

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

INTERVAL SHEET

Page 1 of 1

Well Repository No.: W- 5636

Date rec'd: 1-10-80 Date Processed: 1-10-80

Sample Interval: from 0 to: 1010

PROPERTY:

Number of samples: 64

COMPANY: D'Appolonia (DAPP-4)

Total Depth: 1010

COUNTY: Accomack

Oil or Gas: Water: Exploratory: X

From-To	From-To	From-To	From-To	From-To
0-3	360-370	660-670	-	-
3-20	370-380	670-680	970-980	-
-	380-390	-	-	-
30-40	390-400	690-700	990-1000	-
50-	400-410	-	1000-1010	-
60-	-	710-720	-	-
-	-	720-730	-	-
80-	-	730-740	-	-
-	440-450	-	-	-
100-110	450-460	750-760	-	-
110-120	460-470	-	-	-
120-130	470-480	770-780	-	-
-	480-490	-	-	-
140-150	490-500	790-800	-	-
150-160	-	-	-	-
-	510-520	-	-	-
-	520-530	820-830	-	-
-	530-540	830-840	-	-
240-250	540-550	-	-	-
250-260	550-560	850-860	-	-
-	560-570	-	-	-
270-280	570-580	870-880	-	-
280-290	-	-	-	-
290-300	590-600	890-900	-	-
300-310	-	-	-	-
310-320	610-620	910-920	-	-
320-330	-	-	-	-
330-340	630-640	930-940	-	-
340-350	-	-	-	-
350-360	650-660	950-960	-	-

Unwashed only

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COMPANY: D'APPOLONIA (DAPP-4)

Total Depth: 1010

COUNTY: ACCOMACK

Oil or Gas: Water: Exploratory:

From-To	From-To	From-To	From-To
0 - 3	310 - 320	560 - 570	-
3 - 20	320 - 330	570 - 580	820 - 830
	330 - 340		830 - 840
30 - 40	340 - 350	590 - 600	
50	350 - 360		850 - 860
60 -	360 - 370	610 - 620	-
	370 - 380		870 - 880
80 -	380 - 390	630 - 640	
	390 - 400		890 - 900
100 - 110	400 - 410	650 - 660	
110 - 120	-	660 - 670	910 - 920
120 - 130	-	670 - 680	930 - 940
140 - 150	440 - 450	690 - 700	950 - 960
150 - 160	450 - 460		
-	460 - 470	710 - 720	-
-	470 - 480	720 - 730	970 - 980
-	480 - 490	730 - 740	
240 - 250	490 - 500		990 - 1000
250 - 260		750 - 760	1000 - 1010
-	510 - 520	-	-
270 - 280	520 - 530	770 - 780	-
280 - 290	530 - 540		-
290 - 300	540 - 550	790 - 800	-
300 - 310	550 - 560		-

UNWASHED ONLY

County: ACCOMACK
VDMR Well # 5636

Well: DAPP-4

Farm:

Driller: D'Appolonia

Location: Saxis 7.5' Quadrangle; south end of Saxis Island;
37°55'12" N, 75°43'39" W

Elevation: 5'+ (1.5m)

Total depth: 1010'

Started drilling: 1979

Finished drilling: 1979

Sample description by: Joan K. Polzin, Virginia Division of Mineral Resources

References: D'Appolonia, 1980, Hot dry rock geothermal evaluation,
Cris-Wall site, eastern shore of Maryland and Virginia:
Los Alamos Scientific Laboratory, Los Alamos, N.M.

GEOLOGIC SUMMARY

Depth	Thickness	Formation (and remarks)
0-40	40	Pleistocene undivided
40-180	120	Yorktown Fm.
180-380	200	St. Marys Fm.
380-470	90	Choptank Fm.
470-830	360	Choptank Fm.
830-1010	180	Nanjemoy Fm.

NOTE: All unit picks are from gamma log.

OWNER:
DRILLER: D'Appolonia
COUNTY: Accomack

W # 5636
TOTAL DEPTH - 1010'

DEPTH
(FEET)

WELL LOG

0-3	Clay - grayish orange (10YR 7/4); abundant clasts; abundant sand; medium grained to granule, subangular to subrounded; poor sorting; quartz.
3-20	Clay - olive gray (5Y 4/1); abundant clay; sparse sand; medium grained to granule, subangular to subrounded, poor sorting; quartz.
20-30	No sample.
30-40	Clay - as above; except: sand-medium to very coarse grained; some granules.
40-50	Sand - light and dark gray; sparse clay; medium to very coarse grained, subangular, poor sorting; quartz; 40% shell fragments - mollusks; talc?.
50-60	Sand - as above; except: fine to very coarse grained, some granules; 3% shell fragments.
60-80	No sample.
80-100	Sand - light olive gray (5Y 6/1); very sparse clay in orange clasts; very fine grained to granule, subangular to subrounded, poor sorting; quartz; 10% shell fragments; some phosphate fragments; garnet.
100-110	Sand - as above; except: sparse shell fragments.
110-120	Sand - as above; except: 7% fine, reworked glauconite.
120-130	Sand - greenish gray (5GY 6/1); sparse clay; sand as above; 30% shell fragments; lignite; iron oxide fragments.
130-140	No sample.
140-150	Sand - light olive gray (5Y 5/2); sparse clay; fine to very coarse grained, subangular, poor sorting; quartz; 25% shell fragments; 10% glauconite.
150-160	Sand - as above; except: medium to coarse grained; 45% shell fragments; 30% glauconite.
160-240	No sample.
240-250	Shell, Hash - light and dark gray; 60% ⁺ shell fragments; rest - clay pellets; medium and coarse sand and 15-20% glauconite; talc; iron oxide; muscovite.

DEPTH
(FEET)

WELL LOG

250-260	Shell Hash - as above; except: some granules; scaphopod; iron.
260-270	No sample.
270-280	Sand - light olive gray (5Y 6/1); sparse silt; fine to medium grained, subangular, moderate sorting; quartz; 7% glauconite; 7% fine shell fragments.
280-290	Sand - as above; except: sparse clay clasts; medium to coarse grained; 20% glauconite; 20% shell fragments; echinoderm spines.
290-300	Sand - as above; except: 70% glauconite; 10% shell fragments; iron oxide.
300-310	Sand - as above; except: moderate clay, clasts; fine to very coarse grained, subangular to subrounded, few granules; poor sorting; quartz; 10% shell fragments; 5% glauconite.
310-320	Sand - as above; except: sparse clay; medium to coarse grained, some granules; moderate sorting; talc.
320-330	Sand - as above, except: no granules; 5% shell fragments.
330-340	Sand - as above, except: very sparse clay; medium to coarse grained, moderate sorting; 7% glauconite; 1% shell fragments.
340-350	Sand - as above, except: poorly sorted; 1% glauconite; rare shell fragments; iron oxide.
350-360	Sand - light olive gray (5Y 5/2); very coarse grained with few coarse sized grains, well sorted.
360-370	Sand - as above, except: coarse grained; sparse glauconite; shell fragments; iron oxide; lignite.
370-380	Sand - as above, except: 1% glauconite; 1% shell fragments.
380-390	Sand - as above, except: medium to coarse grained; 2% glauconite; some shell fragments; mica.
390-400	Sand - as above, except: 1% glauconite; 1% shell fragments; iron oxide.
400-410	Sand - as above, except: fine to coarse grained, moderate sorting; 2% shells.
410-440	No sample.

