

OPERATOR: J & J Enterprises
 FARM: E. G. Taylor
 WELL: No. 1-G
 LOCATION: Approximately 1.75 miles ESE of Temperanceville,
 Accomack County, Virginia.
 4850' west of longitude 75°30'W.
 3350' north of latitude 37°52'30" N.
 ELEVATION: 52.5 KB, 51.5 DF, 42.0 GL
 TOTAL DEPTH: 6272
 DRILLING COMMENCED: 3/71
 DRILLING COMPLETED: 4/71
 RESULT: D & A

GEOLOGIC LOG

<u>Depth (feet)</u>	<u>Lithologic Description</u>
<u>COLUMBIA GROUP (0-160)</u>	
0 -10	<u>Quartz Sand</u> - Clear, Medium-grained, fair sorting (M-VC) subrounded, abundant iron stain imparts orange color to gross sample.
10-20	" - except: Slightly better sorted (M-C), less iron stain (gross sample appears light tan).
20-30	" - except: Coarse-grained, fair sort (M-VC), only a trace of iron stain, trace of clay.
30-40	<u>Quartz Sand</u> - Clear, medium-grained, well-sorted, sub-rounded to subangular, abundant iron stain imparts orange color to gross sample, trace of white - pale green micaceous clay.
40-50	" - except: Coarse-grained.
50-60	<u>Quartz Sand to Gravel</u> - Clear, very coarse-grained, fair sorting (VC-peb), rounded, trace of feldspar, trace of black chert.
60-70	" - except: Better sorted (C-grain) due to decrease in gravel content.
70-80	<u>Quartz Sand</u> - Clear, coarse-grained, good sorting (C-VC), subrounded, trace of black chert, trace of rock fragments.
80-90	" - except: Fair sorting (M-VC), 10 percent rock fragments.
90-100	" - except: Medium-grained, well-sorted.

- 100-10 Quartz Sand - Clear, very coarse-grained, fair sorting (M-VC), trace of rock fragments, iron stain (yellow) on 10 percent of quartz grains
- 110-20 " - except: Coarse-grained, better sorted
- 120-30 " - except: Trace of feldspar
- 130-60 Quartz Sand - Clear and light gray with distinct greenish stain (probably caused by finely disseminated glauconite), medium-grained, good sorting (M-C), subrounded to subangular, 10 percent glauconite, trace of feldspar

YORKTOWN FORMATION (160-790)

- 160-70 Quartz Sand - Light gray, medium-grained, good sorting (M-C), subrounded, 10 percent glauconite, 15 percent chalky fossil fragments (mollusks, spines, worm tubes, Bryozoans).
- 170-80 " - except: Fewer fossils, less glauconite, faint green stain on particles probably caused by finely disseminated glauconite
- 180-90 " - except: Even fewer fossils, even less glauconite
- 190-200 Quartz Sand - Light gray, coarse-grained, well-sorted, subrounded, 15 percent chalky fossil fragments (mollusks, spines, vertebrae), some fossil fragments are phosphatized
- 200-20 " - except: Trace of fossil fragments
- 220-30 Quartz Sand - Medium gray, medium-grained, good sorting (subrounded, 10 percent glauconite (distinct greenish stain on some particles probably from glauconite), trace fossil fragments, trace phosphorite
- 230-40 No sample
- 240-50 Quartz and Shell Gravel - Light gray, granule, fair sorting, (VC-peb), subrounded, 15 percent large chalky fossil fragments (mollusks)
- 250-60 Quartz Sand - Light gray, coarse-grained, good sorting (C-VC), subrounded, glauconite (some green staining probably caused by finely disseminated glauconite), trace chalky fossil fragments (mollusks)
- 260-70 Quartz Gravel - Light gray, coarse-grained, poor sorting (C-Peb), subrounded, quartz and quartzite fragments, trace of weathered chert, fossil fragments

- 270-80 " - except: Medium gray, very poor sorting (F-peb)
- 280-310 Quartz Sand - Medium gray, medium grained, good sorting, sub-angular, 25 percent glauconite, abundant chalky fossil fragments (mollusks, spines, bryozoans) some finely comminuted, trace phosphorite
- 310-60 Shell Gravel - Pebble, good sorting (granule - pebble), worn chalky fragments (mostly mollusks) appear thin and "flaky" in gross aspect, trace green silty clay in shell cavities, very clean - no fine material, trace quartz gravel (granule)
- 360-70 " - except: 30 percent admixed quartz sand, light gray, medium-grained, subrounded, glauconitic
- 370-430 Shell Gravel - Pebble, good sorting, thick "massive" fragments (mostly mollusks), very clean - no fine material, green glauconitic silty quartz sand occurs in cavities in fossils and as hard fragments the same size as fossil fragments
- 430-40 Quartz Sand - Medium gray, medium grained, well sorted, subrounded to subangular, 15 percent glauconite, 15 percent chalky fossil fragments (mostly mollusks), trace phosphorite, some quartz grains are water-clear and some are green-tinged probably by glauconite
- 440-70 No sample
- 470-90 Quartz Sand - Light gray, medium grained, good sorting (M-C), subrounded, some quartz grains are green-tinged probably by glauconite, 15 percent glauconite, 5 percent chalky fossil fragments (mostly mollusks), trace phosphorite.
- 490-520 No sample
- 520-30 Quartz Sand - Light gray, medium grained, good sorting (M-C), subrounded, 15 percent glauconite, trace chalky fossil fragments (mostly mollusks), trace phosphorite, some quartz grains green-tinged probably by glauconite, some quartz grains stained yellow
- 530-40 No sample
- 540-50 Quartz Sand - Light gray, medium grained, good sorting (M-C), subrounded, 15 percent glauconite, trace chalky fossil fragments (mostly mollusks), trace phosphorite, some quartz grains green-tinged probably by glauconite
- 550-60 No sample

- 560-70 Quartz Sand - Light gray, coarse grained, fair sorting (M-VC), rounded, 10 percent glauconite, 10 percent phosphorite, 10 percent fossil fragments (mostly mollusks), trace quartz gravel
- 570-80 Shell Gravel - Pebble, mollusks, spines, calcite - cemented fragments of pale gray-green silty quartz sand
- 580-600 No sample
- 600-10 Quartz Sand - Medium gray, coarse-grained, fair sorting (M-VC), subrounded, some quartz grains green-tinged probably by glauconite, 10 percent glauconite, 10 percent fossil fragments (some chalky, some not, some phosphatized), 5 percent phosphorite, trace quartz gravel
- 610-20 " - except: 20 percent fossil fragments, 15 percent glauconite, trace phosphorite
- 620-30 " - except: Few fragments consisting of quartz sand grains slightly cemented with tan clay
- 630-40 " - except: 15 percent fossil fragments, 10 percent glauconite, 10 percent phosphorite
- 640-50 No sample
- 650-60 Quartz Sand - Clear, very coarse-grained, fair sorting (M-VC), subrounded, 5 percent glauconite, 5 percent phosphorite, 5 percent fossil fragments (mollusks), some quartz grains green-tinged probably by glauconite, trace quartz gravel
- 660-70 " - except: Coarse-grained, good sorting (C-VC), no green stain, pervasive yellow stain and clay coatings on quartz grains
- 670-80 Quartz Sand - Clear, very coarse-grained, fair sorting (M-VC) subrounded to well-rounded, 10 percent glauconite, 10 percent phosphorite, 15 percent fossil fragments (mostly mollusks), some quartz grains green-tinged probably by glauconite
- 680-90 Quartz Sand - Medium gray, medium grained, good sorting (M-C), subrounded, 15 percent glauconite, 5 percent phosphorite, 10 percent fossil fragments, some quartz grains green-tinged probably by glauconite
- 690-700 Quartz Sand - Clear, coarse-grained, fair sorting (M-VC), subrounded, 10 percent glauconite, 10 percent phosphorite, 15 percent fossil fragments, some quartz grains green-tinged probably by glauconite

- 700-10 Quartz Sand - Medium gray, medium-grained, fair sorting (M-VC), subrounded, 10 percent glauconite, 10 percent phosphorite, 20 percent fossil fragments, trace quartzite fragments, trace green stain on some quartz grains
- 710-20 " - except: Very coarse-grained, 30 percent fossil fragments (mollusks, spines), 5 percent quartz gravel
- 720-30 " - except: Medium-grained
- 730-40 Shell Gravel - Granule to pebble, mostly mollusks, some fragments of cemented gray-green silty quartz sandstone, very clean - no fine material
- 740-60 " - except: Some shells very chalky, some not, sandy limestone fragments
- 760-70 " - except: Trace gray-green sandy clay
- 770-80 " - except: 5 percent clay
- 780-90 " - except: 50 percent shells, 50 percent clayey quartz sand.

