B 1 7670 SEQUENCE NO. (DP USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please print or type

STATE PERMIT NUMBER: HA-94-0658
fill in this form completely

Date Received (APA): 08/05/95

OWNER INFORMATION

U.S. ARMY ABERDEEN P.G.
Last Name / Owner / First Name

STEAP-SH
Street or RFD

ABERDEEN P.G. MD 21005
Town / State / Zip

DRILLER INFORMATION

DON QUEEN — License No. 0997
Driller's Name

U.S. GEOLOGICAL SURVEY
Firm Name

8600 LaSALLE RD TOWSON, MD 21286
Address (12301 SUNRISE VALLEY DR. RESTON VA 22092)

Signature: David J. Phelan for DON QUEEN — Date: 8/10/95

B 2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.)

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY)

USE FOR WATER (CIRCLE APPROPRIATE BOX)

- D — HOME (SINGLE OR DOUBLE HOUSEHOLD UNIT ONLY)
- F — FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION)
- I — INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOV. OTHER (REQUIRES APPROPRIATION PERMIT)
- P — PUBLIC OR PRIVATE WATER COMPANY (REQUIRES APPROPRIATION PERMIT AND STATE HEALTH DEPARTMENT APPROVAL)
- T — TEST, OBSERVATION, MONITORING (MAY REQUIRE APPROPRIATION PERMIT)

APPROXIMATE DEPTH OF WELL: 600 FEET

APPROXIMATE DIAMETER OF WELL: 2" NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) — JETTED — Jetted & DRIVEN
AIR-ROTary — AIR-PERcussion — ROTARY (Hydraulic Rotary) — CABLE — REVerse-ROTary — DRive-POINT

other

REPLACEMENT OR DEEPENED WELLS
(CIRCLE APPROPRIATE BOX)

- N — THIS WELL WILL NOT REPLACE AN EXISTING WELL
- Y — THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- S — THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY
- D — THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENDED (IF AVAILABLE)

Not to be filled in by driller (OEP USE ONLY)

APPROP. PERMIT NUMBER: GAP

FORCE [ ] WRITE INITIALS IN BOX — PERMIT No. HA-94-0658

SPECIAL CONDITIONS

B 3 LOCATION OF WELL

HAREFORD COUNTY

ABERDEEN PROVING GROUND

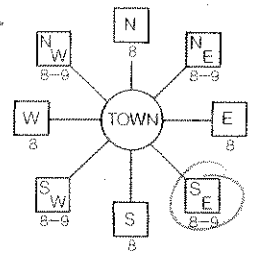
SECTION — LOT

JOPPATOWN
NEAREST TOWN

MILES FROM TOWN (enter 0 if in town): 8 MI

B 4

DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



RICKETT'S PT. ROAD
NEAR WHAT ROAD

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)

DISTANCE FROM ROAD: 0.5

ENTER FT or MI: MI

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

Harford — COUNTY NAME — 12 — COUNTY NO.

