DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1288-D
PAMPHLET ACCOMPANIES MAP

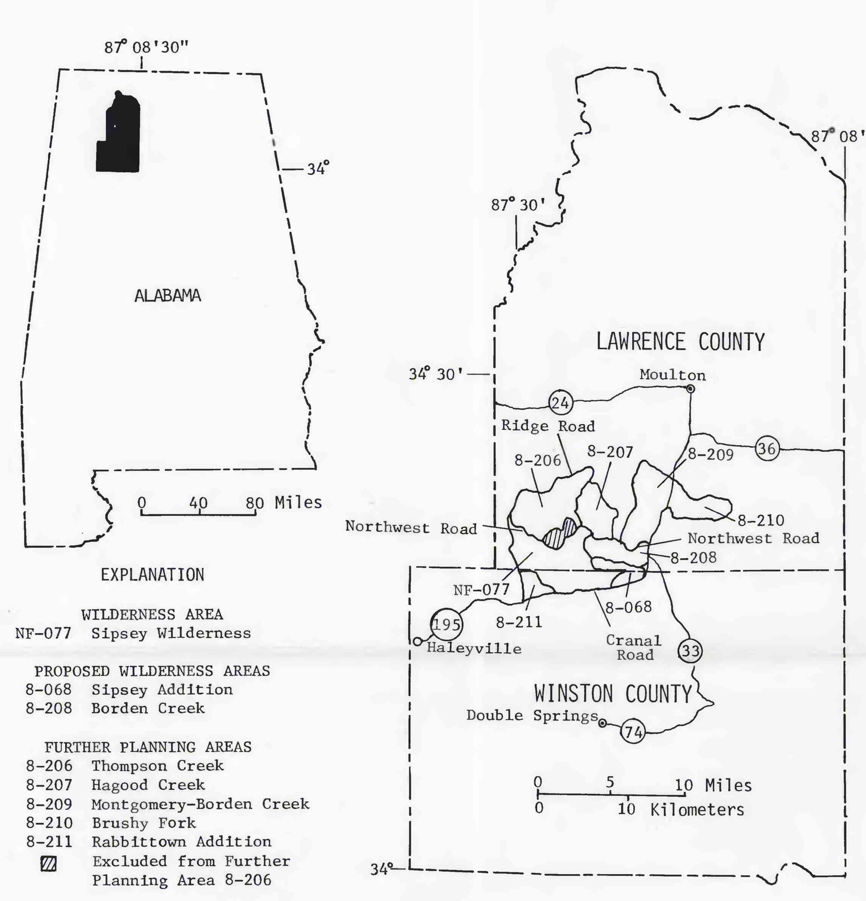

Figure 1.--Index map showing the Sipsey Wilderness and additions. Individual tracts are designated by their Forest Service numbers.

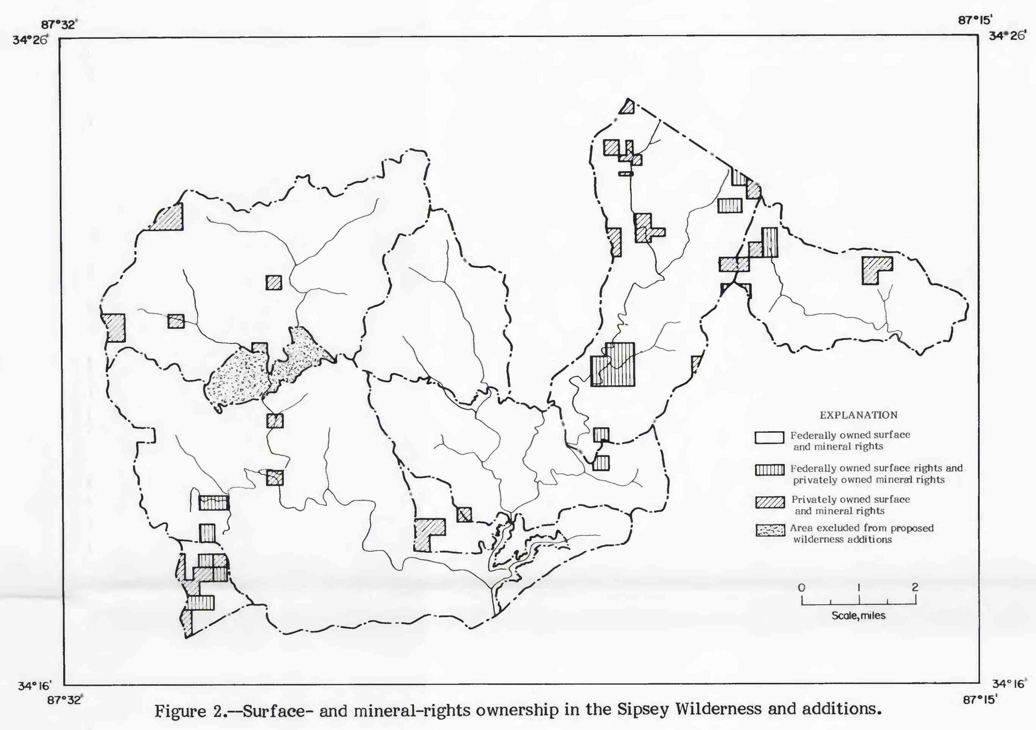

Figure 2.--Surface- and mineral-rights ownership in the Sipsey Wilderness and additions.

