Detailed sections from auger holes and outcrops in the Cainhoy, Charleston, and Fort Moultrie quadrangles, South Carolina

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature

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Contents

Introduction

In the course of preparing a detailed map for the Cainhoy, Charleston, Fort Moultrie, and North Charleston quadrangles, sediments from numerous auger holes and outcrops were studied and recorded to determine their essential geologic characteristics, spatial distribution, and temporal framework. While the major geologic boundaries will be summarized on the forthcoming map, much of the more detailed information could not be summarized in such a visual manner and therefore is included in this open file report so that interested geologists, engineers, and urban planners may have access to this information. The outcrops and auger holes for the North Charleston quadrangle, along with structure contour and isopach maps for the Quaternary sediments, have been summarized previously (U. S. Geological Survey Open-File Report 85-274), so this report includes only the 87 sections described for the Cainhoy, Charleston, and Fort Moultrie quadrangles.

A few of the localities (so indicated) represent natural outcrops or ditch banks, but most represent logs made from auger holes. These auger holes were drilled with a truck-mounted, Mobile Drill B-40 power auger, using 5-foot stem sections. One stem was augered into the ground and then pulled to describe the soil profile. After this, a second run was made in which additional stems were added until either a chattering sound followed by a sudden tightening of the drill string occurred (penetration of the Ashley Formation or Marks Head Formation) or until the vacated 5 feet of the first auger run was filled by rising sediment from the newly penetrated section. In the latter case (usually 4-6 flights, depending on the density of the material being augered), the stems were pulled and described (allowing for 5 feet of total rise during drilling). In most cases the base of the Pleistocene section was penetrated by the third run; in exceptionally thick sections, the rest of the section was augered in 20 to 30 foot runs. The one exceptionally deep section (FM-3) was initially done to 60 feet by the B-40, then the hole was later deepened to over 300 feet with the U. S. Geological Survey B-50 drill.

Although section thicknesses vary considerably, from 5 feet (FM-28) to 310 feet (FM-3), most fall in the range of 35-55 feet. Most of the Quaternary and late Tertiary shallow subsurface units are thin (less than 50 feet total thickness) and poorly consolidated down to the upper Oligocene Ashley Formation of the Cooper Group (locally called the "Cooper Marl"). In contrast, the Ashley is often 100 feet or more thick and firmly compacted. It was

impractical in most instances to try to drill through the Ashley with the B-40, so most of our drill holes were filled and abandoned as soon as we penetrated this unit.

No attempt was made to describe sediments in any great detail. Grain sizes and sediment colors were estimated visually without aid of grain-size or color charts. It is possible, therefore, that units described as "clays" may include clayey silts or clayey sands. Unit names conform to those used by Weems and Lemon (1984a, 1984b), with the addition of the term "Daniel Island beds" for dense, probably lower Pleistocene clays and sands which were encountered sporadically throughout the area of these quadrangles. What we here call the Goose Creek Limestone is known in parts of this area as the "water sands". It appears to be locally important as a shallow water source east of the Cooper River. Additionally, it should be noted that the Marks Head Formation is an important unit in this area, being much thicker and more widespread in these quadrangles than it is in the areas mapped by Weems and Lemon (1984a, 1984b). The Marks Head is macroscopically quite similar to the Ashley Formation, but it can generally be distinguished because it is browner, more clay-rich, and it contains small, mica-like flakes which are absent in the Ashley. Conversely, the Ashley is much more calcareous (effervesces readily in hydrochloric acid), grainy, and yellower in color than the Marks Head. For engineering purposes, the two units are probably very similar in their degree of compaction and bearing strength.

References cited

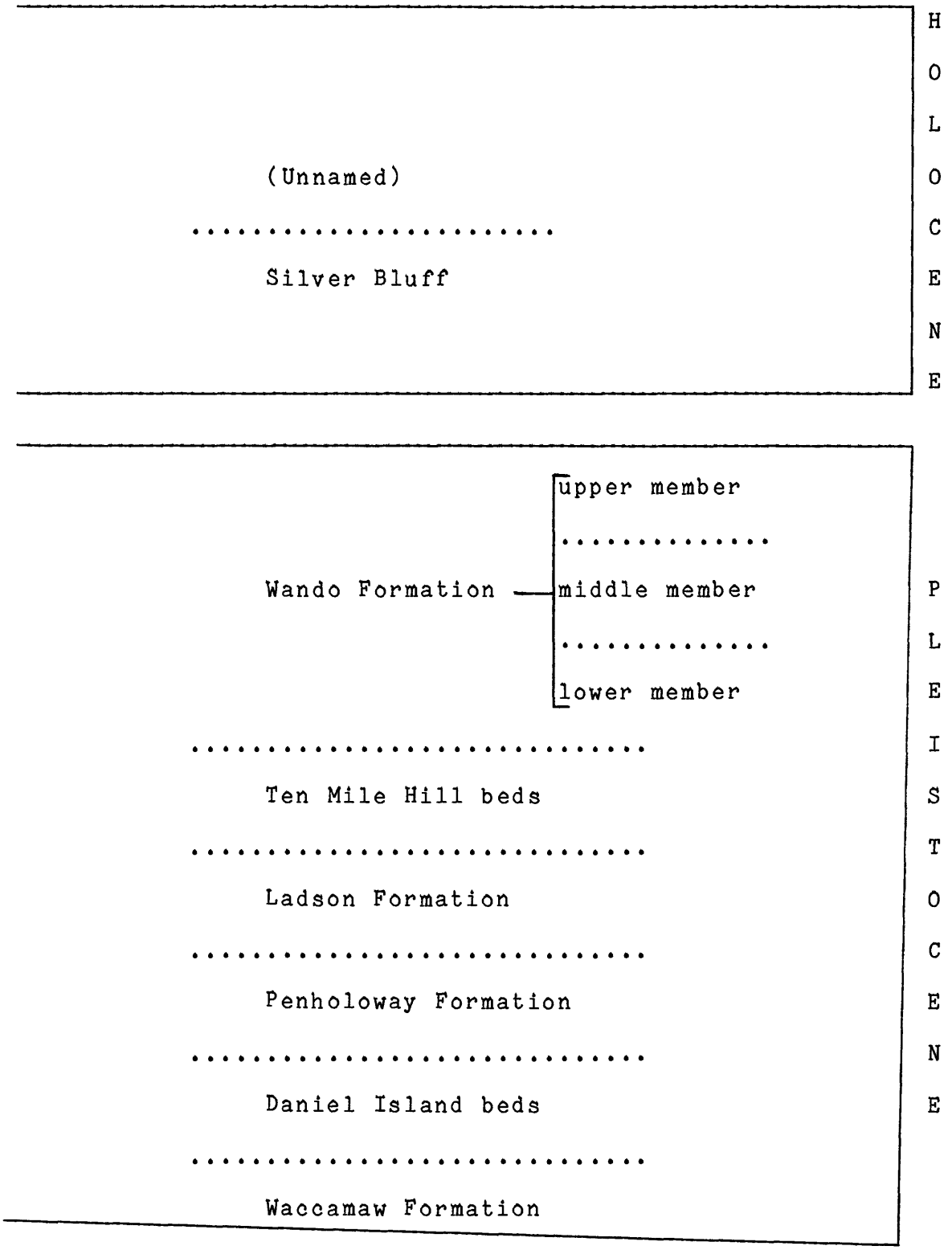
Weems, Robert E., and Lemon, E. M., Jr., 1984a, Geologic map of the Mount Holly quadrangle, Berkeley and Charleston Counties, South Carolina: U. S. Geological Survey Geologic Quadrangle Map GQ-1579, scale 1:24,000.

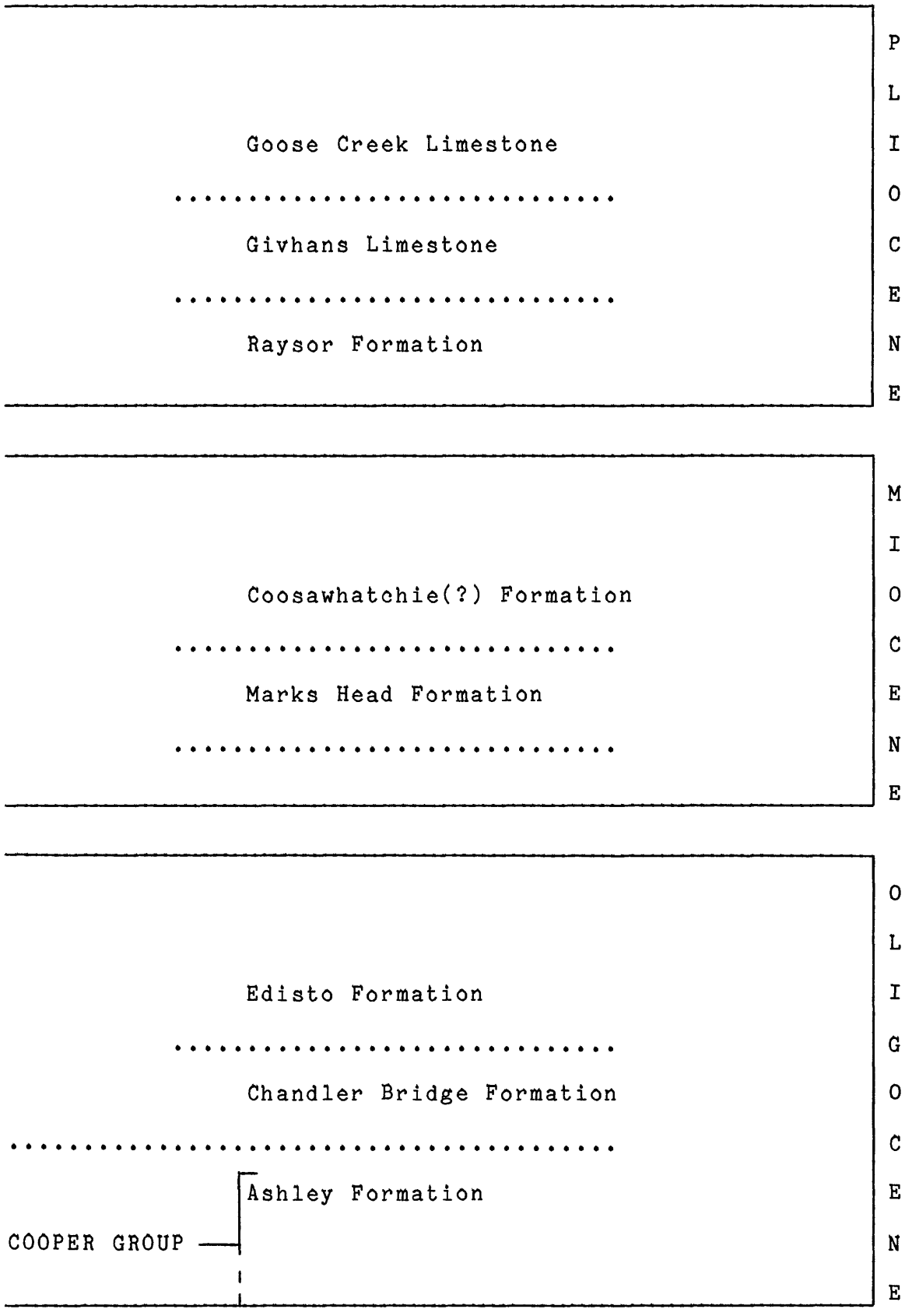
_____, 1984b, Geologic map of the Stallsville quadrangle, Dorchester and Charleston Counties, South Carolina: U. S. Geological Survey, Geologic Quadrangle Map GQ-1581, scale 1:24,000.

