DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1470
PAMPHLET ACCOMPANIES MAP

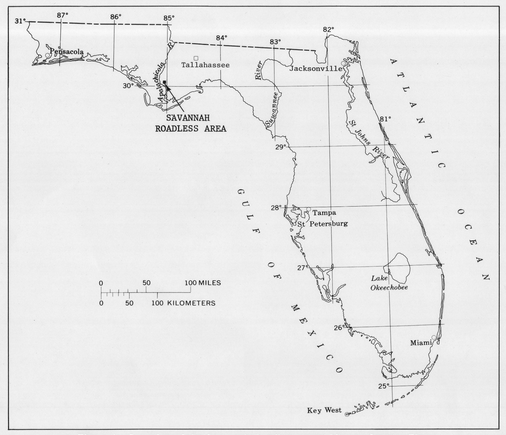


Figure 1.—Location of the Savannah Roadless Area, Liberty County, Fla.

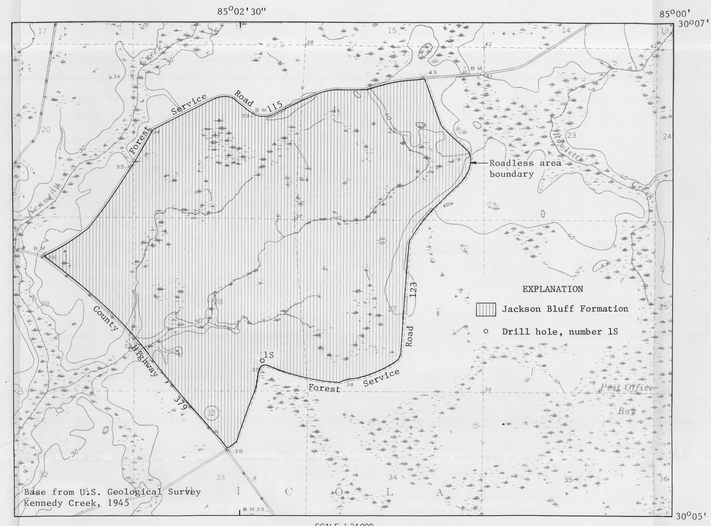
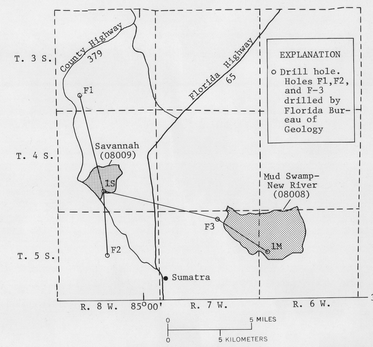


Figure 2.—Geologic map of the Savannah Roadless Area. Map does not show Pleistocene and Holocene sediments.



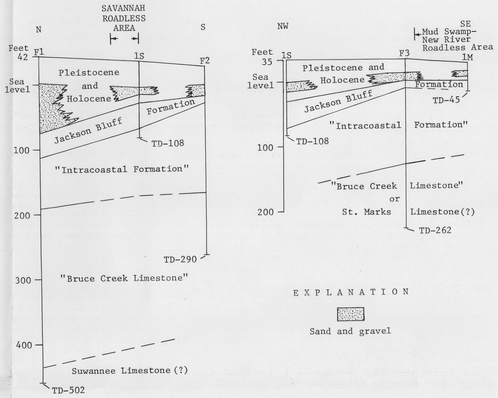


Figure 3.—Locations of core holes F1, F2, F3, 1M, and 1S and correlations of rock units penetrated, Savannah and Mud Swamp- New River Roadless Areas. Each roadless area's RARE II number is shown in parentheses on the map.