CALVERT FORMATION (790-1270)

- 790-800 Clay - Gray, silty, sandy, trace mollusk fragments, diatomaceous (confirmed with petrographic microscope)
- 800-10 Quartz Sand - Dark gray, medium-grained, poor sorting (vf-m), subangular, silty, argillaceous, phosphorite, trace quartz sandstone
- 810-20 Clay - Gray, very sandy, very silty
- 820-50 Quartz Sand - Light gray, medium grained, well sorted, subrounded, 10 percent phosphorite, trace glauconite, trace comminuted fossil fragments (mollusks, spines), trace silt
- 850-80 Clay - Gray, sandy, silty, diatomaceous
- 880-900 No sample
- 900-10 Quartz Sand - Medium gray, medium grained, good sorting (M-C), subrounded, 10 percent phosphorite, trace glauconite, trace quartzite pebbles, trace clay, Foraminifera (Siphogenerina)
- 910-20 " - except: Coarse-grained, fair sorting (f-vc), 10 percent fossil fragments (mollusks, spines), 10 percent clay
- 920-40 Clay - Gray, sandy, silty, fossil fragments
- 940-50 Clay - Medium gray
- 950-70 Clay - Gray, very sandy, very silty, 5 percent phosphorite, 5

- 950-70 percent glauconite, trace fossil fragments, trace mica
- 970-80 Quartz Sand - Gray to tan, medium-grained, fair sorting (M-VC), subangular, very silty
- 980-1000 Quartz Sand - Medium gray, medium-grained, good sorting (M-C), subangular, to subrounded, 5 percent phosphorite, trace glauconite, trace finely comminuted fossil fragments
- 1000-1020 Clay - Gray, very sandy, very silty, 5 percent phosphorite, trace mica
- 1020-50 Quartz Sand - Gray, medium-grained, good sorting (M-C), subrounded, 5 percent glauconite, 5 percent phosphorite, trace fossil fragments
- 1050-60 " - except: 10 percent phosphorite, trace glauconite, some quartz grains faintly green-tinged probably from glauconite
- 1060-70 " - except: Coarse-grained
- 1070-80 " - except: Medium-grained
- 1080-1100 " - except: Coarse-grained
- 1100-10 " - except: 10 percent fossil fragments, Foraminifera (Robulus)
- 1110-1150 Quartz Sand - Gray, medium-grained, fair sorting (F-C), subangular, 5 percent phosphorite, 5 percent glauconite, trace fossil fragments, Foraminifera (Siphogenerina, Robulus, Dentalina), micaceous, some quartz grains, slightly green-tinged probably from glauconite
- 1150-60 Quartz Sand - Medium gray, coarse-grained, good sorting (C-VC), subrounded, 5 percent phosphorite, 5 percent glauconite, 10 percent fossil fragments (mollusks, spines)
- 1160-70 " - except: Medium-grained, good sort (M-C), subangular, Foraminifera (Robulus, Siphogenerina)
- 1170-90 Quartz Sand - Medium gray, coarse-grained, good sorting (C-VC), subrounded, 5 percent phosphorite, 5 percent glauconite, 10 percent fossil fragments (mollusks, spines)
- 1190-1200 " - except: Medium-grained, good sorting (M-C), subangular, Foraminifera
- 1200-10 Clay - Brown, silty, interbedded with quartz sand, Foraminifera (Robulus, Siphogenerina)

- 1210-20 Quartz Sand - Medium gray, medium -grained, fair sorting (F-C), subangular, 5 percent phosphorite, 5 percent glauconite, Foraminifera, micaceous, some quartz grains green-tinged probably by glauconite
- 1220-40 Clay - Greenish-gray, silty, sandy
- 1240-50 Quartz Sand - Medium gray, coarse-grained, fair sorting (F-C), subangular, 5 percent phosphorite, 5 percent glauconite, Foraminifera, Micaceous
- 1250-60 " - except: Some quartz grains green-tinged probably by glauconite
- 1260-70 Clay - Greenish-gray, silty, sandy

NANJEMOY FORMATION (1270-1520)

- 1270-90 Quartz Sand - Dark gray, medium-grained, fair sorting (F-C), subangular, 25 percent glauconite, abundant spines, Foraminifera, (tentatively identified as Marginulina anconoides Hussey of Eocene age)
- 1290-1300 " - except: Trace muscovite, some clay laminations
- 1300-40 Quartz Sand - Dark gray, medium-grained, fair sorting (F-C), subangular, 10 percent glauconite, trace muscovite, Foraminifera (Robulus, Siphogenerina, Marginulina), spines, argillaceous
- 1340-50 Clay - Brown, silty, glauconitic, very micaceous, fossiliferous
- 1350-60 Clay - Tan, clean
- 1360-80 Clay - Tan, silty, glauconitic, very micaceous, abundant mollusk shells
- 1380-90 " - except: Glauconitic lime mud filling some cavities in fossils
- 1390-1400 Clay - Brown, silty, sandy, micaceous, abundant glauconite, fossiliferous (including mollusk molds), interbedded with clean, tan clay
- 1400-10 Clay - Tan, silty, micaceous, glauconitic, abundant mollusk fragments
- 1410-20 " - except: Sandy, finely comminuted fossil debris
- 1420-40 Clay - Tan, very sandy, large fossil fragments grading downward to very sandy, less fossiliferous clay

- 1440-80 Clay - Dark brown, very glauconitic, sandy, trace fossil fragments, may grade to very clayey glauconitic sand in part
- 1480-90 Quartz Sand - Medium brown, medium-grained, fair sorting (F-C), subangular, glauconite, trace phosphorite, trace very chalky fossil debris
- 1490-1500 Clay - Dark gray, very glauconitic, sandy, trace fossil fragments
- 1500-10 " - except: Dark brown
- 1510-20 Quartz and Glauconite Sand - Dark gray, coarse-grained, good sorting (C-VC), subrounded (quartz) to rounded (glauconite), equal portions of each component, trace phosphorite, Foraminifera (tentatively identified as Marginulina anconoides Hussey of Eocene age)

MATTAPONI FORMATION AND "TRANSITIONAL BEDS" (1520-1790)

- 1520-40 Quartz Sand - Light brown, medium-grained, good sorting (M-C), subangular, 5 percent glauconite, abundant mica, abundant fossil debris (chalky mollusk fragments), trace feldspar
- 1540-60 " - except: Fewer fossil fragments
- 1560-70 " - except: Phosphatized fossil fragments
- 1570-80 Quartz Sand and Shell Bed - Dark gray, medium-grained, well-sorted, subangular, trace glauconite, abundant shell fragments (chalky mollusks)
- 1580-1620- No sample
- 1620-30 Quartz Sand - Light gray, coarse-grained, good sorting (C-VC), subangular, trace mica, pyrite, lignite, feldspar, trace fossil fragments (mollusks), carbonate laminations
- 1630-40 " - except: Only a trace of lignite, fossil fragments, and pyrite
- 1640-50 " - except: Noticeable rust-colored stain on quartz grains
- 1650-60 Quartz Sand - Dark gray, coarse-grained, fair sorting (M-VC), subangular, trace glauconite, quartzite, mica, pyritized lignite, chalky mollusk fragments, trace lime mudstone
- 1660-70 Quartz Sand and Shell Bed - Medium gray-brown, very coarse-grained, fair sorting (M-VC), subangular, 10 percent glauconite, chalky fossil fragments, pervasive rust-colored stain
- 1670-80 Quartz Sand - Light gray, coarse-grained, good sorting (C-VC), subangular, trace glauconite, trace chalky mollusk fragments, pervasive rust-colored stain, trace granule gravel, feldspar

- 1680-90 " - except: More shells, more glauconite
- 1690-1700 Quartz Sand - Medium gray, coarse-grained, good sorting (M-C), subangular, 15 percent lignite, trace pyrite, trace quartz pebbles, trace carbonate laminations, abundant fossil fragments
- 1700-20 Quartz Sand and Shell Bed - Medium gray, coarse-grained, poor sorting, (M-VC), abundant chalky mollusk fragments, lignite, rust-colored stain, carbonate laminations
- 1720-30 Quartz Sand - Light brown, fine-grained, good sorting (F-M), subangular, mollusk fragments, abundant lignite, trace mica, glauconite
- 1730-40 " - except: 10 percent brown altered glauconite, less lignite
- 1740-50 " - except: Coarse-grained, good sorting (M-C)
- 1750-60 " - except: Speckled brown and gray, fair sorting (F-C), 30 percent brown altered glauconite, some green glauconite, feldspar, rust-colored stain
- 1760-70 " - except: Very argillaceous (partly lithified)
- 1770-80 Glauconite Sand - Dark brown, very coarse-grained, well sorted, rounded, very argillaceous, slightly cemented, trace quartz sand, trace red clay, trace mollusk fragments
- 1780-90 " - except: More quartz sand

PATUXENT FORMATION (1790-6070)

- 1790-1800 Quartz Sand - Light gray, very coarse-grained, fair sorting (M-VC), subangular, mica, feldspar, trace lignite
- 1800-10 " - except: Coarser grained, 10 percent brown altered glauconite, trace rust-colored stain
- 1810-20 " - except: Very coarse-grained, trace lignite
- 1820-30 Glauconite Sand - Dark brown, very coarse-grained, well sorted, rounded, brown altered glauconite, trace mollusk fragments, trace red clay
- 1830-40 Quartz Sand - Medium gray, medium grained, good sorting (M-C), subangular, muscovite, trace red clay, birdseye vugs
- 1840-50 Quartz Sand - Medium gray, very coarse-grained, good sorting (C-VC), subangular, muscovite, trace lignite
- 1850-60 " - except: Coarse-grained, fair sorting (M-VC)
- 1860-80 " - except: Light gray, brown

