DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1553
PAMPHLET ACCOMPANIES MAP

GEOLOGIC AND MINERAL RESOURCE POTENTIAL MAP OF THE CHAMBERS FERRY ROADLESS AREA, SABINE NATIONAL FOREST, SABINE COUNTY, TEXAS

By

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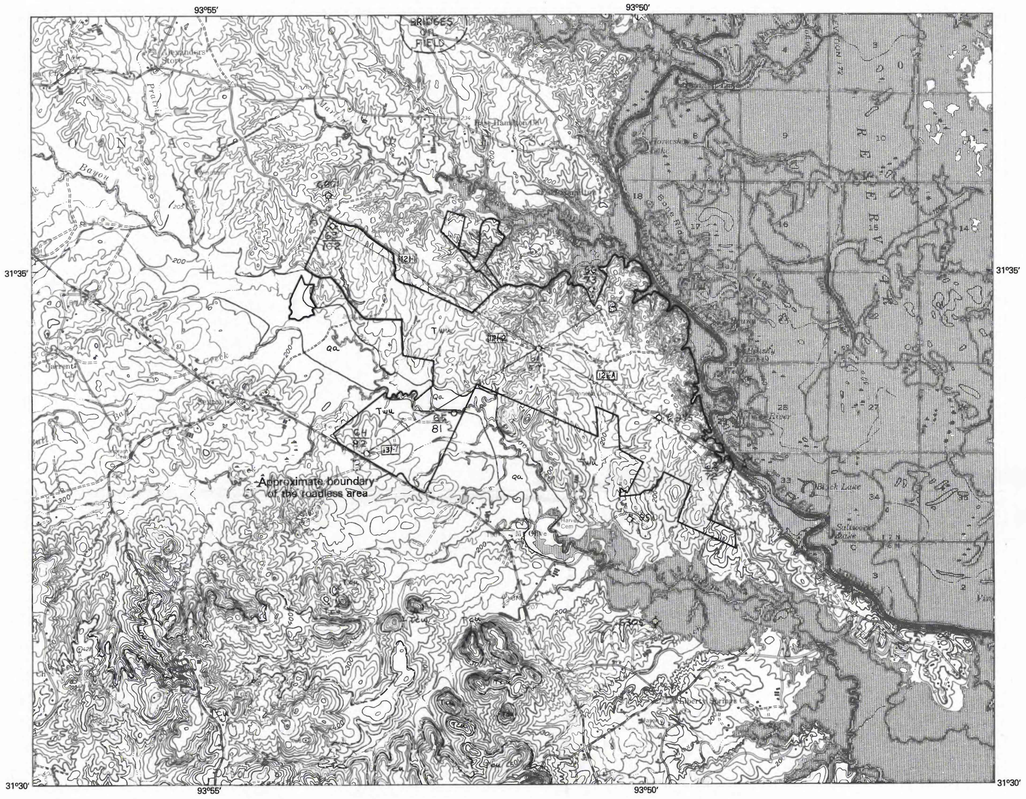

Base from U.S. Geological Survey, 1:62,500
Patroon, 1956

Geology by B. B. Houser, 1982; assisted by F. N. Houser, 1982

SCALE 1:50 000
1 ½ 0 1 2 3 MILES
1 .5 0 1 2 3 KILOMETERS
CONTOUR INTERVAL 20 FEET
NATIONAL VERTICAL DATUM OF 1929

CORRELATION OF MAP UNITS

Qa	Holocene, Pleistocene	QUATERNARY
Unconformity		
Tcu	Eocene	TERTIARY
Unconformity		
Twu		

DESCRIPTION OF MAP UNITS

Qa ALLUVIUM (HOLOCENE AND PLEISTOCENE?)--Flood-plain deposits of Patroon Bayou. Thickness 0-10 ft

Tcu CLAIBORNE GROUP UNDIVIDED (MIDDLE EOCENE)--Present southwest of Chambers Ferry and not mapped during this study. Approximate contact from Barnes (1968)

Twu WILCOX GROUP UNDIVIDED (LOWER EOCENE)--Laminated to locally bioturbated, gray, silty claystone with local lenses of fine-grained, massive to crossbedded sandstone as much as 20 ft thick. Beds of impure lignite 2-11 ft thick and lignitic siltstone and sandstone are locally common. Thickness about 1,000 ft (Kaiser and others, 1980)

