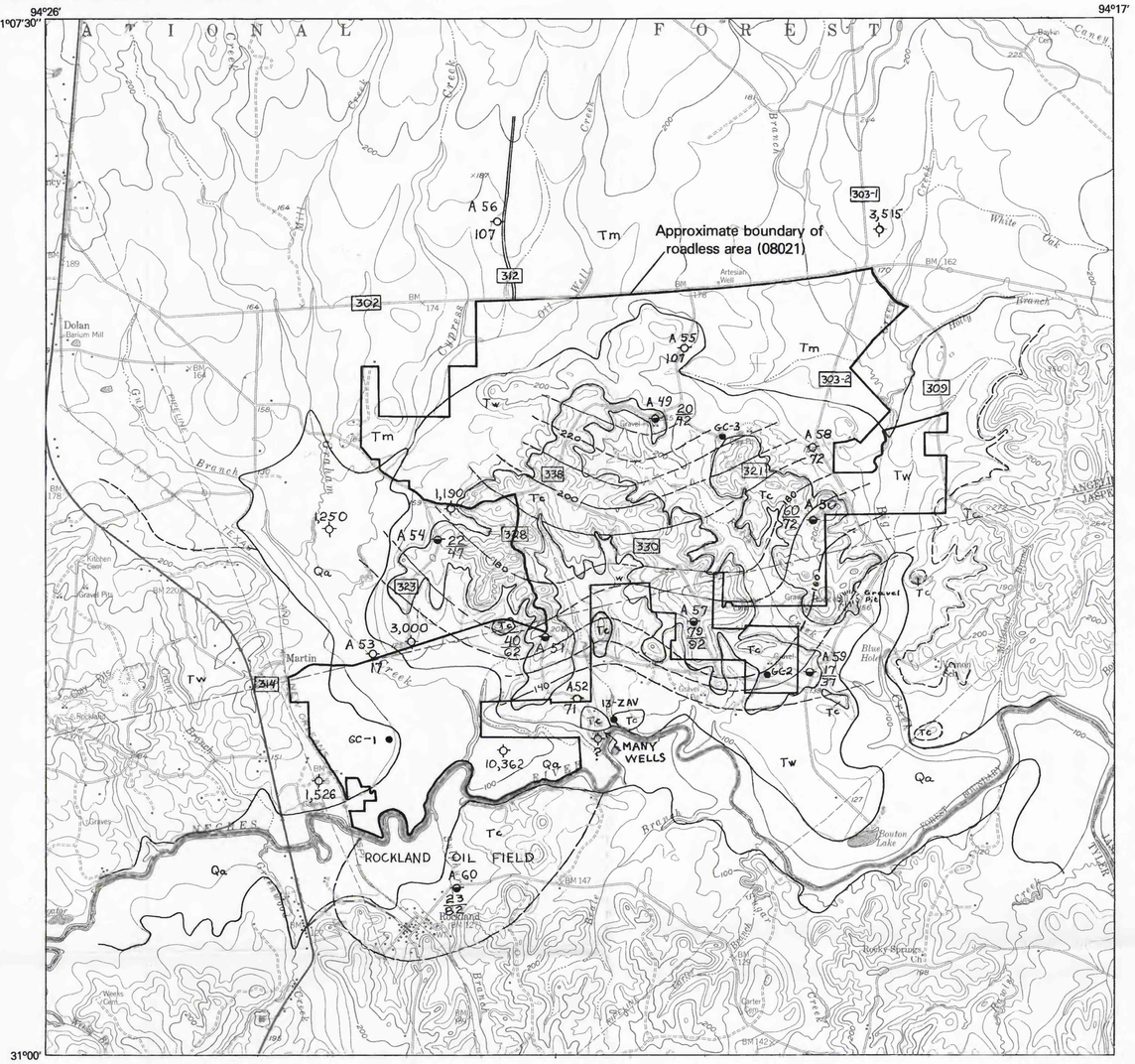
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1552
PAMPHLET ACCOMPANIES MAP



Base from U.S. Geological Survey, 1:62,500
Zavalla, 1958

SCALE 1:50 000

1 ½ 0 1 2 3 MILES

1 .5 0 1 2 3 KILOMETERS

CONTOUR INTERVAL 20 FEET

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

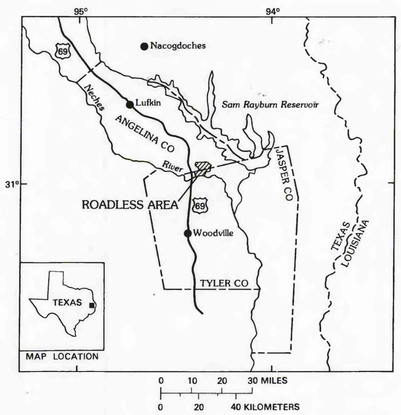


Figure 1.--Index map showing location of the Graham Creek Roadless Area (08021), Angelina and Jasper Counties, Texas.