- 1880-90 Quartz Sand - Light gray, coarse-grained, good sorting (M-C)
subangular, mica, trace lignite
- 1890-1910 Quartz Sand - Dark brown, coarse-grained, poor sorting (clay-VC),
subangular, very argillaceous
- 1910-20 Quartz Sand - Medium gray-brown, coarse-grained, good sorting
(C-VC), subangular, trace red clay, trace rust colored stain
- 1920-30 " - except: Micaceous
- 1930-40 " - except: Medium-grained, good sorting (M-C)
- 1940-50 Quartz Sand - Light gray, coarse-grained, fair sorting (M-VC),
subangular, muscovite, biotite
- 1950-60 " - except: Good sorting (C-VC)
- 1960-70 Quartz Sand - Medium brown, coarse-grained, fair sorting (M-VC),
subangular, mica, trace red clay
- 1970-80 " - except: Very argillaceous
- 1980-2000 Quartz Sand - Dark brown, very coarse-grained, good sorting
(VC-gran), subrounded, trace fossil fragments, trace red clay,
very argillaceous
- 2000-10 Quartz Sand - Medium gray-brown, medium-grained, good sorting
(M-C), subangular, mica
- 2010-20 " - except: Light gray
- 2020-30 Quartz Sand - Dark brown, very coarse-grained, good sorting
(VC-gran), subrounded, trace red clay, trace silt, trace
phosphatized fossils (spines), very argillaceous
- 2030-40 Quartz Sand - Medium brown, medium-grained, good sorting (M-C),
subangular, mica, lignite
- 2040-50 " - except: Slightly coarser-grained
- 2050-60 Quartz Sand - Light gray, coarse-grained, good sorting (C-VC),
subangular, mica
- 2060-70 Quartz Sand - Medium brown, medium-grained, fair sorting (f-c),
subangular
- 2070-80 Quartz Sand - Medium gray, coarse-grained, poor sorting (M-gran),
subangular, lignite, red clay
- 2080-90 Quartz Sand - Medium gray-brown, medium-grained, good sorting
(M-C), subangular, abundant lignite
- 2090-2100 Quartz Sand - Medium gray-brown, coarse-grained, fair sorting
(M-VC), subangular, mica

- 2100-10 Quartz Sand - Dark brown, coarse-grained, good sorting (C-VC), subrounded, silty, trace lignite, trace brown glauconite, trace phosphorite, trace mollusk fragments
- 2110-20 Quartz Sand - Medium gray, coarse-grained, fair sorting (M-Vc), subangular, mica, abundant lignite, trace glauconite
- 2120-30 Quartz Sand - Dark brown, coarse-grained, fair sorting (M-VC), subangular, mica, abundant lignite, trace red clay, trace glauconite, argillaceous
- 2130-40 Quartz Sand - Medium brown, very coarse-grained, good sorting (C-VC), subangular, trace red clay, trace brown glauconite, 5 percent mollusk fragments, less argillaceous than overlying sample
- 2140-50 Quartz Sand - Dark brown, very coarse-grained, poor sorting (clay - VC), subangular, 30 percent clay, mica, glauconite, lignite, finely comminuted shell debris
- 2150-60 " - except: Also red clay
- 2160-70 Quartz Sand - Medium brown, coarse-grained, poor sorting (f-VC), subangular, 5 percent glauconite, lignite, red clay, mica, trace chalky mollusk fragments
- 2170-80 " - except: Medium-grained, good sorting (M-C)
- 2180-90 Quartz Sand - Dark brown, very coarse-grained, good sorting (C-gran), subangular, mica, black glauconite, brown glauconite, red clay, abundant chalky fossil fragments
- 2190-2200 Quartz Sand - Medium brown, coarse-grained, fair sorting (M-VC), subangular, mica, lignite, phosphorite, glauconite, chalky mollusk fragments
- 2200-20 Quartz Sand - Medium brown, very coarse-grained, good sorting (C-VC), subangular, mica, red clay, glauconite, slightly cemented
- 2220-30 " - except: Coarse-grained, good sorting (C-VC)
- 2230-40 " - except: Very coarse-grained, trace lignite
- 2240-50 Quartz Sand - Medium gray, coarse-grained, good sorting (C-VC), subangular, mica, trace lignite, trace red clay, 10 percent glauconite
- 2250-70 Quartz Sand - Medium brown, coarse-grained, good sorting (C-VC), subangular, mica, glauconite, red clay

- 2270-80 " - except: Very coarse-grained, good sorting (C-VC)
- 2280-90 Quartz Sand - Medium brown, coarse-grained, poor sorting (clay-VC), subangular, mica, red clay, lignite, glauconite
- 2290-2300 Quartz Sand - Medium gray, coarse-grained, fair sorting (M-VC), subangular, mica, red clay, glauconite, trace chalky mollusk fragments
- 2300-10 Quartz Sand - Brown, very coarse-grained, good sorting (C-VC), subangular, mica, red clay, glauconite, slightly cemented
- 2310-20 " - except: Coarse-grained, good sorting (C-VC)
- 2320-40 Quartz Sand - Medium gray, very coarse-grained, good sorting (C-VC), subangular, mica, red clay, glauconite
- 2340-60 " - except: Coarse-grained
- 2360-70 " - except: Medium-grained, good sorting (M-C)
- 2370-80 Quartz Sand - Light gray, medium-grained, good sorting (M-C), subangular, abundant muscovite, glauconite, trace biotite
- 2380-90 Quartz Sand - Medium brown, coarse-grained, good sorting (C-VC), subangular, mica, glauconite
- 2390-2410 " - except: Very coarse-grained, good sorting (C-VC)
- 2410-20 Quartz Sand - Light gray, coarse-grained, fair sorting (M-VC), subangular, mica, glauconite, red clay
- 2420-30 " - Poorer sorting (f-VC)
- 2430-40 Quartz Sand - Medium gray, coarse-grained, fair sorting (M-VC), subangular, mica, trace red clay, trace green clay, glauconite
- 2440-50 " - except: Medium-grained, good sorting (M-C)
- 2450-60 Quartz Sand - Light gray, medium-grained, fair sorting (M-VC), subangular, mica, clay
- 2460-2500 Quartz Sand - Medium gray-brown, medium-grained, poor sorting (silt-VC), subangular, mica, red and brown clay, glauconite, lignite, slightly cemented
- 2500-60 " - except: Dark brown
- 2560-80 Quartz Sand - Medium brown, very coarse-grained, good sorting (C-VC), subrounded, chalky mollusk fragments, red clay, glauconite, trace rust-colored stain
- 2580-2600 Quartz Sand - Medium brown, medium-grained, very poor sorting (silt-granule), subangular, mica, glauconite, red clay, trace rust-colored stain

- 2600-10 Quartz Sand - Light gray, coarse-grained, fair sorting (M-VC), subangular, trace mica, red clay, glauconite, trace chalky mollusk fragments, trace phosphatized fossil fragments
- 2610-20 " - except: Good sorting (C-VC)
- 2620-30 " - except: Fair sorting (M-VC)
- 2630-40 Quartz Sand - Dark brown, very coarse-grained, poor sorting (clay-VC), subangular, red clay, mica, glauconite, trace chalky mollusk debris, argillaceous
- 2640-50 " - except: Medium-grained
- 2650-60 " - except: Very coarse-grained
- 2660-70 " - except: Coarse-grained
- 2670-80 Quartz Sand - Light gray, coarse-grained, fair sorting (M-VC), subrounded, trace mica, glauconite
- 2680-90 Quartz Sand - Medium brown, coarse-grained, poor sorting (clay-VC), subangular, red clay, mica, glauconite
- 2690-2700 " - except: Very coarse-grained
- 2700-10 " - except: Slightly improved sorting
- 2710-20 Quartz Sand - Light gray, coarse-grained, fair sorting (M-VC), subrounded, trace mica, glauconite, trace phosphorite, red clay, brown clay
- 2720-30 Quartz Sand - Medium brown-gray, very coarse-grained, well-sorted, subangular, trace chalky fossil debris, trace phosphatized fossil fragments, mica, red clay, brown clay, gray clay
- 2730-40 " - except: Rust-colored stain
- 2740-50 " - except: Dark brown, silty, argillaceous
- 2750-60 " - except: Medium brown
- 2760-70 Quartz Sand - Medium gray, medium - (90 percent) to coarse-grained (10 percent), fair sorting (M-VC), subangular, trace red clay, trace gray clay
- 2770-80 Quartz Sand - Light gray, coarse-grained, good sorting (C-VC), subangular, mica, trace gray clay, glauconite
- 2780-90 " - except: Very coarse-grained
- 2790-2800 " - except: Medium brown, silty, argillaceous, trace red clay

