Lithologic logs of auger holes and analytical data for auger samples from the Four Notch, Graham Creek, and Chambers Ferry Roadless Areas, Walker, Angelina, Jasper, and Sabine Counties, eastern Texas

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Open-File Report 84-0826

1984

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INTRODUCTION

During February and March, 1982, thirty auger holes were drilled in and near the Four Notch, Graham Creek, and Chambers Ferry Roadless Areas in eastern Texas as part of an evaluation of the mineral resource potential of the areas conducted by the U.S. Geological Survey. The holes were drilled using a truck-mounted power auger and auger stems 4 in. in diameter. Seventy-one auger samples of silt and clay were submitted to U.S. Geological Survey laboratories for trace element analysis by semiquantitative spectrographic methods.

This report presents the lithologic logs of the auger holes, and tables of analytical data for each of the three areas (table 1, Four Notch Roadless Area; table 2, Graham Creek Roadless Area; and table 3, Chambers Ferry Roadless Area). Additional data, including location maps of the auger holes, were given in the mineral resource potential maps of the roadless areas (Houser and Ryan, 1983a, 1983b, 1983c).

In the logs that follow, the notation AA means "as above" and refers to the immediately preceding described unit; where numbers (footages) in parentheses follow AA, they refer to the unit described above at that footage. TD is the standard abbreviation for total depth.

REFERENCES CITED

Houser, B. B., and Ryan, G. S., 1983a, Mineral resource potential map of the Four Notch Roadless Area, Sam Houston National Forest, Walker County, Texas: U.S. Geological Survey Miscellaneous Field Studies Map, MF-1549, scale 1:50,000.

_____1983b, Geologic and mineral resource potential map of the Graham Creek Roadless Area, Angelina and Jasper Counties, Texas: U.S. Geological Survey Miscellaneous Field Studies Map, MF-1552, scale 1:50,000.

_____1983c, Geologic and mineral resource potential map of the Chambers Ferry Roadless Area, Sabine County, Texas: U.S. Geological Survey Miscellaneous Field Studies Map, MF-1553, scale 1:50,000.

LITHOLOGIC LOGS

Auger holes 37-48

Four Notch Roadless Area (Houser and Ryan, 1983a)
Sam Houston National Forest
Walker County, Texas
New Waverly, Oakhurst, and Phelps quadrangles; 1:24,000

37-New W-TW

Lat. 30°37'15"
Long. 95°23'19"
Elev. of ground surface, 297 ft
Willis Fm., 0-9 ft depth
Top of Fleming Fm., 9 ft (288 ft elev.)

0-5	stiff sandy silty clay, yellowish-gray (5Y 7/2); upper 3 ft finely mottled red
5-9	yellowish-gray stiff clay, some manganese concretions in upper half; one pebble
9-11	stiff yellowish gray clay; small calcareous nodules <1/4 in. across
12-22	AA; fewer calcareous nodules
22-27	very fine sandy stiff yellowish-gray clay; calcite nodules <1/4 in. across; powdery granular calcareous lenses 1/2 in. thick
27-32	stiff, dusky yellow, calcareous fine sandy clay with 1/4 in. calcareous nodules; minor softer, clayey very fine sand
32-37	AA with chunky texture; dry hackly clay; calcareous nodules 1/2 in. across
37	TD

38-OAK-TW

Lat. 30°39'25"
Long. 95°21'50"
Elev. of ground surface, 353 ft
Willis Fm., 0-30 ft depth
Top of Fleming Fm., 30 ft (323 ft elev.)

0-4	light brown (5YR 5/6) to moderate reddish-brown (10R 4/6), oxidized fine sandy clay
4-7	mottled moderate reddish-brown (10R 4/6) and light olive gray (5Y 6/1) fine sandy stiff clay
7-10	light olive gray clayey fine to medium sand
10-14	thin interbeds (?) of above and stiff dark yellowish-orange (10YR 6/6) and yellowish-gray (5Y 8/2) clay; minor sand in clay
14-21	(5Y 7/2) slightly sandy clay
21-30	(5Y 7/2) fine grained, muddy liquifiable sand
30-32	mottled red, gray, and black, slightly sandy clay; oxidized zone (paleosol)
32-35	mottled gray and yellowish-brown clay with black Mn oxide
35-36	AA; lighter colors with small calcareous nodules <1/2 in.
36-37	loose fragments of yellow gray calcareous clay and calcareous nodules
37	TD

39-PHE-TW

Lat. 30°41'19"
Long. 95°23'50"
Elev. of ground surface, 408 ft
Willis Fm., 0-11 ft depth
Top of Fleming Fm., 11 ft (397 ft elev.)

0-2	soil and moderate brown (5YR 3/4) clay
2-7	yellowish-gray (5Y 7/2) crumbly sandy clay
7-11	grayish orange (10YR 7/4) very fine muddy sand with minor clay blebs
11-17	mottled light brown (5YR 5/6) and moderate brown (5YR 4/4) and light yellowish-gray, fine sandy clay; stiff; black Mn oxide present
17-22	moderate yellow-brown (10YR 5/4), crumbly calcareous clayey sand or sandy clay with round calcareous nodules <1/4 in.
22-32	light brown (5YR 5/6) calcareous, stiff but crumbly, clay with calcareous nodules; minor gray mottling
32	TD

40-PHE-TW

Lat. 30°41'33"
Long. 95°23'54"
Elev. of ground surface, 413 ft
Willis Fm., 0-10 ft depth
Top of Fleming Fm., 10 ft (403 ft elev.)

