

INTERVAL SHEET

WWCR 148

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VDMR Well No.: Well No. 1342

Date 7/28/65

Sample Interval: from 0 to 650

PROP: George Washington Birthplace

Total depth 667

COMP: Sydnor Pump & Well Co.

Oil Gas Water Exploratory

COUNTY: Westmoreland (Oak Grove)

Cuttings Core Other

VDMR Well No: W-1342

From-To	From-To	From-To	From-To	From-To
0 - 10	300 - 310	600 - 610	-	-
10 - 20	310 - 320	610 - 620	-	-
20 - 30	320 - 330	620 - 630	-	-
30 - 40	330 - 340	630 - 640	-	-
40 - 50	340 - 350	640 - 650	-	-
50 - 60	350 - 360	650 - 667 No sample	-	-
60 - 70	360 - 370	-	-	-
70 - 80	370 - 380	-	-	-
80 - 90	380 - 390	-	-	-
90 - 100	390 - 400	-	-	-
100 - 110	400 - 410	-	-	-
110 - 120	410 - 420	-	-	-
120 - 130	420 - 430	-	-	-
130 - 140	430 - 440	-	-	-
140 - 150	440 - 450	-	-	-
150 - 160	450 - 460	-	-	-
160 - 170	460 - 470	-	-	-
170 - 180	470 - 480	-	-	-
180 - 190	480 - 490	-	-	-
190 - 200	490 - 500	-	-	-
200 - 210	500 - 510	-	-	-
210 - 220	510 - 520	-	-	-
220 - 230	520 - 530	-	-	-
230 - 240	530 - 540	-	-	-
240 - 250	540 - 550	-	-	-
250 - 260	550 - 560	-	-	-
260 - 270	560 - 570	-	-	-
270 - 280	570 - 580	-	-	-
280 - 290	580 - 590	-	-	-
290 - 300	590 - 600	-	-	-

OWNER: National Park Service
(George Washington's Birthplace)
DRILLER: Sydnor Pump and Well Co., Inc.
COUNTY: Westmoreland (Oak Grove)

VDMR: 1342
WWCR: 148
TOTAL DEPTH: 667'

GEOLOGIC LOG

COLUMBIA GROUP (0-30')

- 0-10 Sand — orange-brown, slightly argillaceous; medium-grained, moderately sorted; subangular; arkosic (weathered white feldspar), slightly micaceous (muscovite and chlorite); scattered grains of chert
- 10-20 Sand — buff; medium- to coarse-grained, moderately sorted, subangular; moderately arkosic slightly micaceous (muscovite); traces of green epidote, weathered glauconite, and chert
- 20-30 Sand — buff; medium- to very-coarse-grained (appears bimodal), moderately sorted, subangular; moderately arkosic; traces of muscovite, chlorite, chert, green epidote

CALVERT FORMATION (30-90')

- 30-40 Sand and Gravel — brownish-green sand and cream-colored gravel; sand (60% of sediment) very-fine-grained, well-sorted, angular; gravel (40% of sediment) 2-5 mm in diameter, well-sorted, subrounded quartz and minor chert; trace of garnet
- 40-50 Clay — gray, sandy, diatomaceous
- 50-60 Clay — gray with greenish cast, very-slightly sandy, diatomaceous
- 60-70 Sand — gray, very-argillaceous; poorly sorted, subangular to subrounded, quartz; clay is moderately diatomaceous, scattered chitino-phosphatic shell fragments, small pelecypods, echinoid spines, and foraminifera (Nonion)
- 70-80 Sand — brownish-gray, medium- to coarse-grained, moderately sorted, subangular; clear quartz; and traces of dark garnet, brown epidote, muscovite, and glauconite; moderately fossiliferous; megafossils include small pelecypods, pelecypod shell fragments, echinoid spines, and worm tubes; microfossils include foraminifera, a few ostracods, and a trace of diatoms

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80-90 Sand — brownish-gray, medium- to coarse-grained, moderately sorted, subangular; clear quartz; and traces of dark garnet, brown epidote, muscovite, and glauconite; moderately fossiliferous; megafossils include small pelecypods, pelecypod shell fragments, echinoid spines, and worm tubes; microfossils include foraminifera, a few ostracods, and a trace of diatoms; with a few bryozoan fragments

NANJEMOY FORMATION (90-150')