- 2800-10 Quartz Sand - Light gray, coarse-grained, good sorting (C-VC), subangular, trace mica, trace red, gray, and green clays
- 2810-60 " - except: Trace glauconite
- 2860-70 " - except: Fair sorting (M-VC)
- 2870-2910 " - except: Very coarse-grained, good sorting (C-VC), mica, trace gray clay
- 2910-20 Quartz Sand - Light gray, coarse-grained, good sorting (C-VC), subangular, trace mica, trace gray clay, black and brown glauconite
- 2920-30 " - except: Light brown, very coarse-grained
- 2930-40 " - except: Slightly argillaceous
- 2940-50 " - except: Clean, not argillaceous
- 2950-60 " - except: Slightly argillaceous
- 2960-80 Quartz Sand - Light gray, very coarse-grained, good sorting (C-VC), subangular, trace phosphatized fossil fragments, trace green, gray, and red clays
- 2980-90 " - except: Very coarse-grained, good sorting (VC-granule), subrounded to subangular
- 2990-3000 " - except: Very coarse-grained, good sorting (C-VC)
- 3000-10 Quartz Sand - Clear, very coarse-grained, well-sorted, subangular, trace coal, trace red and yellow-green clays, trace muscovite, slightly cemented
- 3010-30 " - except: Trace feldspar, trace lignite, trace yellow stain
- 3030-40 " - except: Trace chalky mollusk debris
- 3040-60 Quartz Sand - Clear to light gray, medium-grained, good sorting (M-C), angular, trace muscovite, trace pale green-yellow stain
- 3060-70 " - except: Trace feldspar
- 3070-3100 " - except: Trace red clay shale, dark gray grains probably smoky quartz or chert, carbonaceous material containing abundant pyrite
- 3100-10 Quartz Sand - Clear, very coarse-grained, well sorted, angular, trace green and red clays, muscovite, feldspar, pale purple quartz

- 3110-20 " - except: Good sorting (C-VC)
- 3120-30 " - except: Coarse-grained
- 3130-40 Quartz Sand - Clear to light gray, medium to coarse-grained, fair sorting (M-VC), angular, distinctly bimodal grain size distribution, muscovite, feldspar, rock fragments, yellow stain on quartz grains
- 3140-50 " - except: Coarse-grained, good sorting (C-VC), pale purple quartz
- 3150-60 Quartz Sand - Clear to light gray, coarse-grained, good sorting (C-VC), angular, muscovite, purple quartz, green clay, trace granule gravel, yellow stain on quartz grains
- 3160-70 " - except: Fine to very coarse-grained, poor sorting (f-VC), angular, muscovite, feldspar, maroon clay
- 3170-80 " - except: Improved sorting (C-VC)
- 3180-90 Quartz Sand - Light gray, very coarse-grained, fair sorting (M-VC), angular, muscovite, biotite, feldspar
- 3190-3200 Quartz Sand - Light brown, very coarse-grained, well sorted, angular, feldspar
- 3200-10 " - except: Maroon clay
- 3210-20 Quartz Sand - Light gray, very coarse-grained, good sorting (C-VC), angular, feldspar, pale purple quartz, muscovite
- 3220-30 " - except: Coarse-grained
- 3230-40 Quartz Sand - Dark brown, medium-grained, poor sorting (f-VC), angular, 20 percent brown-maroon clay, muscovite
- 3240-50 " - except: Coarse to very coarse-grained, good sorting (C-VC)
- 3250-60 Quartz Sand - Medium brown, coarse-grained, fair sorting (M-VC), angular, muscovite, feldspar, color caused by brown-yellow and Maroon clays in sample
- 3260-70 " - except: Poor sorting (f-VC)
- 3270-80 " - except: Good sorting (C-VC)
- 3280-90 " - except: Poor sorting (f-VC)
- 3290-3300 Quartz Sand - Clear, very coarse-grained, well-sorted, angular, feldspar, maroon clay, trace brown-yellow clay

- 3300-10 " - except: Good sorting (C-VC)
- 3310-20 " - except: Fair sorting (M-VC)
- 3320-40 Quartz Sand - Light gray, coarse-grained, good sorting (C-VC), angular, purple and green clays, muscovite, feldspar
- 3340-50 " - except: Maroon clay
- 3350-60 Quartz Sand - Medium brown, very coarse-grained, poor sorting (f-VC), angular, purple quartz, feldspar, maroon and yellow-brown clays
- 3360-70 " - except: Trace chalky mollusk debris
- 3370-3400 " - except: No mollusk debris
- 3400-20 " - except: Good sorting (C-VC), trace coal
- 3420-40 " - except: Angular to subangular
- 3440-50 " - except: Green and red micaceous silt
- 3450-60 Quartz Sand - Gray, medium-grained, good sorting (M-C), angular, red and brown-yellow clays, feldspar, coarse-grained portion of sample apparently caved from above
- 3460-80 " - except: Very little clay
- 3480-90 Quartz Sand - Medium brown, very coarse-grained, good sorting (VC-granule), angular, feldspar, maroon and brown-yellow clays
- 3490-3500 " - except: Quartz Gravel - Granule
- 3500-10 Quartz Sand - Gray, coarse-grained, good sorting (C-VC), angular, feldspar, muscovite, maroon and brown clays
- 3510-20 Quartz Gravel - Brown to gray, granular, good sorting (VC-granule), angular, feldspar
- 3520-30 Quartz Sand - Brown, coarse-grained, poor sorting (M-granule), angular, abundant maroon clay fragments of granular size, feldspar, green clay
- 3530-40 " - except: Sand more abundant, gravel less abundant
- 3540-50 Clay - Red and green, silty
- 3550-60 Quartz Sand - Gray, coarse-grained, fair sorting (M-VC), angular, maroon clay, feldspar

- 3560-70 Quartz Gravel - Brown, granular, fair sorting (VC-pebble), subangular, feldspar, brown and maroon clays of granular grain size
- 3570-80 " - except: Trace lignite, increase in amount of clay
- 3580-90 Clay - Dominantly maroon, some yellow-brown, finely laminated, some green silty micaceous
- 3590-3600 Quartz Sand - Brown, very coarse-grained, fair sorting (C-granule), angular, maroon and brown - yellow clay fragments of granular grain size, feldspar
- 3600-20 Quartz Sand - Gray, very coarse-grained, good sorting (C-VC), angular, feldspar, some granule quartz gravel
- 3620-30 " - except: Maroon clay, and green, silty, micaceous clay
- 3630-50 Quartz Sand - Gray, coarse-grained, good sorting (C-VC), angular, feldspar, muscovite, maroon and green, silty, micaceous clays
- 3650-80 " - except: Trace granule gravel
- 3680-3700 " - except: Quartzite rock fragments
- 3700-10 Quartz Sand - Gray, medium-grained, poor sorting (f-VC), angular, feldspar, muscovite, trace chalky mollusk fragments
- 3710-20 Quartz Sand - Gray, very coarse-grained, good sorting (C-VC), subangular, abundant maroon and green, silty, micaceous and yellow brown clays
- 3720-30 " - except: 30-40 percent clay
- 3730-40 " - except: Less clay, mostly of the green, silty, micaceous type
- 3740-60 " - except: Trace quartzite rock fragments
- 3760-70 Quartz Sand - Gray, coarse-grained, good sorting (C-VC), angular, feldspar
- 3770-90 Quartz Sand and Gravel - Gray, very coarse-grained to granule, good sorting (VC-granule), angular to subangular
- 3790-3800 Clay - Maroon and green, silty, micaceous and yellow-brown clays, coarse-grained quartz sand and granular quartz gravel

- 3800-10 Quartz Sand and Gravel - Brown (color of Sample due to clays), very coarse-grained, fair sorting (VC-pebble), subangular, feldspar, maroon and green, silty, micaceous clays
- 3810-20 Quartz Sand - Brown (color of sample due to clays), very coarse-grained, good sorting (VC-granule), angular, feldspar, greatly diminished amount of clay
- 3820-30 Quartz Sand - Gray, coarse-grained, fair sorting (M-VC), angular feldspar, small amount of clay
- 3830-40 " - except: very coarse-grained, good sorting (VC-granule)
- 3840-50 Quartz Sand and Gravel - Brown, very coarse-grained, good sorting (VC-granule), subangular
- 3850-80 Quartz Sand - Gray, very coarse-grained, good sorting (VC-granule), angular, feldspar, small amount of clay
- 3880-90 Quartz Gravel - Brown, granule, fair sorting, subangular
- 3890-3900 Quartz Sand - Gray, very coarse-grained, good sorting (VC-granule), subangular
- 3900-20 Quartz Sand - Brown, very coarse-grained, fair sorting (C-granule), subangular, feldspar, maroon and green, silty, micaceous and yellow-brown clays (the clays impart the brown color to the sample)
- 3920-30 " - except: Coarse-grained sand more abundant, granule gravel less abundant
- 3930-40 Quartz Sand - Gray, very coarse-grained, fair sorting (C-granule), angular, feldspar, pale purple quartz, no clay
- 3940-50 " - except: Good sorting (VC-granule)
- 3950-70 " - except: No purple quartz
- 3970-80 " - except: Abundant granule gravel, well-sorted
- 3980-90 " - except: Good sorting (VC-granule), purple quartz, trace chalky mollusk fragments
- 3990-4000 Quartz Sand - Light brown, coarse-grained, well-sorted, subangular, admixture of very fine-grained sand and silt
- 4000-10 Quartz Sand - Gray, very coarse-grained, good sorting (VC-granule), angular, feldspar
- 4010-20 " - except: Coarse-grained, argillaceous, purple quartz, muscovite