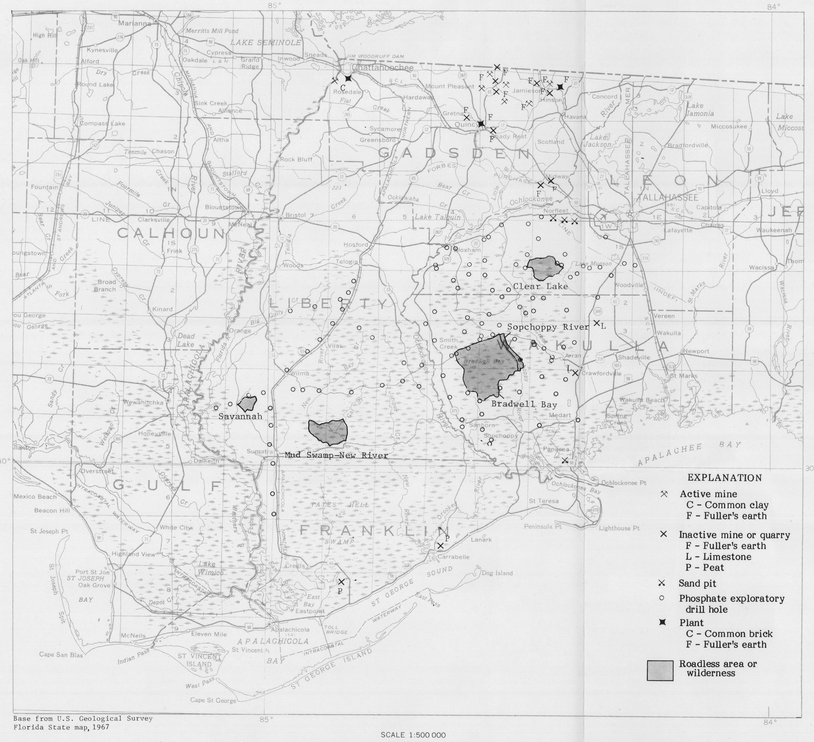


Figure 4.—Locations of industrial-mineral pits, mines, quarries, and plants, and phosphate exploratory drill holes, in the Big Bend region.

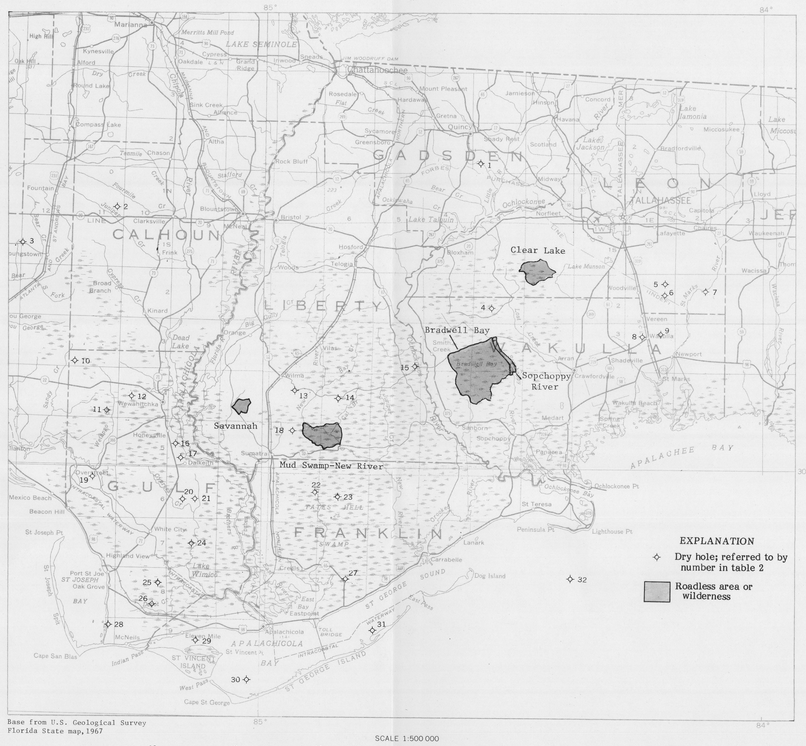


Figure 5.—Locations of dry holes in the Big Bend region.

