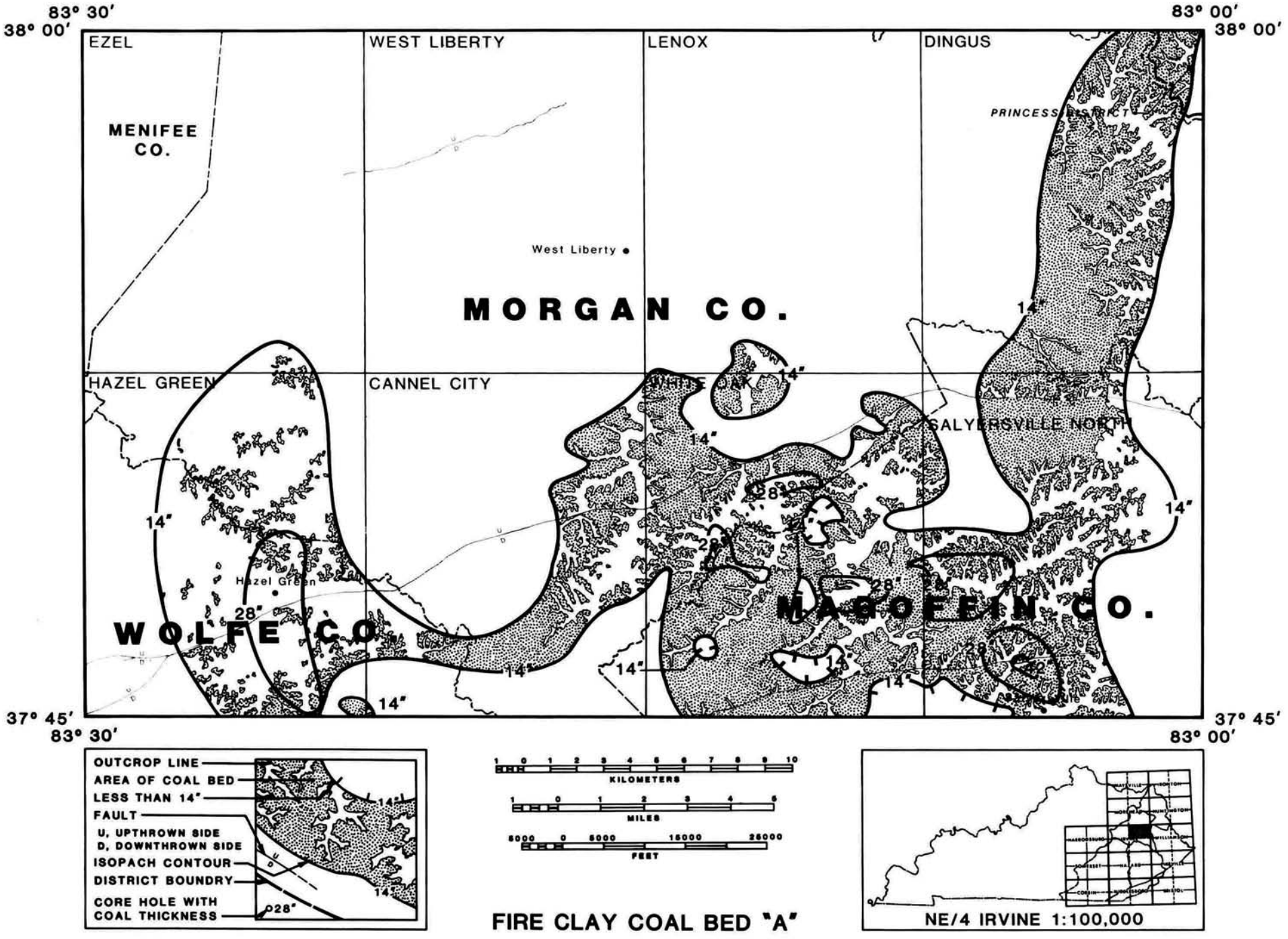
LOWER HAZARD COAL BED



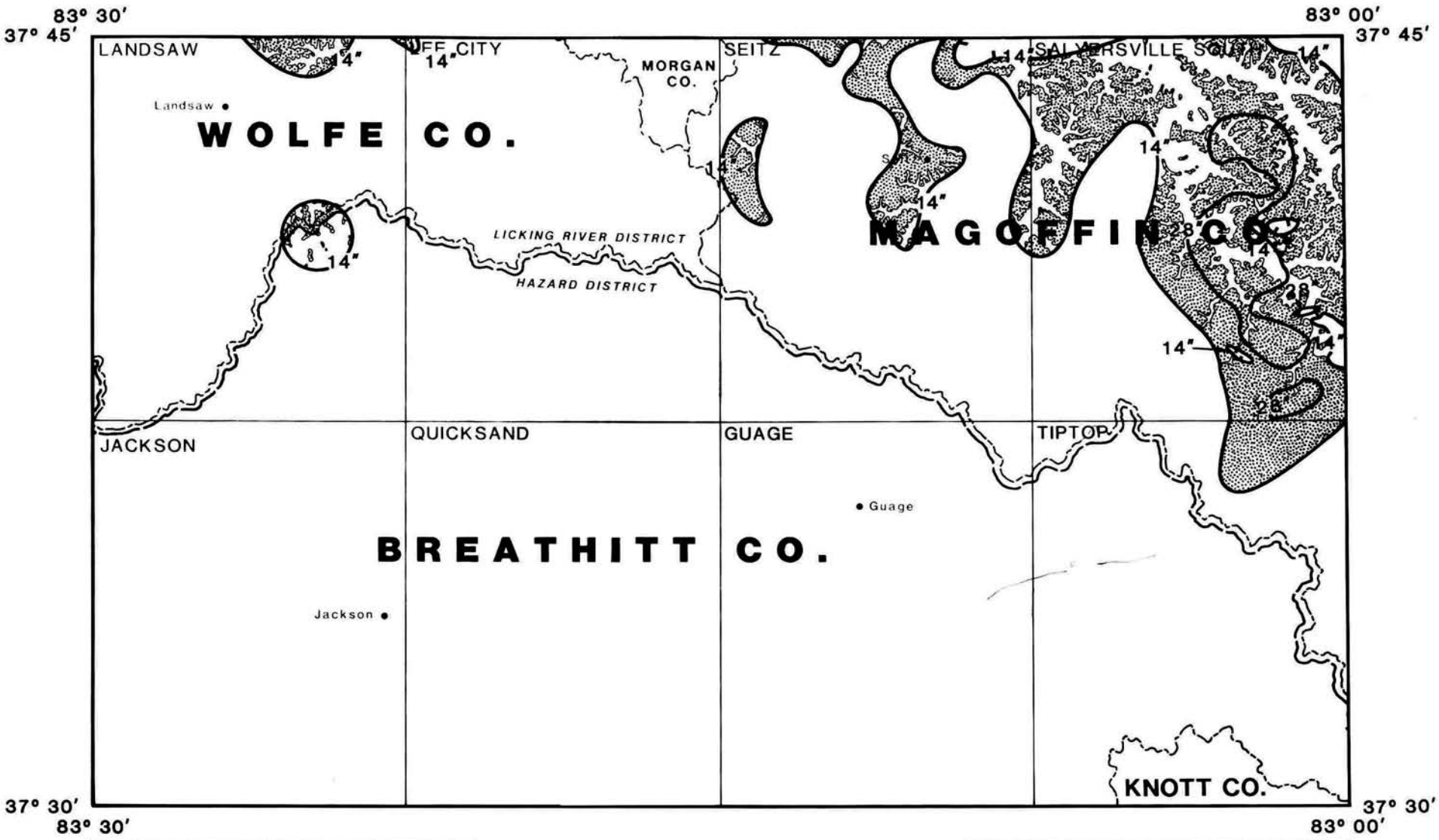
LOWER HAZARD COAL BED

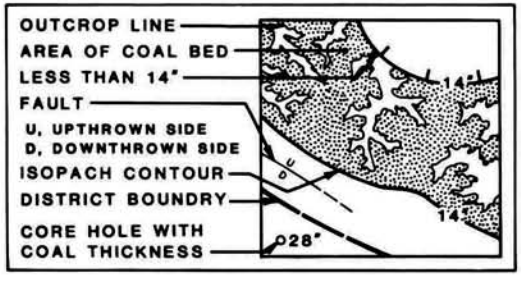


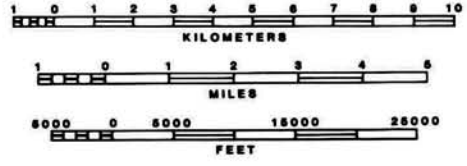
FIRE CLAY COAL BED "A"