DEPTH (FEET)	WELL LOG
440-450	Sand - as above, except: 7% glauconite; 3% shells.
450-460	Sand - as above, except: coarse grained; some fine grained, moderately well sorted.
460-470	Sand - as above, except: moderate silt; fine to coarse grained, poor sorting; 5% glauconite; 3% shell fragments.
470-480	Sand - as above, except: sparse clay; 3% glauconite; 1% shell fragments.
480-490	Sand - as above, except: sparse clay in pellets; medium to coarse grained; poor sorting.
490-510	No sample.
510-520	Sand - as above, except: 1% glauconite; 1% shell fragments; iron oxide.
520-530	Sand - as above, except: no clay.
530-540	Sand - as above, except: mica - biotite and muscovite.
540-550	Sand - as above.
550-560	Sand - as above.
560-570	Sand - as above, except: mica; iron oxide.
570-580	Sand - as above, except: fine to coarse grained; few very coarse grained; iron oxide; mica.
580-590	No sample.
590-600	Sand - as above, except: sparse clay; medium to coarse grained; 5% shell fragments; forams - <u>Robulus (L.)</u> .
600-610	No sample.
610-620	Sand - as above, except: sparse clay in pellets; few very coarse grains; some glauconite; forams - <u>Nonion spp.</u> , <u>Robulus calcar</u> , <u>Textularia</u> ; ostracod; iron oxide; mica.
620-630	No sample.
630-640	Sand - dark yellowish brown (10YR 4/2); moderate clay in pellets; medium to coarse grained, few very coarse and some granule sized grains; subangular to rounded, poor sorting; quartz; rare glauconite.

DEPTH
(FEET)

WELL LOG

640-650 No sample.

650-660 Sand - light olive gray (5Y 5/2); same physical description as above.

660-670 Sand - as above, except: sparse clay.

670-680 Sand - as above, except: 1% shell fragments; iron oxide.

680-690 No sample.

690-700 Sand - as above, except: medium to very coarse grained; rare glauconite; iron oxide.

700-710 No sample.

710-720 Sand - as above, except: very sparse clay; medium to coarse grained, moderate sorting; 1% shell fragments; 3% glauconite; echinoderm spines; foram - Nonion.

720-730 Sand - as above, except: angular to subangular; iron oxide; mica.

730-740 Sand - as above, except: fine to very coarse grained, angular to subrounded, poor sorting; 1% glauconite; iron oxide; feldspar; mica.

740-750 No sample.

750-760 Sand - as above, except: medium to coarse grained, few granules; subangular; forams - Marginulina, Textularia, Siphogenerina, Robulus, Nonion, Pyrulina, Denticulata, Globigerina; iron oxide.

760-770 No sample.

770-780 Sand - as above, except: medium to very coarse grained, subangular to subrounded; 1% glauconite; moderate shell fragments; forams; lignite.

780-790 No sample.

790-800 Sand - as above.

800-820 No sample.

DEPTH (FEET)	WELL LOG
820-830	Sand - as above, except: medium to coarse grained, some very coarse grains; forams - <u>Siphogenerina</u> , <u>Robulus (L.)</u> , <u>Robulus calcar</u> , <u>Elphidium florentine</u> , <u>Marginulina</u> , <u>Textularia</u> , <u>Bolivina</u> ; ostracods.
830-840	Sand - as above, except: coarse grained with few coarse grains and granules; well sorted; 2% glauconite; moderate shell fragments; forams - <u>Siphogenerina</u> ; mica.
840-850	No samples.
850-860	Sand - as above, except: medium to coarse grained with few very coarse grains; poorly sorted; some glauconite; forams - <u>Nonion</u> , <u>Robulus</u> , <u>Siphogenerina</u> ; ostracods.
860-870	No sample.
870-880	Sand - light olive gray (5Y 5/2); very sparse clay; medium to very coarse sized grained, poor sorting; 1% glauconite; forams - <u>Nonion</u> , <u>Siphogenerina</u> .
880-890	No sample.
890-900	Sand - as above, except: few granules; forams - <u>Nonion</u> , <u>Siphogenerina</u> , <u>Marginulina</u> .
900-910	No sample.
910-920	Sand - as above, except: forams - <u>Textularia</u> ; mica.
920-930	No sample.
930-940	Sand - as above, except: rare shell fragments; forams.
940-950	No sample.
950-960	Sand - as above, except: medium to coarse grained with few very coarse and granule sized grains; 7% glauconite; 1% shell fragments; feldspar; mica; iron oxide.
960-970	No sample.
970-980	Sand - light and dark gray; as above, except: 50% glauconite.

DEPTH
(FEET)

WELL LOG

980-990	No sample.
990-1000	Sand - dark greenish gray (5GY 4/1); 93% glauconite; 7% quartz sand, as above.
1000-1010	Sand - as above, except: 80% glauconite; 10% shell-quartz sand mixture; as above at 990-1000'.

Logged by:
J. K. Polzin
Apr., 1980

D'APPOLONIA

CONSULTING ENGINEERS, INC.

December 10, 1979

Project No. 78-356

Mr. Gene Rader
Virginia Division of Mineral Resources
P. O. Box 3667
Charlottesville, VA 22903

Accomack County Well
Data Transmittal

Dear Mr. Rader:

In response to your request to our client, Los Alamos Scientific Laboratories, we are providing you with samples and well logs for the borings we have completed in Accomack County, Virginia. We thank you for the logs of the Tangier Island well you promised to send, as well as for past information exchanges. D'Appolonia appreciates the cooperative working relationship we have established.

Samples collected from Borings DAPP-1, DAPP-3, and DAPP-4 are being sent separately. Gamma logs and field logs for these holes, as well as for DAPP-2, are enclosed. Gamma logging will be performed on DAPP-1 in mid-January and a copy will be forwarded shortly after it becomes available.

Sediment samples were collected from the return fluid flow by washing in a No. 140 sieve. A nylon mesh was used for DAPP-4. For Borings DAPP-3 and DAPP-4, the samples are incomplete due to very small amounts of material in the return flow. Indicated with a check mark on the field logs are the samples which are being made available to you. We do not require return of these samples.

We have enclosed a copy of the preliminary correlations of the gamma logs with a gamma log and geologic description from the Taylor well near Atlantic, Virginia. The gamma logging in the Taylor well was done to the same parameters as used in the logging of DAPP-2, DAPP-3, and DAPP-4 but, of course, the response is different here due to it being a much larger diameter well. Of interest is a marker bed at 630 feet in the Taylor well which can be identified throughout each boring. Conversations with VPI&SO indicate that this may be a radioactive sand that they observed in their Crisfield, Maryland well.

10 DUFF ROAD, PITTSBURGH, PA 15235 TELEPHONE: 412/243-3200

BECKLEY, WV CHESTERTON, IN CHICAGO, IL DENVER, CO HOUSTON, TX LAGUNA NIGUEL, CA
WILMINGTON, NC BRUSSELS, BELGIUM SEOUL, KOREA TEHERAN, IRAN

Mr. Gene Rader

- 2 -

December 10, 1979

You will also find enclosed a geologic description from the Taylor well, as well as coordinates of each of our borings.

Bill Miller, who performed the logging and sampling will be out of the country until February 1, 1980, therefore, please direct any future questions to Carl Schubert or Bill Johnson.

D'Appolonia trusts that these samples and logs will be of value to you and would appreciate your technical comments.

