

Figure 1.—Index map showing location of Troublesome Roadless Area. (F S stands for U.S. Forest Service Route).

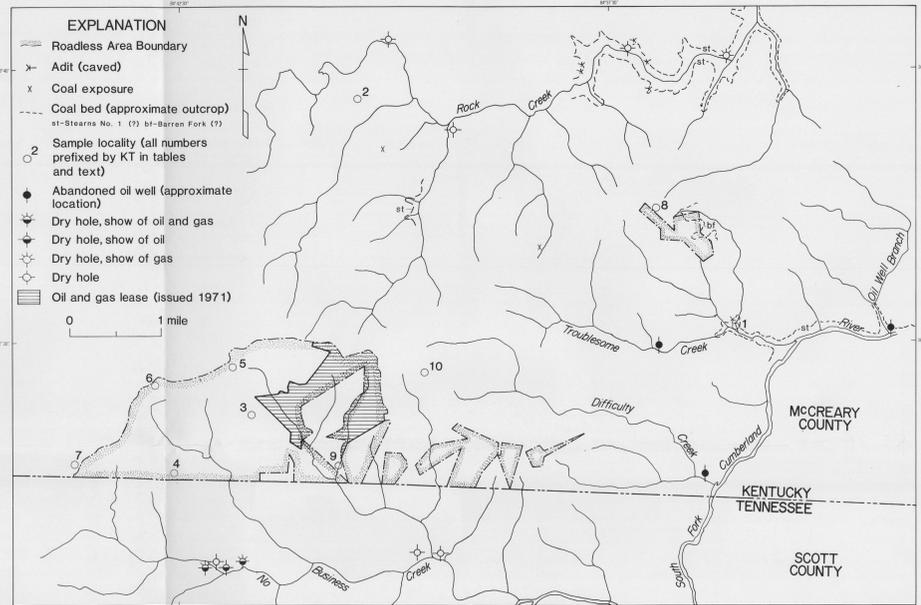


Figure 3.—Map showing location of coal outcrops, rock samples, and oil and gas test holes in and near the Troublesome Roadless Area. (Coal outcrops from Pomeroy, 1964, and Smith, 1978.)

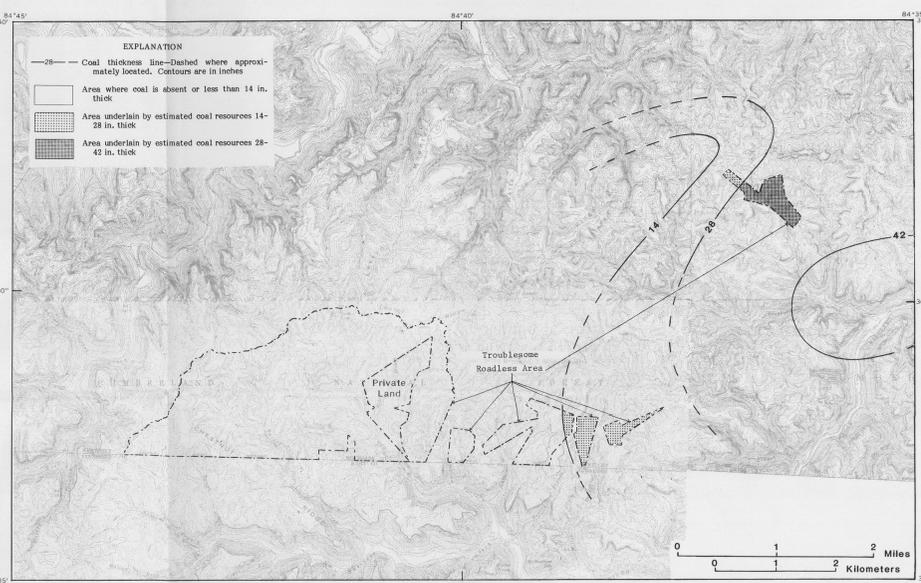


Figure 4.—Isopach map of Stearns No. 1 1/2 (?) coal bed.

