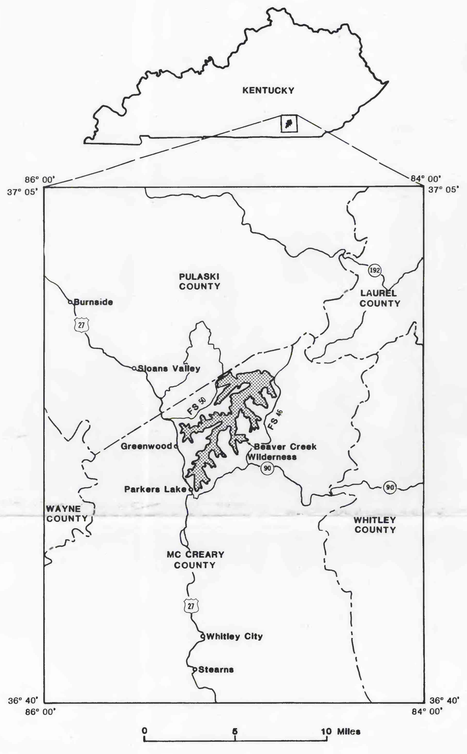
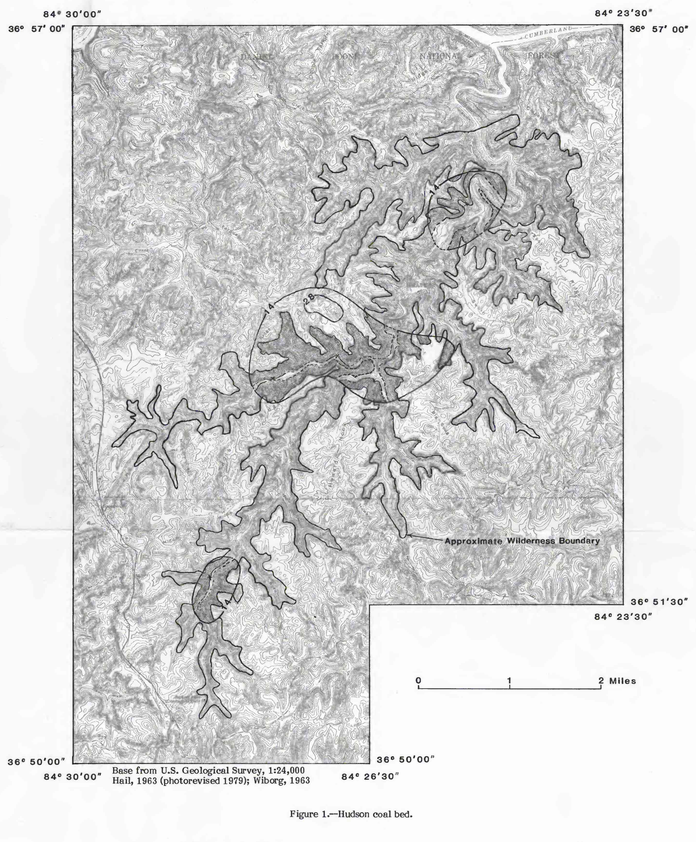
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1348-D
SHEET 1 OF 2
PAMPHLET ACCOMPANIES MAP



