

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT

MAILING ADDRESS:

DIVISION OF MINERAL RESOURCES

OFFICE ADDRESS:

P 3667
Charlottesville, VA 22903

JAMES L. CALVER, COMMISSIONER

McCormick Road
Charlottesville, Virginia

WATER WELL COMPLETION REPORT

OWNER: H. Marvin Clark Mailing Address: P.O. Box A O Tappahannock, Va.

TENANT: Whispering Pines Estates Mailing Address: _____

DRILLER: Fetterolf Bros. Mailing Address: Syringa, Va.

WELL LOCATION: County Essex Approx. 3/4 ~~feet~~ miles South (direction) of
city limit - Tappahannock, Va. and 1/2 ~~miles~~ miles S.E. (direction) of Rt. 17/360

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

DATE STARTED: Sept. 6, 1971 DATE COMPLETED: Sept. 10, 1971

TYPE OF DRILL RIG USED: Rotary TOTAL DEPTH 433 feet

WATER LEVEL: Stands 32 feet below surface OR
has NATURAL flow of _____ gallons per minute.

YIELD TEST: Method Submersible Pump
Drawdown 20 feet
Rate 50 gal. per min.
Duration 6 hrs., 0 min.

HOLE SIZE: 9 inches from 0 to 100 feet
6-1/4 inches from 100 to 150 feet
3-7/8 inches from 150 to 413 feet

WATER ZONES: from 412 to 433 feet
from _____ to _____ feet
from _____ to _____ feet

SCREEN SIZE: 2 inches from 413 to 433 feet
_____ inches from _____ to _____ feet
_____ inches from _____ to _____ feet

WATER: Color _____ Taste _____
Odor _____ Temp. _____ °F

CASE SIZE: 4 inches from 0 to 150 feet
2 inches from 150 to 413 feet
_____ inches from _____ to _____ feet

WELL TO SUPPLY: (check one) Home _____
Farm _____ Town _____ School _____
Industry _____ Other subdivision

GROUTING: Method Pumped
Material cement Depth 100 feet

WATER ANALYSIS AVAILABLE: Yes _____ No _____

PUMP: Type slush pump
Capacity 20 gpm at low rpm per min
Depth of intake _____ feet

DRILL CUTTINGS SAVED: Yes 44 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: The name of the development has been changed from Laurel Estates to
Whispering Pines Estates

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

INTERVAL SHEET

Page 1 of 1

C 155
 Well Repository No: 3308

Date rec'd: 12/7/71 ; processed 12/21/71

Sample Interval; from 0c to: 433'

PROPERTY: H. M. Clark (Whispering Pines)

Number of samples: 44

COMPANY: Fetterolf Bros.

Total Depth: 433'

COUNTY: Essex (Tappahannock)

Oil or Gas: Water; Exploratory:

From-To	From-To	From-To	From-To
0 - 10	250 - 60	-	-
10 - 20	260 - 70	-	-
20 - 30	270 - 80	-	-
30 - 40	280 - 90	-	-
40 - 50	290 - 300	-	-
50 - 60	300 - 10	-	-
60 - 70	310 - 20	-	-
70 - 80	320 - 30	-	-
80 - 90	330 - 40	-	-
90 - 100	340 - 50	-	-
100 - 10	350 - 60	-	-
110 - 20	360 - 70	-	-
120 - 30	370 - 80	-	-
130 - 40	380 - 90	-	-
140 - 50	390 - 400	-	-
150 - 60	400 - 10	-	-
160 - 70	410 - 20	-	-
170 - 80	420 - 30	-	-
180 - 90	430 - 33	-	-
190 - 200	-	-	-
200 - 10	-	-	-
210 - 20	-	-	-
220 - 30	-	-	-
230 - 40	-	-	-
240 - 50	-	-	-

Unwashed only, not enough to split

Owner: A. Clark (Whispering Pines)
Driller: Fetterolf Bros.
County: Essex (Tappahannock)

W - 3308
C - 155
Total Depth: 433'

GEOLOGIC LOG

Depth
(feet)

COLUMBIA GROUP (0-10')

0-10 Sand - tan, trace of clay; medium- to coarse-grained, well sorted; magnetite and decomposed feldspar common; trace of glauconite.

YORKTOWN FORMATION (10-40')

10-20 Sand - gray, slightly (locally?) clayey; medium-grained, well-sorted, subangular to subrounded; clear quartz with 5 percent fragmental phosphorite; rare plant fragments.