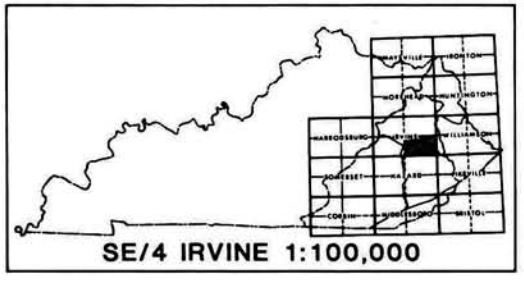
FIRE CLAY COAL BED "A"

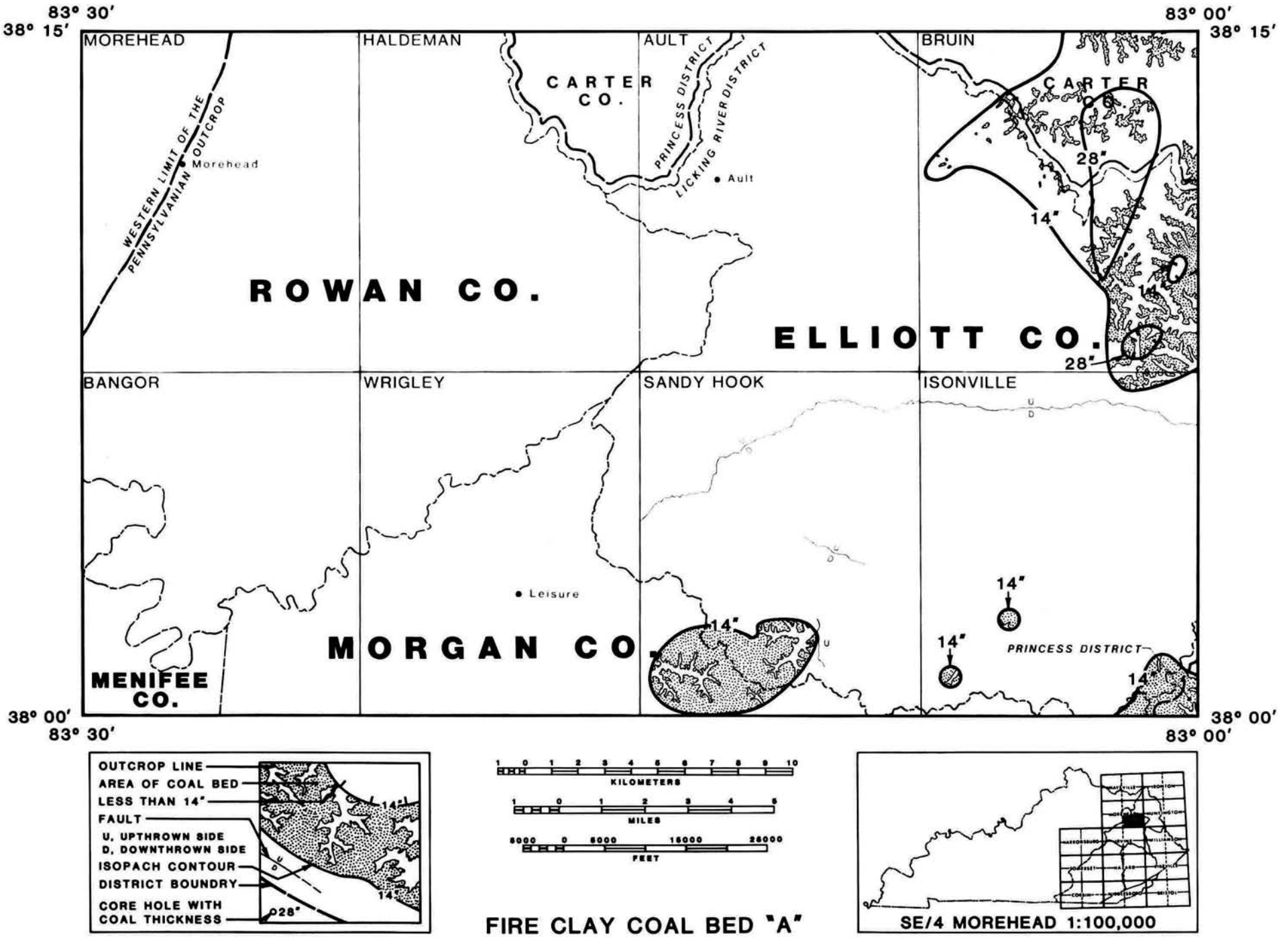






FIRE CLAY COAL BED "A"



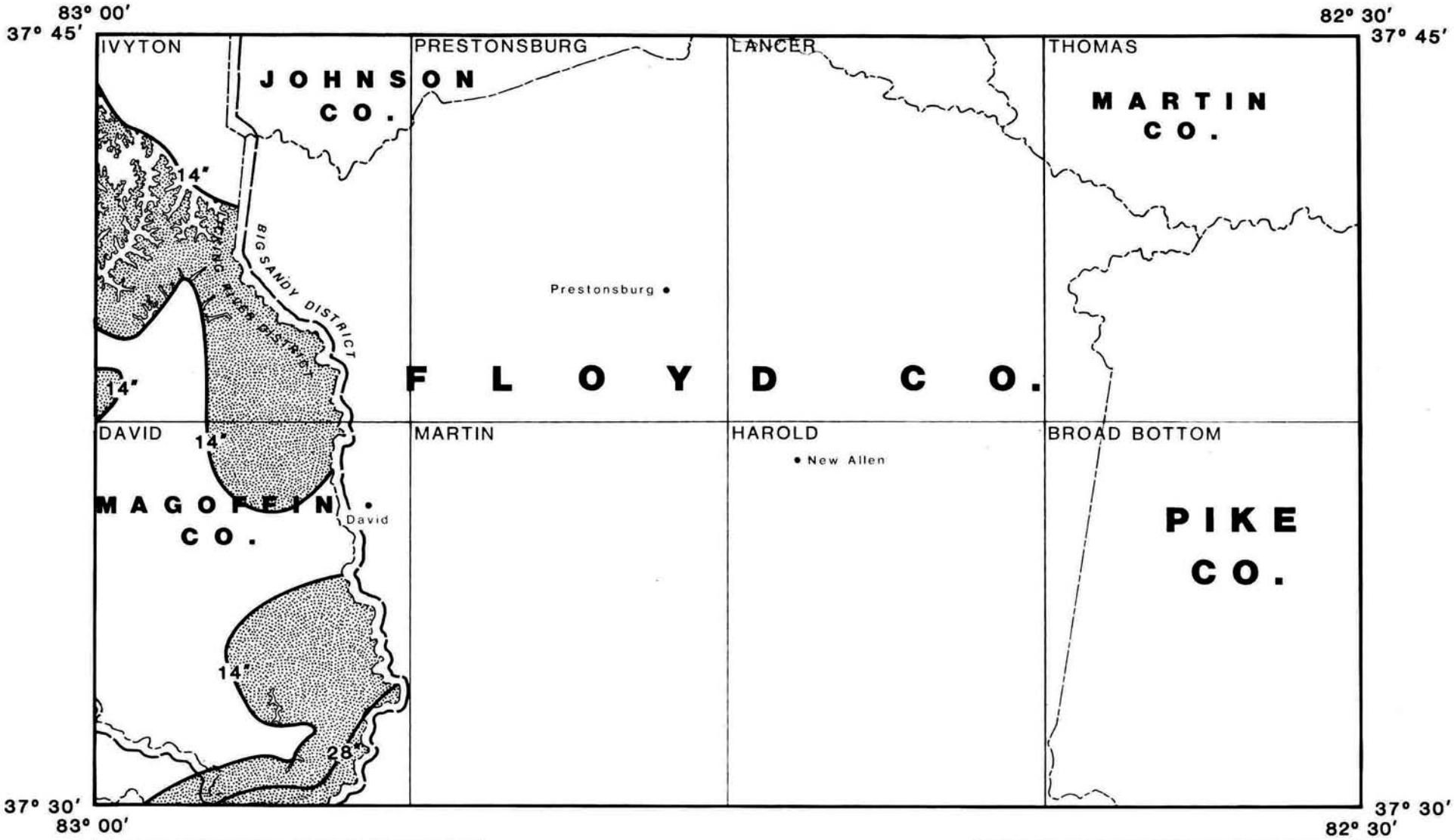


OUTCROP LINE
AREA OF COAL BED
LESS THAN 14"
FAULT
U, UPTHROWN SIDE
D, DOWNTHROWN SIDE
ISOPACH CONTOUR
DISTRICT BOUNDRY
CORE HOLE WITH COAL THICKNESS