System	Series	Formation	Member and bed	Lithology	Thickness of coal bed in inches (centimeters)	Thickness in feet (meters)	Description
Quaternary	Holocene	Alluvium				20(6)	Unconsolidated clay, silt, sand, gravel, and large boulders in and adjacent to streams
Pennsylvanian	Lower Pennsylvanian	Pottsville (in part)	Boyles Sandstone Member(?); Bear Creek(?) coal bed*		0-14(36)	400+(121+)	Basal unit of massive, cliff-forming, pebbly sandstone as much as 100 ft (30 m) thick is overlain by interbedded sandstone, shale, mudstone, claystone, and coal, in unconformable contact with the Parkwood Formation. Sandstone is very light to light gray and weathers white to moderate yellowish gray and occasionally pink, is medium to coarse grained but occasionally fine grained, and has well- to moderately well sorted and rounded grains. The sandstone is very quartzose to moderately argillaceous, feldspathic, and micaceous, is medium to massive bedded and occasionally thin bedded, and is very resistant to moderately friable. It contains sparse to abundant, well-rounded pebbles of white quartz, usually 0.25 to 0.75 in. (0.6 to 1.9 cm) in diameter but occasionally as large as 1.5 in. (3.8 cm) in diameter, in thin to thick zones; clay chips as large as 3 in. (7.6 cm) in length; small, reworked siderite nodules; hematite- and limonite-cemented lenses and "boxwork", usually in the basal part; occasional mudstone lenses; and abundant, low-angle, planar crossbedding. No identifiable fossils were found in the sandstone. Shale, mudstone, and claystone are medium to dark gray and weather olive gray to pale or dark yellowish orange. The shale is mostly silty, sandy, and micaceous and contains a few thin beds of siderite nodules. No marine or freshwater animal megafossils were found in the shale, and well-preserved plant megafossils were found only in the roof shale of the Bear Creek(?) coal bed. The mudstone is predominantly massive and contains thin beds of siderite nodules and abundant plant trash. The claystone is massive and where it is an underclay it commonly has abundant fossil-root impressions. Siltstone is light to dark gray and weathers olive gray and moderate yellowish brown. It is very quartzose to very argillaceous and usually micaceous, is very thin to medium bedded and occasionally ripple bedded, and typically contains abundant fossil-plant trash on bedding planes. Coal is restricted to the Bear Creek(?) coal bed which was found just west of but not in the study area
Pennsylvanian	Lower Pennsylvanian	Parkwood	Unnamed coal beds; Unnamed coal beds		0-32(81), 0-6(15), 0-18(46); 0-23(58), 0-6(15)	32-230(10-70)	Interbedded sandstone, shale, mudstone, siltstone, claystone, carbonaceous shale, and coal, in unconformable contact with the Bangor Limestone. Sandstone is light to medium gray and weathers olive gray and moderate yellowish brown. It is very fine to fine grained but occasionally medium grained, and is very quartzose and well sorted to very argillaceous, feldspathic, and micaceous. Bedding is even to uneven, and is thin to massive in units as much as 30 ft (9 m) thick. The sandstone is very resistant to moderately friable and occasionally calcareous. It contains small-scale low-angle cross bedding, ripple bedding, trails, burrows, and bioturbated zones; marine megafossils in a few thin zones; and a few beds that are well cemented with manganese and iron minerals. Shale, mudstone, and claystone are medium to dark gray and weather olive gray to pale or dark yellowish orange and, rarely, red. The shale is commonly clay-rich and micaceous but occasionally is silty or sandy. It contains abundant well-preserved plant megafossils in several beds as much as 10-15 ft (3-4.5 m) thick, a few thin beds of siderite nodules, and several thin zones having sparsely distributed marine megafossils. The claystone is typically massive; as underclay it commonly contains abundant fossil-root impressions. Siltstone is light to dark gray and weathers olive gray and moderate yellowish-brown, is very quartzose to very argillaceous, and usually micaceous; is very thin to medium bedded and occasionally ripple bedded, and commonly contains abundant fossil-plant trash on bedding planes. Carbonaceous shale is dark gray to black and weathers light to medium gray, and is commonly coaly, thin to medium bedded, and occasionally as much as 3 ft (1 m) thick. Coal beds are thin, lenticular, and nonpersistent
Mississippian	Upper Mississippian	Bangor Limestone				255+(77+)	Limestone having several zones of interbedded shale and claystone as much as 15 ft (4.5 m) thick, and at least one thin zone of interbedded dolomitic siltstone, very fine-grained sandstone, and sandy limestone near the top; base is not exposed. Limestone is white to light gray and brownish gray, very coarse to fine grained, biogenic to oolitic, and clean to occasionally very argillaceous. It is thin to massive bedded and contains abundant marine megafossils and a few shale fragments. Shale and claystone are light gray to grayish red and grayish green, are calcareous, and contain abundant veins of calcite. Siltstone and sandstone are light gray to light brownish gray, are calcareous, and are thin to medium bedded