20-30 " "

30-40 " , except: more clayey; locally bound by pale yellow clay.

CALVERT FORMATION (40-140')

40-50 Clay - buff, pulverulent; trace of quartz sand; diatomaceous.

50-60 " "

60-70 " "

70-80 " "

80-90 Clay - pale greenish-gray, sand-free, diatomaceous.

90-100 Clay - pale greenish-gray, sand-free, uniformly silty (fine-grained silt); diatomaceous.

- 100-110 Silt - grayish green, moderately, clayey, friable; slightly to moderately diatomaceous; a few sand-size fragments of phosphorite.
- 110-120 " , except: generally more clayey, with abundant laminae of pale greenish-gray, moderately diatomaceous to diatomaceous clay.
- 120-130 Sand - matrix and discrete laminae of greenish-brown clayey silt, and laminae of moderately diatomaceous pale clay; 10 percent shell fragments; sand is fine- to coarse-grained, moderately sorted (skewed fine), angular to subrounded; clear quartz with minor fragmental phosphorite.
- 130-140 " "

NANJEMOY FORMATION (140-290')

- 140-150 Shell, Gravel, and Sand - gray, slightly clayey; 40 percent abraded pelecypod shells and shell fragments (2 to 8 mm); 30 percent well-sorted and well-rounded gravel (2 to 6 mm) consisting of quartz and minor phosphorite; 30 percent fine- to medium-grained moderately sorted sand (two-thirds clear to greenish quartz, one-third glauconite); sand and shell are partly cemented by carbonate and fine-grained pyrite; accessory pyrite, garnet, muscovite; a very few fish teeth, foraminifers, aragonite sheaves, and spines.
- 150-160 Sand - gray, clean, with 20 percent small (2 to 4 mm) shell fragments; medium- to very coarse-grained, fairly well-sorted; sand fraction is 75 percent subangular to rounded clear and green-tinted quartz, 20 percent medium-grained fresh glauconite, 5 percent shell fragments; trace of pyrite; a few foraminifers and ostracods.
- 160-170 Sand - gray, clean, trace of shell fragments; medium-grained, fairly well-sorted; 75 percent subangular to subrounded clear and green-tinted quartz, and 25 percent fresh glauconite; a few foraminifers and ostracods.

- 170-180 Sand and Shell - gray, clean; 30 percent small (2 to 8 mm) abraded shell fragments; 70 percent coarse- to very coarse-grained, fairly well-sorted sand comprising subrounded to rounded, clear to green-tinted quartz and less than 5 percent glauconite; a few foraminifers and ostracods.
- 180-190 Clay - gray, very sandy; sand is bimodal -- 60 to 70 percent very fine-grained, very well-sorted, angular sand comprising angular clear and greenish quartz (60 to 70 percent) and dark-green glauconite (30 to 40 percent); 30 to 40 percent coarse- to very coarse-grained, fairly well-sorted sand comprising subrounded to well-rounded clear quartz; both sands contain small percentages of shell fragments; foraminifers and ostracods common; a few spines and otoliths.
- 190-200 Sand - dark greenish-gray, slightly to moderately clayey; fine- to very fine-grained, very well-sorted; 50 percent glauconite, 50 percent angular greenish quartz; medium-grained white mica is a common accessory; shell material rare.
- 200-210 Sand - light greenish-gray, moderately clayey to clayey; fine- to very fine-grained, well-sorted; 50 percent glauconite, 50 percent angular clear and greenish quartz; micaceous; a few shell fragments, foraminifers and ostracods.
- 210-220 Sand - abundant matrix and lenses of grayish-brown clay; very fine- to medium-grained, moderately sorted; 60 percent dark-green glauconite, 40 percent angular clear and greenish quartz; micaceous; a few foraminifers, ostracods, and spines.
- 220-230 Sand - very abundant matrix of greenish-gray clay; 95 percent very fine- to medium-grained, fairly well-sorted dark-green glauconite; 5 percent quartz divided between a very fine-grained well-sorted angular increment and a

coarse-grained, well-sorted, better rounded fraction; washed residue is essentially a glauconite concentrate; rare foraminifers.

- 230-240 Clay - light greenish-gray, moderately sandy; sand fraction comprises about 50 percent fine- to very fine-grained, well-sorted, angular, clear and greenish quartz, and 50 percent very fine- to medium-grained dark-green glauconite; muscovite common; foraminifers rare.
- 240-250 Clay - light greenish-gray to medium greenish-gray and sandy, with lenses of dark-gray to black, relatively compact silty clay; sand-silt fraction is predominantly finer than 0.5 mm; subordinate fine-grained quartz; rare foraminifers.

250-260 " "

- 260-270 Clay - interlaminations of the lithology described for the 240-260¹ interval and the following lithologies in order of decreasing abundance: (1) pale- to salmon-pink sand-free clay, (2) light-gray slightly micaceous sand-free clay, and (3) quartz sand in matrix of pale-yellow clay.

270-280 " "

- 280-290 Clay - predominantly salmon-pink glauconite-bearing clay.

MATTAPONI FORMATION (290-370')

- 290-300 Sand - gray, speckled, clean; medium- to coarse-grained, well-sorted; subequal amounts of medium-grained, fresh glauconite, and medium- to coarse-grained, subangular to subrounded, clear to yellowish quartz; about 5 percent rounded goethite after glauconite.

300-310 " , except: slightly coarser.

- 310-320 Sand - speckled, clean; medium- to coarse-grained, fairly well-sorted; about 45 percent dark- to olive-green glauconite, 5 percent rounded goethite after glauconite, and 50 percent sub-angular to well-rounded clear, green, yellow, and brown quartz.
- 320-330 " "
- 330-340 Clay-Sand-Sandstone - this interval consists of a complexly interlaminated association of the following discrete lithologies: (1) salmon-pink clay (dominant), pure to densely populated with medium- to coarse-grained quartz and glauconite, (2) dark-gray, very sandy, very glauconitic clay, (3) light-gray, micaceous, sand-free clay, (4) calcitic, quartzo-glauconitic sandstone -- white to bright pea-green, apparently due to weathering and dispersion of contained glauconite, (5) phosphorite nodules and fragments of glauconite-bearing phosphate rock, (6) pelecypod fragments and Nodosaria, both abraded. (5) and (6) probably were concentrated in pockets within the interval (channel-fill mode of occurrence).
- 340-350 Sand - dark-gray, speckled, clean; medium- to coarse-grained, fairly well-sorted; about 50 percent stained quartz (brown, orange, yellow, green), and 50 percent glauconite of various colors (black, greens, brown); a very few poorly preserved foraminifers and ostracods.
- 350-360 " , except: slightly coarser, more poorly sorted, and slightly clayey; a few Robulus, Nodosaria, spines.
- 360-370 Sand - slightly clayey, with lenses of dark-gray silty and sandy clay; very fine- to coarse-grained, moderately sorted, positively skewed; about 50 percent rounded stained quartz, and 50 percent glauconite showing a spectrum of decomposition; trace of feldspar; rare shell fragments and foraminifers, mainly Nodosaria.

PATUXENT FORMATION (370-433')

- 370-380 Sand - tan, clean; coarse- to very coarse-grained, well-sorted, subrounded; quartz, with 10 to 20 percent feldspar; 2 to 3 percent of medium-grained glauconite; traces of plant fragments and pink garnet.
- 380-390 " , except: with many intercalations of fine-grained material, including: dark-gray slightly sandy clay; pink clay with traces of sand; light-gray sand-free clay; light-green clayey silt; fine- to medium-grained glauconitic silt-sand with matrix of glauconitic clay.
- 390-400 " , except: fine-grained (clayey) interbeds are the dominant lithologies, and the coarse clastic fraction ranges from medium-grained sand to granule gravel.
- 400-410 " , except: fine-grained (clayey) interbeds, and especially the gray clays, gray sandy clays, and gray clayey sands are predominant; sand fraction is medium- to coarse-grained, moderately sorted.
- 410-420 Sand - brownish-gray, locally clayey, with a few lenses of the fine-grained lithologies described above; medium-grained sand to granule gravel, subangular to subrounded; feldspathic, slightly glauconitic, accessory pink and orange garnet.
- 420-430 Sand - tan, clean; coarse-grained sand to granule gravel, well-sorted, subangular to subrounded; feldspathic, trace of glauconite, accessory garnet.
- 430-433 Clay - mainly dark-gray silty, micaceous, with small pockets of fresh glauconite or clear angular quartz; trace of pyrite; a few plant fragments.

GEOLOGIC SUMMARY

<u>Depth</u> <u>(feet)</u>	<u>Rock Unit</u>	<u>Age</u>
0-10	Columbia Group	post-Miocene
10-40	Yorktown Formation	Miocene
40-140	Calvert Formation	Miocene
140-290	Nanjemoy Formation	Eocene
290-370	Mattaponi Formation	Paleocene-Late Cretaceous
370-433	Patuxent Formation	Early Cretaceous

VIRGINIA DIVISION OF MINERAL RESOURCES
Robert H. Teifke - Geologist
April 13, 1972

Owner: A. Clark (Whispering Pines)
Driller: Fetterolf Bros.
County: Essex (Tappahannock)

W - 3308
C - 155
Total Depth: 433'
Quad. : Tappahannock
Elev. : ~ 30'

GEOLOGIC LOG

Depth
(feet)

COLUMBIA GROUP (0-10')

0-10 Sand - tan, trace of clay; medium- to coarse-grained, well sorted; magnetite and decomposed feldspar common; trace of glauconite.

YORKTOWN FORMATION (10-40')

10-20 Sand - gray, slightly (locally?) clayey; medium-grained, well-sorted, subangular to subrounded; clear quartz with 5 percent fragmental phosphorite; rare plant fragments.

20-30 " "

30-40 " , except: more clayey; locally bound by pale yellow clay.

CALVERT FORMATION (40-140')

40-50 Clay - buff, pulverulent; trace of quartz sand; diatomaceous.

50-60 " "

60-70 " "

70-80 " "

80-90 Clay - pale greenish-gray, sand-free, diatomaceous.

90-100 Clay - pale greenish-gray, sand-free, uniformly silty (fine-grained silt); diatomaceous.

10-40'
possibly
Calvert Fm.

- 100-110 Silt - grayish green, moderately, clayey, friable; slightly to moderately diatomaceous; a few sand-size fragments of phosphorite.
- 110-120 " , except: generally more clayey, with abundant laminae of pale greenish-gray, moderately diatomaceous to diatomaceous clay.
- 120-140'*
no glauconite 120-130 Sand - matrix and discrete laminae of greenish-brown clayey silt, and laminae of moderately diatomaceous pale clay; 10 percent shell fragments; sand is fine- to coarse-grained, moderately sorted (skewed fine), angular to subrounded; clear quartz with minor fragmental phosphorite.
- 130-140 " "

NANJEMOY FORMATION (140-290')

- 140-150'*
highest glauconite 140-150 Shell, Gravel, and Sand - gray, slightly clayey; 40 percent abraded pelecypod shells and shell fragments (2 to 8 mm); 30 percent well-sorted and well-rounded gravel (2 to 6 mm) consisting of quartz and minor phosphorite; 30 percent fine- to medium-grained moderately sorted sand (two-thirds clear to greenish quartz, one-third glauconite); sand and shell are partly cemented by carbonate and fine-grained pyrite; accessory pyrite, garnet, muscovite; a very few fish teeth, foraminifers, aragonite sheaves, and spines.
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- 140-180'*
possibly Calvert Fm. 160-170 Sand - gray, clean, trace of shell fragments; medium-grained, fairly well-sorted; 75 percent subangular to subrounded clear and green-tinted quartz, and 25 percent fresh glauconite; a few foraminifers and ostracods.

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- 200-210 Sand - light greenish-gray, moderately clayey to clayey; fine- to very fine-grained, well-sorted; 50 percent glauconite, 50 percent angular clear and greenish quartz; micaceous; a few shell fragments, foraminifers and ostracods.
- 210-220 Sand - abundant matrix and lenses of grayish-brown clay; very fine- to medium-grained, moderately sorted; 60 percent dark-green glauconite, 40 percent angular clear and greenish quartz; micaceous; a few foraminifers, ostracods, and spines.
- 220-230 Sand - very abundant matrix of greenish-gray clay; 95 percent very fine- to medium-grained, fairly well-sorted dark-green glauconite; 5 percent quartz divided between a very fine-grained well-sorted angular increment and a

beach over lagoon?
(transgression)



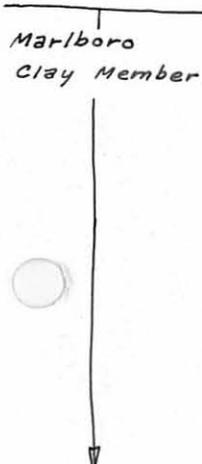
barren

coarse-grained, well-sorted, better rounded fraction; washed residue is essentially a glauconite concentrate; rare foraminifers.

- 230-240 Clay - light greenish-gray, moderately sandy; sand fraction comprises about 50 percent fine- to very fine-grained, well-sorted, angular, clear and greenish quartz, and 50 percent very fine- to medium-grained dark-green glauconite; muscovite common; foraminifers rare.
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- 280-290 Clay - predominantly salmon-pink glauconite-bearing clay.

MATTAPONI FORMATION (290-370')

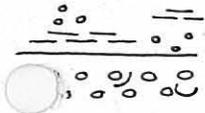
- 290-300 Sand - gray, speckled, clean; medium- to coarse-grained, well-sorted; subequal amounts of medium-grained, fresh glauconite, and medium- to coarse-grained, subangular to subrounded, clear to yellowish quartz; about 5 percent rounded goethite after glauconite.
- 300-310 " , except: slightly coarser.



Marlboro
Clay Member

- 310-320 Sand - speckled, clean; medium- to coarse-grained, fairly well-sorted; about 45 percent dark- to olive-green glauconite, 5 percent rounded goethite after glauconite, and 50 percent sub-angular to well-rounded clear, green, yellow, and brown quartz.
- 320-330 " "
- 330-340 Clay-Sand-Sandstone - this interval consists of a complexly interlaminated association of the following discrete lithologies: (1) salmon-pink clay (dominant), pure to densely populated with medium- to coarse-grained quartz and glauconite, (2) dark-gray, very sandy, very glauconitic clay, (3) light-gray, micaceous, sand-free clay, (4) calcitic, quartzo-glauconitic sandstone -- white to bright pea-green, apparently due to weathering and dispersion of contained glauconite, (5) phosphorite nodules and fragments of glauconite-bearing phosphate rock, (6) pelecypod fragments and Nodosaria, both abraded. (5) and (6) probably were concentrated in pockets within the interval (channel-fill mode of occurrence).
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- 350-360 " , except: slightly coarser, more poorly sorted, and slightly clayey; a few Robulus, Nodosaria, spines.
- 360-370 Sand - slightly clayey, with lenses of dark-gray silty and sandy clay; very fine- to coarse-grained, moderately sorted, positively skewed; about 50 percent rounded stained quartz, and 50 percent glauconite showing a spectrum of decomposition; trace of feldspar; rare shell fragments and foraminifers, mainly Nodosaria.

lagoon over beach ?



*grains of clear
quartz invariably
are WR - VWR
(introduced aeolian?)*

PATUXENT FORMATION (370-433')

370-380 Sand - tan, clean; coarse- to very coarse-grained, well-sorted, subrounded; quartz, with 10 to 20 percent feldspar; 2 to 3 percent of medium-grained glauconite; traces of plant fragments and pink garnet.

380-433'
dark clays increase
at expense of
light (pinkish) clays.



380-390 " , except: with many intercalations of fine-grained material, including: dark-gray slightly sandy clay; pink clay with traces of sand; light-gray sand-free clay; light-green clayey silt; fine- to medium-grained glauconitic silt-sand with matrix of glauconitic clay.

390-400 " , except: fine-grained (clayey) interbeds are the dominant lithologies, and the coarse clastic fraction ranges from medium-grained sand to granule gravel.

400-410 " , except: fine-grained (clayey) interbeds, and especially the gray clays, gray sandy clays, and gray clayey sands are predominant; sand fraction is medium- to coarse-grained, moderately sorted.

410-420 Sand - brownish-gray, locally clayey, with a few lenses of the fine-grained lithologies described above; medium-grained sand to granule gravel, sub-angular to subrounded; feldspathic, slightly glauconitic, accessory pink and orange garnet.

Patapsco Fm.?
370-430'

420-430 Sand - tan, clean; coarse-grained sand to granule gravel, well-sorted, subangular to subrounded; feldspathic, trace of glauconite, accessory garnet.

430-433'
possibly
Arundel Fm.)

430-433 Clay - mainly dark-gray silty, micaceous, with small pockets of fresh glauconite or clear angular quartz; trace of pyrite; a few plant fragments.

top Patuxent Fm.?
> 433

GEOLOGIC SUMMARY

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April 13, 1972