0-5	stiff gray and red mottled sandy clay
5-8	yellowish gray, stiff, slightly sandy clay
8-10	yellowish-gray and black mottled, slightly sandy clay
10-11	yellow gray-brown, crumbly, calcareous clay with calcareous blebs <1/4 in. across
11-14	pale yellowish-brown (10YR 6/2), crumbly, muddy fine sand
14-20	yellowish-gray and dark yellowish-orange mottled, crumbly clay
20-27	mottled? red and gray calcareous clay; calcareous areas are soft, not nodular
27	TD

41-PHE-TW

Lat. 30°38'12"
Long. 95°23'19"
Elev. of ground surface, 362 ft
Willis Fm., 0-58 ft
Top of Fleming Fm., 58 ft (304 ft elev.)

0-5	A-horizon; dark yellowish orange (10YR 6/6), clayey sand
5-7	B-horizon; mottled red-gray and yellow-orange sandy clay
8-10	moderate red-brown (10R 4/6) and yellow-gray, stiff clayey sand
10-13	moderate yellow-brown (10YR 5/4) slightly clayey, fine to medium sand with 10% gray clay blebs
13-16	(10YR 5/4) clean, fine to medium sand
16-26	pale yellow-orange (10YR 8/6), fine to medium clean sand

26-27	yellow-gray fine to medium clean sand with clay blebs and black speckled coloration disseminated throughout
27-31	moderate yellow-brown (10YR 5/4), slightly clayey fine to medium sand with 15% clay blebs
31-37	grayish-orange (10YR 7/4), moderately stiff clayey sand or sandy clay with minor gray clay blebs; uncommon black (MnO?) particles <1/8 in. across
37-40	fairly soft clayey sand (10YR 7/4)
40-58	slightly muddy, liquifiable, fine to medium sand; gray-orange (10YR 7/4) to pale yellow brown (10YR 6/2); minor small (1/8 in.) flat clay fragments
58-65	yellow gray (5Y 7/2) stiff clay
65-73	yellow-gray to orange-brown, stiff calcareous clay; slightly crumbly; calcareous nodules in upper 2-3 ft
73-77	(10R 4/6 to 10YR 6/2, mottled with gray) slightly silty, noncalcareous clay
77	TD

42-PHE-TW

Lat. 30°39′07″
Long. 95°24′53″
Elev. of ground surface, 379 ft
Willis Fm., 0-52 ft depth
Top of Fleming Fm., 52 ft depth (327 ft elev.)

0-3	leached, stiff sandy clay
3-16	very stiff, medium sandy clay, mottled yellowish-gray and red orange-brown (10R 5/6)
16-20	yellowish-gray, stiff medium sandy clay
20-30	slightly clayey, soft medium sand; (10R 5/6)
30-32	medium sandy clay; gray and red-orange with black mottling
32-52	yellow gray, soft clayey sand and sandy clay
52-62	light brown (5YR 5/6) and gray, crumbly clay; very slightly calcareous
62-72	dark yellowish-orange (10YR 6/6) and yellowish-gray mottled sandy clay; fairly soft; not calcareous
72-87	grayish-red to pale yellow-brown, mottled with yellowish-gray soft clay; very slightly calcareous; no nodules
87	TD

43-OAK-TW

Lat. 30°38′23″
Long. 95°21′53″
Elev. of ground surface, 354 ft
Willis Fm., 0-50 ft
Top of Fleming Fm., 50 ft (304 ft elev.)

3-6	B-horizon; gray and red medium sandy clay
6-10	yellowish-gray with minor red, fine sandy, stiff clay
10-21	slightly muddy, fine sand
21-23	stiff, yellow gray clay
23-43	AA (10-21)

43-44	stiff, yellowish-gray clay with orange-yellow mottling
44-47	AA (10-21)
47-50	stiff clay; pale brown, gray and yellowish-orange with black MnO(?)
50-63	yellowish-gray clay; mottled grayish-orange (10YR 7/4) and dark yellowish-orange (10YR 6/6); calcareous with minor calcareous nodules
63	TD

44-PHE-TW

Lat. 30°40'36"
Long. 95°22'02"
Elev. of ground surface, 411 ft
Willis Fm., 0-48 ft depth
Top of Fleming Fm., 48 ft (363 ft elev.)

0-8	A-, B-, and C-soil horizons
8-14	slightly clayey, fine to medium sand; moderate red-orange to moderate red-brown
14-20	fine to medium loose sand; mottled gray-pink (5YR 7/2) and moderate red-orange (10R 6/6)
20-29	moderate red-orange (10R 6/6) muddy, slightly clayey sand
29-32	AA (14-20)
32-42	AA (20-29)
42-47	moderate yellow-brown (10YR 6/6), extremely stiff, medium sandy clay
47-48	pale yellowish-brown (10YR 6/2), muddy medium sand
48-50	stiff clay; mottled yellowish-gray, dark yellow-gray and black (Mn oxide)
50-53	stiff, yellowish-gray and light brown (5YR 5/6) clay; noncalcareous
53-62	AA with calcareous lenses enclosed by gray clay, and minor calcareous nodules
62	TD

45-PHE-TW

Lat. 30°42'22"
Long. 95°24'23"
Elev. of ground surface, 371 ft
Willis Fm., not present (0-1 ft soil)
Top of Fleming Fm., 1 ft (370 ft elev.)