*Not present in study area; see text in Schweinfurth and others, 1981.

Figure 3.--Generalized stratigraphic section of rocks exposed in and near the study area.

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 mineral resource potential survey of the Sipsey Wilderness and additions, William B. Bankhead National Forest, Lawrence and Winston Counties, Alabama. The Sipsey Wilderness was established by Public Law 93-622, January 3, 1975. The Sipsey Addition (08068) and Borden Creek (08208) roadless areas were classified as proposed wilderness areas, and the Thompson Creek (08206), Hagood Creek (08207), Montgomery-Borden Creek (08209), Brushy Fork (08210), and Rabbittown Addition (08211) roadless areas were classified as further planning areas during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979 (fig. 1).

SUMMARY

The Sipsey Wilderness and additions (hereinafter called the study area) are deemed to have a low economic potential for mineral resources. Limestone, shale, and sandstone are the principal mineral resources; no potential was found for metallic minerals. Limestone has been quarried by the Forest Service for road metal and construction material. Possible uses for shale include structural products and expanded lightweight aggregate. The sandstone may be suitable for silica, construction sand, and dimension stone.

A small amount of coal is present in the study area in thin, nonpersistent beds. Several beds have been mined locally for domestic and blacksmithing use but present economic potential for coal in the study area is considered to be very low. Resources are estimated to total about 727,000 short tons. However, none of this coal exceeds 28 in. in thickness and therefore does not constitute a resource from which a reserve base[1] can be estimated.

Production of oil and (or) natural gas may be possible if suitable structural traps exist in the subsurface. Small amounts of asphaltic sandstone and limestone, commonly referred to as "tar sands", may also occur in the subsurface.

The conclusions presented here are based on results of geologic mapping, examination of mines, quarries, and prospects, and a geochemical survey of stream sediments, soil, and bedrock.

INTRODUCTION

The Sipsey Wilderness and additions are in the William B. Bankhead National Forest, Lawrence and Winston Counties, Ala. (fig. 1). They are accessible via State Route 33 from either Moulton, in Lawrence County, or Double Springs, in Winston County, or from Haleyville via State Route 195 and Cranal Road. Altitudes of the plateau surface in the study area range from about 1,050 ft along the northern boundary to about 880 ft along Cranal Road, which marks the southern boundary of the area. Topographic relief averages approximately 400 ft throughout the study area.

SURFACE- AND MINERAL-RIGHTS OWNERSHIP

The Federal Government owns about 95 percent of the combined surface and mineral rights within the study area (fig. 2). Mineral rights are privately held on numerous small tracts totalling about 800 acres, or about 2 percent, of Federal surface-owned land. Privately owned combined surface and mineral rights on scattered tracts total about 1200 acres, or about 3 percent, of the total area. This, combined with the 2 percent of private mineral ownership under the Federally owned surface makes a total of about 5 percent of the study area for which the Federal Government does not hold the mineral rights.

GEOLOGY

About 880 ft of Upper Mississippian to upper Lower Pennsylvanian age sedimentary rocks crop out in the study area (fig. 3), and as much as 6,800 ft of older Paleozoic sedimentary rocks might be present in the subsurface (Moore and Daniel, 1972, p. 29). The basal part of the exposed section consists of marine limestone assigned to the Bangor Limestone of Late Mississippian age. This unit crops out principally in stream valleys in the east-central part of the study area. The Bangor Limestone is also exposed in the headwaters of streams draining the western part of the area. Overlying rocks of the Parkwood and Pottsville Formations of late Early Pennsylvanian age consist of interbedded, coarse- to fine- grained, clastic, continental and marine sedimentary rocks. The Parkwood Formation crops out along valley walls of the area and the Pottsville Formation forms the upland throughout the study area. Unmapped deposits of locally derived colluvium mantle much of the valley walls. Alluvium, consisting of unconsolidated clay, silt, sand, gravel, and large boulders, lies along the valley floors.