90-100 Sand — dark-gray, with greenish cast, silty and moderately argillaceous; very-fine-grained, well-sorted, angular quartz (90%) with 10% coarse- to very-coarse-grained, well-sorted, rounded quartz; micaceous (muscovite); very slightly glauconitic; traces of brown epidote, phosphorite, fine-grained pyrite, rutilated quartz, tourmaline, plagioclase, garnet, and pyrito-carbonaceous material; slightly fossiliferous (pelecypod fragments, worm tubes, foraminifera, and a few diatoms)

100-110 Sand — gray, with greenish cast, silty and slightly argillaceous, a few rounded quartz pebbles (15-20 mm); very-fine- to medium-grained (skewed fine), well-sorted, angular to subangular; clear to green-tinted quartz (60-70%) and fresh, dark-green to black glauconite (30-40%); glauconite coarser than quartz; minor muscovite and small amount pyrite; scattered chalky pelecypod shell fragments and poorly preserved foraminifera

110-120 " but more poorly sorted (small % coarse sand)

120-130 Sand — greenish-gray, silty and slightly argillaceous, very-fine- to medium-grained, moderately sorted; quartz (60-70%) and glauconite (30-40%); micaceous (muscovite); scattered chalky pelecypod shell fragments and a few echinoid spines

130-140 "

140-150 "

OWNER: National Park Service (George Washington's Birthplace)

MATTAPONI FORMATION (150-360')

- 150-160 Sand — greenish-gray, moderately silty and argillaceous, a few pebbles (15-20 mm) of quartz; fine- to medium-grained, well-sorted; angular to subangular quartz * (50%) and fresh, greenish-black glauconite (50%); micaceous (muscovite); small amount chalky shell fragments and a few foraminifera
* Quartz is finer-grained than glauconite
- 160-170 Sand — dark-greenish-gray, moderately silty and argillaceous; fine-grained, well-sorted, angular to subangular quartz (15-20%) and medium-grained, well-sorted, fresh, black glauconite (80-85%); slightly micaceous (muscovite); a few chalky shell fragments and foraminifera
- 170-180 "
- 180-190 "
- 190-200 Sand — greenish-gray, slightly silty, trace of clay; medium- to coarse-grained, well-sorted glauconite (50%) and fine- to very-coarse-grained, poorly sorted, angular to subrounded quartz (50%); slightly micaceous (muscovite); trace of chalky shell material
- 200-210 "
- 210-220 Sand — dark-gray, moderately silty and argillaceous; very-fine- to coarse-grained, poorly sorted; angular to subrounded quartz (50%) and greenish-black glauconite (50%); slightly micaceous (muscovite); small amount of pyrite; trace of shell material, fish teeth
- 220-230 Sand — gray, slightly silty and argillaceous; fine- to coarse-grained, moderately sorted quartz - glauconite sand (50%) each; large amount of the glauconite is oxidized to browns and brownish-greens and much of quartz is iron-stained; discrete chunks of abundant pink glauconite-bearing clay *; small amounts of pyrite and muscovite
* Pink clay must have been present as balls or lenses
- 230-240 " but with more quartz and less glauconite

OWNER: National Park Service (George Washington's Birthplace)

- 240-250 Sand — black, brown, and white speckled, very slightly silty and argillaceous; medium-grained, well-sorted; fresh, greenish-black glauconite and abundant browns and brownish-greens oxidized glauconite (40%); clear to iron-stained, subrounded quartz (60%); abundant pink, glauconite-bearing clay
- 250-260 "
- 260-270 Sand — dark-gray, trace of pink clay; medium-grained, very-well-sorted; fresh, greenish-black glauconite (50%) and subrounded quartz (50%); trace of shell material (Note absence of oxidized glauconite and iron-stained quartz)
- 270-280 " but with a trace of echinoid spines and foraminifera
- 280-290 Sand — "salt- and -pepper", small amount pink clay; medium-grained, well-sorted; subangular to subrounded, clear to white to green-tinted quartz (65-70%) and pale-green to greenish-black glauconite (30-35%); trace of muscovite; an occasional pelecypod shell fragment; foraminifera moderately abundant; a few ostracods
- 290-300 Sand — greenish-gray, argillaceous, including small amount of pink clay; fine- to medium-grained, moderately sorted; subangular to subrounded clear to green, to yellow quartz (75%) and dark-green glauconite (25%); a few coarse pelecypod shell fragments; foraminifera very abundant; a few ostracods
- 300-310 Sand, Carbonate, and Clay — dark-greenish-gray, medium- to coarse-grained, well-sorted sand, composed of fresh, dark-green glauconite and clear, to yellowish, to greenish quartz, and a small amount of brown limonite after glauconite; yellowish-white, friable carbonate containing abundant glauconitic sand; pink and gray sand-bearing clays; abundant gastropods (internal casts), some echinoid spines, pelecypod fragments, corals, and bryozoans; very abundant foraminifera and a few ostracods
- 310-320 " but buff in color, with higher percentages of carbonate and brown limonite after glauconite

