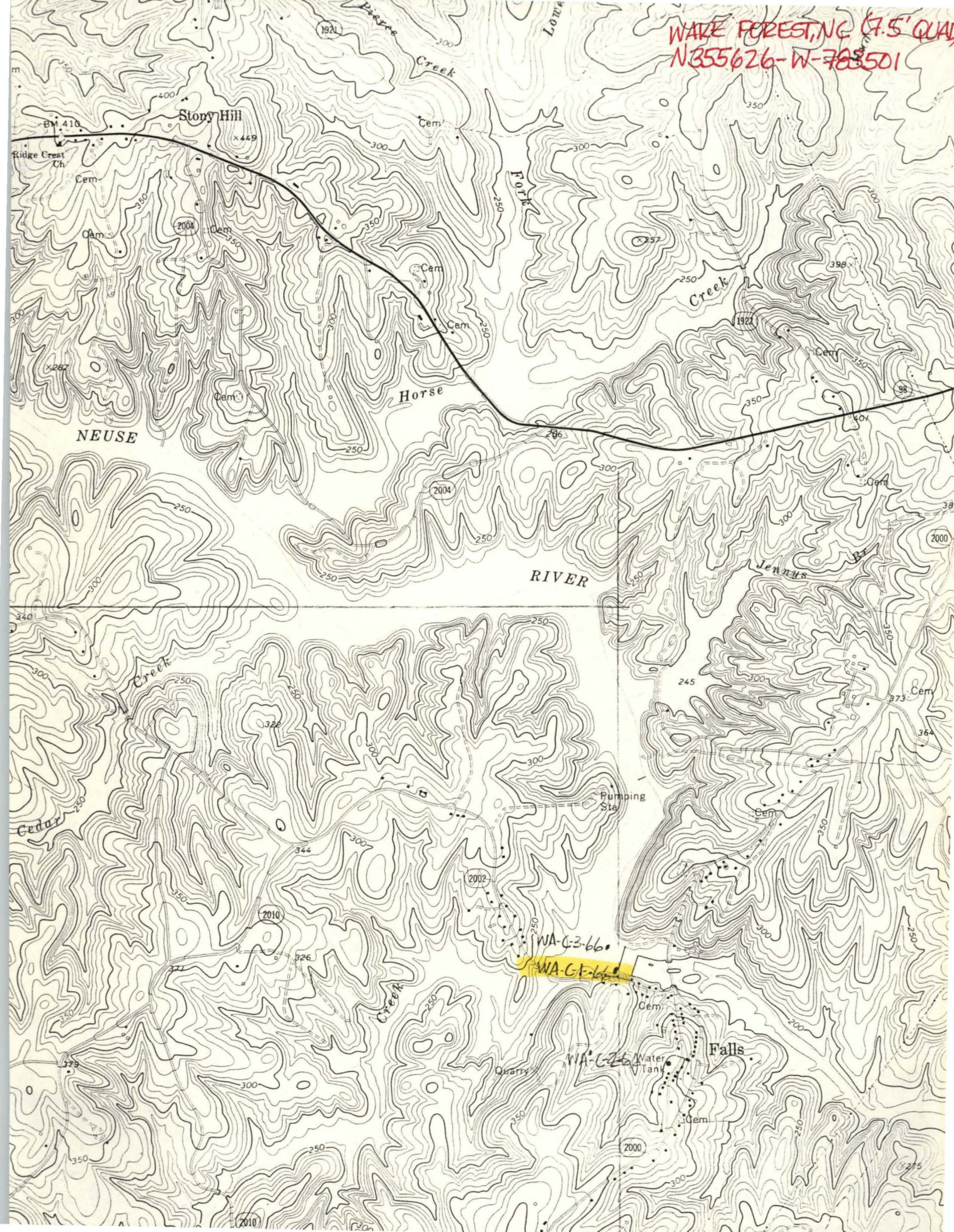


WAKE FOREST, NC (7.5' QUAD)
N355626-W-783501



Stony Hill

Horse Fork

NEUSE

RIVER

Lenoir

Falls

WA-G-3-66

WA-G-14

WA-G-26

Water Tank

Pumping Sta.

Quarry

BM 410

Ridge Crest Ch.