Sincerely yours,

W.A. Miller

William Miller *WAM*
Geophysicist

Carl E. Schubert

Carl E. Schubert
Senior Project Engineer

WM:CES:rt
Enclosures

D'APPOLONIA

October 9, 1979

Project No. 78-356

Commonwealth of Virginia
 Department of Labor and Industry
 Division of Mines and Quarries
 Big Stone Gap, Virginia 24219

Attention: Mr. William Kelly

Revision to Request for Approval
to Conduct Drilling Operations in
Accomack County, Virginia

Dear Mr. Kelly:

In the Request for Approval to Conduct Drilling for geothermal test borings sent to your attention on October 1, 1979, proposed drilling locations were provided. These drilling locations have been finalized by establishing agreements with specific landlords and this has resulted in slight changes to the locations presented to you on October 1, 1979. The revised final locations are shown on the attached topographic maps and are described as follows:

BORING NO.	LOCATION	COORDINATE	ELEVATION
DAPP-1	Wallops Island	37° 52' 58" N- 75° 25' 59" W	El. 15 ft
DAPP-2 ⁴	New Church - East	37° 58' 34" N- 75° 30' 30" W	El. 35 ft
DAPP-3	Makemie Park	37° 54' 32" N- 75° 34' 16" W	El. 17 ft
DAPP-4 ²	Saxis	37° 55' 12" N- 75° 43' 39" W	El. 5 ft

The drilling procedures remain as presented in our letter of October 1, 1979. The drilling program is still scheduled to begin about October 15. The incorporation of the revised drilling locations into your permit is greatly appreciated. If you require any additional information,

D'APPOLONIA

CONSULTING ENGINEERS, INC.



By _____ Date _____ Subject _____ Sheet No. _____ of _____

Chkd. By _____ Date _____ Proj. No. _____

GENE RADER
VIRGINIA DIVISION OF MINERAL RESOURCES
P.O. BOX 3667
CHARLOTTESVILLE, VA 22903

MR. RADER:

ENCLOSED PLEASE FIND SAMPLES FROM WELL DAPP-2 TAKEN BY MYSELF AT NEW CHURCH, VIRGINIA. SAMPLES WERE COLLECTED FROM THE RETURN FLOW USING A # 100 SIEVE (.0041 INCHES).

COORDINATES OF THE WELL ARE APPROXIMATELY:

42 03 000 N
4 55 000 E

OR

37° 58' N
75° 30' 30" E

THE WELL IS LOCATED ON Rt. 709, 1.4 MILES EAST OF HIGHWAY 13, NEAR NEW CHURCH, VIRGINIA.

FINAL DEPTH OF THE WELL WAS 1005'.

IF YOU HAVE ANY QUESTIONS OR COMMENTS, PLEASE DIRECT THEM TO BILL JOHNSON IN OUR PITTSBURGH OFFICE. (PHONE # 412-243-3200).

WE WILL BE IN TOUCH SHORTLY, AND I WILL FORWARD SAMPLES FROM OUR REMAINING WELLS AS SOON AS THEY ARE COMPLETED AND CATALOGUED.

Sincerely,

William Miller

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER:		PROJECT NAME:		
BORING NUMBER:		COORDINATES		DATE:
ELEVATION:		GWL:	AT	HRS.
ENGINEER/GEOLOGIST:			AT	HRS.
DRILLING METHODS:				PAGE OF

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
				OVER			

NOTES:

THIS IS THE CLASSIFICATION SYSTEM USED IN THE FIELD LOGS.

W. S. M. J.

Unified Soil Classification System

UNIFIED SOIL CLASSIFICATION (Including Identification and Description)								
Major Division	Group Symbols	Typical Names	Field Identification Procedures (Excluding particles larger than 3 in., and listing fractions on estimated weights.)	Information Required for Describing Soil	Laboratory Classification Criteria			
1	2	3	4	5	6			
Coarse-grained Soils More than half of material is larger than No. 200 sieve size. The No. 200 sieve size is about the smallest particle which is to be retained.	Gravels More than half of coarse fraction is larger than 4.75 mm (No. 10) sieve size. (Asterisk size may be used on flow chart classification, the 1/4" size may be used on approximate to No. 4 sieve size.)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	Wide range in grain sizes and substantial amounts of all intermediate particle sizes.	For undisturbed soils add information on stratification, degree of compaction, cementation, moisture conditions, and drainage characteristics.	$C_u = \frac{D_{60}}{D_{10}} \text{ Greater than } 4$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} \text{ Between } 1 \text{ and } 3$ <p>Not meeting all gradation requirements for GW</p> <p>Atterberg limits below "A" line or PI less than 4</p> <p>Atterberg limits above "A" line with PI greater than 7</p>		
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.	Predominantly one size or a range of sizes with some intermediate sizes missing.				
		GMH	Silty gravels, gravel-sand-silt mixture.	Nonplastic fines or fines with low plasticity (For identification procedures see ML below.)				
		GM	Clayey gravels, gravel-sand-clay mixtures.	Plastic fines (For identification procedures see CL below.)				
	Sands More than half of coarse fraction is finer than No. 60 sieve size. (Flow chart classification, the 1/4" size may be used on approximate to No. 4 sieve size.)	Clean Gravels (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines.	Wide range in grain size and substantial amounts of all intermediate particle sizes.	<p>Examples:</p> <p>Silty sand, gravelly, about 20% hard, angular gravel particles 1/2-in. maximum size; rounded and subangular sand grains, coarse to fine; about 15% nonplastic fines with low dry strength; well compacted and moist in place; at least sand. (SH).</p>	$C_u = \frac{D_{60}}{D_{10}} \text{ Greater than } 6$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} \text{ Between } 1 \text{ and } 3$ <p>Not meeting all gradation requirements for SW</p> <p>Atterberg limits below "A" line or PI less than 4</p> <p>Atterberg limits above "A" line with PI greater than 7</p>	
			SP	Poorly graded sands or gravelly sands, little or no fines.	Predominantly one size or a range of sizes with some intermediate sizes missing.			
		Sands with Fines (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures.	Nonplastic fines or fines with low plasticity (For identification procedures see ML below.)			
			SMC	Clayey sands, sand-clay mixtures.	Plastic fines (For identification procedures see CL below.)			
			Identification Procedures on Fraction Smaller than No. 40 Sieve Size					<p>For undisturbed soils add information on structure, stratification, consistency in undisturbed and remolded states, moisture, and drainage conditions.</p> <p>Give typical name; indicate degree and character of plasticity amount and maximum size of coarse grains; color in wet condition; odor, if any; local or geologic name and other pertinent descriptive information; and symbol in parentheses.</p> <p>Examples:</p> <p>Clayey silt, brown, slightly plastic; small percentage of fine sand; numerous vertical root holes; (MH).</p>
			Silty and Clays Liquid limits less than 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.			
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	Medium to high		None to very slow	Medium			
Silty and Clays Liquid limits greater than 50	OL	Organic silts and organic silty clays of low plasticity.	Slight to Medium	Slow	Slight			
	MH	Inorganic silts, micaceous or silty silts, silty silts.	Slight to medium	Slow to none	Slight to medium			
	CH	Inorganic clays of high plasticity, fat clays.	High to very high	None	High			
	OH	Organic clays of medium to high plasticity, organic silts.	Medium to high	None to very slow	Slight to medium			
Highly Organic Soils	U	Peat and other highly organic soils.	Readily identified by color, odor, spongy feel and frequently by fibrous texture.					

(1) Boundary classification: Soils possessing characteristics of two groups are designated by combinations of group symbols. For example, GW-GC, well-graded gravel-sand mixture with clay binder. (2) All sieve sizes on this chart are U.S. standard.

FIELD IDENTIFICATION PROCEDURES FOR FINE-GRAINED SOILS OR FRACTIONS
These procedures are to be performed on the minus No. 40 sieve particles, approximately 1/44 in. For field classification purposes, crushing is not intended, simply remove by hand the coarse particles that interfere with the tests.