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- 320-330 Sand — "salt- and -pepper", moderately argillaceous (pink and gray clays containing glauconitic sand), medium-grained, well-sorted, subrounded to rounded; clear to yellowish to orangeish quartz (about 60%) and glauconite and limonite after glauconite (about 40%); moderately fossiliferous, mostly foraminifera but with some ostracods, echinoid spines, and pelecypod fragments
- 330-340 "
- 340-350 Sand — gray; slightly argillaceous (pink clay); medium- to coarse-grained, moderately sorted, subrounded; quartz, mostly clear (50%) and fresh black glauconite (50%); foraminifera moderately abundant, a few echinoid spines

350-360 "

PATUXENT FORMATION (360-650⁺)

- 360-370 Sand — brown, moderately argillaceous; fine- to coarse-grained, poorly to moderately sorted, subangular to subrounded; relatively unstained quartz (75-80%) and green glauconite (20-25%); trace of greenish mica; relatively unfossiliferous (a few foraminifera and echinoid spines)
- 370-380 Sand — brownish-red, argillaceous (reddish clay); fine- to coarse-grained, poorly sorted, angular to subrounded; quartz, mostly clear but some hyacinth (85%), white chert, white, weathered feldspar, and green glauconite (5% each); trace of muscovite; foraminifera present but rare
- 380-390 Sand — brownish-red, argillaceous (reddish clay); medium- to coarse-grained, moderately sorted, angular to subrounded; quartz, mostly clear but some hyacinth (85%), white chert, white, weathered feldspar, and green glauconite (5% each); trace of muscovite; a few coarse shell fragments
- 390-400 Sand — brown, argillaceous; medium- to coarse-grained, moderately sorted, subangular; quartz, mostly clear but some hyacinth (90%), white chert, white, weathered feldspar, and green glauconite (subequal amounts); trace of muscovite

OWNER: National Park Service (George Washington's Birthplace)

- 400-410 Sand — grayish-white; medium- to coarse-grained, fairly-well-sorted, subangular to subrounded; essentially clear quartz with small amounts of white feldspar, white chert, glauconite, and muscovite; traces of chlorite, brown epidote, and of staurolite
- 410-420 " but slightly more clay, and with a trace of pink garnet in place of epidote and staurolite
- 420-430 Sand — grayish-brown, slightly to moderately argillaceous; fine- to coarse-grained, rather poorly sorted, subangular; essentially clear quartz with small amounts of glauconite, intensely weathered white feldspar (microcline and microperthite), and traces of muscovite, chlorite, and brown epidote; trace of chalky shell material and a very few foraminifera
- 430-440 "
- 440-450 " but medium- to coarse-grained, better sorted
- 450-460 Sand — grayish-brown, trace of clay; coarse- to very-coarse-grained, fairly-well-sorted, subangular; predominately clear quartz, with small amounts fresh glauconite and weathered, white feldspar; traces of muscovite and pink garnet
- 460-470 "
- 470-480 "
- 480-490 " but slightly more argillaceous and glauconitic and with a trace of earthy hematite
- 490-500 Sand and Clay — brown, glauconitic and slightly arkosic (microcline), cherty, quartz sand (about 50%) and variegated clay (about 50%); small nodules of limonite and earthy hematite moderately abundant
- 500-510 "
- 510-520 "

