INTERVAL SHEET

Page 1 of 1 VDMR Well No:2038

Date rec'd: 11-14-67 Sample Interval: from 0 to: 375

PROP: Number of samples: 38

COMP: Total Depth: 375

COUNTY: Southampton Oil or Gas: Water: Exploratory: X

From-To	From-To	From-To	From-To
0 - 10	300 - 310	-	_
10 - 20	310 - 320		
20 - 30	320 - 330	_	_
30 - 40	330 - 340	=	
40 - 50	340 - 350		
10 - 50	310 - 330	_	-
50 - 60	350 - 360	_	_
60 - 70	360 - 370	-	
70 - 80	370 - 375	-	7.—1
80 - 90	-	_	: - :
90 - 100	-	_	
100 - 110		-	_
110 - 120	-	-	(= :
120 - 130	=	-	()
130 - 140	-	-	· ·
140 - 150	-	-	-
150 - 160	-	-	
160 - 170	i n	Ξ.	-
170 - 180	-	-	· -
190 - 190	-	-	-
190 - 200	-		-
200 - 210		-	
210 - 220	_	-	-
220 - 230	-	-	-
230 - 240	-	-	-
240 - 250		-	=
250 - 260	-	-	
260 - 270	i=:	-	
270 - 280	1-	-	₹
280 - 290	-	-	-
290 - 300	-	-	

All intervals have both washed and unwashed samples

Dulled 5/66 Continental

CONFIDENTIAL

50-T-6 C-160

ELEV .: 901 Geologic Log / Strip Log /

INTERVAL SHEET

Page / of

Date rec'd:

PROP:

COMP:

6.0 Miles 5. of

and SAL RR.

Southampton COUNTY:

(BOYKINS (IS") SHEET)

Courtland at X unmarked Co. Rte. ,

VDMR Well No: WELL NO. 2038

Sample Interval: from to

Number of samples: 38

375 Total Depth:

Oil or Gas: Water: Exploratory: X

		UNW	COURT	LAND ?	5")			
	Fr	om-To		From-	То	From-To	From-To	
fine sand			5 4					
sandy o. clay	0	- 10	- 1000 2	300 -	310	-	-	
sand & granute	10	- 20	1800	310 -	320	-	-	
- cooks	20	- 30	1500	320 -	330	-	_	
aceous day >	30	- 40	- A P	330 -	340	-	-	
locally red and yellow	40	- 50		340 -	350	-	-	
pale gray , pow -			0					ii ii
diatomateous selenite common	50	- 60	00	350 -	360		<u></u>	
minor glauto.	60	- 70		360 -	370		<u> </u>	
1 forams	70	- 80	0 0 10	370 -	375		_	
diatoms	80	- 90	000	_	515	_	_	
mod clayey ,	90							
SI glauco	30	- 100				_	-	
souds, w/		tware of	glaucon	tic alad				
1 fine	100	- 110	grad co.	c/ag				
y & P2Os	1 110					_		
	2 120	- 120		_		_		
purple clay	130	- /30		_		-	_	
sands w/		- 140					_	
minor shell	140	- 150				_	_	
brown,								
SI. clayey,	150	- 110						
tr. glauco -	160	- 160		_		-		
tr. 94psum	170	- 170-		_		_	_	
gray clay, br weathering >	180	- 180				_	-	
A micaceous	190	- 190		-		_	- 4	
silt- F sand,	110	- 200		_		_	_	
brown The								
bright ==	200	- 210		_		=	_	
a clay w/	210	- 220		_		_	_	
Fic sands	270	- 230		_	7 -	_	_	
3 squed ""	230	- 240		_		_	_	ITA.
C to VC sand	240	- 250		_		_	_	The last
I reddish - br. op								E. Par
is st. clayey soo								ENTIAL
p ()	250	- 260					ANEX	
W/ minor auts. 2000	260	- 270.		_		_	Co.	
granule grove 1	270	- 280		_		22	_	
arkosic oco	280	- 290				_	_	- 6
- 0.00	290	- 300		_		The party of the		
		200						×

Well: C-160

Property: Seaboard Air Line Railway Driller: Norfolk and Western Railway

Location: 6.0 miles S of Courtland, on railroad right-of-way; 77°05'00"W, 36°38'00"N