KILOMETERS
MILES
FEET

SE/4 MOREHEAD 1:100,000

FIRE CLAY COAL BED "A"



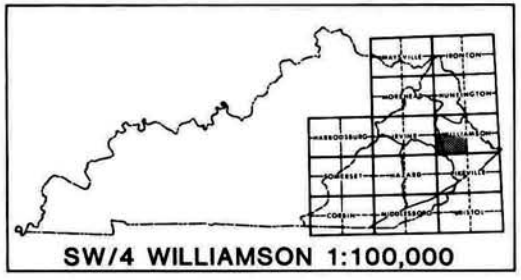
OUTCROP LINE
AREA OF COAL BED
LESS THAN 14"
FAULT
U, UPTHROWN SIDE
D, DOWNTHROWN SIDE
ISOPACH CONTOUR
DISTRICT BOUNDRY
CORE HOLE WITH COAL THICKNESS

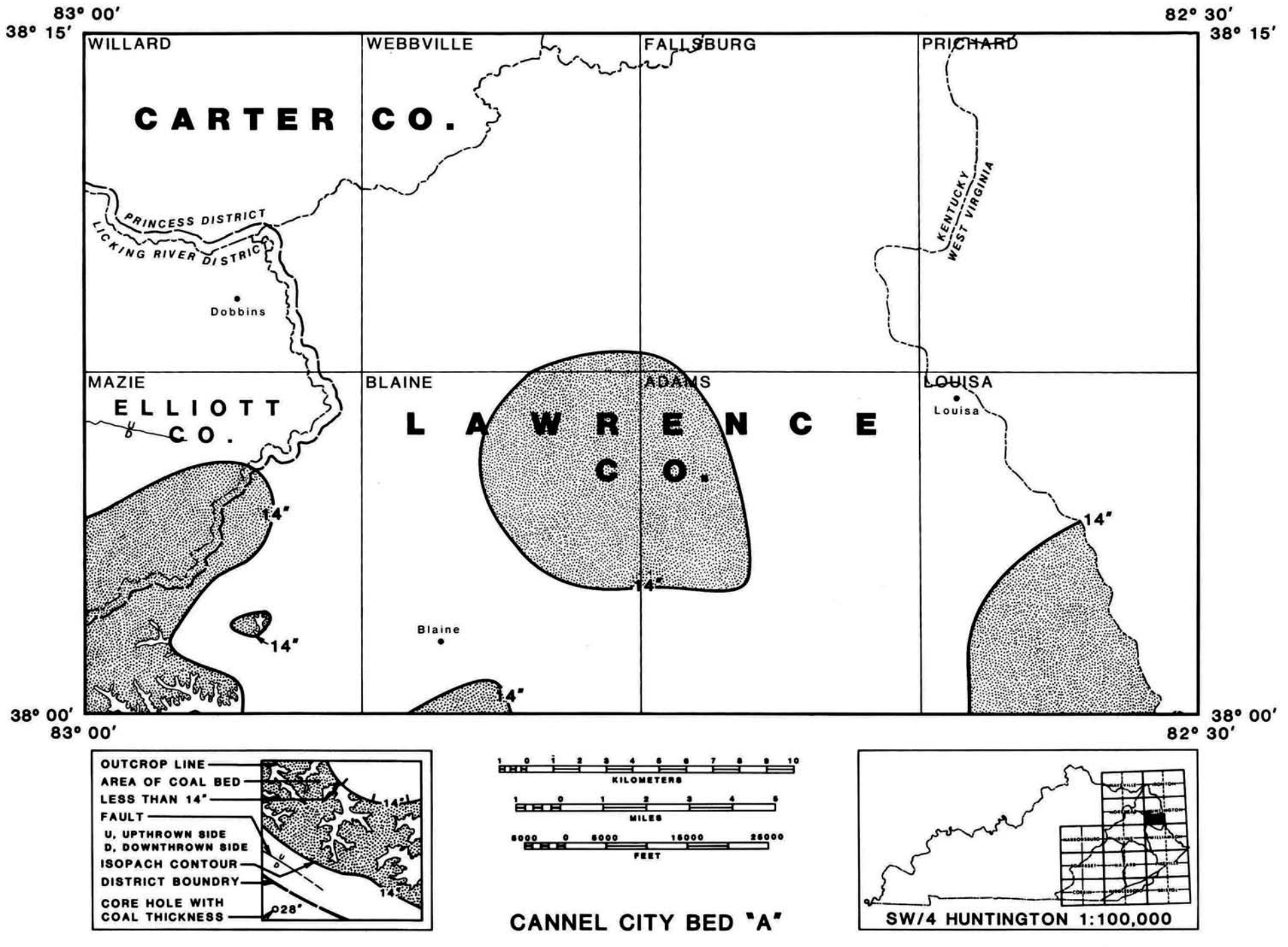
1 0 1 2 3 4 5 6 7 8 9 10