STATE SIGNATURE — INSERT S

DATE ISSUED: 08/12/95 — CO SIGNATURE: Pam Young — EXP. DATE: 8/12/96

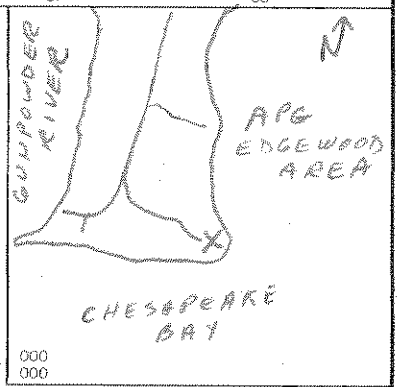
NORTH GRID: 535000 — EAST GRID: 1003000

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X

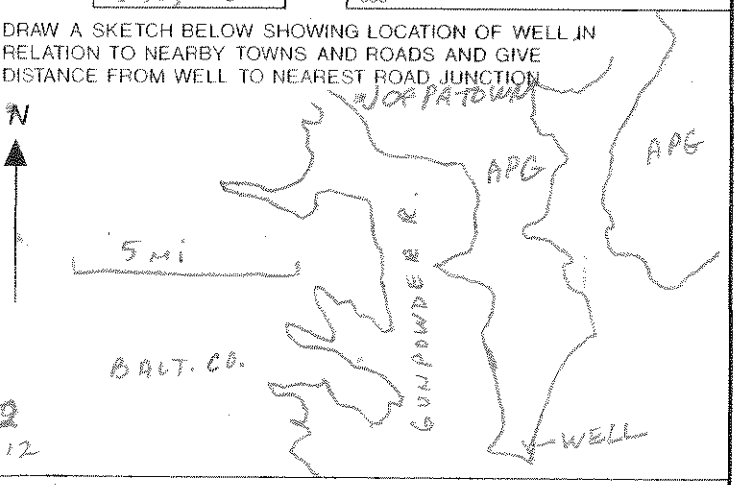
SOURCES OF DRILLING WATER
1.
2.
3.

WRITE THE BOX NUMBER FROM THE MAP HERE

E 1,000,000
N 530,000
000 000



DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



32 F12

SURVEY

C 1 -2308 SEQUENCE NO. (DENV USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 12

ST/CO USE ONLY
DATE Received

DATE WELL COMPLETED 06/19/96

Depth of Well 412 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" HA-94-0658

OWNER US ARMY

STREET OR RFD Ricketts Point Road TOWN Aberdeen

SUBDIVISION APG Aberdeen SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
SEE ATTACHMENTS			

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL

CEMENT CM BENTONITE ~~CLAY~~ GROUT BC

NO. OF BAGS 25 NO. OF POUNDS 1250

GALLONS OF WATER 700

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. TOP to 385 ft. BOTTOM (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	2	392

EACH CASING — OTHER CASING (if used)

	diameter inch	depth (feet) from	depth (feet) to
PL	2	402	412

SCREEN RECORD
screen type or open hole — insert appropriate code below

ST STEEL BR BRASS BRONZE PL PLASTIC HO OPEN HOLE OT OTHER

C 2

EACH SCREEN

		DEPTH (nearest ft.)	
1	PL	392	402
2			
3			

SLOT SIZE 1 20 2 3

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 385 to 422

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

C 3 NO Pump TEST

PUMPING TEST

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min. to nearest gal.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING

WHEN PUMPING

TYPE OF PUMP USED (for test)

A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES (NO)

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE:

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)

+ above / – below LAND SURFACE 3 (nearest foot)

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

(E) ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

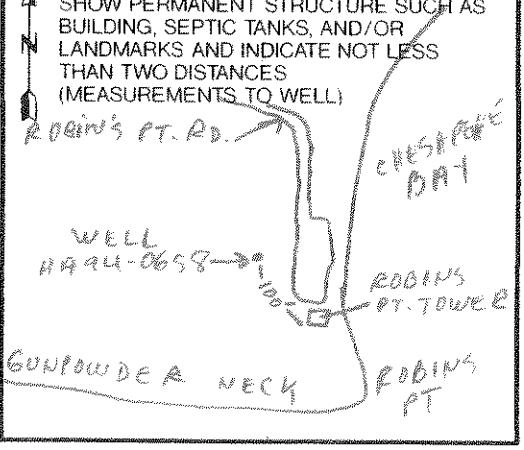
I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 0997

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION) Daniel J. Chicken FOR DON QUEEN

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (70) TELESCOPE CASING

(E.R.O.S.) (72) LOG INDICATOR

W Q (74 75 76) OTHER DATA

SURVEY

Appendix B.

PRELIMINARY LITHIC SUMMARY - ROBINS POINT COREHOLE

By David S. Powars

The following gives the drill depths (in feet) of lithic breaks that separate the numerous fining upward cycles along with a brief description of the lithology.