Elevation: 90 feet Total Depth: 375 feet

Started drilling: May 1966 Completed drilling: May 1966

Sample description by: R. H. Teifke, Virginia Division of Mineral Resources,

August 1968

GEOLOGIC LOG*

Depth in feet			
COLUMBIA GROUP	0 () -30')	
0-10	Sand -	angular; clear a	clayey; fine-grained, well-sorted, nd iron-stained quartz, with minor vite, iron ores, and potassic feldspar
10-20	Clay -	5 percent granul very coarse-grain angular to subro	ted, with orange-brown aspect, sandy; e gravel; sand fraction is fine- to ned, fairly well-sorted (skewed fine), unded; minor amounts of magnetite, tassic feldspar; trace of muscovite
20-30			sand fraction is fine- to very coarse- grained, poorly sorted; 15 percent granule gravel
YORKTOWN FORMA	LTION (3	0-120')	•
30-40	Clay -		d (hematite), locally moderately sandy; quartzose; carbonaceous particles are
40-50	Clay -	medium-gray, mod	erately silty, very slightly sandy
50-60	Clay -	lent, slightly s poorly sorted, o	ray, locally brownish-yellow, pulveru- sandy; sand is fine- to coarse-grained, quartzose; moderately diatomaceous; omorphs after selenite are common; trace
60-70		n	minor light-green glauconite

70-80	Sand and Shell - moderately abundant matrix of yellowish-gray clay; 50 percent pelecypod shell fragments; 50 percent medium-grained, fairly well-sorted, subangular to subrounded sand; slightly glauconitic; anhydrite pseudomorphs after selenite are common; foraminifers common, but not abundant
80-90	Sand - abundant matrix of gray and yellow-brown clay; 10 percent pelecypod shell fragments; fine- to medium-grained, moderately sorted, angular to subangular; clear to yellowish quartz, with minor amounts of glauconite and phosphorite; anhydrite pseudomorphs after selenite are abundant; a few echinoid spines, foraminifers, and diatoms
90-100	Sand - moderately abundant matrix of light grayish-brown clay; 5 percent very fine-grained, well-rounded gravel, consisting of quartz and phosphorite nodules; a few pele-cypod shell fragments; fine-to medium-grained, well-sorted, angular to subangular; clear quartz, with 2-3 percent fresh glauconite; accessory selenite and coarse muscovite; traces of feldspar and garnet
100-110	" fine- to coarse-grained, angular to sub- angular; a few fish teeth
110-120	" fine- to very coarse-grained, angular to to rounded
TRANSITIONAL E	DS (120-230')
120-130	Clay - gray, with purple cast, moderately sandy, a few small pebbles, phosphate nodules, and shell fragments; sand is fine- to very coarse-grained, poorly sorted, angular to subrounded, clear quartz, with small amounts of glauconite, gypsum, pyrite, and muscovite
130-140	Sand - binder of tan, brown weathering clay; fine-grained, well- sorted, angular; clear quartz, with abundant muscovite; small amounts of glauconite and anhydrite pseudomorphs after selenite
140-150	" medium-grained, well-sorted, subangular; slightly micaceous, moderately feldspathic
150-160	Sand - brown, slightly clayey, trace of shell fragments; medium to very coarse-grained, rather poorly sorted, angular to subrounded; feldspathic; slightly micaceous; traces of glauconite and garnet
160-170	" coarse- to very coarse-grained, moder- ately sorted