Figure 2.--Map showing mineral resource potential of the Graham Creek Roadless Area, Texas.

CORRELATION OF MAP UNITS

Qa	Holocene and Pleistocene	QUATERNARY
Unconformity		
Tc	Miocene and Oligocene	TERTIARY
Unconformity		
Tw, Tm	Eocene	TERTIARY

DESCRIPTION OF MAP UNITS

Qa — ALLUVIUM (HOLOCENE AND PLEISTOCENE?)--Flood plain deposits of Graham Creek, Big Creek, and the Neches River. Sandy silt to pebbly sand. Thickness 0-15 ft

Tc — CATAHOULA FORMATION (LOWER? MIOCENE AND UPPER? OLIGOCENE)--Clean to slightly muddy or clayey, fine- to coarse-grained, crossbedded sand. Pebble beds and clay laminae common. Basal 10-20 ft commonly contain pods of opal-cemented sandstone, pebble conglomerate lenses, kaolinite clay balls and rip-up clasts, and opalized palm wood fragments as large as logs. Thickness 0-100 ft

JACKSON GROUP

Tw — WHITSETT FORMATION (UPPER EOCENE)--Chiefly dark-greenish-gray, stiff, silty clay with fine-grained sand and silt laminae. Lignitic silt and clay and lignitic, crossbedded, silty sandstone are common. Upper 20 ft locally contains tuffaceous silt and silty kaolin bodies. Thickness 60 ft (Barnes, 1968)

Tm — MANNING FORMATION (UPPER EOCENE)--Chiefly dark-greenish-gray, stiff, silty clay with minor fine-grained sand and silt laminae. Sparse volcaniclastic layers. Sparse and local fossiliferous zones. Thickness 200 ft (Barnes, 1968)

EXPLANATION

——— CONTACT--Dashed where inferred

—200— STRUCTURE CONTOUR--Drawn on Catahoula-Whitsett contact as determined from auger-hole data. Dashed where Catahoula is absent

A 49 ⊖ 20/42 AUGER-HOLE LOCATION AND NUMBER
Depth to Catahoula-Whitsett contact (above bar) and total depth (below bar), shown in feet

A 56 ⊖ 107 Catahoula not present. Total depth shown in feet

⊹ 3,515 OIL OR GAS TEST WELL--Approximately located. Total depth shown in feet. Queried where depth not known

● 13-ZAV SAMPLE LOCALITY

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 geological and mineral surveys of the Graham Creek Roadless Area (08021), Angelina National Forest, Angelina and Jasper Counties, Texas. The Graham Creek 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.

MINERAL RESOURCE POTENTIAL
SUMMARY STATEMENT

Geologic and geochemical investigations have been conducted to evaluate the mineral resource potential of the Graham Creek Roadless Area, Angelina and Jasper Counties, Tex. The roadless area lies within the western Gulf of Mexico Coastal Plain and is underlain by Eocene, Oligocene(?), and Miocene semiconsolidated clastic sediments. Ninety 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 based on the regional setting and the presence of nearby producing fields. Kaolinite and smectite clay and general-use sand are present in the area. These conclusions are based on surface and shallow subsurface geologic examination, radiometric survey, and geochemical and mineralogic study of subsurface auger samples.

INTRODUCTION

The Graham Creek Roadless Area (fig. 1) comprises 7,766 acres in the Angelina National Forest in Angelina and Jasper Counties, Tex. Topographically, the area can be divided into three parts: the southwestern part consisting of flood plains and terraces of Graham Creek and the Neches River, the central part characterized by rolling hills and occasional sandstone ledges, and the relatively flat northern part. The climate is humid subtropical with an annual precipitation of about 51 in. and a mean annual temperature of about 67°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 (Houston Embayment), which is filled with a thick sequence of offlapping sedimentary prisms of Cenozoic clastic rocks. This sequence rests upon Cretaceous and Jurassic sandstones and carbonates and the Jurassic Louann Salt.

The rocks of the Graham Creek Roadless Area are Eocene through early(?) Miocene semiconsolidated clastic sediments and Quaternary alluvium in the flood plains of the larger streams. The oldest units in the area, the upper Eocene Manning and Whitsett Formations are part of the Fayette delta system described by Fisher and others (1970).

The contact between the Manning Formation and the Whitsett was not recognized in the auger holes and, therefore, the contact was modified from Barnes (1968), assuming a thickness of about 60 ft for the Whitsett Formation. An erosional unconformity separates the Eocene Whitsett Formation from the overlying upper Oligocene(?)-Miocene Catahoula Formation.