- 4020-30 " - except: No clay, trace mollusk fragments, trace feldspar
- 4030-40 " - except: Very coarse-grained
- 4040-50 " - except: Coarse-grained
- 4050-60 Quartz Sand - Gray, very coarse-grained, good sorting (VC-granule), angular, trace mollusk fragments, trace feldspar
- 4060-70 " - except: Coarse-grained, argillaceous, slightly brown in color due to clay portion of sample
- 4070-80 " - except: Very coarse-grained, purple quartz
- 4080-90 " - except: Coarse-grained, fair sorting (f-c), admixed silt, slightly argillaceous
- 4090-4100 " - except: slightly better sorted (fines disappear)
- 4100-10 " - except: Sorting worsens (more silt and clay appear)
- 4110-20 " - except: Good sorting (M-C), no silt or clay
- 4120-30 " except: Very coarse-grained, good sorting (C-VC), no clay
- 4130-40 " - except: Trace maroon clay
- 4140-50 " - except: No clay, no mollusks, trace purple quartz
- 4150-80 Quartz Sand - Gray, coarse-grained, good sorting (C-VC), angular, trace chalky mollusk fragments, trace feldspar
- 4180-90 " - except: Trace purple quartz
- 4190-4200 " - except: No mollusks
- 4200-10 " - except: Well-sorted
- 4210-20 " - except: Abrupt increase in grain size to very coarse-grained, muscovite, feldspar, trace chalky mollusk fragments, purple quartz, some rust-colored staining
- 4220-30 " - except: Coarse-grained, good sorting (C-VC), no rust-colored stain
- 4230-80 " - except: Coarse to very coarse-grained, sorting slightly poorer
- 4280-90 " - except: Increase in grain size to very coarse-grained
- 4290-4330 " - except: Decrease in grain size to coarse-grained

- 4330-40 Quartz Sand - Gray, very coarse-grained, well-sorted, angular, feldspar
- 4340-50 " - except: Coarse-grained, trace chalky mollusk fragments
- 4350-60 " - except: Trace admixed silt
- 4360-70 " - except: Very coarse-grained, no silt
- 4370-4400 " - except: Slight decrease in grain size (still very coarse-grained)
- 4400-20 " - except: Trace admixed silt
- 4420-30 " - except: Very coarse-grained to granule, no silt
- 4430-40 " - except: Coarse to very coarse-grained
- 4440-60 " - except: Very coarse-grained to granule
- 4460-70 Quartz Gravel - Gray, granule, well-sorted, subangular
- 4470-90 " - except: Trace rutilated quartz
- 4490-4510 Quartz Sand - Gray, very coarse-grained, good sorting (C-VC), angular, trace chalky mollusk fragments, feldspar, trace mottled purple quartz, trace rust-colored stain
- 4510-20 " - except: Admixed silt, poorer sorting
- 4520-30 " - except: Medium to very coarse-grained, fair sorting (M-VC), muscovite, no silt
- 4530-40 " - except: Admixed silt, poor to fair sorting
- 4540-60 " - except: Very coarse-grained to granule, good sorting, trace silt
- 4560-70 " - except: Coarse-grained, fair sorting (M-VC)
- 4570-80 " - except: Very coarse-grained to granule, good sorting
- 4580-90 " - except: Coarse-grained
- 4590-4600 " - except: Very coarse-grained to granule
- 4600-10 " - except: Very coarse-grained
- 4610-30 " - except: Very coarse-grained to granule
- 4630-80 Quartz Gravel - Gray, granule, well-sorted

- 4680-90 " - except: Trace silt
- 4690-4700 " - except: Trace unidentified fossil fragments
- 4700-40 Quartz Sand - Gray, very coarse-grained, good sorting (C-VC), angular, trace silt, feldspar, maroon and green, silty micaceous clays
- 4740-60 " - except: Trace green-colored material possibly feldspar
- 4760-80 " - except: Trace chalky fossil fragments
- 4780-90 " - except: Increased admixture of silt
- 4790-4810 Quartz gravel Gray, granule, well-sorted, maroon and green, silty, micaceous clays
- 4810-20 Quartz Sand - Gray, very coarse-grained, good sorting (VC-granule), angular, feldspar, muscovite, rutilated quartz grains
- 4820-30 Quartz Sand - Gray, very coarse-grained, poor sorting (f-granule), abundant green and red, silty, micaceous clay hard enough to be called shale
- 4830-40 " - except: Trace chalky fossil fragments
- 4840-50 " - except: Less clay, less gravel
- 4850-70 " - except: Gray, carbonaceous shale
- 4870-80 Quartz Sand - Gray, very coarse-grained, fair sorting (VC-pebble), angular, feldspar
- 4880-90 " - except: Increased amount of silt, less gravel
- 4890-4900 Quartz Sand - Gray, very coarse-grained, fair sorting (C-granule), angular, feldspar, increased amounts of maroon, and green, silty, micaceous, and carbonaceous clays (the latter may be hard enough to be called shale)
- 4900-10 Quartz Sand - Gray, very coarse-grained, fair sorting (VC-pebble), angular, abundant shale as in overlying sample, trace metamorphic rock fragments, pink quartz, no feldspar
- 4910-20 Quartz Sand - Gray, very coarse-grained, good sorting, (VC-granule), angular, no feldspar, "cleaner" and better sorted than sample directly overlying
- 4920-30 " - except: Trace feldspar

- 4930-40 Quartz Sand - Gray, very coarse-grained, fair sorting (VC-pebble), angular, abundant maroon and green shales, trace chalky mollusk fragments, silty
- 4940-50 " - except: Worse sorting (C-granule), larger proportion of shale
- 4950-60 Quartz Gravel - Gray, granule, fair sorting (VC-pebble), angular, trace chalky mollusk fragments, abundant green and maroon, silty, micaceous shales, some gray, carbonaceous shale
- 4960-80 Quartz Sand - Gray, very coarse-grained, well-sorted, angular, feldspathic
- 4980-90 " - except: Trace chalky mollusk fragments
- 4990-5000 " - except: trace rust-colored stain
- 5000-10 " - except: Coarse-grained, fair sorting (M-VC), trace gastropod fragments
- 5010-30 Quartz Gravel - Brown (color imparted by included shale), pebble, good sorting (granule-pebble), angular, silty, abundant maroon and green shales as above, trace mollusk fragments
- 5030-40 " - except: sample may be mostly shale
- 5040-50 " - except: Gray shale common
- 5050-60 Quartz Sand - Gray, very coarse-grained, well-sorted, angular, silty, feldspathic, some maroon, and green, and gray shales
- 5060-80 " - except: Maroon, and green shales are more abundant
- 5080-90 " - except: Mollusk fragments, fragments of quartz sandstone (Medium-to coarse-grained, angular, cemented with possible quartzose matrix).
- 5090-5100 " - except: Maroon, and green shales less abundant
- 5100-20 " - Except: Larger proportion of shale, silty
- 5120-30 " - except: Sandy gray shale, sandstone fragments
- 5130-40 " - except: Shale still abundant
- 5140-50 Quartz Sand - Gray, coarse-grained, poor sorting (f-VC), angular, pink feldspar, maroon, green, silty micaceous shales, silty
- 5150-60 " - except: No pink feldspar
- 5160-70 " - except: Very poor sorting (silt-granule)

- 5170-80 " " except: Decreased amount of silt, trace slightly lithified sandstone fragments containing lignite
- 5180-5200 " - except: Larger proportion of silt
- 5200-10 Quartz Sand - Gray, very coarse-grained, fair sorting (C-granule), angular, trace lignite, feldspar
- 5210-20 " - except: Coarse-grained, poor sorting (M-granule), silty
- 5220-30 " - except: Fair sorting (M-VC)
- 5230-40 " - except: Medium-grained, good sorting (M-C), angular, trace chalky fossil fragments, abundant muscovite and biotite, trace lignite
- 5240-50 Quartz Sand - Gray, mixture of medium-grained, and very coarse-grained (each size range by itself is well-sorted), angular, pervasive rust-colored stain
- 5250-60 Quartz Sand - Gray, medium-grained, fair sorting (M-VC), angular, trace chalky fossil fragments, abundant lignite
- 5260-70 Quartz Sand - Light gray, coarse-grained, fair sorting (C-granule), angular, gray, laminated, carbonaceous, micaceous shale
- 5270-80 " - except: Feldspar
- 5280-90 Quartz Sand - Gray, very coarse-grained, poor sorting (f-granule), angular, mollusk fragments common, lignite, gray, laminated, carbonaceous, micaceous shale
- 5290-5300 " - except: No fossil fragments, maroon shale

NOTE

For some time now, the Patuxent Formation down to this point has been made up of two alternating lithologic types:

1. Very coarse-grained quartz sand and gravel, angular, poorly sorted, with varying amounts of silt, traces of chalky fossil fragments, and abundant green, silty, micaceous clay, maroon clay, and gray, carbonaceous clay, none to "some" feldspar, trace metamorphic rock fragments, and lignite, usually thicker than # 2.

2. Medium - to coarse-grained quartz sand, gray, better sorted than # 1, "clean" (no silt), traces of chalky fossil fragments, little or no clay, muscovite, none to trace feldspar.

Interpretations

1. Various deltaic depositional environments, with thin interbeds of paralic or nearshore marine sediments: chalky fossil fragments, gray, carbonaceous shale.

Interpretations (continued)

2. Shallow marine sediments deposited in fairly high-energy environments which produced notably better sorting.

The remainder of the description for the Patuxent Formation will be described simply as # 1 or # 2, where applicable.