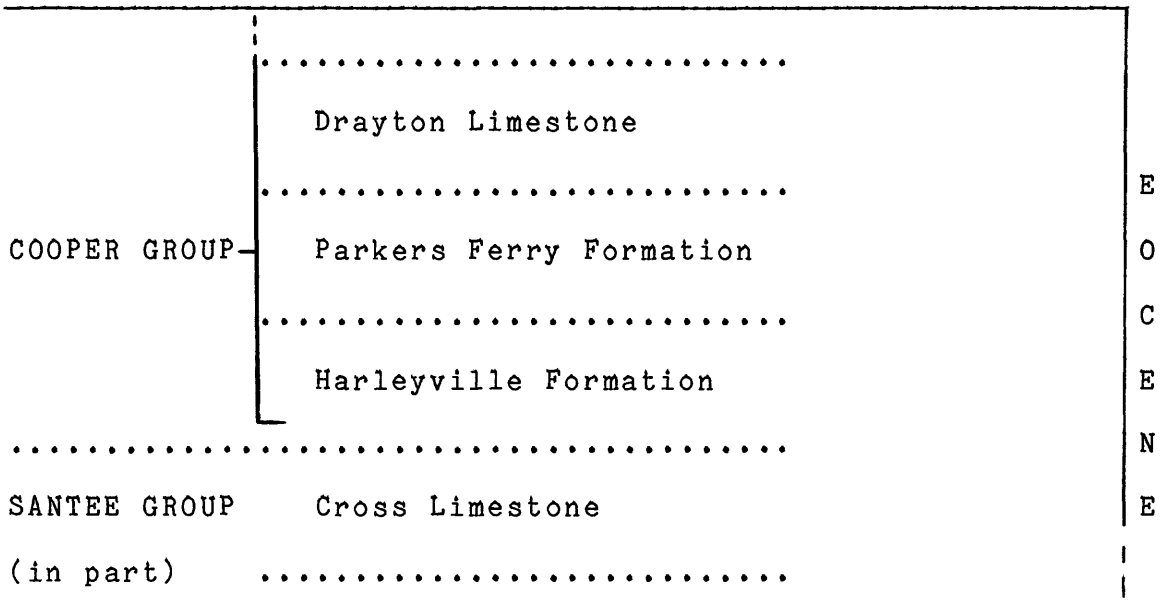
Weems, R. E., Lemon, E. M., Jr., and McCartan, Lucy, 1985, Shallow subsurface geology of the North Charleston 7.5-minute quadrangle, South Carolina: U. S. Geological Survey Open-File Report 85-274, p. 1-62.

Ages and Sequence of Regionally Recognized Geologic Units

(in any given section, many units will be missing due to erosion)




Goose Creek Limestone
Givhans Limestone
Raysor Formation
PLIOCENE
Coosawhatchie(?) Formation
Marks Head Formation
MIOCENE
Edisto Formation
Chandler Bridge Formation
Ashley Formation
COOPER GROUP
OLIGOCENE


Drayton Limestone
COOPER GROUP
Parkers Ferry Formation
Harleyville Formation
SANTEE GROUP
(in part)
Cross Limestone
E
O
C
E
N
E

CAINHOY QUADRANGLE
(depths in feet)

CA-1: 1.25 mi. E of west quad. (quadrangle) border, 1.6 mi. S of north quad. border. Surface elevation 35 feet.

TEN MILE HILL BEDS	0-7	Clay, medium-gray and medium-orange mottled, sandy, grading down to sand, fine- grained, clayey, plinthite lumps near base
	7-17	Clay, medium-gray and medium-orange, well sorted, numerous fine- grained heavies, grades to dark-orange in basal 6 inches
	17-24	Clay, medium-bluish-gray, massive, micaceous, soft, slightly sticky
	24-28	Sand, medium- grained, medium-gray, well sorted, sand-size phosphate and sparse shell fragments present
GOOSE CREEK LS	28-43	Calcarenite, medium- grained, pale-yellowish-brown phosphate pebble bed at base
ASHLEY FM	43-55	Calcarenite, fine- grained, large forams present, burrowed in upper foot and burrows filled with pale-yellowish-brown calcarenite from above

Base of Ten Mile Hill beds: +7 feet above sea level
Base of Goose Creek Limestone: -8 feet below sea level
Bottomed in Ashley Formation

CA-2: 0.65 mile W of east quad. border, 0.1 mile S of north quad. border. Surface elevation 50 feet.

TEN MILE HILL BEDS	0-23	Sand, fine- grained, well sorted, medium-orange grading through medium-gray to dark-brown and humic by 15 feet
	23-35	Sand, fine- grained, silty, medium- gray, micaceous, contains stringers of medium-gray clay
	35-43	Sand, fine-grading to medium- grained, oyster shell hash at base
	43-51	Clay, medium-gray, micaceous, contains oyster and wood fragments
PENHOLOWAY FM (?)	51-62	Sand, medium- grained, shelly (oyster, snail, coral, etc.), phosphate pebbles at base; coral yielded alloisoleucine/isoleucine ratio of 0.87
DANIEL ISLAND BEDS	62-65	Clay, dark-gray, stiff, shelly
	65-66	Sand, medium- grained, well sorted, woody
	66-85	Clay, medium-gray, sticky, dense but still slightly greasy, very woody, dark-gray below 77 feet
	85-95	Sand, medium- grained, dark-gray, sparsely shelly, contains sand-size phosphate, phosphate lumps in basal foot. Probably near base of unit

Base of Ten Mile Hill beds: -1 foot below sea level
Base of Penholoway(?) Formation: -12 feet below sea level
Bottomed in Daniel Island beds

CA-3: 2.25 mi. E of west quad. border, 3.4 mi. N of south quad. border. Surface elevation 5 feet (outcrop).

SILVER BLUFF	0-5	Clay, sandy, rich in organic matter, soft
WANDO FM (LOWER MEM)	5-7	Sand, fine- grained, pale-yellow, well sorted
	7-8	Sand, fine- grained, very shelly with coral, sand dollars, and *Anadara brasiliana* present. Coral dated at 139±10 thousand years

Base of Silver Bluff (Holocene): ±0 feet at sea level
Bottomed in Wando Formation, lower member

CA-4: 0.45 mi. W of east quad. border, 3.1 mi. S of north quad. border. Surface elevation 6 feet.

SILVER BLUFF	0-8	Clay, medium-orange and medium-gray mottled, stiff, phosphate pebbles in basal foot
GOOSE CREEK LS	at 8	Calcarenite, medium- grained, pale-brown, very phosphatic, thin shell fragments, about 1 inch thick
ASHLEY FM	8-35	Calcarenite, fine- grained, olive-brown, large forams present

Base of Silver Bluff (Holocene): -2 feet below sea level
Base of Goose Creek Limestone: -2 feet below sea level
Bottomed in Ashley Formation

CA-5: 1.95 mi. W of east quad. border, 2.3 mi. S of north quad. border. Surface elevation 33 feet.

WANDO FM (LOWER MEM)	0-19	Sand, fine- grained, numerous fine- grained heavies, well sorted, pale-orange (0-1) grading through pale-gray (1-4) and medium-gray (4-16) to humic dark-brown (16-19)
	19-20	Sand, fine- grained, medium-gray, silty, very micaceous, grading down to
	20-25	Clay, medium-gray, soft, shell hash and coarse quartz grains at base
	25-31	Shell hash, sandy to silty, phosphate pebbles near base
	at 31	Peat, dark-brown
DANIEL ISLAND BEDS	31-93	Clay, medium-bluish-gray, stiff, roots in upper 2 feet, dark-brown woody zones at 42-44 feet, 68 feet, 72 feet, and 91-93 feet, shelly zones at 61-63 feet, 70 feet, and 75-91 feet, phosphate pebbles at base
ASHLEY FM	93-100	Calcarenite, pale-gray (calcite-enriched zone) grading quickly to medium-yellowish-brown, abundant large forams

Base of Wando Formation (Lower Member): +2 feet above see level
Base of Daniel Island beds: ..... -60 feet below sea level
Bottomed in Ashley Formation

CA-6: 3.55 mi. E of west quad. border, 2.7 mi S of north quad. border. Surface elevation 51 feet.

TEN MILE HILL BEDS	0-32	Sand, fine- grained, medium-orange (0-3) grading through light-gray (3-16) and medium-gray (16-30) then back to medium-orange (30-32), well sorted, numerous fine-grained heavies, thrixotropic, occasional angular 2 mm feldspar grains and medium-grained between 16 and 23 feet.
	32-34	Clay, medium-gray grading to medium-blue, sticky
	34-48	Sand, fine- grained, medium-gray, well sorted, sparse shell fragments near base, basal phosphate pebble bed
GOOSE CREEK LS	48-60	Calcarenite, medium-grained, pale-yellowish-brown, Argopecten eboreus and Amusium mortoni present, phosphate pebble bed at base
ASHLEY FM	60-65	Calcarenite, fine- grained, olive-brown, contains large forams

Base of Ten Mile Hill beds: +3 feet above sea level
Base of Goose Creek Limestone: -9 feet below sea level
Bottomed in Ashley Formation

CA-7: 3.6 mi. W of east quad. border, 0.1 mi. S of north quad. border. Surface elevation 41 feet.

TEN MILE HILL BEDS	0-27	Sand, fine- grained, medium-orange (0-2) grading through light-gray (2-22) then back to medium-orange (22-27), well sorted, numerous fine- grained heavies
	27-28	Clay, medium-blue, micaceous, sticky
	28-37	Sand, fine- grained, medium-gray, very silty grading down to medium- grained and dark-gray, thin bed of medium-blue clay at base
GOOSE CREEK LS	37-56	Calcarenite, medium- grained, pale-yellowish-brown, phosphate pebble bed at base
ASHLEY FM	56-65	Calcarenite, fine- grained, olive-brown, contains large forams

Base of Ten Mile Hill beds: +4 feet above sea level
Base of Goose Creek Limestone: -15 feet below sea level
Bottomed in Ashley Formation

CA-8: 3.3 mi. E of west quad. border, 4.2 mi. S of north quad. border. Surface elevation 18 feet.

WANDO FM (LOWER MEM)	0-7	Sand, fine- to coarse-grained, humic dark-brown (0-2) grading to light-gray and medium-orange mottled (2-7), some feldspar present
	7-8	Clay, dark-gray, greasy, micaceous
	8-15	Sand, fine- grained, dark-gray, silty, very shelly (mostly Mulinia), shells very fresh and glossy
	15-16	Clay, light-gray, contains medium and coarse sand grains and phosphate pebbles
GOOSE CREEK LS	16-23	Calcarenite, medium- grained, pale-yellowish-brown, contains calcite-cemented lumps, phosphate pebble bed at base
ASHLEY FM	23-25	Calcarenite, fine-grained, olive-brown, abundant large forams present

Base of Wando Formation (lower member): +2 feet above sea level
Base of Goose Creek Limestone: -5 feet below sea level
Bottomed in Ashley Formation

CA-9: 2.75 mi. E of west quad. border, 3.1 mi. N of south quad. border. Surface elevation 6 feet.

SILVER BLUFF	0-11	Clay, medium-gray mottled medium-orange, sandy from 0-3 and from 5-11, root fragments in basal foot
WANDO FM (LOWER MEM)	11-14	Sand, fine- grained, yellowish-brown, many Mulinia, oysters and others present
	14-15	Clay, sandy, medium-bluish-gray, some shells, phosphate lumps, and discoidal quartz pebbles present
ASHLEY FM	15-27	Calcarenite, fine- grained, pale-brown (15-26) grading to olive-brown (26-27), phosphatic, sparse shells, large forams present
	27-34	Calcilutite, dark-olive-brown, silty, forams abundant
	34-35	Calcarenite, fine-grained, olive-brown

Base of Silver Bluff (Holocene): -5 feet below sea level
Base of Wando Formation (lower member): -9 feet below sea level
Bottomed in Ashley Formation

CA-10: 2.95 mi. W of east quad. border, 3.65 mi. S of north quad. border. Surface elevation 15 feet.

FILL	0-2	Road material
WANDO FM (UPPER MEM)	2-5	Clay, dark-gray with medium-orange mottles, calcareous nodules and roots present
	5-9	Clay, medium-orange, medium-brown, and medium-gray mottled, sandy, 3 inch layer of oyster shell hash at base
	9-11	Clay, dark gray, contains oyster fragments and sparse phosphate pebbles at base
GOOSE CREEK LS	11-18	Calcarenite, medium-grained, pale-yellowish-brown, contains calcite-cememted lumps, phosphate pebble bed at base
ASHLEY FM	18-25	Calcarenite, fine-grained, olive-brown, abundant sand-sized phosphate and large forams

Base of Wando Formation (upper member): +4 feet above sea level
Base of Goose Creek Limestone: -3 feet below sea level
Bottomed in Ashley Formation

CA-11: 2.75 mi. W of east quad. border, 4.35 mi. S of north quad. border. Surface elevation 8 feet.

FILL	0-2	Road material
SILVER BLUFF	2-8	Clay, medium-gray and pale-orange mottled, stiff, sticky
	8-12	Sand, fine-grained, light-gray, well sorted, grading down to sandy clay with phosphate pebbles at base
GOOSE CREEK LS	at 12	Calcarenite, medium-grained, pale-yellowish-brown, about 1 inch thick and in burrows in underlying unit
ASHLEY FM	12-25	Calcarenite, fine-grained, light-brown, abundant sand-size phosphate

Base of Silver Bluff (Holocene): -4 feet below sea level
Base of Goose Creek Limestone: -4 feet below sea level
Bottomed in Ashley Formation

CA-12: 0.75 mi. W of east quad. border, 1.45 mi. S of north quad. border. Surface elevation 25 feet.

