

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT

W-4357
C- 175

MAILING ADDRESS:
Box 3667
Charlottesville, VA 22903

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

OFFICE ADDRESS:
McCormick Road
Charlottesville, Virginia

OWNER: Busch Gardens #3 Mailing Address: P. O. Box F. C. Williamsburg, VA. 23185

TENANT: _____ Mailing Address: _____

DRILLER: J. G. Mitchell Mailing Address: (ICO) Sydnor Hydrodynamics, Inc. Richmond, VA. 23223

WELL LOCATION: County James City Approx. 1/2 ~~miles~~ miles SSE (direction) of Busch Brewery Building and 1/4 ~~miles~~ miles SW (direction) of HWY #60

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

DATE STARTED: 11-13-74 DATE COMPLETED: 1-22-75

TYPE OF DRILL RIG USED: Mud Rotary TOTAL DEPTH 520 feet

WATER LEVEL: Stands _____ feet below surface OR has NATURAL flow of _____ gallons per minute.

YIELD TEST: Method 12" Turbine HOLE SIZE: _____ inches from _____ to _____ feet
Drawdown 53 feet _____ inches from _____ to _____ feet
Rate 1012 gal. per min. _____ inches from _____ to _____ feet
Duration 24 hrs., _____ min. SCREEN SIZE: 8 inches from 451 to 456 feet

WATER ZONES: from _____ to _____ feet
from _____ to _____ feet
from _____ to _____ feet
CASE SIZE: _____ inches from _____ to _____ feet

WATER: Color _____ Taste _____ inches from _____ to _____ feet
Odor _____ Temp. _____ °F _____ inches from _____ to _____ feet

WELL TO SUPPLY: (check one) Home _____ GROUTING: Method _____
Farm _____ Town _____ School _____ Material _____ Depth _____ feet
Industry _____ Other Lake Water Supply

WATER ANALYSIS AVAILABLE: Yes X No _____ PUMP: Type _____ Capacity _____ gal. per min.

DRILL CUTTINGS SAVED: Yes X No _____ Depth of intake _____ feet
(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: _____

FURNISHED BY: _____ DATE: _____

DEPTH (feet)		TYPE OF ROCK OR SOIL PENETRATED (gravel, clay, etc., hardness, color, etc.)	REMARKS (water, caving, shot, screen, sample, etc.)
FROM	TO		
0	3	Gray Sand	
3	10	Dark Yellow Clay	
10	20	Light Yellow Clay	
20	30	Dark Yellow Clay	
30	33	Brown Sand Gravel	
33	42	Open Hole	
42	52	Shells	
52	54	Blue Clay	
54	120	Shells and some Blue Clay Streaks	
120	135	Shells Some Blue Clay	
135	150	Shells and Blue Clay	
150	200	Blue Clay, Some Shells	
200	280	Green Clay	
280	320	Green Clay, some Streaks of Shells and Sand	
320	330	Green Clay, some Shells	
330	340	Shells	
340	350	Gray Clay, some shells, sand	
350	395	Gray clay, some fine black sand	
395	403	Black Gray, sand, shells and gray clay	
403	405	Gray clay	
405	418	Gray clay, black sand	
418	460	Rock and streaks of gray clay and black sand	
460	470	Gray clay and black sand and gray sand	
470	505	Gray sand	
505	520	Gray Clay and sand	

VIRGINIA DIVISION OF MINERAL RESOURCES
 Box 3667, Charlottesville, VA 22903

INTERVAL SHEET

Page 1 of 1 Well Repository No.: W-4357 C- 175
 Date rec'd 4/28/75 Date Processed: 2/22/76 Sample Interval: from 0 to: 520
 PROPERTY: Busch Garden #3 Number of samples: 49
 COMPANY: Sydnor Total Depth: 520
 COUNTY: James City (Grove) Oil or Gas: Water~~X~~ Exploratory:

From-To	From-To	From-To	From-To
0 - 10	250 - 260	500 - 510	-
10 - 20	260 - 270	510 - 520	-
20 - 30	270 - 280	-	-
-	280 - 290	-	-
-	290 - 300	-	-
50 - 60	300 - 310	-	-
60 - 70	310 - 320	-	-
70 - 80	320 - 330	-	-
80 - 90	330 - 340	-	-
90 - 100	340 - 350	-	-
100 - 110	350 - 360	-	-
110 - 120	360 - 370	-	-
120 - 130	370 - 380	-	-
130 - 140	380 - 390	-	-
140 - 150	390 - 400	-	-
150 - 160	400 - 410	-	-
160 - 170	410 - 420	-	-
170 - 180	420 - 430	-	-
180 - 190	430 - 440	-	-
190 - 200	440 - 450	-	-
200 - 210	450 - 460	-	-
210 - 220	460 - 470	-	-
220 - 230	470 - 480	-	-
230 - 240	480 - 490	-	-
240 - 250	-	-	-

Both washed and unwashed samples.

OWNER: Busch Gardens #3
DRILLER: Sydnor
COUNTY: James City (Grove)

W#: 4357
C#: 175
TOTAL DEPTH: 520'

GEOLOGIC LOG

Depth
(feet)

WINDSOR FORMATION (0-20)

- 0-10 Clay - pale brown, some gray and red splotches; locally sandy; fine to coarse grained; quartz; some opaques; few grains glauconite.
- 10-20 Clay and sand - pale yellow; abundant sand; abundant clay; fine to medium grained; subangular; moderately sorted; quartz; feldspar; opaques; glauconite; muscovite.

YORKTOWN FORMATION (20-130)

- 20-30 Clay and sand - orangish brown locally light gray; heavily iron stained; abundant sand; abundant clay; silty; fine to coarse grained; subangular to subrounded; moderately sorted; quartz; feldspar; 2% weathered shell fragments; spines; few grains glauconite; few ferricrete fragments; few limestone fragments.
- 30-50 NO SAMPLE.
- 50-60 Sand and shell hash - gray; moderately clayey; fine to medium grained sand with coarse sand size shell hash; subangular to rounded; moderately well sorted sand; quartz; 35% shell hash; inc. pecten and gastropods; 25 % glauconite; spines; forams (inc. Quinqueloculina and Textularia (sp)); ostracodes (sp); few phosphatic fragments.
- 60-70 Shell hash - gray; slightly clayey; granular sized; slightly sandy; fine to medium subangular to rounded quartz and glauconite (10%) sand; spines; few phosphate fragments; forams (inc. Quinqueloculina and Buccella); ostracodes.
- 70-80 Sand and shell hash-gray; slightly clayey; fine to medium grained with granular hash; subrounded to rounded; moderately well sorted sand; 40% shell fragments; quartz; 10% glauconite; spines; forams (inc. Quinqueloculina and Buccella); ostracodes (sp); few phosphate fragments.
- 80-90 Sand and shell hash - gray; slightly clayey; silty; fine to medium grained; subangular to subrounded; well sorted; quartz; 45% shell hash inc. Isognomen ? and gastropod; 10% glauconite; some phosphatic material; spines; forams common (inc. Quinqueloculina, Discorbis, Textularia and Buccella); ostracodes.

Depth
(feet)

- 90-100 Sand - gray; slightly clayey; fine to medium grained; subangular to subrounded; moderately well sorted; quartz; 42% shell hash inc. Isognomen ? and gastropods; 5% glauconite; some phosphatic material; spines; forams (inc. Quinqueloculina).
- 100-110 As above except 2% glauconite; forams scarce (only Textularia); ostracodes.
- 110-120 Sand - gray; slightly clayey; fine with some medium and rounded coarse grains; subangular to subrounded; moderately well sorted; quartz; 30% shell and limestone fragments; 2% glauconite; phosphatic material; spines; forams (inc. Quinqueloculina).
- 120-130 Sand - gray; moderately clayey; fine grained; subangular to subrounded; moderately well sorted; quartz; 30% shell and limestone fragments; 2% glauconite; phosphatic material; spines; forams (inc. Quinqueloculina; Nonion and Buccella); ostracodes.
- CALVERT FORMATION (130-320)
- 130-140 Sand - gray; abundant clay; silty; fine grained; subangular to subrounded; well sorted; quartz; 25% shell fragments; 5% glauconite; 5% spines; black phosphatic material; forams (Buccella and Textularia).
- 140-150 Silt and sand - greenish gray; abundant clay; fine grained; subangular to subrounded; quartz; 6% shell fragments; trace of glauconite; black phosphatic material; spines; forams (inc. Buccella and Textularia); ostracodes.
- 150-160 Clay and sand - greenish gray; abundant clay; silty; very fine to fine grained; subangular to subrounded well sorted; quartz; 5% shell fragments; trace glauconite; black phosphate material; spines; forams (inc. Buccella, Nonion, Textularia and Quinqueloculina); ostracode.
- 160-170 Clay and shell hash - dark greenish gray; slightly sandy; fine grained; 25% weathered shell and limestone fragments; quartz; some phosphatic material; spines; few glauconite grains; forams rare (inc. Buccella).
- 170-180 Clay - dark greenish gray; silty; slightly sandy; fine grained subangular; quartz 20% weathered shell fragments; few phosphatic fragments; few glauconite grains; spines; forams (inc. Buccella).