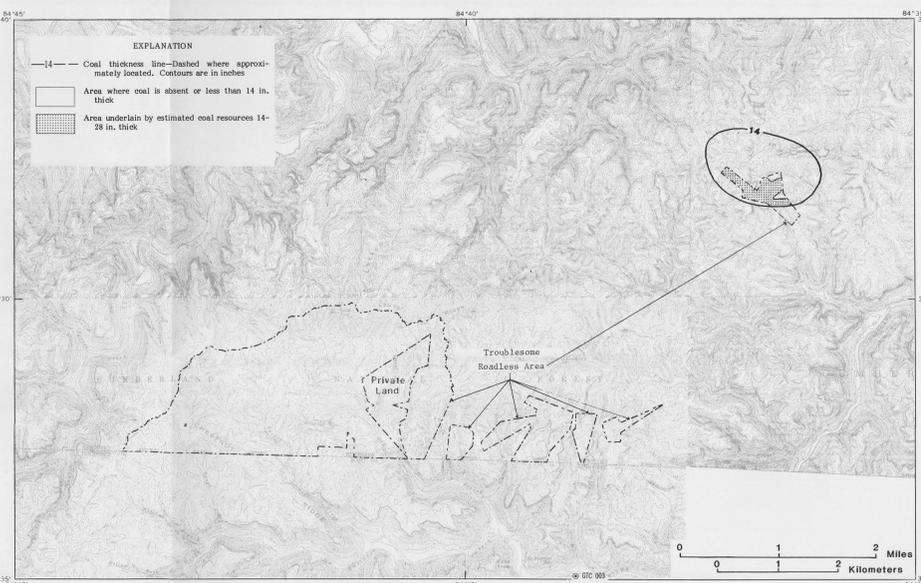


Figure 5.—Isopach map of Barren Fork(?) coal bed.

SYSTEM	SERIES	FORMATION, MEMBER, AND BED	LITHOLOGY	THICKNESS OF COAL BED IN INCHES	THICKNESS IN FEET
QUATERNARY	HOLOCENE	Alluvium			0-20
		Colluvium			0-30
		Corbin (?) Sandstone Member of Lee Formation			40+
		Upper tongue of Breathitt Formation			30-60
PENNSYLVANIAN	LOWER AND MIDDLE PENNSYLVANIAN	Middle sandstone member of Lee Formation			60-80
		Lower tongue of Breathitt Formation			30-60
		Barren Fork (?) coal bed			0-22
		Rockcastle Sandstone Member of Lee Formation			100-125
		Shale member of Lee Formation			0-6
					0-2
					0-2
					0-8
					0-17
					0-3
MISSISSIPPIAN	UPPER MISSISSIPPIAN	Stearns No. 1 1/2 (?) coal bed			15-50
					0-17
					0-6
		Upper member			20-130

Figure 2.—Generalized stratigraphic column of exposed rock formations in the Troublesome Roadless Area (Sigleo and Randall, 1981).

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 presents the results of a geologic and mineral survey of the Troublesome Roadless Area in the Daniel Boone National Forest, McCreary County, Ky. The area was classified as a further planning area during the Second Roadless Area Review and Evaluation (Rare II) by the U.S. Forest Service, January 1978.

INTRODUCTION

The Troublesome Roadless Area is composed of six tracts of land totaling 2,943 acres (figs. 1 and 3). The largest tract, 13 mi southwest of Stearns, Ky., is accessible from that town via State Route 92 to Hill Top, Ky., and then southwestward along country roads. Unimproved U.S. Forest Service roads, abandoned logging roads, and primitive trails provide access by foot or horseback into the interior of each tract.

About 800 ft of sedimentary rocks of Late Mississippian to Middle Pennsylvanian age crop out in and adjacent to the study area (fig. 2), and as much as 8,000 ft of older Paleozoic rocks may be present in the subsurface. The basal part of the exposed section, assigned to the Newman Limestone of Late Mississippian age, crops out along the South Fork of the Cumberland River and its major tributaries east of the area. Overlying rocks of the Lee and Breathitt Formations of Early and Middle Pennsylvanian age are mostly continental and coalbearing, but the sequence may also contain marine deposits. The rocks of these formations crop out in the study area and underlie the highlands. Unmapped deposits of collium mantle many valley slopes, and deposits of alluvium, consisting of sand, coarse gravel, and large boulders, underlie the valley floors.

RESOURCE EVALUATION

Coal, sandstone, and shale are the principal resources in the study area. Coal has been mined near the roadless area from the Stearns No. 1 1/2 (?) and the Barren Fork (?) coal beds. Quartzose sandstone, exposed throughout most of the area, may be suitable for glass, filter, furnace, and abrasive sand. Other possible uses for sandstone include construction sand and dimension stone. In addition, shale may be suitable for structural clay products. No potential was found for metallic mineral deposits. Commercial quantities of oil and gas may be present at shallow depths in rocks of Mississippian age.

Coal

Coal in the Troublesome Area is apparently of high-volatile A bituminous rank. It occurs in at least 13 beds of which two, the Stearns No. 1 1/2 (?) and the Barren Fork (?), contain coal resources. The coal resources in the Troublesome area have not been commercially developed except for local use. Coal has been produced from several mines north of the area near Fidelity, Ky., and to the southeast on Watson Branch near the South Fork of the Cumberland River. All pits are now abandoned and most are caved.