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 Savannah Roadless Area in the Apalachicola National Forest, Liberty County, Florida. This area was classified as a further planning area (Forest Service number 08009) during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

SUMMARY

The Savannah Roadless Area is underlain by sedimentary rocks having low potential for oil and gas and virtually no potential for valuable minerals. No minerals have been mined within the area and the only production nearby has been the digging of clayey sand used in stabilizing U.S. Forest Service roads. Fuller's earth, quartz sand and gravel, clayey sand, and common clay presently are produced elsewhere in the region, and limestone and peat have been produced in the past. No clay suitable for structural clay products or fuller's earth is present in the Savannah Roadless Area; however, a bed of quartz sand and gravel of excellent quality was penetrated at a depth interval of 37-50 ft by one drill hole. Although this bed is coarser grained—and therefore is more suitable for many uses—than the sand deposits worked elsewhere in the region, its mineral resource potential is reduced by the thickness of overburden above it and by its distance from markets in population centers. The Apalachicola National Forest has been explored for phosphate and reconnoitered for heavy minerals, but no valuable deposits of either have been found.

INTRODUCTION

The Savannah Roadless Area lies in the Big Bend region of the Florida panhandle (fig. 1). The area can be reached by traveling about 6 mi northwest from the village of Sumatra on County Highway 379. Sumatra, in southern Liberty County, is located at the junction of County Highway 379 and Florida Highway 65. The Savannah Roadless Area is a three-sided tract of 1,944 acres bounded by County Highway 379 on the southwest and by Forest Service roads 115 on the northwest and 123 on the southeast. The area is very gently undulating; altitudes as shown on the topographic map (fig. 2) range from a maximum of 43 ft at the northern corner of the area to a low of about 25 ft where small intermittent streams cross the southwestern boundary. Compared to much of the land in the surrounding region the area is well drained. None of the swamps in the roadless area that are shown on the map (fig. 2) contain standing water in the dry season. About half the area is open grassland, which is the basis for the name Savannah. The other half is irregularly covered by open pine-palmetto forest.

GEOLOGY

The entire Savannah Roadless Area is blanketed by unconsolidated sediments that overlie a thick sequence of sedimentary rocks that were deposited in the Apalachicola embayment. The A-horizon soil covering the area is rarely more than a foot thick. It consists chiefly of slightly clayey sand containing minor amounts of organic matter and root remains. Below the soil is a sequence of Pleistocene and Holocene unconsolidated sand, gravel, and clay having a thickness of about 60 ft, which in turn overlies the Pliocene Jackson Bluff Formation (fig. 3). This formation is the uppermost bedrock unit and extends over the entire area (fig. 2). The Jackson Bluff comprises mainly light-gray, coarse-sand- to gravel-sized shell fragments, quartz sand, and clay containing trace amounts of phosphate pellets, heavy minerals, and glauconite. The thick sequence of older rocks underlying the Jackson Bluff Formation is similar to that described by Schmidt and Clark (1980).

The Savannah Roadless Area is located in the central part of the Apalachicola embayment, a deep structural basin that was formed by the depression of crustal rocks. The embayment was filled with Triassic to Quaternary sediments having a total thickness of more than 14,000 ft. Deep rocks along the axis of the embayment plunge about 65 ft per mile to the west-southwest (Applegate, Pontigo, and Rooke, 1978, p. 80). Shallow rocks, which were deposited after the embayment was mostly filled, dip only a few feet per mile toward the Gulf of Mexico.

No faults have been recognized in the Savannah Roadless Area. However, minor disturbances of strata by slumping into solution cavities have no doubt occurred in a few places. Rock displacements of this type involve breakage and differential movement, but are not ordinarily considered to be structural features.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Fuller's earth, common clay, sand and gravel, and clayey sand are produced in the Big Bend region, and limestone was quarried and peat dug in the past (fig. 4). The region also has been explored for phosphate and reconnoitered for heavy minerals, but no commercial deposits have been found. There has been no mining activity within the Savannah Roadless Area, and the only production nearby has been the digging of clayey sand, used in stabilizing Forest Service roads, from borrow pits located 2 mi south of the area.