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- 520-530 Sand and Clay — brown; very-fine- to medium-grained, rather poorly sorted, variably rounded; sand fraction 65% quartz, 35% glauconite; with small amounts of feldspar, muscovite, earthy hematite, and limonite after glauconite; variegated clay (about 40% of sediment); a few foraminifera
- 530-540 "
- 540-550 "
- 550-560 "
- 560-570 "
- 570-580 Clay and Sand — brown; variegated clay (60% of sediment); fine- to coarse-grained, rather poorly sorted, variably rounded sand (quartz 75-80%, glauconite 20-25%); small amounts muscovite, nodular earthy hematite, and feldspar; trace of pyrite; a few foraminifera
- 580-590 "
- 590-600 "
- 600-610 "
- 610-620 Clay and Sand — brown; variegated clay (60% of sediment); rather poorly sorted, variably rounded quartz sand with considerable white feldspar (about 10% of sand fraction) and small amounts of glauconite and nodular earthy hematite
- 620-630 "
- 630-640 " but more arkosic
- 640-650 Sand — brown, moderately argillaceous; medium- to coarse-grained, fairly-well-sorted, subangular to subrounded; quartz dominant, white alkali feldspar subordinate, small amount glauconite, and trace of muscovite
- 650-667 No sample

OWNER: National Park Service (George Washington's Birthplace)

GEOLOGIC SUMMARY

	<u>ROCK UNIT</u>	<u>AGE</u>
0-30	Columbia Group	Pleistocene
30-90	Calvert Formation	Middle Miocene
90-150	Nanjemoy Formation	Middle Eocene
150-360	Mattaponi Formation	Paleocene
360-650	Patuxent Formation	Early Cretaceous
650-667	No sample	

Virginia Division of Mineral Resources
Robert H. Teifke, Geologist
September 2, 1965

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT

x-sections ✓ VDMR #1342
WWCR #148

MAILING ADDRESS:
Box 3667, University Sta.
Charlottesville, Virginia

DIVISION OF MINERAL RESOURCES
JAMES L. CALVER, COMMISSIONER
WATER WELL COMPLETION REPORT

OFFICE ADDRESS:
McCormick Road
Charlottesville, Virginia

OWNER: National Park Service Mailing Address: Box 679, Fredericksburg, Va.

TENANT: George Washington's Birthplace Mailing Address: Westmoreland County, Oak Grove, Va.

DRILLER: Sydnor Pump and Well Co., Inc. Mailing Address: 1305 Brook Rd., Richmond, Va.

WELL LOCATION: County Westmoreland Approx. 2 ^{1/2} miles northeast (direction) of
Rt. 3 and end of Rt. 204 and _____ feet _____ miles _____ (direction) of _____

(GIVE DIRECTION AND DISTANCE IN FEET OR MILES FROM TWO REFERENCE POINTS - ROADS, TOWNS, RIVERS, ETC. - ON COUNTY HIGHWAY OR OTHER MAP.)

DATE STARTED: 6/16/65 DATE COMPLETED: _____

TYPE OF DRILL RIG USED: Rotary TOTAL DEPTH 667 feet

WATER LEVEL: Stands 18-1/2 feet below surface OR
has NATURAL flow of _____ gallons per minute.

YIELD TEST: Method _____

Drawdown 15-1/2 feet

Rate 57 gal. per min.

Duration 12 hrs., _____ min.

WATER ZONES: from 451 to 466 feet

from _____ to _____ feet

from _____ to _____ feet

WATER: Color Clear Taste _____

Odor _____ Temp. _____ °F

WELL TO SUPPLY: (check one) Home _____

Farm _____ Town _____ School _____

Industry _____ Other Public

WATER ANALYSIS AVAILABLE: Yes _____ No _____

DRILL CUTTINGS SAVED: Yes X No _____

(DRILL CUTTINGS SHOULD BE COLLECTED AT 10 FOOT INTERVALS. THESE SAMPLES MAY BE SHIPPED TO THIS OFFICE EXPRESS COLLECT. SAMPLE BAGS ARE FURNISHED FREE OF CHARGE UPON REQUEST.)

REMARKS: No bedrock. Electric log run by USGS.

HOLE SIZE: 10 inches from 0 to 496 feet

7 inches from 496 to 667 feet

_____ inches from _____ to _____ feet

SCREEN SIZE: 6 inches from 451 to 466 feet

_____ inches from _____ to _____ feet

_____ inches from _____ to _____ feet

CASE SIZE: 6 inches from 0 to 496 feet

_____ inches from _____ to _____ feet

_____ inches from _____ to _____ feet

GROUTING: Method Pressure

Material cement/water Depth 50 feet

PUMP: Type _____

Capacity _____ gal. per min

Depth of intake _____ feet

OWNER: National Park Service
(George Washington's Birthplace)
DRILLER: Sydnor Pump and Well Co., Inc.
COUNTY: Westmoreland (Oak Grove)

VDMR: 1342
WWCR: 148
TOTAL DEPTH: 667'
QUAD. : Wakefield
ELEV. : 26'