INDEX MAP

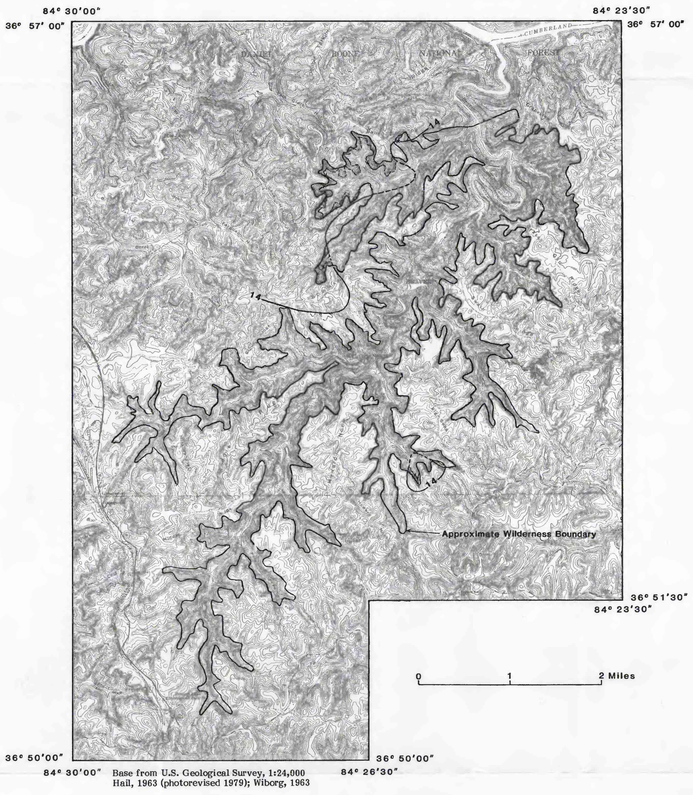


Base from U.S. Geological Survey, 1:24,000
Hail, 1963 (photorevised 1979); Wiborg, 1963

Figure 1.—Hudson coal bed.

EXPLANATION
(for figs. 1-3 and 5)

- Area underlain by estimated coal resources greater than 42 in. thick
- Area underlain by estimated coal resources 28-42 in. thick
- Area underlain by estimated coal resources 14-28 in. thick
- Area where coal is absent or less than 14 in. thick
- Approximate mined area
- Coal bed outcrop—Dashed where approximately located
- 14 Coal thickness, in inches—Dashed where approximately located. Isopach interval is 14 in.
- × Prospect or outcrop



Base from U.S. Geological Survey, 1:24,000
Hail, 1963 (photorevised 1979); Wiborg, 1963

Figure 3.—Beaver Creek rider coal bed.

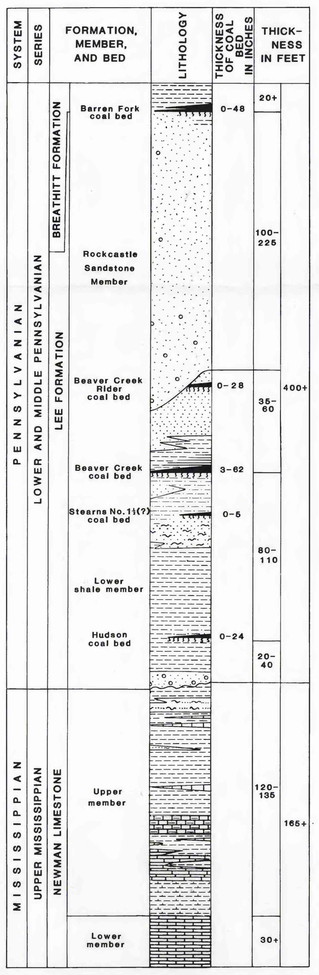
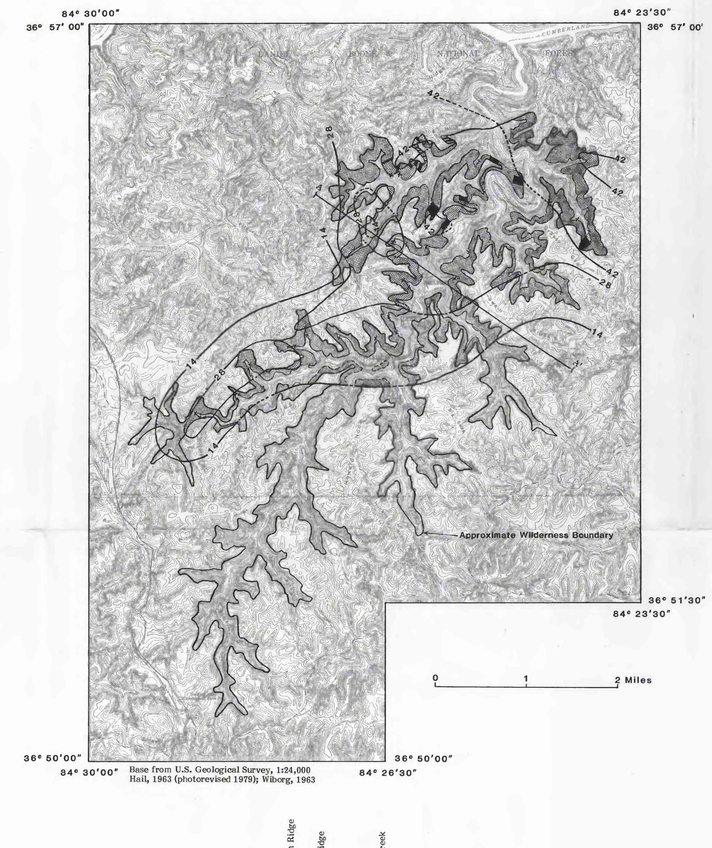