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WA-C-1-66

U. S. ARMY

PETROGRAPHIC REPORT		CORPS OF ENGINEERS, U.S. ARMY SOUTH ATLANTIC DIVISION LABORATORY MARIETTA, GEORGIA	
No. IM674-1M676	Date Sept. 1966	Work Order No. 4211 Req. No. SAS-ENG-FALLS-1	
Source Falls Dam Site, Falls, N.C.	Type NX Cores		
Project Falls Dam Site	District Savannah	Date Received 8-18-66	Sampled by Savannah Dist. Personnel

SUMMARY

Petrographic analysis has been made of three NX cores from Falls Dam Site near Falls, North Carolina. The rock types encountered are summarized as follows:

Lab. No.	Core Hole	Depth (ft)	Rock Type
IM674	A-3	29.1 - 29.6	Quartz-Microcline Gneiss
IM675	A-3	21.2 - 21.7	Hornblende Gneiss
IM676	A-6	37.0 - 37.7	Quartz-Epidote Gneiss

The lineation and in some cases, foliation of the gneiss dips between 25 to 35 degrees from the horizontal. The gneiss ranges from fresh to slightly weathered and only the sample from core hole A-6, 37.0 - 37.7 ft. depth contains evidence of joint systems. The brecciated, granular, and linear nature of the texture of these gneisses is evident in thin section analysis. In general, rock comprising the cores are typical Piedmont rock types.

DETAILED PETROGRAPHY

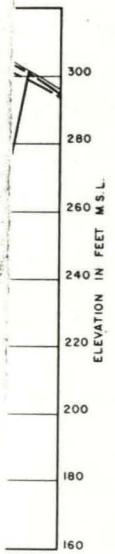
Detailed petrographic description of each core hole rock specimen is given in the following paragraphs. Mineral identification and texture analysis was performed by means of the petrographic microscope. Thin section and grain mount techniques were employed in the study. A photomicrograph (Figures 1 through 3) was made of each rock type. Rock classification is by means of the AGI binomial system for naming metamorphic rocks in which the main rock name is based on the texture of the rock while the principal or more significant minerals are added as modifying nouns.

Lab IM674 - Core Hole A-3, 29.1 - 29.6 ft - Quartz-microcline gneiss

The rock core from 29.1 to 29.6 ft. depth of core hole A-3 consists of pink, lineated, fine to medium grained, interlocking-granular, fresh, dense, quartz-microcline gneiss. Although lineated the gneiss is not foliated or banded; lineation dips approximately 35 degrees from the horizontal. The lineation is imparted by the parallel arrangement of black mica (biotite) in a pink groundmass.

Thin section analysis reveals a brecciated, interlocking-granular arrangement of minerals in which microcline attains the largest grain size. (See Figure 1). Average grain size approximately 0.3 mm with range up to 2 mm grain size for microcline. Feldspar is the most abundant mineral with microcline the most abundant variety. Microcline ranges from fresh, surfaces with discrete "gridiron" twinning (combined albite and periclase twinning) to surface weathered, with "cloudy" surfaces which masks

Reported by:	Tested by:	Checked by:
<input type="checkbox"/> phone <input type="checkbox"/> wire _____ date	J.N.	C.J.C.
Appendix I Page 7 of 11		



U. S. ARMY
ENGINEER DISTRICT, WILMINGTON
CORPS OF ENGINEERS
WILMINGTON, NORTH CAROLINA
NDUM 10
NES A-A' & B-B'
DISTRICT ENGINEER
FILE: PP 1/10

<p>PETROGRAPHIC REPORT (cont'd)</p>	<p>Laboratory No. 1M674-1M676</p>	<p>Date: 9 Sept. 1966</p>
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Quartz occurs interstitial in the groundmass with grain size generally smaller than feldspars. Biotite is lineated in the groundmass but never concentrated enough to form foliations. Trace amounts of minor other accessory minerals occur as inclusions in the groundmass. Mineral composition approximates the following:

Feldspar (predominantly microcline) ----	63%
Quartz -----	30%
Biotite -----	7%
Minor Others -----	Trace

There are no apparent structural defects in this gneiss but some of the feldspars are surface weathered, a factor which contributes to less rock strength.

1M675 - Core Hole A-3, 21.2 to 21.7 feet - Hornblende Gneiss

The rock core from 21.2 to 21.7 ft. depth of core hole A-3 is a greenish grey, fine grained, lineated, fresh, dense, hornblende gneiss. Although lineated the rock is not foliated or banded; lineation approximates a 25 degree dip with the horizontal.

Thin section analysis reveals a granulated lineated texture comprised of hornblende, biotite, quartz, and feldspar (See Figure 2). The green, pleochroic hornblende is the most abundant ferromagnesian mineral and consists of euhedral to anhedral crystals with generally well defined amphibole cleavage. Biotite, of less abundance, tends to parallel the hornblende lineation. Feldspars are commonly frayed or brecciated with well defined albite or Carlsbad twinning; most abundant feldspar variety is oligoclase while orthoclase is of minor occurrence. Quartz tends to be slightly smaller in grain size than feldspars. Mineral composition approximates the following percentage distribution:

Hornblende -----	35%
Biotite -----	10%
Feldspar -----	25%
Quartz -----	30%
Magnetite & Minor Others --	Trace

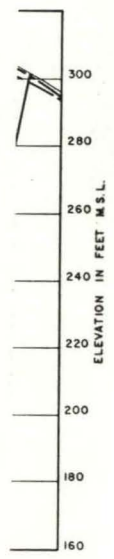
This rock type is tough and dense with no apparent structural defects.

1M676 - Core Hole A-6, 37.0 - 37.7 ft - Quartz - Epidote Gneiss

The rock core from 37.0 to 37.7 ft depth of core hole A-6 consists of white, fine grained, foliated, dense, fresh to slightly weathered quartz-epidote-feldspar gneiss. Local coarser textured and light grey quartz bands from 3 to 8 mm thick occur parallel to the foliation for the length of the core sample. Foliation dips at an angle of thirty degrees from the horizontal. Local healed joints occur in vertical attitude and parallel to the foliation.

Thin section analysis reveals a highly brecciated, granulated, and lineated groundmass of quartz, epidote, feldspar, and minor other minerals (See Figure 3). Average grain size is about 0.2 mm. Epidote, probably derived at the expense of plagioclase during metamorphism, is light yellow in color, granulated, and stands in high relief in contrast to more singularly occurring quartz grains. Feldspar grains are slightly weathered with orthoclase, the more common variety; twinning is generally absent in the feldspars. Other minor accessory minerals include disseminated zircon, magnetite, and others. Average mineral composition approximates the following percentage distribution.

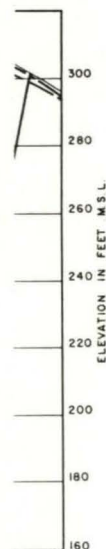
Appendix I
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PETROGRAPHIC REPORT (cont'd)	Laboratory No. LM674 - LM676	Date: 9 Sept. 1966
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Quartz ----- 56%
 Epidote ----- 33%
 Feldspar ----- 10%
 Zircon & Minor Others ----- 1%

This rock probably represents a metamorphosed aplite (a white granitic rock void of ferromagnesian minerals) in which most of the feldspar was altered to epidote and the quartz was merely ground to smaller size. Some of the feldspars which were not altered during metamorphism are the more easily weathered minerals and the amount of surface weathering present contributes to structural weakness of the rock. Minor vertical joints appear well healed. A few minor joints essentially parallel to bedding appear well healed; these are probably sheet or exfoliation joints.



DRILLING LOG		DIVISION South Atlantic	INSTALLATION Falls, N. C.	SHEET 1 OF 3 SHEETS	
1. PROJECT Falls Dam			10. SIZE AND TYPE OF BIT 1-1/2" ID SS, NWX, 2-3/4x3-7/8		
2. LOCATION (Coordinates or Station) Baseline A - Sta. 12 + 32, 140' Left			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL		
3. DRILLING AGENCY Savannah Dist. - Corps of Engineers			12. MANUFACTURER'S DESIGNATION OF DRILL Failing 314		
4. HOLE NO. (As shown on drawing title and file number) A-3			13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	DISTURBED 0	UNDISTURBED 0
5. NAME OF DRILLER J. H. McDonald			14. TOTAL NUMBER CORE BOXES 3		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER 209.7 15 June 66		
7. THICKNESS OF OVERBURDEN 9.5'			16. DATE HOLE STARTED 6-15-66 COMPLETED 6-16-66		
8. DEPTH DRILLED INTO ROCK 26.0'			17. ELEVATION TOP OF HOLE 213.4'		
9. TOTAL DEPTH OF HOLE 35.5'			18. TOTAL CORE RECOVERY FOR BORING 93 %		
			19. SIGNATURE OF INSPECTOR E.M. Mayland, Insp. J.A. Albritton, Geol.		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			SM - Tan, Fine-med. micaceous			Soil field classified in accordance with the Unified Soil Classification System. 0 10 20 40 60 80 100 3 2 2 2 0 1 100/0.5'
			CH - Micaceous, gray			
			ML - Tan, clayey, mic. w/wood particles			
			MH - Dark gray, micaceous, plastic			
			OL - Dark gray			
WT 6.3'	6-15-66		SM - Dark-gray, fine-med w/ some gravel			NOTE: Scale change 10.0' Sampled with 2-3/4 x 3-7/8 core barrel.
			Rock bit 9.5' to 9.9' Top of Rock 9.5'			
203.9'	10		Quartz, microcline gneiss. Hard, fresh, lineated, pink. Foliation dips 50-60°			1 Pull # 1 9.9' to 14.9' Run 5.0' Rec 3.7' Cl. 1.3' Most probable core loss at 9.9' to 11.2'.
			TOP SOUND ROCK 10.8'	74		
202.6'	12		Breaks: Fresh, near horizontal at 11.8', 12.3', 15.2', 15.5' 15.7', 16.0', 16.3', 16.6' 16.9'			
	14					Blows Per Foot: Number required to drive 1-1/2" splitspoon w/140 lb. hammer falling 30".
	16				2	
	18		CONTINUED ON SHEET # 2			

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Falls, M. C.	SHEET 2 OF 3 SHEETS
1. PROJECT Falls Dam		10. SIZE AND TYPE OF BIT		
2. LOCATION (Coordinates or Station)		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
3. DRILLING AGENCY		12. MANUFACTURER'S DESIGNATION OF DRILL		
4. HOLE NO. (As shown on drawing title and file number)		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	DISTURBED	UNDISTURBED
5. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER		
7. THICKNESS OF OVERBURDEN		16. DATE HOLE	STARTED	COMPLETED
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE		
9. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING %		
		19. SIGNATURE OF INSPECTOR		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Quartz, microcline gneiss, hard, fresh, lineated, pink. foliation 50-60°.	99	2	Pull # 2 14.9' to 21.2' Run 6.3' Rec 6.2' Cl. 0.1'
	22		Break at 23.0', fresh, near horiz.			Sampled with NX core barrel from 14.9' to 35.5'.
	24					
	26					Pull # 3 21.2' to 31.5' Run 10.3' Rec 10.1. Cl. 0.2'
	28					
	30		CONTINUED ON SHEET # 3			

Hole No. A-3

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Falls, N. C	SHEET 3 OF 3 SHEETS
1. PROJECT Falls Dam		10. SIZE AND TYPE OF BIT		
2. LOCATION (Coordinates or Station)		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
3. DRILLING AGENCY		12. MANUFACTURER'S DESIGNATION OF DRILL		
4. HOLE NO. (As shown on drawing title and file number)		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	DISTURBED	UNDISTURBED
5. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		13. ELEVATION GROUND WATER		
7. THICKNESS OF OVERBURDEN		16. DATE HOLE _____ STARTED _____ COMPLETED _____		
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE		
9. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING _____ %		
		19. SIGNATURE OF INSPECTOR		

ELEVATION e	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Biotite gneiss, dark gray, fresh			
			Break: 29.7' 60° jnts (3), stained.			
	32					
	34*		Alternating bands (1") biotite gneiss & microcline gneiss, dark gray & pinkish.	100	3	Pull # 4 31.5' to 35.5' Run 4.0' Rec 4.0'
177.9'			Microcline Gneiss, fresh qtz. BOTTOM OF HOLE 35.5'			
	36					

blows per foot:
of blows to drive
ID splitspoon with
hammer falling 30".