Fuller's Earth and Other Clays

A large district leading the world in the production of palygorskite-(attapulgite-) type fuller's earth straddles the boundary of Florida and Georgia northeast of the Savannah Roadless Area (Patterson, 1974). The closest active processing plants are at Quincy, Fla., 42 mi northeast of the roadless area, and Hinson, Fla., east of Quincy (fig. 4).

The fuller's earth occurs in the Miocene Hawthorn Formation, which is not present in the Savannah Roadless Area. No fuller's earth was found in the cores from the five drill holes (fig. 3); therefore, we conclude the roadless area has no potential for fuller's earth.

The only current mining of common clay in the Big Bend region is at the Apalachee Correctional Institution plant south of Chattahoochee (fig. 4). This plant, which is operated by the State of Florida, uses clayey and silty alluvium from the floodplain of the Apalachicola River to make common construction brick.

Common bricks were made many decades ago at a site along the Apalachicola River 9.5 mi south of the roadless area. The name Brickyard is applied to a landing and a small creek shown on maps of the region. Patterson found fragments of bricks at the site but no evidence of a kiln or clay pit. A senior citizen living nearby stated that brickmaking at this locality had ceased long before he was born, and no better information about when brickmaking took place was found. Examination of the brick fragments revealed that they were made from very sandy material that was probably alluvium dug along the Apalachicola River.

Very sandy plastic clay was penetrated by drill hole 1S in the roadless area (fig. 2) at depth intervals of 59-64 ft and 72-76 ft. In addition to much quartz, the upper bed consisted of kaolinite, illite, and organic matter. The clay minerals in the lower bed were kaolinite and montmorillonite (smectite).

No commercial common-clay deposits are present in the Savannah Roadless Area. The two beds penetrated in the drill hole are too thin and too deeply buried to be of value, and no extensive alluvial deposits are present in the area.

Heavy Minerals

Several reconnaissance studies of the heavy minerals in sands in the Big Bend region have been made, but no valuable concentrations have been found. The studies include M.S. theses on heavy minerals in Leon and Wakulla Counties, cited by Schmidt and Clark (1980, p. 72). In the work leading to the present report (table 1), among the heavy-mineral determinations made were those of a sample from the depth interval of 37-50 ft (drill hole 1S; fig. 2); a sample from a borrow pit located 2 mi south of the roadless area, and two samples from the Roberts Sand Co. pit located at Norfleet, near Tallahassee. The sample from the drill hole contained 1.8 percent and the sample from the borrow pit 2.3 percent heavy minerals (table 1), which are too low for profitable recovery. Heavy minerals identified include biotite, muscovite, ilmenite, tourmaline, staurolite, sillimanite, rutile, leucoxene, kyanite, chlorite, garnet, and phosphate. The wide range of mineral species present, rather than concentrations of valuable minerals such as ilmenite, rutile, and zircon, further detracts from the heavy-mineral potential of the sand.

Limestone

Several inactive quarries, where limestone was obtained for stabilizing secondary roads, are scattered throughout the Big Bend region. The largest one is in sec. 4, T. 3 S., R. 1 W. east of Florida Highway 369, about 40 mi east of the Savannah Roadless Area. The workings of this quarry, which has not been operated for many years, extend over more than 40 acres. Another old quarry is located in sec. 12, T. 4 S., R. 2 W., 2.3 mi south of Crawfordville (fig. 4). The limestone at both quarries is in the Miocene St. Marks Formation. Marl, a soft impure calcareous rock, was also dug for road-surfacing material in western Leon County and east-central Franklin County.

Very large quantities of limestone are present below the surface of the Savannah Roadless Area, but they have no value. The limestone is under excessive thicknesses of overburden, and unlimited quantities are present at sites more favorable for quarrying and closer to markets in other parts of the Big Bend region.