Depth
(feet)

- 180-190 As above except dark greenish gray; 35% weathered shell fragments; (only Nonion observed).
- 190-200 Clay - dark greenish gray; few quartz and glauconite grains; 25% weathered shell fragments; few phosphatic grains; forams (inc. Textularia, Nonion, Bulimina, Buccella and Quinqueloculina); spines.
- 200-210 As above except 30% shell fragments; (no Buccella or Quinqueloculina, but Bolivina); ostracode.
- 210-220 As above except (only Bulimina and Nonion identified (sp?); no ostracode; fish vertebra.
- 220-230 As above plus few rounded limestone fragments and gastropod shells; plus (Textularia).
- 230-240 As above except only 25% shell and few limestone fragments inc. gastropod; forams (inc. Bulimina, Nonion, Buccella and Globigerina); ostracode; bone fragment.
- 240-250 As above except 5% shell fragments; few limestone fragments; forams (inc. Nonion, Bulimina and Buccella); no ostracodes observed; bone fragments.
- 250-260 Clay - dark greenish gray; silty; slightly sandy; very fine to fine grained; subangular to rounded; quartz; 2% shell fragments; some phosphatic material; few grains of glauconite; spines; forams common (inc. Uvigerina, Bulimina, Buccella, Robulus and Quinqueloculina); ostracode.
- 260-270 As above except slightly more quartz; 3% shell fragments; forams common (inc. Nonion, Uvigerina, Bulimina, Robulus and Textularia observed).
- 270-280 Clay - dark greenish gray; slightly silty; slightly sandy; very fine to fine grained; quartz; 5% shell fragments; some phosphatic material; few grains glauconite; few spines; forams common (inc. Uvigerina, Nonion, Buccella, Bulimina, Robulus, Bolivina and Quinqueloculina); Diatoms common; limestone fragment.
- 280-290 As above except 3% shell fragments; (no Buccella, Robulus or Quinqueloculina, but Bulimina observed); no limestone fragments.
- 290-300 Clay - light olive green; scattered fine to coarse sands; some shell fragments; phosphatic material; glauconite; forams common (Siphogenerina, Nonion, Dentalina ?, Uvigerina Marginulina ?); few limestone fragments; Diatoms common.

Depth
(feet)

