



**US Army Corps
of Engineers
Savannah District**

Clemson, South Carolina

**Solicitation Number
DACW21-03-B-0002
Seismic Remediation - Clemson Diversion Dams
Hartwell Lake
Volume II of II - Appendices
May 2003**

**THIS SOLICITATION IS UNRESTRICTED PURSUANT TO THE
"BUSINESS OPPORTUNITY DEVELOPMENT REFORM ACT OF 1988"
(PUBLIC LAW 100-656)**

**U.S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
100 WEST OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640**

APPENDICES

TABLE OF CONTENTS

Appendix A - Logs of Borings and Instrument Installations

Appendix B - Results of Laboratory Soils Index
Testing

Appendix C - Time-History and Cross-Section Plots of Reservoir and
Piezometric Levels (December 1995 - January 2002) and
Recent Water Level Readings for Piezometers and
Monitoring Wells

Appendix D - Results of Chemical Testing of Reservoir and Groundwater

APPENDIX A

LOGS OF BORINGS AND INSTRUMENT INSTALLATIONS

LOWER DAM

**NO LOGS WERE MADE FOR THE FOLLOWING
BORINGS WHICH WERE DRILLED TO OBTAIN
UNDISTURBED TUBE SAMPLES:**

CLD-514

CLD-515

CLD-516

CLD-517

CLD-518

CLD-521

CLD-522

CLD-524

Hole No. CLD-1

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 5 SHEETS
1. PROJECT Clemson Lower Dam		10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &		
2. LOCATION (Coordinates or Station) Sta 8+00, 45' upstream centerline		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 4x5 1/2 core bit		
3. DRILLING AGENCY Savannah District		12. MANUFACTURER'S DESIGNATION OF DRILL MSI		
4. HOLE NO. (As shown on drawing title and file number) CLD-1		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED 24 UNDISTURBED 0		
5. NAME OF DRILLER Archie Padgett		14. TOTAL NUMBER CORE BOXES 4		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER Not Recorded		
7. THICKNESS OF OVERBURDEN 87.2'		16. DATE HOLE STARTED 8 Spr 80 COMPLETED 23 Apr 80		
8. DEPTH DRILLED INTO ROCK 24.8'		17. ELEVATION TOP OF HOLE +680.2		
9. TOTAL DEPTH OF HOLE 112.0'		18. TOTAL CORE RECOVERY FOR BORING 100 %		
		19. SIGNATURE OF INSPECTOR CARMEL JONES		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	W.C. %	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
680.2	0		SP-Red-brown sand, fine, organic. 0.5' tan-brown with gravel. 1.5' light tan 3.5' SM seams 4.0' gray-black 4.5' brown to orange brown		1		44
674.8	5		SC-Red, clayey sand, coarse 7.5' to 9.8' red-brown, mica- ceous.	16.0	2		26
670.4	10		SM-Tan-brown, silty sand, very micaceous, medium grained. 10.5' orange-brown 13.5' green-brown to purple, very micaceous 16.0' red-brown, very mica- ceous.	17.6	3 4 5		27 16 19 20 22 25
656.2	25		SC-Orange-brown, clayey sand, silty, fine to medium, very micaceous, seams of clay. 25.5' red-brown, medium to coarse. 28.5' medium gravel 29.5' red-brown to green- brown.		6	Sample Lab	27
650.2	30			18.2	7	No Class LL PL PI	27
						2 34 21 13	58
						5 45 37 8	44
						7 49 32 17	21
						12 49 38 11	
						18 SP-SM NP NP NP	21

DRILLING LOG (Cont Sheet)			ELEVATION TOP OF HOLE +680.2		Hole No. CLD-1		
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 2 OF 5 SHEETS		
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	W.C. % e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
650.2	30		SC-Red-brown to green-brown, clayey sand, silty, fine to medium, very micaceous, seams of clay				27
647.2	33.0						54
	35		ML-Silver, fine, sandy, some coarse sand, silt, very micaceous.		8		36
	39.0		39.0' silver to green-brown, fine, silty sand.		9		26
	40						27
	43.5		43.5' greenish brown seam of SC, clayey sand.		10		26
	45						26
	48.0		48.0' purple-brown, silty sand, very micaceous.		11		21
	50						23
	55						18
	60						29
618.7	61.5			20.0	12		28
617.2	68.0		MH-Tan-brown silt, contains fine sand.		14		36
	65		SM-Tan-brown to black, silty sand, fine.		15		40
	64.5		64.5' dark brown				37
	66.0		66.0' micaceous with some ML layers, clayey.		16		15
613.0	67.2						19
	70		ML-Black silt, clayey, sandy, micaceous, slightly organic.		17		16
611.5	68.7		SM-Tan-brown, silty sand,				23
610.2			(continued on sheet 3) Continued on sheet 3				

DRILLING LOG (Cont Sheet)

ION TOP OF HOLE

+680.2

Hole No. CLD-1

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 3
OF 5 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	W.C. % e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) f
610.2	70		medium grained with some medium to fine gravel. 70.5			NOTE: Scale change at 70.0'.
609.7			SP-Green-gray, poorly graded medium sand, layers fine to medium GM from 71.0' to 73.0'			42
	72			18.2	18	58
			73.5' to 76.5' contains med- ium to coarse gravel.			50
	74					49
					19	66
	76		76.5' to 87.2' increase in coarse gravel, cobbles in- crease with depth.			NOTE: Changed to 3" solid spoon at 70.5', w/300 lb. hammer.
						100
	78				20	115
						108
	80		80.5' to 81.0' seams of SP with medium gravel.			66
						107
	82				21	135
						73
	84				22	105
						136
	86				23	200
594.2						195
			Continued on sheet 4			

DRILLING LOG (Cont Sheet)

ION TOP OF HOLE +680.2

Hole No. CLD-1

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 4
OF 5 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
594.2	86		Top of Rock 87.2'			NOTE: Drilled 88.2' to 88.4' with 6" rock bit.
593.0	88		Granite Gneiss-Greenish yellow, brown, intensely weathered (Saprolite), weathered to an SM, medium gravel, very micaceous, very soft, crumbles in hand.		24	300 lb. hammer used with 3" solid spoon from 86.5' to 88.2'.
	90		88.4' gray, black, some orange, medium hard to soft foliation poor to absent, medium to coarse grained. 88.4'-89.0' soft zone with near horizontal joints at 88.5'.	84	BOX 1	Pull 1 From 88.4' to 93.4' Run 5.0' Rec 4.2' CL 0.8'
	92		88.6' badly weathered to 88.7', some staining. 89.4' near horizontal joint, slightly weathered, some staining. Approx Top of Firm Rock 90.6'-91.3' badly weathered zone.	RQD 25		NOTE: 6" casing set at 89.0'.
	94		90.8'-91.0' acute angle joint. Clay filling in joint, very stained. 91.4' near horizontal joint with some staining.			Pull 2 From 93.4' to 97.4' Run 4.0' Rec 4.0' CL 0.0'
	96		91.6' fresh rock, hard, gray and black. Near horizontal joint with slight staining. 92.2'-92.3' acute angle joint with heavy staining. 92.6'-92.7' acute angle joint with heavy staining.	100		
	98		93.4'-93.6' acute angle joint with 0.5" sand filling, fine to coarse grained. 94.1'-95.6' near vertical joint heavily stained with some clay filling.	RQD 49	95.9	
	100		94.1' near horizontal joint, some staining. 94.6' near horizontal joint, heavily stained with thin layer of clay filling.		BOX 2	
	102			95		Pull 3 From 97.4' to 99.4' Run 2.0' Rec 2.0' CL 0.0'
				95		
				100	100.2	Pull 4 From 99.4' to 103.6' Run 4.2' Rec 4.5' CL 0.0'
				RQD 89	BOX 3	
578.2	102		Continued on sheet 5			

DRILLING LOG (Cont Sheet)