Surface Elevation = 3 to 4 feet above sea level

DEPTH	THICKNESS	LITHOLOGY
0.6	0.6	SOIL, sandy clayey silt, organic-rich, dark brown (7.5YR4/2) to very dark brown (7.5YR3/2)
2.4	1.8	Clayey silty SAND, very fine to fine, dark yellow brown (10YR4/6) to yellow brown (10YR5/6)
2.7	0.3	IRON STONE CEMENTED SAND, concretion layer interfingered with rootlets, yellow brown (10YR5/6)
4.6	1.9	Clayey silty SAND and CLAYEY SILT interbedded (1.0mm to 1.0cm), fine to medium, some organic material, yellow brown (10YR5/6 to 5/8) to brown yellow (10YR6/8) and very light gray (N8) to for the clayey silt layers
7.35	2.75	SAND, medium, with some coarse grains, loose, few clayey silt layers, weekly cemented iron oxide layer near base, mica flakes (1.0 to 2.0mm), yellow brown (5YR4/6) to brown yellow (10YR6/6 to 6/8) with a little red (2.5YR5/8), 5.8-ft clayey silt layer includes brown gray (10YR6/2) to strong brown (7.5YR5/8 to 4/6)
----------7.35----------		SHARP CONTACT----------
8.6	1.25	CLAYEY SILT and SAND in a clayey silt matrix, interbedded, very fine to fine, laminated (0.5mm) to thin beds (2.0mm), fair amount of mica, at 8.0-ft black pebble (2.6cm), light gray (10YR6/1) grayish brown (10YR5/2) to light brownish gray (10YR6/2), top 0.3-ft weathered (oxidized) yellow brown (10YR5/6) to red yellow (7.5YR7/8 to 6/8) with a white 2.0cm band at the base
31.3	22.7	Silty SAND, fine to medium, interbedded with thin clayey silt layers, well sorted, scattered to finely disseminated organic material increases downward primarily frosted to clear quartz , 2-5% rose quartz angular to subrounded, few iron and

chlorite stained with an increase in iron stained quartz in lower 6.0-ft, 1-5% heavies, mostly oxidize colors grayish brown (10YR5/2) to light brown gray (2.5Y6/2) to light olive brown (2.5Y6/4) to olive yellow (2.5Y6/6) with bands of yellow brown (10YR6/8) to red brown (5YR5/6), 30.0 to 30.3-ft includes pebble size clayey silt rip-clasts with a gradational color and lithic change (31.3 to 31.7-ft) from oxidized brownish yellow to reduced grays

.....31.3.....GRADATIONAL CONTACT..... = BASE OF HOLOCENE ? .....

41.8 10.5 SAND, medium to coarse, abundant black grains and chips primarily organic material (range from silt to very coarse) with light olive brown (2.5Y5/4) to black (10YR2/1) organic-rich (wood chips) at 31.7 to 31.8-ft, , dominated by frosted quartz, some clear, rare rose quartz /rock fragments/gray chert, 1-5% heavies, angular to subrounded with a few rounded, poorly sorted, ranges from very fine to very coarse lowest 7-ft, light gray (5Y7/1) to gray (5Y6/1)

----------41.8----------SHARP CONTACT----------

132.7 90.9 Clayey SILT, to sandy clayey SILT to silty CLAY, interbedded horizontal to slightly inclined crossbeds, finely laminated (0.25 to 1mm,) to thin beds (0.5cm) to massive appearance due to the abundant bioturbation, burrowed (some clay lined), organic rich , 47.3 to 83.5-ft includes shells and only some laminations, 83.5 to 115-ft contains abundant organic material often concentrated in black (N1) discrete layers (finely disseminated to wood fragments - twigs and bark to large chunk of bored reddish dark brown wood at 106.8-ft, and scattered light yellow brown (2.5Y6/4) marcasite or siderite banding (1.0 to 2.0cm), 100-ft first appearance of grayish blue (5PB5/2) vivinite (organic-sulfide mineral), 115 to 132.5-ft is the finest grained (highest %.clay) interval in this section lowest 0.2-ft becomes a clayey silty very fine to fine sand, with a few medium to granular , dark gray (5Y4/1 to N4) to dark olive gray (5Y5/2) to gray (N5)

.....132.7.....SHARP CONTACT.....

PRELIMINARY LITHIC SUMMARY - ROBINS POINT COREHOLE

By David S. Powars

161.5 28.8 Clayey SILT to SAND, fine to medium, ranges from very fine to granular, interbedded, laminated (0.25 to 1.0mm) to thin beds (2.0mm to 0.5cm), horizontal to slightly inclined to cross-bedded sand layers and numerous truncation surfaces, angular to rounded well sorted quartz sand at top becomes coarser and more angular downward, organic matter scattered throughout ranges from finely disseminated to dark reddish brown wood chunks (up to 1.0cm, which oxidizes immediately to black when exposed to air), little mica, few scattered rose quartz, dark gray (5Y4/1 to 5YR4/1) to gray (5Y5/1), 153 to 156.2-ft becomes a light gray (5Y7/1) to gray (5Y6/1) to light gray (10YR7/2), loose pebbly (well rounded up to 2.5cm) medium to very coarse sand, primarily clear and frosted quartz, angular to subrounded, few scattered rose to smoke quartz and chert, fair amount of iron-stained quartz grains, some scattered chlorite-stained, 2-5% heavies, 156.2 to 161.5 becomes a GRAVEL, with pebbles, cobbles (>8cm), and clay rip-clasts, wide variety of rock fragments, well rounded to angular