0-1	sand
1-6	yellowish-gray, slightly sandy clay
6-8	AA with calc nodules 1 in. across and speckled with black Mn oxide
8-17	yellow-gray and light brown, very stiff, calcareous clay
17	TD

46-PHE-TW

Lat. 30°42'50"
Long. 95°24'30"
Elev. of ground surface, 395 ft
Willis Fm., 0-60 ft depth
Top of Fleming Fm., 60 ft (335 ft elev.)

0-1	sand
1-4	gray and red mottled, stiff fine sandy clay
4-7	gray and red-orange mottled, clayey sand
7-16	yellowish-gray, slightly muddy fine sand
16-17	pale red, slightly sandy stiff clay
17-40	slightly muddy fine sand; minor pale red clay stringers
40-42	moderately stiff, yellowish-gray clay with minor black Mn oxide; probably has fine sand interbeds
42-60	gray fine to medium sand
60-62	stiff clay; yellowish gray with black Mn oxide
62-67	mostly orange-brown with some yellowish-gray, stiff calcareous clay; minor small nodules
67-72	stiff gray noncalcareous clay with some Mn oxide; minor sand
72	TD

47-PHE-TW

Lat. 30°42'14"
Long. 95°23'51"
Elev. of ground surface, 392 ft
Willis Fm., not present
Top of Fleming Fm., 0 ft (392 ft elev.)

0-3	stiff clayey sand with minor soft calcareous areas; yellowish gray and orange brown
3-6	red-brown and yellowish-gray, stiff clay with soft calcareous areas about 1 in. across
6-7	AA with 50% calcareous areas (caliche?)
7-9	red-brown stiff calcareous clay with yellowish gray veining and minor black Mn oxide spots
9-15	loose calcareous silt with calcareous nodules, about 1 in. across in zone in center
15-17	AA, (7-9)
17	TD

48-PHE-TW

Lat. 30°40'18"
Long. 95°24'58"
Elev. of ground surface, 320 ft
Quaternary alluvium, 0-10 ft
Willis Fm., not present
Top of Fleming Fm., 10 ft (310 ft elev.)

0-10	stiff clayey sand or sandy clay; dark gray and orange brown with black Mn oxide; quartz pebbles at 7-10
10-12	gray and orange, stiff sandy clay; calcareous areas
12-13	very stiff, calcareous clay; yellowish gray, light brown, and orange brown with black Mn oxide
13-17	light pink-brown and gray-green, very stiff calcareous clay
17	TD

Table 1.--Major and trace element composition of auger samples from the Four Notch Roadless Area, Walker County, Texas

[Six-step semiquantitative spectrographic analyses made in U.S. Geological Survey laboratories; numbers in parentheses are limit of determination values; analyses by Betty Adrian]

Auger hole number	Depth interval (ft)	(.05) Fe%	(.02) Mg%	(.05) Ca%	(.002) Ti%	(10) Mn	(10) B	(20) Ba	(1) Be	(5) Co	(10) Cr	(5) Cu	(20) La	(5) Ni	(10) Pb	(5) Sc	(100) Sr	(10) V	(10) Y	(10) Zr
37-New W-TW	5-9	7	1.5	0.7	0.5	300	100	200	2.0	15	150	50	100	70	50	20	L	200	50	150
	9-22	5	1.0	3.0	0.5	300	100	300	1.5	15	100	50	70	50	50	15	150	150	50	150
	22-27	2	0.5	2.0	0.3	300	100	2000	1.5	10	70	20	50	20	20	7	150	100	20	200
	27-37	5	1.5	5.0	0.5	500	150	500	1.0	20	100	30	50	30	70	15	200	100	30	200
39-PHE-TW	11-17	2	1.0	0.5	0.5	1500	100	1000	3.0	20	150	50	100	70	70	15	L	100	100	200
	17-22	2	0.5	3.0	0.3	1000	100	700	1.0	15	70	20	50	20	50	7	L	70	30	200
	22-27	2	0.5	3.0	0.5	700	70	1000	1.0	10	50	20	50	20	30	7	150	100	20	150
	27-32	3	1.0	3.0	0.5	500	100	500	2.0	15	70	30	50	30	30	15	150	150	30	100
42-PHE-TW	32-52	1.5	0.3	0.5	0.3	100	70	500	2.0	10	20	10	50	20	10	5	N	70	20	100
	52-62	3	0.7	1.0	0.5	300	100	700	2.0	20	70	30	50	30	20	10	L	150	50	150
	62-72	2	0.7	0.5	0.5	1000	100	500	2.0	20	50	20	50	50	20	10	L	150	30	150
	72-87	5	1.5	1.0	0.5	300	100	500	2.0	20	100	30	50	30	50	20	L	150	50	150
45-PHE-TW	1-6	2	0.5	0.5	0.5	150	100	2000	1.5	20	70	20	50	20	50	10	L	100	30	300
	6-7	2	0.7	1.0	0.5	700	100	700	1.5	20	100	20	70	50	30	10	L	100	50	300
	8-11	2	1.0	5.0	0.5	1000	70	700	1.5	20	70	15	50	20	20	10	200	150	30	100
	14-17	3	1.5	5.0	0.5	700	100	1500	1.0	20	150	50	70	50	70	20	300	150	50	150
46-PHE-TW	60-62	2	1.0	0.7	0.5	1500	100	500	3.0	10	100	20	70	30	30	15	L	150	50	150
	62-67	2	1.0	10.0	0.5	700	70	300	1.0	10	100	30	50	30	30	10	300	150	30	100
	67-72	2	0.7	0.5	0.5	300	100	300	1.0	10	50	20	50	20	20	10	L	100	30	300

Remarks: Fe, Mg, Ca, and Ti reported in percent; all other elements reported in parts per million.
Results are in the series 1, 1.5, 2, 3, 5, 7, 10, etc.
N = Not detected at limit of detection.
L = Detected, but below limit of determination.