Dilatancy (reaction to shaking)

After removing particles larger than No. 40 sieve size, prepare a pat of moist soil with 1/2 volume of about one-half cubic inch. Add enough water if necessary to make the soil soft but not sticky. Place the pat in the open palm of one hand and shake horizontally, shifting vigorously against the other hand several times. A positive reaction consists of the appearance of water on the surface of the pat which changes to a livery consistency and becomes glossy. When the sample is squeezed between the fingers, the water and silt disappear from the surface, the pat stiffens, and finally it cracks or crumbles. The rapidity of appearance of water during shaking and its disappearance during squeezing assist in identifying the plasticity of the fines in a soil. Very fine clays are the stiffest and most dilatant reaction whereas a plastic clay has the softest and least dilatant reaction whereas a lean clay has a moderate reaction.

Dry Strength (crushing characteristics)

After removing particles larger than No. 40 sieve size, mold a pat of soil to the consistency of putty, adding water if necessary. Allow the pat to dry completely by oven, sun, or air-drying, and then test its strength by breaking and crumbling between the fingers. This strength is a measure of the character and quantity of the colloidal fraction contained in the soil. The dry strength increases with increasing plasticity. High dry strength is characteristic for clays of the CH group. A typical lean-silt pat shows only very slight dry strength. Silty fine sands and silts have about the same slight dry strength, but can be distinguished by the feel when powdering the dried specimen. Fine sand feels gritty whereas a typical silt has the smooth feel of flour.

Toughness (consistency near plastic limit)

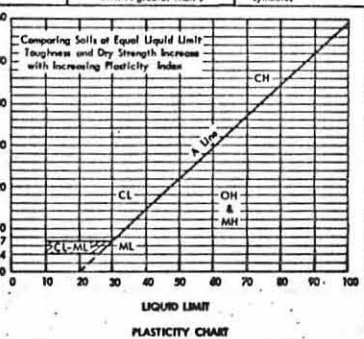
After particles larger than the No. 40 sieve size are removed, a specimen of soil about one-half inch in cube size is molded to the consistency of putty. If too dry, water must be added and if silty, the specimen should be spread out in a thin layer and allowed to lose some moisture by evaporation. Then the specimen is rolled out by hand on a smooth surface or between the palms into a thread about one-eighth inch in diameter. The thread is then folded and rolled repeatedly. During this manipulation the moisture content is gradually reduced and the specimen stiffens, finally loses its plasticity, and crumbles when the plastic limit is reached. After the thread crumbles, the pieces should be lumped together and a slight kneading action continued until the lump crumbles. The tougher the thread near the plastic limit and the stiffer the lump when it finally crumbles, the more potent is the colloidal clay fraction in the soil. Weakness of the thread at the plastic limit and quick loss of coherence of the lump below the plastic limit indicate either inorganic clay of low plasticity, or materials such as kaolin-type clays and organic clays which occur below the A-line. Highly organic clays have a very weak and spongy feel at the plastic limit.

Use plasticity curves in identifying the fractions as given under field identification.

Determine percentages of gravel and sand from gravimetric curves. Depending on percentages of fines (fraction smaller than No. 200 sieve size) coarse-grained soils are classified as follows:

GW, GP, SW, SP, GM, GC, SM, SC, SH, MH, OH, U

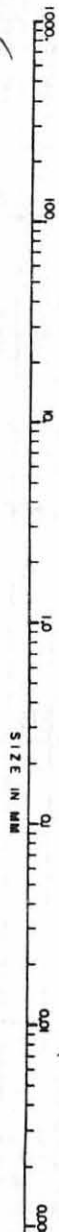
Less than 5%
More than 12%
5% to 12%



For laboratory classification of fine-grained soils

U.S.C.S. CLASSIFICATION FOR SOILS

COBBLES
GRAVEL
FINE
COARSE
SAND
MEDIUM
FINE
SILT AND CLAY



CLEAR SIEVE OPENINGS
U.S. STANDARD SIEVE OPENINGS

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR	
BORING NUMBER: DAPP-4	COORDINATES N 37° 55' 12" W 35° 43' 35"	DATE: 18 OCT '79
ELEVATION: 5 FT	GWL: AT HRS.	DATE STARTED: 18 OCT 79
ENGINEER/GEOLOGIST: W. Miller	AT HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS: FLUSH JOINT 3/4" ROD, ROLLER BIT, ZEOGEL		PAGE OF 35

DEPTH (FEET)	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
0	SA-1	NA	NA	CLAYEY SAND - SOME SMALL GRAVEL, MEDIUM TO COARSE GRAINED WELL ROUNDED LIGHT BROWN SAND WITH SOME 15% GREY CLAY - SP	SP		SAMPLE TAKEN FROM MUD PIT - SOIL IS FILL MATERIAL
3	SA-2			BLUE GREY CLAY, SOME FINE GRAINED WELL ROUNDED QUARTZ SAND, ABUNDANT ORGANIC MATERIAL, PLASTIC NOTE: SAMPLE SA-2 CAME OFF OF AUGER BIT	CL		DREDGED - CHANNEL MUD USED AS FILL AUGERED TO 20'
10				SAME			
20				SAME - BLUE CLAY AS INDICATED BY COLOR OF RETURN FLOW FROM HOLE NO SAMPLE			STARTED DRILLING WITH CORE BARREL & ROLLER BIT
24				SAME - BLUE CLAY	CL		

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LABL - HDR	
BORING NUMBER: DAPP-4	COORDINATES	DATE: 18 Oct 79
ELEVATION:	GWL: AT HRS.	DATE STARTED: 18 Oct 79
ENGINEER/GEOLOGIST: Wm J. J. J.	AT HRS.	DATE COMPLETED: 23 Oct 79
DRILLING METHODS:	PAGE 2 OF 35	

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
30	SA-3		1555	BLUE GRAY CLAY, SOME FINE GRAINED WELL ROUNDED QUARTZ SAND	CL		
40	SA-3		1538 1545	SAME	CL		
45	SA-4			CAME AS ABOVE BUT WITH SHELLS BLUE GRAY CLAY, SOME FINE GRAINED WELL ROUNDED QUARTZ SAND BROKEN SHELL FRAGMENTS	CL		
50	SA-5		1542 1554				
60	SA-5		1550		CL		

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPD-4	COORDINATES		DATE: 18 OCT '79
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT 79
ENGINEER/GEOLOGIST: W. J. Miller	AT	HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS:			PAGE 3 OF 35

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
60	SA-6		1605	BLUE GREY SILTY CLAY WITH BROKEN SHELLS AND WELL ROUNDED FINE QUARTZ SAND	CL		
70	SA-7	30SER	1608	MEDIUM TO COARSE ANGULAR QUARTZ SAND, POORLY GRADED, SOME BROKEN SHELLS	SP		NOTICEABLE FLUID COLOR CHANGE FROM BLUE GREY TO CLEAR
80	SA-8		1618	HARDER MATERIAL @ 76 FINE TO COARSE ANGULAR QUARTZ SAND, POORLY GRADED, TRACE 15% BROKEN SHELLS, SOME 10% BIOTITE?	SP		
85	SA-8		1622	VERY FINE TO MEDIUM GRAINED, SUB ROUNDED QUARTZ SAND WITH SOME 25% BROKEN SHELL FRAGMENTS, POORLY GRADED GREY SAND	SP		
90			1624		SP		