----------161.5----------SHARP CONTACT----------

169.9 8.4 CLAY, silty, massive, with angular pebbles in clay at base (Note: pebbles could be a drilling artifact) dark greenish gray (5G4/1) to grayish green (5G4/2) to dark gray (5Y4/1) to dark olive gray (5Y3/2) with some light olive gray (5Y6/2) to olive gray (5Y6/1) mottling

----------169.9----------SHARP CONTACT (?)----------

177.2 7.3 SAND, medium, ranges from fine to very coarse, with a few scattered pebbles (0.5 to 0.75cm), 2-5% heavies, some mica, dark gray (5Y4/1) to olive (5Y4/4) to light gray (N7) to white (N9), 173.1-ft medium gray (N5) clay filled burrow or rip-clast, clayey silty fine to medium sand with fair amount of organic material at top coarsen down into olive gray (5Y5/2) to grayish brown (10YR5/2) coarse sand with the lowest 0.2-ft a gravel, pebbles (up to 3cm) angular to rounded pebbles (up to 3cm), wide variety of rock fragments, abundant iron-stained

quartz grains at contact (= very thin paleosol ?), contact possible burrowed or has 4.0cm of relief

----------177.2----------SHARP CONTACT = BASE OF PLEISTOCENE-------MAJOR UNCONFORMITY

181.8 4.6 Clayey SILT to silty clayey SAND to sand in a clayey silt matrix, interbedded, white to pinkish gray, top 0.1-ft orange weathered paleosol (?), sand is primarily very fine to fine with a few medium grains, top 1.0-ft crossbedded (low angle ~10 degrees) marked with clayey (1mm) drapes, burrowed (?), some mica , few black streaks are heavy mineral concentrations

----------181.8----------SHARP CONTACT (0.1-ft relief)----------

185.0 3.2 Clayey SILT to silty CLAY matrix, with a little very fine to fine sand, white to pale light gray

194.0 9.0 SAND, medium, ranges from very fine to coarse, tan with some purple and yellow banding, lowest 2-ft crossbedded with 1mm white clayey silt drapes

----------194.0----------SHARP CONTACT----------

196.4 2.6 Clayey SILT to silty CLAY, white to pale light gray, with yellow and brown Lysagang banding, tight

208.5 12.1 SAND to clayey SILT to silty clayey SAND to sand in a clayey silt matrix, interbedded, white to light gray, little yellowish brown mottling, top 1.0-ft burrowed and/or soft sediment deformation, overall coarsens downward grading from very fine sand interbedded with clayey silt laminations (0.5mm) to crossbedded (30 to 40 degrees) sand and clayey silt (up to 1.0cm thick) to pale brown to light gray to pink fine to medium sand, some mica (up to very coarse)

----------208.5----------SHARP CONTACT----------

210.5 2.0 Clayey SILT, laminated (0.5 to 1.0mm) with a few interbeds of very fine to fine sand, white to light gray with a little yellowish brown mottling, paper thin iron-cemented layer near top