WANDO FM (LOWER MEM)	0-11	Sand, fine-grained, pale-orange (0-3) grading to light-gray (3-11), well sorted, micaceous, contains numerous fine-grained heavies
	11-15	Clay, dark-gray, micaceous, greasy, sticky
	15-27	Sand, fine-grained, dark-gray, contains medium- to coarse-grained shell hash, sand-size phosphate, shells (mostly oyster, Mulinia, Anadara brasiliana, snails), basal four feet full of phosphate pebbles up to 6 cm in diameter
ASHLEY FM	27-30	Calcarenite, fine-grained, olive-brown, abundant large forams

Base of Wando Formation (lower member): -2 feet below sea level
Bottomed in Ashley Formation

CA-13: 2.4 mi. W of east quad. border, 0.45 mi. S of north quad. border. Surface elevation 35 feet.

TEN MILE HILL BEDS	0-6	Sand, fine-grained, medium-orange, sparsely mottled light-gray grading down to light-gray, clayey to silty, stiff, dense
	6-26	Sand, fine-grained, brownish-gray, abundant mica flakes up to 1 mm in diameter, basal four feet contains reworked Goose Creek shells and rolled oyster fragments, coarse-grained quartz sand at basal contact
GOOSE CREEK LS	26-42	Calcarenite, medium-grained, pale-brown, abundant sand-size phosphate, calcite-cemented lumps, Amusium mortoni abundant, phosphate pebble bed at base
ASHLEY FM	42-45	Calcarenite, fine-grained, olive-brown, abundant large forams

Base of Ten Mile Hill beds: +9 feet above sea level
Base of Goose Creek Limestone: -7 feet below sea level
Bottomed in Ashley Formation

CA-14: 2.7 mi. W of east quad. border, 1.4 mi. S of north quad. border. Surface elevation 45 feet.

TEN MILE HILL BEDS	0-22	Sand, fine- to medium-grained, pale-orange (0-1) grading through dark-gray (1-4) and light-gray (4-6) to light-grayish-white, well sorted, abundant very fine grained heavies
	22-25	Clay and sand, fine-grained, interbedded, medium-brown mottled medium-orange and medium-gray
	25-37	Sand, fine-grained, light-gray grading down through medium-gray to medium-bluish-gray below 29, well sorted, micaceous
	37-40	Clay, dark-gray, phosphate lumps at base
GOOSE CREEK LS	40-56	Calcarenite, medium-grained, pale-yellowish-brown numerous calcite-cemented lumps present, abundant sand-size phosphate, phosphate pebbles at base
ASHLEY FM	56-60	Calcarenite, fine-grained, pale-olive-brown grading down to olive-brown, large forams and sand-size phosphate abundant

Base of Ten Mile Hill beds: +5 feet above sea level
Base of Goose Creek Limestone: -11 feet below sea level
Bottomed in Ashley Formation

CA-15: 0.65 mi. W of east quad. border, 1.8 mi. N of south quad. border. Surface elevation 8 feet.

WANDO FM (UPPER MEM)	0-5	Clay, medium-orange grading to medium-gray sparsely mottled medium-orange, silty, sandy
(MIDDLE MEM)	5-13	Sand, fine-grained, medium-gray grading to dark-gray, silty, micaceous, fine-grained heavies abundant
	13-26	Clay, dark-bluish-gray, greasy, shelly in basal 5 feet (Anadara, Noetia oyster), phosphate pebbles in basal foot
MARKS HEAD FM	26-42	Sand, fine-grained, olive-green grading down to dark-brown, dense, abundant sand-size phosphate, slightly clayey, shell fragments on basal contact
ASHLEY FM	42-50	Calcarenite, fine-grained, olive-brown, abundant large forams

Base of Wando Formation (upper member): +3 feet above sea level
Base of Wando Formation (middle member): -18 feet below sea level
Base of Marks Head Formation: -34 feet below sea level
Bottomed in Ashley Formation

CA-16: 0.9 mi. W of east quad. border, 0.25 mi. N of south quad. border. Surface elevation 25 feet.

WANDO FM (UPPER MEM)	0-8	Sand, fine-grained, medium-orange (0-2.5) grading through pale-brown (2.5-4) to medium-gray (4-8), well sorted, micaceous, numerous fine-grained heavies
	8-10	Clay, light-gray with faint medium-orange mottles in upper foot, micaceous, moderately dense
(MIDDLE MEM)	10-25	Sand, very-fine-grained, light-gray grading to medium-gray by 15 feet, silty, micaceous, very fine-grained heavies present, shelly below 15 feet
	25-35	Clay, medium-gray, micaceous, sticky
(LOWER MEM?)	35-43	Shell hash, contains shells (Anadara ovalis, oyster, diverse gastropods) and phosphate pebbles
GOOSE CREEK LS	43-46	Calcarenite, medium-grained, pale-yellowish-brown, phosphate lumps and quartz pebbles at base
MARKS HEAD FM	46-50	Clay, dark-olive-green, cheese-like texture, phosphate lumps present

Base of Wando Formation (upper member): +15 feet above sea level
Base of Wando Formation (middle member): -10 feet below sea level
Base of Wando Formation (lower member?): -18 feet below sea level
Base of Goose Creek Limestone: -21 feet below sea level
Bottomed in Marks Head Formation

CA-17: 0.1 mi. W of east quad. border, 3.3 mi. N of south quad. border. Surface elevation 6 feet

SILVER BLUFF	0-6	Sand, fine-grained, bright medium-orange and medium-gray mottled (0-4.5) grading to light-gray (4.5-6), silty
	6-12	Sand, fine-grained, medium-gray, silty, micaceous
	12-17	Clay, medium-gray, greasy, contains green lumps and wood
WANDO FM? (LOWER MEM?)	17-18	Shell hash, shells rather soft, glauconitic and phosphatic, contact with above sharp
GOOSE CREEK LS	18-26	Calcarenite medium-grained, pale-yellowish-brown, phosphate lumps and quartz discoids in burrows at base
MARKS HEAD FM	26-30	Sand, fine-grained, dark-brown, dense

Base of Silver Bluff (Holocene): -11 feet below sea level
Base of Wando(?) Formation (lower member?): -12 feet below sea level
Base of Goose Creek Limestone: -20 feet below sea level
Bottomed in Marks Head Formation

CA-18: 1.0 mi. E of west quad. border, 3.65 mi. N of south quad. border. Surface elevation 33 feet.

WANDO FM (LOWER MEM)	0-22	Sand, fine-grained, pale-orange grading through medium-orange to medium-gray by 6 feet, humic dark-brown below that, well sorted, many fine-grained heavies, shelly below 10 feet (including Mulina, Anadora ovalis, A. brasiliana), grades to
	22-26	Clay, medium-gray, silty, shelly, grades to
	26-30	Sand, fine-grained, medium-gray, silty, sand-size phosphate present, shelly, sparse phosphate pebbles at base
GOOSE CREEK LS	30-33	Calcarenite, medium-grained, pale-yellowish-brown, phosphate pebble bed at base
ASHLEY FM	33-45	Calcarenite, fine-grained, olive-brown, sand-size phosphate and large forams abundant

Base of Wando Formation (lower member): +3 feet above sea level
Base of Goose Creek Limestone: ±0 feet at sea level
Bottomed in Ashley Formation

CA-19 0.4 mi. E of west quad. border, 2.2 mi. N of south quad. border. Surface elevation 8 feet.

SILVER BLUFF	0-8	Clay, light-gray and medium-orange mottled grading through medium-yellow mottled medium-orange and light-gray to light-gray by 5 feet, sandy
WANDO FM (LOWER MEM)	8-10	Clay, light-brown, very shelly, sharp contact above and below
	10-14	Clay, dark-gray, stiff, woody, phosphate pebbles at base
TEN MILE HILL BEDS(?)	14-16	Sand, fine-grained, dark-gray, abundant sand-size phosphate and sparse phosphate pebbles
ASHLEY FM	16-20	Calcarenite, fine-grained, pale-brown grading rapidly to dark-greenish-brown, clayey

Base of Silver Bluff (Holocene): ±0 feet at sea level
Base of Wando Formation (lower member): -6 feet below sea level
Base of Ten Mile Hill beds(?): -8 feet below sea level
Bottomed in Ashley Formation

CA-20: 2.0 mi. W of east quad. border, 1.1 mi. S of north quad. border. Surface elevation about 44 feet.

HOLOCENE	0-5	Peat, dark-brown (basal foot dated 6260±200 years, USGS Radiocarbon Lab Number 5282)
TEN MILE HILL BEDS	5-6	Sand, fine-grained, light-gray, well sorted

Base of Holocene: +39 feet above sea level
Bottomed in Ten Mile Hill beds

CA-21: 2.3 mi. E of west quad. border, 3.95 mi. N of south quad. border. Surface elevation about 16 feet.

WANDO FM (UPPER MEM)	0-6	Sand, fine-grained with a bimodal minor coarse-grained fraction, medium-orange (0-2) grading through light-orange (2-4) and back to medium-orange (4-6), well-sorted, micaceous
	6-10	Clay, bright-medium-orange, silty and sandy, micaceous grades down abruptly to:
	10-11	Clay, dark-bluish-gray, silty and sandy, sparsely shelly, sharp basal contact
(LOWER MEM)	11-17	Sand, fine-grained, medium-olive-gray grading to light-bluish-gray, silty, shelly, micaceous
	17-20	Clay, medium-bluish-gray, silty, interbedded with laminae of very fine grained sand
TEN MILE HILL BEDS	20-33	Sand, fine-grained, dark-gray, well sorted, sparsely shelly, very fine grained heavies present, black (1-2 cm diameter) phosphate pebbles at base
ASHLEY FM	33-45	Calcarenite, very fine grained, dark-brown and clayey, grading down to medium-olive-brown and grainy, large forams present

Base of Wando Formation (upper member): +5 feet above sea level
Base of Wando Formation (lower member): -4 feet below sea level
Base of Ten Mile Hill beds: -17 feet below sea level
Bottomed in Ashley Formation

CA-22: 3.3 mi. W of east quad. border, 0.8 mi. N of south quad. border. Surface elevation 13 feet.

WANDO FM (UPPER MEM)	0-5	Sand, fine-grained, bright-medium-orange and light-gray streaked, well sorted, silty, clayey from 1 to 4 feet
	5-9	Sand, fine-grained, light-olive-gray, well sorted, silty, micaceous
	9-17	Sand, fine-grained, medium-bluish-gray, silty, some intervals clayey, micaceous, moderately shelly (mostly Mulinia)
	17-18	Clay, medium-bluish-purple
	18-19	Peat, brownish-black
	19-20	Clay, medium-greenish-bluish-gray, dense
(LOWER MEM)	20-28	Sand, fine- grading down to medium-grained, light-bluish-gray, very shelly (Busycon, Olivella, Dinocardium, Noetia, Mulinia, and many others, also bryozoan colonies), no basal phosphate bed
MARKS HEAD FM	28-42	Sand, fine-grained, medium-olive-brown, phosphatic and calcareous but mostly quartzose, contains scattered oyster fragments; oyster fragments, phosphate pebbles (2 cm diameter) and phosphate sand concentrated in basal 6 inches
ASHLEY FM	42-45	Calcarenite, very fine grained, medium-yellowish-brown dense, clayey, large forams abundant

Base of Wando Formation (upper member): -7 feet below sea level
Base of Wando Formation (lower member): -15 feet below sea level
Base of Marks Head Formation: -29 feet below sea level
Bottomed in Ashley Formation

CA-23: 2.05 mi. E of west quad. border, 2.7 mi. S of north quad. border. Surface elevation 43 feet.

TEN MILE HILL BEDS	0-8	Sand, fine-grained, medium-yellowish-brown (0-1), grading through medium-chocolate-brown (1-3) to light-brown, well sorted, contains muscovite flakes up to 2 mm in diameter
	8-9	Clay, light-gray, fine-grained, sandy
	9-21	Sand, fine-grained to very fine grained grading down to dominantly fine-grained, very-light-gray, well sorted, thrixotropic, large muscovite flakes (2-3 mm diameter) and very fine grained heavies abundant
	21-22	Sand, as above but gold in color
	at 22	Clay, gold at top grading rapidly down to dark-gray, about 2 cm total thickness
	22-27	Sand, fine-grained, medium-yellowish-brown, well sorted
	at 27	Clay, medium-gray, about 2 cm total thickness
	27-49	Sand, fine-grained, medium-gray, silty, 1 mm muscovite flakes and very fine grained heavies abundant, sparse shell fragments present below 34 feet; some Goose Creek Limestone reworked into basal 4 feet
GOOSE CREEK LS	49-50	Calcarenite, medium-grained, medium-gray, oyster fragments recognizable

Base of Ten Mile Hill beds: -6 feet below sea level
Bottomed in Goose Creek Limestone

CA-24: 2.85 mi. E of west quad. border, 1.75 mi. S of north quad. border. Surface elevation 33 feet.