Auger holes 49-60

Graham Creek Roadless Area (Houser and Ryan, 1983b)
Angelina National Forest
Angelina and Jasper Counties, Texas
Zavalla quadrangle; 1:62,500

49-ZAV-TW

Lat. 31°04'36"
Long. 94°20'52"
Elev. of ground surface, 258 ft
Catahoula Fm., 0-20 ft depth
Elev. of top of Whitsett Fm., 238 ft

0-10	light brown (5YR 5/6), clayey, fine to medium sand
10-14	dark yellowish-orange (10YR 6/6), clayey, fine to medium sand with quartz pebbles about 1 in. in diameter
14-20	AA with minor pale yellowish-brown (10YR 6/2) stringers
20-24	stiff yellowish-gray (5Y 7/2) clay
24-31	AA with black marbling (minor)
31-33	greenish-gray (5G 6/1) stiff, crumbly, silty clay
33-35	AA, dark greenish gray (5G 4/1)
35-37	silty lignite; dry, crumbly
37-42	AA (31-33)
42	TD

50-ZAV-TW

Lat. 31°03'52"
Long. 94°19'32"
Elev. of ground surface, 226 ft
Catahoula Fm., 0-60 ft
Elev. of top of Whitsett Fm., 166 ft

0-5	yellowish-gray (5Y 7/2), clean, very fine to fine sand
5-8	slightly clayey sand; mottled light brown (5YR 5/6) and moderate red-brown (10R 4/6)
8-12	AA (0-5); mottled with light brown (5YR 5/6)
12-15	clean, light gray (N7) fine sand
15-17	marbled light gray (5Y 6/1), dark yellowish-orange (10YR 6/6) and moderate red-brown (10R 5/6), stiff clay
17-32	clean fine sand; dark yellowish to grayish orange (10YR 6/6-10YR 7/4), and very light gray (N8)
32-52	clean fine sand; moderate to grayish yellow (5Y 8/4-7/6), grayish orange (10YR 7/4), and pale to dark yellowish orange (10YR 8/6-6/6); clay seam a few inches thick at 50 ft
52-60	no recovery
60-61	dark gray (N3), lignitic, silty clay
61-70	alternating olive gray (5Y 2/1), fine sand and greenish gray (5G 6/1) sandy clay
70-72	dark gray lignitic clay and silt
72	TD

51-ZAV-TW

Lat. 31°03'01"
Long. 94°21'48"
Elev. of ground surface, 205 ft
Catahoula Fm., 0-40 ft depth
Elev. of top of Whitsett Fm., 165 ft

0-10	light brown (5YR 5/6), fairly clean, fine sand
10	layer of quartz pebbles about 1 in. across
10-23	light brown (5YR 6/4), slightly clayey, medium to coarse sand, with minor pebbles
23-26	grayish-orange (10YR 6/4), pebbly medium sand
26-32	slightly clayey fine sand; very pale orange (10YR 8/2) to grayish orange (10YR 7/9)
32-40	AA with minor 1/2 in. thick, light gray clay stringers
40-50	dark greenish-gray (5G 4/1) clay with stringers of light gray silt; may be interbedded with greenish-gray medium sand
50-58	dark greenish-gray (5G 4/1) brittle clay with light gray silt stringers; minor pyrite nodules
58-61	AA but crumbly and softer; minor pyrite zones and nodules
61-62	greenish-gray (5G 6/1), clean, fine to medium sand
62	TD

52-ZAV-TW

Lat. 31°02'35"
Long. 94°21'29"
Elev. of ground surface, 125 ft
Quaternary alluvium 0-2 ft depth
Elev. of top of Whitsett Fm., 123 ft

0-2	pale yellow-brown (10YR 6/2) fine sand
2-7	mottled weathered (5YR 4/2) clay with minor silt stringers; lignitic
7-9	grayish-brown (5YR 3/2), soft clay
9-13	pale yellowish brown (10YR 6/2) fine to medium sand
13-20	yellowish-gray (5Y 7/2) clay, with grayish-yellow (5Y 8/4) and moderate yellow (5Y 7/6) silty streaks and mottling
20-24	dark greenish-gray (5G 6/1) stiff clay with minor plant fragments
24-28	dark gray clay with dark gray fine sand
28-32	dark greenish-gray (5G 6/1) clay; crumbly
32-40	AA with light gray silt stringers
40-44	fine to medium sandy clay (5G 4/1)
44-46	brownish-black (5YR 2/1) lignitic clay
46-52	slightly clayey medium sand (5G 4/1) with minor lignitic zones
52-57	olive gray (5Y 4/1) stiff silty clay
57-61	olive gray (5Y 4/1) waxy hard clay
61-62	brownish-black (5YR 2/1) lignitic clay (may be mostly lignite)
62-67	greenish gray (5G 6/1) crumbly sandy clay; minor lignite
67-71	dry semi-indurated, grayish-olive (10Y 4/2) silt with lignitic coatings
71	rock--refused bit
71	TD