KILOMETERS

1 0 1 2 3 4 5
MILES

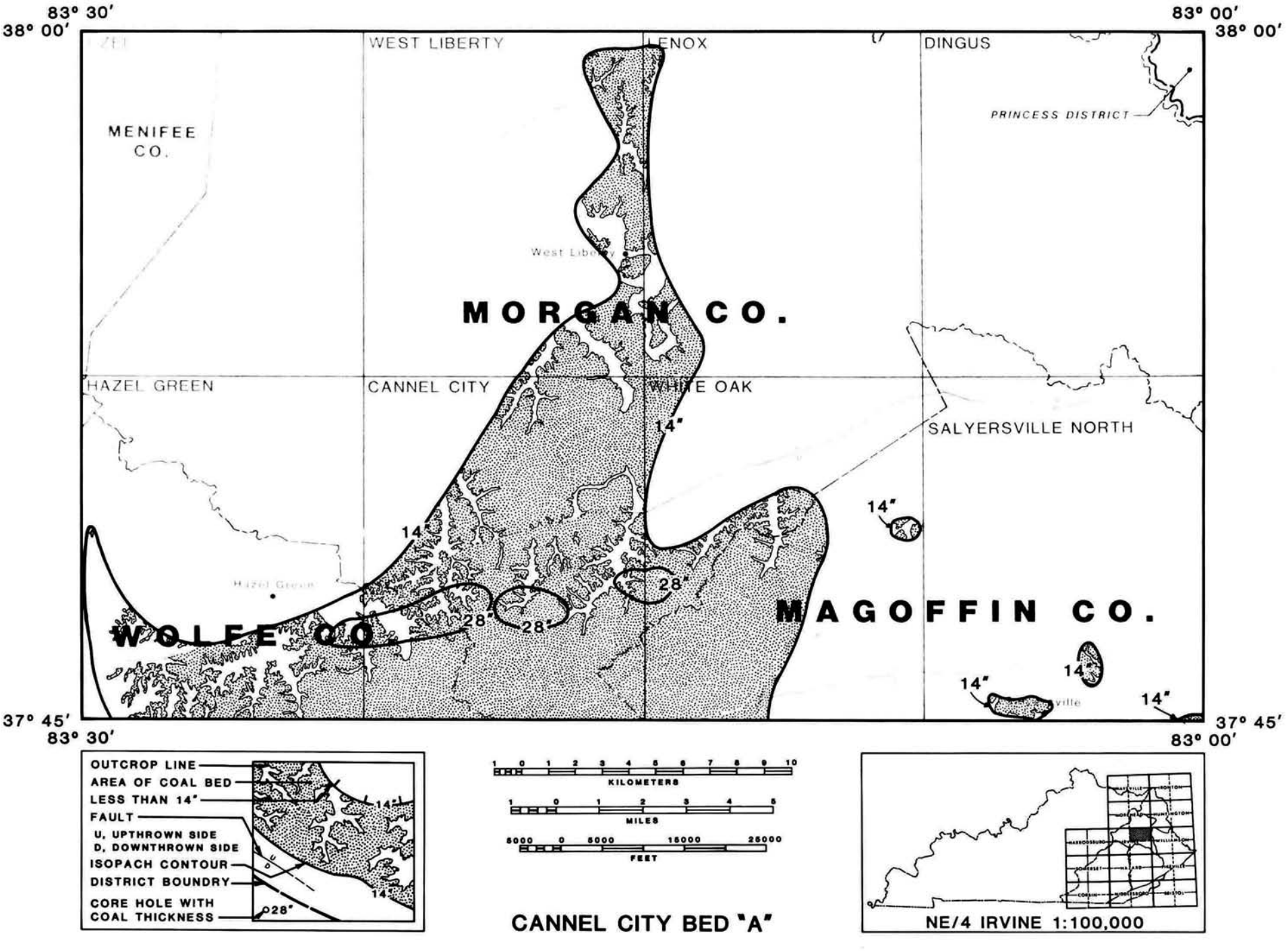
6000 0 6000 15000 26000
FEET

FIRE CLAY COAL BED "A"

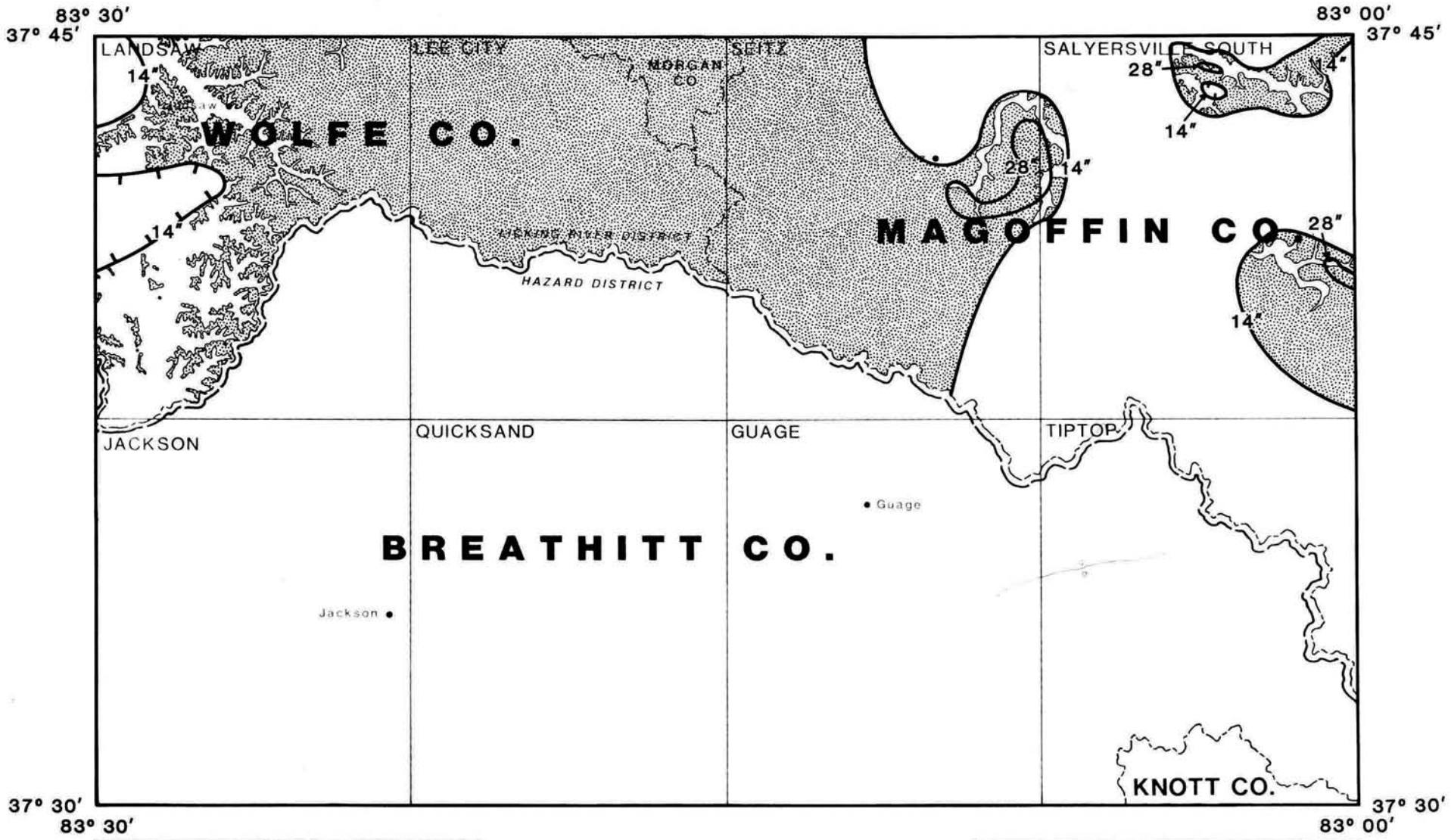


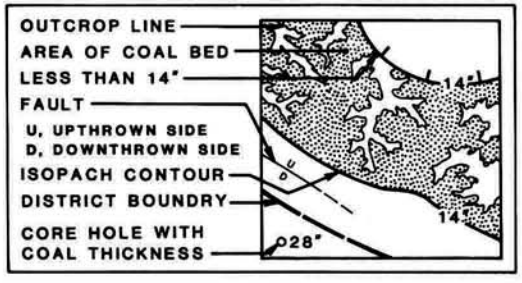


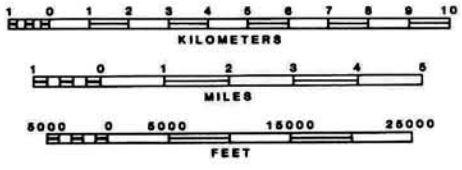
CANNEL CITY BED "A"



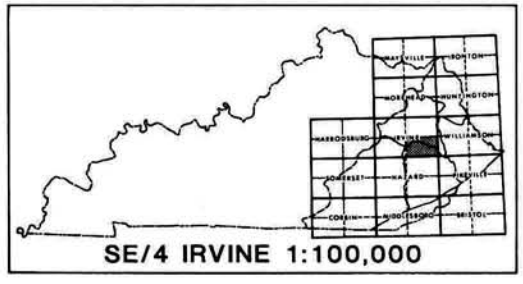
CANNEL CITY BED "A"