IGN TOP OF HOLE

+680.2

Hole No. CLD-1

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 5
OF 5 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV. ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
578.2	102		95.0'-95.1' near horizontal joint with some staining and some sand present.	103.0	BOX 3	Pull 4 (continued)	
			95.0'-95.6' near vertical joint, some clay present and moderately stained.				103.6
	104		95.6' near horizontal joint with some staining.	91			Pull 5 From 103.6' to 107.9' Run 4.3' Rec 3.9' CL 0.4'
			95.9' near horizontal joint.				
			96.4' near horizontal joint.	ROD 100			
	106		97.5'-97.6' acute angle joint with some staining.				
			98.7'-98.9' near horizontal joint with some weathering.				
			100.2' near horizontal joint.		107.0		
			101.9' acute angle joint.				
	108		102.0'-102.3' two acute angle joints, 1st one badly weathered. Thin layer of clay and sand present.			107.9	107.9
		102.6'-103.0' 45° angle joint.	100		BOX 4	Pull 6 From 107.9' to 112.0' Run 4.1' Rec 4.1' CL 0.0'	
		103.7' near horizontal joint.					
	110	104.2' near horizontal joint.					
		107.0' near horizontal joint.					
		108.4'-108.5' near horizontal joint.					
		110.1' near horizontal joint.					
		111.4'-111.9' 45° angle joint					
568.2	112		Bottom of Boring 112.0'			112.0	
						<p>NOTES: Open hole packer test run for 10 min. at depth of 89.0' to 93.0'. Total of 6 gallons taken.</p> <p>Back filled boring to top of rock with 4 bags of cement.</p>	

DRILLING LOG		DIVISION South Atlantic		INSTALLATION Hartwell Lake		SHEET 1 OF 6 SHEETS	
1. PROJECT Clemson Lower Dam				10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &			
2. LOCATION (Coordinates or Station) 20+00, 45" upstream of centerline				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL 4x5 1/2 core bit			
3. DRILLING AGENCY Savannah District				12. MANUFACTURER'S DESIGNATION OF DRILL Failing 314			
4. HOLE NO. (As shown on drawing title and file number) CLD-2		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 24		UNDISTURBED 0	
5. NAME OF DRILLER Bill Parker				14. TOTAL NUMBER CORE BOXES 6			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				16. DATE HOLE 24 Apr 80		15. ELEVATION GROUND WATER Not recorded	
7. THICKNESS OF OVERBURDEN 89.0'		17. ELEVATION TOP OF HOLE +681.3		18. TOTAL CORE RECOVERY FOR BORING 99.2 %		19. SIGNATURE OF INSPECTOR CARMEL JONES/I WIGGINS/C SMITH	
8. DEPTH DRILLED INTO ROCK 37.1'		9. TOTAL DEPTH OF HOLE 126.1'					
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% Mois- ture	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
681.3	0		SM-Dark brown to red, silty sand, fine to medium, micaceous.		1		20
675.8	5		ML-Red-brown, sandy silt, fine grained with some fine gravel, micaceous.	5.5	2		17 15 22
	10		12.0 Red-brown with regions of orange, purple and black, fine gravel present.		3		26 22 17
	15		16.0 Clayey seams.	21.9	4		18 24 24
664.8			19.4 CL-Red-brown, sandy clay with medium to coarse sand, mottled with brown & black.	16.5	5		30 26
661.9	20		ML-Purple to red-brown, sandy silt, very micaceous, clay seams throughout.		6		34 28
	25				7	Sample Lab	27
						No Class LL PL PI	
						2 SM 45 28 17	35
						4 SM Insuf material	21
						10 SM 43 32 11	
						13 SM Insuf material	2
						17 SM-H 52 39 12	
654.3			28.8 CL-Sandy clay, red-brown to dark brown, fine grained with occasional gravel		8	22 SM NP NP NP	22
652.5	30		ML-Purple to red-brown (cont)		9	24 SM 34 26 8	22
Continued on sheet 2							
NOTE: Soils field classified in accordance with the Unified Soil Classification System.							
				57			
				BLOWS PER FOOT: Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".			

DRILLING LOG (Cont Sheet)

EL ON TOP OF HOLE

+681.3

Hole No. CLD-2

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 2
OF 6 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	W.C. % e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
651.3	30		ML-Purple to tanish brown, sandy silt, medium to fine, micaceous. 32.4-33.0 CL stringer. 33.8-36.0 SC stringer.				32 26 26 31
	35			19.1	10		36
645.3			CL-Red-brown, fine sandy clay, some medium sand, coarse quartz present. 37.5-39.0 ML seams. 42.0 mottled with yellow.		11		39 35 41
	40				12		31
	45			20.4	13		32
636.3			ML-Gray, orange, brown, clayey silt, sandy, medium to fine, micaceous.		14		32
634.8			CL-Red-brown, fine sandy clay, some mica. 50.0 thin seams of ML throughout.		15		31 37
	50				16		41
	55			21.3	17		35
628.5			ML-Gray to brown, fine sandy silt, very micaceous, fine to coarse, clay seams, decreasing with depth.		18		33 35 40
	60				19		32
620.6			SM-Gray-black, fine silty sand, micaceous. 63.0 light brown, mottled with gray, moist to damp.		20		42 6 10
	65		MH-Black, sandy silt, black organics present, moist. 69.0 mottled with orange and brown, wet.		21		19 16 17
611.3	70		Continued on sheet 3				17

DRILLING LOG (Cont Sheet)		ON TOP OF HOLE +681.3		Hole No. CLD-2		
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 3 OF 6 SHEETS	
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	W.C. % e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant?) g
611.3	70		MH-Black, sandy silt, black organics present, moist.			
						13
						15
						13
606.3	75		SM-Tan-brown, silty sand, mottled with orange, black and gray, micaceous, 45° planar parting, no striations in MH seams. 78.5 gray green.	27.4	22	
						32
						27
						44
	80		81.5 tan, brown with occasional coarse sand.			36
						37
						44
	85					43
						NOTE: Scale change at 85.0'.
						162
595.1	87		SP-Tan, poorly graded gravelly sand, fine gravel to fine sand with intermediate sizes present.		23	NOTE: Used 3" solid spoon with 300 lb. hammer from 87.0' to 90.0'. NOTE: Set 6" casing to 90.0'.
						114
						130
592.3	89		Top of Rock 89.0'	14.3	24	
			Granite Gneiss - Tan-brown, intensely weathered with occasional quartz lenses, medium grained, micaceous with remnant near horizontal to 45° joints, poorly foliated.			166
	91			100	BOX 1	Pull 1 From 90.0' to 90.7' Run 0.7' Rec 0.7'
				100		Pull 2 From 90.7' to 91.7' Run 1.0' Rec 1.0'
	93			100		Pull 3 From 91.7' to 99.0' Run 7.3' Rec 7.3' CL 0.0'
						NOTE: Core barrell blocked on pulls 1 and 2
586.3	95					

DRILLING LOG (Cont Sheet)

ELI ON TOP OF HOLE +681.3

Hole No. CLD-2

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 4
OF 6 SHEETS

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	
586.3	95		Granite Gneiss (continued) 95.4-101.2-Badly weathered, gray-brown, soft to moderately hard with very soft dark brownish green, highly mica-ceous zones; numerous closely spaced near horizontal to 45° open joints with slight brown staining.		BOX 1	Pull 3 continued	
	96.4					BOX 2	
	97			101.2-101.9-Cream brown, moderately hard to soft quartz Feldspar pegmatite.			99.0
	99			101.9-107.0-Gray, white, light brown, moderately hard, moderately weathered with numerous close to very close near horizontal to high angle open joints with slight staining. 102' Approx Top of Firm Rock	85		Pull 4 From 99.0' to 102.9' Run 3.9' Rec 3.3' CL 0.6'
	101			107.0-Near horizontal joint 108.6-108.7-Acute angle joint 109.1-Acute angle joint 109.3-109.4-Two intersecting 45° joints.		102.8	102.9
	103			109.6-Near horizontal joint slightly stained with thin layer of clay. 109.6-110.1-Acute angle joint heavily stained with thick layer of clay. 109.9-110.1-Three parallel near horizontal joints, heavily stained clay present. 110.1-110.5-Acute angle joint, heavily stained with medium layer of clay.	93	BOX 3	Pull 5 From 102.9' to 107.0' Run 4.1' Rec 3.8' CL 0.3'
	105			110.5-111.1-Acute angle joint heavily stained. 111.1-111.3-Moderately weathered, soft to medium hard, slightly stained.	100		Pull 6 From 107.0' to 109.3' Run 2.3' Rec 2.3' CL 0.0'
	107			111.1-111.3-Moderately weathered, soft to medium hard, slightly stained.	100		109.3
	109			111.3-111.5-Slight clay filled breaks.	100	110.1	Pull 7 From 109.3' to 117.0' Run 7.7' Rec 7.7' CL 0.0'
						BOX 4	