EXPLANATION

——— CONTACT--Dashed where approximately located

62/72 AUGER HOLE LOCATION AND NUMBER--Number below bar is depth of hole in feet

9500 OIL OR GAS TEST WELL--Approximately located; depth of hole in feet

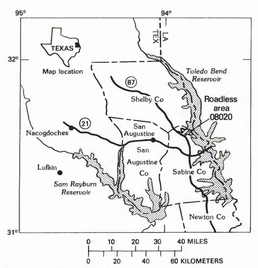

Figure 1.--Index map showing location of the Chambers Ferry Roadless Area (U.S. Forest Service area 08020), Sabine County, Texas.

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 geological and mineral surveys of the Chambers Ferry Roadless Area (08020) in the Sabine National Forest, Sabine County, Tex. The Chambers Ferry Roadless 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 1979.

SUMMARY STATEMENT

Geologic and geochemical investigations have been conducted to evaluate the mineral resource potential of the Chambers Ferry Roadless Area, Sabine County, Tex. The roadless area lies within the western Gulf of Mexico Coastal Plain on the southern margin of the Sabine uplift and is underlain by lower Eocene semiconsolidated clastic sediments. Thirty-four percent of the mineral rights to land within the roadless area are privately owned.

The area has moderate to high potential for oil and gas resources on the basis of the regional setting and the presence of nearby producing fields. Near-surface lignite is present in the area, but the lignite seams are thin and laterally discontinuous and the ash content is high. The projected depth beneath the roadless area of the lignite seams exposed to the north is greater than 2,000 ft. These conclusions are based on surface and shallow subsurface geologic examination, radiometric surveys, and geochemical and mineralogic study of subsurface auger samples.

INTRODUCTION

The Chambers Ferry Roadless Area (fig. 1) comprises 4,661 acres in the Sabine National Forest in Sabine County, Tex., adjacent to the Texas-Louisiana State line. The roadless area is in the Gulf of Mexico Coastal Plain and is characterized by low hills separated by numerous small drainages. The climate is humid subtropical, annual precipitation is about 52 in., and mean annual temperature is about 66°F. The area supports the vegetation of the pine woods belt of the forested Coastal Plain.

GEOLOGY

The roadless area is in the north-central part of the greater western Gulf basin, which is filled with a thick sequence of off-lapping sedimentary prisms of Cenozoic clastic rocks. This sequence rests upon Cretaceous and Jurassic sandstones and carbonates and the Jurassic Louann Salt. The area was mapped previously at a scale of 1:250,000 as part of the Palestine 1° x 2° quadrangle of the Geologic Atlas of Texas (Barnes, 1968).

The rock units present in the Chambers Ferry area are semiconsolidated to consolidated, fine-grained clastic sediments of the lower Eocene Wilcox Group and Quaternary alluvium. In this region the Wilcox Group is predominantly a mudstone facies informally named the Pendleton Lagoon-Bay system. Rocks of the middle Eocene Claiborne Group crop out on a relatively high ridge less than 1.5 mi southwest of the study area. The approximate contact of the Claiborne with the Wilcox Group was taken from the geologic map of the Palestine 1° x 2° quadrangle (Barnes, 1968). Pleistocene(?) and Holocene alluvium is present in the flood plain of Patroon Bayou. The alluvium is thin and was not investigated in this study.

The Chambers Ferry area is on the south-southwest margin of the Sabine uplift, a broad area of domal arching on the Texas-Louisiana State line, and the rocks dip gently to the southwest. Because of the absence of distinctive stratigraphic marker horizons, more precise determination of the strike and dip of the units is not possible. Exposures in the bluffs along Toledo Bend Reservoir indicate that the rocks probably are largely undeformed.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Oil and gas