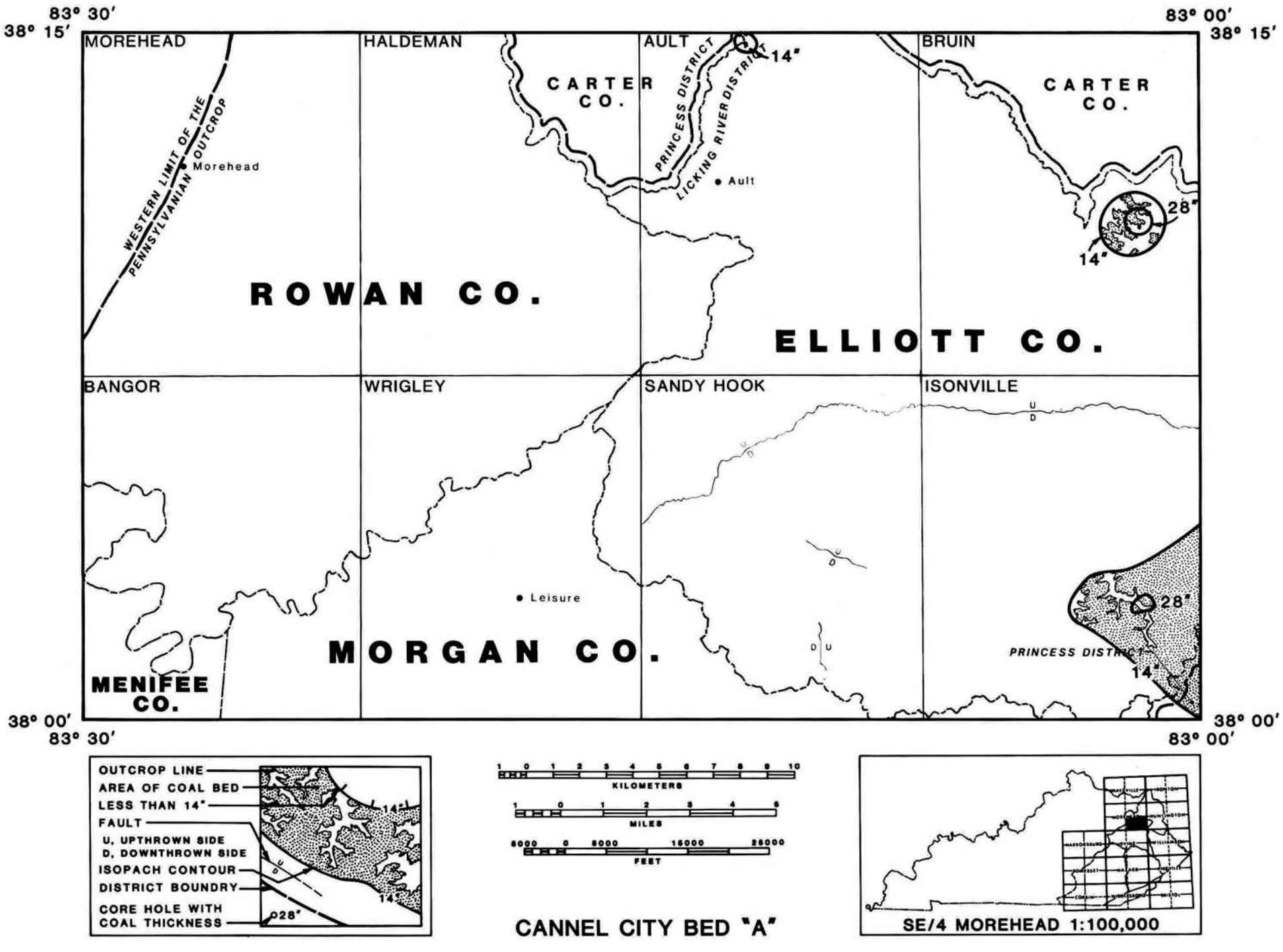




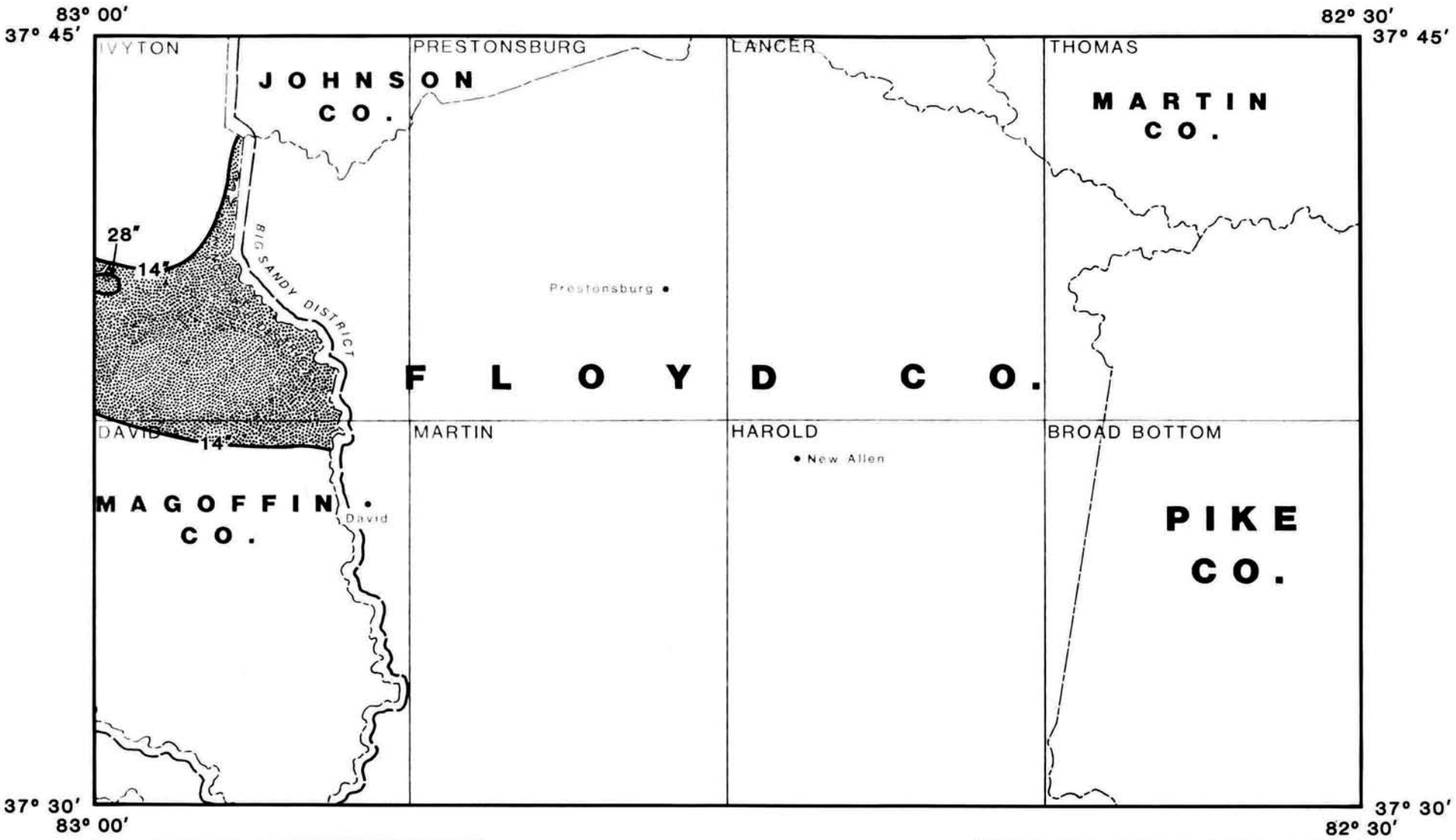


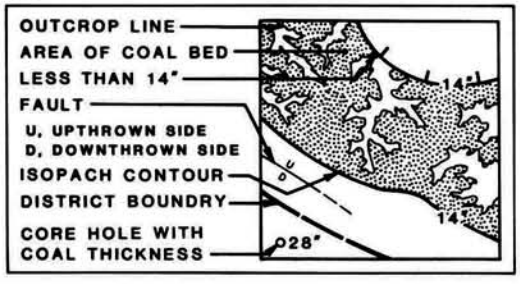
CANNEL CITY BED "A"

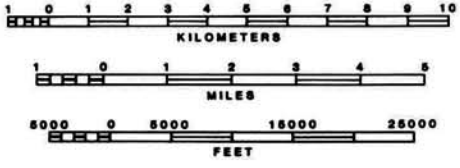




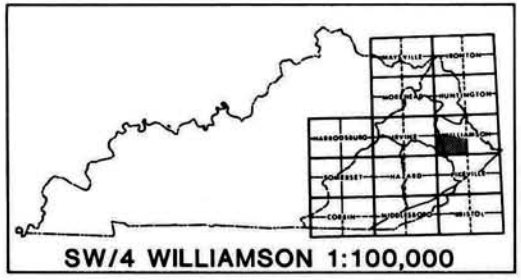
CANNEL CITY BED "A"