570.3

111

Continued on sheet 5

DRILLING LOG (Cont Sheet)		EL ON TOP OF HOLE		681.3		Hole No.		CLD-?	
PROJECT				INSTALLATION				SHEET	
Clemson Lower Dam				Hartwell Lake				5	
								OF 6 SHEETS	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)			
a	b	c	d	e	f	g			
570.3	111		Granite Gneiss (continued)			Pull 7 continued			
			111.4-Acute angle jointed.			BOX 4			
			112.0-112.2-Closely jointed, moderately hard, slightly weathered, moderately to heavily stained.						
	113		112.2-112.4-Closely jointed, moderately hard.						
			112.5-113.6-Moderately hard, slight to heavily stained; solid, fairly uniform, closely jointed.						
	115		113.6-113.9-Moderately hard, slight to heavily stained, closely jointed, healed joint.						
			113.9-114.8-Very closely jointed, badly to moderately weathered, moderately stained, moderately hard, healed joint.		98				
	117		114.8-115.7-Moderately weathered, healed joints, slightly stained, closely jointed.			117.5	Pull 8		
			115.7-116.2-45° angle joint, some near vertical, badly stained, hard, healed joints, slightly weathered, some Saprolite between joints.			BOX 5	From 117.0 to 126.1		
			116.2-116.8-Medium gray, closely jointed, moderately weathered, moderately hard, near horizontal joints, badly stained.				Run 9.1' Rec 8.9'		
		116.8-117.5-Moderately weathered, hard, slightly stained.				CL 0.2'			
	119	117.5-117.6-Closely jointed, badly to moderately weathered, near horizontal, slightly stained.							
		117.6-119.5-Moderately weathered, closely jointed, slightly stained, near horizontal.							
	121				124.5				
					BOX 6				
	123								
	125								
	127		Continued on sheet 6						
						NOTE: Pressure test ran with bottom of packer at 92.0'. Took 5 gal of water in 10 minutes.			

DRILLING LOG (Cont Sheet)

ELEVATION ON TOP OF HOLE +681.3

Hole No. CLD-2

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 6
OF 6 SHEETS

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
			Granite Gneiss (continued) 119.5-120.0-Badly weathered, some healed joints, moderate- ly to heavily stained. 120.0-120.9-Moderately weathered, near horizontal, slightly stained, hard. 120.9-124.5-Very closely jointed, near horizontal joints, moderately weathered, slightly stained. 124.5-125.2-Slightly stained, moderately hard, moderately weathered, near horizontal joints, some healed. 125.2-125.5-Slightly stained, traces of clay filling, badly weathered. 125.5-125.9-Closely jointed, moderately weathered, some staining, moderately hard.			
			Bottom of Boring 126.1'			

Hole No. CLD-5

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 7 SHEETS
1. PROJECT Clemson Lower Dam		10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &		
2. LOCATION (Coordinates or Station) Sta 4+50, 6.0' upstream of centerline		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 4x5 1/2 core bbl		
3. DRILLING AGENCY Savannah District		12. MANUFACTURER'S DESIGNATION OF DRILL MSI		
4. HOLE NO. (As shown on drawing title and file number) CLD-5		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		UNDISTURBED
5. NAME OF DRILLER C. Fuller		DISTURBED 16		UNDISTURBED 0
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES 7		
7. THICKNESS OF OVERBURDEN 51.0'		15. ELEVATION GROUND WATER 636.8'		
8. DEPTH DRILLED INTO ROCK 48.6'		16. DATE HOLE		STARTED 11 Jul 80 COMPLETED 25 Jul 80
9. TOTAL DEPTH OF HOLE 99.6'		17. ELEVATION TOP OF HOLE 681.0'		
		18. TOTAL CORE RECOVERY FOR BORING 91 %		
		19. SIGNATURE OF INSPECTOR JAMES KOTTI		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% Moisture	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
a	b	c	d				
681.0	0		SM-Tan, fine silty sand		1		29
676.5	4.5			4.5			25
	5		SC-Red and tan, clayey, fine sand, silty, occasional gravel	8.8	2	W. T. 44.2' Water table reading 24 hrs. after hole completed.	22
	10			10.5	3		31
670.5			ML-Pinkish orange silt, slightly sandy, micaceous		4		14
	15				5		21
664.5	16.5		SC-Brown, clayey sand with red micaceous sandy silt seams		6		24
663.0	18.0				7	Sample Lab	17
	20		ML-Red, sandy silt, micaceous with brown clay lenses	19.9		No Class LL PL PI	
	22.5				8	2 SM 37 25 12	
658.5			MH-Reddish orange, sandy silt, clayey, 20% micaceous		9	7 SM 46 44 2 23	
	25				10	10 CL 46 22 24	
655.0	26.0		45% micaceous		14	14 SM 41 35 6 32	
	28		CL-Dark red, sandy clay seams of mica	15.7	16	16 ML 44 30 14	33
	30		Seams of brown clayey sand		11		19
651.0			Continued on sheet 2				15
			NOTE: Soils field classified in accordance with the Unified Soil Classification System.				31

BLOWS PER FOOT:
Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE 681.0'		Hole No. CLD-5			
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 2 OF 7 SHEETS		
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	Mois- ture %	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
651.0	30		CL-Dark red -(continued) Seams of reddish orange, sandy silt, 25% micaceous.	33.5		NOTE: Upon splitspoon refusal, rock bit was used to ream hole.	25 20
647.5	35		MH-Pinkish tan, sandy silt, 25% micaceous, Kaolinite pockets, red, sandy clay seams.		12 13	NOTE: Casing set at 51.2' to begin core. NOTE: Scale change at 50.0'.	25 26 44
637.5	40		Seams of yellow silty sand Red sandy clay seams	21.0	14		24 24 39
634.5	45		45% micaceous CL-Dark red, sandy clay	43.5 46.5	15		42 44 32
630.0	50		MH-Brownish red, very clayey, sandy silt, 10% micaceous Seam of reddish gray, silty sand, very micaceous.	24.1	16		33 33
	51		TOP OF ROCK	51.0	51.0		50/0.4
	52		Granite Gneiss-Medium grained with quartz, feldspar, and biotite in alternating bands; muscovite and garnet (red) are also prominent; well foli- ated at 15° to 20°.	90 RQD 0 51.9	BOX 1	Pull 1 From 51.0' to 52.0' Run 1.0' Rec 0.9' CL 0.1'	52.0
	53		51.0' to 51.9' very badly weathered, very soft with moderate rusty brown stain. 51.9' to 52.0' not recovered 52.0' to 54.4' moderately hard, moderately weathered with slight brown stain. 52.4' to 52.8' easily crumbled, very badly weathered with slight brown stain.	93 RQD 0		Pull 2 From 52.0' to 54.8' Run 2.8' Rec 2.6' CL 0.2'	
627.0	54		52' Approx Top of Firm Rock				54.8
Continued on sheet 3							

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No.	
PROJECT Clemson Lower Dam		681.0'		CLD-5	
INSTALLATION Hartwell Lake			SHEET 3 OF 7 SHEETS		
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
627.0	54		Granite Gneiss (continued) 54.4' to 55.8' easily crumbled, very badly weathered with heavy rusty brown staining. Joints are closely spaced, nearly horizontal to low angled with dark rusty brown staining.		Pull 2 (continued)
	55		55.8' to 61.8' moderately hard, moderately weathered with slight brown stain, low angle foliation. Numerous closely spaced joints, nearly horizontal with moderate degree of staining. Fracture zone at 60.5' to 60.9'. Very badly weathered at 59.6' to 60.0' and at 61.5' to 61.8'.	78 RQD 0	54.8 Pull 3 From 54.8' to 59.3' Run 4.5' Rec 3.5' CL 1.0'
623.0	58			58.3	
	59				59.3
	60			100 RQD 0	Pull 4 From 59.3' to 63.3' Run 4.0' Rec 4.6' CG 0.6'
619.0	62		61.8' to 66.5' moderately hard, moderately weathered, slight brown stain, low angle foliation. Joints less frequent, closely spaced. Continued on sheet 4		