TEN MILE HILL BEDS	0-5	Sand, fine-grained, bright-medium-orange with light-gray mottles below 2 feet and medium-red mottles below 4 feet, very clayey, micaceous, stiff
	5-10	Sand, fine-grained, medium-yellow, silty, contains 2 mm muscovite flakes, thixotropic
	10-11	Clay, dark-gray
	11-28	Sand, fine-grained, medium-gray, silty, dark very fine grained heavies present, muscovitic with flakes about 1 mm at top and 1-2 mm toward the bottom, shell fragments present and less silty below 25 feet, grades to medium-grained in basal foot and muscovite flakes coarsen to 3 mm diameter
GOOSE CREEK LS	28-35	Calcarenite, fine-grained, light-bluish-gray, clayey, tough drilling, Pecten eboreus, barnacle plates and large echinoid spines (about 4-5 mm diameter) present, 0.5 cm phosphate pebbles scattered throughout

Base of Ten Mile Hill beds: +5 feet above sea level
Bottomed in Goose Creek Limestone

CHARLESTON QUADRANGLE
(depths in feet)

CH-1: 0.15 mi. E of west quad. border, 1.43 mi. N of south quad. border. Surface elevation 9 feet.

WANDO FM (UPPER MEM)	0 -10	Sand, fine-grained, medium-yellow (0-5) grading down to dark-gray, micaceous
	10-20	As above but shelly (Anadara brasiliana, etc.)
	20-24	As above but slightly clayey
	24-28	As above but oysters and many small phosphate lumps appear
ASHLEY FM	28-40	Calcarenite, fine-grained, olive-brown, dense, quartz and phosphate and foram sand present, calcareous lumps, a few shell fragments.

Base of Wando Formation: -19 feet below sea level
Bottomed in Ashley Formation

CH-2: 3.21 mi. E of west quad. border, 2.21 mi. N of south quad. border. Surface elevation 7 feet.

FILL	0-32	Soft, fulsome, sticky material enclosing wood, brick, plaster, nails and oyster shells
MID-WISCONSINAN?	32-70	Clay, medium-blue, stiff and plastic, small shells with coloring still evident. Sparse basal phosphate bed
ASHLEY FM	70-85	Calcarenite, fine-grained, olive-brown, dense, quartz and phosphate and foram sand grains present.

Base of mid-Wisconsinan(?): -63 feet below sea level
Bottomed in Ashley Formation

CH-3: 0.68 mi. S of north quad. border, 3.22 mi. W of east quad. border. Surface elevation 10 feet.

WANDO FM (UPPER MEM)	0-6	Sand, fine-grained, medium-red, well sorted, micaceous
	6-7	Clay, medium-gray
	7-14	Sand, mostly fine-grained, medium-gray, poorly sorted, clayey, sparsely pebbly, reddish angular sand at base, shelly in basal 3 feet
(LOWER MEM)	14-18	Sand, fine-grained, medium-gray, loose, fine heavies sprinkled throughout, numerous shells from 15-18 feet, quartz and phosphate pebbles at base
GOOSE CREEK LS	18-19	Calcarenite, fine-grained, light-bluish-gray, sand-size phosphate abundant
ASHLEY FM	19-20	Calcarenite, fine-grained, olive-brown, dense, scattered quartz and phosphate sand

Base of Wando Formation (upper member): -9 feet below sea level
Base of Wando Formation (lower member): -13 feet below sea level
Base of Goose Creek Limestone: -14 feet below sea level
Bottomed in Ashley Formation

CH-4: 1.16 mi. W of east quad. border, 3.45 mi. N of south quad. border. Surface elevation 9 feet.

WANDO FM (UPPER MEM)	0-2	Sand, fine-grained, medium-orange, well sorted
	2-26	Sand, fine-grained, light-gray, well sorted, micaceous, very fine grained heavies abundant; basal foot dark-gray and humic
DANIEL ISLAND BEDS	26-47	Clay, dark-bluish-gray, and fine-grained sand interbedded, shelly, no phosphate bed at base
ASHLEY FM	47-55	Calcarenite, fine-grained, olive-brown, dense, quartz and phosphate sand grains present

Base of Wando Formation (upper member): -17 feet below sea level
Base of Daniel Island beds: -38 feet below sea level
Bottomed in Ashley Formation

CH-5: 0.52 mi. W of east quad. border, 2.60 mi. N of south quad. border. Surface elevation 5 feet.

FILL	0-7	Sand, fine-grained, pale-gray, shelly, root zone at base
WANDO FM (MIDDLE MEM)	7-11	Sand, fine-grained, dark-gray and humic at top grading down to medium-orange and then to medium-gray, sand well sorted and micaceous
	11-24	Sand, fine-grained, medium-gray, silty at top, numerous very fine grained heavies present
	24-25	Sand, fine-grained, medium-blue, silty, micaceous and clay, medium-blue, silty
	25-28	As above but extremely shelly
MARKS HEAD FM	38-54	Sand, fine-grained, dark-chocolate-brown, dense, very phosphatic but not calcareous
ASHLEY FM	54-55	Calcarenite, fine-grained, olive-brown, contains large forams

Base of Wando Formation (middle member): -33 feet below sea level
Base of Marks Head Formation: -49 feet below sea level
Bottomed in Ashley Formation

CH-6: 0.9 mi. E of west quad. order, 3.9 mi. S of north quad. border. Surface elevation 15 feet.

WANDO FM (UPPER MEM)	0-2	Sand, fine-grained, medium-orange, well sorted, well packed, some mica, slightly clayey
	2-6	As above, but not clayey
	6-15	Sand, fine-grained, pale-yellow, many very fine grained heavies present, looser than above
	15-16	As above but with medium-gray clay stringers
	16-17	Sand with clay stringers as above, but dark-bluish-gray
	17-20	Sand, fine-grained, dark-blue, rich in very fine grained heavies
	20-26	Sand, fine-grained, medium-gray, shelly, a few clay stringers present
	26-28	Clay, dark-gray, shelly, a few sandy lenses present
ASHLEY FM	28-50	Calcarenite, fine-grained, olive-brown, dense, scattered quartz and phosphate sand present

Base of Wando Formation (upper member): -13 feet below sea level
Bottomed in Ashley Formation

CH-7: 1.56 mi. E of west quad. border, 2.48 mi. N of south quad. border. Surface elevation 5 feet.

SILVER BLUFF	0-6	Sand, fine-grained, light-brown, with many very fine grained heavies, a few coarse grains present at base
	6-13	Clay, medium-gray, stiff
WANDO FM (UPPER MEM)	13-18	Sand, fine-grained, light-brown, clayey, contains scattered clay lenses
	18-30	As above but shelly, phosphate pebble bed at base
ASHLEY FM	30-40	Calcarenite, fine-grained, olive-brown, dense, quartz and phosphate sand present

Base of Silver Bluff (Holocene): -8 feet below sea level
Base of Wando Formation: -25 feet below sea level
Bottomed in Ashley Formation

CH-8: 0.7 mi. W of east quad. border, 0.4 mi. N of south quad. border. Surface elevation 8 feet.

WANDO FM (UPPER MEM)	0-6	Sand, fine-grained, light-brown, a scattering of very fine grained heavies present
	6-12	As above but grading to medium-gray
	12-16	Clay, medium-blue, very stiff, oysters and wood fragments present
(MIDDLE MEM)	16-20	Sand, fine-grained, medium-blue, clayey, loose, shelly
	20-22	Clay, medium-blue
	22-35	Shell hash, medium-blue, clayey fine-grained quartz sand matrix
GOOSE CREEK LS	35-37	Calcarenite, medium-grained, pale-yellowish-brown, loose, very phosphatic, phosphate pebble bed at base and burrows filled with this calcarenite extend into upper 6 inches of unit below
ASHLEY FM	37-45	Calcarenite, fine-grained, olive-brown, dense, scattered quartz and phosphate sand

Base of Wando Formation (upper member): -8 feet below sea level
Base of Wando Formation (middle member): -27 feet below sea level
Base of Goose Creek Limestone: -29 feet below sea level
Bottomed in Ashley Formation

CH-9: 3.05 mi. E of west quad. border, 2.82 mi. S of north quad. border. Surface elevation 15 feet.

WANDO FM (UPPER MEM)	0-5	Sand, medium-grained, reddish-orange, occasional lumps in upper 3 feet
	5-19	Sand, fine-grained, pale-yellow, well sorted with many very fine grained heavies and some mica, medium-orange clay lense present at 15 feet (less than 6" thick)
(MIDDLE MEM)	19-20	Clay, dark-gray, and sandy clay; contact with above very sharp
	20-23	Sand, fine-grained, dark gray, well sorted with very fine grained heavies
	23-28	Clay, dark gray, sticky but stiff
	28-45	As above but shelly. Occasional sand lenses below 34 feet; oysters in basal 2 feet and phosphate pebbles at base
ASHLEY FM	45-50	Calcarenite, fine-grained, olive-brown, dense, scattered quartz and phosphate sand present

Base of Wando Formation (upper member): -4 feet below sea level
Base of Wando Formation (middle member): -30 feet below sea level
Bottomed in Ashley Formation

CH-10: 0.85 mi. W of east quad. border, 2.90 mi. S of north quad. border. Surface elevation 25 feet.

WANDO FM (UPPER MEM)	0-5	Sand, bimodal with mostly fine-grained and well sorted but also with scattered coarse grains, well sorted and well rounded, medium-orange
	5-15	As above but medium-yellow, contains abundant very fine grained heavies present
	15-17	Sand, very fine-grained, medium-yellow, very micaceous, no coarse fraction
	17-23	Sand, fine-grained, medium-yellow, well sorted, very fine grained heavies abundant, Mulinia present
	23-25	Clay, medium-gray, sandy, shelly
	25-29	Clay, dark-blue, shelly
	29-31	Clay, dark-blue, sandy, wood and grass fragments present
	31-37	Clay, medium-bluish-green, silty, shelly and woody, fine-grained sand lenses with very fine grained heavies present
(MIDDLE MEM)	37-60	Sand, fine-grained, medium-blue, silty, contains numerous Mulinia and others (oysters, Olivella) with luster
DANIEL ISLAND BEDS	60-69.5	Clay, dark-blue, dense, sparsely shelly
ASHLEY FM	69.5-70	Calcarenite, fine-grained, olive-brown, dense, quartz and phosphate and foram sand present

Base of Wando Formation (upper member): -12 feet below sea level
Base of Wando Formation (middle member): -35 feet below sea level
Base of Daniel Island beds: -45 feet below sea level
Bottomed in Ashley Formation

CH-11: 0.78 mi. W of east quad. border, 4.15 mi. N of south quad. border. Surface elevation 26 feet.

WANDO FM (UPPER MEM)	0-3	Sand, fine-grained, medium-orange, well sorted
	3-5	Sand, fine-grained, medium-yellow, well sorted, very fine grained heavies abundant
	5-13	As above but light-gray
	13-22	Clay, medium-gray, and clay, bright medium-orange, sandy, interbedded; very micaceous
	22-24	Clay, medium-blue, micaceous
	24-26	Clay, medium-blue, and sand, medium-orange, interbedded
(MIDDLE MEM)	26-29	Sand, fine-grained, medium-orange, shelly
	29-33	Clay, medium-blue, sparsely shelly
	33-34	Clay, medium-brown, shelly
	34-45	Clay, pale-blue, sandy, sparsely shelly in upper 4 feet and much shellier below that
	45-46	Clay, medium-gray, stiff, no fossils
	46-47	Clay, dark-brown, peaty
(LOWER MEM)	47-55	Sand, fine-grained, medium-gray, silty, sparsely shelly
	55-74	Sand, coarse-grained, light-gray, much sand size phosphate
ASHLEY FM	74-85	Calcarenite, fine-grained, olive-brown, dense, scattered quartz and phosphate sand

Base of Wando Formation (upper member): ±0 feet at sea level
Base of Wando Formation (middle member): -21 feet below sea level
Base of Wando Formation (lower member): -48 feet below sea level
Bottomed in Ashley Formation

CH-12: 0.83 mi. E of west quad. border, 1.22 mi. S of north quad. border. Surface elevation 33 feet.

WANDO FM (LOWER MEM)	0-6	Sand, fine-grained, pale-orange (0-3 feet) grading down to medium-brown and humic by 5 feet, well sorted, very fine grained heavies come in at 3 feet
	6-20	Sand, fine-grained, medium-gray, well sorted, micaceous, very fine grained heavies abundant
	20-26	As above but shelly (mostly Mulinia)
	26-34	Sand, fine-grained, medium-gray, silty, shelly, some gray clay lenses interbedded. Phosphate pebbles in basal foot
DANIEL ISLAND BEDS	34-39	Clay, medium gray, dense, sandy with quartz granules and pebbles and phosphate pebbles. Spartina fragments present
GOOSE CREEK LS	39-41	Calcarenite, medium-grained, pale-yellowish-brown, loose, Argopecten eboreus fragments present. Phosphate pebbles at base and burrows penetrate into the underlying bed
ASHLEY FM	41-45	Calcarenite, fine-grained, olive-brown, dense, phosphatic, large forams present

Base of Wando Formation (lower member): -1 foot below sea level
Base of Daniel Island beds: -6 feet below sea level
Base of Goose Creek Limestone: -8 feet below sea level
Bottomed in Ashley Formation

CH-13: 0.2 mi. N of south quad. border, 3.25 mi. E of west quad. border. Surface elevation 9 feet.