53-ZAV-TW

Lat. 31°02'55"
Long. 94°23'15"
Elev. of ground surface, 108 ft
Quaternary alluvium, 0-10 ft depth
Elev. of top of Whitsett Fm., 98 ft

0-6	pale yellowish-brown (10YR 6/2) fine sand
6-10	dark yellowish-brown (10YR 4/2) fine sandy silt
10-12	dark gray (5Y 4/1) fine sand and silt
12-15	dark gray (5G 4/1) fine sand
15-17	dark gray (5Y 4/1) fine sand with clay stringers
17	TD

54-ZAV-TW

Lat. 31°03'43"
Long. 94°22'42"
Elev. of ground surface, 200 ft
Catahoula Fm., 0-22 ft depth
Elev. of top of Whitsett Fm., 178 ft

0-7	light brown (5YR 5/6), slightly clayey fine sand
7-22	fine sand, various yellow or gray colors
22-24	pale yellowish-brown clay--probably as 2-3 in. thick stringers laminated with fine sand
25-30	yellow gray, clayey fine sand or sandy clay
30-35	pale yellow-brown (10YR 6/2) to light olive-gray (5Y 6/1) stiff clay with very thin orange silt stringers
35-38	greenish-gray, slightly silty clay
39-41	greenish-gray, very fine sandy silt
41-44	dark greenish-gray silty clay with fine sand laminae
44-47	greenish black, clayey, silty fine sand, and clay with silt and sand stringers
47	TD

55-ZAV-TW

Lat. 31°05'07"
Long. 94°20'37"
Elev. of ground surface, 204 ft
Catahoula Fm. not present
Whitsett Fm., 0-47 ft(?) depth
Elev. of top of Manning Fm., 157 ft(?)

0-7	yellow gray, crumbly, stiff clay
7-17	yellowish-brown (10YR 5/2) stiff clay with thin laminae of silt and fine sand (yellow and light gray)
17-29	AA, perhaps a little siltier at the bottom. Grades to dark yellowish brown (10YR 4/2)
29-47	dark greenish-gray (5GY 4/1) stiff clay with thin laminae of silt and fine sand
47-62	dark greenish-gray, stiff silty clay with sparse fine sand laminae

62-107 greenish black (5G 2/1) slightly silty clay--sparse fine sand laminae and abundant layers of thin-walled shell material
107 TD

56-ZAV-TW

Lat. 31°06'01"
Long. 94°21'59"
Elev. of ground surface, 185 ft
Catahoula and Whitsett Fms. not present
Elev. of top of Manning Fm., 185 ft

0-2 pale yellowish-brown, fine sand
2-14 pale yellowish-brown (10YR 6/2), stiff clay, with thin stringers of fine sand and silt
14-16 yellowish-gray, crumbly clay
16-17 very pale orange (10YR 8/2), crumbly clay
17-23 moderate yellow brown (10YR 5/4) stiff clay with uncommon silt stringers
23-25 AA with lenses of dark greenish-gray clay (5GY 4/1) and pockets of gypsum crystals
25-29 dark greenish-gray clay with moderate yellow-brown lenses
29-42 dark greenish-gray clay with uncommon silt and fine sand stringers
42-57 dark greenish-gray clay with silt and fine sand stringers
57-102 AA (29-42)
102-107 stiffer (brittle) clay, olive gray (5Y 4/1) with uncommon silt stringers
107 TD

57-ZAV-TW

Lat. 31°03'07"
Long. 94°20'34"
Elev. of ground surface, 242 ft
Catahoula Fm., 0-79 ft depth
Elev. of top of Whitsett Fm., 163 ft

0-10 dark yellow-orange, fine sand
10-14 light brown (5YR 5/6), medium sand, slightly clayey
14-17 AA with quartz pebbles
17-20 grayish-orange, clean, fine sand
20-27 AA (10-14) fining downward
27-37 poor recovery--had to pull augers out with reverse rotation; light brown (5YR 5/6), medium to coarse clayey sand with one yellowish-gray clay stringer about 1/2 in. thick
37-47 clayey medium to coarse sand, marbled very pale, grayish-, and dark yellowish-orange (10YR 8/2, 10YR 7/4 and 10YR 6/6)
47-67 grayish-orange (10YR 7/4), muddy medium sand
67-71 AA with one light gray (N7) clay stringer
71-76 grayish-orange (10YR 7/4) clayey medium sand
76-79 stiff, clayey, medium to coarse sand; medium blue-gray (5B 5/1) mottled grayish-orange (10YR 7/4)
79-81 greenish-gray (5G 6/1) clay with abundant sand laminae

81-85	dark greenish-gray to greenish-black (5G 4/1 to 5G 2/1) stiff clay with minor lignite pods; sandy around the lignite
85-87	greenish-gray (5G 6/1) silty clay
87-92	dark greenish-gray (5G 4/1) fine sandy clay
92	TD

58-ZAV-TW

Lat. 31°04'25"
Long. 94°19'32"
Elev. of ground surface, 161 ft
Catahoula Fm. not present
Whitsett Fm., 0-42 ft(?) depth
Elev. of top of Manning Fm., 119 ft