The Bangor Limestone is separated from the overlying Parkwood Formation by an erosional unconformity, which may be angular in the eastern third of the study area. The Parkwood in turn is separated from the overlying Pottsville Formation by an erosional unconformity that is angular in the eastern third of the area (Schweinfurth and others, 1981). The Parkwood contains a few thin, nonpersistent coal beds.

The strata of the western part of the study area dip to the south at an average rate of about 55 ft per mi. The structural configuration of the eastern part of the area is dominated by a low-relief, southward-plunging structural nose. The average plunge of the crest of this nose is about 40 ft per mi to the south. The nose is believed to be the result of at least two periods of local uplift during Early Pennsylvanian time followed by southward tilting in post-Pennsylvanian time (Schweinfurth and others, 1981). Large positive gravity anomalies (Clements and Sandy, 1970) and magnetic anomalies (I. Zietz, U.S. Geological Survey, oral commun., 1981) are associated with the structural nose.

No faults were found in the study area, but evidence from nearby areas suggests that normal faults having throws of as much as 100 ft may be present within the study area.

GEOCHEMISTRY

Geochemical investigations were conducted in November 1978 and April 1979. A total of 53 representative rock samples and 271 bulk stream-sediment samples were collected. These samples were analyzed for as many as 36 elements, including the common metals having the greatest economic importance (Grosz, 1981; and Siems and others, 1981). Each sample was analyzed semiquantitatively for 31 elements by D. F. Siems, U.S. Geological Survey (USGS), Denver, Colo., using a six-step, direct-current-arc, optical-emission spectrographic method (Grimes and Marranzino, 1968), or for 34 elements by Shannon Gore of Specomp Services, Inc., Hayden, Colo., under contract to the USGS. In addition, each sample was analyzed for zinc by means of an atomic-absorption technique (Ward and others, 1969, p. 20) by B. F. Arbogast, USGS, Denver, Colo., and for uranium by means of a spectrofluorimetric method by J. D. Mensik of Geoco, Inc., Wheat Ridge, Colo., under contract to the USGS.

No major chemical anomalies were located by the geochemical survey, and no obviously anomalous chemical-element concentrations related to mineralized rock are present in the data. The complete analytical data and sample descriptions are given by Siems and others (1981).

Metallic mineral deposits were not identified in the study area during the survey, and none have been reported for the surrounding region in the literature. The lithologic units exposed in the wilderness and additions do not normally host metallic deposits in the surrounding region, and the probability that such deposits occur in the study area is low.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Limestone

A high resource potential for limestone exists in the eastern part of the study area (fig. 4) in the Bangor Limestone. Chemical analyses indicate that sampled beds have a high calcium carbonate content, averaging 96.7 percent, and are low in silica, generally less than 2 percent (Mory and others, 1981, table 1). Other tests indicate that the limestone would be useful for road metal, paving aggregate, and dimension stone; for the manufacture of portland cement, high-calcium lime, and agricultural lime; and as steel-flux limestone, rock-dusting limestone, and limestone for general chemical uses. However, the commercial potential of the limestone is low for all uses other than local road construction. Extensive deposits of limestone occur north of the study area in the Moulton Valley where they are more favorably located relative to transportation routes and potential markets.

Clay and Shale

Clay and shale are present within the study area in the Parkwood Formation and in the Pottsville Formation (figs. 3 and 4). Preliminary ceramic tests performed on 14 clay and shale samples collected during this study show that all samples were suitable for structural clay products such as building brick, floor brick, and tile. Five samples bloated during quick-fire tests and may indicate material suitable for expanded lightweight aggregate (Mory and others, 1981, table 2).

Resources of clay and shale in the study area are large, but similar materials are available outside the area and are closer to transportation routes and markets.

Sandstone

Thick beds of high-silica sandstone occur in two units within the Pottsville Formation, and thinner beds of quartzose, feldspathic, and ferruginous sandstone occur within both the Pottsville and the Parkwood Formations (figs. 3 and 4). Weakly cemented high-silica sandstone in the Pottsville may be suitable for use as filter, furnace, and abrasive (sandblasting) sand. Two samples that were low in iron and alumina indicate that the sandstone may have marginal potential for use as molding sand and low-grade glass sand (Mory and others, 1981, tables 4 and 5). Other potential uses include construction sand, filler sand, and engine sand. Some dense, well-cemented sandstones within the area may be suitable for rough building stone, or dimension stone.

Commercial potential of silica from the sandstone in the study area is low, however. Silica resources in the Pottsville Formation are widely distributed throughout northern Alabama and access to transportation in the study area is poor.