The depositional system of the Catahoula Formation in East Texas is named the Chita-Corrigan fluvial system for the Chita and Corrigan sand units in the lower part of the formation.

Throughout the roadless area, the contact of the Whitsett and Catahoula was placed at the base of the sand and top of the silt and clay. In the south and southeast part of the area, however, at least the upper 18-20 ft of clayey silt (auger hole 59 and locality 13-ZAV) perhaps should be included in the Catahoula Formation.

Regionally, the Tertiary rock units strike about N. 75° E. and dip gently (1/2°-2°) to the southeast as shown by the map pattern of these units on the Palestine 1° x 2° quadrangle geologic map (Barnes, 1968). Within the roadless area, contours drawn on the erosional unconformity separating the Whitsett and Catahoula Formations indicate that part of this surface has the shape of one-third of a dome. The available data are not sufficient to determine if this is an erosional dome or a structural dome.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Oil and gas

The Graham Creek Roadless Area has moderate to high resource potential for oil and gas (fig. 2). Data show a history of scattered, mostly very shallow, exploration drilling in and around the area, especially at its southern and western edges. Immediately to the south, production has been established at Rockland and Sugar Creek fields in Jasper and Tyler Counties. Rockland field produced a small amount of oil (45,000 barrels) from Eocene Yegua sandstones, while Sugar Creek is a small gas-condensate field producing from the Upper Cretaceous Woodbine Formation. Farther to the southeast the Turpentine field in Jasper County also produces a small amount of oil and gas from the Upper Cretaceous (Austin Group and Woodbine Formation). Rockland field discovered in 1928, is the oldest of these fields. A new field, McGee Bend, was discovered in Angelina County in 1982.

If the domal shape of the W-C surface is structural and not erosional, the area would have a high potential for oil and gas resources.

Lignite

There is no known lignite resource in the area. Kaiser and others (1980) inferred that a resource of near-surface lignite existed in the roadless area in the Manning Formation; however, the shallow drilling program of this study indicates that there is no lignite in the upper 100-200 ft of the Manning Formation beneath the area. Although lignitic sand and silt are common in the Whitsett Formation, no lignite beds were penetrated in the auger holes.

Clay

Southern Angelina County and northern Jasper County have a considerable history of clay production from relatively small pits (less than 25 acres), one of which (now abandoned) is located within the area. Most production has been from the Whitsett Formation 1.5 mi west of the area. Kaolinite clay and smectite clay resources of limited extent are present in the roadless area (fig. 2). The boundaries of the resource areas are very approximate and are based on data from exposures and auger holes.

The kaolinite clay resource consists of quartzose silt in a monomineralic matrix of kaolinite clay. This is essentially the same material being mined west of the area. The kaolinite clay occurs in the southeast part of the area as a layer 5-20 ft thick, perhaps lenticular, in the top of the Whitsett Formation or in the base of the Catahoula. The smectite clay resource in the north-central part of the area is greater than 15 ft thick in auger hole 49 and is probably a lenticular body. It consists of quartzose silty smectite and occurs in the top of the Whitsett Formation.

Uranium

The Graham Creek Roadless Area was examined as part of the National Uranium Resource Evaluation (NURE) program (U.S. Department of Energy, 1979) to determine the uranium resources of the United States. Very low uranium values were found in ground-water samples and only slightly higher values were obtained from stream-sediment samples. Arfele (1980) also found very low uranium values in ground-water samples from the study area in an evaluation of uranium mineralization in the Whitsett Formation.

In the present study, subsurface samples of silty clay from the Whitsett Formation contained 1.3, 1.1, and 1.1 ppm uranium. Three surface samples, one from the Whitsett and two from the Catahoula, contained 25, 10, and 43 ppm uranium, respectively. Although the surface samples may be above normal levels of uranium content, the evidence is insufficient to suggest other than a low potential for uranium in the roadless area.

Sand

The basal sand of the Catahoula Formation is presently being mined and crushed 0.25 mi east of the roadless area by the Neches Stone Company. Sand from the Catahoula was also mined from an abandoned sand pit in the southeast corner of the area. The sand consists of a mixture of loose, slightly clayey sand and sharp fragments of opal-cemented sandstone and is used as road metal on the many graded roads of the region. Sand of this kind is widespread throughout the outcrop belt of the Catahoula Formation.

Trace-element abundance

Thirty-seven auger samples of clay from the Manning and Whitsett Formations 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.

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GEOLOGY AND MINERAL RESOURCE POTENTIAL MAP OF THE GRAHAM CREEK ROADLESS AREA, ANGELINA AND JASPER COUNTIES, TEXAS

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