0-3	light brown-gray fine sand
3-7	yellowish-gray, brittle silty clay
7-12	yellowish-gray to pale yellow-brown (10YR 6/2) stiff brittle clay, minor rusty zones (10R 4/6 and 5YR 5/6) in upper half
12-26	pale yellow-brown (10YR 6/2) with pale yellow-orange (10R 8/6) laminae, stiff brittle clay; gypsum crystals in upper half in cavities
26-28	dark yellow-brown (10YR 4/2) and olive gray (5Y 4/1) marbled, stiff clay with silt laminae
28-31	dark green-gray (5G 4/1), stiff clay
31-42	olive black clay with abundant olive gray silt laminae, upper 1/3 marbled olive black and olive gray
42-45	olive black stiff clay
45-72	dark green-gray (5GY 4/1) stiff clay with uncommon silt laminae
72	TD

59-ZAV-TW

Lat. 31°02'47"
Long. 94°19'35"
Elev. of ground surface, 165 ft
Catahoula Fm., 0-17 ft depth
Elev. of top of Whitsett Fm., 148 ft

0-4	clean medium sand (soil)
4-7	red-orange and yellow, clayey, coarse sand
7-13	AA, light brown (5YR 5/6)
13-17	light gray (N7) coarse sandy clay or clayey coarse sand
17-22	yellowish-gray, stiff, brittle clay
22-30	crumbly, semi-indurated silty clay; yellowish gray to pale yellowish brown (10YR 6/2)
30-32	light bluish-gray, dry powdery material
32-35	greenish-gray (5G 6/1), stiff brittle clay with fine sand laminae
35-37	greenish-gray, slightly darker than 32-35, and more brittle; little or no sand laminae
37	TD

60-ZAV-TW

Lat. 31°01'13"
Long. 94°22'32"
Elev. of ground surface, 115 ft
Catahoula Fm., 0-23 ft
Elev. of top of Whitsett Fm., 92 ft

0-7	pale yellow-brown (10YR 6/2) and dark yellow (10YR 6/6) fine sand
7-12	dark yellow (10YR 6/6) fine sand
12-21	light gray (N7) fine sand
21-23	light gray, fine to medium sand, with common small pebbles
23-32	greenish-gray (5G 6/1) fine sandy clay or clayey sand
31-35	(5G 6/1) silty clay
35-38	(5G 6/1) sandy clay
38-44	(5G 4/1) clayey medium sand with carbonized wood at base
44-47	(5G 6/1) crumbly silty clay
47-50	(5G 6/1) fine sandy silty clay
50-62	(5G 6/1) dry crumbly silt
62-63	no recovery
63-67	dark greenish-gray, lithified waxy clay; couldn't penetrate any farther with clay bit
70-74	rock bit--light gray (N7) indurated sandy silty material
67-70	greenish gray (5GY 6/1) at the top and clayey
74-82	(5G 6/1) silty crumbly clay, gray powdery areas
82	TD

Table 2.--Major and trace element composition of auger samples from the Graham Creek Roadless Area, Angelina and Jasper Counties, Texas

[Six-step semiquantitative spectrographic analyses made in U.S. Geological Survey laboratories; numbers in parentheses are limit of determination values; analyses by Betty Adrian and Belinda Arbogast]

Auger hole number	Depth interval (ft)	(.05) Fe%	(.02) Mg%	(.05) Ca%	(.002) Ti%	(10) Mn	(10) B	(20) Ba	(1) Be	(5) Co	(10) Cr	(5) Cu	(20) La	(5) Mo	(20) Nb	(5) Ni	(10) Pb	(5) Sc	(100) Sr	(10) V	(10) Y	(10) Zr
52-ZAV-TW	17-20	3	1.0	0.2	0.7	200	150	1000	5	10	70	20	100	L	30	15	70	15	150	100	70	300
	28-32	5	1.0	0.5	0.3	300	100	500	15	15	50	50	100	N	L	20	30	15	150	150	150	150
	44-46	3	0.7	0.5	0.5	200	150	700	5	15	50	30	100	10	L	15	70	10	200	100	70	200
	57-61	2	0.5	0.3	0.7	200	150	700	3	15	70	30	70	N	20	15	100	10	200	100	50	300
55-ZAV-TW	7-17	3	0.7	0.15	0.5	100	150	500	2	10	70	10	50	N	L	15	50	10	L	150	30	200
	29-32	3	0.7	0.3	0.5	200	200	500	5	20	70	15	100	N	L	20	70	15	150	150	50	300
	47-62	5	1.5	0.5	0.7	700	300	300	2	20	150	15	70	5	20	30	100	20	150	200	50	300
	62-75	5	1.0	0.5	0.7	300	200	300	2	15	100	20	50	N	L	30	70	20	150	200	50	200
	82-92	5	1.5	0.5	0.7	500	200	500	2	20	150	50	70	L	20	50	100	20	200	200	50	200
	92-102	5	1.0	0.5	0.7	300	200	500	2	20	100	20	70	N	20	20	70	15	200	200	50	200
	102-107	5	0.7	1.0	0.5	1000	200	1500	3	20	100	15	50	N	L	20	50	10	300	150	50	300
56-ZAV-TW	17-23	5	1.0	0.2	1.0	100	300	300	2	15	100	50	50	L	20	30	50	20	L	300	30	200
	25-29	3	0.7	0.2	0.7	100	150	500	3	20	150	20	150	N	L	30	70	15	L	200	100	300
	29-42	5	1.0	0.2	0.7	300	200	500	3	30	100	30	70	N	20	50	70	15	L	300	70	300
	42-57	5	1.5	0.5	0.7	500	150	700	2	15	100	30	70	N	20	30	70	15	150	200	50	300
	57-75	3	1.5	0.5	0.7	300	150	700	2	15	100	15	70	N	20	20	50	10	150	200	50	300
	92-102	3	1.0	0.5	0.7	300	200	500	3	15	100	20	70	L	L	20	70	10	L	200	50	300
	102-107	5	1.5	0.5	0.7	300	200	500	3	20	100	30	70	L	20	20	100	10	150	150	50	150
58-ZAV-TW	17-26	3	1.0	0.7	0.3	70	150	500	2	7	150	10	50	L	L	10	30	15	150	100	30	200
	28-31	5	1.5	0.3	0.5	300	200	500	7	20	70	30	100	N	L	20	50	10	200	100	70	200
	31-42	3	1.0	0.5	0.5	500	200	700	3	15	100	20	70	L	20	20	70	10	200	100	50	300
	42-45	3	1.0	0.5	0.5	300	200	500	3	15	70	20	50	N	L	20	70	10	200	100	30	200
	45-57	5	1.0	0.5	0.5	300	200	300	2	20	100	30	50	N	L	20	50	15	150	150	30	150
	57-72	5	1.5	0.5	0.5	300	150	500	2	15	100	30	50	N	L	20	50	15	N	150	50	150
59-ZAV-TW	17-22	2	0.5	0.07	0.7	70	100	200	1.5	5	70	5	150	N	20	5	100	20	N	150	150	200
	27-30	1	0.15	0.05	0.5	50	70	300	1	5	50	10	100	N	L	L	50	10	N	100	50	300
	30-32	1	0.3	0.07	1.0	100	100	500	1	10	70	70	100	N	20	10	100	15	N	100	70	1000
	32-35	1.5	0.5	0.1	0.5	100	100	500	1.5	10	50	30	70	N	20	7	30	10	N	100	30	200
	35-37	3	1.0	0.3	0.5	200	100	300	3	20	70	50	100	N	L	30	150	15	L	200	70	150
60-ZAV-TW	32-35	2	0.7	0.7	0.5	300	70	1000	2	7	30	15	70	N	L	5	50	7	200	100	50	500
	44-47	3	0.7	0.5	1.0	500	100	1000	1.5	10	70	20	100	N	20	7	70	10	L	100	70	500
	56-62	2	0.7	0.3	0.7	500	100	1000	2	10	50	20	70	N	L	7	70	10	150	100	50	500
	63-67	3	1.0	0.7	0.7	500	150	1000	2	10	100	20	70	N	20	5	30	10	200	150	50	1000
	74-82	2	0.5	0.3	0.5	200	150	700	2	5	30	7	50	N	L	5	50	7	150	100	20	500