Peat

Peat has been produced on a minor scale in the Big Bend region, and small deposits occur in several swamps (Davis, 1946). No large peat swamps are present in the Savannah Roadless Area. The production closest to the roadless area in recent years has been near Carrabelle, about 27 mi to the southeast, where both bulk and packaged peat have been prepared (Cameron and Mory, 1977, p. 29).

Phosphate

Very minor amounts of phosphate are present in the Pleistocene to Holocene sand, the Pliocene Jackson Bluff Formation, and the Intracoastal Formation underlying the Savannah Roadless Area. The phosphate occurs as scattered black, gray, tan, and white pellets of very fine to medium grain size, and rarely as fragments of fish or other fossil remains. Some of the phosphatic materials are thought to have been reworked from deposits in the Miocene Hawthorn Formation farther north.

Although minor amounts of phosphate are present in the strata underlying the roadless area, there is very little possibility that commercial deposits are present. A selected drill-core sample of a phosphatic shell-hash bed 13 ft thick from 85-102 ft depth in the drill hole 1S (fig. 2) contained less than 0.5 percent P_2O_5, which is far too low to be of value. Furthermore, no commercial phosphate was found during exploration programs carried out by two companies in and near the Apalachicola National Forest in the 1960s. These two firms drilled 124 holes (some are shown in figure 4) including a few close to the Savannah Roadless Area. One company apparently decided to do no analytical testing after examining core samples. According to records of the U.S. Geological Survey, the other company found that 37 of 52 holes penetrated phosphatic material worth sampling. The sample richest in P_2O_5 (5.45 percent) was from a 3-ft-thick interval (81-to 84-ft depth) penetrated by a single hole. Two other samples from thin, deep intervals each contained 4.16 percent P_2O_5. The remaining 49 samples contained less than 4 percent P_2O_5 and about half of them had less than 2 percent P_2O_5.

Sand

Sand for construction and miscellaneous uses is produced at several places in the Big Bend region. Sand requirements of the Tallahassee market area are satisfied by the Roberts Sand Co. at Norfleet and by two other companies operating nearby (Scott and others, 1980). A pit near Panacea, 38 mi east of the Savannah Roadless Area, is the source of sand for the market along the Gulf Coast. Sand also is dredged from the Apalachicola River near Chattahoochee.

A sand and gravel bed 13 ft thick (depth interval 37-50 ft) was penetrated by drill hole 1S in the Savannah Roadless Area. A sample of this bed was found to be remarkably pure, consisting almost entirely of angular quartz, with 1.8 percent heavy minerals and a trace of clay. Only 17 percent of this sand was finer than coarse sand, and 28.6 percent was gravel (table 1, sample 1).

Not only does the sand and gravel bed contain large quantities under the roadless area, but the bed is known also to extend for several miles outside of the area. The same bed was penetrated by hole 1M in the Mud Swamp-New River Roadless Area about 1l mi east-southeast of the Savannah area, by hole F3, 7 mi east of the Savannah area, by hole F2, 0.6 mi south of the Savannah area, and by hole F1, about 5 mi north of the Savannah area (fig. 3).

Although the sand and gravel deposits underlying the roadless area are of better quality than the deposits found in active pits in the Big Bend region, the mineral resource potential of the former is reduced by several factors. A considerable thickness of overburden would have to be stripped if the sand and gravel were to be produced. Moreover, the deposits are much farther from markets in population centers than are the sand and gravel currently produced.

Clayey sand of the type found in the borrow pits 2 mi south of the Savannah Roadless Area (table 1, sample 4) is widespread in the region. Large tonnages of this type of material occur in the roadless area, but they have no particular value because unlimited quantities exist elsewhere.