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP-4	COORDINATES		DATE: 18 OCT 79
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT 79
ENGINEER/GEOLOGIST: WSM/ly	AT	HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS:			PAGE 4 OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
90	SA-9		1633	MEDIUM GRAINED TO COARSE SAND SOP ANGLAR QUARTZ SAND, TRACE S% SHELLS, POORLY GRADED	SP		
100	SA-10		1636 1640	SAME BUT SLIGHTLY FINER GREY SAND	SP		
110	SA-11		1644	MEDIUM GRAINED SUBANGULAR GRAY QUARTZ SAND, POORLY GRADED, TRACE S% BROKEN SHELLS			

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356		PROJECT NAME: LASL-HDR	
BORING NUMBER: DAPP-4		COORDINATES	
ELEVATION:		GWL: AT	HRS.
ENGINEER/GEOLOGIST: <i>W. S. Miller</i>		AT	HRS.
DRILLING METHODS:		PAGE 5 OF 35	

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
120	SA-12	105 sec		MEDIUM GRAINED GREY QUARTZ SAND, POORLY GRADED, SOME 5% BROKEN SHELLS; ~ 20% FINE SAND	SP		
130	SA-13		1745	SAME BUT MORE FINES. FINE TO MEDIUM GREY QUARTZ SAND	SP		
140	SA-14	90 sec	1748 1754	MEDIUM GRAINED, SUB ANGULAR TO ROUNDED GREY QUARTZ SAND. POORLY GRADED, SLIGHTLY MORE SHELL FRAGMENTS (10%)	SP		VERY NOTICEABLE FINE COLOR CHANGE FROM GREY TO OLIVE GREEN
150			1759				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP-A	COORDINATES		DATE: 18 OCT 79
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT 79
ENGINEER/GEOLOGIST: WSM/llen	AT	HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS:	PAGE 6		OF 35

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
150	SA-15		940	FINE TO MEDIUM QUARTZ SAND HIGH PERCENTAGE (30%) SHELL FRAGMENTS	SP		USING TACKLER AND MAKING SAMPLE RECOVERY VERY DIFFICULT
160	SA-16		950	SAME, FINER, FLACKER SAND	SP		MUD CHANGED COLOR FROM OLIVE GREEN TO BROWN
170	SA-17		1000	FINE TO MEDIUM QUARTZ SAND	SP		
180			1005				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LARL-HDR
BORING NUMBER: DAPP-A	COORDINATES
ELEVATION:	GWL: AT HRS.
ENGINEER/GEOLOGIST: W. J. Miller	AT HRS.
DRILLING METHODS:	DATE: 19 OCT 79
	DATE STARTED: 18 OCT 79
	DATE COMPLETED: 23 OCT 79
	PAGE 2 OF 35

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
180	SA-18		1010	FINE GREY QUARTZ SAND POORLY SORTED GRADED WITH LESS BLACK MATERIAL	SP		
190	SA-19		1015 1020	SAME	SP		
200	SA-19		1025 1029	LITTLE IF ANY SANDS WASHED THROUGH SOME SHELLS	SP		MUD IS EXTREMELY THICK MAKING SAMPLE RECOVERY VERY DIFFICULT
210	NO SAMPLES		1035				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LAGL-HDZ	
BORING NUMBER: DAPP-4	COORDINATES	DATE: 19 OCT 79
ELEVATION:	GWL: AT HRS.	DATE STARTED: 18 OCT 79
ENGINEER/GEOLOGIST: Wampler	AT HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS:	PAGE 8 OF 35	

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
210	SA-20		1040	FINE TO MEDIUM GRAY SAND	SP		
220	SA-21		1055	HIGH % of SHELLS	SP		
230	SA-22		1100 1163	INDICATIONS OF GRAVEL AND LARGER SHELLS			ENCOUNTERED HARD SPOTS AT 235' AND 240' - DRILLERS CAMBOUT
240			1110				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP-4	COORDINATES		DATE: 19 OCT 1979
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT 79
ENGINEER/GEOLOGIST: Wampler	AT	HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS:			PAGE 9 OF 35

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
240	SA-23		1112	MAINTLY BROKEN SHELL FRAGMENTS MEDIUM TO VERY COARSE ANGLULAR QUARTZ SAND WITH TRACE OF GRAVEL	SP		ENCOUNTERED HARD SPOT @ 245'
250	SA-24		1125	SAME AS ABOVE SMALL BLUE GRAY CLAY BALL	SP		DELAY DUE TO BROKEN WATER HOSE 1120-1200 SAMPLE RECOVERY TECHNIQUE CHANGED - BETTER VOLUME OF MATERIAL, SAME MATERIAL
260	SA-25	60 gal ?	1205	SAME			FIND FLOW GETTING CLOGGED, MUD RETURN VERY DARK. PROBABLY DUE TO CLAY

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356		PROJECT NAME: LASL-402		
BORING NUMBER: DAPP-4		COORDINATES		DATE: 19 OCT '79
ELEVATION:		GWL: AT	HRS.	DATE STARTED: 18 OCT '79
ENGINEER/GEOLOGIST: <i>usmjly</i>		AT	HRS.	DATE COMPLETED: 23 OCT '79
DRILLING METHODS:				PAGE 10 OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
270	S4-26 SEE REMARKS						STEEL CLOGGED @ 1250 HRS AT ~ 272'. PULLED THE ROD NOTE: PIECE OF SANDY BLUE CLAY ON BIT BUT NOT FROM INSIDE - MAY BE FROM UP SHALLOW IN SAMPLE <u>S4-26</u> PUMP BROKE, QUIT FOR 2ND DAY.
280				STOPPED FOR DAY - PUMP BROKEN			

NOTES:

PUMP BROKEN, PROBLEMS WITH HOLE. HAD A CAVE-IN AROUND BIT DUE TO MUDCAKE BREAKDOWN AND OVERPRESSURING OF AN AQUIFER. DETERGENT WAS ADDED TO MUD CAUSING SAND TO FALL OUT OF SUSPENSION. THAT AND PUMP PROBLEMS CAUSED BLOCKAGE AND LOSS OF CIRCULATION.

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356		PROJECT NAME: LASL-HDR	
BORING NUMBER: DAPP-4		COORDINATES	
ELEVATION:		GWL: AT	HRS.
ENGINEER/GEOLOGIST: W. Samplen		AT	HRS.
DRILLING METHODS:		PAGE 11 OF 36	
		DATE: 21 OCT. 1979	
		DATE STARTED: 18 OCT. 1979	
		DATE COMPLETED: 23 OCT '79	

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
270	SA-27						RE DRILL OF THIS SEGMENT - CASE IN
280	SA-28	+2 min	1120	FINE TO MEDIUM GREY QUARTZ SAND POORLY GRADED. GOOD AMOUNT OF FINES AS WELL AS TRACE OF ROCK FRAGMENTS AND GRAVEL. SOME SANDY CLAY BUT THIS MAY BE FROM SURFACE TRACE 5% SMALL SHELL FRAGMENTS	SP		ENCOUNTERED HARD LAYERS @ 290 ± 295
290	SA-29		1130 1137	SAME, BUT MORE COARSE ANGULAR QUARTZ			
300			1146				

NOTES: REPAIRS MADE. DRILLING @ 1420 HRS. RE-ENTERING HOLE TO 280' (20 OCT 79)
NO PROGRESS ON 20 OCT 79 DUE TO PUMP REPAIR AND MUD MIXING. RE-ENTERING HOLE ON 21 OCT 79.