WANDO FM (UPPER MEM)	0-4	Sand, fine-grained, well sorted, medium-brown, contains fine mica and very fine grained heavies
	4-33	As above but becomes medium-orangish-brown
	33-36	As above but occasional medium-gray clay lenses present
	36-38	Medium-blue clay
	38-39	Shell hash bed, (mostly Mulinia)
DANIEL ISLAND BEDS	39-53	Medium-blue clay, phosphate pebbles and a few shells occur in the basal foot
ASHLEY FM	53-70	Calcarenite, fine-grained, olive brown, dense

Base of Wando Formation (upper member): -30 feet below sea level
Base of Daniel Island beds: -44 feet below sea level
Bottomed in Ashley Formation

CH-14: 0.2 mi. N of south quad. border, 1.35 mi. W of east quad. border. Surface elevation 9 feet.

WANDO FM (UPPER MEM)	0-19	Sand, fine-grained, well sorted, pale-yellow, numerous very fine grained well sorted heavy minerals
	19-20	Medium-blue clay
(MIDDLE MEM)	20-23	Sand, fine-grained, medium-gray, micaceous
	23-39	As above but shelly, phosphate pebble bed at base
MARKS HEAD FM	39-55	Clay, dark-brown, phosphatic, grading down to medium-brown, dense

Base of Wando Formation (upper member): -11 feet below sea level
Base of Wando Formation (middle member): -30 feet below sea level
Bottomed in Marks Head Formation

CH-15: 0.15 mi. S of north quad. border, 0.83 mi. E of west quad. border. Surface elevation 13 feet.

WANDO FM (UPPER MEM)	0-5	Sand, fine-grained, pale-yellow to white (0-2) grading down through humic and medium-brown (2-3) to medium-orange (3-5); upper two feet notably finer grained and maybe dune sand
	5-25	Clay, medium-blue, massive and sticky. Plant fragments in upper 4 feet, shells appear in basal 4 feet
	25-32	As above, shelly, with a few scattered sand lenses
TEN MILE HILL BEDS	32-44	Sand, fine-grained, medium-gray, silty, grading down to medium-grained, rare shell fragments present, clay lense at 38 feet, phosphate pebbles in dominantly coarse-grained sand matrix in basal 3 feet
ASHLEY FM	44-50	Calcarenite, fine-grained, olive-brown, dense, scattered quartz and phosphate sand

Base of Wando Formation (upper member): -19 feet below sea level
Base of Ten Mile Hill beds: -31 feet below sea level
Bottomed in Ashley Formation

CH-16: 3.39 mi. W of east quad. border, 3.11 mi. N of south quad. border. Surface elevation 8 feet.

WANDO FM (UPPER MEM)	0-8	Sand, fine-grained, pale-yellow, well sorted, very fine grained heavies present
(MIDDLE MEM)	8-22	Clay, medium-blue to medium-gray, shelly, some silty to sandy lenses. Mostly Mulinia, but some Anadara, Mercenaria and oyster. Calcareous lumps at 15 ft. very stiff from 19-22 feet
	22-30	Clay, silty, medium-blue to medium-gray, soft, shelly Busycon, Dinocardium, etc.)
	30-43	Sand, fine-grained, medium-gray, silty, shelly, contact with above gradational
	43-50	Clay, medium-gray, contains wood fragments and small shells
	50-55	Clay, medium-gray, very shelly (Anadara ovalis, etc.), sparse phosphate pebbles at base
ASHLEY FM	55-80	Calcarenite, fine-grained, olive-brown, dense, scattered quartz and phosphate sand present

Base of Wando Formation (upper member): ±0 feet at sea level
Base of Wando Formation (middle member): -47 feet below sea level
Bottomed in Ashley Formation

CH-17: 0.15 mi. E of west quad. border, 3.25 mi. N of south quad. border. Surface elevation 15 feet.

WANDO FM (UPPER MEM)	0-7	Sand, fine-grained, medium-orange and white mottled, clayey, well sorted
	7-13	Sand, fine-grained, medium-gray, shelly (Anadara ovalis, etc.)
	13-32	As above but with sporadic clay lenses
	32-34	Shell hash
	34-35	Sand, fine-grained, clayey, shelly, phosphate nodules
ASHLEY FM	35-40	Calcarenite, fine-grained, olive-brown, dense, quartz and phosphate and foram sand grains present

Base of Wando Formation (upper member): -20 feet below sea level
Bottomed in Ashley Formation

CH-18: 0.6 mi. W of east quad. border, 1.55 mi. S of north quad. border. Surface elevation 9 feet.

WANDO FM (UPPER MEM)	0-2	Sand, fine-grained, medium-orange, clayey
	2-9	As above but medium-yellow and less clayey
	9-11	As above but clay lenses present
	11-13	As above but going to medium-gray
	13-18	As above but getting shelly; mostly Mulinia at top, but also Dinocardium, Tellina, and Anadara ovalis farther down.
	18-32	Clay, medium-gray
(MIDDLE MEM)	32-36	As above but with a few sandy and shelly lenses
	36-37	Sand, coarse-grained, medium-gray, phosphate pebbles and shell fragments present
ASHLEY FM	37-40	Calcarenite, fine-grained, olive-brown, dense, scattered quartz and phosphate grains

Base of Wando Formation (upper member): -23 feet below sea level
Base of Wando Formation (middle member): -28 feet below sea level
Bottomed in Ashley Formation

CH-19: 1.46 mi. W of east quad. border, 2.15 mi. S of north quad. border. Surface elevation 8 feet.

WANDO FM (UPPER MEM)	0-1	Sand, fine-grained, light-gray, loose, powdery
	1-3	Sand, fine-grained, reddish-orange, clayey, a few gray mottles near base
	3-11	Sand, fine-grained, medium-gray, well sorted, loose, very fine grained heavies abundant
	11-15	As above but medium-gray clay lenses come in
	15-17	Sand, fine-grained, medium-blue, silty and clayey
	17-20	As above but shelly
	20-25	Clay, medium-gray, sandy, dense, contains wood fragments
(MIDDLE MEM)	25-34	Sand, medium-grained, medium-gray, poorly sorted, phosphatic, contains phosphate and quartz pebbles near base
ASHLEY FM	34-35	Calcarenite, fine-grained, olive-brown, dense, quartz and phosphate sand grains present

Base of Wando Formtion (upper member): -17 feet below sea level
Base of Wando Formation (middle member): -27 feet below sea level
Bottomed in Ashley Formation

CH-20: 1.87 mi. S of north quad. border, 2.27 mi. W of east quad. border. Surface elevation 8 feet.

WANDO FM (UPPER MEM)	0-5	Sand, fine-grained, medium-gray and medium-orange mottled, well sorted, slightly clayey
	5-10	Sand, fine-grained,medium-orange, well sorted, silty, very fine grained heavies present
	10-29	As above but very shelly, clay stringer at 13 feet; sand-size phosphate comes in about 18 feet; shells numerous and well worn
	29-39	As above but more clay lenses come in
	39-45	Shell hash
DANIEL ISLAND BEDS	45-48	Clay, gray, no phosphate bed at base
ASHLEY FM	48-55	Calcarenite, fine-grained, olive brown, dense, scattered quartz and phosphate grains

Base of Wando Formation (upper member): -37 feet below sea level
Base of Daniel Island beds: -40 feet below sea level
Bottomed in Ashley Formation

CH-21: 2.6 mi. W of east quad. border, 1.35 mi. S of north quad. border. Surface elevation 10 feet.

WANDO FM (UPPER MEM)	0-3	Sand, fine-grained, medium-orange and medium-gray mottled, clayey, stiff, grades down to:
	3-12	Sand, fine-grained, medium-orange, well sorted, silty
	12-32	Shell hash, many shells badly worn and rounded, in a fine-grained sand matrix; phosphate pebble bed at base
DANIEL ISLAND BEDS	32-43	Clay, medium-gray, sandy, shelly zone at 37 feet; phosphate pebble and cobble bed at base
ASHLEY FM	43-45	Calcarenite, fine-grained, olive-brown

Base of Wando Formation (upper member): -22 feet below sea level
Base of Daniel Island beds: -33 feet below sea level
Bottomed in Ashley Formation

CH-22: 1.15 mi. S of north quad. border, 1.65 W of east quad. border. Surface elevation 6 feet.

SILVER BLUFF	0-14	Sand, fine-grained, medium-orange and medium-gray mottled, clayey
	14-30	Clay, medium-bluish-gray, sandy, dense, some sand lenses (? burrows), oysters appear abundantly at 23 feet
ASHLEY FM	30-40	Calcarenite, fine-grained, olive-brown, dense, quartz sand, large forams, and abundant phosphate sand present

Base of Silver Bluff (Holocene): -24 feet below sea level
Bottomed in Ashley Formation

CH-23: 0.75 mi. S of north quad. border, 1.3 mi. W of east quad. border. Surface elevation 11 feet.

WANDO FM (UPPER MEM)	0-8	Sand, fine-grained, medium-orange, slightly clayey, micaceous, well sorted
	8-13	Clay, medium-gray, sparsely shelly
(MIDDLE MEM)	13-25	Sand, fine-grained, medium-gray, silty, shelly, a few shell-hash lenses present. Burrows filled with quartz and phosphate sand near base
DANIEL ISLAND BEDS	25-31	Clay, medium-gray, sandy, dense, a few chalky shells at feet and phosphate pebbles
ASHLEY FM	31-45	Calcarenite, fine-grained, olive-brown, dense, quartz and phosphate sand present

Base of Wando Formation (upper member): -2 feet below sea level
Base of Wando Formation (middle member): -14 feet below sea level
Base of Daniel Island beds: -20 feet below sea level
Bottomed in Ashley Formation

CH-24: 0.05 mi. S of north quad. border, 2.20 mi. W of east quad. border. Surface elevation 11 feet.

WANDO FM (UPPER MEM)	0-3	Sand, fine-grained, medium-orange, well sorted, slightly clayey
	3-7	Sand, fine-grained, pale-yellow, well sorted, loose, abundant very fine grained heavies
	7-10	Clay, medium-blue grading down to medium-gray
(MIDDLE MEM)	10-16	Sand, fine-grained light-gray silty, very shelly
DANIEL ISLAND BEDS	16-37	Clay, light-gray, sandy, stiff, shelly
	37-47	Silt, light-gray, loose, oysters abundant
ASHLEY FM	47-60	Calcarenite, fine-grained, olive-brown, dense, quartz and phosphate sand grains present

Base of Wando Formation (upper member): +1 foot above sea level
Base of Wando Formation (middle member): -5 feet below sea level
Base of Daniel Island beds: -36 feet below sea level
Bottomed in Ashley Formation

CH-25: 0.4 mi. E of west quad. border, 3.7 mi. S of north quad. border. Surface elevation 20 feet.

WANDO FM (UPPER MEM)	0-8	Sand, fine-grained, pale-brown grading down to pale-gray, well sorted, micaceous, contains numerous very fine grained heavies
	8-12	Clay, medium-gray, sticky, increasingly silty downward
	12-32	Sand, fine-grained grading by 18 feet to medium-grained, clay lense at 22 feet, medium-gray, silty, loose, micaceous, shelly (oyster, Mulinia, Mercenaria, Anadara, Terebra, etc.) from 27-32 feet
(MIDDLE MEM)	32-34	Clay, medium-gray, stiff, sparsely shelly
	34-39	Sand, fine-grained, medium-gray, very silty
	39-43	Clay, medium-gray, stiff, woody, phosphate pebbles at base
ASHLEY FM	43-50	Calcarenite, fine-grained, medium-yellowish-brown, sparsely shelly, phosphate sand and large forams present

Base of Wando Formation (upper member): -12 feet below sea level
Base of Wando Formation (middle member): -23 feet below sea level
Bottomed in Ashley Formation

CH-26: 0.4 mi. E of west quad. border, 0.75 mi. N of south quad. border. Surface elevation 19 feet.