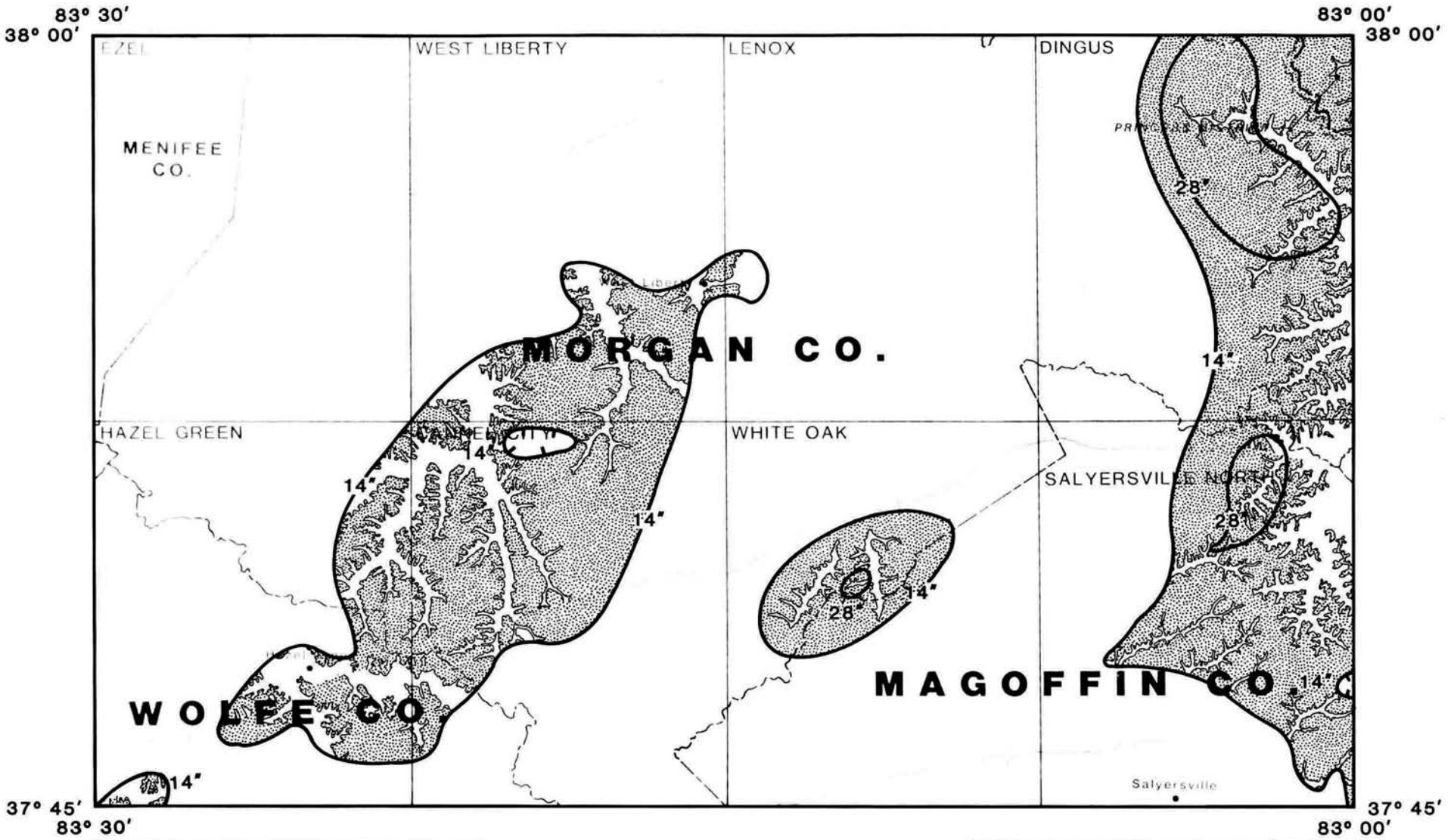


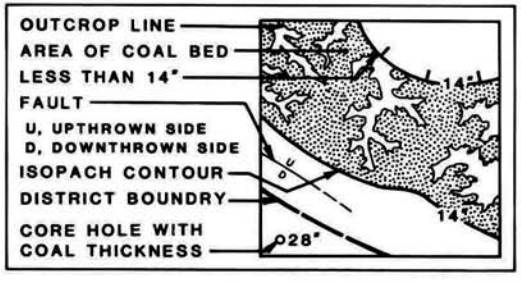


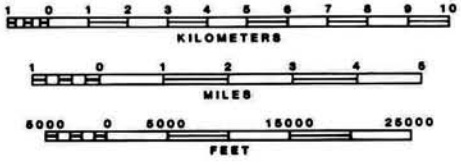


CANNEL CITY BED "A"