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP-4	COORDINATES		DATE: 21 OCT '79
ELEVATION:	GWL:	AT	HRS.
ENGINEER/GEOLOGIST: <i>W.M. Miller</i>		AT	HRS.
DRILLING METHODS:			DATE COMPLETED: 23 OCT '79
			PAGE 12 OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
300	SA-30		1152	GETTING MORE FINES AND MORE PLASTIC FINES	SP		APPEAR TO BE MIXING SOME CLAY - BLUE COLOR OF FLUID GETTING DARKER & FOAMY
310	SA-31		1201 1206	SAND FINE TO MEDIUM GREY QUARTZ SAND, SUBANGULAR TO ROUND ~ 10% BROKEN SHELL FRAGMENTS PLASTIC FINE MATERIAL IN SAMPLE POORLY GRADED	SP MS APPROPRIATE SC		ENCOUNTERED ANOTHER HARDER LAYER @ 325'
320	SA-32		1228 1306	FINE TO MEDIUM GREY QUARTZ SAND SOME INDICATIONS OF A SANDY PALE-GREY CLAY	SP SC		DRILLED AT A MUCH SLOWER RATE VERY LITTLE SAMPLE RECOVERY, MAYBE DUE TO THE SLOW RATE
330			1326				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: (ASL-HDR)		
BORING NUMBER: DAP-4	COORDINATES		DATE: 21 OCT. 79
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT. 79
ENGINEER/GEOLOGIST: W.S. Miller	AT	HRS.	DATE COMPLETED: 23 OCT. 79
DRILLING METHODS:	PAGE 13 OF 35		

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
330	SA-33		1335	FINE GRAY QUARTZ SAND POORLY GRADED, ROUNDED 5% BROKEN SHELLS	SP		DRILLING RATE VERY SLOW & DIFFICULT
340	SA-34		1405 1410	FINE TO MEDIUM ROUNDED QUARTZ SAND, POORLY GRADED TRACE OF GLAUCONITE (3 TO 5%) ALMOST NO SHELLS	SP		
350	SA-35		1435 1442	FINE TO MEDIUM GRAINED, SUB-ANGULAR TO ROUNDED GRAY QUARTZ SAND TRACE GLAUCONITE AND IRON STAINED QUARTZ 5% BROKEN SHELL FRAGMENTS	SP		

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP-4	COORDINATES		DATE: 21 OCT. 79
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT. 79
ENGINEER/GEOLOGIST: W. Miller	AT	HRS.	DATE COMPLETED: 23 OCT. 79
DRILLING METHODS:			PAGE 14 OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
360	SA-36		1520	FINE TO MEDIUM GRANNED, ROUNDED QUARTZ SAND NO SHELLS OR DISTINGUISHABLE GLAUCONITE POORLY GRADED TRACES OF A DARK COLORED CHLORITE < 1%	SP		
370	SA-37		1545 1550	FINE ROUNDED QUARTZ SAND 10% DARK CHLORITE POORLY GRADED TRACE OF CLAY	SP		DEPT OUTFLOW SEEMED TO THICKEN SLIGHTLY
380	SA-38		1608 1612	FINE ROUNDED QUARTZ SAND @ 390 GOING TO FINE TO MEDIUM QUARTZ SAND @ 400' TRACE BROKEN SHELLS TRACE CLAY	SP		
390			1629				

NOTES: SURFACE CASING WAS LOST - DISCONNECTED BY GROUND LEVEL DISCOVERED @ 1610 HRS

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL - HDR	
BORING NUMBER: DAPP-4	COORDINATES	DATE: 21 OCT '79
ELEVATION:	GWL: AT HRS.	DATE STARTED: 18 OCT '79
ENGINEER/GEOLOGIST: <i>W.M. Miller</i>	AT HRS.	DATE COMPLETED: 23 OCT '79
DRILLING METHODS:	PAGE 15 OF 35	

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
370	SA-39		1700	FINE ROUNDED QUARTZ SAND LITTLE OR NO SHELLS TRACES OF GLAUCONITE	SP		PUMP BEING USED IS NOT CIRCULATING WELL. SWITCHING TO PUMP ON THE RIG DELAY FROM WASHING
400	SA-40	1	1725	SAME			
			1740				
410			1800	LAST SAMPLE OF DAY			

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356		PROJECT NAME: LASL-ADR		
BORING NUMBER: DAPP-4		COORDINATES		DATE: 22 OCT. 79
ELEVATION:		GWL:	AT	HRS.
ENGINEER/GEOLOGIST: W. Miller			AT	HRS.
DRILLING METHODS:				DATE STARTED: 18 OCT. 79
				DATE COMPLETED: 23 OCT. 79
				PAGE 16 OF 35

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
410	SA-A1		0810	FINE ROUNDED QUARTZ SAND TRACES OF DARK CALCAREOUS POORLY GRADED NO SHELLS	SP		PRESSURE OF MUDFLOW IS LOW - MAY NOT BE WASHING UP ANYTHING BUT FINES
420			0820				
	NO SAMPLE		0837	LITTLE IF ANY SAMPLE PREDOMINANTLY FINE TO VERY FINE QUARTZ SAND WITH TRACES OF CLAY	SP ↓ SC		
430	SA-A2		0842				
			0850	VERY FINE TO FINE QUARTZ SAND TRACES OF CLAY TRACE OF GRAVEL (ONE PIECE IN SAMPLE) NO SHELLS	SP ↓ SC?		TO RECOVER ANY SAMPLE AT ALL HAD TO SCRATCH THE SIEVE. MUDFLOW PRESSURE VERY LOW
440			0900				

NOTES: IT APPEARS THAT THE ANNULUS AROUND THE RODS IS WASHING OUT AT DEPTH. MUD PIT LEVEL HAS DROPPED, MUD FLOW PRESSURE IS LOW. HOWEVER, DURING WASHING WE ARE GETTING SOME OF THE MEDIUM GRAINED SANDS TO WASH UP OUT OF THE HOLE, SO THE SAMPLES FROM 430 TO 450 MAY NOT REFLECT A REAL CONDITION.
OUT FLOW DURING WASHING IS GOOD.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356		PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP-4		COORDINATES		DATE: 22 OCT. 1979
ELEVATION:		GWL: AT	HRS.	DATE STARTED: 18 OCT. 1979
ENGINEER/GEOLOGIST: <i>W. Miller</i>		AT	HRS.	DATE COMPLETED: 23 OCT '79
DRILLING METHODS:				PAGE 17 OF 35

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
440	SA-43		0945	FINE TO MEDIUM GRAINED ROUNDED QUARTZ SANDS POORLY GRADED FEW IF ANY SHELLS	SP		WASHING FROM 0900-0945 BETTER CIRCULATION
450	SA-44		0950 0955	SAME TRACE BROKEN SHELL FRAGMENTS	SP		MUCH BETTER CIRCULATION
460	SA-45		1005 1007	SAME TRACE OF ANGULAR MEDIUM QUARTZ POORLY GRADED	SP		
470			1017				

NOTES:

(Faint handwritten notes and markings in the notes section)

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP-4	COORDINATES		DATE: 22 OCT 79
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT 79
ENGINEER/GEOLOGIST: <i>W. Smiley</i>	AT	HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS:	PAGE 18 OF 35		

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
470	SA-46		1022	FINE TO MEDIUM QUARTZ SAND SUB-ANGULAR TO ROUND TRACE SHELLS	SP		
480	SA-49		1028 1031	SAME	SP		
490	SA-48		1037 1042	SAME TRACE CLAY	SP		
500			1050				

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-40R	DATE: 22 OCT. 79
BORING NUMBER: DAPP-A	COORDINATES	DATE STARTED: 18 OCT. 79
ELEVATION:	GWL: AT HRS.	DATE COMPLETED: 23 OCT 79
ENGINEER/GEOLOGIST: <i>W. M. Miller</i>	AT HRS.	PAGE 19 OF 35
DRILLING METHODS:		