Coal

A few thin, nonpersistent coal beds are present in the Parkwood Formation within the study area (fig. 3). Of the coal beds observed within the study area only beds c and e (figs. 3, 5, and 6) are thick enough to contain resource quantities of coal[2] (table 1; figs. 5 and 6). However, neither of these beds is thick enough within the study area to contain reserve base quantities of coal[1]. Only weathered coal samples were available for analysis from coal bed c (Mory and others, 1981, table 7). The results of the analyses indicate that bed c is high in ash content (about 22 to 45 percent on an as-received basis), and low to high in sulfur content (about 0.7 to 4.0 percent on an as-received basis).

The approximate distribution of coal bed c is shown in figure 5 and that of coal bed e in figure 6. The distribution patterns appear to have been controlled mainly by the erosion that took place prior to the deposition of the Pottsville Formation. Thicknesses shown for beds c and e are for coal only. Bed e commonly contains clay partings, which constitute about half of the total bed thickness (Mory and others, 1981, table 6, and fig. 4, map number 15).

Coal bed c is estimated to contain the bulk of the remaining coal resource in the study area (table 1). The economic potential of both beds, however, is very low at this time because: 1) both beds are thin and lenticular; 2) the post-Parkwood erosional unconformity may have cut into or through either bed in an unpredictable manner; and 3) the coal beds are exposed in relatively steep valley walls where they are overlain by a thick sequence (up to 300 ft) of massive beds of sandstone and shale of the Parkwood and Pottsville Formations (Schweinfurth and others, 1981). In addition, the Surface Mining Control and Reclamation Act of 1977 (30 U.S. Code, 1272(e)) prohibits surface mining of coal on the Federal lands in national forests.

The amount of original coal resources in the study area is estimated to have been about 727,000 short tons (table 1). A limited quantity of coal was removed from a few small drift mines in coal bed c (fig. 5), but coal bed e apparently was not mined within the study area. No attempt was made to quantify the amount of coal removed from bed c; past mining is considered negligible in the study area.

Oil and Gas

Heavy oil, dead oil, and oil staining have been reported from 15 rock units and shows of natural gas have been reported from 12 rock units where penetrated by wells drilled in or near the study area (fig. 7; table 2). However, neither oil nor natural gas has been produced in commercial quantities from wells in or near the study area, apparently because suitable traps for oil and gas have not been found.

The rocks in the study area dip generally to the south but in the eastern third of the area they are arched into a low, southward-plunging nose (Schweinfurth and others, 1981, fig. 4). This nose does not show structural closure at the surface but it is associated with strong, positive gravity anomalies (Clements and Sandy, 1970) and magnetic anomalies (I. Zietz, USGS, oral commun., 1981) and may be structurally closed at depth. Normal faults are present near and possibly within the study area (Schweinfurth and others, 1981). Such faults, if they are present, could in conjunction with the structural nose enhance the possibility that structural traps underlie the area. Normal faults alone may also produce structural traps in the regionally southward-dipping strata lying to the east and west of the structural nose.

The structural nose has been tested by only one drill hole, the Brooks No. 1 U.S.A. test (State permit no. 919), located in sec. 26, T.7 S., R.8 W. This test, completed and abandoned in 1959, was drilled to a total depth of 1,815 ft in Upper Ordovician rocks (fig. 7; table 2). Oil shows were reported in the Bangor Limestone, Hartselle Sandstone, and Tuscumbia Limestone. This test did not penetrate the entire stratigraphic sequence of rocks, which are reported to have produced shows of oil and gas in other tests in northern Alabama. For example, a large show of natural gas was recorded in rocks of the Knox Group penetrated in a test hole about 8 mi southwest of the study area (State permit no. 2284, fig. 7; table 2). The Knox lies well below the bottom of the Brooks test hole, and although available data indicate a low potential for significant oil or gas discoveries in the study area, the Knox is considered by Haley (1981) to have the best potential for the discovery of commercial quantitites of oil or gas in the area. Further exploration drilling will be necessary, however, before the Knox Group can be properly evaluated in the study area.

One other test well has been drilled in the study area. The Murphy Oil Corp. core test no. 2 (State permit no. 1587), located in sec. 17, T. 8 S., R. 9 W., was completed as a dry hole at a depth of 908 ft in the upper part of the Hartselle Sandstone (fig. 7; table 2). Slight shows of oil and asphalt were reported in the Hartselle.