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE 681.0		Hole No. CLD-5	
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 4 OF 7 SHEETS
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
619.0	62		Granite Gneiss (continued) nearly horizontal to low angle with brown stain. Fracture zone exists at 63.1' to 63.4', very soft, very badly weathered and brown stain.		Pull 4 (continued)
	63				63.3
	64			100 RQD 0	Pull 5 From 63.3' to 68.0' Run 4.7' Rec 4.7' CL 0.0'
	65				65.1 BOX 3
615.0	66				
	67		66.5' to 68.2' very badly weathered, easily crumbled with rusty brown stain.		
	68			68.0	68.0
	69		68.2' to 68.7' moderately hard, moderately weathered with rusty brown stain. 68.7' to 71.1' moderately hard, moderately to slightly weathered with slight brown stain. 69.9' to 70.2' quartz vein.	73 RQD 0	Pull 6 From 68.0' to 72.5' Run 4.5' Rec 3.3' CL 1.2'
611.0	70		Continued on sheet 5		

DRILLING LOG (Cont Sheet)			ION TOP OF HOLE	681.0'	Hole No. CLD-5	
PROJECT				INSTALLATION		SHEET 5
Clemson Lower Dam				Hartwell Lake		OF 7 SHEETS
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)		BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
611.0	70		Granite Gneiss (continued)			Pull 6 (continued)
	71		71.1' to 71.3' badly weathered, soft with rusty brown stain. 71.3' to 72.5' not recovered.	71.3		
	72					72.5
	73		72.5' to 73.6' moderately weathered, moderately hard with brown stain.		100	Pull 7 From 72.5' to 76.7' Run 4.2' Rec 4.2' CL 0.0'
	74		73.6' to 75.0' badly weathered with rusty brown stain.		RQD 0	
607.0	75		75.0' to 76.6' moderately hard, moderately weathered with slight brown stain.		73.5 BOX 4	
	76					76.7
	77		76.6' to 78.5' easily crumbled, very soft, very badly weathered with rusty brown stain.	58		Pull 8 From 76.7' to 84.8' Run 8.1' Rec 4.6' CL 3.5'
	78				RQD 22	
603.0			Continued on sheet 6			

DRILLING LOG (Cont Sheet)			ION TOP OF HOLE 681.0'		Hole No. CLD-5	
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 6 OF 7 SHEETS	
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
603.0	78		Granite Gneiss (continued) 78.5' to 80.4' fracture zone of badly weathered, soft rock with rusty yellow stain. Numerous nearly horizontal closely spaced joints with rusty yellow stain.			Pull 8 (continued)
	79					
	80					
	81.3		80.4' to 81.4' moderately hard, moderately weathered with slight brown stain. 81.4' to 84.8' not recovered.	81.3	BOX 5	NOTE: Scale change at 80.0'.
	82					
597.0	84		84.8' to 87.9' moderately hard, moderately weathered, brownish gray with brown stain. Fracture zone at 85.6' to 86.5' with numerous vertical and horizontal, closely spaced joints.	84.8		94.8 84.8
	86			100		Pull 9 From 84.8' to 90.6' Run 5.8' Rec 6.1' CG 0.3'
	88			RQD 28		
	90					
	90.6		90.6' very soft, badly weathered, brownish gray. 90.6' to 93.6' moderately to slightly weathered, hard, (greenish gray) with num- erous closely spaced joints	90.6	BOX 6	Pull 10 From 90.6' to 93.6' Run 3.0' Rec 3.8' CG 0.8'
589.0	92		Continued on sheet 7	100 RQD 37		

DRILLING LOG (Cont Sheet)			ELEVATION TOP OF HOLE 681.0'		Hole No. CLD-5	
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 7 OF 7 SHEETS	
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
589.0	92		Granite Gneiss (continued) with brown stain.			Pull 10 (continued)
	94		93.6' to 96.9' dark gray, very hard, slightly weathered with joints at 94.7' and 96.7'.	97		Pull 11 From 93.6' to 99.6' Run 6.0' Rec 5.8' CL 0.2'
	96		96.9' to 97.6' greenish gray, hard, moderately to slightly weathered with numerous joints closely spaced, nearly hori- zontal with brown stain.	RQD 30		
	98		97.6' to 99.4' very hard, very slightly weathered, gray and white with large pegmatoid vein throughout the section.		96.9 BOX 7	
581.4			99.4' to 99.6' not recovered.	99.4	99.6	
	100		Bottom of Boring 99.6'			Pressure test resulted with the hole taking the following amounts of water at the correspond- ing depths: 53.0' - 233 gal/10 min 58.0' - 217 gal/10 min 63.0' - 212 gal/10 min 68.0' - 213 gal/10 min 73.0' - 205 gal/10 min 78.0' - 164 gal/10 min 83.0' - 8 gal/10 min NOTE: Depth indicated for press. test is depth of bottom of packer. Water Pressure 40 psi.

DRILLING LOG (Cont Sheet)

ION TOP OF HOLE +681.0'

Hole No. CLD-6

PROJECT		INSTALLATION		SHEET			
Clemson Lower Dam		Hartwell Lake		2 OF 7 SHEETS			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
651.0	30	c	d				
650.0			CL-Red, sandy clay (continued)				30
			MH-Yellowish to pinkish tan, sandy, silt, very micaceous, evidence of Kaolinite pockets throughout.		11		28
			Evidence of clay.		12		35
	35		Greenish brown.		13		32
			Very slightly clayey.		14		24
	40		42.0' to 43.5' evidence of clay lenses existing in sandy silt.		15		36
					16		32
	45				17		33
					18		22
	50		54.0' to 55.5' continuing appearance of clay lenses within sandy silt.		UD-3		22
					15		28
	55		58.5' to 60.0' yellow layer of sandy silt.		16		37
					17		31
	60		60.0' to 61.5' very micaceous with fine gravel. (Quartz)		18		34
							37
	65		67.5' dark brownish gray, sandy silt, very micaceous, increase in water content, decrease in clay content.				31
							23
	70						38
611.0			Continued on sheet 3				37
							30

NOTE: Undisturbed sample unsuccessful from 65.0' to 66.0'. pushed

49

DRILLING LOG (Cont Sheet)

ION TOP OF HOLE +681.0'

Hole No. CLD-6

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 3
OF 7 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
611.0	70	c	d				
			MH-Tan, sandy silt (continued)				28
			72.0' to 73.5' silver gray, sandy silt, very micaceous, minimal clay, increased water content.		19	NOTE: Attempted undisturbed sample at 75.0'; unsuccessful	27
607.0	75		SM-Grayish brown, well graded, angular sand, some gravel and evidence of silt, micaceous.			Began using 3" spoon with 300# hammer to 87.0'.	33
							23
					20		38
600.0	80		Slightly silty.		21		15
			GM-Grayish brown, rounded, silty gravel with sand, micaceous				20
					22	NOTE: Scale change at 85.0'.	10
			Coarse gravel, some evidence of Saprolite.				13
						NOTE: Set casing to 86.0'.	20
							163
			Approx Top of Firm Rock 87.0' Top of Rock 87.0'				87.0
594.0	87		Granite Gneiss - Fine to medium grained, moderately hard to hard, generally fresh with alternating bands of Biotite, Quartz, and Feldspar, traces of Garnet (red).	100	BOX 1	Pull 1 From 87.0' to 87.9' Run 0.9' Rec 0.9' CL 0.0'	87.9
				RQD 88			
			87.0' to 88.6' fresh, solid.	100		Pull 2 From 87.9' to 90.9' Run 3.0' Rec 3.0' CL 0.0'	
			88.6' to 88.9' nearly horizontal, slightly stained, closely spaced joints, predominately Biotite with band of Quartz at 88.9'.		RQD 83		
			89.0' to 89.1' intersecting joints at 30°, slightly stained.				
591.0	90						

DRILLING LOG (Cont Sheet)

TION TOP OF HOLE

+681.0

Hole No. CLD-6

PROJECT

Clemson Lower Dam

INSTALLATION

Hartwell Lake

SHEET 4

OF 7 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant!)	
591±0	90b	c	d	e	f	g	
589.0			Granite Gneiss (continued)		BOX 1	Pull 2 (continued)	
			90.1' very closely spaced joints, slightly weathered with brown stain.				
			90.4' healed joints in Biotite.				90.9
	91		90.9' mechanical break.		100		Pull 3
			90.9' to 91.3' Biotite rich zone.				From 90.9' to 95.9'
			91.3', 91.5' and 92.5' to 92.7' Quartz bands.		RQD 77		Run 5.0' Rec 5.0'
	92						CL 0.0'
			92.9' very closely spaced joints, nearly horizontal with brown stain.				
	93			93.1' joint, parallel to foliation at 15°, slightly weathered.		93.6	
			93.6' very closely spaced joint parallel to foliation at 15°, slightly weathered and stained.			BOX 2	
	94		93.6' to 93.9' vein of Quartz with intersecting healed fractures.				
		93.9' nearly horizontal joint, slightly weathered, slightly stained.					
	95		94.1' to 94.4' Quartz veins.				
		94.1' horizontal joint, slightly weathered.				95.9	
	96		94.9' joints very closely spaced, nearly horizontal, slightly weathered.	100		Pull 4	
		95.1' joint, slightly weathered, 15°, parallel to foliation.		RQD 85		From 95.9' to 104.6'	
	97		95.7' joint, badly weathered, nearly horizontal with brown stain.			Run 8.7' Rec 8.7'	
		95.7' to 95.9' badly weathered.				CL 0.0'	
	98		95.9' mechanical fracture.				
583.0			Continued on sheet 5				

DRILLING LOG (Cont Sheet)

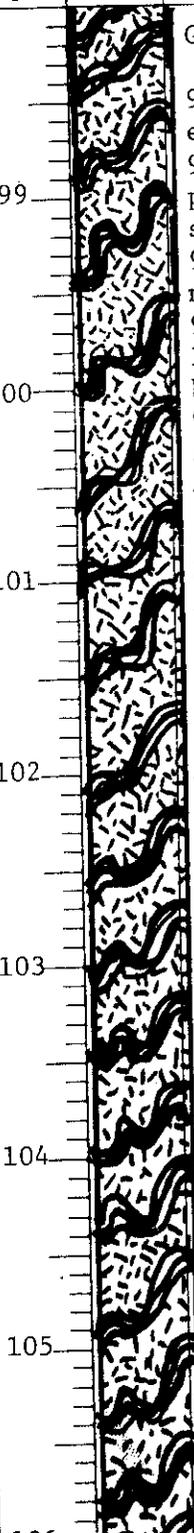
ION TOP OF HOLE +681.0'

Hole No. CLD-6

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 5
OF 7 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
583.0	98	c	d			Pull 4 (continued)
			Granite Gneiss (continued)			
			95.9' to 96.2' badly weathered to slightly weathered.		BOX 2	
	99		96.2' joint, low angle, parallel to foliation, slightly weathered.			
			96.8', 97.1', and 97.3' mechanical breaks.			
			97.5' low angle joint, slightly weathered and stained brown.			
	100		98.4' very closely spaced, slightly weathered, low angle joints.			100.3
			98.5' healed joint, low angle, parallel to foliation.			BOX 3
	101		99.6' slightly weathered, very closely spaced, horizontal joints.			
			100.0' to 100.1' moderately weathered.			
			100.1' to 100.3' moderately weathered with multiple horizontal joints.			
		100.3' horizontal, very closely spaced joints, moderately weathered.				
		101.0' 15° healed joint.				
	103	101.1' joint, slightly weathered, low angle.				
		102.4' to 102.6' series of 4 joints, closely spaced, moderately weathered with brown stain.				
		102.6' to 103.3' weathered.				
	104	102.9' to 103.0' Quartz-Feldspar vein.				
		103.3' two intersecting, very closely spaced, moderately weathered joints with brown stain.		100		
	105	103.3' to 104.0' slightly weathered with very closely spaced joint meeting horizontal joint at 75° at 104.0'.		RQD 86		
						104.6
						Pull 5 From 104.6' to 109.9' Run 5.3' Rec 5.3' CL 0.0'
575.0	106		Continued on sheet 6			

52

DRILLING LOG (Cont Sheet)

EL ELEVATION TOP OF HOLE +681.0

Hole No. CLD-6

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 6
OF 7 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
575a.0	106	c	d	e	f	g
			Granite Gneiss (continued)			Pull 5 (continued)
	107		104.0' to 104.6' numerous very closely spaced intersecting joints with heavy brown stain, slight to moderate weathering.		BOX 3	
			104.6' to 105.0' 45° joint slightly weathered with brown stain.		107.3	
	108		105.4' to 106.0' 45° slightly weathered joint with brown stain.		BOX 4	
			106.8' very closely spaced joints, nearly horizontal with no apparent stain.			
	109		107.3' mechanical break.			
			107.3' to 108.0' high foliation angle.			
			108.0' nearly horizontal with brown stain, moderately weathered.			
			108.0' to 108.5' increasing Quartz content in zones of foliation.		97	
	110		108.5' low angle joint with slight brown stain.		RQD	
			108.9' low angle joint parallel to foliation.		92	
	111		109.9' nearly horizontal, very closely spaced joints with absence of stain.			
			110.8' nearly horizontal, very closely spaced joints with no stain.			
	112		110.8' to 111.6' increase in Quartz and Biotite.			
		112.0' to 112.1' alternating bands of Quartz and Biotite with joint existing in Biotite band at 112.1'.				
	113	112.6' to 112.7' two horizontal joints with some brown stain, slight to moderately weathered.				
567.0	114		Continued on sheet 7			

53

DRILLING LOG (Cont Sheet)

TION TOP OF HOLE +681.0'

Hole No. CLD-6

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 7
OF 7 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)												
		c	d	e	f	g												
567.0	114		Granite Gneiss (continued)		114.1	Pull 6 (continued)												
			114.1' joint, nearly horizontal, no stain.		BOX 5													
	115		115.2' to 115.4' series of closely spaced joints with slight weathering and staining, nearly horizontal.															
	116		116.3' nearly horizontal, closely spaced joints, slightly stained and weathered.															
564.0	117		117.1' slightly weathered. 117.2' to 117.5' two closely spaced, nearly horizontal, slightly to moderately weathered and slightly stained joints. 117.5' to 117.7' not recovered. Bottom of Boring 117.7'		117.7	117.7												
						NOTE: Grouted to top of rock and back filled to top of ground with clay soil, packing soil to top of ground.												
						<p align="center"><u>Pressure Test</u></p> <table border="1"> <thead> <tr> <th>Depth</th> <th>Water Take</th> </tr> </thead> <tbody> <tr> <td>89.0</td> <td>215 gal/10 min.</td> </tr> <tr> <td>94.0</td> <td>96 gal/10 min.</td> </tr> <tr> <td>100.0</td> <td>106 gal/10 min.</td> </tr> <tr> <td>107.0</td> <td>53 gal/10 min.</td> </tr> <tr> <td>110.0</td> <td>5 gal/10 min.</td> </tr> </tbody> </table> <p>NOTE: Depth indicated is depth of bottom of packer. Water Pressure 40 psi.</p>	Depth	Water Take	89.0	215 gal/10 min.	94.0	96 gal/10 min.	100.0	106 gal/10 min.	107.0	53 gal/10 min.	110.0	5 gal/10 min.
Depth	Water Take																	
89.0	215 gal/10 min.																	
94.0	96 gal/10 min.																	
100.0	106 gal/10 min.																	
107.0	53 gal/10 min.																	
110.0	5 gal/10 min.																	

54

DRILLING LOG	DIVISION	South Atlantic	INSTALLATION	Hartwell Lake	SHEET 1 OF 6 SHEETS
	1. PROJECT	Clemson Lower Dam			
2. LOCATION (Coordinates or Station)	Sta 9+50, 5.0' upstream of centerline				
3. DRILLING AGENCY	Savannah District				
4. HOLE NO. (As shown on drawing title and file number)	CLD-7				
5. NAME OF DRILLER	C. Fuller				
6. DIRECTION OF HOLE	<input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		10. SIZE AND TYPE OF BIT	1 3/8" ID splitspoon &	
7. THICKNESS OF OVERBURDEN	88.0'		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	4x5 1/2 core MSL	
8. DEPTH DRILLED INTO ROCK	31.4'		12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 314	
9. TOTAL DEPTH OF HOLE	119.4'		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 13 UNDISTURBED 1	
			14. TOTAL NUMBER CORE BOXES	5	
			15. ELEVATION GROUND WATER	637.5	
			16. DATE HOLE	STARTED 10 Jun 80 COMPLETED 24 Jun 80	
			17. ELEVATION TOP OF HOLE	681.0	
			18. TOTAL CORE RECOVERY FOR BORING	94 %	
			19. SIGNATURE OF INSPECTOR	JIM KOTTI	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	Moist- tute	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS h
681.0	0		CL-Reddish brown, sandy clay organics, dry		1		30
679.0				2.0	2		14
			MH-Light reddish brown, very sandy silt with red clay seams, dry				13
675.5	5			5.5			14
			CL-Red sandy clay with occasional quartz gravel	13.4	3		7
672.5				8.5			12
	10		MH-Light reddish brown, sandy silt, slightly clayey		4	Undisturbed sample taken from 10.0' to 11.5' with 5" x 3' shelly tube.	20
			Occasional quartz gravel				15
	15		Seam of dark red, sandy clay, 16.0' to 16.5'. Increase in micas to 20%		5	Sample Lab	14
						No Class LL PL PI	
						3 SC Insuf mat.	8
						7 SM-H 50 41 9	15
						12 SM 49 38 11	15
						13 SM NP NP NP	22
	20				6		18
							32
							16
	25		General increase in clay content, frequent red and yellow clay seams	19.4	7		32
							20
							8
651.0	20		Seams of dark red, sandy clay from 23.0' to 29.0'		8		11
			Continued on sheet 2				
			NOTE: Soils field classified in accordance with the Unified Soil Classification System.				

BLOWS PER FOOT:
Number required to drive 1 3/8" ID splitspoon w/ 140 lb hammer falling 30".

DRILLING LOG (Cont Sheet)		ON TOP OF HOLE 681.0		Hole No. CLD-7			
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 2 OF 6 SHEETS		
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS	
651.0	30		CL continued			18	
			Occasional granitoid gravel, pockets of white Kaolinite				21
							20
	35				9		19
							19
							19
	40			Seams of red, sandy clay	10	W. T. not recorded.	22
							28
							22
	45			Kaolinite pockets	11		20
						W. T. 43.5'	22
						Water table reading	25
				Seams of red and yellow sandy clays. Seams of silty and clayey sand		24 hrs. after hole completed.	23
	30						28
							24
						17	
	55					29	
						22	
						19	
	60					28	
						24	
						25	
						51	
	65		Mica increase to 25%			18	
						26	
						32	
						28	
611.0	70		Continued on sheet 3				

PROJECT: **Clemson Lower Dam** INSTALLATION: **Hartwell Lake** SHEET 3 OF 6 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% Mois- ture	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
611.0	70		CL continued			NOTE: Upon split-spoon refusal rock bit was used to advance hole through very resistant zone 87.0' to 88.0'. Very resistant to rock bit at 88.0'. NOTE: Set 6" casing at 87.0' to begin core.	24
607.5	73.5			19.8	12		27
	75		SM-Brownish gray, silty sand, slightly clayey				23
	80					NOTE: Scale change at 90.0'.	24
599.5	81.5						30
	85		GM-Brownish gray, sandy and silty gravel	7.0	13		33
	88.0						58
	90.0		Granite Gneiss-Alternating band of feldspar, quartz, and biotite; evidence of muscovite and red garnet, foliation 15° to 20°	100	BOX 1	Pull 1 From 88.0' to 90.5' Run 2.5' Rec 2.5' CL 0.0	72
593.0	90.5						67
	91.0		88.0' to 90.5', very badly weathered rock with quartz vein at 89.5'. Rusty brown stain.	83	ROD 0	Pull 2 From 90.5' to 93.5' Run 3.0' Rec 2.5' CL 0.5	76
	91.5		90.5' to 91.1', badly to moderately weathered rock with rusty yellow stain.				90
	92.0		91.1' to 93.0', moderately weathered with brown stain.				90
	93.0		93.0' to 93.5', not recovered.				90
	93.5						100/0.2
	93.0						93.5
	93.5						93.5
	94.0					Pull 3	93.5
587.0	94		Continued on sheet 4				93.5

DRILLING LOG (Cont Sheet)

ION TOP OF HOLE

681.0'

Hole No. CLD-7

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 4
OF 6 SHEETS

ELEVATION a	DEPTH 94	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
587.0			Granite Gneiss (continued)	RQD 60		Pull 3 (continued) From 93.5' to 96.0' Run 2.5' Rec 1.9' CL 0.6
	95		93.5' to 95.1', moderately to slightly weathered with brown stain and several joints very closely spaced, parallel to foliation at 15°. 94.5' Approx Top of Firm Rock	95.4		
			95.1' to 95.4', badly weathered with rusty brown stain.		95.6	
	96		95.4' to 96.0', not recovered		BOX 2	96.0
			96.0' to 96.4', very badly weathered (easily crumbled) with brown stain.	96 RQD 85		Pull 4 From 96.0' to 100.5' Run 4.5' Rec 4.3' CL 0.2
	97		96.4' to 99.5', fresh with low angle joint at 97.8'. 99.5' to 100.5', not recovered.			
	98		100.5' to 103.0', fresh, very hard, no stain. 102.7' to 103.0', high angle joint.			
	99		103.0' to 104.5', fresh to slightly weathered with fracture zone from 103.7' to 104.1', exhibiting vertical and horizontal joints, rusty brown stain.			
	100		104.5' to 106.5', fresh, very hard.	100.3		100.5
			106.5' to 109.5', fresh to slightly weathered with numerous joints, horizontal to vertical. Heavy fracture zone from 108.5' to 109.0', slightly brown stain.	100 RQD 90		Pull 5 From 100.5' to 104.5' Run 4.0' Rec 4.8' CG 0.8 NOTE: Core gain partially due to fall-in.
579.0	102		Continued on sheet 5			

DRILLING LOG (Cont Sheet)

ION TOP OF HOLE

681.0'

Hole No. CLD-7

SHEET 5

PROJECT

Clemson Lower Dam

INSTALLATION

Hartwell Lake

OF 6 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
579.0	102		Granite Gneiss (continued)			Pull 5 (continued)
	104		109.5' to 112.5', fresh with heavy fracture zones at 109.5' to 109.8' and 112.3' to 112.5'. Numerous joints, high to low angle, very closely to closely spaced. Quartz-Feldspar veins are frequent.		103.0 BOX 3	NOTE: Scale change at 102.0'. 104.5
	106		112.5' to 114.5', fresh with several high angles, nearly horizontal joints, very closely spaced. Quartz-Feldspar vein 113.1' to 113.4'	105.2 100 RQD 46		Pull 6 From 104.5' to 109.5' Run 5.0' Rec 5.0' CL 0.0
	108		114.5' to 119.2', fresh, very hard with numerous high to low angle, very closely to closely spaced, with very slight brown stain.	109.5	109.5	109.5
	110		119.0' to 119.2', high angle joint intersected by nearly horizontal, very closely spaced joint.	100 RQD 68	BOX 4	Pull 7 From 109.5' to 114.5' Run 5.0' Rec 5.0' CL 0.0
	112		119.2' to 119.4', not recovered.			
	114			114.5		114.5
	116			96 RQD 80	116.2 BOX 5	Pull 8 From 114.5' to 119.4' Run 4.9' Rec 4.7' CL 0.2
563.0	118		Continued on sheet 6			

DRILLING LOG (Cont Sheet)

ION TOP OF HOLE 681.0'

Hole No. CLD 7

PROJECT: **Clemson Lower Dam** INSTALLATION: **Hartwell Lake** SHEET **6**
OF 6 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
563.0	118		Granite Gneiss (continued)			Pull 8 (continued)
561.6			Bottom of Boring 119.4'	119.2		119.4
						NOTE: Water pump-in test performed with bottom of packer set at 88.5'. No water was taken after filling the boring and applying 40 psi of pressure.

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 11 SHEETS
	1. PROJECT Clemson Lower Dam	10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 4x5 1/2 core bbl
2. LOCATION (Coordinates or Station) Sta 22+00, 2.0' upstream of centerline	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 314	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 30 UNDISTURBED 0
3. DRILLING AGENCY Savannah District	14. TOTAL NUMBER CORE BOXES 9	15. ELEVATION GROUND WATER +637.5	
4. HOLE NO. (As shown on drawing title and file number) CLD-8	16. DATE HOLE	STARTED 11 Jun 80	COMPLETED 23 Jun 80
5. NAME OF DRILLER Crawford Hall	17. ELEVATION TOP OF HOLE +681.0	18. TOTAL CORE RECOVERY FOR BORING 97 %	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.	19. SIGNATURE OF INSPECTOR JAMES KOTTI		
7. THICKNESS OF OVERBURDEN 82.5'	9. TOTAL DEPTH OF HOLE 145.0'		
8. DEPTH DRILLED INTO ROCK 62.5'			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS h
681.0	0		OL-Reddish brown, organic, sandy silt, very dry 1.5		1		41
679.5			SM-Yellowish brown, silty sand, slightly organic, occasional gravel 3.0		2		35
678.0			MH-Yellowish tan, sandy silt, clayey, 20% micaceous 4.5		3		21
676.5	5		CL-Red, sandy clay, decrease in mica content. very dry 9.0		4	W. T. 43.5'	39
			MH-Reddish orange, sandy silt, slightly clayey, 35% micaceous, rounded quartz pebbles 13.0		5	Water table reading 24 hrs. after hole completed.	30
672.0	10		CL-Red, sandy clay, slightly micaceous 18.5		6		27
			Decrease in mica 20.0		7		23
668.0	15		Occasional quartz pebbles 21.0		8		24
			MH-Yellowish greenish brown, sandy silt, slightly clayey, 40% micaceous 22.5		9		24
			Decrease in mica, evidence of clay seams 21.0-22.5 27.5		10		29
			Quartz pebbles 28.0		11		18
662.5	20		Red to pink, sandy, clayey silt, evidence of clay lenses, dry 29.0		12		28
			CL-Dark reddish brown, sandy clay, gravel, moist 30.0				25
653.5	25		MH-Yellowish, sandy silt 31.0				20
			Continued on sheet 2 32.0				20
652.0	30		NOTE: Soils field classified in accordance with the Unified Soil Classification System.				36
651.0							47

BLOWS PER FOOT:
Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".

DRILLING LOG (Cont Sheet)

FROM TOP OF HOLE +681.0'

Hole No. CLD-8

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 2
OF 11 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant!) g	BLOWS
651.0	30		MH continued				23
648.5			Light reddish brown seams of SC, moist 32.5		13		21
			CL-Red, sandy clay, slightly silty		14		38
644.5	35		Granitoid gravel 36.5		15		57
642.5			MH-Yellowish red and brown, sandy silt, slightly clayey, 35% micaceous 38.5		16		28
639.5	40		CL-Deep red, sandy clay, little mica, occasional fine quartz gravel 41.5		17		24
			MH-Reddish, sandy silt, very clayey, greenish gray pockets of mica, moist 44.0		18		26
637.0					19		29
636.0	45		CL-Deep red, sandy clay, slightly silty, quartz pebbles 45.0		20		31
			MH-Red, sandy silt, clayey, 5% micaceous				24
			Seams of organic, sandy silt and sandy clay 46.5-48.0				20
	50		Pinkish red, sandy silt, clayey, occasional quartz gravel, 10% micaceous 49.5-54.0		21		31
			Increase in mica to 25% 54.5				29
626.5							27
	55		OH-Black organic, sandy clay 55.5' to 57.5' no recovery 57.5		22		41
623.5						NOTE: 55.5' to 57.5' was augered out inadvertently, no blow count.	19
622.0			CL-Reddish brown, sandy clay, very moist, med-light plasticity 59.0		23		9
	60		MH-Red, sandy silt, slightly clayey, 15% micaceous		24		12
618.0							11
			CL-Brown, sandy clay, medium high plasticity, very moist, decrease in mica 63.0		25		14
615.5	65		CH-Light gray, fat clay, very moist		26		17
			Yellowish brown limonite stains				21
611.5							29
	70		Continued on sheet 3				

DRILLING LOG (Cont Sheet)

EL ELEVATION TOP OF HOLE +681.0

Hole No. CLD-8

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 3
OF 11 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
611.0	70		ML-Light gray, clayey silt, little sand, low plasticity		27	NOTE: Splitspoon refusal at 78.5'.	
608.0			Increase in silt, very fine sand, decrease in clay, 17.0 micaceous		28	Cleaned with fish- tail to 79.5'.	
			SM-Rusty orange, fine silty sand			Splitspoon refusal again at 80.5'.	29
604.5	75		Seam of gray, sandy silt Grayish brown, silty sand, 20% micaceous, quartz pebbles 76.5		29	Cleaned to 81.0'.	35
			GM-Grayish brown, silty, sandy gravel, Kaolinite pockets, 10% micaceous		30	At 81.0 3"x5' spoon and 300 lb. hammer were installed. At 82.5' refusal was encountered. 51/0.5	78
598.5	80		Rusty yellow, sandy gravel, organic evidence 78.0'-78.5'			NOTE: Set casing at 82.5'. 50/0.5	100/0.4
			Granite Gneiss-Fine to medium grained with evidence of quartz-Feldspar, biotite ex- isting in alternating bands, Muscovite and Garnet (red) also present	100		Pull 1 From 82.5' to 85.5' Run 3.0' Rec 3.0' CL 0.0'	
595.5	85		82.5' to 83.1' thin of quartz	RQD 90		Scale change at 85.0'. 85.5	
			83.1' to 86.2' very badly to badly weathered with prominent brown stain, exhibiting num- erous nearly horizontal, very closely to closely spaced joints	85.5			
	86		86.2' to 89.2' badly to mod- erately weathered with med- ium to slight brown stain. Foliation is 15° to 20°.	93		Pull 2 From 85.5' to 89.5' Run 4.0' Rec 3.7' CL 0.3'	
			Joints are nearly horizontal to parallel to foliation, very closely to closely spaced	RQD 55			
	87		88.9' to 89.0' fracture zone of horizontal joints, very closely spaced				
	88						
	89		89.2' to 94.5' becomes mod- erately weathered with numer- ous nearly horizontal joints, very closely to closely spaced, staining generally less prom- inent	89.2			89.5
591.5						Pull 3	
591.0	90						

Continued on sheet 4

DRILLING LOG (Cont Sheet)

TOP OF HOLE +681.0'

Hole No. CLD-8

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 4
OF 11 SHEETS

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
591.0	90		89.5' to 89.6' is very badly weathered	100	BOX 2	Pull 3 continued From 89.5' to 94.5' Run 5.0' Rec 5.1' CG 0.1'
			90.5' to 90.0' moderately weathered with brown stain and increase in biotite	RQD 76		
	91		90.9' to 91.1' fracture zone of nearly horizontal joints, badly weathered			
	92		92.1' to 92.2' badly weathered			
	93					
	94		94.0' to 94.5' intense fracture zone of numerous low and high angle joints, badly weathered	94.5		
586.5			94.5' to 99.5' moderate weathering and staining	100		Pull 4 From 94.5' to 99.5' Run 5.0' Rec 5.0' CL 0.0'
	95		95.4' to 96.0' badly weathered with slight yellow stain	RQD 51		
	96		96.6' to 96.8' series of horizontal, very closely spaced joints		96.0	
			96.8' Approx Top of Firm Rock		BOX 3	
	97		97.9' to 98.3' very badly weathered			
583.0	98		Continued on sheet 5			

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE +681.0'		Hole No. CLD-8		
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 5 OF 11 SHEETS	
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
583.0	98		Granite Gneiss (continued)		BOX 3	Pull 4 (continued)
	99					
581.5	99.5		99.5' to 104.5' moderate to slightly weathered. Joints are horizontal or parallel to foliation at 20° to 25°, rusty yellow stain	100		Pull 5 From 99.5' to 104.5' Run 5.0' Rec 5.2' CG 0.2'
	100			RQD 58		
	100.6		100.6' joint (30°) cross-cutting the foliation, slight rusty brown stain			
	101		101.2 intersecting joints both low angle and very closely spaced			
	101.5		101.5' joint parallel to foliation at 25°, slight rusty yellow stain			
	102					
	103					
	103.4		103.4' to 103.5' quartz vein (pegmatite) with slight rust stain			
	103.5		103.5' to 103.8' very badly weathered with rusty brown stain around grains			
576.5	104		104.0' to 104.1' two joints very closely spaced with rusty yellow stain			
	104.5		104.5' to 106.5' very badly to badly weathered with light brown stain and numerous joints nearly horizontal, very closely to closely spaced	104.7		
	105			100		
	104.9		104.9' to 105.4' very badly to badly weathered with	RQD		
575.0	106		Continued on sheet 6			

DRILLING LOG (Cont Sheet)

TION TOP OF HOLE +681.0'

