WA-C-2-66

Hole No. A-6

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Falls, N. C.

SHEET 1 OF 7 SHEETS

1. PROJECT: Falls Dam
2. LOCATION (Coordinates or Station): Station -1 + 76, 178' Right Baseline A
3. DRILLING AGENCY: Savannah District - Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number): A-6
5. NAME OF DRILLER: J. McDonald
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 21.2'
8. DEPTH DRILLED INTO ROCK: 71.4'
9. TOTAL DEPTH OF HOLE: 92.6'
10. SIZE AND TYPE OF BIT: 11/2 ID SS, 4x5,2 3/4 x 3 7/8
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 314
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 6; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES: 8
15. ELEVATION GROUND WATER: 14.8' 11 Jun 66
16. DATE HOLE: STARTED 11 Jul 66; COMPLETED 13 Jul 66
17. ELEVATION TOP OF HOLE: 288.1'
18. TOTAL CORE RECOVERY FOR BORING: 90 %
19. SIGNATURE OF INSPECTOR: G J Kraynak

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) 0 10 20 40 60 80 100
			SC - Red-tan, sl. plastic clayey sand		1	19
					2	20
			SM - Tan, silty, fine & med. sand			18
						17
			CL - Tan, inorganic clay w/med. plasticity		3	15
					4	14
	10					13
			SM - Silty sand & decomposed Rock.			17
			Tan, fine & Med.			20
WT 14.8'						23
11/6/66			Gray, med. & coarse		5	16
						13
	20					75
			Tan, med. & coarse			
266.9'			Top of Rock 21.2'		6	100 100/0.2'
	22		Quartz, microcline saprolite, soft, intensely weathered.	100	1	NOTE: Change in Scale at 20.0'. Pull # 1 21.2' to 23.8' Run 2.6' Rec 2.6'
	24		NOTE: Soils field classified in accordance with unified soil classification system.			
				83		Pull # 2 23.8' to 28.4' Run 4.6' Rec 3.8' Cl. 0.8'
	26					
	28		CONTINUED ON SHEET # 2			
			Soils field classified in accordance with the Unified Soil Classification System.			NOTE: Blows per feet: Number of blows to drive 1-1/2" ID splitspoon with 180# hammer falling 30".

Hole No. A-6

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Falls, N. C. | SHEET 2 OF 7 SHEETS

1. PROJECT: Falls Dam
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP 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
			Quartz-Microcline soft, intensely weathered.			
	30			88	2	NOTE: Sampled with 4 x 5-1/2" core barrel 21.2' to 41.3' Pull # 3 28.4' to 32.3' Run 3.9' Rec 3.4' Cl. 0.5'
	32					
	34			100		Pull # 4 32.3' to 36.5' Run 4.2' Rec 4.2'
	36					
	38		Quartz-epidote-muscouite gneiss greenish-light gray, soft, badly to mod. weathered. 36.5' to 37.0' badly bkn. zone 37.8' 30° jnt. 38.2' 60° jnt., sl. stn. 38.4' 30° jnt., sl. stn. 38.7' to 39.7' badly bkn zone due to vert. jnting., stn.	96	3	Pull # 5 36.5' to 41.3' Run 4.8' Rec 4.6' Cl. 0.2'
	40		40.0' 30° jnt., fresh CONTINUED ON SHEET # 3			

Hole No. A-6

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Falls, N. C.	SHEET 3 OF 7 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 ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER		
		16. DATE HOLE	STARTED	COMPLETED
7. THICKNESS OF OVERBURDEN		17. ELEVATION TOP OF HOLE		
8. DEPTH DRILLED INTO ROCK		18. TOTAL CORE RECOVERY FOR BORING		%
9. TOTAL DEPTH OF HOLE		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
			Quartz-epidote-muscovite gneiss greenish-light gray, soft, bdly to mod. weath.			
			40.3' to 41.3' bdly bkn zone due to vert & dia. jnting slightly stn.			NOTE" Sampled with 2-3/4 x 3-7/8 core barrel 41.3' to 53.5'
	42		41.5',41.7',41.9' (3) 20° jnts., sl. stn.			
			Quartz-microcline gneiss brownish, pinkish, light gray, badly to mod. weath.			Pull # 6
	44		42.3' to 43.1' bdly. wea. zone	90		41.3' to 46.9'
			43.4' low angle jnt.			Run 5.6'
			43.6' low angle jnt.			Rec 5.0'
			44.1' 45° jnt., sl. stn.		4	Cl. 0.6'
			44.5' 45° jnt., sl. stn.			
			44.8' 30° jnt., sl. stn.			
	46		45.1' 30° jnt., sl. stn.			
			45.4' to 46.9' bdly. wea. zone			
			Pinkish, lt. gray, foliation about 50°. mod. to slt. wea.			
			47.2' 30° jnt.			
	48		47.9' 45° irr. jnt.			
			48.4' 10° jnt.			
			48.7' 20° jnt.			
			49.5' 30° jnt.			Pull # 7
			49.9' low angle jnt.	95		46.9' to 52.2'
	50		50.2' 45° irr. jnt.			Run 5.3'
			50.4' 30° jnt., sl. stn.			Rec 5.0'
			51.0' 30° jnt., sl. stn.			Cl. 0.3'
			51.2' low angle jnt.			
			51.6' 60° jnt., sl. stn.			
	52		CONTINUED ON SHEET # 4			

Hole No. A-6

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Falls, N. C.	SHEET 4 OF 7 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 ☐ VERTICAL ☐ 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
			Quartz-microcline gneiss pinkish-lt. gray, foliation about 50°. mod. to slightly weathered.	90	5	Pull # 8 52.2' to 53.5' Run 1.3', rec 1.1' Cl. 0.2'
			52.2' 30° jnt., sl. stn.			
	54		52.8' low angle jnt. sl. stn.			NOTE: Sampled with NX core barrel 53.5' to 92.6'
			53.1' low angle jnt. sl. stn.			
			53.3' low angle jnt. sl. stn.			
			53.5' machine break			
			53.8' low angle jnt., sl. stn.			
			54.0' 45° jnt.			
	56		54.7' to 55.0' vert. jnt.			
			54/8' low angle jnt.			
			55.2' 20° jnt., sl. stn.			
			56.7' 45° jnt., stn.			Pull # 9 53.5' to 62.7'
			57.9' 30° jnt., stn.	90		Run 9.2'
	58		58.4' 60° jnt., stn.			Rec.8.3'
					6	Cl. 0.9'
			59.4' 70° jnt., stn.			
			59.7' 45° irr. jnt., stn.			
	60		60.0' (2) low angle joints			
			61.7' 45° jnt., stn.			
	62		62.2' 30° jnt., stn.			
			62.4' 30° irr. jnt., stn.			
			62.7' 45° irr. jnt., stn.			
			63.1' low angle irr jnt stn			
	64		63.9' (2) low angle irr jnt.stn			CONTINUED ON SHEET # 5

Hole No. A-6

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Falls, N. C.	SHEET 5 OF 7 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 ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER	
		16. DATE HOLE	STARTED / COMPLETED
7. THICKNESS OF OVERBURDEN		17. ELEVATION TOP OF HOLE	
8. DEPTH DRILLED INTO ROCK		18. TOTAL CORE RECOVERY FOR BORING	%
9. TOTAL DEPTH OF HOLE		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
222.6'			Quartz-Microcline gneiss w/ increase in biotite content pinkish-dark gray, slt weath. to fresh. Top Sound Rock 65.5'			
	66				6	
		*				
	68					Pull # 10 62.7' to 72.6' Run 9.9' Rec 8.4' Cl. 1.5'
			68.9' low angle jnt., sl. stn.	85		
			69.5' 50° jnt., sl. stn. 70.0' low angle jnt., stn.			
	70					
			71.0' 45° jnt., sl. stn.		7	
			71.2' machine break 71.4' machine break			
	72		71.9' machine break 72.4' machine break			
				119		Pull # 11 72.6' to 75.3' Run 2.7' Rec 3.2' Cg. 0.5'
	74					
		*	75.3' machine break 75.8' machine break			
	76		CONTINUED ON SHEET # 6			

Hole No. A-6

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Falls, N. C.	SHEET 6 OF 7 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 ☐ VERTICAL ☐ 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
			Quartz-Microcline gneiss with increase in biotite content, pinkish-dark gray, slightly wea. to fresh			
			76.2' machine break			
	78					
			78.7' (3) 45° jnts., stn.		7	
						Pull # 12
	80		80.0' machine break	97		75.3' to 82.7'
						Run 7.4'
						Rec 7.2'
						Cl. 0.2'
	82					
			82.7' (2) 60° jnts., stn.			
			83.7' 60° jnt., stn.			
	84					
			85.2' to 85.5' 60° biotite healed jnt.		8	
	86		Biotite gneiss, dark gray med. grained, fol. low. fresh rock			
			87.3' 30° jnt., stn.			
			87.5' 30° jnt., stn.			
			87.6' 30° jnt., stn.			
	88		CONTINUED ON SHEET # 7			

Hole No. A-6

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Falls, N. C.

SHEET 7 OF 7 SHEETS

1. PROJECT: Falls Dam
2. LOCATION (*Coordinates or Station*)
3. DRILLING AGENCY
4. HOLE NO. (*As shown on drawing title and file number*)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (*TBM or MSL*)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP 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
			Biotite gneiss, dark gray med. grained, fol. low fresh rock.			
			89.3' machine break			
	90		89.5' machine break			
			90.3' to 92.6' core loss of 2.3' left in bottom of hole.		8	Pull # 13 82.7' to 92.6' Run 9.9' Rec 7.6' Cl. 2.3'
				77		
	92					
195.5'			Bottom of Hole 92.6'			
	94					

WA-C-2-66

PETROGRAPHIC REPORT (cont'd)	Laboratory No.	Date:
	1M674-1M676	9 Sept. 1966

ing. Quartz occurs interstitual in the groundmass with grain size generally ller than feldspars. Biotite is lineated in the groundmass but never concentrated h to form foliations. Trace amounts of minor other accessory minerals occur as inations in the groundmass. Mineral composition approximates the following:

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

re no apparent structural defects in this gneiss but some of the feldspars are ce 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, grained, lineated, fresh, dense, hornblende gneiss. Although lineated the rock t foliated or banded; lineation approximates a 25 degree dip with the horizontal.

Thin section analysis reveals a granulated lineated texture comprised of horn-de, biotite, quartz, and feldspar (See Figure 2). The green, pleochroic hornblende e most abundant ferromagnesian mineral and consists of euhedral to anhedral crystals generally well defined smphibole cleavage. Biotite, of less abundance, tends to llel the hornblende lineation. Feldspars are commonly frayed or brecciated with well ned albite or Carlsbad twinning; most abundant feldspar variety is oligioclase while ldspar 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

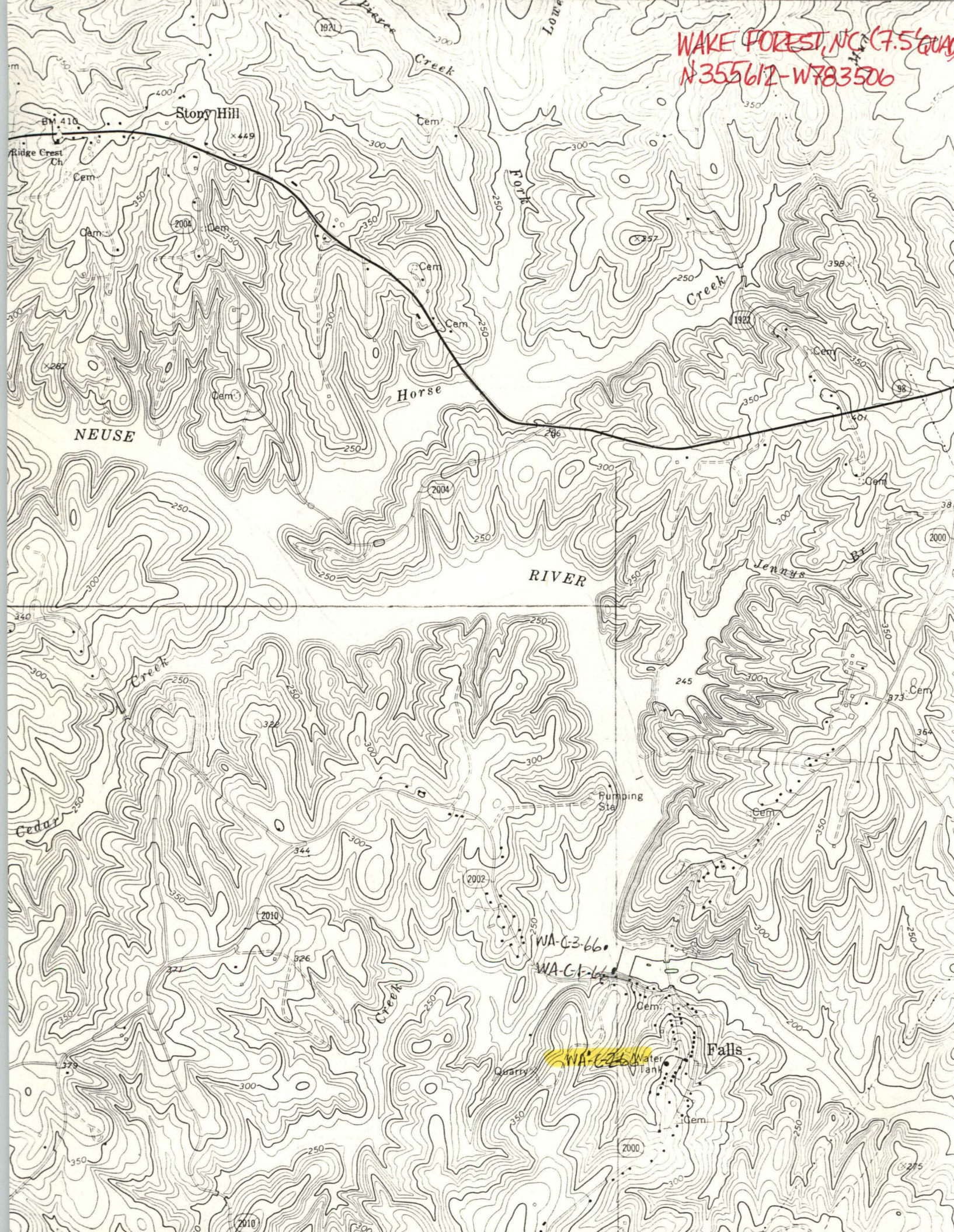
The rock core from 37.0 to 37.7 ft depth of core hole A-6 consists of white, fine ined, foliated, dense, fresh to slightly weathered quartz-epidote-feldspar gneiss. l coarser textured and light grey quartz bands from 3 to 8 mm thick occur parallel foliation for the length of the core sample. Foliation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

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

PETROGRAPHIC REPORT (cont'd)	Laboratory No.	Date:
	1M674 - 1M676	9 Sept. 1966

Quartz	56%
Epidote	33%
Feldspar	10%
Zircon & Minor Others	1%

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


WAKE FOREST, NC (7.5' QUAD)
N355612-W783506
Stony Hill
BM 410
Ridge Crest Ch
Cem
Creek
Fork
Horse
NEUSE
RIVER
Jennys
Cedar
Pumping Sta
Quarry
Water Tank
Falls
WA-C-3-66
WA-C-1-66
1921
1922
2004
2002
2010
2000
98