"Tar Sands"

Limestone and sandstone beds of Mississippian age contain potentially valuable "tar-sand" deposits in northern Alabama (U.S. Bureau of Mines, 1965). Asphaltic sandstone has been mined from outcrops of the Hartselle Sandstone in northern Lawrence County and used as road metal (Haley, 1981). However, the Hartselle does not crop out in the study area and the two tests drilled in the study area (fig. 7) did not penetrate any major "tar-sand"-impregnated intervals. Therefore, the "tar-sand" potential in the study area is believed to be low.

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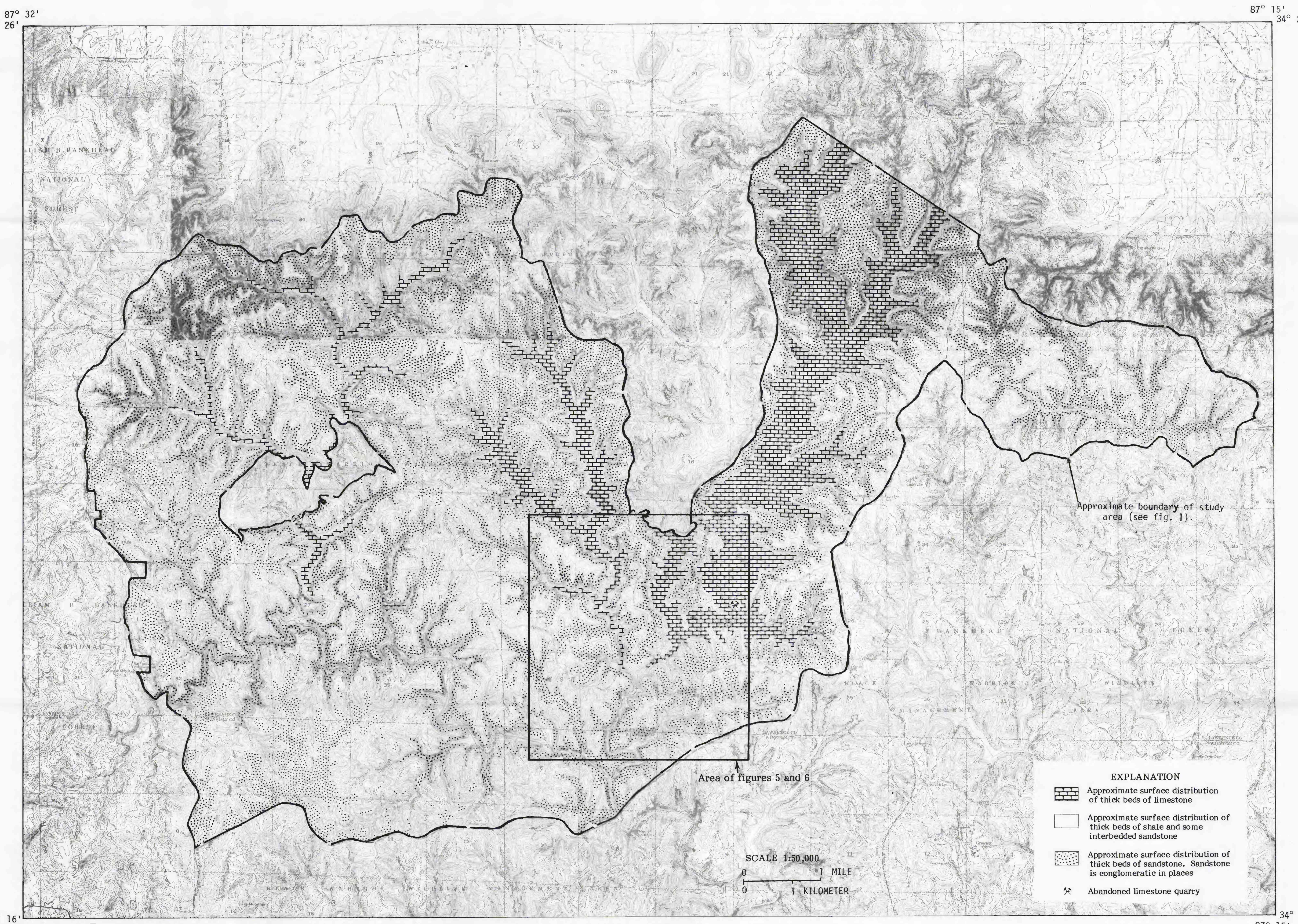
[1] Reserve base includes beds of bituminous coal 28 in. or more thick that occur at depths to 1,000 ft (U.S. Bureau of Mines and U.S. Geological Survey, 1976). The reserve base includes coal from only the measured and indicated categories of reliability.

[2] Resource quantities include beds of bituminous coal 14 in. or more thick that occur at depths to 6,000 ft (U.S. Bureau of Mines and U.S. Geological Survey, 1976).



Base from U.S. Geological Survey, 1:24,000 Newburg, 1945 (photorevised 1967); Kinlock Spring, 1947 (photorevised 1969); Bee Branch, Grayson, Landersville, and Moulton, 1960 (photorevised 1976)

Figure 4.--Map showing the approximate surface distribution of bedrock intervals containing thick beds of limestone, shale, and sandstone.

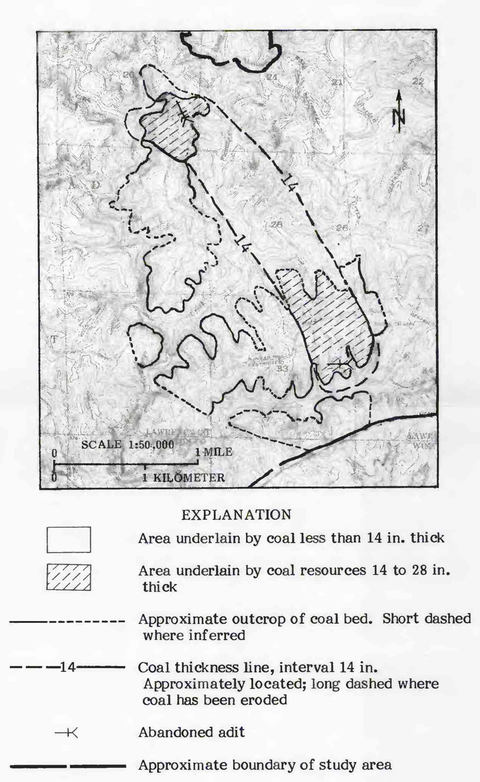


Figure 5.--Distribution of coal bed c.

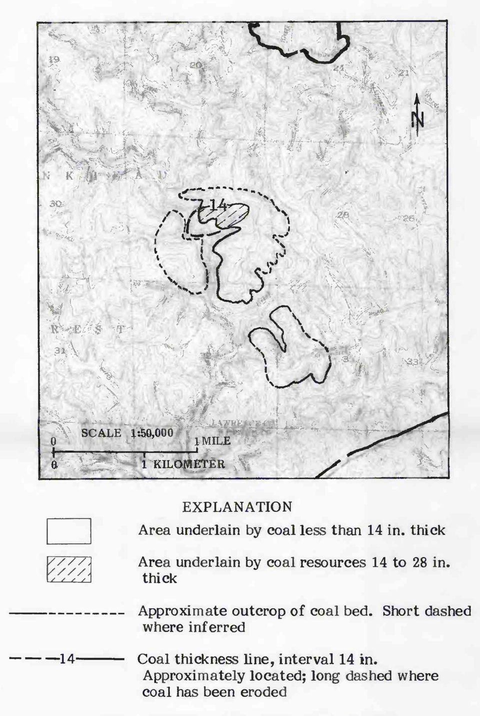


Figure 6.--Distribution of coal bed e.

Table 1.--*Estimated original bituminous coal resources in the Sipsey Wilderness and additions covered by less than 1,000 ft of overburden*
[Values in thousands of short tons as of December 31, 1980]

Formation	Coal bed	Original Resources: Measured	Original Resources: Indicated	Original Resources: Total
		In beds 14-28 inches thick	In beds 14-28 inches thick	In beds 14-28 inches thick
Parkwood	e	54	0	54
	c	417	256	673
	Total	471	256	727