Most of the coal is banded with dull and bright attritus and lesser amounts of vitrain and fusain. Partings of impure coal, shale, and underclay are common, and finely disseminated pyrite is in the principal beds. The stratigraphic position and range in thickness of each coal bed and the thickness and lithologic characteristics of the intervening strata are presented in figure 2.

Coal resources were estimated for the Stearns No. 1 1/2 (?) bed in the Lee Formation and for the Barren Fork (?) bed in the Breathitt Formation. Approximately 913,000 short tons of coal are contained in the two resource-bearing coal beds located in the Troublesome Roadless Area (table 1). Of the estimated original and remaining resources, 53 percent is in the 14-28 in. thick category, and 47 percent is 28-42 in. thick. There are no known coal resources thicker than 42 in. in the area. The Stearns No. 1 1/2 (?) is the thickest and most persistent bed, and contains an estimated 747,000 short tons of coal or 82 percent of the total calculated for the entire study area. The coal resources for the two beds appear to be mostly in the southeastern part of the Troublesome Roadless Area. Coal reserves were not distinguished within the study area by the USBM.

A proximate analysis of the Stearns No. 1 1/2 (?) coal on Watson Branch was determined by the USBM. The analysis indicates that the coal is apparently of high-volatile A bituminous rank and has low sulfur and ash contents. Analyses are not available for the Barren Fork (?) coal in the Troublesome area. Accurate rank determinations were not made because of the lack of unweathered coal samples.

Sandstone and Shale

Sandstone in the Troublesome Roadless Area occurs as cliff-forming orthoquartzite beds in the Lee Formation and poorly exposed subgraywacke and quartzose sandstone beds in the Breathitt Formation. The Rockcastle Sandstone Member of the Lee Formation contains 95 percent or more SiO<sub>2</sub>. Chemical analyses of selected samples of sandstone of the Lee Formation, from in or near the study area, are shown in Table 2. Potential uses of sandstone from the study area include filter, furnace, and abrasive sand (samples KT-3, 4, 6, and 8). Three samples (KT-4, 6, and 8) of friable, deeply weathered sandstone beds have marginal potential for use as low-grade glass sand.

Shale, ranging in color from light to dark gray, occurs in both the Lee and Breathitt Formations in the study area. Good exposures of shale are found in deep stream valleys that have been cut below the base of the Rockcastle Sandstone Member of the Lee Formation. Three shale samples were collected during the field investigation and tested to determine ceramic and bloating properties. Preliminary tests indicate that shale exposed in the roadless area may be suitable for structural clay products (table 3). None of the samples bloated during quick-fire tests, thus eliminating shale from consideration as possible raw material for lightweight aggregate production.

Metallic Minerals

Metallic mineral deposits have not been reported in the area, and none were observed during the field investigations. The rock units exposed in the study area do not normally host metallic deposits in this region, and the potential for such deposits appears low. Major geochemical anomalies indicative of mineralization were not located by the geochemical survey (Grosz and Siems, in press).

Oil and Gas

Nearby producing and abandoned oil and gas wells suggest the possibility of limited accumulation of oil and gas in commercial amounts in the near the Troublesome Roadless Area (fig. 3). In most wells, production is from the "Beaver sand," a driller's term for a porous limestone in the lower part of the Fort Payne Formation of Early Mississippian age (R. C. Keperle, written commun., 1981). No exploratory drilling has been conducted in the study area; however, about 410 acres are included in an oil and gas lease (ES-7925) issued by the U.S. Bureau of Land Management in 1971. In summary, limited drilling adjacent to the Troublesome Roadless Area indicates low potential for significant hydrocarbon discoveries at shallow depth. Additional exploration, including deep drilling, is necessary before the oil and gas potential can be fully evaluated.

REFERENCES CITED

Grosz, A. E., and Siems, D. F., 1982, Geochronology survey of the Troublesome Roadless Area, McCreary County, Kentucky: U.S. Geological Survey Miscellaneous Field Studies Map MF 1341-B, scale 1:50,000 in press.

Pomeroy, J. R., 1964, Geology of the Barthell quadrangle and part of the Oneida North quadrangle, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-314, scale 1:24,000.

Sigleo, W. R., and Randall, A. H., 1981, Geologic map of the Troublesome Roadless Area, McCreary County, Kentucky: U.S. Geological Survey Miscellaneous Field Studies Map MF-1341-A, scale 1:50,000.

Smith, J. H., 1978, Geologic map of the Bell Farm quadrangle and part of the Barthell SW quadrangle, McCreary and Wayne Counties, Kentucky: U.S. Geological Survey Geologic Quadrangle Map GQ-1496, scale 1:24,000.