Remarks: Fe, Mg, Cs, and Ti reported in percent; all other elements reported in parts per million.
Results are in the series 1, 1.5, 2, 3, 5, 7, 10, etc.
N = Not detected at limit of detection.
L = Detected, but below limit of determination.

Auger holes 61-66

Chambers Ferry Roadless Area (Houser and Ryan, 1983c)
Sabine National Forest
Sabine County
Patroon quadrangle; 1:62,500

61-PAT-TW

Lat. 31°34'13"
Long. 93°51'14"
Elev. of ground surface, 275 ft

0-4	soil
4-8	grayish-orange (10YR 7/4), very fine silty sand
8-18	finely laminated silt and clay, grading from grayish orange and yellowish gray (weathered) to olive gray (5Y 4/1) and light gray (N7)
18-26	olive gray and light gray, finely laminated silt and clay
26-27	silty lignite
27-30	laminated lignitic clay and silt
30-33	clayey lignite
33-37	lignitic, laminated silt and clay
37-56	light gray (or light olive gray, 5Y 5/1), fine sand
56-57	sandstone--refused bit at 57
57	TD

62-PAT-TW

Lat. 31°33'02"
Long. 93°49'00"
Elev. of ground surface, 230 ft

0-7	gray and orange, clean very fine sand
7-12	gray and orange, partly lithified, clayey fine sand with iron oxide(?) nodules
12-32	finely laminated dark gray clay and dark greenish-gray fine sand and silt; upper 2 ft weathered orange and dark brown
32-46	olive-black (5Y 2/1) silt
46-48	olive-black to olive-gray silt and clay; finely laminated
48-50	olive-black clay and lignite laminae
50-52	mascerated clay, lignite and sand
52-72	olive-gray (5Y 4/1) finely laminated silty clay or clayey silt
72	TD

63-PAT-TW

Lat. 31°35'26"
Long. 93°53'32"
Elev. of ground surface, 265 ft

0-7	light brown fine sand
7-20	dark yellow (10YR 6/6), slightly muddy fine to medium sand
20-23	moderate gray and brownish-gray laminated silt, sand and clay

23-25	lignite
25-27	lignitic silt and clay
27-42	olive gray (5Y 4/1) silty fine sand, laminated
42-54	AA, becoming more clayey downward; slightly lignitic
54-57	lignitic silty clay with 1 ft thick layer of lignite
57-70	olive-gray micaceous, dirty fine sand, grading downward to sandy silt; minor lignitic areas
70-72	brownish-black (5YR 2/1) silty lignitic clay
72-76	brownish-black and olive-gray laminated silt, fine sand, and clay
76-80	brownish-black clayey silt
80-87	olive-gray, micaceous, dirty fine sand
87-102	AA (72-76)
102	TD