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
500	SA-49		105A	SAME	SP		
510	SA-50	TOOK 90 SECS FOR WATER TO RUN UP OUT OF MULE AFTER TURNING ON THE PUMP	1107	SAME TRACE FELDSPAR (RED)	SP		
520	SA-51		1130	TRACES OF CLAY SAME MATERIAL BUT MUCH LESS COMING UP IN OUTFLOW	SP		DRILLING PROGRESS SLOWED SOMEWHAT
530			1146				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP-4	COORDINATES		DATE: 22 OCT. 1979
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT. '79
ENGINEER/GEOLOGIST: W. Miller	AT	HRS.	DATE COMPLETED: 23 OCT '79
DRILLING METHODS:			PAGE 20 OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
530	SA-52		1149	FINE TO MEDIUM GRAINED, BOUNDED QUARTZ SAND TRACE OF DARK CHLORITE & GLAUCONITE TRACE BROKEN SHELL FRAGMENTS MORE FINE MATERIAL POORLY GRADED	SP		STILL ONLY A SMALL AMOUNT OF CUTTINGS COMING OUT - PROBABLY HIGHER % OF FINES
540	SA-53		1156 1205	SAME	SP		MORE MATERIAL COMING OUT NOW
550	SA-54		1219 1218	SAME	SP		AGAIN - SMALL AMOUNT OF CUTTINGS COMING THROUGH
560			1230				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		DATE: 22 Oct. 79
BORING NUMBER: DAPP-4	COORDINATES		DATE STARTED: 18 Oct. 79
ELEVATION:	GWL: AT	HRS.	DATE COMPLETED: 23 Oct. 79
ENGINEER/GEOLOGIST: Wampler	AT	HRS.	PAGE 21 OF 35
DRILLING METHODS:			

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
560	SA-55	195 cc/s	1517	FINE TO MEDIUM, ROUNDED QUARTZ SAND, POORLY GRADED NO SHELLS	SP		SMALL AMOUNT OF MATERIAL IN THE RETURN FLOW NOTE: CHANGED MUD PUMPS DURING THIS RUN
570	SA-56		1338 1348	SAME WITH TRACES OF CLAY	SP & SP		VERY FEW CUTTINGS
580	SA-57		1355 1400	SAME, WITH TRACES OF CLAY	SP & SC		VERY FEW CUTTINGS

590

NOTES: MUD PIT LEVEL WAS DROPPED STEADILY ALL DAY

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL- HDR		DATE: 22 Oct. 79
BORING NUMBER: DAPP-4	COORDINATES		DATE STARTED: 18 Oct 79
ELEVATION:	GWL: AT	HRS.	DATE COMPLETED: 23 Oct 79
ENGINEER/GEOLOGIST: <i>W. Miller</i>	AT	HRS.	PAGE 22 OF 35

DRILLING METHODS:

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
570	SA-58		118	SAME BOT ALMOST ALL FINES	SP SC		VERY FEW CUTTINGS
600	SA-59		1430	FINE QUARTZ SAND, TRACES OF CLAY	SP SC		VERY FEW CUTTINGS
610	SA-60		1441	SAME	SP SC		VERY FEW CUTTINGS
620			1450				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR	
BORING NUMBER: DAPP-4	COORDINATES	DATE: 22 OCT 79
ELEVATION:	GWL: AT HRS.	DATE STARTED: 18 OCT 79
ENGINEER/GEOLOGIST: W. Miller	AT HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS:	PAGE 23 OF 35	

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
620	SA-61		456	SAME - FINE ROUNDED QUARTZ SAND	SP E SC		VERY FEW CUTTINGS
630	SA-62		1504 1508	FINE TO MEDIUM SUBANGULAR TO ROUNDED QUARTZ SAND TRACE OF COARSE QUARTZ WITH IRON STAINING TRACE FELDSPAR (RED)	SP		VERY FEW CUTTINGS HARD SPOT @ 655
640	SA-63		1516 1521	FINE TO MEDIUM ROUNDED QUARTZ SAND WITH 10% COARSE ANGULAR FELDSPAR AND QUARTZ TRACE COARSE ANGULAR CHERT TRACE GLAUCONITE	SP		CUTTINGS INCREASING STOPPED FOR REPAIRS FROM 1530-1500
650			1524				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL - HDR	
BORING NUMBER: DAPP-4	COORDINATES	DATE: 23 OCT. '79
ELEVATION:	GWL: AT HRS.	DATE STARTED: 18 OCT. '79
ENGINEER/GEOLOGIST: <i>Wampler</i>	AT HRS.	DATE COMPLETED: 23 OCT '79
DRILLING METHODS:		PAGE 24 OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
650	SA-6A		1150	FINE TO MEDIUM GRAINED ROUNDED QUARTZ SAND TRACE BROKEN SHELL FRAGMENTS POORLY GRADED	SP		REPAIRS FROM 0800-1130 7 AND PREP.
660	SA-6B		1213 1216	SAME TRACE OF COARSE QUARTZ TRACE IRON STAINING ON THE QUARTZ	SP		SMALL SAMPLE
670	SA-6C		1220 1230	SAME	SP		SMALL SAMPLE
680			1237				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356		PROJECT NAME: LASL-HDR	
BORING NUMBER: DAPP-4		COORDINATES	DATE: 23 OCT. 1979
ELEVATION:		GWL: AT HRS.	DATE STARTED: 18 OCT. 79
ENGINEER/GEOLOGIST: <i>Wampler</i>		AT HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS:			PAGE 25 OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
680	SA-67		1243	FINE TO MEDIUM GRAINED LUNNED QUARTZ SAND TRACE WEATHERED FELDSPAR (RED) TRACE BROKEN SHELL FRAGMENTS	SP		SMALL SAMPLE
680	SA-68		1250 1254	SAME, 5% COARSE QUARTZ	SP		SMALL SAMPLE
700	SA-69		1305 1317	SAME	SP		SMALL SAMPLE
710			1325				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL - HDR		
BORING NUMBER: DAPP-4	COORDINATES		DATE: 23 OCT '79
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT. 79
ENGINEER/GEOLOGIST: <i>Wampler</i>	AT	HRS.	DATE COMPLETED: 23 OCT '79
DRILLING METHODS:	PAGE 26		OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
710	SA-70		1331	FINE ROUNDED QUARTZ SAND POORLY GRADED TRACE OF FINELY BROKEN SHELL FRAGMENTS	SP		LARGER SAMPLE
720	SA-71		1338 1344	SAME	SP		GETTING MORE MATERIAL IN MID OUTFLOW
730	SA-72		1351 1355	FINE TO MEDIUM ROUNDED QUARTZ SAND TRACE SUB ANGULAR CORNICE QUARTZ TRACE BROKEN SHELL FRAGMENTS POORLY GRADED	SP		SMALL SAMPLE
740			1402				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: FB-356	PROJECT NAME: LASL HDR	
BORING NUMBER: DAPP-4	COORDINATES	DATE: 23 OCT 79
ELEVATION:	GWL: AT HRS.	DATE STARTED: 18 OCT '79
ENGINEER/GEOLOGIST: W. Smiley	AT HRS.	DATE COMPLETED: 23 OCT '79
DRILLING METHODS:		PAGE 27 OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
740	5A-73		1409	FINE ROUNDED QUARTZ SAND TRACE FINELY BROKEN SHELL FRAGMENTS POORLY GRADED	SP		SMALL SAMPLE
750	5A-74		1430	FINE ROUNDED QUARTZ SAND SOMEWHAT CLAYEY TRACE FINELY BROKEN SHELL FRAGMENTS POORLY GRADED	SP & SC		SMALL SAMPLE DELAY DUE TO FITTING SWATCH BLOCK ON LIFT CABLE
760	5A-75		1438	FINE ROUNDED QUARTZ SAND TO VERY FINE POORLY GRADED SOMEWHAT CLAYEY	SP U SC		SMALL SAMPLE
770			1443				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL - HDR		DATE: 23 OCT 79
BORING NUMBER: DAPP-4	COORDINATES		DATE STARTED: 18 OCT 79
ELEVATION:	GWL: AT	HRS.	DATE COMPLETED: 23 OCT '79
ENGINEER/GEOLOGIST: W. J. Miller	AT	HRS.	PAGE 28 OF 35
DRILLING METHODS:			