WANDO FM (UPPER MEM)	0-26	Sand, fine-grained, pale-brownish-orange (0-2) grading through pale-yellow (3-5), pale-brown (5-9), and pale-yellowish-brown (9-22) to medium-orangish-brown (22-26), well sorted, numerous fine-grained heavies, muscovitic from 5 to 9 feet, some medium-grained sand below 9 feet
	26-27	Clay, medium-blue, sandy and woody
(MIDDLE MEM)	27-38	Sand, medium-grained, medium-gray, shelly (Anadara transversa, Mulinia, Dinocardium, Astarte, oyster, Dosinia, Olivella, etc.), sparse phosphate pebbles at base; Mulinia yielded alloisoleucine/isoleucine ratios of 0.38 to 0.47
DANIEL ISLAND BEDS	38-43	Clay, medium-gray, stiff, dense, sandy, much tougher than above, numerous phosphate lumps up to 5 cm in diameter in basal 3 feet
ASHLEY FM	43-55	Calcarenite, fine-grained, olive-brown, calcite-cemented lumps and large forams present

Base of Wando Formation (upper member): -8 feet below sea level
Base of Wando Formation (middle member): -19 feet below sea level
Base of Daniel Island beds: -24 feet below sea level
Bottomed in Ashley Formation

CH-27: 0.65 mi. E of west quad. border, 1.85 mi. S of north quad. border. Surface elevation 15 feet.

WANDO FM (LOWER MEM)	0-13	Sand, medium-grained, light-gray grading down to medium-gray, well sorted, micaceous, abundant very fine grained heavies, thin clay lense at base
	13-30	Clay, sandy, medium-gray grading down to medium-bluish-gray, shelly from 13 to 21 feet
ASHLEY FM	30-45	Calcarenite, fine-grained, olive-brown, dense

Base of Wando Formation (lower member): -15 feet below sea level
Bottomed in Ashley Formation

CH-28: 0.85 mi. E of west quad. border, 4.0 mi. N of south quad. border. Surface elevation 16 feet.

WANDO FM (UPPER MEM)	0-14	Sand, fine-grained, well sorted, micaceous, abundant very fine grained heavies, light-orange grading down to medium-yellow then to medium-gray by 10 feet
(MIDDLE MEM)	14-30	Sand, fine-grained, well sorted, micaceous, very fine grained heavies abundant, medium-gray, full of shells
DANIEL ISLAND BEDS	30-48	Clay, medium-blue-gray, stiff, sticky, sparse phosphate pebbles at base about 1 cm in diameter
ASHLEY FM	48-50	Calcarenite, fine-grained, olive-brown

Base of Wando Formation (upper member): +2 feet above sea level
Base of Wando Formation (middle member): -14 feet below sea level
Base of Daniel Island beds: -32 feet below sea level
Bottomed in Ashley Formation

CH-29: 0.6 mi. E of west quad. border, 1.0 mi. N of south quad. border. Surface elevation 11 feet.

WANDO FM (UPPER MEM)	0-8	Sand, fine-grained, well sorted, clayey, pale-orange and pale-gray mottled
(MIDDLE MEM)	8-32	Sand, medium-grained, well sorted, micaceous, shelly, medium-gray, silty, gets coarser and more clayey downward, oyster fragments at base, no pebble bed at base
ASHLEY FM	32-40	Calcarenite, fine-grained, olive-brown

Base of Wando Formation (upper member): +3 feet above sea level
Base of Wando Formation (middle member): -21 feet below sea level
Bottomed in Ashley Formation

CH-30: 1.75 mi. E of west quad. border, 2.4 mi. S of north quad. border. Surface elevation 13 feet.

WANDO FM (UPPER MEM)	0-2	Sand, very-fine-grained, pale-orange
	2-4	Clay, medium orange and light-gray mottled,stiff, sticky
(MIDDLE MEM)	4-8	Sand, fine-grained, light-gray, well sorted, abundant very fine grained heavies, grades abruptly down to:
	8-10	Sand, fine-grained, medium-brown, silty, shelly, grades abruptly down to:
	10-24	Silt, medium-gray, shelly (oyster, Mulinia, Anadara brasiliana, Mercenaria), contains lenses of clay, grades abruptly down to:
	24-58	Clay, medium-gray, sticky, very similar to clay at CH-2 but not shelly, sparse phosphate pebbles at base
ASHLEY FM	58-60	Calcarenite, fine-grained, olive-brown, dense, abundant large forams

Base of Wando Formation (upper member): +9 feet above sea level
Base of Wando Formation (middle member): -45 feet below sea level
Bottomed in Ashley Formation

CH-31: 3.3 mi. E of west quad. border, 3.8 mi. N of south quad. border. Surface elevation 8 feet.

FILL	0-5	Materials of diverse origin
UPPER HOLOCENE	5-10	Swamp muck, nails, oysters
SILVER BLUFF	10-16	Clay, medium-orange and medium-gray streaked, dense, stiff
WANDO FM (MIDDLE MEM)	16-23	Sand, very fine to fine-grained, pale-brown, abundant very fine grained heavies, silty, grades down to:
	23-27	Sand, fine-to medium-grained, pale-brown, shelly
	at 27	Clay, medium-gray, contains layers of sand grains, about 6 inches thick
	27-41	Sand, fine-grained, medium-gray, silty, sparsely shelly, clay interbeds in basal 5 feet
	41-56	Clay, medium-gray, stiff
ASHLEY FM	56-70	Calcarenite, fine-grained, olive-brown, numerous large forams

Base of upper Holocene: -2 feet below sea level
Base of Silver Bluff (lower Holocene): -8 feet below sea level
Base of Wando Formation (middle member): -48 feet below sea level
Bottomed in Ashley Formation

CH-32: 3.3 mi. W of east quad. border, 0.1 mi. N of south quad. border. Surface elevation 10 feet.

WANDO FM (UPPER MEM)	0-12	Sand, fine-grained, well sorted, many fine-grained heavies present, slightly clayey in upper foot, grades down to medium-grained by base, medium-gray
	at 12	Peat, dark-brown, 3 inches thick
	12-22	Clay, blue-gray, caliche nodules present 3 feet under peat, stiff, sparse shells present
(MIDDLE MEM)	22-31	Sand, fine-grained, silty, abundant very fine grained heavies, medium-gray, shelly including Anadara brasiliana
	31-39	Clay, silty, blocky, shelly including Cancellaria and A. brasiliana, medium-gray, phosphate pebbles up to 1 cm in diameter in basal 3 feet
GOOSE CREEK LS	39-41	Calcarenite, medium-grained, pale-yellowish-brown, fragments of Argopecten eboreus present, phosphate pebbles present in basal foot
MARKS HEAD FM	41-57	Clay, dark-olive-brown, enclosing numerous sand-size phosphate grains, grading down to dark-brown and not phosphatic, dense
ASHLEY FM	57-70	Calcarenite, fine-grained, olive-brown, phosphatic, contains abundant large foram tests

Base of Wando Formation (upper member): -12 feet below sea level
Base of Wando Formation (middle member): -29 feet below sea level
Base of Goose Creek Limestone: -31 feet below sea level
Base of Marks Head Formation: -47 feet below sea level
Bottomed in Ashley Formation

CH-33: 1.0 mi. E of west quad. border, 0.55 mi. N of south quad. border. Surface elevation 11 feet.

WANDO FM (UPPER MEM)	0-15	Sand, fine-grained, medium-gray (0-1) grading through pale-orange (1-3) to pale-gray, well sorted, micaceous, abundant very fine grained heavies, shelly below 7 feet
	15-22	Clay, medium-gray, stiff, caliche-like nodules in upper foot
(MIDDLE MEM)	22-31	Sand, fine-grained, pale-gray, silty, shelly (mostly Mulinia)
	31-35	Sand, fine-grained, medium-gray, very clayey, stiff sticky
	35-44	Sand, fine-grained, medium-gray, silty, shelly, phosphate lumps at base
ASHLEY FM	44-45	Calcarenite, fine-grained, olive-brown

Base of Wando Formation (upper member): -11 feet below sea level
Base of Wando Formation (middle member): -33 feet below sea level
Bottomed in Ashley Formation

CH-34: 2.4 mi. E of west quad. border, 2.75 mi. N of south quad. border. Surface elevation 5 feet.

FILL	0-46	Clay, gray, fulsome
ASHLEY FM	46-60	Calcarenite, fine-grained, olive-brown, large forams abundant

Base of Holocene: -41 feet below sea level
Bottomed in Ashley Formtion

CH-35: 1.85 mi. W of east quad. border, 0.55 mi. S of north quad. border. Surface elevation 11 feet.

WANDO FM (UPPER MEM)	0-5	Clay, light-gray, pale-orange and pale-brown mottled, sandy (fine-to coarse-grained), sharp contact with below
(MIDDLE MEM)	5-7	Sand, fine-grained, white, well sorted, abundant very fine grained heavies
	7-15	Sand, fine-grained, light-gray, silty, Mulinia and other shell fragments present
	15-18	Clay, blue-gray, dense, large caliche-like lumps in upper foot
GOOSE CREEK LS	18-19	Calcarenite, medium-grained, pale-yellowish-brown, Amusium mortoni present
ASHLEY FM	19-35	Calcarenite, fine-grained, olive-brown, large forams present

Base of Wando Formation (upper member): +6 feet above sea level
Base of Wando Formation (middle member): -7 feet below sea level
Base of Goose Creek Limestone: -8 feet below sea level
Bottomed in Ashley Formation

FORT MOULTRIE QUADRANGLE
(depths in feet)

FM-1: 1.45 mi. E of west quad. border, 2.55 mi. N of south quad. border. Surface elevation 6 feet.

SILVER BLUFF	0-2	Sand, fine-grained, medium-gray, poorly sorted with a few medium to coarse grains, very fine grained heavies abundant
WANDO FM (UPPER MEM)	2-5	Sand, fine-grained, poorly sorted, bright medium-yellowish-orange
	5-12	As above but medium-gray again and shelly. Alloisoleucine/isoleucine ratio for *Mulinia* about 0.23 at 5-8 foot depth
	12-14	Clay, medium-gray
(MIDDLE MEM)	14-16	Sand, fine-grained, and clay interbedded, both medium-gray and shelly (mostly oysters)
	16-28	Clay, medium-gray, shelly, gastropods and oysters
	28-33	Clay, medium-gray, no fossils, stiff
MARKS HEAD FM	33-40	Sand, fine-grained, highly phosphatic, dark-olive-brown

Base of Silver Bluff (Holocene): +4 feet above sea level
Base of Wando Formation (upper member): -8 feet below sea level
Base of Wando Formation (middle member): -27 feet below sea level
Bottomed in Marks Head Formation

FM-2: 3.40 mi. E of west quad. border, 3.65 mi. N of south quad. border. Surface elevation 7 feet.

UPPER HOLOCENE	0-5	Sand, fine-grained, pale-reddish-brown, well sorted, a few fine-grained heavies present near base
WANDO FM (UPPER MEM)	5-13	Sand, fine-grained, well sorted, medium-gray, shelly
	13-28	As above but medium-gray clay interbeds scattered in, shelly throughout (alloisoleucine/isoleucine ratio for *Mulinia* = 0.25 at 14 feet)
	28-37	Clay, medium-gray, stiff, no fossils, sand lenses in basal foot
MARKS HEAD FM	37-50	Sand, fine-grained, dark-olive-brown, very phosphatic, dense

Base of upper Holocene: +2 feet above sea level
Base of Wando Formation (upper member): -30 feet below sea level
Bottomed in Marks Head Formation

FM-3: 0.8 mi. N of south quad. border, 1.8 mi. E of west quad. border. Surface elevation 5 feet.

FILL	0-10	Sand, charcoal, shell, brick, all fulsome
UPPER HOLOCENE	10-16	Clay, gray, dense, contains some oysters
	16-22	Clay, gray, silty, rather loose, occasional sandy lenses but still holds shape on stem rather than oozes off, Mulinia and Polinices present (at 22 feet Mulinia alloisoleucene/isoleucene ratio = 0.07)
WANDO FM (UPPER MEM)	22-27	Clay, medium gray, stiff, crunchy zone at base
	27-30	Clay, pale gray, very dense, sandy
	at 30	4-inch thick shell bed, densely packed shell hash (alloisoleucine/isoleucine ratio=0.31)
	30-32	Silt, medium-gray, soft, shelly
	32-35	Clay, dark-gray, dense, sand filled burrows present near base
GOOSE CREEK LS	35-43	Calcarenite, medium-grained with sand size phosphate grains, pale-yellowish-brown, many fragmentary pieces of Pecten eboreus
MARKS HEAD FM	43-75	Sand, fine-grained, silty, slightly calcareous, dense, dark-olive-brown, slightly more calcareous lumps appear at 54 feet, very clayey below that, sparse basal lag bed made up of rolled and rounded shells
ASHLEY FM	75-125	Calcarenite, fine-grained, olive-brown, contains abundant large forams, phosphate pebble bed at base
PARKERS FERRY FM	125-193	Calcilutite, medium-greenish-gray, sticky, contains echinoid spines, phosphate pebble bed at base
HARLEYVILLE FM	193-294	Calcilutite, medium-brownish-gray, silty, thin (less than 1 cm) lenses of limestone scattered throughout, phosphate pebble bed at base

CROSS FM	294-310	Calcarenite, fine-grained, pale-yellowish-white, abundant sand-size phosphate and glauconite, well cemented

Base of Holocene: -17 feet below sea level
Base of Wando Formation (upper member): -30 feet below sea level
Base of Goose Creek Limestone: -38 feet below sea level
Base of Marks Head Formation: -70 feet below sea level
Base of Ashley Formation: -120 feet below sea level
Base of Parkers Ferry Formation: -188 feet below sea level
Base of Harleyville Formation: -289 feet below sea level
Bottomed in Cross Formation

FM-4: 0.65 mi. N of south quad. border, 0.9 mi. E of west quad. border. Surface elevation 5 feet.

UPPER HOLOCENE	0-23	Sand, fine-grained, well sorted, light-gray, abundant very fine grained heavy minerals and shell fragments
	23-30	As above but becoming slightly clayey and sticky
	30-33	Shell hash
WANDO FM (UPPER MEM)	33-34	Stiff sandy clay, medium-gray
	34-37	Sand, fine-grained, medium-gray, silty, shelly, (alloisoleucine/isoleucine ratio for Mulinia about 0.29)
	37-41	Clay, medium-gray, dense, sand filled burrows and phosphate pebble bed at base
MARKS HEAD FM	41-45	Sand, fine-grained, dark-olive-brown, silty, dense phosphatic

Base of Upper Holocene: -28 feet below sea level
Base of Wando Formation (upper member): -36 feet below sea level
Bottomed in Marks Head Formation

FM-5: 1.2 mi. N of south quad. border, 3.35 mi. E of west quad. border. Surface elevation 5 feet.

UPPER HOLOCENE	0-22	Sand, fine-grained, well-sorted, light-gray, loose, abundant very fine grained heavy minerals and shells
	22-28	As above but getting dark-gray and slightly clayey, still loose on stem
WANDO FM (UPPER MEM)	28-30	Clay, light-gray, dense, with many shells
	30-36	Sand, fine-grained, medium-gray, silty, very shelly, loose on stem
	36-41	Clay, medium-gray, stiff, sandy lenses near base
	41-43	Sand, fine-grained, medium-gray, clayey grading down to coarse-grained at base
DANIEL ISLAND BEDS	43-59	Clay, medium-gray, dense, no phosphate bed at base
MARKS HEAD FM	59-70	Sand, fine-grained, silty, phosphatic, dark-olive-brown, slightly calcareous at top but not farther down

Base of Holocene: -23 feet below sea level
Base of Wando Formation (upper member): -38 feet below sea level
Base of Daniel Island beds: -54 feet below sea level
Bottomed in Marks Head Formation

FM-6: 3.1 mi. E of west quad. border, 3.65 mi. S of north quad. border. Surface elevation 13 feet.

WANDO FM (UPPER MEM)	0-1	Sand, medium-grained, medium-brown, contains iron-hydroxide-cemented pebbles
	1-5	Sand, fine- to medium-grained, pale-yellow, poorly sorted, full of fine-grained heavies and mica
	5-24	Sand, fine- to medium-grained, medium-gray, poorly sorted, full of very fine grained heavies and mica, very shelly (mostly Mulinia) from 5-13, sparsely shelly below that, clay lense at 24 feet
(MIDDLE MEM)	24-32	Sand, fine- to medium-grained, medium-gray, clayey below 28 feet, stiff, sparsely shelly
(LOWER MEM)	32-38	Sand, medium-grained, medium-gray, no shells
MARKS HEAD FM	38-42	Silt, dark-brown, sandy, clayey, stiff
ASHLEY FM	42-50	Calcarenite, fine-grained, olive-brown, sharp contact with above

Base of Wando Formation (upper member): -11 feet below sea level
Base of Wando Formation (middle member): -19 feet below sea level
Base of Wando Formation (lower member): -25 feet below sea level
Base of Marks Head Formation: -29 feet below sea level
Bottomed in Ashley Formation

FM-7: 1.75 mi. E of west quad. border, 2.3 mi. S of north quad. border. Surface elevation 23 feet.

WANDO FM (UPPER MEM)	0-20	Sand, medium-grained, medium-brown with pale-orange mottles (0-5) grading to medium-gray, well sorted, micaceous, scattered very fine grained heavies increase in abundance downward, shelly in basal 2 feet
	20-21	Clay, medium-blue, shelly (Mulinia, Busycon, etc.), some sand-filled burrows
(MIDDLE MEM)	21-30	Sand, fine-grained, medium-gray, shelly (Mulinia, Busycon, Tellina, etc.)
	30-33	Peat, dark-brown
(LOWER MEM)	33-40	Sand, fine-grained, medium-gray, well sorted, shelly (mostly Mulinia), very silty
MARKS HEAD FM	40-43	Clay, dark-olive-green, fine-grained sandy
ASHLEY FM	43-55	Calcarenite, fine-grained, olive-brown

Base of Wando Formation (upper member): +2 feet above sea level
Base of Wando Formation (middle member): -10 feet below sea level
Base of Wando Formation (lower member): -17 feet below sea level
Base of Marks Head Formation: -20 feet below sea level
Bottomed in Ashley Formation

FM-8: 2.05 mi. W of east quad. border, 2.5 mi. N of south quad. border. Surface elevation 7 feet.

UPPER HOLOCENE	0-30	Sand, medium-grained, shelly, well sorted, very fine grained heavies abundant, pale-gray (0-5) grading down to medium-gray (alloisoleucene/isoleucene ratio less than 0.1 throughout)
	30-39	Clay, silty, no pebble bed at base
MARKS HEAD FM	39-60	Sand, fine-grained, silty, sparsely calcareous, olive-brown
ASHLEY FM	60-65	Calcarenite, fine-grained, olive-brown

Base of Upper Holocene: -32 feet below sea level
Base of Marks Head Formation: -53 feet below sea level
Bottomed in Ashley Formation

FM-9: 0.05 mi. W of east quad. border, 3.45 mi. N of south quad. border. Surface elevation 10 feet.

HOLOCENE	0-24	Sand, medium-grained, medium-gray, abundant very fine grained heavies, well sorted, shelly
	24-41	Clay, medium- to dark-gray, massive, sandy, stiff, sparse oysters, sparse phosphate pebbles at base
MARKS HEAD FM	41-50	Sand, fine-grained, dark-grayish-green, contains abundant sand-size phosphate, stiff

Base of Upper Holocene: -31 feet below sea level
Bottomed in Marks Head Formation

FM-10: 1.35 mi. W of east quad. border, 3.35 mi. N of south quad. border. Surface elevation 6 feet.

UPPER HOLOCENE	0-17	Sand, medium-grained, light-gray (0-5) grading down to dark-gray, well sorted, abundant very fine grained heavies, shelly
	17-32	Clay, medium-bluish-gray, massive, soft, fulsome, sparse oysters
	32-36	Clay, medium-bluish-gray with medium-green mottles, dense, sandy
MARKS HEAD FM	36-47	Sand, fine-grained, dark-greenish-gray, contains sand-size phosphate
ASHLEY FM	47-55	Calcarenite, fine-grained, olive-brown

Base of Upper Holocene: -30 feet below sea level
Base of Marks Head Formation: -41 feet below sea level
Bottomed in Ashley Formation

FM-11: 3.35 mi. E of west quad. border, 1.95 mi. S of north quad. border. Surface elevation 21 feet.

WANDO FM (UPPER MEM)	0-22	Sand, fine-grained, medium-brown (0-2) grading through medium-yellowish-orange (2-4) and pale-yellow (4-6) to medium-gray (6-22), well sorted, silty, shelly below 13 feet
	22-22.5	Peat, dark-brown, clayey
(MIDDLE MEM)	22.5-38	Sand, fine-grained, medium-gray, clayey in some horizons, shelly
	38-39	Clay, medium-gray, stiff
	39-40	Sand, fine-grained, medium-gray, slightly clayey, shelly
	40-42	Clay, medium-gray, stiff
(LOWER MEM)	42-54	Sand, fine-grained grading down to medium-grained, medium-gray, silty, shelly, abundant sand-size phosphate, no basal pebble bed
ASHLEY FM	54-65	Calcarenite, fine-grained, olive-brown

Base of Wando Formation (upper member): -1 foot below sea level
Base of Wando Formation (middle member): -21 feet below sea level
Base of Wando Formation (lower member): -33 feet below sea level
Bottomed in Ashley Formation

FM-12: 2.5 mi. E of west quad. border, 1.05 mi. S of north quad. border. Surface elevation 8 feet.

FILL	0-2	Road material
SILVER BLUFF	2-8	Clay, medium-orange and light-gray streaked, stiff, sticky
WANDO FM (MIDDLE MEM)	8-31	Sand, fine-grained, grading to medium-grained by 16 feet, pale-brown, silty, shelly, no pebble bed at base
ASHLEY FM	31-40	Calcarenite, fine-grained, olive-brown

Base of Silver Bluff (Holocene): ±0 foot at sea level
Base of Wando Formation (middle member): -23 feet below sea level
Bottomed in Ashley Formation

FM-13: 3.05 mi. E of west quad. border, 1.35 mi. S of north quad. border. Surface elevation 9 feet.

SILVER BLUFF	0-3	Clay, medium-gray and medium-orange mottled, sandy
WANDO FM (MIDDLE MEM)	3-20	Sand, fine-grained, light-gray grading rapidly to medium-gray, well sorted, micaceous, very shelly below 5 feet, sparse phosphate pebbles at base
MARKS HEAD FM	20-24	Sand, fine-grained, dark-greenish-gray, clayey, sharp contact with below
ASHLEY FM	24-40	Calcarenite, fine-grained, olive-brown

Base of Silver Bluff (Holocene): +6 feet above sea level
Base of Wando Formation (middle member): -11 feet below sea level
Base of Marks Head Formation: -15 feet below sea level
Bottomed in Ashley Formation

FM-14: 0.35 mi. E of west quad. border, 4.2 mi. N of south quad. border. Surface elevation 22 feet.

WANDO FM (UPPER MEM)	0-14	Sand, fine-grained, light-gray grading to medium-gray by 8 feet, well sorted, micaceous, very fine grained heavies abundant, thin clay bed at base
	14-25	Sand, fine-grained, well sorted, micaceous, shelly, very fine grained heavies abundant
	25-28	Clay, medium-gray, micaceous, fairly dense, sticky, contains sparse shells
(MIDDLE MEM)	28-45	Sand, fine-grained, well sorted, micaceous, shelly, very fine grained heavies abundant
MARKS HEAD FM	45-55	Clay, medium-brown to dark-brown, cheese-like texture

Base of Wando Formation (upper member): -6 feet below sea level
Base of Wando Formation (middle member): -23 feet below sea level
Bottomed in Marks Head Formation

FM-15: 1.65 mi. E of west quad. border, 3.85 mi. N of south quad. border. Surface elevation 18 feet.

FILL	0-3	Dark-gray sandy soil
WANDO FM (UPPER MEM)	3-8	Sand, fine-grained, medium-brownish-gray, well sorted, very fine grained heavies abundant, grades to:
	8-23	Sand, fine-grained, dark-gray, micaceous, sparsely shelly at top grading to very shelly by 15 feet
	23-26	Clay, medium-gray, stiff, dense, sandy
(MIDDLE MEM)	26-35	Sand, fine-grained, dark-gray, micaceous, shelly
	35-42	Clay, medium-gray, grading to silty, fine-grained sand by base, peat bed at 36 feet, sticky, shelly only from 35 to 36 feet
MARKS HEAD FM	42-48	Clay, dark-brown, stiff, cheese-like texture
	48-50	Clay, medium-yellowish-brown, stiff, cheese-like texture, faintly calcareous

Base of Wando Formation (upper member): -8 feet below sea level
Base of Wando Formation (middle member): -24 feet below sea level
Bottomed in Marks Head Formation

FM-16: 0.70 mi. E of west quad. border, 1.95 mi. N of south quad. border. Surface elevation about 8 feet.

WANDO FM (UPPER MEM)	0-8	Sand, fine-grained, medium-gray grading down to light-humic-brown, well sorted, micaceous, abundant very fine grained heavies, no soil profile. Slightly coarser and less well sorted in top foot
	8-18	Sand, light-gray, fine-grained, shelly
	18-20	Clay, medium-gray, sticky, peaty lense near middle and caliche-like nodules near base
(MIDDLE MEM)	20-33	Sand, fine-grained, medium-gray, sparsely shelly, very silty, grading down to sandy clay, phsophate pebble bed at base
MARKS HEAD FM	33-56	Sand, fine-grained, dark-brown, silty, phosphatic
ASHLEY FM	56-65	Calcarenite, fine-grained, olive-brown, numerous foram tests

Base of Wando Formation (upper member): -12 feet below sea level
Base of Wando Formation (middle member): -25 feet below sea level
Base of Marks Head Formation: -49 feet below sea level
Bottomed in Ashley Formation

FM-17: 3.4 mi. E of west quad. border, 4.25 mi. S of north quad. border. Surface elevation about 7 feet.