Table 1.—Estimated original coal resources, in thousands of short tons covered by less than 1,000 ft overburden, as of July 1981

Formation	Coal bed	Original and remaining resources										
		Measured		Indicated		Inferred		Total		Total		
		In beds 14-28 inches thick	Total	In beds 14-28 inches thick	Total	In beds 14-28 inches thick	Total	In beds 14-28 inches thick	Total	In beds 28-42 inches thick	Total	
Breathitt	Barren Fork (?)	93	93	73	---	73	---	---	---	166	---	166
	Stearns No. 1 1/2 (?)	9	9	45	311	356	265	117	382	319	428	747
	Total	102	102	118	311	429	265	117	382	485	428	913

Table 2.—Analyses of sandstone samples from the Lee Formation

Analyses performed by U.S. Bureau of Mines Reno Research Center, Reno, Nev. Symbol used: ---, less than. All samples are random chip through sample interval.

Sample number	Sample interval (feet)	Neutron activation <sup>1</sup> (percent) SiO <sub>2</sub>	Atomic absorption (percent)		X-ray fluorescence (percent) SiO <sub>2</sub>			
			Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>				
KT-3	10	95.0	0.6	1.9	0.03	0.03	0.01	0.08
KT-4	20	97.4	0.4	0.7	0.03	0.02	0.01	0.13
KT-5	20	92.6	0.6	1.6	0.07	0.03	0.04	0.16
KT-6	20	96.0	0.4	0.7	0.06	0.03	0.01	0.14
KT-7	20	93.6	0.8	2.7	0.01	0.05	0.01	0.10
KT-8	15	96.5	0.6	1.0	0.01	0.03	0.01	0.16

<sup>1</sup> Accuracy is plus or minus 3.5 percent of value given.

Table 3.—Evaluation of clay and shale samples

Analyses by U.S. Bureau of Mines Tuscaloosa Research Center, Tuscaloosa, Ala. All data are based on preliminary laboratory tests and will not suffice for plant or process design.

Sample number	Raw properties	Temp. (°C)	Munsell color	Moh's hardness	Slow Firing Test			Apparent porosity (percent)	Bulk density (g/cc)	Potential use
					Linear shrinkage (percent)	Absorption (percent)	Swelling (percent)			
KT-2	Water of plasticity: 14.6%	1,000	5 YR 7/4	3	2.5	17.0	30.8	1.82	Structural clay products (e.g., building brick at 1,100°-1,250°C). Abrupt firing range.	
	Working properties: short	1,050	5 YR 6/6	3	5.0	13.5	26.5	1.96		
	Drying shrinkage: 2.5%	1,100	5 YR 5/6	4	5.0	10.5	22.0	2.09		
	Dry strength: Fair	1,150	2.5 YR 4/4	4	7.5	8.3	18.3	2.19		
	pH: 5.4	1,200	2.5 YR 4/2	5	10.0	4.9	10.8	2.20		
HCl effervescence: none	1,250	5 YR 4/1	5	10.0	3.3	7.1	2.21			
KT-9	Water of plasticity: 20.2%	1,000	5 YR 7/6	3	2.5	21.8	37.1	1.71	Not suitable for structural clay products. Abrupt vitrification between 1,150°-1,200°C.	
	Working properties: short	1,050	5 YR 6/6	3	5.0	18.3	33.3	1.79		
	Drying shrinkage: 0.0%	1,100	5 YR 5/6	3	5.0	13.1	26.9	2.05		
	Dry strength: Fair	1,150	5 YR 4/4	4	7.5	9.3	19.3	2.07		
	pH: 4.6	1,200	---	---	Melted	---	---	---		
HCl effervescence: none	1,250	---	---	---	---	---	---			
KT-10	Water of plasticity: 21.3%	1,000	7.5 YR 8/6	3	5.0	18.4	32.9	1.79	Structural clay products (e.g., building brick at 1,150°-1,250°C).	
	Working properties: plastic	1,050	5 YR 6/8	3	5.0	14.3	27.5	1.92		
	Drying shrinkage: 2.5%	1,100	2.5 YR 5/6	3	7.5	10.4	21.6	2.06		
	Dry strength: good	1,150	2.5 YR 4/6	4	7.5	8.4	17.9	2.14		
	pH: 4.2	1,200	2.5 YR 4/4	4	10.0	6.2	13.5	2.18		
HCl effervescence: none	1,250	2.5 YR 4/2	5	10.0	4.0	8.9	2.23			

MINERAL RESOURCE POTENTIAL MAP OF THE TROUBLESOME ROADLESS AREA, McCREARY COUNTY, KENTUCKY

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