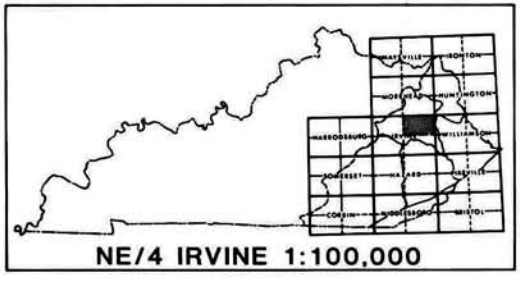


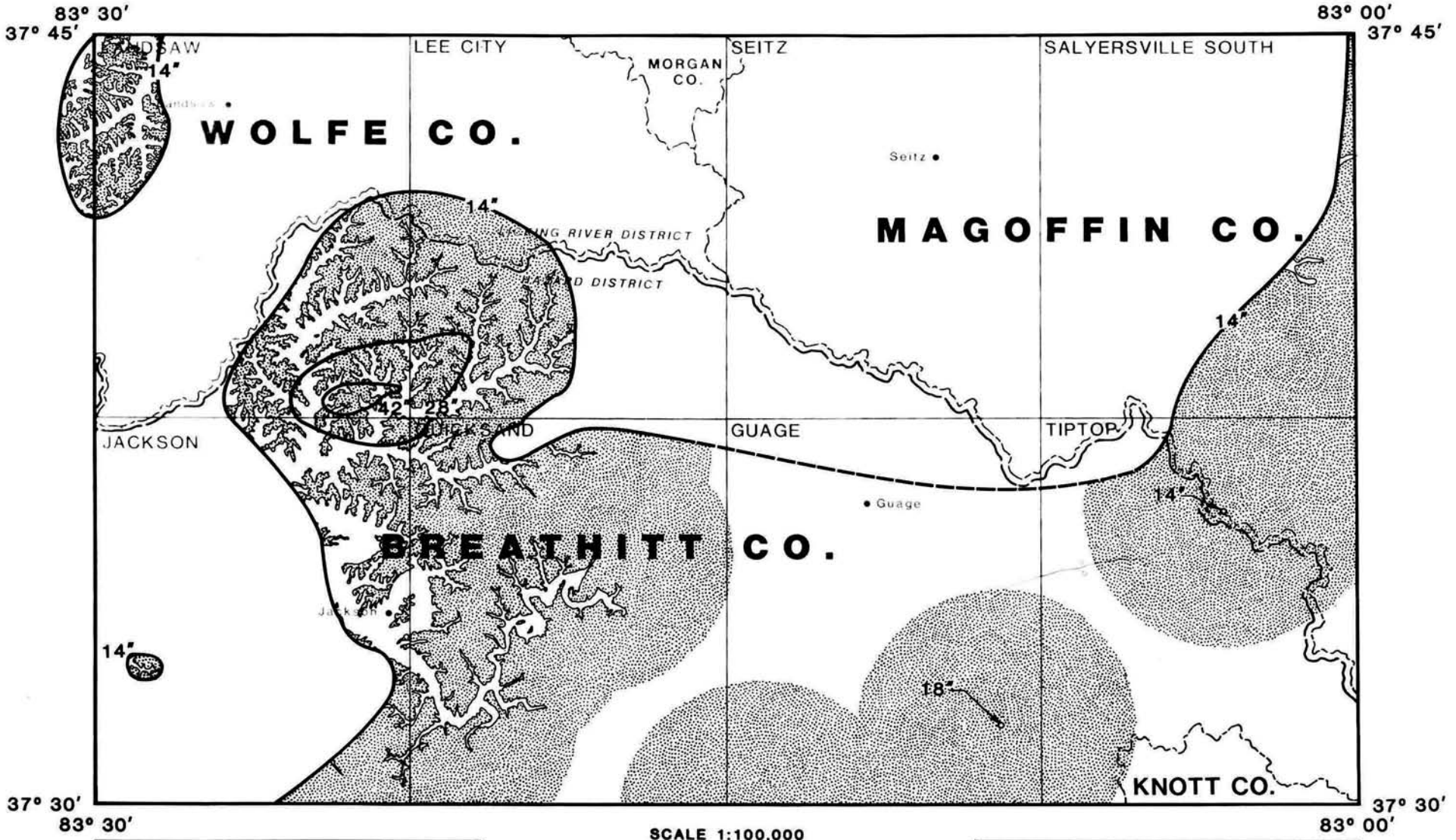


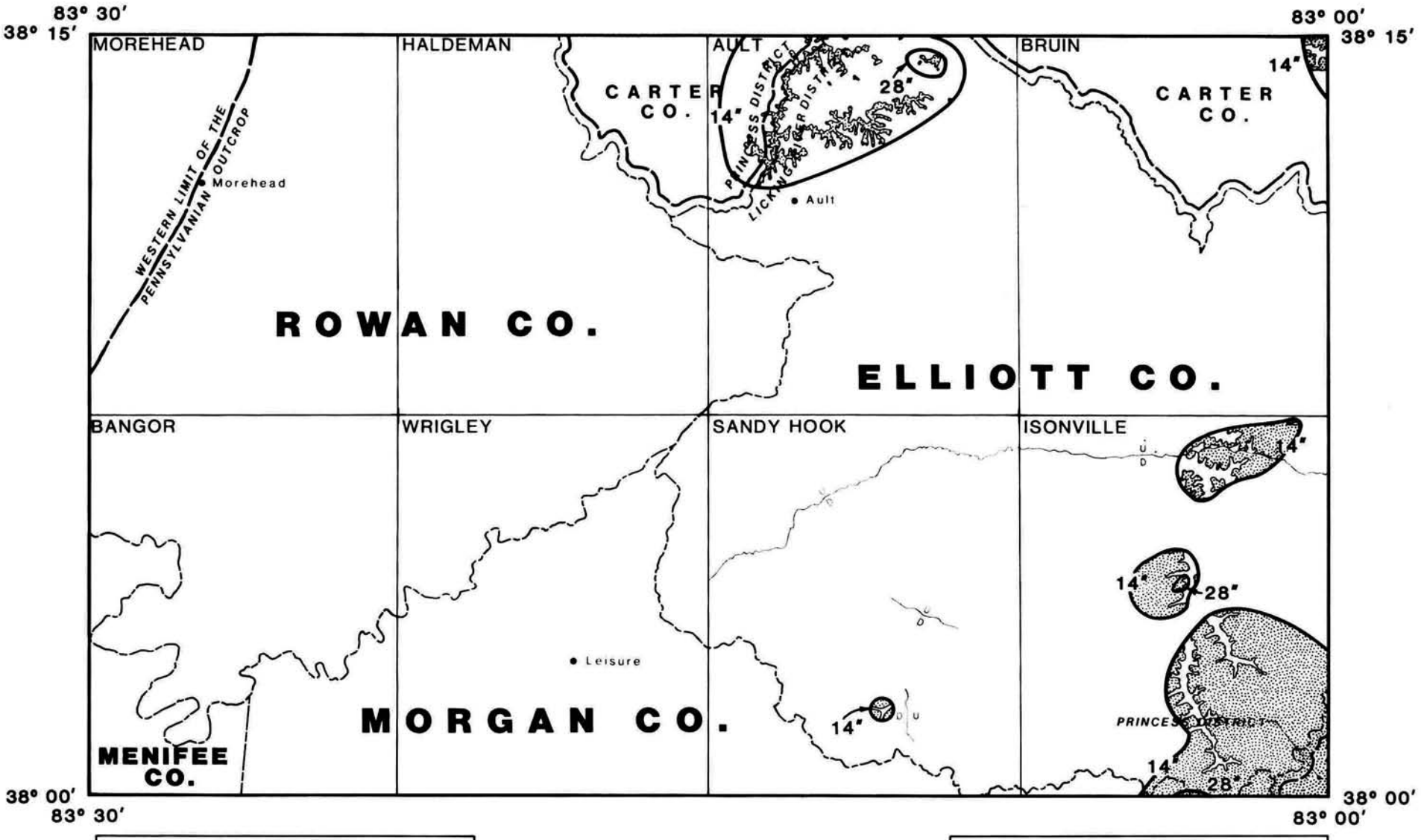


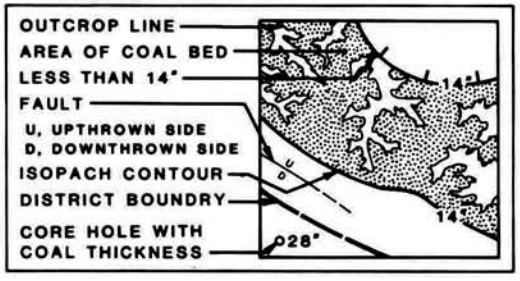


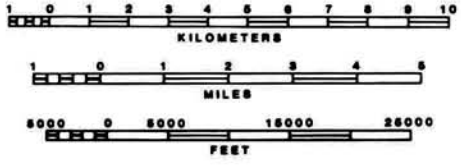
LITTLE CANEY BED "B"



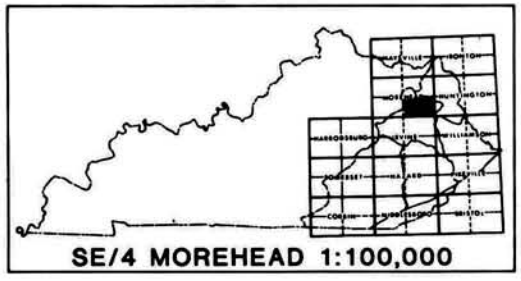

83° 30'
37° 45'
83° 00'
37° 45'
LEE CITY
MORGAN CO.
SEITZ
SALYERSVILLE SOUTH
WOLFE CO.
Seitz
MAGOFFIN CO.
14"
42"
28"
JACKSON
GUAGE
TIPTOP
Guage
BREATHITT CO.
18"
KNOTT CO.
37° 30'
83° 30'
83° 00'
37° 30'
OUTCROP LINE
AREA OF COAL BED
LESS THAN 14"
FAULT
U, UPTHROWN SIDE
D, DOWNTHROWN SIDE
ISOPACH CONTOUR
DISTRICT BOUNDRY
CORE HOLE WITH
COAL THICKNESS
SCALE 1:100,000
KILOMETERS
MILES
FEET
UPPER ELKHORN No.3
(Hazard District)
LITTLE CANEY BED "B"
(Licking River District)
SE/4 IRVINE 1:100,000