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
770	SA-76		1453	VERY FINE TO FINE BOUNDED QUARTZ SAND, SOMEWHAT CLAYEY	SP ↓ SC		
780	SA-77		1500 1503	FINE BOUNDED QUARTZ SAND TRACE FINELY BROKEN STEELS TRACE FELDSPAR (RED)	SP		SMALL SAMPLE
790	SA-78		1508 1511	FINE BOUNDED QUARTZ SAND	SP ↓ SC		SMALL SAMPLE
800			1516				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP-4	COORDINATES		DATE: 23 OCT. 79
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT 79
ENGINEER/GEOLOGIST: <i>W. S. Miller</i>	AT	HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS:			PAGE 29 OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
800	SA-79		1521	VERY FINE TO FINE ROUNDED QUARTZ SAND, FEELS CLAYEY	SP ↓ SC		VERY SMALL SAMPLE
810	SA-80		1529 1535	SAME	SP ↓ SC		VERY SMALL SAMPLE
820	SA-81		1540 1547	SAME - SOME MEDIUM SAND	SP ↓ SC		VERY SMALL SAMPLE
830			1553				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 28-356	PROJECT NAME: LASL - HDR	
BORING NUMBER: DAPP-4	COORDINATES	DATE: 23 OCT. 1979
ELEVATION:	GWL: AT HRS.	DATE STARTED: 18 OCT '79
ENGINEER/GEOLOGIST: Wampler	AT HRS.	DATE COMPLETED: 23 OCT '79
DRILLING METHODS:	PAGE 30 OF 35	

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
830	SA-82		1557	VERY FINE TO FINE ROUNDED QUARTZ SAND, POORLY SORTED NOTED A SMALL LARVAE-TYPE SNAIL IN SAMPLE	SP SC		VERY LITTLE SAMPLE
840	SA-83		1603 1609	SAME - TRACE OF COARSE SUB-ANGULAR QUARTZ	SP SC		VERY LITTLE SAMPLE
850	SA-84		1614 1620	SAME - NO COARSE MATERIAL	SP SL		VERY LITTLE SAMPLE
860			1625				

NOTES:

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP-4	COORDINATES		DATE: 23 OCT. '79
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT. '79
ENGINEER/GEOLOGIST: WAM Miller	AT	HRS.	DATE COMPLETED: 23 OCT. '79
DRILLING METHODS:			PAGE 31 OF 35

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
860	SA-85		1633	SAME - FINE TO VERY FINE QUARTZ SAND POORLY GRADED FEELS CLAYEY	SP ↓ SC		VERY LITTLE SAMPLE
870	SA-86		1641 1645	SAME	SP ↓ SC		VERY LITTLE SAMPLE
880	SA-87		1653 1700	SAME - SOME MEDIUM QUARTZ SAND TRACE CLAY & FINE SHELL FRAGMENTS GRADING FAIR	SP ↓ SC		VERY LITTLE SAMPLE
890			1705				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HOR		DATE: 23 OCT. '79
BORING NUMBER: DAPP-4	COORDINATES		DATE STARTED: 18 OCT '79
ELEVATION:	GWL: AT	HRS.	DATE COMPLETED: 23 OCT '79
ENGINEER/GEOLOGIST: W. Sample	AT	HRS.	PAGE 32 OF 35
DRILLING METHODS:			

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
870	SA-88		1707	FINE TO MEDIUM QUARTZ SAND, SUB-ANGULAR TO ROUND TRACE FINE BROKEN SHELLS TRACE CLAY	SP ↓ SC		VERY LITTLE SAMPLE
900	SA-87		1711 1716	SAME	SP ↓ SC		LITTLE SAMPLE
910	SA-90		1722 1728	SAME - TRACE OF COARSE SHELL FRAGMENTS	SP ↓ SC		VERY LITTLE SAMPLE
920			1735				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-256	PROJECT NAME: LASL-HDR	
BORING NUMBER: DARR-4	COORDINATES	
ELEVATION:	GWL: AT	HRS.
ENGINEER/GEOLOGIST: W. Miller	AT	HRS.
DRILLING METHODS:	DATE: 23 OCT 79	
	DATE STARTED: 18 OCT 79	
	DATE COMPLETED: 23 OCT 79	
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DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
920	SA-91		1744	FINE TO MEDIUM, SUBANGULAR TO ROUNDED QUARTZ SAND TRACE BROKEN SHELL FRAGMENTS TRACE FELDSPAR (RED) TRACE COARSE SUB-ANGULAR QUARTZ	SP ↓ SC		VERY LITTLE SAMPLE
730	SA-92		1750 1758	SAME	SP ↓ SC		SMALL SAMPLE
740	SA-93		1807 1813	SAME, SOME VERY FINE CLAYEY MATERIAL	SP ↓ SC		SMALL SAMPLE
950			1829				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL HDR		DATE: 23 OCT. 79
BORING NUMBER: DAPP-4	COORDINATES		DATE STARTED: 18 OCT. 79
ELEVATION:	GWL: AT	HRS.	DATE COMPLETED: 23 OCT. 79
ENGINEER/GEOLOGIST: W. J. Miller	AT	HRS.	PAGE 34 OF 35
DRILLING METHODS:			

DEPTH	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CONNECTION	REMARKS
950	SA-9A		1823	SAME	SP ↓ SC		VERY LITTLE SAMPLE
960	SA-9B		1835 1840	SAME SOME COARSE QUARTZ ALMOST GRAVEL	SP ↓ SC		VERY LITTLE SAMPLE
970	SA-9C		1850 1852	SAME	SP ↓ SC		VERY LITTLE SAMPLE
980			1900				

NOTES:

D'APPOLONIA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 78-356	PROJECT NAME: LASL-HDR		
BORING NUMBER: DAPP 4	COORDINATES	DATE: 23 OCT 79	
ELEVATION:	GWL: AT	HRS.	DATE STARTED: 18 OCT 79
ENGINEER/GEOLOGIST: W. S. Miller	AT	HRS.	DATE COMPLETED: 23 OCT 79
DRILLING METHODS:	PAGE 35 OF 35		

DEPTH ()	SAMPLE TYPE & NO.	ESTIMATED MUD FLOW RATE	DRILLING RATE	DESCRIPTION	USCS SYMBOL	ESTIMATED DEPTH CORRECTION	REMARKS
980	SA-97	~240 g/min	1914	FINE TO MEDIUM BLACK SAND SOME COARSE QUARTZ POORLY GRADED	SP		ENCOUNTERED HARDER DRILLING @ 1005' GOOD AMOUNT OF SAMPLE
990	SA-98		1920	SAME	SP		DRILLING IS MUCH SLOWER
1000	SA-99		1930	SAME	SP		
1010			1938	END OF BORING			

NOTES: