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PAMPHLET

MINERAL RESOURCE POTENTIAL OF THE BIG SANDY, WEST ELLIOTTS CREEK, AND REED BRAKE ROADLESS AREAS, TUSCALOOSA, HALE, AND BIBB COUNTIES, ALABAMA

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Studies Related to Wilderness

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and related acts, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral survey of the Big Sandy, West Elliotts Creek, and Reed Brake Roadless Areas in the Talladega National Forest, Tuscaloosa, Hale, and Bibb Counties, Alabama. The Big Sandy (08214) and West Elliotts Creek (08213) Roadless Areas were classified as further planning areas and the Reed Brake Roadless Area (08063) as a proposed wilderness during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

SUMMARY

The Big Sandy area is mostly in Tuscaloosa County, and parts of it extend into Hale and Bibb Counties; the West Elliotts Creek area is in Hale County; and the Reed Brake area is in Bibb County. The three areas comprise about 8113 acres.

Eighty-nine percent of the surface rights and 55 percent of the mineral rights are owned by the Federal Government; remaining surface and mineral rights are privately owned. Oil and gas leases covering 23 percent of the study areas have been issued. Lease applications covering an additional 33 percent are awaiting U.S. Bureau of Land Management action.

The exposed rocks in the three study areas consist of two gently dipping formations of Cretaceous age, and younger alluvium. The two formations consist mainly of sand, silt, gravel, and clay. Older subsurface rocks include the coal-bearing Pottsville Formation of Pennsylvanian age and pre-Pottsville Paleozoic formations.

The only potentially valuable mineral deposits in the exposed rocks are sand and plastic clay of the type used in making brick, terra cotta, tile, and pottery. Sand has been dug in one pit in the West Elliotts Creek area for use in road construction; this has been the only mining activity in the three areas in recent years. The sand and clay resources of the three study areas are large, but large resources of these materials are present outside the areas.

Hypothetical coal resources of as much as 100 million tons may occur in the Pottsville Formation beneath the Big Sandy and West Elliotts Creek areas.

The three study areas may also have potential for oil and gas, a conclusion based largely on geologic inferences and leasing activities and on seismic studies by private industry in the Talladega National Forest. However, extensive exploratory drilling would be necessary to determine the potential of oil and gas.

INTRODUCTION

The Big Sandy area (3,190 acres), West Elliotts Creek area (4,237 acres), and Reed Brake area (686 acres) are located in the Oakmulgee Division of the Talladega National Forest[1]. The study areas are about 15 mi south of Tuscaloosa, in west-central Alabama (fig. 1).

[1]Acreage figures are those of the U.S. Forest Service (1979) and do not agree with those of more recent calculations (table 1).

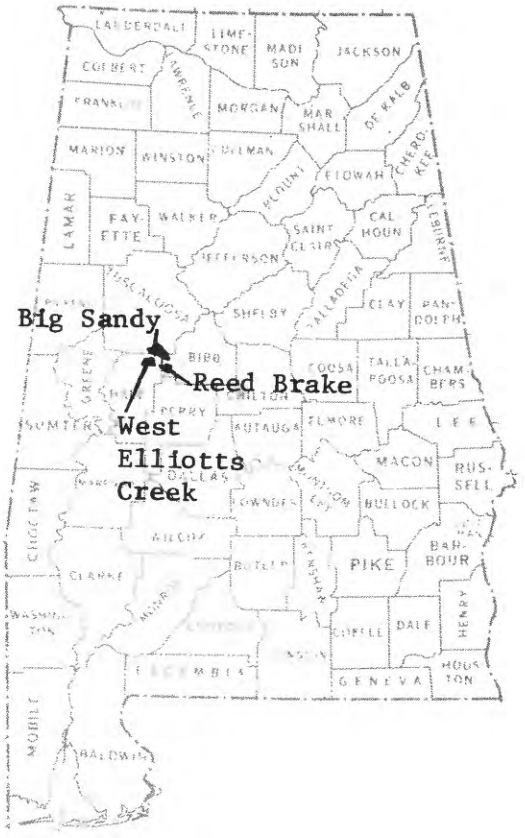


Figure 1.—Location of the Big Sandy, West Elliotts Creek, and Reed Brake Roadless Areas, Alabama.

U.S. Forest Service roads provide access to the boundaries of each area. Interior access to the Big Sandy and West Elliotts Creek areas is provided by two seasonally-gated roads and abandoned logging roads. A washed-out access road, along the pipeline defining the eastern boundary of the Big Sandy area, is suitable for use as a foot trail.

The three areas are in the Fall Line Hills belt of the East Gulf Coastal Plain division of the Coastal Plain physiographic province (Fenneman, 1938, p. 65-83). The region is a dissected upland with a few broad, flat divides. The highest point in the areas is 541 ft above sea level, on the eastern boundary road of the Reed Brake area. Three hills in the West Elliotts Creek area are a little more than 520 ft high, and several hills in the Big Sandy area are higher than 400 ft. The lowest point in the three areas is at 174 ft altitude, where South Sandy Creek is crossed by the western boundary road of the Big Sandy area. All three areas except for a few square yards in the Big Sandy area are drained by westward-flowing South Sandy and Elliotts Creeks. Elliotts Creek flows directly into the Black Warrior River, and the South Sandy joins Big Sandy Creek which discharges into the same river.

Previous Investigations

The economic geology of the mineral and water resources in the Oakmulgee Division of the Talladega National Forest was outlined by Szabo and Nordstrom (1974) in a report prepared for the U.S. Forest Service. Information on geology is included in mineral resource reports on Tuscaloosa County (Beg and others, 1978), Bibb County (Chaffin, Szabo, and Daniel, 1976), and Hale County (Tolson, 1977). Geology is also discussed in reports on water resources in Hale County by Davis, Sanford, and Jefferson (1975) and Tuscaloosa County by Paulson, Miller, and Drennen (1962). A map by Kidd (1976) shows the configuration of the eroded top of the Pottsville Formation on which the younger Cretaceous formations rest.

Present Investigations

The U.S. Geological Survey (USGS) investigation was conducted by Patterson in the spring of 1979. Geologists of the Geological Survey of Alabama and officials of the U.S. Forest Service were consulted during the work. Szabo and Nordstrom's (1974) report is the basis for the discussion of the geology of the three areas (Szabo and Patterson, in press).

Armstrong and Mory of the U.S. Bureau of Mines (USBM) conducted a field reconnaissance in the spring of 1980, chiefly evaluating sand and clay deposits. Twenty clay, sand, and sandstone samples were collected in and near the study areas; 19 sand and gravel pits and two clay pits were examined. Minerals in nine clay samples were identified by X-ray diffraction methods at the USBM, Reno Research Center, Reno, Nev. Ceramic properties and lightweight-aggregate potential of all clay samples, and sieve analyses of sand samples, were performed at the USBM, Tuscaloosa Research Center, Tuscaloosa, Ala. The ceramic test data is included in a report by Armstrong and Mory (1982).

Measurements of acreages of the three roadless areas (table 1) were made on U.S. Forest Service land-status maps with a planimeter by Armstrong, and percentages of areas under mineral-rights ownership and oil and gas lease coverage are based on these measurements.

Acknowledgments

The authors are grateful for the cooperation of the U.S. Forest Service, U.S. Bureau of Land Management (BLM), Geological Survey of Alabama, and State Oil and Gas Board of Alabama. Appreciation is extended to Ben W. Fenton, District Ranger, Oakmulgee Division, Talladega National Forest, and to James E. Bylsma, staff officer, U.S. National Forest Office, Montgomery, Ala., for providing maps and regional minerals information. Personnel of the BLM supplied records of leasing activity. Otis M. Clarke, Jr. and Michael W. Szabo of the Geological Survey of Alabama are acknowledged for sharing their regional geological expertise with Patterson and suggesting valuable references. Frank Hinkle and Thomas Sexton of the State Oil and Gas Board of Alabama provided information on oil and gas for this report.

SURFACE- AND MINERAL-RIGHTS OWNERSHIP AND LEASE STATUS

The Federal Government owns 89 percent of the surface rights and 55 percent of the mineral rights in the study areas. The remaining surface and mineral rights are privately owned (fig. 2, table 1).

Oil and gas lease applications on tracts within the study areas were filed with the BLM between December 1973 and October 1980 (fig. 3, table 1). Leases covering 23 percent of the study areas were issued in May and June of 1981. Lease applications covering 33 percent of the study areas have had no BLM action as of September 1981. No drilling for oil and gas has taken place on the leased tracts. Oil and gas leases and lease applications on private tracts within the study areas are not on file at BLM. The lease status of these tracts was not assessed during the present investigation.

GEOLOGY

Stratigraphy and General Geology

The exposed rocks in the three areas consist of the Coker Formation, Gordo Formation, and alluvium. The two formations make up the Tuscaloosa Group of Cretaceous age (table 2). These formations consist of unconsolidated clastic beds that overlap older rocks of Paleozoic age. The total thickness of the Tuscaloosa Group is 500 to 900 ft. The alluvium is of Pleistocene and Holocene age and consists of material transported from the uplands to the swampy lowlands along streams.

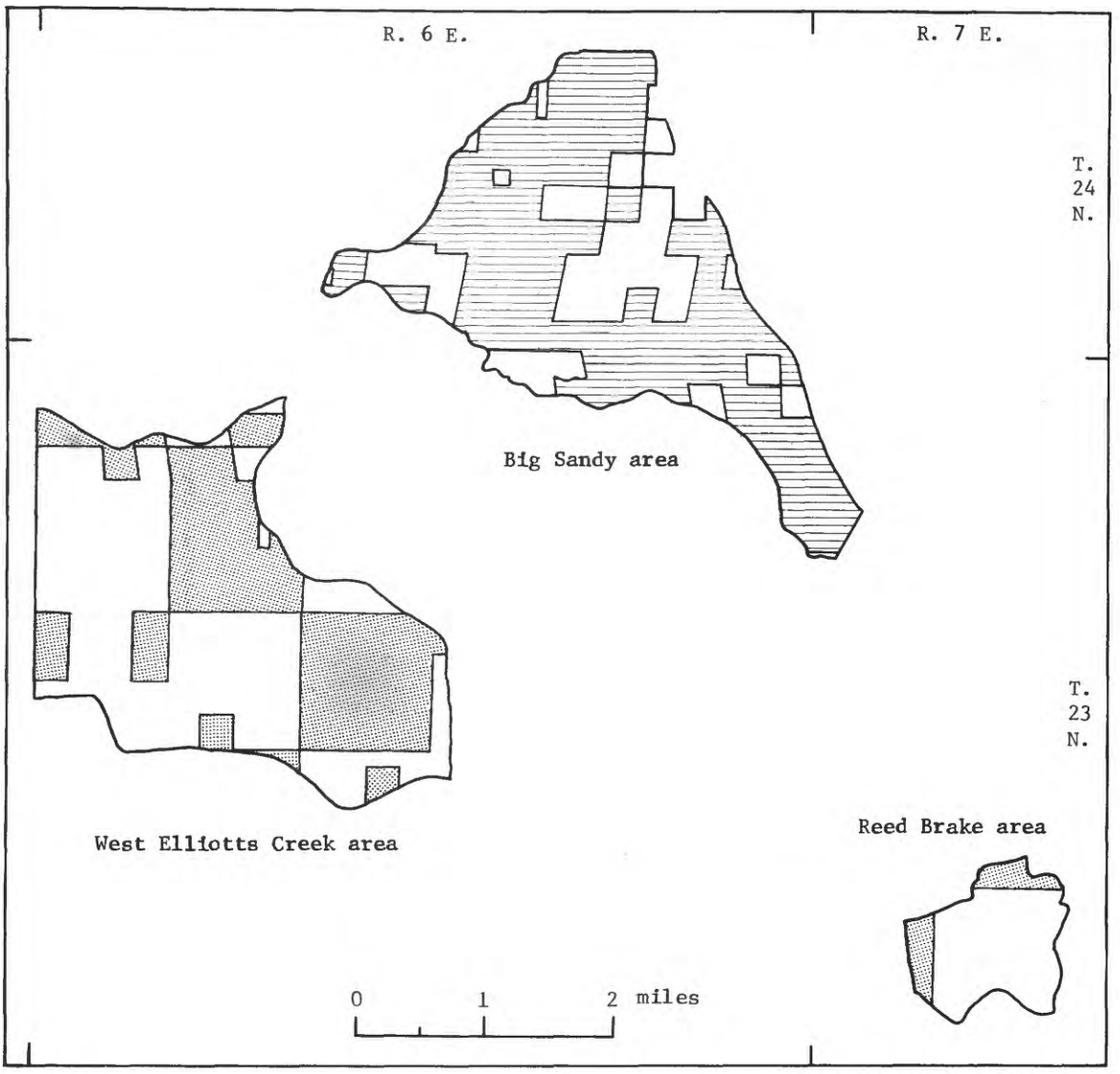
Paleozoic rocks are exposed (fig. 4) in the central and northern parts of Tuscaloosa County (Beg and others, 1978, pls. 1 and 2) and Bibb County (Szabo,

Compiled by Armstrong from data provided by the U.S. Bureau of Land Management

EXPLANATION

- Federally acquired land; no mineral rights outstanding or reserved
- Federally acquired land; mineral rights held privately in perpetuity
- Privately owned surface and mineral rights

Figure 2.—Surface- and mineral-rights ownership in the Big Sandy, West Elliotts Creek, and Reed Brake Roadless Areas.



Compiled by Armstrong from data provided by the U.S. Bureau of Land Management

EXPLANATION

Issued leases, effective May 1, 1981

Lease application filed; no action as of September 1981

Figure 3.—Oil and gas lease-application status in Big Sandy, West Elliotts Creek, and Reed Brake Roadless Areas.

Daniel, and Chaffin, *in* Chaffin, Szabo, and Daniel, 1976, pl. 1). The closest Paleozoic exposures to the three roadless areas are 7 to 12 mi to the north and northeast, but no doubt these rocks are present in the subsurface of the areas. The youngest of the Paleozoic rocks is the Pottsville Formation of Early Pennsylvanian age. The Pottsville unconformably overlies pre-Pottsville formations of Paleozoic age (Chaffin, Szabo, and Daniel, 1976, p. 2 and 3).

The unconformity between the Cretaceous and Paleozoic formations represents an interval of approximately 200 million years, extending from Early Pennsylvanian to the close of the Early Cretaceous, for which there is no geologic record in the area. The unconformity represented by the top of the Pottsville Formation (fig. 4) has low relief, and dips 40 to 50 ft/mi to the southwest. It is at sea level along the northern boundary of the Big Sandy area and nearly 300 ft below sea level in the southern part of the West Elliotts Creek area.

Paleozoic Rocks

The Big Sandy and West Elliotts Creek areas are underlain by the Pottsville Formation at depths of 350 to about 750 ft and by older sedimentary rocks 17,000 to 21,000 ft thick. The Pottsville is known to be present in the subsurface of the two areas because it was penetrated by a groundwater test well located between them (Paulson, Miller, and Drennen, 1962, p. 91). These authors also located several other wells in the region that intersected the Pottsville and provided many of the altitude points used by Kidd (1976) in making a contour map of the eroded top of this formation (fig. 4).

The Pottsville Formation is probably missing below the Cretaceous strata in the Reed Brake area, where the Tuscaloosa Group is presumably underlain by one or more of the 19 pre-Pottsville formations known to be present in outcrops in easternmost Tuscaloosa County (Beg and others, 1978) and the central part of Bibb County (Chaffin, Szabo, and Daniel, 1976). The reasons the Pottsville is thought to be missing under the Reed Brake area are: 1. two wells (fig. 4) drilled 6 to 7 mi northeast of the area penetrated older rocks subjacent to the Tuscaloosa Group; and 2. the Birmingham and Blue Creek anticlines, along which the Pottsville Formation is missing, trend toward Reed Brake, and the overthrust block of the Helena fault on which the Pottsville is absent also trends toward Reed Brake. Pre-Pottsville rocks are probably present at depths of no greater than 700 to 800 ft below the surface of the Reed Brake area, if the configuration of the erosional surface on the top of the pre-Pottsville rocks is similar to that on the Pottsville rocks (fig. 4).

The Pottsville in the subsurface of the Big Sandy and West Elliotts Creek areas is, no doubt, similar to the outcrops of this formation in central Tuscaloosa County, where it consists of sandstone, shale, clay, and coal. As many as 34 beds of coal are exposed in Tuscaloosa County (Beg and others, 1978, p. 26), and approximately 52 beds of coal occur in this formation in Bibb County (Chaffin, Szabo, and Daniel, 1976, p. 6). Thicknesses of the Pottsville in Tuscaloosa County, where it fills the Black Warrior basin, are 2,500 to 4,400 ft (Beg and others, 1978, p. 4).

Upper Cretaceous Series

Coker Formation—The Coker consists of two sedimentary sequences (Drennen, 1953, p. 534-536) that are characteristic of shallow marine and nearshore or deltaic deposition. The formation has a total thickness of 400 to 500 ft (table 2). The lower part is made up of lenticular units of sand, clay, and gravel. The clay is generally gray and carbonaceous, and locally contains much pyrite and lignitized wood; imprints of pelecypod shells are present in a few places. The clay is laminated and has partings of ripple-marked, glauconitic, fine-grained sand (Drennen, 1953, p. 534). The mineral resource map by Szabo and Nordstrom (1974) shows much of the lower part of the Coker Formation in the Big Sandy area as having potential deposits of bloating clay. None of this clay is shown to be present in the West Elliotts Creek or Reed Brake areas. In a few places the crossbedded sand in the lower part is laminated and contains films, balls, and layers of clay. Sand beds near the base of the formation tend to be coarse grained and contain considerable amounts of gravel. Lignite occurs in the lower part of the Coker Formation in a few places in the southern and western parts of Tuscaloosa County (Beg and others, 1978, p. 26). However, no lignite has been found in exposed rocks in the three roadless areas, and none was present in rocks penetrated by holes located between the Big Sandy and West Elliotts Creek areas (Paulson, Miller, and Drennen, 1962, p. 90 and 91).

The upper part of the Coker Formation consists mainly of sand and clay. A few miles northeast of the Reed Brake area the upper Coker sand contains layers of fissile gray clay.

Gordo Formation—The Gordo Formation consists of irregular and lenticular beds of sand, clay, and a minor amount of gravel, that are similar to the units in the underlying Coker Formation. The formation is 100 to 400 ft thick. As shown on the mineral resource map by Szabo and Nordstrom (1974), the base of the Gordo is marked by a prominent clay zone. A second clay zone occurs in the upper part of the formation. The lower clay zone is present in all three roadless areas, and the second zone is in the West Elliotts Creek and Reed Brake areas but has been eroded from the Big Sandy area. The clay zones range in thickness from 2 ft to nearly 100 ft. They consist of overlapping lenses of laminated and massive clay that interfinger with sand units. Nine samples of the clay collected in and near the three areas were examined by means of X-ray methods by the USBM and were found to be chiefly mixtures of kaolinite and quartz containing minor amounts of chlorite and muscovite. Clays at other localities in the region also contain mixtures of montmorillonite (smectite) and illite (Szabo and Nordstrom, 1974, p. 8).

Sand makes up most of the Gordo Formation. It is composed chiefly of fine- to medium-grained rounded and subrounded quartz. However, beds containing minor amounts of gravel and sand beds containing sufficient clay to be used to stabilize Forest Service roads occur locally. Chert pebbles are moderately abundant in the gravelly units. Both the clay and the sand beds in the Gordo Formation tend to be light-colored in the subsurface. The weathered clay in outcrops is varicolored shades of purple, red, pink, buff, and gray, and most of the sand is red or reddish brown.

Table 1.—*Surface- and mineral-rights ownership and oil and gas lease status, Big Sandy, West Elliotts Creek, and Reed Brake Roadless Areas*[1]

	Big Sandy area	West Elliotts Creek area	Reed Brake area	Total
Surface- and mineral-rights ownership				
Federally acquired land; no mineral rights outstanding or reserved	2,597 acres (72%)	1,629 acres (44%)	127 acres (20%)	4,353 acres (55%)
Federally acquired land; mineral rights outstanding in perpetuity	756 acres (21%)	1,484 acres (40%)	509 acres (80%)	2,749 acres (34%)
Privately owned surface and mineral rights	251 acres (7%)	604 acres (16%)	0	855 acres (11%)
Oil and gas lease status (as of September 1981)				
Land with issued leases (effective May 1, 1981)	54 acres (1%)	1,625 acres (44%)	131 acres (20%)	1,810 acres (23%)
Land with lease applications filed (no action as of September 1981)	2,601 acres (72%)	0	0	2,601 acres (33%)

[1] Acreages were planimetered on U.S. Forest Service land-status maps by Armstrong and percentages are based on these measurements. Acreages do not agree with those of the U.S. Forest Service (1979).

Table 2.—*Generalized lithology of the stratigraphic units exposed in the Big Sandy, West Elliotts Creek, and Reed Brake Roadless Areas.*
[Modified from Szabo and Nordstrom, 1974]

System	Series	Geologic unit		Thickness (feet)	Lithology
Quaternary	Pleistocene and Holocene	Alluvium		0-50	Sand and gravel; lenticular beds of very fine- to coarse- grained sand, gravel, and clay.
Cretaceous	Upper Cretaceous	Tuscaloosa Group	Gordo Formation	100-400	Sand, very fine- to coarse-grained, crossbedded; gravelly in basal part; contains lenticular clay units.
			Coker Formation	400-500	Sand, very fine- to coarse-grained, crossbedded; basal sand 100 to 200 ft thick; contains carbonaceous clay lenses.

Pleistocene and Holocene Alluvium

Accumulations of alluvium of Pleistocene and Holocene age underlie the floodplains of South Sandy and Elliotts Creeks and the lower parts of the principal tributaries. The alluvium consists of mixtures of clay, silt, sand, and gravel. Much of the alluvium contains organic matter that colors it gray to dark gray. The alluvium is 50 ft thick where penetrated by a hole located between the Big Sandy and West Elliotts Creek areas (Paulson, Miller, and Drennen, p. 90), and it is probably not much thicker in any of the three areas.

Structure

The geologic structure of the rocks cropping out in the three roadless areas is simple, but some of the rocks at depth almost certainly gave been folded and faulted to form complex features. The Upper Cretaceous Coker and Gordo Formations dip uniformly to the southwest at 30 to 40 ft/mi (Paulson, Miller, and Drennen, 1962, p. 17), and no faults or folds in these rocks have been recognized in the roadless areas. The Pottsville Formation in the subsurface of the Big Sandy and West Elliotts Creek areas probably has undergone little structural deformation, inasmuch as a structural contour map of a coal bed in this formation in the central part of Tuscaloosa County (Beg and others, 1978, fig. 3) illustrates only low dips. The pre-Pottsville Paleozoic rocks at depth, however, are no doubt deformed much like those cropping out 7 to 12 mi north and northeast of the study areas and farther northeast. The largest structural features of exposed Paleozoic formations in the region are the Black Warrior basin in central and northern Tuscaloosa County (Beg and others, 1978) and the Cahaba basin in central and northern Bibb County (Culbertson, 1964). Rocks of the Pottsville Formation occur at the surface in the two basins. Prominent anticlines and faults are present in the Paleozoic rocks of easternmost Tuscaloosa County and central and eastern Bibb County. The largest and most significant of these features is the Helena thrust fault (fig. 4). The thrusting along this fault emplaced the Upper Cambrian Ketona Dolomite northwestward onto the Lower Pennsylvanian Pottsville Formation. The Helena thrust fault is alined in the direction of the Reed Brake area, and it is inferred to extend below the Cretaceous beds. Other major structural features in Paleozoic rocks northeast of the Reed Brake area include the Birmingham and Blue Creek anticlines (fig. 4). Whether or not the two anticlines extend in the subsurface as far as the Reed Brake area is uncertain.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Known mineral resources of the study areas are sand and clay. Although tests confirmed their suitability for construction materials and structural clay products, both sand and clay are available in abundant supply elsewhere in Tuscaloosa, Hale, and Bibb Counties.

The presence of coal, oil, and gas beneath the three roadless areas has not been established, but extrapolations of stratigraphic and structural trends from exposed rocks to the north imply the presence of large tonnages of coal beneath the Big Sandy and West Elliotts Creek areas. Oil and gas potential is speculative. Extensive exploratory drilling would be necessary to determine the potential of these commodities.

Several types of mineral deposits occur in Paleozoic rocks in southeastern Tuscaloosa County and adjoining parts of Bibb County, a region located 5 to 20 mi northeast of the three roadless areas (fig. 4). Brown iron ore has been mined in the Woodstock district, and red iron ore has been mined at scattered localities nearby. Other minerals occurring in this region include barite, limestone, dolomite, and chert. Some of these minerals in the region may be at considerable depths beneath the three roadless areas. However, they have no current potential because of the high costs of deep mining.

Clay

Mining of clay in the Coker and Gordo Formations in Tuscaloosa County occurred as early as 1829 (Ries, 1900). Current production in the vicinity of the three roadless areas is limited to two intermittently active pits. One is about 10 mi southeast of the Reed Brake area (fig. 4). Plastic clay from this pit has been used in making terra cotta at a plant in Birmingham (Ben W. Fenton, oral commun., 1979). The other pit is located 12 mi farther southeast. The clay from this pit is used by a local pottery.

Plastic clay that may be suitable for use in structural clay products occurs in two zones in the Gordo Formation. A clay zone at the base of the Gordo is present in all three study areas. A zone near the middle of the formation is present in the West Elliotts Creek area and probably in the Reed Brake area. The clays in both zones are chiefly mixtures of kaolinite and quartz containing minor amounts of chlorite and muscovite.

Szabo and Nordstrom (1974) and Clarke (1970) reported that carbonaceous clays of the Coker Formation near the Talladega National Forest have bloating properties making them suitable for use in lightweight aggregate (fig. 4). Szabo and Nordstrom's map (1974) shows bloating clays extending over much of the Big Sandy area. However, no carbonaceous clay was found by the USBM personnel during their fieldwork and none of the 12 clay samples tested had bloating properties.

Preliminary ceramic evaluations indicate that clays in the study areas may be suitable for structural clay products (Armstrong and Mory, 1982). However, potential use of the clay is low because of regional abundance of similar materials (fig. 4) (Szabo and Nordstrom, 1974; Clarke, 1966, 1970). Clay and shale moved during coal stripping and discarded on waste dumps in Tuscaloosa and Bibb Counties are another potential ceramic resource (Beg and others, 1978) and would be more economical to recover than any of the clays from the study areas.

Sand

The Tuscaloosa Group and alluvium in the three roadless areas and surrounding region contain enormous resources of sand and gravel that have been used for road construction and maintenance. Most deposits in the Tuscaloosa Group are in tabular and lenticular units having an average thickness of about 10 ft. Thin stringers of sandstone, cemented with iron oxide, and clay zones occur in some deposits. Little is

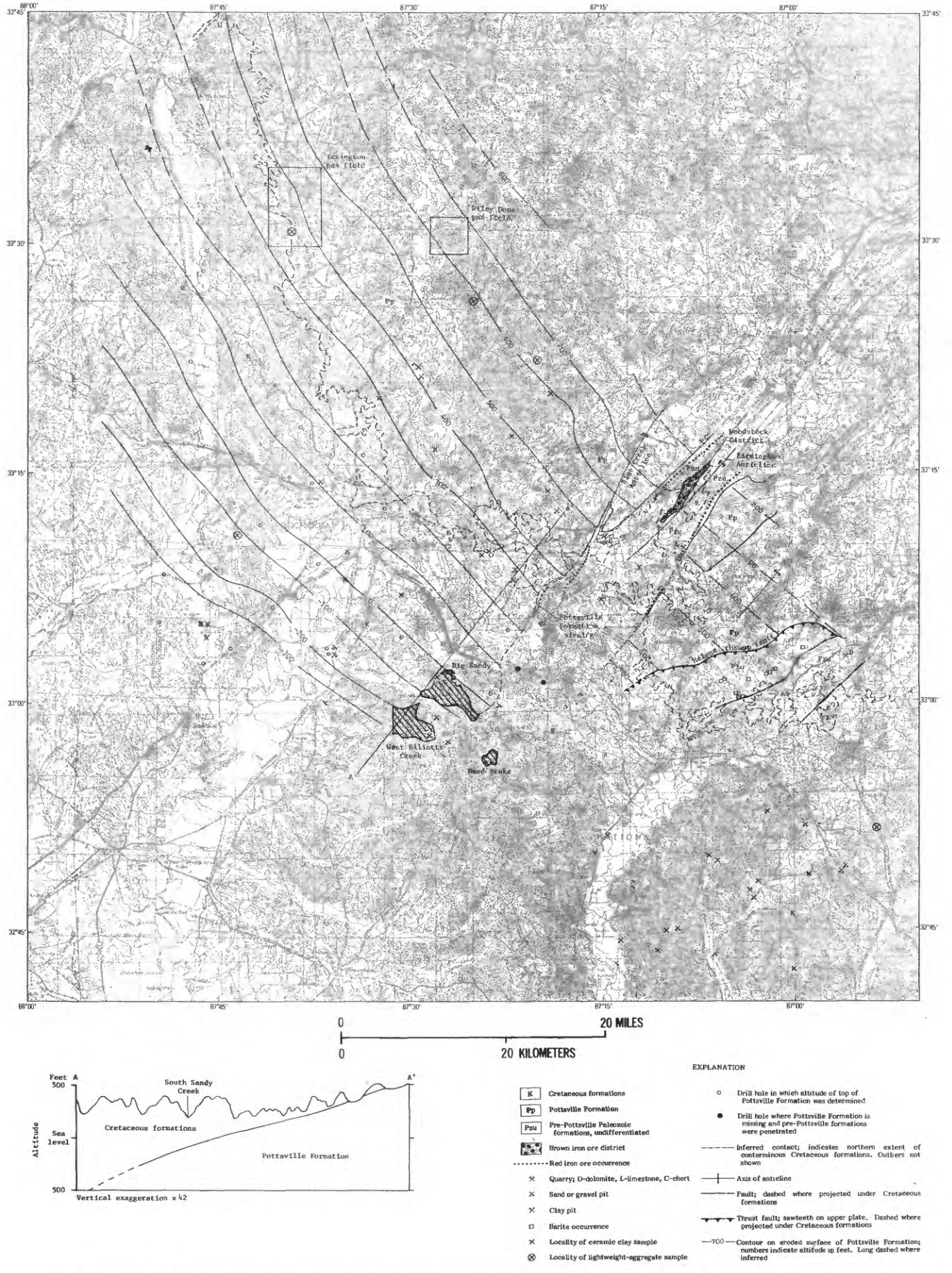


Figure 4.—Locations of mines, pits, and quarries, clay sample localities, and contours on the eroded surface of the Pottsville Formation in the region of the Big Sandy, West Elliotts Creek, and Reed Brake Roadless Areas.

known about the alluvium of the floodplains along South Sandy and Elliotts Creeks, but considerable quantities of sand are present in both lowlands. A pit consisting of three small workings is located in the eastern part of the West Elliotts Creek area (fig. 3, mineral resource potential map). This pit is intermittently active and has been the only mining operation in the three areas in recent years.

Sand sampled at four localities contained subangular to subrounded, very fine- to coarse-grained quartz and ranged in color from very pale orange to dark yellowish-brown, and light to moderate brown. Histograms of sieved samples (fig. 6, mineral resource potential map) illustrate that about 96 percent of the sampled material is in the sand-size fraction. Gravel is present, but in quantities too small to consider significant.

Material from the deposits sampled could be used for construction purposes. Sample 18 meets American Society for Testing and Materials (1981) specifications for bituminous paving mixtures.

Potential use of the sand deposits in the three roadless areas is low because large resources are scattered elsewhere throughout the region. The U.S. Forest Service has several inactive borrow pits outside the three areas that are adequate for local needs. The city of Tuscaloosa, located about 10 mi northwest of the Big Sandy area, is amply supplied with extensive deposits of sand and gravel in the Tuscaloosa Group and in terraces along the Black Warrior River. Similar deposits occur along the Cahaba River, about 10 mi east of the areas.

Coal

Bituminous coal of the outcropping Pottsville Formation is currently mined in the Warrior Basin in northern and central Tuscaloosa County, and in the southern portion of the Cahaba Coal Field, in northeastern Bibb County. Eight coal groups, each containing two to six coal beds, are recognized in Tuscaloosa County (Beg and others, 1978). Approximately half of the estimated 34 coal beds exposed in the county have been mined commercially (Beg and others, 1978). Coal has been mined 9.5 mi northeast of the Big Sandy area in Tuscaloosa County and has been mapped on the surface 5.5 mi northeast of this area (Daniel, pl. 2, *in* Beg and others, 1978).

Contours on top of the Pottsville Formation indicate its presence at depths ranging from less than 350 ft below the Big Sandy area to about 750 ft below the West Elliotts Creek area (Kidd, 1976). Metzger (1965) states that the Pottsville Formation dips gently to the southwest and thickens in that direction. Although coal has not been proven to exist beneath these areas, its presence is highly likely if the subsurface geology of the Pottsville Formation in this location is similar to that in the Warrior Basin. Regional structural trends of the Birmingham anticline and the Helena thrust fault northeast of the roadless areas (Szabo and Patterson, in press) suggest that the Pottsville Formation is absent under the Reed Brake area.

Hypothetical coal resources in the Pottsville Formation underlying the Big Sandy and West Elliotts Creek areas at depths of no more than 4,000 ft are probably as much as 100 million tons. This estimate was made by multiplying the total acreage of the two areas times the average coal resources of about 15,400 tons per acre in Tuscaloosa County. The total of coal resources in the county, estimated to be about 6.5 billion tons, was calculated by Boone and Daniel (1980). In making their calculation they multiplied the total acreage covered by the Pottsville Formation, 423,000—as measured on a coal resource map (Daniel, pl. 2, *in* Beg and others, 1978) —by 15,400.

Complex subsurface structure related to the systems of folds and faults on the border between Tuscaloosa and Bibb Counties may exist beneath the Big Sandy and West Elliotts Creek areas, complicating the geology of the Pottsville Formation. Exploratory work, including drilling and geophysical investigations, would have to be conducted to properly evaluate the potential for coal beneath the two roadless areas.

Lignite occurs sporadically in the lower part of the Coker Formation in the southern and western parts of Tuscaloosa County (Beg and others, 1978). The lower part of this formation is not exposed in the study areas and no lignite occurrences were noted during this investigation.

Oil and Gas

Coal bed gas is presently produced in two degasification projects in the region of the three study areas, and gas has been found in two other fields (Thomas Sexton, oral commun., 1982). The producing Brookwood Degasification Field extends over more than 75 mi^2, and its southern boundary is only about 15 mi northeast of the Big Sandy area. The other producing field, the Oakgrove Field, is farther northeast. The nonproducing gas areas are the Wiley Dome and Lexington fields, which are located about 35 mi north of the Big Sandy area (fig. 4). The gas in both fields is in the Upper Mississippian(?) Parkwood Formation (Frank Hinkle, oral commun., 1982).

The three roadless areas may have potential for oil and gas, a conclusion based largely on industry activities in the Talladega National Forest and on geologic inferences. During the past seven years, numerous applications for oil and gas leases in the three study areas have been submitted to the BLM (table 1, fig. 3), and several leases were in effect in May 1981. Periodic seismic studies made by private industry along roads throughout the national forest (Ben W. Fenton, oral commun., 1980) also indicate continuing interest by oil and gas companies. However, little is known about possible hydrocarbon host rocks at depth in the areas. The region appears as favorable for the occurrence of gas as northern Tuscaloosa County, where the Wiley Dome and Lexington fields have been found; the Parkwood Formation, which contains gas in these two fields, probably is present at depths of no more than 5,000 ft in the region. However, this likelihood is only an inference because no deep holes have been drilled near the areas. Coal beds, thought to be present in the Pottsville Formation under the Big Sandy and West Elliotts Creek areas, would be even more likely to contain gas than the degasification fields to the north because of greater depth of burial. Porous clastic beds in the Pottsville Formation may also serve as traps for hydrocarbons, because containing seals are likely to have been provided by impermeable zones in the upper part of the formation. Such zones are known to be too impermeable to permit the flow of groundwater (Paulson, Miller, and Drennen, 1962, p. 20).

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