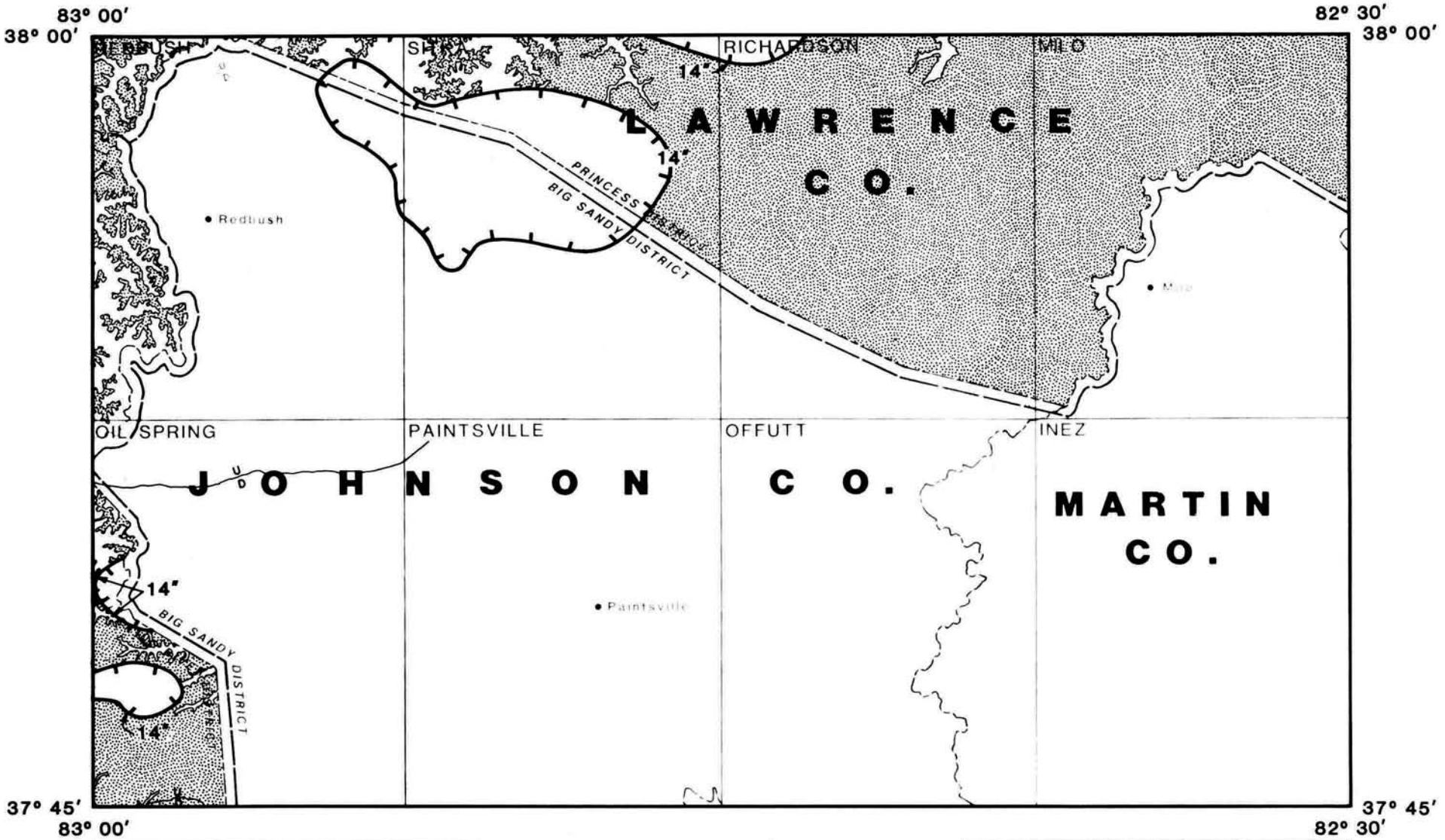






LITTLE CANEY BED "B"



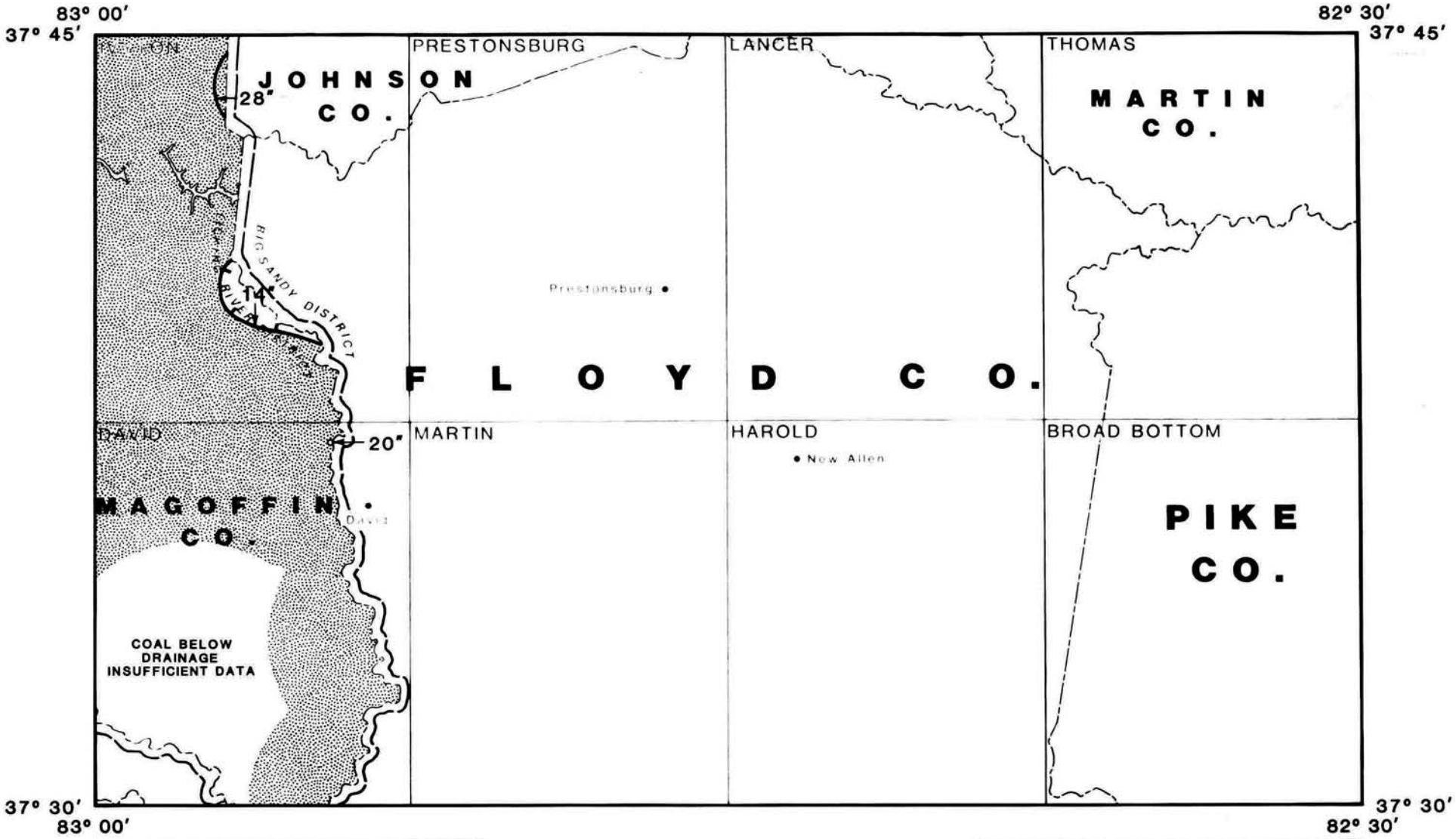


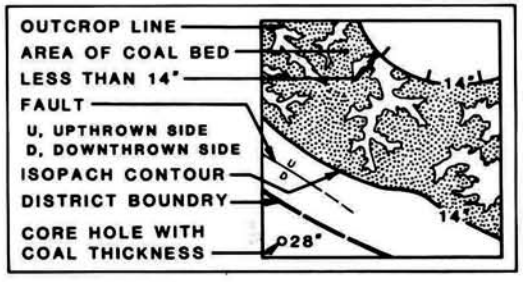
OUTCROP LINE
AREA OF COAL BED
LESS THAN 14"
FAULT
U, UPTHROWN SIDE
D, DOWNTHROWN SIDE
ISOPACH CONTOUR
DISTRICT BOUNDRY
CORE HOLE WITH COAL THICKNESS

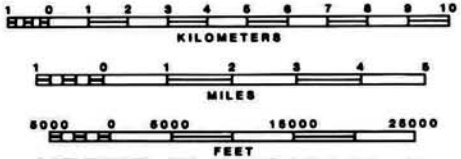
KILOMETERS
MILES
FEET

LITTLE CANEY BED "B"

NW/4 WILLIAMSON 1:100,000

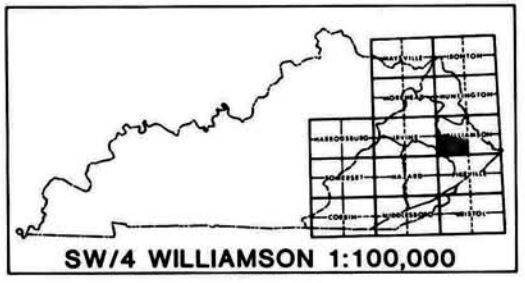






UPPER ELKHORN No.3
(Big Sandy District)

LITTLE CANEY BED "B"
(Licking River District)



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