Figure 4.—Generalized stratigraphic section of rocks exposed in the Beaver Creek Wilderness (from Englund and Teaford, 1981).



Base from U.S. Geological Survey, 1:24,000
Hail, 1963 (photorevised 1979); Wiborg, 1963

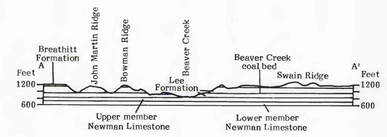
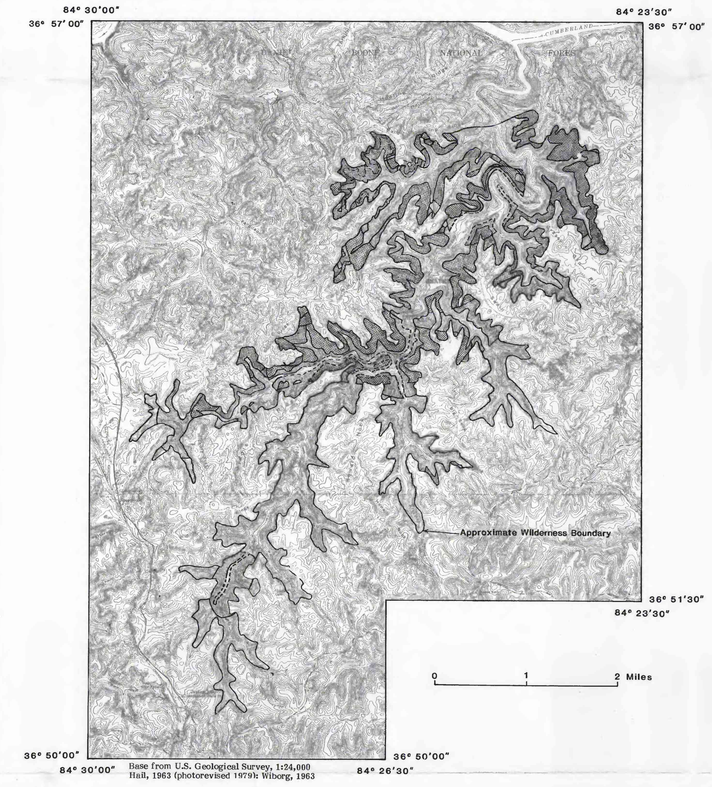


Figure 2.—Beaver Creek coal bed. Cross section A - A' shows geology of the area (from Englund and Teaford, 1981).



Base from U.S. Geological Survey, 1:24,000
Hail, 1963 (photorevised 1979); Wiborg, 1963

Figure 5.—Known cumulative coal-resource distribution of all beds in the Beaver Creek Wilderness.

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral resource potential survey of the Beaver Creek Wilderness in the Daniel Boone National Forest, McCreary County, Kentucky. The area was established as a wilderness by Public Law 93-622, January 3, 1975.

INTRODUCTION

The Beaver Creek Wilderness occupies an area of 4,791 acres within the cliffline bordering the Beaver Creek drainage in McCreary County, southeastern Kentucky. It is in the Daniel Boone National Forest and includes part of the Beaver Creek Cooperative Wildlife Management Area, which is managed by the U.S. Forest Service and the Kentucky Department of Fish and Wildlife Resources. The area is located about 11 mi southeast of Burnside, Ky., and is accessible from the north and south via U.S. Route 27 and Forest Service Road 50, located at its northwest border (see index map). From the east, the area can be reached via State Route 90 and Forest Service Road 46 located at the eastern edge of the area. Access by foot into the interior is provided by an abandoned Forest Service road and by several primitive trails that extend along the major streams.

The Beaver Creek Wilderness is located at the western edge of the Appalachian coal region and is within the highly dissected Cumberland Plateau section of the Appalachian Plateaus physiographic province. It is drained by Beaver Creek and its tributaries, which flow northeastward into Lake Cumberland about one mile north of the study area. Altitudes range from about 730 ft on the lower part of Beaver Creek to about 1,200 ft at its headwaters.

Available analyses of coal beds in McCreary County indicate that the coal in nearby areas is of high-volatile A bituminous rank (table 1). Coal was found in five beds in the Lee and Breathitt Formations of Early to Middle Pennsylvanian age. Of these beds, the Hudson, Beaver Creek, and Beaver Creek rider are of sufficient thickness, extent, and quality to contain identified coal resources (figs. 1-3). Resources were not calculated for the Barren Fork coal bed, which crops out just above the cliffline that delineates the wilderness boundary.

All of the coal is banded and consists largely of bright attritus with minor amounts of vitrain and dull attritus. Few of the observed coal bed exposures contained partings of impure coal and shale, powdery fusain, or finely disseminated pyrite. The geology and lithic character of rocks between the coal beds (fig. 4) are described in an accompanying report (Englund and Teaford, 1981).

Development of the coal resources in the Beaver Creek Wilderness has been limited to several small underground mines in the Beaver Creek coal bed in the northeastern part of the area (fig. 2). All of the operations were abandoned prior to fieldwork in 1980.

METHODS OF STUDY

Field investigations by the U.S. Geological Survey consisted of reconnaissance geologic mapping and data collecting, including the measurement of stratigraphic sections and the tracing of coal beds and resistant sandstone units. Coal bed information was obtained from abandoned mines and recent prospect pits in or near the area. The coal resources of the Beaver Creek Wilderness have been calculated according to standard procedures and categories as follows:

1. Measured resources were computed for areas where the thickness and extent of the coal bed are well defined by measurements 0.5 mi or less apart. They generally extend in a belt 0.25 mi wide adjacent to coal bed outcrops or points of measurement;
2. Indicated resources were computed where observation points are 1.5 mi apart and for areas that extend in a belt as much as 0.75 mi beyond the limit assumed for measured coal.

In addition to these reliability categories, coal bed maps with thickness intervals of 14-28 in., 28-42 in., and greater than 42 in. were used to estimate the total coal resources of the area. Resources for coal beds less than 14 in. thick were not determined. There are no estimated inferred resources in the Beaver Creek Wilderness.

COAL RESOURCES

Coal resources have been estimated for the Hudson, Beaver Creek, and Beaver Creek rider coal beds. In nearby areas of McCreary County, the Hudson and Beaver Creek are also known as the Stearns No. 1 and No. 2 coal beds, respectively.

The Hudson coal bed is approximately 20 to 40 ft above the Mississippian-Pennsylvanian boundary and crops out along the lower valley slopes bordering Beaver Creek and its main tributaries. The coal bed is widespread but is generally less than 12 in. thick. Estimated resources are oriented along a northeasterly trend through the central part of the area (fig. 1).

The Beaver Creek coal is a persistent and widely distributed bed that occurs from 80 to 110 ft above the Hudson coal. Estimated resources are in the northeastern two-thirds of the area (fig. 2) where the bed attains its maximum thickness of 62 in. A small tonnage of coal has been depleted by underground mining (table 2).

The Beaver Creek rider coal bed lies 35 to 60 ft above the Beaver Creek coal and ranges from 0 to 28 in. in thickness. In much of the area the bed had been eroded prior to the deposition of the overlying sandstone. Two small areas of resources in the 14- to 28-in. category are present at the northwest and southeast edges of the area (fig. 3).

The outcrop areas of the coal beds with estimated resources are commonly covered with colluvium from cliffs of the Rockcastle Sandstone Member of the Lee Formation (fig. 4).

RESOURCE SUMMARY

Approximately 8.3 million tons of remaining coal resources are estimated for three coal beds in the Beaver Creek Wilderness (table 2). An additional 87 thousand tons of coal are estimated to have been mined, or lost in mining from the Beaver Creek coal bed. Of the estimated total original resources, 48 percent is in the 14- to 28-in. category; 33 percent is in the 28- to 42-in. category; 18 percent is in the greater than 42 in. category; and 1 percent has been mined. The Beaver Creek coal, the thickest and most persistent bed, contains an estimated 6 million tons of coal, or 73 percent of the remaining coal resources. Most coal resources are located in the northern two-thirds of the wilderness (fig. 5).

Analyses of samples of coal from nearby areas of McCreary County show that coal in the Hudson and Beaver Creek coal beds is of high-volatile A bituminous rank (table 1). On an as received basis, most of the coal is low in ash (less than 8 percent), moderate to high in sulfur (1.8 to 4.2 percent), and high in heating value (greater than 12,300 Btu/lb.). The trace element and major and minor oxide compositions of both laboratory coal ash and whole coal from one coal sample are listed in tables 3 and 4. The sample did not contain significant amounts of either potentially toxic or economically valuable trace elements.

REFERENCES CITED

Englund, K. J., and Teaford, N. K., 1981, Geologic map of the Beaver Creek Wilderness, McCreary County, Kentucky: U.S. Geological Survey Miscellaneous Field Studies Map MF-1348-A, scale 1:50,000.

Fieldner, A. C., and others, 1944, Analyses of Kentucky coals: U.S. Bureau Mines Bulletin 446, 45 p.

Table 1.--*Coal analyses from McCreary County, Kentucky, in percent*
[AR, as received; MF, moisture free; MAF, moisture and ash free;--, no data]

Sample[1]	Coal bed	Ash softening temperature (F°)	Condition of sample	Proximate analysis: Moisture	Proximate analysis: Volatile matter	Proximate analysis: Fixed carbon	Proximate analysis: Ash	Ultimate analysis: Hydrogen	Ultimate analysis: Carbon	Ultimate analysis: Nitrogen	Ultimate analysis: Oxygen	Ultimate analysis: Sulfur	(Btu/lb)	Source
208217	Beaver Creek	2570	AR	2.7	43.4	45.6	8.3	5.5	71.2	1.4	9.3	4.2	13060	N.C.R.D.S.[2]
			MF		44.8	46.9	8.5	5.3	73.2	1.4	7.1	4.3	13420	
			MAF		48.8	51.2		5.8	80.0	1.6	7.8	4.7	14670	
88171	Beaver Creek	2280	AR	2.7	37.5	47.3	12.5	----	----	----	----	3.2	12380	A. C. Fieldner and others, 1944
88172	Beaver Creek	2510	AR	2.4	40.8	46.7	10.1	----	----	----	----	3.4	13330	A. C. Fieldner and others, 1944
88858	Hudson	2260	AR	3.1	39.0	51.2	6.7	----	----	----	----	2.9	13260	A. C. Fieldner and others, 1944
88859	Hudson	2390	AR	3.7	39.4	51.2	5.7	----	----	----	----	2.3	13380	A. C. Fieldner and others, 1944
82631	Hudson	2510	AR	3.3	37.5	50.5	8.7	----	----	----	----	1.9	13020	A. C. Fieldner and others, 1944
82632	Hudson	2150	AR	3.1	37.0	50.0	9.9	----	----	----	----	3.4	12870	A. C. Fieldner and others, 1944
82633	Hudson	2240	AR	3.8	37.8	51.7	6.7	----	----	----	----	2.2	13340	A. C. Fieldner and others, 1944
82634	Hudson	2350	AR	3.8	37.6	51.6	7.0	----	----	----	----	2.5	13240	A. C. Fieldner and others, 1944
82635	Hudson	2310	AR	3.7	36.8	53.2	6.3	----	----	----	----	2.0	13380	A. C. Fieldner and others, 1944
82636	Hudson	2510	AR	3.8	35.5	54.0	6.7	----	----	----	----	2.0	13300	A. C. Fieldner and others, 1944
88861	Hudson	2370	AR	3.1	39.3	51.1	6.5	----	----	----	----	1.8	13380	A. C. Fieldner and others, 1944
88862	Hudson	2280	AR	3.1	38.6	52.6	5.7	----	----	----	----	2.2	13490	A. C. Fieldner and others, 1944