PRELIMINARY LITHIC SUMMARY - ROBINS POINT COREHOLE

By David S. Powars

DEPTH	THICKNESS	LITHOLOGY
215.5	5.0	SAND, medium, ranges from fine to coarse, white to light gray to yellowish brown, top 2.0-ft interbedded with clayey silt laminations (0.5mm) , very coarse mica flakes scattered in the sands with banded heavy mineral layers
----------215.5----------		SHARP CONTACT (0.1-ft relief)----------
216.8	1.3	Silty CLAY, laminated (1.0mm), white to light gray
223.7	6.9	SAND, medium, ranges from silt to very coarse, light gray to white to a patch of yellowish brown at 219.0-ft, 218.5 to 220-ft slightly inclined bedding interbedded with thin (up to 0.5cm) silty clay layers, coarsens downward to base becoming a coarse sand with silty clay rip-clasts
----------223.7----------		SHARP CONTACT----------
224.2	0.5	SAND, fine, to sand in clayey silt matrix, to interbedded with clayey silt laminations (0.5 to 1.0mm), some medium sand, light gray to white
234.0	9.8	SAND, fine to medium, coarsens downward to coarse very coarse sand, light gray to white, at 227.7-ft clayey silt layer (1.0cm) slightly inclined (5 degrees)
----------234.0----------		SHARP CONTACT----------
235.0	1.0	SAND, fine, in a clayey SILT matrix, light gray, ranges from very fine to medium
238.4	4.4	SAND, medium, ranges from fine to coarse, light gray, with abundant white to light gray clay rip-clast (up to 5.0cm)
239.9	1.5	CLAY CLAST CONGLOMERATE, with a little coarse sand matrix, white to light gray
----------239.9----------		SHARP CONTACT----------
241.0	1.1	Silty CLAY , laminated (0.5 to 5.0mm) interbedded with very fine to fine sand, grades downward into sand in a silty clay matrix
246.4	5.4	SAND, very fine to fine, with scattered clay rip-clast, white to light gray, 245 to 245.6-ft is a 45 degree angle iron oxide stained (yellow brown) fracture semi-cemented, 245.6 to 246.4-ft grades to interbedded sand and silty clay
----------246.4----------		SHARP CONTACT----------

PRELIMINARY LITHIC SUMMARY - ROBINS POINT COREHOLE

By David S. Powars

247.9	1.5	Silty CLAY, laminated (0.5 to 1.0mm), white to light gray with a little dark brown mottling
264.5	16.6	SAND, medium to coarse, light gray to gray some iron oxide yellow brown banding, with scattered white to light gray clay rip-clast (1.0mm to 5.0cm, angular), top 3.8-ft gray fine to coarse sand with yellow brown iron oxides concentrated at the top, 250.3 to 251.7-ft semi-indurated sand with thin interbeds (0.5 to 1.0mm), coarsens downward becoming a medium to very coarse sand with large clay rip-clasts bottom 3.7-ft
265.5	1.0	SAND in SILTY CLAY matrix, coarse to very coarse, ranges from medium to granular, white to yellow to light gray, abundant (40 to 50%) iron stained quartz grains
272.8	7.3	SAND, medium to coarse, with scattered very coarse grains, interbedded with thin (0.5 to 1.0cm) silty clay layers some slightly inclined, 270.7 to 271.3 includes white clay rip-clasts (up to 2cm)
279.5	6.7	SAND and CLAY interbedded (4cm to 0.5ft), medium to coarse, white to gray to red and yellow
281.5	2.0	CLAY CLAST CONGLOMERATE, white clay rip-clast (primarily < 3cm, up to 4cm) floating in a red to orange (oxidized) medium to granular sand with a few scattered fine pebbles (1.0cm), bottom 0.1-ft thin iron stone layer and clayey silty very fine to fine sand

----------281.5----------SHARP CONTACT (1.5cm relief)----------

297.5	16.0	CLAY and SAND interbedded (0.2 to 1.2-ft), slumped and soft sediment deformation, ranges from dark gray laminated silty clay (0.5 to 1.0mm) to light gray silty very fine to fine sand with some black lignitic material, various burrows
300.9	3.4	CLAY to SAND in SILTY CLAY matrix, grades downward from olive gray lignitic rich laminated clay to light gray very fine to fine sand floating in a silty clay matrix , with a few sand filled burrows and/or fractures (40 to 50 degree angle)