ASSESSMENT OF OIL AND GAS POTENTIAL

According to the reports and records of the Florida Bureau of Geology, many exploratory wells have been drilled in search of oil and gas in the Big Bend region (fig. 5; table 2). To date, only a few shows of oil have been found, and all of the holes have been dry. Of the selected holes shown in table 2, 30 were deeper than 5,000 ft and 15 were deeper than 10,000 ft. The deepest hole bottomed at 14,570 ft. Surprisingly, two of the shallow dry holes (table 2, wells 5 and 8) were reported to have good shows of oil (Hendry and Sproul, 1966, p. 105). These two wells are located about 50 mi east of the Savannah Roadless Area. Oil stains also were found in the Jurassic Smackover Formation and in a conglomeratic calcareous sandstone of the Jurassic Norphlet Formation in a Hunt Oil Co. dry hole (Schmidt and Clark, 1980, p. 73), located 20 mi west-northwest of the roadless area.

Although there are no reasons for optimism about the discovery of oil and gas in and near the roadless area, the possibilities cannot be completely ruled out. Oil and gas may occur in the Jurassic Smackover Formation, which is present at depth in the roadless area (Applegate, Pontigo, and Rooke, 1978). Oil and gas are produced from this formation in the Jay field in the westernmost Florida panhandle and in a nearby field in Alabama (Babcock, 1972). Therefore, geologists think that this formation has potential for oil in the Big Bend region. However, the several holes that have been drilled into the Smackover in parts of the Big Bend region east, south, and west of the Savannah Roadless Area have all been dry (Applegate, Pontigo, and Rooke, 1978). Other reasons for not ruling out the potential for oil and gas discovery in the roadless area include: 1) the shows of oil in dry holes in the region, noted in the foregoing paragraph; 2) uncertainty as to whether or not formations older than the Smackover may contain oil and gas; and 3) the geology of the region, which is favorable for the occurrence of both structural and sedimentary traps (Applegate, Pontigo, and Rooke, 1978, p. 84).

Table 1.—*Grain size and heavy-mineral content of sand and gravel in the region of the Savannah and Mud Swamp-New River Roadless Areas, and comparative samples from the Roberts Sand Co. pit, in percent*

Sample number	Gravel >10 mesh	Very coarse sand 10-18 mesh	Coarse sand 18-35 mesh	Medium sand 35-60 mesh	Fine sand 60-120 mesh	Very fine sand, silt and clay <120 mesh	Total	Heavy minerals
1	28.6	33.2	22.0	9.8	3.4	2.8	99.8	1.8
2	0.2	5.4	27.0	31.4	15.4	20.0	99.4	0.40
3	11.6	30.6	33.4	15.0	4.6	4.4	98.6	0.14
4	–	0.4	3.8	36.6	47.4	11.4	98.6	2.3
5	3.2	9.6	20.8	44.6	18.4	3.2	99.8	0.12
6	12.2	13.2	14.6	30.8	24.2	4.6	99.6	0.29

Description of samples:

1. Drill core of sand and gravel, depth interval 37-50 ft, hole 1S, Savannah Roadless Area
2. Drill core of sand, depth interval 3-15 ft, hole 1M, Mud Swamp-New River Roadless Area
3. Drill core of sand and gravel, depth interval 15-20 ft, hole 1M, Mud Swamp-New River Roadless Area
4. Channel sample of clayey sand 9 ft thick in wall of borrow pit, 2 mi south of Savannah Roadless Area
5. Composite of grab samples of upper sand beds approximately 12 ft thick in wall of Roberts Sand Co. pit, Norfleet, Fla.
6. Composite of grab samples of sand beds approximately 5 ft thick, underlying sample no. 5

Table 2.—*Selected exploratory oil and gas data for Apalachicola National Forest and surrounding region*
[Source: Florida Bureau of Geology, oil and gas reports and records]