GEOLOGIC LOG

✓ COLUMBIA GROUP (0-~~30~~^{29'})

0-10 Sand -- orange-brown, slightly argillaceous; medium-grained, moderately sorted; subangular; arkosic (weathered white feldspar), slightly micaceous (muscovite and chlorite); scattered grains of chert

10-20 Sand -- buff; medium- to coarse-grained, moderately sorted, subangular; moderately arkosic slightly micaceous (muscovite); traces of green epidote, weathered glauconite, and chert

^{29'}
20-~~30~~ Sand -- buff; medium- to very-coarse-grained (appears bimodal), moderately sorted, subangular; moderately arkosic; traces of muscovite, chlorite, chert, green epidote

✓ CALVERT FORMATION (~~30-90~~^{29-88'})

²⁹
30-40 Sand and Gravel -- brownish-green sand and cream-colored gravel; sand (60% of sediment) very-fine-grained, well-sorted, angular; gravel (40% of sediment) 2-5 mm in diameter, well-sorted, subrounded quartz and minor chert; trace of garnet

40-50 Clay -- gray, sandy, diatomaceous

50-60 Clay -- gray with greenish cast, very-slightly sandy, diatomaceous

60-70 Sand -- gray, very-argillaceous; poorly sorted, subangular to subrounded, quartz; clay is moderately diatomaceous, scattered chitino-phosphatic shell fragments, small pelecypods, echinoid spines, and foraminifera (Nonion)

70-80 Sand -- brownish-gray, medium- to coarse-grained, moderately sorted, subangular; clear quartz; and traces of dark garnet, brown epidote, muscovite, and glauconite; moderately fossiliferous; megafossils include small pelecypods, pelecypod shell fragments, echinoid spines, and worm tubes; microfossils include foraminifera, a few ostracods, and a trace of diatoms

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~~80-90~~⁸⁸

Sand — brownish-gray, medium- to coarse-grained, moderately sorted, subangular; clear quartz; and traces of dark garnet, brown epidote, muscovite, and glauconite; moderately fossiliferous; megafossils include small pelecypods, pelecypod shell fragments, echinoid spines, and worm tubes; microfossils include foraminifera, a few ostracods, and a trace of diatoms; with a few bryozoan fragments

✓ NANJEMOY FORMATION

(88-241')
~~(90-150')~~

~~90-100~~⁸⁸

Sand — dark-gray, with greenish cast, silty and moderately argillaceous; very-fine-grained, well-sorted, angular quartz (90%) with 10% coarse- to very-coarse-grained, well-sorted, rounded quartz; micaceous (muscovite) very slightly glauconitic; traces of brown epidote, phosphorite, fine-grained pyrite, rutilated quartz, tourmaline, plagioclase, garnet, and pyrito-carbonaceous material; slightly fossiliferous (pelecypod fragments, worm tubes, foraminifera, and a few diatoms)

100-110

Sand — gray, with greenish cast, silty and slightly argillaceous, a few rounded quartz pebbles (15-20 mm); very-fine- to medium-grained (skewed fine), well-sorted, angular to subangular; clear to green-tinted quartz (60-70%) and fresh, dark-green to black glauconite (30-40%); glauconite coarser than quartz; minor muscovite and small amount pyrite; scattered chalky pelecypod shell fragments and poorly preserved foraminifera

110-120

" but more poorly sorted (small % coarse sand)

120-130

Sand — greenish-gray, silty and slightly argillaceous, very-fine- to medium-grained, moderately sorted; quartz (60-70%) and glauconite (30-40%); micaceous (muscovite); scattered chalky pelecypod shell fragments and a few echinoid spines

130-140

"

140-150

"

OWNER: National Park Service (George Washington's Birthplace)

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~~MATTAPONI FORMATION (150-360')~~

- 150-160 Sand — greenish-gray, moderately silty and argillaceous, a few pebbles (15-20 mm) of quartz; fine- to medium-grained, well-sorted; angular to subangular quartz * (50%) and fresh, greenish-black glauconite (50%); micaceous (muscovite); small amount chalky shell fragments and a few foraminifera
* Quartz is finer-grained than glauconite
- 160-170 Sand — dark-greenish-gray, moderately silty and argillaceous; fine-grained, well-sorted, angular to subangular quartz (15-20%) and medium-grained, well-sorted, fresh, black glauconite (80-85%); slightly micaceous (muscovite); a few chalky shell fragments and foraminifera
- 170-180 "
- 180-190 "
- 190-200 Sand — greenish-gray, slightly silty, trace of clay; medium- to coarse-grained, well-sorted glauconite (50%) and fine- to very-coarse-grained, poorly sorted, angular to subrounded quartz (50%); slightly micaceous (muscovite); trace of chalky shell material
- 200-210 "
- 210-220 Sand — dark-gray, moderately silty and argillaceous; very-fine- to coarse-grained, poorly sorted; angular to subrounded quartz (50%) and greenish-black glauconite (50%); slightly micaceous (muscovite); small amount of pyrite; trace of shell material, fish teeth
- 220-230 Sand — gray, slightly silty and argillaceous; fine- to coarse-grained, moderately sorted quartz - glauconite sand (50%) each; large amount of the glauconite is oxidized to browns and brownish-greens and much of quartz is iron-stained; discrete chunks of abundant pink glauconite-bearing clay *; small amounts of pyrite and muscovite
* Pink clay must have been present as balls or lenses
- 230-240/ " but with more quartz and less glauconite

OWNER: National Park Service (George Washington's Birthplace) #1342

✓ **MATAPONI FORMATION (241-360')**

- 241-250 Sand — black, brown, and white speckled, very slightly silty and argillaceous; medium-grained, well-sorted; fresh, greenish-black glauconite and abundant browns and brownish-greens oxidized glauconite (40%); clear to iron-stained, subrounded quartz (60%); abundant pink, glauconite-bearing clay
- 250-260 "
- 260-270 Sand — dark-gray, trace of pink clay; medium-grained, very-well-sorted; fresh, greenish-black glauconite (50%) and subrounded quartz (50%); trace of shell material (Note absence of oxidized glauconite and iron-stained quartz)
- 270-280 " but with a trace of echinoid spines and foraminifera
- 280-290 Sand — "salt- and -pepper", small amount pink clay; medium-grained, well-sorted; subangular to subrounded, clear to white to green-tinted quartz (65-70%) and pale-green to greenish-black glauconite (30-35%); trace of muscovite; an occasional pelecypod shell fragment; foraminifera moderately abundant; a few ostracods
- 290-300 Sand — greenish-gray, argillaceous, including small amount of pink clay; fine- to medium-grained, moderately sorted; subangular to subrounded clear to green, to yellow quartz (75%) and dark-green glauconite (25%); a few coarse pelecypod shell fragments; foraminifera very abundant; a few ostracods
- 300-310 Sand, Carbonate, and Clay — dark-greenish-gray, medium- to coarse-grained, well-sorted sand, composed of fresh, dark-green glauconite and clear, to yellowish, to greenish quartz, and a small amount of brown limonite after glauconite; yellowish-white, friable carbonate containing abundant glauconitic sand; pink and gray sand-bearing clays; abundant gastropods (internal casts), some echinoid spines, pelecypod fragments, corals, and bryozoans; very abundant foraminifera and a few ostracods
- 310-320 " but buff in color, with higher percentages of carbonate and brown limonite after glauconite

OWNER: National Park Service (George Washington's Birthplace)

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- 320-330 Sand — "salt- and -pepper", moderately argillaceous (pink and gray clays containing glauconitic sand), medium-grained, well-sorted, subrounded to rounded; clear to yellowish to orangeish quartz (about 60%) and glauconite and limonite after glauconite (about 40%); moderately fossiliferous, mostly foraminifera but with some ostracods, echinoid spines, and pelecypod fragments
- 330-340 "
- 340-350 Sand — gray; slightly argillaceous (pink clay); medium- to coarse-grained, moderately sorted, subrounded; quartz, mostly clear (50%) and fresh black glauconite (50%); foraminifera moderately abundant, a few echinoid spines

350-360 "