[1]Analysis of coal samples collected from mines in McCreary County, Ky.
[2]Sample collected and submitted to the National Coal Resource Data System by J. Currens, Kentucky Geological Survey. Analysis by U.S. Department of Energy, Division of Solid Fuel Mining and Preparation, Pittsburgh, Pa.

Table 2.--*Estimated remaining and original coal resources in the Beaver Creek Wilderness*
[Values in thousands of short tons, covered by less than 1000 ft of overburden, as of September 1, 1981; ---, no data]

Formation	Coal bed	REMAINING RESOURCES: Measured: In beds 14-28 in. thick	Measured: In beds 28-42 in. thick	Measured: In beds more than 42 in. thick	Measured: Total	Indicated: In beds 14-28 in. thick	Indicated: In beds 28-42 in. thick	Indicated: In beds more than 42 in. thick	Indicated: Total	Total: In beds 14-28 in. thick	Total: In beds 28-42 in. thick	Total: In beds more than 42 in. thick	Total: Total	Mined and lost in mining	Total original resources
Lee	Beaver Creek rider	232	---	---	232	17	---	---	17	249	---	---	249	---	249
	Beaver Creek	1,203	2,106	978	4,287	592	657	517	1,766	1,795	2,763	1,495	6,053	87	6,140
	Hudson	959	---	---	959	1,001	---	---	1,001	1,960	---	---	1,960	---	1,960
	Totals	2,394	2,106	978	5,478	1,610	657	517	2,784	4,004	2,763	1,495	8,262	87	8,349

Table 3.--*Trace element composition on a whole-coal basis*
[Values in parts per million. Analysis by Roosevelt Moore, U.S. Geological Survey]

Trace element	Beaver Creek coal bed sample no. w208217
As	5.0
Ce	15.0
Cl	1,190
Co	7.2
Cr	14.0
Cs	.6
Eu	.25
F	.30
Hf	.6
Hg	.27
La	8.0
Lu	.1
Na	200.0
P	330.0
Rb	9.0
Sb	.20
Sc	2.0
Se	2.0
Sm	1.3
Tb	.2
Th	1.0
U	3.3
Yb	.6

Table 4.--*Major and minor oxide composition of the laboratory ash of a bituminous coal sample*
[Values in percent. Analysis by Roosevelt Moore, U.S. Geological Survey]

Coal bed Sample No.	Ash	SiO_2	Al_2O_3	CaO	MgO	Na_2O	K_2O	Fe_2O_3	TiO_2	P_2O_5	SO_3
Beaver Creek w208217	9.1	32	15	2.2	.70	.30	1.6	40	1.2	.84	2.5

COAL RESOURCE MAPS
By
Priscilla L. Johnson and Kenneth J. Englund

MINERAL RESOURCE POTENTIAL MAPS OF THE BEAVER CREEK WILDERNESS, MC CREARY COUNTY, KENTUCKY

By
Kenneth J. Englund and Priscilla L. Johnson, U.S. Geological Survey
and
Richard W. Hammack and Robert B. Ross, Jr., U.S. Bureau of Mines

1983

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