Florida Bureau of Geology number	Dry hole number, fig. 5	Company or owner's name	Dry hole or firm name	County	Sec.	T.	R.	Year of completion	Altitude of derrick floor above sea level (ft)	Total depth of hole (ft)
305	1	C. E. Prince	Ernine Gwenby	Gadsden	29	2S	3W	1963	197	7,021
149	2	Sun Oil Co.	#1 E. L. Jordan, et al	Calhoun	36	1N	11W	1953	100	5,002
246	3	Flamingo Oil Co.	#1 E. L. Jordan, et al	Bay	18	1S	12W	1956	134	5,000
696	4	Placid Oil Co.	Placid Oil Co. No. 1 USA 27-2	Wakulla	27	2S	3W	1974	99	12,116
W32	5	Central Florida Oil and Gas Co.	Rhodes No. 1	Leon	11	2S	1E	1924	50	3,755
717	6	Phillips Petroleum Co.	St. Joe Paper Co. #1	Leon	14	2S	1E	1974	33	10,466
W936	7	Stanolind Oil Co.	St. Joe Paper Co.	Leon	15	2S	2E	1944	41	6,520
W12	8	Bonheur Development Co.	Cates No. 1	Wakulla	16	3S	1E	1919	17	2,169
W440	9	Ravlin Brown	V. G. Phillips No. 1	Wakulla	14	3S	1E	1943	28	5,766
746	10	Hunt Oil Co.	International Paper Co.	Gulf	31	3S	11W	1974	81	13,284
48	11	Pure Oil Co.	#1 E. L. McMillan	Gulf	25	4S	11W	1947	44	5,069
846	12	Exxon Corp.	Neal Lumber and Mfg. Co.	Gulf	20	4S	10W	1076	59	13,587
769	13	Placid Oil Co.	Placid Oil Co. No. 1, USA, 10-3	Liberty	10	4S	7W	1975	75	12,454
745	14	Placid Oil Co.	Placid Oil Co. No. 1, USA, 16-3	Liberty	16	4S	6W	1974	74	12,400
730	15	Placid Oil Co.	Placid Oil Co. No. 1, USA, 26-4	Liberty	26	3S	5W	1975	62	12,131
W1469	16	Pure Oil Co.	Kate Gaskins No. 1	Gulf	19	5S	9W	1945	43	5,606
957	17	Mesa Petroleum Corp.	St. Joe Paper Co. Unit 29-4 #1	Gulf	29	5S	9W	1979	47	14,186
277	18	Gulf Coast Drilling and Exploration Co.	Gulf Coast Drilling and Exploration Co., No. 1, USA 16-2	Liberty	4	5S	7W	1959	49	10,010
40	19	Pure Oil Co.	St. Joe Paper Co. #3	Gulf	3	6S	11W	1946	11	5,025
W1470	20	Pure Oil Co.	---	Gulf	--	6S	9W	--	33	7,255
W914	21	Pure Oil Co.	---	Gulf	--	6S	9W	--	32	8,708
960	22	Mesa Petroleum Corp.	Buckeye Cellulose Corp.	Franklin	23	6S	7W	1979	87	12,885
814	23	Exxon Corp.	Buckeye Cellulose Corp. No. 16-3	Franklin	16	6S	6W	1976	50	11,950
134	24	Pure Oil Co.	---	Gulf	--	7S	9W	--	21	5,796
762	25	Charter Exploration Co.	St. Joe Paper Co.	Gulf	12	8S	10W	1975	22	14,570
670	26	Charter Exploration Co.	St. Joe Paper Co.	Gulf	26	8S	10W	1973	34	14,290
32	27	Pure Oil Co.	Gex. and Lewin	Franklin	3	8S	6W	1946	15	5,060
37	28	Gulf Oil Co.	Pick Hollinger et al #1	Gulf	12	9S	11W	1946	14	5,656
43	29	Magnolia Petroleum Co.	Florida State Block 5-B	offshore	--	--	--	1947	10	7,021
387	30	MoMil Oil Corp.	#1 C Florida State Lease 224-A	offshore	--	--	--	1968	37	14,369
281	31	The California Co.-Coastal Petroleum Co.	Florida State Lease 224-A	offshore	--	--	--	1959	26	7,031
293	32	The California Co.-Coastal Petroleum Co.	Florida State Lease 224-A	offshore	--	--	--	1961	34	10,560

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MINERAL RESOURCE POTENTIAL MAP OF THE SAVANNAH ROADLESS AREA, LIBERTY COUNTY, FLORIDA

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1982

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