170-180	:	eathering, locally sandy; micaceous and anhydrite pseudomorphs after selenite)
180-190	n	
190-200	to fine-graine yellowish, and conite and abu	dant matrix of brown clay; coarse silt ed sand, well-sorted, angular; clear, d greenish quartz, with 5 percent glaumodant selenite and anhydrite pseudomorphs e; moderately micaceous
200-210	to moderately	egated, with reddish-brown aspect; slightly sandy; sand is fine- to coarse-grained, ldspathic, slightly glauconitic; muscovite are common
210-220	н	sand fraction is fine-grained, well- sorted, micaceous
220-230	. "	sand fraction is fine- to coarse-grained, fairly well-sorted (skewed fine)
PATUXENT FORM	ATION (230-375')	
230-240	grained, fair: slightly to mo	of reddish-brown clay; medium- to coarse- ly well-sorted, subangular to subrounded; oderately feldspathic; slightly micaceous; uconite and rock fragments
240-250	gravel; coarse sorted, subang	of orange brown clay, grades into granule e- to very coarse-grained, fairly well- gular to subrounded; iron-stained quartz weathered feldspar; a few rock fragments
250-260	" decomposed fe	coarse- to very coarse-grained, well- sorted; clear quartz and white, partially ldspar
260-270	II .	II .
270-280	granule grave; well-sorted,	ly clayey, 15 percent quartzo-feldspathic l; coarse- to very coarse-grained, fairly subangular to subrounded; feldspathic; covite, garnet, tourmaline, brown epi-k fragments
280-290	и	20-25 percent granule gravel and a few rounded pebbles up to 8 mm
290-300	moderately so	lightly clayey; fine- to coarse-grained, rted, subangular to subrounded; feldspathic; net and muscovite; traces of tourmaline

300-310 Sand and Gra	wel - abundant matrix of reddish-brown clay,
35 pe perce sorte	ercent quartzo-feldspathic granule gravel; 65 ent medium- to very coarse-grained, moderately ed, angular to rounded sand; very feldspathic; es of garnet and muscovite
aspec fine- angul with covit	dant matrix of variegated clay with reddish-brown ct, 10 percent quartzo-feldspathic granule gravel; to coarse-grained, moderately sorted (skewed fine), ar to subangular; clear and iron-stained quartz; subordinate weathered feldspar; magnetite, musce, green biotite, and earthy hematite are abundant sories; traces of garnet and tourmaline
320-330 "	fine- to very coarse-grained, poorly sorted; unstained quartz and fresh feldspar; garnet common
alkal	fine- to coarse-grained, moderately ed, angular to subangular; very feldspathic (fresh line feldspar); traces of hematite and biotite; et common
grain	n, very slightly clayey; coarse- to very coarse- ned, well-sorted, subangular to rounded; very spathic; minor garnet and muscovite
350-360 "	medium- to coarse-grained, well-sorted
360-370 "	coarse- to very coarse-grained, with 10 percent granule gravel; garnet relative-ly abundant
370-375 "	coarse- to very coarse-grained, with 25 percent granule gravel

GEOLOGIC SUMMARY

	Rock Unit	Age
0-30	Columbia Group	post-Miocene
30-120	Yorktown Formation	Miocene
120-230	Transitional beds	Late Cretaceous
230-375	Patuxent Formation	Early Cretaceous

^{*} The use of the lithologic term, "clay" includes all size ranges of particles less than $1/32 \ \mathrm{mm}$.

Well: C-160

Property: Seaboard Air Line Railway Driller: Norfolk and Western Railway

Location: 6.0 miles S of Courtland, on railroad right-of-way;

77°05'00"W, 36°38'00"N

Elevation: 90 feet Total Depth: 375 feet

Started drilling: May 1966 Completed drilling: May 1966

Sample description by: R. H. Teifke, Virginia Division of Mineral Resources,

August 1968; Stratigraphy revised, R. H. Teifke, March 3, 1972

GEOLOGIC LOG*

Depth in feet		
COLUMBIA GROUP	<i>(</i>)/-30')	
0-10	Sand -	yellowish-brown, clayey; fine-grained, well-sorted, angular; clear and iron-stained quartz, with minor amounts of muscovite, iron ores, and potassic feldspar
10-20	Clay -	brightly variegated, with orange-brown aspect, sandy; 5 percent granule gravel; sand fraction is fine- to very coarse-grained, fairly well-sorted (skewed fine), angular to subrounded; minor amounts of magnetite, hematite, and potassic feldspar; trace of muscovite
20-30		" sand fraction is fine- to very coarse- grained, poorly sorted; 15 percent granule gravel
YORKTOWN FORMAT	PION (30	0-120')
30-40	Clay -	gray, locally red (hematite), locally moderately sandy; sand is medium, quartzose; carbonaceous particles are common
40-50	Clay -	medium-gray, moderately silty, very slightly sandy
50~60	Clay -	pale brownish-gray, locally brownish-yellow, pulveru- lent, slightly sandy; sand is fine- to coarse-grained, poorly sorted, quartzose; moderately diatomaceous; anhydrite pseudomorphs after selenite are common; trace of glauconite
60-70		" minor light-green glauconite

70-80	<pre>clay; 50 percent pe medium-grained, fa: rounded sand; sligh</pre>	ly abundant matrix of yellowish-gray elecypod shell fragments; 50 percent irly well-sorted, subangular to sub-ntly glauconitic; anhydrite pseudo-ite are common; foraminifers common,
80-90	pelecypod shell fra moderately sorted, yellowish quartz, wellowish quartz, we and phosphorite; as	gray and yellow-brown clay; 10 percent agments; fine- to medium-grained, angular to subangular; clear to with minor amounts of glauconite ahydrite pseudomorphs after selenite w echinoid spines, foraminifers, and
90-100	5 percent very fine sisting of quartz cypod shell fragment sorted, angular to percent fresh glaue	t matrix of light grayish-brown clay; e-grained, well-rounded gravel, con- and phosphorite nodules; a few pele- nts; fine- to medium-grained, well- subangular; clear quartz, with 2-3 conite; accessory selenite and coarse of feldspar and garnet
100-110		ne- to coarse-grained, angular to sub- gular; a few fish teeth
110-120		ne- to very coarse-grained, angular to rounded
TRANSITIONAL B	BEDS (120~230')	
120-130	pebbles, phosphate is fine- to very c to subrounded, cle	cast, moderately sandy, a few small nodules, and shell fragments; sand oarse-grained, poorly sorted, angular ar quartz, with small amounts of , pyrite, and muscovite
130-140	sorted, angular; c	wn weathering clay; fine-grained, well- lear quartz, with abundant muscovite; lauconite and anhydrite pseudomorphs
140-150		dium-grained, well-sorted, subangular; ightly micaceous, moderately feldspathic
150-160	to very coarse-gra	ayey, trace of shell fragments; medium ined, rather poorly sorted, angular dspathic; slightly micaceous; traces garnet
160-170		arse- to very coarse-grained, moder- ely sorted

170-180		athering, locally sandy; micaceous and hydrite pseudomorphs after selenite)
180-190	u	
190-200	to fine-grained yellowish, and conite and abu	ant matrix of brown clay; coarse silt is sand, well-sorted, angular; clear, greenish quartz, with 5 percent glaundant selenite and anhydrite pseudomorphs; moderately micaceous
200-210	to moderately	gated, with reddish-brown aspect; slightly sandy; sand is fine- to coarse-grained, dispathic, slightly glauconitic; muscovite re common
210-220	a .	sand fraction is fine-grained, well- sorted, micaceous
220-230	tł	sand fraction is fine- to coarse-grained, fairly well-sorted (skewed fine)
PATUXENT FORMA	ATION (230-375')	
230-240	grained, fairly slightly to mod	of reddish-brown clay; medium- to coarse- y well-sorted, subangular to subrounded; derately feldspathic; slightly micaceous; conite and rock fragments
240~250	gravel; coarse sorted, subange	of orange brown clay, grades into granule - to very coarse-grained, fairly well- ular to subrounded; iron-stained quartz weathered feldspar; a few rock fragments
250-260	" decomposed felo	coarse- to very coarse-grained, well- sorted; clear quartz and white, partially dspar
260-270	11	u
270-280	granule gravel well-sorted, s	y clayey, 15 percent quartzo-feldspathic; coarse- to very coarse-grained, fairly ubangular to subrounded; feldspathic; ovite, garnet, tourmaline, brown epifragments
280-290	n	20-25 percent granule gravel and a few rounded pebbles up to 8 mm
290-300	moderately sor	ightly clayey; fine- to coarse-grained, ted, subangular to subrounded; feldspathic; et and muscovite; traces of tourmaline

300-310	Sand as	35 percent quar percent medium-	dant matrix of reddish-brown clay, tzo-feldspathic granule gravel; 65 to very coarse-grained, moderately to rounded sand; very feldspathic; t and muscovite
310-320	Sand -	aspect, 10 perc fine- to coarse angular to suba with subordinat covite, green b	of variegated clay with reddish-brown ent quartzo-feldspathic granule gravel; -grained, moderately sorted (skewed fine), ngular; clear and iron-stained quartz; e weathered feldspar; magnetite, musiotite, and earthy hematite are abundant aces of garnet and tourmaline
320-330			fine- to very coarse-grained, poorly sorted; unstained quartz and fresh feldspar; garnet common
330-340			fine to coarse-grained, moderately to subangular; very feldspathic (fresh ar); traces of hematite and biotite;
340-350	Sand -	grained, well-s	ghtly clayey; coarse- to very coarse- orted, subangular to rounded; very nor garnet and muscovite
350-360		RE .	medium- to coarse-grained, well-sorted
360-370		tı	coarse- to very coarse-grained, with 10 percent granule gravel; garnet relative- ly abundant
370-375		37	coarse- to very coarse-grained, with 25 percent granule gravel

GEOLOGIC SUMMARY

	ROCK UNIT	Age	
0-30	Columbia Group	post-Miocene	
30-120	Yorktown Formation	Miocene	
120-230	Transitional beds	Late Cretaceous	
230-375	Patuxent Formation	Early Cretaceous	

^{*} The use of the lithologic term, "clay" includes all size ranges of particles less than $1/32\ {\rm mm}$.

VDMR Well No. 2038 County: Southampton

Well: C- 160

Property: Seaboard Air Line Railway Driller: Norfolk and Western Railway

Location: 6.0 miles S of Courtland, on railroad right-of-way;

77° 05° 00" W, 36° 38° 00" N

Elevation: 90 feet Total Depth: 375 feet

Started drilling: May, 1966 Completed drilling: May, 1966 Sample description by: R. H. Teifke, Virginia Division of Mineral

Resources, August, 1968

GEOLOGIC LOG *

Depth in feet

COLUMBIA GROUP (0-301)

- 0-10 Sand yellowish-brown, clayey; fine-grained, well-sorted, angular; clear and iron-stained quartz, with minor amounts of muscovite, iron ores, and potassic feldspar
- 10-20 Clay brightly variegated, with orange-brown aspect, sandy; 5% granule gravel; sand fraction is fine-to very coarse-grained, fairly well-sorted (skewed fine), angular to subrounded; minor amounts of magnetite, hematite, and potassic feldspar; trace of muscovite
- 20-30 " sand fraction is fine to very coarsegrained, poorly sorted; 15% granule gravel

YORKTOWN FORMATION (30-1201)

- 30-40 Clay gray, locally red (hematitic), locally moderately sandy; sand is medium, quartzose; carbonaceous particles are common
- 40-50 Clay —medium-gray, moderately silty, very slightly sandy
- 50-60 Clay —pale brownish-gray, locally brownish-yellow, pulverulent, slightly sandy; sand is fine—to coarse-grained, poorly sorted, quartzose; moderately diatomaceous; anhydrite pseudomorphs after selenite are common; trace of glauconite
- 60-70 " minor light-green glauconite
- 70-80 Sand and shell moderately abundant matrix of yellowish-gray clay; 50% pelecypod shell fragments; 50% medium-grained, fairly well-sorted, subangular to subrounded sand; slightly glauconitic; anhydrite pseudomorphs after selenite are common; foraminifers common, but not abundant
- Sand —abundant matrix of gray and yellow-brown clay; 10% pelecypod shell fragments; fine- to medium- grained, moderately sorted, angular to subangular; clear to yellowish quartz, with minor amounts of glauconite and phosphorite; anhydrite pseudomorphs after selenite are abundant; a few echinoid spines, foraminifers, and diatoms
- 90-100 Sand —moderately abundant matrix of light grayish-brown clay; 5% very fine-grained, well-rounded gravel, consisting of quartz and phosphorite nodules; a few pelecypod shell fragments; fine-to medium-grained, well-sorted, angular to sub-angular; clear quartz, with 2-3% fresh glauconite; accessory selenite and coarse muscovite; traces of feldspar and garnet
- 100-110 "fine--to coarse-grained, angular to subangular; a few fish teeth

110-120 " fine- to very coarse-grained, angular to rounded

TUSCALOOSA FORMATION (120-190')

- 120-130 Clay —gray, with purple cast, moderately sandy, a few small pebbles, phosphate nodules, and shell fragments; sand is fine to very coarse-grained, poorly sorted, angular- to subrounded, clear quartz, with small amounts of glauconite, gypsum, pyrite, and muscovite
- 130-140 Sand binder of tan, brown-weathering clay; fine-grained, well-sorted, angular; clear quartz, with abundant muscovite; small amounts of glauconite and anhydrite pseudomorphs after selenite
- 140-150 " medium-grained, well-sorted, subangular; slightly micaceous, moderately feldspathic
- 150-160 Sand —brown, slightly clayey, trace of shell fragments; medium to very coarse-grained, rather poorly sorted, angular to subrounded; feldspathic; slightly micaceous; traces of glauconite and garnet
- 160-170 " coarse to very coarse-grained, moderately sorted
- 170-180 Clay gray, brown-weathering, locally sandy; micaceous and gypsiferous (anhydrite pseudomorphs after selenite
- 180-190 '

PATUXENT FORMATION (190-375')

190-200 Silt and sand — abundant matrix of brown clay; coarse silt to fine-grained sand, well-sorted, angular; clear, yellowish, and greenish quartz, with 5% glauconite and abundant selenite and anhydrite pseudomorphs after selenite; moderately micaceous

200-210	Clay —	brightly variegated, with reddish-brown aspect; slightly to moderately sandy; sand is fine-to coarse-grained, moderately sorted, moderately feldspathic, slightly glauconitic; muscovite and selenite are common
210-220		sand fraction is fine-grained, well-sorted, micaceous
220-230		sand fraction is fineto coarse-grained, fairly well-sorted (skewed fine)
230-240	Sand —	sparse matrix of reddish-brown clay; medium-to coarse-grained, fairly well-sorted, subangular to subrounded; slightly to moderately feldspathic; slightly micaceous; traces of glauconite and rock fragments
240-250	Sand —	sparse matrix of orange-brown clay, grades into granule gravel; coarse-to very coarse-grained, fairly well-sorted, subangular to subrounded; iron-stained quartz and intensly-weathered feldspar; a few rock fragments
250-260		coarse to very coarse-grained, well-sorted; clear quartz and white, partially decomposed feldspar
260-270		п
270-280	Sand —	brown, slightly clayey, 15% quartzo-feldspathic granule gravel; coarse- to very coarse-grained, fairly well-sorted, subangular to subrounded; feldspathic; traces of muscovite, garnet, tourmaline, brown epidote, and rock fragments
280-290		20-25% granule gravel and a few rounded pebbles up to 8 mm

290-300 Sand —	grained, r subrounde	ry slightly clayey; fine-to coarse- noderately sorted, subangular to d; feldspathic; accessory garnet and ; traces of tourmaline and kyanite
300-310 Sand and	clay; 35% 65% mediu moderatel	- abundant matrix of reddish-brown quartzo-feldspathic granule gravel; um- to very coarse-grained, y sorted, angular to rounded sand; pathic; traces of garnet and
310-320 Sand —	brown asp gravel; fir sorted (sk clear and weathered green biot	matrix of variegated clay with reddishect, 10% quartzo-feldspathic granule ne-to coarse-grained, moderately ewed fine), angular to subangular; iron-stained quartz, with subordinate feldspar; magnetite, muscovite, ite, and earthy hematite are abundant es; traces of garnet and tourmaline
320 - 330	11	fine- to very coarse-grained, poorly sorted; unstained quartz and fresh feldspar; garnet common
330-340	H	fine—to coarse-grained, moderately sorted, angular to subangular; very feldspathic (fresh alkaline feldspar); traces of hematite and biotite; garnet common
	coarse-gr	ry slightly clayey; coarse- to very ained, well-sorted, subangular to very feldspathic; minor garnet and
350 - 360	n,	medium- to coarse-grained, well-sorted
360-370	n	coarse- to very coarse-grained, with 10% granule gravel; garnet relatively abundant

370-375

coarse- to very coarse-grained, with 25% granule gravel

GEOLOGIC SUMMARY

	Rock Unit	Age	
0-30	Columbia Group	Pleistocene	
30-120	Yorktown Formation	Late Miocene	
120-190	Tuscaloosa Formation	Late Cretaceous	
190-375	Patuxent Formation	Early Cretaceous	

^{*} The use of the lithologic term, "clay" includes all size ranges of particles less than 1/32 mm.