✓ **TRANSITIONAL BEDS (360-400')**
~~ESTABLISHED FORMATION (360-650')~~

- 360-370 Sand — brown, moderately argillaceous; fine- to coarse-grained, poorly to moderately sorted, subangular to subrounded; relatively unstained quartz (75-80%) and green glauconite (20-25%); trace of greenish mica; relatively unfossiliferous (a few foraminifera and echinoid spines)
- 370-380 Sand — brownish-red, argillaceous (reddish clay); fine- to coarse-grained, poorly sorted, angular to subrounded; quartz, mostly clear but some hyacinth (85%), white chert, white, weathered feldspar, and green glauconite (5% each); trace of muscovite; foraminifera present but rare
- 380-390 Sand — brownish-red, argillaceous (reddish clay); medium- to coarse-grained, moderately sorted, angular to subrounded; quartz, mostly clear but some hyacinth (85%), white chert, white, weathered feldspar, and green glauconite (5% each); trace of muscovite; a few coarse shell fragments
- 390-400 Sand — brown, argillaceous; medium- to coarse-grained, moderately sorted, subangular; quartz, mostly clear but some hyacinth (90%), white chert, white, weathered feldspar, and green glauconite (subequal amounts); trace of muscovite

OWNER: National Park Service (George Washington's Birthplace)

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PATUXENT FORMATION (400-667')

- 400-410 Sand — grayish-white; medium- to coarse-grained, fairly-well-sorted, subangular to subrounded; essentially clear quartz with small amounts of white feldspar, white chert, glauconite, and muscovite; traces of chlorite, brown epidote, and of staurolite
- 410-420 " but slightly more clay, and with a trace of pink garnet in place of epidote and staurolite
- 420-430 Sand — grayish-brown, slightly to moderately argillaceous; fine- to coarse-grained, rather poorly sorted, subangular; essentially clear quartz with small amounts of glauconite, intensely weathered white feldspar (microcline and microperthite), and traces of muscovite, chlorite, and brown epidote; trace of chalky shell material and a very few foraminifera
- 430-440 "
- 440-450 " but medium- to coarse-grained, better sorted
- 450-460 Sand — grayish-brown, trace of clay; coarse- to very-coarse-grained, fairly-well-sorted, subangular; predominately clear quartz, with small amounts fresh glauconite and weathered, white feldspar; traces of muscovite and pink garnet
- 460-470 "
- 470-480 "
- 480-490 " but slightly more argillaceous and glauconitic and with a trace of earthy hematite
- 490-500 Sand and Clay — brown, glauconitic and slightly arkosic (microcline), cherty, quartz sand (about 50%) and variegated clay (about 50%); small nodules of limonite and earthy hematite moderately abundant
- 500-510 "
- 510-520 "

OWNER: National Park Service (George Washington's Birthplace)

#1342

- 520-530 Sand and Clay — brown; very-fine- to medium-grained, rather poorly sorted, variably rounded; sand fraction 65% quartz, 35% glauconite; with small amounts of feldspar, muscovite, earthy hematite, and limonite after glauconite; variegated clay (about 40% of sediment); a few foraminifera
- 530-540 "
- 540-550 "
- 550-560 "
- 560-570 "
- 570-580 Clay and Sand — brown; variegated clay (60% of sediment); fine- to coarse-grained, rather poorly sorted, variably rounded sand (quartz 75-80%, glauconite 20-25%); small amounts muscovite, nodular earthy hematite, and feldspar; trace of pyrite; a few foraminifera
- 580-590 "
- 590-600 "
- 600-610 "
- 610-620 Clay and Sand — brown; variegated clay (60% of sediment); rather poorly sorted, variably rounded quartz sand with considerable white feldspar (about 10% of sand fraction) and small amounts of glauconite and nodular earthy hematite
- 620-630 "
- 630-640 " but more arkosic
- 640-650 Sand — brown, moderately argillaceous; medium- to coarse-grained, fairly-well-sorted, subangular to subrounded; quartz dominant, white alkali feldspar subordinate, small amount glauconite, and trace of muscovite
- 650-667 No sample

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GEOLOGIC SUMMARY

	<u>ROCK UNIT</u>	<u>AGE</u>
✓ 0- 30 ²⁹	Columbia Group	Pleistocene
✓ 29-88 ²⁹⁻⁸⁸ 20-90	Calvert Formation	Middle Miocene
✓ 88-241 ⁸⁸⁻²⁴¹ 90-150	Nanjemoy Formation	Middle Eocene
✓ 241 ²⁴¹ 150-360	Mattaponi Formation	Paleocene- Late Cretaceous
✓ 360-550 ⁻⁴⁰⁰	Patuxent Formation <i>Transitional beds</i>	Late Early Cretaceous
✓ 400 ⁴⁰⁰ 650-667	No sample <i>Patuxent Formation</i>	<i>Early Cretaceous</i>

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3/1/72

Virginia Division of Mineral Resources
Robert H. Teifke, Geologist
~~September 2, 1965~~

Revised : March 1, 1972