5300-80 # 1

5380-5400 # 2

5400-40 # 1

5440-70 # 2

5470-5500 # 1

5500-10 # 2

5510-60 # 1, but better sorted than normal: almost everything is medium- to coarse-grained.

5560-70 # 2

5570-80 # 1

5580-95 # 2. First appearance of possible epidote: green-yellow, striated, good cleavage.

5595-5620 # 1. Mostly shale; 5600-10: olive-drab shale

5620-90 # 2. Rust-colored stain, abundant shale

5690-5720 # 1. Coarser than usual: quartz gravel, granule

5720-50 # 1

5750-70 Quartz Sand - White, very coarse-grained, good sorting (VC-granule), angular, looks like # 2, but is coarser grained

5770-5850 " -except: Granule gravel, trace schistose rock fragments from 5840-50

5850-60 # 2

5860-5900 # 1 . Mostly green and gray shale; maroon shale notably absent; more quartz sand and less shale from 5880-90

5900-20 # 2

5920-30 # 2. Rust-colored stain, medium-grained to granule, slightly poorer sorted than usual

5930-65 # 2. Abundant carbonaceous debris: 5930-40; abundant rust-

5930-65 colored stain: 5940-50
cont.
5965-90 # 1. Finer-grained than usual: medium-grained; poorer sorting
than usual: M-VC

5990-6000 # 2

6000-6040 # 1. Trace coal: 6000-10; pyritic quartz: 6030-40

6040-50 # 2. Abundant rust-colored stain

6050-70 # 1. Abundant maroon, micaceous shale: 6050-60

"RED BEDS" (6070-6186)

6070-6100 Shale - Red, hard, very micaceous, incipient "crinkle foliation"
in places, quartz sandy laminations, with shale clasts and quartz
grains making up some sandstone fragments

6100-50 " - except: Layered greenstone, harder than shale, appearing
finely vesicular, micaceous, schistose: 6120-30

6150-60 Shale - Gray-green, micaceous; quartz and carbonate fragment
interpreted as quartz country rock and calcite-filled fracture

6160-80 Shale - Red, hard, very micaceous, laminated

6180-90 Rock Fragments - Gray, quartzose (silt-size grains) with black
porphyroblasts

"BASEMENT" (6186-6272)

Top of "basement" picked from Schlumberger induction - laterolog.

6190-6200 No sample

6200-60 Rock Fragments - Gray siltstone or finely-crystalline rock with
large, dark mica flakes producing a spotted appearance

6260-72 No sample

GEOLOGIC SUMMARY

<u>Depth</u>	<u>Rock Unit</u>	<u>Age</u>
0- 160	Columbia Group	Pleistocene
160- 790	Yorktown Formation	Miocene
790-1270	Calvert Formation	Miocene
1270-1520	Nanjemoy Formation	Eocene
1520-1790	"transitional beds"	Paleocene - Cretaceous
1790-6070	Patuxent Formation	Cretaceous
6070-6186	"red beds"	Triassic
6186-6272	"basement"	Paleozoic - Precambrian

Emil Onuschak, Jr.
December, 1971

CORE DESCRIPTION

Overall cored interval 6058-6081
Recovery 6058-6074 (?)

At the well site all of the material from each individual half foot of core was placed in two small plastic bags and these two bags then placed in a cloth sack which was labeled with that foot. When the samples were received at the lab larger core pieces were sawed lengthwise on a diamond saw and the sawed surface washed clean. Lithologic descriptions below were made with the aid of a binocular microscope from the sawed pieces

6058-6059'

Mainly hard when dry, soft when wet, dark reddish-brown, non-calcareous, silty, very highly micaceous shale with abundant burrows up to 1/3" in diameter filled with blue-gray, hard, micaceous, non-calcareous, argillaceous silt to very fine sand. Burrows run at various angles through the core, but are mainly high angle to vertical.

6059-6060'

Argillaceous silt - dark reddish-brown, hard when dry, moderately soft when wet, non-calcareous, highly argillaceous, very highly micaceous silt which shows some low-angle (up to 10°) cross-bedding and which has some lamination, but which also tends to weather or spall spheroidally.

6060-6061'

Sand and silt - two major types of lithology in this interval; one is reddish-greenish-gray, friable when wet, tight, non-calcareous, very highly micaceous, argillaceous silt to fine sandstone with the mica flakes very weakly aligned. The other lithology is dark reddish-brown, argillaceous, non-calcareous, very highly micaceous silt to fine sand, which has been highly burrowed and the burrows filled with greenish-gray, argillaceous, micaceous sand of essentially the same composition. In this second rock type it is often difficult to tell which is the major color or major lithology and which is the burrow filling.

6061-6062'

Mainly dark brownish-gray, silty, highly micaceous, non-calcareous shale to mudstone with some bluish-gray, argillaceous, highly micaceous silt to fine sandstone occurring as burrow fillings and as individual beds.

6062-6063'

Lithology as above.

6063-6064'

An abundance of lithologic "types" including dark brownish-gray, highly argillaceous, non-calcareous, very highly micaceous, some fine sandy silt; brownish-gray, argillaceous, very highly micaceous, silt to fine sand showing low-angle cross-bedding; and interbeds and burrow fillings of grayish-brown to bluish-gray, very highly micaceous, argillaceous silt to fine sand.

6064-6065'

Lithology as above.

6065-6066'

Part is dark grayish-red, very highly argillaceous, very highly micaceous, silt to very fine sand. The remainder is irregularly interbedded and burrowed, grayish-red and bluish-gray, argillaceous, very highly micaceous silt to fine sand.

6066-6067'

Dark grayish-red, non-calcareous, very highly micaceous, moderately to highly silty mudstone with some rounded sand grains up to coarse sand size and with some blue-gray burrows (?) filled with the same lithology.

6067-6068'

Pale brownish-gray to medium light gray, argillaceous, very highly micaceous silt to fine sand with the mica flakes well aligned and showing well developed crossbedding, with major units up to 3/4" thick having crossbedding within the units; maximum angle of dip is 20°.

6068-6069'

Lithology as above, but with some burrows and discontinuous bands of bluish-gray, very highly argillaceous, very highly micaceous silt to fine sand.

6069-6070'

Lithology as above.

6070-6071'

Continued change and gradation from dark brownish-gray, very highly micaceous, slightly silty clay through very highly argillaceous silt to argillaceous, very highly micaceous silt to fine sand. Sedimentary textures and structures range from thin, laminar, parallel bedding to low-angle crossbedding to units which appear highly churned and burrowed.

6071-6072'

Lithology as above.

6072-6072½'

Dark reddish-brown, non-calcareous, very highly micaceous, silty clay with minor fine to medium sand grains scattered throughout. Unit contains abundant minute to ½" diameter burrows (?) filled with the same type of lithology. There appears to be very weak horizontal bedding or parting, but the unit also spalls spheroidally.

6072½-6073'

Pebbly mudstone - green to greenish-gray, locally slightly calcareous, very slightly micaceous mudstone with abundant quartz grains ranging from medium sand to up to ¼" diameter. No apparent bedding and the whole unit spalls spheroidally, giving the appearance of mud balls or perhaps of some plastic flow after deposition.

6073-6074'

Major lithology is dark grayish-red, hard, non-calcareous, slightly micaceous clay to silty clay with rare, fine sand size particles. There is a minor amount of dark brownish-gray, very highly argillaceous, silt to very fine sandstone and there is one 1½" thick piece of light gray, non-calcareous, very highly micaceous, argillaceous silt to fine sandstone with the mica well-aligned and showing continual low-angle crossbedding. A few of the pieces of grayish-red clay have rare, rounded fragments up to ¼" across of what appears to be a mica shist.

R. P. ZINGULA

May 17, 1971

J & J ENTERPRISES, INC.
ACCOMACK CO., VIRGINIA

W. C.
(Atlantic District Permit #54)

#1-G E. G. TAYLOR

SIDEWALL CORE DESCRIPTION

Sidewall cores were received sealed in the original sidewall core bottles. The surface was carefully shaved with a knife to remove drilling mud contamination, and the lithology described under a microscope. Each sidewall sample (except sands) was later processed for coccoliths, foraminifers and ostracods, and acid insoluble microfossils.

Samples below which carry the designation USGS, rather than a lithologic description, were selected and paid for by the U. S. Geological Survey, and were retained by them. We do not, at this time, have samples of these cores, but when that material is received the lithologic description of those sidewall cores will be incorporated with this report.

Depth 1560'	USGS Sample
Depth 1616'	USGS Sample (Noted on the sidewall core record as sandstone)
Depth 1655'	USGS Sample
Depth 1688'	USGS Sample
Depth 1772'	USGS Sample (No recovery)
Depth 1860'	USGS Sample (Listed as sandstone)
Depth 1920'	USGS Sample (Listed as sandstone)
Depth 1952'	USGS Sample (No recovery)
Depth 2062'	Recovery 1 inch. Silty clay - bluish to greenish, soft and waxy, finely micaceous clay with minor amount of silt to fine-grained sand. Rare, small wood fragments up to 1/8" diameter. Core shows some mottling with olive-gray to brown color. This may be part of the true formation or may be oxidation after coring. No apparent bedding. Small residue is <u>very</u> angular to shardy(?), silt to fine medium grain quartz sand with some green and clear mica; limonitic clay; and tan, glassy spheres 0.2-0.3 mm in diameter of unknown (non-calcareous) composition. No fossils other than rare small wood fragments.

- Depth 2126' USGS Sample
Depth 2214' USGS Sample
Depth 2260' Recovery - 1 inch.

Argillaceous sand - medium light gray to olive-gray, very soft and unconsolidated, slightly to highly porous, very slightly to highly argillaceous, fine silt to fine sand. No apparent bedding. Changes in clay content are quite irregular and may represent burrowing. Silt to sand size grains are mainly silt to very fine silt, appear to be about 85-90% quartz, 10-15% other minerals, including muscovite, biotite(?), and other gray and green minerals with a trace of orange to yellow grains. Clay does not appear to be calcareous. (Sample not processed for fossils)

- Depth 2440' USGS Sample
Depth 2548' USGS Sample
Depth 2566' Recovery - 1½ inch.

Argillaceous sand - light gray to light olive-gray, loose and unconsolidated, slightly porous, argillaceous silt to fine sand, with most of the grains being in the fine sand to very fine sand range. No apparent bedding. Sand grains are 95% quartz; 5% dark gray and green minerals, muscovite and rare, yellowish-green minerals. (Sample not processed for fossils)

- Depth 2126' USGS Sample
Depth 2665' Recovery - 1½ inch.

Argillaceous sand - yellow gray to pale yellow-brown, very soft and unconsolidated, slightly porous, argillaceous silt to fine sand. Grains are 95% quartz; 5% assorted black, gray, orange, and red minerals with rare thin bands having a concentration of black mineral resembling rutile. (Sample not processed for fossils)

- Depth 2702' USGS Sample
Depth 2853' Recovery - 1½ inch.

Sand - light olive-gray, very soft and unconsolidated, clean and porous, to argillaceous and tight silt to medium grain sand. Most of core is argillaceous and fairly tight, but there are two or three, nearly parallel bands up to 1/16" thick of porous, fairly well-sorted, non-argillaceous, fine to medium-grained sand. Sands are 95% quartz; 5% dark gray, green, yellow and orange grains. (Sample not processed for fossils)

Depth 2888' USGS Sample

Depth 2997' Recovery 1 inch.

Argillaceous sand - light olive-gray, soft and unconsolidated, porous to tight, slightly to highly argillaceous silt to medium grained sand with a much higher percentage of medium grain sand than above. No apparent bedding. Grains are 90-95% quartz; 5-10% black (rutile?), gray, green, and orange minerals and rose quartz (?). (Sample not processed for fossils)

Depth 3051' Recovery 1 inch.

Silty clay - blue-gray, firm, highly micaceous, very highly silty clay, with no apparent bedding. There is a very weak alignment of the mica and silt grains. Mica flakes are clear, brown, green, and black. Clay is non-calcareous.

Large residue is silt (mainly quartz) with 15-20% clear, green and brown mica. No fossils.

Depth 3114' Recovery - 1 1/4 inch.

Clay - mottled, tan, greenish-gray, olive-gray, and reddish-brown, sticky, waxy-appearing, non-calcareous clay. Reddish portion of the clay has some microscopic very dark brownish-gray spheres, which appear to be organic.

Tiny residue is tiny reddish lumps of limonite and/or hematite with very rare silt to medium sand size angular to subangular quartz grains. No fossils noted.

Depth 3232' Recovery - 1 1/4 inch.

Clay - mottled, purple, light greenish-gray, light olive-gray, reddish-brown, and some tan, soft and waxy, non-calcareous clay. No apparent bedding.

Tiny residue is small reddish lumps of limonite and/or hematite, silt to medium grain sand and some small fragments of purplish gray clay. No fossils noted.

Depth 3254' Recovery 1-3/4 inch.

Sand with clay stringers - pale yellow-gray, soft and unconsolidated, slightly to highly porous, slightly argillaceous, silt to fine grain sand with some discontinuous wavy bands up to 1/8" thick of medium gray, sandy clay to highly argillaceous sand with some small wood fragments. Sand grains are 90% quartz; 10% gray and green minerals, mica and minor brownish minerals.

(continued)

(3254' continued)

Large residue is silt to medium grain sand; 90% quartz; some mica and rare yellow to orange minerals. Grains mostly angular.

No fossils noted.

Depth 3270' USGS Sample
(Noted as sandstone on sidewall core record)

Depth 3275' Recovery - 1½ inch.

Lithology same as at 3254'.
(Sample not processed for fossils)

Depth 3334' Recovery - 1-3/4 inch.

Limestone and clay - core sample is a mixture of blue, firm, waxy clay and sugary to clear, crystalline calcite. No apparent bedding. It is impossible to tell from this sample whether the calcite is truly a limestone or whether it is calcite filling the veins.

A thin section shows some areas of calcite including silt grains, showing the calcite to be secondary. Shape of calcite masses, and random orientation of adjacent grains or masses indicate that the calcite is concretionary.

Large residue is cream-colored, very finely to coarsely crystalline calcite with some silt to fine grain sand.

No fossils.

Depth 3483' Recovery - 1¼ inch.

Clay - mottled, blue-gray, gray and reddish-brown, firm, waxy clay with some fine sand size quartz grains. No apparent bedding.

Residue is angular silt to medium grain quartz sand with minor brown limonitic clay. Quartz grains are chemically(?) etched.

No fossils.

Depth 3491' Recovery - 1-3/4 inch.

Sand - light gray, very soft and unconsolidated, porous, slightly argillaceous silt to fine sand with no apparent bedding. Sand is 95% quartz; less than 5% chlorite(?) and miscellaneous black, gray, green, and yellowish-green miner

Large residue is angular silt to medium grain sand. Grains slightly chemically(?) etched.

No fossils.

Depth 3493' USGS Sample
Depth 3578' USGS Sample
Depth 3585' Recovery - 1¼ inch.

Silty clay - blue-gray, firm, very highly but finely micaceous, very highly but finely silty clay with the minerals very well-aligned and with weak, very thin bedding. Clay is non-calcareous.

Residue is highly micaceous silt.

No fossils.

Depth 3636' USGS Sample
Depth 3652' Recovery - 1½ inch.

"Silty" clay - dark olive-gray, firm highly microscopically micaceous, clay that appears to have a fairly high percentage of clastic fragments so fine as to be almost unrecognizable under the binocular microscope. This material is actually finer than silt but is not quite down to the normal clay size. Mica particles well-aligned, but there is no definite bedding.

Residue is silt, mica and silty clay.

No fossils.

Depth 3743' USGS Sample
Depth 3748' Recovery - 1¼ inch.

Silt - olive-gray, firm, argillaceous, micaceous, very fine silt with the mica flakes weakly aligned.

Large residue is silt and green and clear mica.

No fossils.

Depth 3820' Recovery - 1-3/4 inch.

Clay - dark olive-gray, very highly microscopically micaceous clay with some small brownish-gray, hard concretionary(?) masses less than 1/8" diameter. No apparent bedding.

Small residue is silt with some mica, fine grain sand, and brownish-gray silty clay.

No fossils.

Depth 3827' USGS Sample

Depth 3848' Recovery - 1½ inch.

Sand - light gray, loose and unconsolidated, porous, slightly argillaceous, silt to medium grain sand (rare, coarse sand size particles) with no apparent bedding.

(Sample not processed for fossils)

Depth 3953' Recovery - 1¼ inch.

Limey clay - dark greenish-gray, firm, very highly calcareous clay, which has enough calcium carbonate that on the broken surface of the core there are microscopic white specks of pure calcium carbonate. The core also contains very rare, very fine grain sand size particles and rare small mica flakes. No apparent bedding.

Residue is silty, limey clay or limey silt.

No fossils.

Depth 3963' USGS Sample

Depth 4005' Recovery - ¾ inch.

Calcareous clay - greenish-gray, very soft and sticky to firm, limey, very finely silty clay. Entire core is shattered and there is no indication that there is any bedding.

Residue is highly calcareous, argillaceous silt to fine grain sand.

No fossils.

Depth 4096' Recovery - 1-¾ inch.

Silt - olive-gray, soft and friable, porous, slightly argillaceous, micaceous silt to very fine sand with the mica flakes well aligned and locally concentrated into paper-thin bands. Bands show weak low-angle crossbedding and are nearly parallel to the axis of the core.

Large residue is silt to fine grain sand with some mica.

No fossils.

Depth 4146' Recovery - 1½ inch.

Sand - greenish-gray, firm but friable, slightly porous, argillaceous silt to fine sand with the grains very weakly aligned. Sand grains 75% quartz; 25% assorted yellow, green, gray, black and brown minerals.

Large residue is silt to medium grain sand with some mica.

No fossils.

Depth 4227' Recovery - 2 inch.

Sand - light greenish-gray, firm but unconsolidated, slightly porous, argillaceous, very fine grain to fine grain sand with no apparent bedding or alignment of minerals.

Sample not processed for fossils.

Depth 4287' Recovery - 1-3/4 inch.

Silty clay - dark greenish-gray, very highly micaceous, very highly and finely silty clay with the mica flakes weakly aligned. Sample is non-calcareous.

Residue is silt and green and gray mica.

No fossils.

Depth 4370' Recovery - 1½ inch.

Clay and pebbles - dark blue-gray, soft and sticky clay with rounded quartz pebbles up to ½" in diameter.