64-PAT-TW

Lat. 31°33'15"
Long. 93°53'10"
Elev. of ground surface, 263 ft

0-7	weathered, light brown fine sand and silt
7-17	finely laminated, olive-gray clayey silt and fine silty sand
17-27	olive-black (5Y 2/1) fine to medium clayey sand with common olive-gray silt nodules
27-31	olive-black clayey silt, and moderate brown (5YR 4/4) dirty sand
31-37	moderate yellow-brown (10YR 5/4) fine sand
37-50	AA, grading from moderate brown (5YR 4/4) to dusky yellow (5Y 6/4) to medium gray (N5)
50-52	lignite
52-67	olive-gray (5Y 4/1) micaceous silty fine sand
67-82	olive-gray and dark gray sandy silt
82	TD

65-PAT-TW

Lat. 31°33'35"
Long. 93°52'11"
Elev. of ground surface, 185 ft

0-18	dark yellow (10YR 6/6) grading to yellowish-gray fine sand
18-21	moderate yellow-brown (10YR 5/4) slightly clayey fine sand
21-28	medium dark gray and greenish-black clayey, silty fine sand
28-31	AA with cemented light gray silt nodules
31-47	olive-black (5Y 2/1) massive clayey silt
47-50	brownish-black, slightly lignitic, laminated silt
50-54	olive-gray (5Y 4/1) micaceous silty sand
54-70	olive-gray and medium gray laminated silt and fine sand
70-81	olive-black, stiff clayey silt (bioturbated?) with wispy fine sand
81	sandstone(?) - refused bit - TD

66-PAT-TW

Lat. 31°34'46"
Long. 93°50'36"
Elev. of ground surface, 245 ft

0-3	gray and orange, stiff clay
3-8	very fine (5Y 7/3) clean sand
8-18	grayish-yellow to dusky yellow fine clean sand
18-21	dark yellow (10YR 6/6) fine sand; a little dirty
21-24	transition; sand (AA), with blebs of dark gray clay about 1/4 in. across
24-33	medium dark gray (N4) micaceous silt
33-47	AA with lighter gray areas; may be disrupted fine sand laminae
47-51	brown-black clayey silt
51-58	olive-gray fine sandy silt; grading downward to fine silty sand
58-73	olive-black (5Y 7/1) clayey silt with wispy, fine sandy silt lenses
73	TD

Table 3.--Major and trace element composition of auger samples from the Chambers Ferry Roadless Area, Sabine County, Texas

[Six-step semiquantitative spectrographic analyses made in U.S. Geological Survey laboratories; numbers in parentheses are limit of determination values; analyses by Betty Adrian]

Auger hole number	Depth interval (ft)	(.05) Fe%	(.02) Mg%	(.05) Ca%	(.002) Ti%	(10) Mn	(10) B	(20) Ba	(1) Be	(5) Co	(10) Cr	(5) Cu	(20) La	(5) Ni	(10) Pb	(5) Sc	(100) Sr	(10) V	(10) Y	(10) Zr
61-PAT-TW	14-18	3	1.5	0.2	0.5	300	150	700	1.5	20	100	30	50	70	50	15	150	150	30	200
	18-26	5	1.5	0.15	0.5	500	150	700	1.5	20	150	50	50	50	30	20	L	150	30	150
	27-30	2	1.0	0.15	0.7	150	200	1000	1.0	7	150	15	70	20	50	15	L	100	20	200
62-PAT-TW	12-22	3	1.0	0.15	0.3	300	150	500	1.5	30	70	20	50	30	30	15	150	100	30	300
	22-32	5	1.0	0.15	0.5	700	150	500	1.5	20	150	50	50	30	50	15	200	100	50	150
	32-42	3	1.5	0.30	0.5	1000	150	700	1.5	30	100	30	50	30	70	15	200	100	30	200
	46-48	3	1.0	0.20	0.5	500	150	500	1.5	20	100	30	50	30	50	15	200	150	30	150
	52-62	3	1.0	0.30	0.5	700	150	700	1.0	20	150	30	50	30	50	15	200	100	30	200
	62-72	3	1.0	0.20	0.5	500	150	700	1.0	15	150	30	50	30	30	15	200	100	50	150
63-PAT-TW	20-23	2	1.0	0.20	0.5	200	150	700	1.0	30	150	30	50	50	50	10	150	100	50	300
	42-54	3	1.0	0.20	0.5	700	150	700	1.0	30	150	20	50	70	50	15	150	100	30	200
	54-57	3	1.5	0.20	0.5	500	150	700	1.5	20	150	30	50	70	50	15	200	150	30	150
	76-80	3	1.5	0.30	0.5	300	150	700	1.0	20	150	30	50	50	50	15	300	150	30	100
64-PAT-TW	7-17	3	1.0	0.10	0.5	200	150	700	1.5	30	150	20	50	70	50	15	150	150	30	150
65-PAT-TW	31-43	3	1.0	0.30	0.5	500	100	700	1.0	20	150	30	50	70	30	15	200	150	30	150
	70-81	10	1.5	0.50	0.5	700	150	700	1.5	20	150	70	50	100	50	20	300	200	30	200
66-PAT-TW	33-43	5	1.5	0.20	0.5	700	150	700	1.0	20	150	30	50	50	50	15	200	150	30	100
	58-73	5	0.7	0.20	0.3	700	150	700	1.0	20	70	20	50	30	50	10	L	100	50	150

Remarks: Fe, Mg, Ca, and Ti reported in percent; all other elements reported in parts per million.
Results are in the series 1, 1.5, 2, 3, 5, 7, 10, etc.
N = Not detected at limit of detection.
L = Detected, but below limit of determination.