The Chambers Ferry Roadless Area has moderate to high oil and gas resource potential. Exploration drilling has been done in the vicinity. Most exploratory wells were shallow, on the order of 1,500 to 3,000 ft, and penetrated portions of the Eocene sequence. Several deep wells penetrated rocks as old as Cretaceous. A 9,500-ft test well was drilled near the southeastern edge of the area (Santa Fe Energy, #1 Chamber). The nearest production is about 2-3 mi to the north and northwest of the roadless area at the Bridges and Patroon fields in Shelby County, Tex. These fields, discovered in 1950 and 1948 respectively, have produced only small amounts of high-gravity oil to date (slightly more than 50,000 barrels) from the Lower Cretaceous Fredericksburg Group. Gas production has been established at Huxley field about 15 mi north of the roadless area, where production is from the Lower Cretaceous Paluxy, Rodessa, and Pettet Formations. Oil has been produced about 10 mi east of the Chambers Ferry Roadless Area in Sabine Parish, La., at Zwolle, Pendleton-Many, and Converse fields, in addition to production at small fields such as Blue Lake (now beneath Toledo Bend Reservoir). The significant production zones at these fields in Louisiana are Upper and Lower Cretaceous reservoirs, and producing depths are generally 1,500-3,000 ft. By the end of 1976, Pendleton-Many, the largest field, had produced about 20 million barrels of oil and Zwolle had produced more than 16 million barrels.

Near-surface lignite

The resource potential for near-surface lignite in the Chambers Ferry area is high, but the seams are thin and laterally discontinuous (fig. 2) and the ash content is high. Seven lignite seams, ranging from 2 to 11 ft thick and averaging 4 ft in thickness, were penetrated in the auger holes. Proximate and ultimate analyses of four lignite samples from the roadless area compared with an average analysis of lignite from the Wilcox Group on the Sabine uplift, chiefly northwest of the study area (Kaiser and others, 1980), indicate that lignite in the roadless area has a high ash content and higher sulfur content than lignite to the northwest. The high ash content may be caused in part by sediment mixing inherent in the augering method of drilling; however, Fisher and McGowen (1967) noted that lignite of the Pendleton Lagoon-Bay facies of the Wilcox Group is relatively impure.

Deep-basin lignite

Deep basin lignite (defined as lignite occurring at depths of 200-2,000 ft) is probably not present beneath the roadless area. The projected depth of lignite seams exposed to the north is greater than 2,000 ft beneath the roadless area (Kaiser and others, 1980).

Clay

All clay encountered in the auger holes was silty. X-ray diffraction patterns of three crushed, nonoriented, bulk samples of silty clay indicate similar mineralogic composition for the three samples. The samples contain 30-50 percent quartz, feldspar, and muscovite (mainly silt size). The principal clay minerals are kaolinite and smectite, present in subequal amounts. The presence of illite could not be determined because of masking by muscovite. The color of the dry crushed, silty clay is medium light olive gray (5Y 5/1) and medium yellowish brown (10YR 5/2). Analyses by Fisher (1965) of similar silty clays from the Wilcox Group in Sabine County and in Shelby County indicated that the only industrial or construction use for clay of this type is as lightweight aggregate. Although there is an abundant resource of silty clay in the roadless area, it has limited use because of the distance from industrial centers and the abundance of similar material in the region surrounding the roadless area.

Sand

Lenticular bodies of clean to slightly muddy, fine-grained sand, averaging 20 ft thick, are common in the Wilcox Group in the Chambers Ferry Roadless Area. The sand is dominantly quartzose with as much as 15 percent impurities; mostly feldspar, muscovite, and opaque grains. The utility of the sand resource for construction or other purposes is minimized by the distance from the area to urban and industrial centers and by the proximity of high-quality specialty sand in the Carrizo Sand (basal Claiborne Group) to the south and southwest (Fisher, 1965).

Uranium

Formations that contain economic uranium deposits in east and south Texas are not present in the Chambers Ferry Roadless Area. In addition, National Uranium Resource Evaluation (NURE) studies (U.S. Department of Energy, 1980) indicated no anomalous radioactivity in the roadless area. Although no uranium deposits are known in the immediate vicinity of the roadless area, a 1-mi-long zone of anomalous radiation count was detected 3 mi south of the roadless area. One sample obtained from the residuum in that zone assayed 0.0046 percent uranium. None of the subsurface samples obtained by augering had anomalous radiation counts.

Trace-element abundance

Eighteen auger samples of silty clay from the Wilcox Group were analyzed spectrographically for 31 minor and trace elements. A comparison of these samples with chiefly fine-grained rocks of the Pierre Shale (Schultz and others, 1980) indicates that the trace-element composition of the clay in the roadless area is within the normal range for nonmineralized clay sediment, both marine and nonmarine.

REFERENCES CITED

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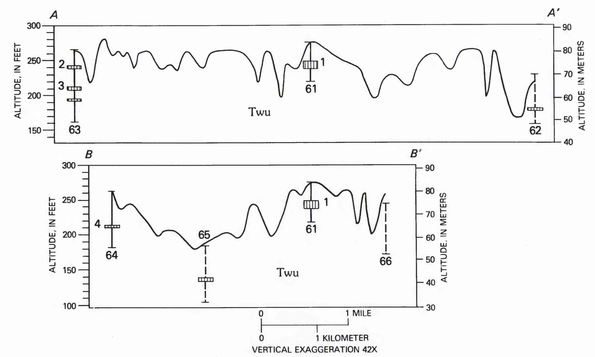

Figure 2.--Cross sections showing depth and thickness of lignite seams penetrated in auger holes.

Table 1.--Proximate and ultimate analyses of lignite samples from the Wilcox Group in the roadless area (south flank, Sabine uplift) and averaged analyses of 113 samples of Wilcox Group lignite from the Sabine uplift, chiefly northwest of the roadless area

[Proximate and ultimate analyses, forms of sulfur, and equilibrium moisture in percent. Analyses of Wilcox Group samples from Kaiser and others (1980)]

		1 61(26-27)[3]	2[1] 63(23-25)	3 63(54-57)	4 64(50-52)	Arithmetic mean	Sabine uplift[2]
As-received basis							
Proximate	Moisture	19	8	35	41	32	33
	Ash	58	45	40	22	40	15
	Volatile matter	15	26	13	18	15	27
	Fixed carbon	8	21	11	19	13	25
Ultimate	Hydrogen	3.4	3.4	5.2	6.5	5.0	3.1
	Carbon	15	32	16	27	19	39
	Nitrogen	0.3	0.7	0.3	0.6	0.4	0.7
	Sulfur	1.6	3.4	1.1	2.0	1.6	1.1
	Oxygen	22	15	37	42	34	8
	Ash	58	45	40	22	40	15
BTU/lb		2335	5637	2713	4555	3201	6441
Forms of sulfur	Sulfate sulfur	0.43	0.07	0.26	0.09	0.26	0.03
	Pyritic sulfur	0.76	2.73	0.57	1.39	0.91	0.26
	Organic sulfur	0.38	0.61	0.24	0.47	0.36	0.65
Dry basis							
Proximate	Ash	72	49	62	37	55	22
	Volatile matter	18	28	21	31	25	41
	Fixed carbon	10	22	17	32	20	37
Ultimate	Hydrogen	1.6	2.8	2.0	3.3	2.4	4.6
	Carbon	18	35	25	45	31	59
	Nitrogen	0.4	0.8	0.5	1.0	0.7	1.0
	Sulfur	1.9	3.7	1.7	3.3	2.7	1.7
	Oxygen	6	9	8	10	8	12
	Ash	72	49	62	37	55	22
BTU/lb		2904	6113	4181	7708	5227	9764
Forms of sulfur	Sulfate sulfur	0.53	0.08	0.40	0.15	0.29	0.05
	Pyritic sulfur	0.93	2.97	0.88	2.34	1.78	0.39
	Organic sulfur	0.48	0.64	0.37	0.81	0.58	0.98
Ash fusion tempera-tures[4]	Initial deformation	2400	2200	2240	2210	2263	2108
	Softening	2590	2310	2430	2370	2425	2168
	Fluid	2680	2420	2560	2540	2550	2393
Equilibrium moisture		17	16	25	28	23	

[1]Sample was dried out and was omitted for calculations of arithmetic means of analyses in as-received basis.

[2]Average of 113 samples (Kaiser and others, 1980).

[3]Auger hole number with depth interval of lignite sample in parentheses. See figure 1 for location of auger holes.

[4]Fusion temperatures in reducing atmosphere, °F.

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