SILVER BLUFF	0-6	Sand, fine-grained with minor coarse-grained fraction (bimodal), pale-brown grading down to light-gray
WANDO FM (UPPER MEM)	6-23	Sand, fine-grained, medium-gray, silty, shelly (mostly Mulinia, some oyster)
	23-25	Sand, fine-grained, and clay interbedded, dark-gray, contains lenses of peat
(MIDDLE MEM)	25-27	Sand, fine-grained, silty, sparsely shelly
MARKS HEAD FM	27-56	Sand, fine-grained, dark-brown, silty, sand-size phosphate abundant, light-brown clayey lense from 38 to 45 feet, cheese-like texture
ASHLEY FM	56-60	Calcarenite, fine-grained, olive-brown, large forams abundant

Base of Silver Bluff (Holocene):	±0 feet at sea level
Base of Wando Formation (upper member):	-18 feet below sea level
Base of Wando Formation (middle member):	-20 feet below sea level
Base of Marks Head Formation:	-49 feet below sea level

Bottomed in Ashley Formation

FM-18: 2.6 mi. E of west quad. border, 2.95 mi. S of north quad. border. Surface elevation 16 feet.

WANDO FM (UPPER MEM)	0-5	Sand, fine-grained, pale-brown and dark-gray mottled, well sorted, micaceous, rich in organic debris
	5-11	Sand, fine-grained, light-gray grading down to medium-gray, well sorted, micaceous, very-fine-grained heavies abundant
	11-18	Sand, coarser than above but still fine-grained, pale-brown, very shelly
	18-20	Clay, medium-blue, sticky, sand-filled burrows present, some lenses of shell (especially oyster)
(MIDDLE MEM)	20-28	Sand, fine-grained, medium-gray, very silty, very shelly (mostly Mulinia, rarely oyster)
	28-29	Sand, fine-grained, dark-gray, well sorted, slightly clayey, cohesive
	29-34	Sand, fine-grained, medium-gray, very silty, very shelly (mostly Anadara, Mercenaria, etc.) down to gray clay lense at 34 feet
(LOWER MEM)	34-44	Sand, fine-grained, medium-gray, sparsely shelly, sand-size phosphate abundant
DANIEL ISLAND BEDS	44-62	Clay, pale-bluish-green, silty, sparsely shelly
ASHLEY FM	62-65	Calcarenite, fine-grained, medium-yellowish-brown, sand-size phosphate present

Base of Wando Formation (upper member): -4 feet below sea level
Base of Wando Formation (middle member): -18 feet below sea level
Base of Wando Formation (lower member): -28 feet below sea level
Base of Daniel Island: beds: -46 feet below sea level
Bottomed in Ashley Formation

FM-19: 1.7 mi. W of east quad. border, 2.25 mi. S of north quad. border. Surface elevation 8 feet.

WANDO FM (UPPER MEM)	0-17	Sand, fine-grained, pale-orange (0-2) grading through pale-brown (2-4) and pale-gray (4-6) to medium-gray, well sorted, very-fine-grained heavies abundant, shelly below 11 feet (mostly Mulinia, a few Polinices)
	17-18	Clay, medium-gray, sandy
(MIDDLE MEM)	18-37	Sand, fine- to medium-grained, medium-gray, very silty and shelly, poorly sorted at top but better sorted downward
DANIEL ISLAND BEDS	37-74	Clay, pale-bluish-green grading to medium-gray by 47 feet, sandy in upper part, more stiff and sticky toward base
ASHLEY FM	74-85	Calcarenite, fine-grained, medium-yellowish-brown

Base of Wando Formation (upper member): -10 feet below sea level
Base of Wando Formation (middle member): -29 feet below sea level
Base of Daniel Island beds: -66 feet below sea level
Bottomed in Ashley Formation

FM-20: 0.2 mi. W of east quad. border, 0.15 mi. S of north quad. border. Surface elevation 10 feet.

SILVER BLUFF	0-5	Sand, fine-grained, medium-brown, very silty and clayey
	5-6	Clay, medium-brown with streaks of medium-gray, greasy, micaceous
WANDO FM (UPPER MEM)	6-11	Sand, fine-grained, medium-gray, well sorted, silty, micaceous, shelly from 8 to 11 feet
	11-17	Clay, medium-bluish-gray, some wood fragments and caliche-like nodules in top foot, stiff, sticky, upper half sparsely shelly, more shelly in basal half with mostly Mulinia and oysters
GOOSE CREEK LS	17-67	Calcarenite, medium-grained, pale-yellowish-brown
	67-77	Sand, medium-grained, very rich in phosphate sand, some blue quartz grains and white quartz grains up to 3 mm present, coarsens downward to a phosphate pebble bed with some quartz pebbles present, both irregular lumps and discoids present up to 1 cm in diameter and some shark and ray teeth
MARKS HEAD FM	77-85	Clay, fine-grained sandy, dark-brown grading down to medium-yellowish-brown, slightly calcareous, fine mica flakes scattered throughout, cheese-like texture

Base of Silver Bluff (Holocene): +4 feet above sea level
Base of Wando Formation (upper member): -7 feet below sea level
Base of Goose Creek Limestone: -67 feet below sea level
Bottomed in Marks Head Formation

FM-21: 1.1 mi. W of east quad. border, 0.25 mi. S of north quad. border. Surface elevation 20 feet.

WANDO FM (UPPER MEM)	0-19	Sand, fine-grained, medium-gray (0-3) grading to light-gray, micaceous, very fine grained heavies abundant, well sorted, silty, shelly below 14 feet (mostly Mulinia)
	19-20	Peat, root fragments present
	20-24	Clay, light-gray, sticky, roots scattered throughout, sparsely shelly at base
(MIDDLE MEM)	24-32	Sand, fine-grained, medium-gray, silty, very shelly, thin phosphate pebble bed at base
MARKS HEAD FM	32-50	Clay, pale-yellowish-green, stiff, more silty downward, mica flakes visible, cheese-like texture

Base of Wando Formation (upper member): -4 feet below sea level
Base of Wando Formation (middle member): -12 feet below sea level
Bottomed in Marks Head Formation

FM-22: 3.15 mi. W of east quad. border, 0.2 mi. S of north quad. border. Surface elevation 11 feet.

WANDO FM (UPPER MEM)	0-5	Sand, fine-grained, mottled light-gray and medium-orange, well sorted, very clayey
	5-13	Sand, fine-grained, pale-brownish-orange (5-8) grading to medium-gray, silty, micaceous
	13-18	Clay, medium-bluish-gray, stiff, sticky, 3 inch peat bed at top, caliche-like nodules in basal 2 feet
TEN MILE HILL BEDS	18-35	Sand, fine-grained, medium-gray, silty, shelly (*Rangia*, *Mulinia*, *Noetia ponderosa*, oyster, snails, bryozoans), grades to medium-grained and phosphatic by 25 feet, some coarse-grained fraction below 30 feet
MARKS HEAD FM	35-36	Sand, dark-brown, contains sand-size phosphate
ASHLEY FM	36-40	Calcarenite, fine-grained, olive-brown, large forams abundant

Base of Wando Formation (upper member): -7 feet below sea level
Base of Ten Mile Hill beds: -24 feet below sea level
Base of Marks Head Formation: -25 feet below sea level
Bottomed in Ashley Formation

FM-23: 1.2 mi. W of east quad. border, 1.15 mi. S of north quad. border. Surface elevation 8 feet.

SILVER BLUFF	0-5	Sand, fine-grained, dark-gray, very clayey
	5-6	Clay, dark-gray, greasy, contains wood fragments dated by ^{14}C at 7860 ± 60 years (USGS Radiocarbon Lab Number 5038)
WANDO FM (MIDDLE MEM)	6-15	Sand, medium-grained grading down to fine-grained by 9 feet, medium-gray, very silty, very fine grained heavies abundant, shelly below 10 feet (Dinocardium, Mulinia, etc.)
	15-31	Clay, medium-gray, sticky, dense, oyster and wood fragments near top, sparse Mulinia and Pteropleura farther down, micaceous
	31-32	Shell hash and phosphate pebbles, medium-gray
TEN MILE HILL BEDS	32-59	Sand, fine-grained, medium-gray, well sorted, shelly (Mulinia, Mercenaria, oyster, etc.)
ASHLEY FM	59-70	Calcarenite, fine-grained, olive-brown, large forams present

Base of Silver Bluff (Holocene): +2 feet above sea level
Base of Wando Formation (middle member): -24 feet below sea level
Base of Ten Mile Hill beds: -51 feet below sea level
Bottomed in Ashley Formation

FM-24: 2.8 mi. W of east quad. border, 3.2 mi. S of north quad. border. Surface elevation 8 feet.

SILVER BLUFF	0-7	Sand, fine-grained, medium-brown, well sorted
WANDO FM (UPPER MEM)	7-11	Shell hash, light-brown, sharp contact with above, fine-grained sand matrix, thin clay lense at base, loose, greasy, soft, light-gray
(MIDDLE MEM)	11-30	Sand, very-fine-grained, medium-gray, very silty, shelly
	30-35	Clay and sand, fine-grained, medium-gray, interbedded
	35-45	Clay, medium-gray, sand laminae scattered through, grass fragments, very sparse small (5 mm) phosphate discoids and burrows at base
MARKS HEAD FM	45-54	Clay, dull olive-green, dense, cheese-like texture
ASHLEY FM	54-73	Calcarenite, fine-grained, olive-brown, large forams abundant, abundant sand-size phosphate in basal 3 feet
PARKERS FERRY FM	73-80	Calcilutite, greenish-gray, stiff, plastic, slightly brittle

Base of Silver Bluff (Holocene):	+1 foot above sea level
Base of Wando Formation (upper member):	-3 feet below sea level
Base of Wando Formation (middle member):	-37 feet below sea level
Base of Marks Head Formation:	-46 feet below sea level
Base of Ashley Formation:	-65 feet below sea level

Bottomed in Parkers Ferry Formation

FM-25: 1.55 mi. E of west quad. border, 1.65 mi. S of north quad. border. Surface elevation 8 feet.

SILVER BLUFF	0-4	Sand, fine-grained, medium-brown, slightly clayey
	4-8	Clay, light-gray, stiff, sticky, sand-filled burrows near base, plant fragments present throughout
WANDO FM (MIDDLE MEM)	8-22	Sand, fine-grained, medium-gray, silty, shelly (Mulinia, rarely Dinocardium)
ASHLEY FM	22-45	Calcarenite, fine-grained, olive-brown, large forams abundant, sand-size phosphate abundant to 37 feet and rarer below

Base of Silver Bluff (Holocene): ±0 feet at sea level
Base of Wando Formation (middle member): -14 feet below sea level
Bottomed in Ashley Formation

FM-26: 0.85 mi. W of east quad. border, 1.15 mi. S of north quad. border. Surface elevation 8 feet.

SILVER BLUFF	0-9	Sand, medium-grained with a bimodal coarse-grained fraction, pale-orange, clean, micaceous in basal 3 feet
	9-10	Sand, fine-grained, light-gray, very fine grained heavies abundant, Mulinia, quartz and some phosphate pebbles present
WANDO FM (MIDDLE MEM)	10-15	Sand, fine-grained, light-gray grading to medium-gray, very fine grained heavies abundant, well sorted, increasingly shelly downward (diverse bivalves and snails)
	15-19	Peat, dark-brown
	19-20	Clay, dark-gray, sticky

Base of Silver Bluff (Holocene): -2 feet below sea level
Bottomed in Wando Formation (middle member)

FM-27: 1.55 mi. W of east quad. border, 1.45 mi. S of north quad. border. Surface elevation 11 feet.

WANDO FM (UPPER MEM)	0-12	Sand, fine-grained with bimodal coarse-grained to pebbly fraction, medium-orange (0-1) grading to light-gray, shelly below 7 feet (mostly Mulinia)
	12-13	Clay, medium-blue, silty, oysters abundant
(MIDDLE MEM)	13-45	Shell hash, medium-grained, white, mostly Mulinia and some oyster
DANIEL ISLAND BEDS	45-55	Silt and clay, medium-blue, contains sand-filled burrows in lower half of section

Base of Wando Formation (upper member): -2 feet below sea level
Base of Wando Formation (middle member): -34 feet below sea level
Bottomed in Daniel Island beds

FM-28: 1.95 mi. E of west quad. border, 3.0 mi. N of south quad. border. Surface elevation 5 feet (ditch bank).

UPPER HOLOCENE	0-3	Sand, fine-grained, pale-brown, well sorted, stumps of trees on basal contact rooted in unit below yielded a ^{14}C date of 950±100 years (USGS Radiocarbon Lab Report 5039)
WANDO FM (UPPER MEM)	3-5	Sand, fine-grained, medium-gray, Mulinia abundant

Base of upper Holocene: +3 feet above sea level
Bottomed in Wando Formation (upper member)