----------300.9----------SHARP CONTACT----------

PRELIMINARY LITHIC SUMMARY - ROBINS POINT COREHOLE

By David S. Powars

DEPTH	THICKNESS	LITHOLOGY
345.5	44.6	CLAY, PALEOSOL, interbedded with finely laminated (0.5mm to 1.0cm) intervals, multicolored (iron oxides) red, orange, brown, yellow, purple, and light gray to white, paleosol's are very cracked (rootlets, burrows, fractures), 310.0 to 313.5-ft includes numerous hard granular hydrous iron concretions (siderite, limonite, hematite) and soft granular amber concretions (gypsum?)
----------345.5----------		GRADATIONAL CONTACT----------(possible base of Elk Neck beds)----------
365.2	19.7	Silty CLAY and SAND interbedded (0.5mm to 4cm), laminated gray to dark gray silty clay to light crossbedded very fine to fine sand with a few medium grains, some intervals with abundant black lignitic material (including large chunks of wood, top 2.0-ft massive gray to olive gray clay with abundant light gray sand filled burrows, 360.5 to 361.5-ft includes oxidized red brown clay conglomerate rip-clasts, 363.4 to 364.4-ft includes some medium and a few coarse sand grains
406.6	41.4	SAND, fine grading downward to medium (392-ft) to coarse (395.0-ft), white to light gray, crossbedded to massive to interbedded with silty clay laminae (0.5 to 1.0mm) and layers (1.0cm), top 19-ft scattered to abundant black lignitic material (including chunks of wood concentrated in crossbeds), white clay rip-clasts (up to 3cm) scattered from 382.0 to 392.0-ft and (up to 4cm) 399.2 to 399.8-ft, 401.4 to 402.1-ft includes slightly inclined thin silty clay laminae
----------406.6----------		SHARP CONTACT----------
414.0	7.4	CLAY, dark to medium to light gray, laminated to thinly bedded (1.0 to 3.0mm), sand and clay filled burrows, grades downward to include interbeds of very fine to fine sand (1.0mm to 0.1-ft) a few inclined
422.2	8.2	SAND and CLAY interbedded, grades downward to a clay clast conglomerate, light gray to white very fine to fine sand (some medium to coarse) with abundant white clay rip-clasts, some crossbedded laminated (0.5 to 1.0mm) clay and sand

PRELIMINARY LITHIC SUMMARY - ROBINS POINT COREHOLE

By David S. Powars

438.3	16.1	SAND, fine to medium grades downward to medium coarse to pebbly (1.5cm) coarse very coarse, light gray to white, with red brown (iron oxide) mottling at 433.2 to 433.7-ft, top 8.0-ft crossbedded with white silty clay laminae (1.0mm), lower 8.0-ft massive sand with clay rip-clasts (up to 5.0 cm), lowest 0.3-ft clay clast conglomerate in a clayey silt matrix

----------438.3----------SHARP CONTACT----------

495.6	57.3	CLAY, PALEOSOLS interbedded with laminated clays (0.5 to 1.0mm), multicolored (iron oxides) brown, red, olive green, pink, purple, yellow, white, and light gray, top 6.0-ft white with brown mottling, various intervals of scattered to abundant hydrous iron granular concretions (ones that crush by knife =? gypsum)
504.7	9.1	SAND, fine grades downward to medium to coarse, rages from very fine to granular, pink brown, lowest 1.0-ft contains light gray clay layers or ? clay rip-clasts, bottom 0.2-ft is indurated sand

----------504.7----------SHARP CONTACT----------

529.6	24.9	CLAY to clayey SILT to SAND, interbedded, very fine to fine, dark to light gray to pastel lavender, laminated (0.5 to 1.0mm) to thinly bedded (2.0mm to 1cm) burrowed thoroughout, scattered black lignitic material (large chunk of wood at 520.0-ft)
534.5	4.9	SAND, coarse to very coarse, ranges from medium to granular with scattered pebbles (up to 1.0cm) and light to dark clay rip-clasts (up to cobble size)

----------534.5----------SHARP CONTACT (0.1-ft relief, ?burrowed)----------

540.0	5.5	CLAY to sandy clayey SILT, interbedded, dark to light gray to pastel lavender, burrowed
540.4	0.4	SAND, coarse to very coarse with pebbles (up to 1.0cm), medium gray, includes dark gray clay rip-clasts and black lignitic wood chunk

----------540.4----------SHARP CONTACT (1.0cm relief)----------

PRELIMINARY LITHIC SUMMARY - ROBINS POINT COREHOLE

By David S. Powars

DEPTH	THICKNESS	LITHOLOGY
584.7	44.3	SAND and CLAY interbedded, white to dark to light gray to lavender, overall fining upwards sequence, crossbedded, burrowed, lower 10.0-ft becomes medium to very coarse sand with pebbles (up to 1.0cm) black lignitic chunks of wood and dark gray clay rip-clast (both to cobble size),
----------584.7----------		SHARP CONTACT (0.1-ft relief)----------
594.7	10.0	CLAY, laminated (0.5 to 1.0mm) and thin layered (2.0mm to 1.0cm), wavy to convoluted to inclined angle, with a few black lignitic fragments, burrowed, lower 5.0-ft interbedded with thin light gray very fine sand layers and burrows
604.8	10.1	SAND, coarse to very coarse, ranges from medium to granular with pebbles (up to 1.0cm) and few white to medium gray clay rip-clast, scattered black lignitic material throughout with wood chunks in lower half, some crossbedded , top 4.0-ft finer grained sand interbedded with white to dark gray laminated to thin clay layers
----------604.8----------		SHARP CONTACT (2.0cm relief)-------(possible base of Patapsco Formation)----------
611.3	6.5	CLAY, to clayey silt, soft sediment deformation, dark to light gray, abundant black lignitic material (including wood chunks), ?burrowed
620.3	9.0	Silty CLAY to clayey silty sand, very fine, light gray, burrowed , coarsens downward to primarily a very fine sand, grades into clay below
624.5	4.2	CLAY, laminated to massive, maroon to lavender to gray, burrowed
633.8	9.3	CLAY, PALEOSOL, multicolored maroon, burgundy, light to medium gray, olive gray brown, interbedded with laminated intervals, burrowed and rootlets (cracks)
636.2	2.4	SAND, slumped and/or faulted interval, 45 degree angle contacts at the top and a conjugate 1.0-ft below (this one includes a 0.5cm clay ? gouge) separates light brown (? white) well sorted fine sand from brown medium to very coarse sand with pebbles (up to 1.5cm) at base

PRELIMINARY LITHIC SUMMARY - ROBINS POINT COREHOLE

By David S. Powars

647.3	11.1	CLAY and SAND, very fine to fine, slumped and/or faulted, soft sediment deformation, dark to light gray to white to pastel lavender, large (cobble size) chunk of black lignitic wood at 638.2-ft, interbedded, ?burrowed
----------647.3----------SHARP CONTACT----------		
665.7	18.4	CLAY, PALEOSOL, brick red to brown to some light gray to yellow to pastel lavender, marbled or beef steak appearance,
671.2	5.5	Clayey silty SAND, light gray to white, fine sand, top 1.2-ft sandstone cemented concretions (cobble to boulder size), lowest 1.0-ft crossbedded
----------671.2----------SHARP CONTACT (0.1-ft relief)----------		
742.2	71.0	CLAY, PALEOSOL, multicolored, intervals of abundant hydrous iron granular concretions (siderite, limonite, and hematite) and soft granular concretions (gypsum?), grades down into the interbedded clay and sand below
762.2	20.0	CLAY and SAND, interbedded laminated (0.5 to 1.0mm) to thin (1.0cm) beds, occasionally crossbedded clayey sand, sand grades upward from a fine (ranges from very fine to medium) to very fine sand with some fine grains,dark to medium to light gray, black lignitic wood chunks and material scattered, burrowed, base marked with abundant wood chunks and pyrite concretions
767.4	5.2	CLAY and clayey silty SAND, interbedded laminated, white to light to medium gray
794.5	27.1	SAND, medium, ranges from fine to coarse, coarsens downward to coarse sand with very coarse to pebbles (up to 3.0cm), crossbedded with clay rip-clasts and black lignitic wood chunks and fragments
----------794.5----------SHARP CONTACT (1.0cm relief)----------		
804.5	10.0	SAND, medium to coarse, ranges from fine to very coarse, top finer grained includes clayey silt laminae (0.5 to 1.0mm), some clay rip-clasts and black lignitic material scattered
888.6	84.1	SAND, overall fining upwards sequence, top 4.0-ft primarily a laminated clay

with silty very fine burrows and/or lenses, crossbedded, abundant clay rip-clasts and black lignitic wood chunks, ranges from very fine sand to pebbles

----------888.6----------SHARP CONTACT -----BASE OF CRETACEOUS = MAJOR UNCOFORMITY------

961.0 72.4 BASEMENT -saprolite and weathered rock, consisting of metamorphosed, predominantly mafic igneous complex with crosscutting dikes and faults, with the very bottom being a weathered metadiorite (?) (* a more detailed description (including thin section) from Wright Horton is forth coming)