Residue is very angular silt and fine sand to rounded pebbles up to ½ inch diameter. Rare schist pebbles.

No fossils.

Depth 4440' Recovery - 1-3/4 inch.

Sand and lignite - light gray, slightly porous, argillaceous silt to fine sand with abundant thin, discontinuous laminae of peat and plant fragments. Laminae show well-developed, low-angle crossbedding. Plant material probably makes up less than 15% of the core volume.

Large residue is silt to medium grain angular sand with abundant mica and some plant fragments.

No fossils other than plant fragments.

Depth 4470'

Recovery - 2 inches.

Sand and clay - medium light gray, very slightly porous, argillaceous silt to medium sand with blebs and discontinuous thin lenses and laminae of dark gray, finely micaceous, silty clay.

Large residue is silt to coarse grain angular sand; 95% quartz; 5% mica and other minerals.

No fossils.

Depth 4552'

Recovery - 1-3/4 inch.

Argillaceous sand - light gray to light olive-gray, soft and unconsolidated, tight, argillaceous, non-calcareous, fine grain to coarse grain sand. Sand grains are nearly all quartz. Finer fragments are angular to sub-angular, coarser fragments are rounded to sub-rounded. No apparent bedding.

Large residue is quartz silt to pebbles up to 1/4 inch diameter. All grains angular except pebbles.

No fossils.

Depth 4580'

Recovery - 1-3/4 inch.

Argillaceous sand - very light gray, soft and crumbly, tight to very slightly porous, non-calcareous, highly argillaceous, fine sand to coarse grain sand with rare quartz pebbles up to 1/4" in diameter. No apparent bedding. Clay is white and milky in appearance. Sand grains 95% quartz; 5% dark gray, black, and green minerals.

Sample not processed for fossils.

Depth 4685'

Recovery - 1-3/4 inch.

Argillaceous sand - very light gray to pale yellow-gray, soft and friable, non-calcareous, tight, argillaceous, very fine grain to medium grain sand with very rare, coarse sand size particles. No apparent bedding. Sand is 90-95% quartz; remainder is green and orange and gray minerals.

Large residue is silt to medium sand size subangular to very angular quartz grains, with 5% assorted mica and pink and brown garnet fragments, and very rare 1/4 inch diameter quartz pebbles. Grains slightly chemically etched.

No fossils.

Depth 4756' Recovery - 1-3/4 inch.

Argillaceous sand - light green to pale yellow-gray, soft, tight, highly argillaceous, fine grain to coarse grain sand with rare quartz pebbles up to 1/4" in diameter. No apparent bedding. Clay is non-calcareous.

Large residue is silt to 1/2 inch long quartz grains with 5% feldspar and miscellaneous minerals. Silt to medium sand size grains are very angular to subangular. Grains weakly chemically aligned.

No fossils.

Depth 4970' Recovery - 1-3/4 inch.

Argillaceous sand - very light gray, soft and unconsolidated, non-calcareous, highly argillaceous, very fine grain to medium grain sand with rare, coarse sand size grains. No apparent bedding.

Large residue is silt to coarse sand size quartz grains with less than 5% feldspar and other minerals. Quartz grains weakly chemically etched. Silt to medium sand very angular to subangular.

No fossils.

Depth 5050' Recovery - 1 1/2 inch.

Clay - mottled and very irregularly interbedded, greenish-gray and dark reddish-brown, soft, non-calcareous, highly micromicaceous, locally very finely silty, clay with weakly developed parting.

Small residue is mica and gray and red-brown, silty, micaceous clay.

No fossils.

Depth 5066' Recovery - 1 1/4 inch.

Silty clay - medium dark gray to olive-gray, non-calcareous, firm, micromicaceous, very finely silty clay with common microscopic brown to black plant fragments. Grains weakly aligned and there is some weak, irregular bedding where there is local concentration of the fine silt.

Residue is silt to very fine sand with some fine to medium sand. More than 95% quartz.

No fossils.

Depth 5195' Recovery - 1-3/4 inch.

Argillaceous sand - very light gray, soft, calcareous, tight to very slightly porous, very fine to fine grain sand with rare paper-thin laminae of dark brown to black plant material. Sand grains are very weakly aligned, and good lamination is developed on mica fragments and the plant material. There is a zone, approximately 1/4" thick, near the center of the core which runs perpendicular to the axis of the core that is brownish-gray in color, is argillaceous, very fine grain to fine grain sand as the rest of the core, but also has some rounded quartz fragments up to coarse sand size. This zone is perpendicular to both the axis of the core and to the lamination on the laminae of plant material.

Large residue is silt to medium sand with minor coarse sand to 1/4" diameter sand grains and chunks of silty greenish gray clay. Sand is 90-95% quartz with some mica and other minerals.

No fossils.

Depth 5270' Recovery - 1 1/2 inch.

Clay - dark brown, soft, micromicaceous, very finely silty clay with rare, small, brown to black plant fragments. No apparent bedding.

Residue is very angular to angular silt to fine sand size quartz grains.

No fossils.

Depth 5309' Recovery - 1-3/4 inch.

Clay - dark brown, very soft and waxy clay.

Small residue is very angular quartz silt, brownish-gray clay, and a trace of mica.

No fossils.

Depth 5325' Recovery - 1 1/2 inch.

Argillaceous sand - very light gray, very soft and unconsolidated, slightly porous, argillaceous, non-calcareous, very fine grain to fine grain sand with no apparent bedding. Sand grains are nearly all quartz.

Sample not processed for fossils.

Depth 5401' Recovery - 2 inches.

Clay - dark grayish-brown, soft, non-calcareous clay.
No apparent bedding.

Small residue is brownish-gray, waxy shale, fine plant fragments, and some quartz silt.

No fossils other than plant fragments.

Depth 5480' Recovery - 1-3/4 inch.

Sandy clay - dark olive-gray to dark brownish-gray, firm, non-calcareous, micromicaceous, silty to slightly finely sandy clay. No apparent bedding or lamination.

Large residue is silt to fine sand with some medium to coarse sand, and some argillaceous siltstone. Sand is 65% quartz, 25% unidentified grayish green mineral, and 10% miscellaneous minerals.

No fossils.

Depth 5536' Recovery - 3/4 inch.

Argillaceous silt and sand - light gray, firm, tight, gray, highly argillaceous silt and fine grain sand with some microscopic plant fragments. There is a moderately sharp contact between argillaceous sand and argillaceous silt with a concentration of plant fragments (?) at the boundary.

Residue is silt to medium sand size quartz grains with 15% mica and other minerals.

No fossils.

Depth 5628' Recovery - 1 1/4 inch.

Silty clay - very dark olive-green, soft, micromicaceous, silty clay with rare, fine to coarse sand size quartz grains. No apparent bedding.

Large residue is silt to medium sand with rare coarse sand; and large fragments of sandy, highly argillaceous siltstone which did not disaggregate in the washing process.

No fossils

Depth 5648' Recovery - 1-3/4 inch.

Argillaceous sand - very light gray to very pale yellow-gray, soft and unconsolidated, tight to very slightly porous, argillaceous, non-calcareous, very fine grain to medium grain sand with no apparent bedding. Sand grains are nearly all quartz.

Sample not processed for fossils.

Depth 5685' Recovery - 1 1/2 inch.

Argillaceous silt - bluish-gray, firm, non-calcareous, tight, highly argillaceous silt to very fine grain sand. Grains are very weakly aligned.

Large residue is silt to fine sand size quartz grains with some muscovite and very rare biotite and other minerals.

No fossils.

Depth 5816' Recovery - 1 1/2 inch.

Argillaceous sand - very light gray, soft and unconsolidated, non-calcareous, slightly porous, argillaceous, poorly sorted, very fine grain to coarse grain sand. No apparent bedding. Sand fragments are nearly all quartz.

Sample not processed for fossils.

Depth 5868' Recovery - 1 1/2 inch.

Argillaceous sand - very light gray with a greenish tinge, firm, tight, non-calcareous, highly argillaceous, silt to fine grain sand with no apparent bedding. Sand is 95% quartz; 5% green, gray, and orange minerals.

Sample not processed for fossils.

Depth 5963' Recovery - 1-3/4 inch.

Argillaceous sand - very light greenish-gray, soft and crumbly, non-calcareous, argillaceous silt to coarse grain sand with some quartz fragments up to 1/4" in diameter. No apparent bedding. Sand is 95% quartz; 5% gray, green, and yellowish minerals.

Large residue is silt to 10 mm diameter pebbles of quartz, with 10-15% muscovite and other minerals.

No fossils

Depth 6105' Recovery - 1¼ inch.

Clay and calcite - reddish-brown, soft clay with concretions or crystals or blobs of light buff to very pale yellow-gray calcite which has a very finely sugary appearance under the microscope. No apparent bedding and there does not seem to be any pattern to the distribution of the calcite in the sample.

Residue is clear to red-stained silt to medium sand, sugary calcite, and rounded fragments of schist.

No fossils.

Depth 6135' Recovery - 1 inch.

Schist? - dark gray, firm to hard material which seems to grade from a compressed clay to a very fine schist. Core has several, thin, white calcite veins. Thin section shows schistose structure; but with alignment direction changing constantly across the sample this may in part be due to compression in coring.

Residue is highly calcareous fine mica schist with white calcite veins.

No fossils.

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