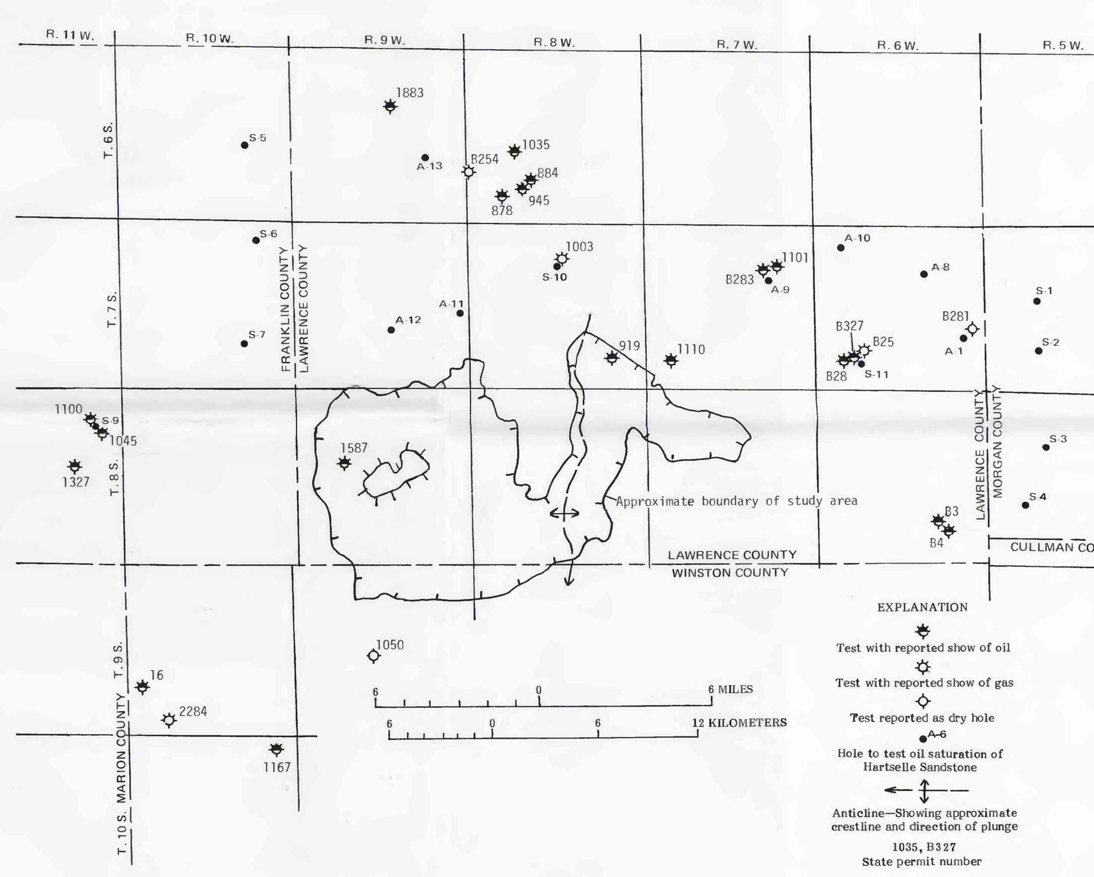


Figure 7.--Locations of oil and gas exploratory test holes and "tar-sand" test holes in and near the study area.

Table 2.--*Selected oil and gas test-hole data from the study area and vicinity*
[Source of data: Poe and others, 1979, and Haley, 1981]

Permit[1] number	Operator and well name	Location	Depth (feet)	Completion date	Deepest rock unit penetrated	Oil and gas shows[2]
B283	Fidelity Oil and Gas Co., Rob Jacobs No. 1	Cen. SW 1/4 SE 1/4 sec. 11, T. 7 S., R. 7 W.	1,500	1928	Silurian	A,O
919	David K. Brooks, United States of America No. 1	410' EWL and 660' NSL, SE 1/4 SE 1/4 sec. 26, T. 7 S., R. 8 W.	1,815	6/5/59	Ordovician	O
1003	Clyde H. Seitz, Young Brothers No. 1	500' WEL and 600' SNL, NW 1/4 NW 1/4 sec. 10, T. 7 S., R. 8 W.	615	1959	Tuscumbia Limestone (Upper Mississippian)	G
1050	R. G. Houser, E. M. Hawkins No. 1	2,314' NSL and 2,158' WEL SE cor. sec. 21, T. 9 S., R. 9 W.	1,575	10/1/60	Tuscumbia Limestone (Upper Mississippian)	N
1101	FWA Drilling Co., No. 1 John H. Previt Tract No.2	Cen. NE 1/4 SE 1/4 sec. 11, T. 7 S., R. 7 W.	185	8/6/61	---	O
1110	FWA Drilling Co., No. 1 Chenault Brothers Tract No. 6	Cen. SW 1/4 SW 1/4 sec. 29, T. 7 S., R. 7 W.	905	9/14/61	---	A,O
1167	Mt. Carmel Drilling Co., No. 1 Marwin Corp.	Cen. NW 1/4 SW 1/4 sec. 1, T. 10 S., R. 10 W.	1,534	6/2/62	Tuscumbia Limestone (Upper Mississippian)	O
1587	Murphy Oil Corp., Core Test No. 2	1,980' FWL and 2,017' FSL sec. 17, T. 8 S., R. 9 W.	908	2/20/71	Hartselle Sandstone (Upper Mississippian)	A,O
2284	Energy Explorations, Inc., I Batchelor 32-14, No. 1	650' FWL and 675' FSL SE 1/4 SW 1/4 sec. 32, T. 9 S., R. 10 W.	3,220	---	Knox Group (Lower Ordovician and Upper Cambrian)	G

[1] State oil and gas board permit number
[2] A, asphalt; O, oil; G, gas; N, log not available

MINERAL RESOURCE POTENTIAL MAP OF THE SIPSEY WILDERNESS AND ADDITIONS, LAWRENCE AND WINSTON COUNTIES, ALABAMA

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