- 300-310 As above more coarse subangular to subrounded quartz; forams common (only Siphogenerina, Robulus and Nonion identified); some spines.
- 310-320 Sand - dark gray, moderately clayey; silty; fine to medium with some coarse grains; subrounded; moderately well sorted; quartz; 5% shell fragments; 2% phosphatic material; few grains of glauconite; forams abundant (inc. Uvigerina, Siphogenerina, Globigerina, Robulus, Quinqueloculina, Bulimina and Nonion); bone fragments.
- NANJEMOY FORMATION (320-400)
- 320-330 Clay - dark greenish gray; slightly sandy; fine to coarse subangular to subrounded quartz; 32% shell fragments; 2% sandy limestone fragments; phosphatic material; glauconite; forams common (inc. Siphogenerina, Uvigerina, and Nonion).
- 330-340 Limestone - gray; slightly clayey; some quartz and glauconite sand; limestone locally pure to sandy, in molds and casts of shells inc. gastropods and forams; 2% pyrite as crystals and balls; few shell fragments; Malachite and Azurite stains.
- 340-350 Sand and limestone - brownish gray; moderately clayey; silty; fine to coarse grained; subrounded to rounded; poorly sorted; quartz; 25% limestone fragments; 25% glauconite (mostly brown); 2% pyrite (crystals and balls); some shell fragments; phosphatic material; forams (some carbonate coating) (inc. Buccella and Bulimina).
- 350-360 Sand - brownish gray; moderately clayey; medium to coarse grained; rounded; moderately sorted; 70% glauconite (brown mostly); 25% quartz (heavily iron stained); 3% limestone fragments; pyrite; few shell fragments; forams (inc. Buccella (carbonate coatings) and Quinqueloculina).
- 360-370 Sand - brownish gray; moderately clayey; fine to coarse grained; rounded; moderately sorted; 70% glauconite (brown and green); 30% quartz; some limestone fragments; some phosphatic material; pyrite; forams (most with calcareous coating inc. Uvigerina); spines scarce; ostracode.
- 370-380 As above except (only Buccella observed); shell fragments; no spines; no ostracode.

Depth
(feet)

- 380-390 Clay - gray; slightly silty; slightly sandy; fine to medium quartz and glauconite; some limestone and shell fragments; pyrite; forams (inc. Buccella and Uvigerina); spines rare.
- 390-400 Clay and sand - gray, locally pink; abundant clay; slightly sandy; medium to coarse; rounded; moderately well sorted; 80% glauconite (black); quartz; some shell and limestone fragments; spines; forams; pyrite.

MATTIPONI FORMATION (400-450)

- 400-410 Sand - dark greenish gray; slightly clayey; medium to coarse grained; rounded; moderately sorted; 85% glauconite; 10% shell and limestone fragments; quartz; pyrite.
- 410-420 As above except glauconite more green; 7% shell and limestone fragments; spines; pyrite; forams (inc. Nodosaria); bone fragment.
- 420-430 As above except moderate clay; no bone fragment.
- 430-440 As above except 70% glauconite; 10% limestone fragments; some shell fragments.
- 440-450 As above plus 15% limestone fragments.

PATUXENT FORMATION (450-520⁺)

- 450-460 Sand - salt and pepper gray; medium to coarse grained; subangular to rounded; moderately sorted; quartz; feldspar; 30% glauconite; some limestone and shell fragments; pyrite; garnet; forams scarce (inc. Nodosaria); spines rare.
- 460-470 Sand - salt and pepper gray; medium to coarse with a few granular grains; subangular to rounded; moderately sorted; quartz; feldspar; 25% glauconite; few shell and limestone fragments; garnet.
- 470-480 Sand - salt and pepper gray; medium to very coarse with some granular grains; subangular to rounded; moderately sorted; quartz; feldspar; 8% glauconite; garnet.
- 480-490 Sand - salt and pepper gray; coarse to very coarse with some granular grains; subangular; moderately well sorted; quartz; feldspar; 3% glauconite; garnet.

Depth
(feet)

490-500 No Sample.

500-510 Sand - gray; moderate clay; silty; medium to coarse with some granular grains; **subangular** to subrounded; moderately sorted; quartz; feldspar; trace of glauconite; few shell and limestone framgents.

510-520 Sand and clay - light brownish gray; abundant yellowish brown clay; **fine** to coarse grained; subangular to subrounded; moderately sorted; quartz; feldspar; 8% glauconite; garnet; some forams (inc. Robulus).

Note - Sp: sample taken.

GEOLOGIC SUMMARYThickness
(feet)

20	Windsor Formation	Pleistocene
110	Yorktown Formation	Pliocene-Miocene
190	Calvert Formation	Miocene-Eocene
80	Nanjemoy Formation	Eocene
50	Mattiponi Formation	Eocene-Cretaceous
70 ⁺	Patuxent Formation	Cretaceous

Virginia Division of Mineral Resources
David A. Hubbard, Jr., Geologist
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