Hole No. CLD-8

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 6
OF 11 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
575.0	106		Granite Gneiss (continued) light brown stain and a high angle joint from 105.1' to 105.4'		BOX 4	Pull 6 continued
	107		106.1' to 106.5' fracture zone with 3 horizontal joints and a vertical joint			
	108		106.5' to 114.1' slightly weathered with staining light to dark rusty brown and yellow Muscovite predominant mica banding less pronounced, Garnets absent			
	109		107.2' to 107.3' Quartz-Muscovite vein with evidence of sulfides			
571.5			108.1' to 108.7' slightly weathered with high angle joint, dark rusty brown stain in joint			109.5
	110		109.8' to 110.0' very badly weathered with slight brown stain	100		Pull 7 From 109.5' to 112.0'
	110		110.2' to 110.3' moderately weathered, brown stain	RQD	110.0	Run 2.5' Rec 2.5' CL 0.0'
	110		110.4' to 110.7' very badly weathered		BOX 5	
	111		110.7' to 111.2' fracture zone of numerous joints vertical to horizontal, separating biotite-muscovite gneiss (vein)			
	111		111.2' to 111.3' fracture zone of quartz vein			
569.0	112		111.6' to 112.0' fracture zone of quartz vein, slight yellow stain with joints vertical and horizontal			112.0
	112			RQD		Pull 8 From 112.0' to 115.0' Run 3.0' Rec 3.0' CL 0.0'
	113		113.4' band of green mineral, possibly epidote			
567.0	114		113.9' to 114.1' slight to moderately weathered with			
			Continued on sheet 7			

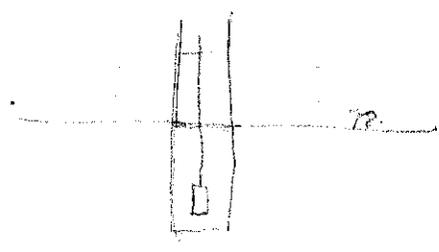
DRILLING LOG		DIVISION <u>South Atlantic</u>	INSTALLATION <u>Hartwell Lake</u>	SHEET <u>1</u> OF 3 SHEETS
1. PROJECT <u>Clemson Lower Dam</u>		10. SIZE AND TYPE OF BIT <u>1 3/8" splitspoon + 4 x 5 1/2" Core</u>		
2. LOCATION (Coordinates or Station) <u>22+1.5 ; 21' upstream center of pond</u>		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) <u>MSL</u>		
3. DRILLING AGENCY <u>Savannah District</u>		12. MANUFACTURER'S DESIGNATION OF DRILL <u>Falling 314</u>		
4. HOLE NO. (As shown on drawing title and file number) <u>CLD-8A</u>		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN <u>12</u>		UNDISTURBED <u>—</u>
5. NAME OF DRILLER <u>D. Justiss</u>		14. TOTAL NUMBER CORE BOXES <u>2</u>		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER		16. DATE HOLE <u>9 Aug 1982</u>
7. THICKNESS OF OVERBURDEN <u>78.0'</u>		17. ELEVATION TOP OF HOLE <u>+675.34' ±</u>		STARTED <u>13 Aug 1982</u>
8. DEPTH DRILLED INTO ROCK <u>11.8'</u>		18. TOTAL CORE RECOVERY FOR BORING <u>64%</u>		COMPLETED
9. TOTAL DEPTH OF HOLE <u>89.8'</u>		19. SIGNATURE OF INSPECTOR <u>Bob Green</u>		

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
675.34	0		SM - Dark Brown, fine grained, silty sand, with some gravel		1	Note: Rock bitted thru soil and riprap from 3.0 to 9.0
	5		Color change to Dark Gray			
664.84				7.5		
	10		SC - Brown and Orange, fine grained, clayey sand		2	W.T. not observed
	15					Date <u>9 Aug 1982</u> Depth to water during drilling
658.84			Brown, very micaceous, with some gravel	16.5		W.T. <u>39.6'</u> Water table reading
	20		SM - Brown, fine grained, silty sand, micaceous	19.5	3	<u>24</u> hrs. after hole completed.
655.84						
	25		SC - Orange to Dark Red, fine grained, clayey sand, micaceous, with some gravel	24.0	4	
651.34						
	30		SM - Red, fine grained, silty sand, very micaceous, with seams of SC		5	
			Color change to Brown			
645.34			Seams of Red SC			
			Continued on Sheet 2			
			NOTE: Soils field classified in accordance with the Unified Soil Classification Systems			

BLOWS PER FOOT:
Number required to drive 1 3/8" ID splitspoon w/140 lb. hammer falling 30".

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No. <i>CLD-8A</i>		
PROJECT		INSTALLATION		SHEET <i>2</i>		
<i>Clansan Lower Dam</i>		<i>Hartwell Lake</i>		OF 3 SHEETS		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	JAR	B Blows
645.34	30		SM - silty sand (cont.)			
	35					
	40					
	45		Seams of Red SC			
	50		Seams of Red SC			
624.84	50		Alluvium - Embarkment Contact 50.5			
	55		SC - Black, fine grained clayey sand, with some organics and some gravel		6	
	55		52.5: Color change to Red			
618.34	57.0					
	60		Cb - Brown, fine grained sandy clay		7	
614.84	60					
	60		CH - Light Brown to Gray fat clay		8	
612.34	63.0					
	65		MH - Light Gray, fine silt		9	
607.84	67.5					
	70		SM - Gray and Brown, fine grained, silty sand		10	
605.34			Continued on Sheet 3			

DRILLING LOG (Cont Sheet)		ELEVATION IN TOP OF HOLE		Hole No. CLD 8A		
PROJECT			INSTALLATION		SHEET 3 OF 3 SHEETS	
Clemson Lower Dam			Hartwell Lake			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	JAR	B Blows
605.34	70		SM - Silty sand (cont.)			33
603.84			71.5			100% 10.9
			GM - Brown, fine to coarse grained, silty gravel		11	100% 10.8
599.34	75		76.0			Note: Scale change to at 80'; 1 in. = 2 ft.
597.34			SM - Orangeish Brown, fine grained, silty sand		12	40
			78.0			30
	80		Granite Gneiss - Brown, very badly weathered, rock crumbles when handled	81% RQD	Box 1	Pull 1
		0 79.6		From 78.0 To 79.6		
		46% RQD		Run 1.6 Rec 1.3		
		0		CL 0.3 79.6		
	82			82.0		Pull 2
				69% RQD		From 79.6 To 82.0
				0		Run 2.4 Rec 1.1
				83.3		CL 1.3 82.0
	84		83.3 - 89.8: Brown, badly weathered rock, moderately hard with closely spaced horizontal joints, brown stained	83.3		Pull 3
				65% RQD		From 82.0 To 83.3
				0		Run 1.3 Rec 0.9
				89.3		CL 0.4 83.3
	86					Pull 4
						From 83.3 To 89.8
						Run 6.5 Rec 4.2
						CL 2.3
	88					
	90		Bottom of Boring at 89.8'	89.8	Box 2	89.8
685.54						Note: A piezometer with 2.0' of screen was set at 80.0'. Sand backfilled to 78.0' and mudballs to 74.0. 0.0 - 74.0: soil



Soil
NO Sand
Not in Pit

Hole No. CLD-9

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 6 SHEETS
1. PROJECT Clemson Lower Dam			10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &	
2. LOCATION (Coordinates or Station) Sta. 10+00, 5.0' upstream of centerline			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL 4x5 1/2 core bbl	
3. DRILLING AGENCY Savannah District			12. MANUFACTURER'S DESIGNATION OF DRILL Falling 314	
4. HOLE NO. (As shown on drawing title and file number) CLD-9			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED 14 UNDISTURBED 2	
5. NAME OF DRILLER C. Fuller			14. TOTAL NUMBER CORE BOXES 5	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER 630.1'	
7. THICKNESS OF OVERBURDEN 89.9			16. DATE HOLE STARTED 8 Jul 80 COMPLETED 10 Jul 80	
8. DEPTH DRILLED INTO ROCK 34.8			17. ELEVATION TOP OF HOLE +681.0' +	
9. TOTAL DEPTH OF HOLE 124.7			18. TOTAL CORE RECOVERY FOR BORING 92 %	
			19. SIGNATURE OF INSPECTOR JAMES KOTTI	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% Moisture	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
681.0	0				JAR		
679.5			SM-Dark brownish red, silty sand with Quartz gravel, organics. 1.5	9.4	1		33
			SG-Yellowish tan, clayey sand with gravel 5.5		2		13
675.5	5		CL-Red, sandy clay, slightly micaceous, Quartz pebbles. 9.0		3	W. T. 50.9'	16
			MH-Yellowish orange, sandy, silt, 20% micaceous, rounded Quartz pebbles.		4	Water table reading 24 hrs. after hole completed.	24
672.0	10		Seam of black, organic, fine silty sand.				19
			MH-Yellowish orange, sandy, silt, 20% micaceous, rounded Quartz pebbles.		4		15
	15		Decrease in mica, increase in clay.		5	Sample Lab	23
			Increase in mica to 20%.		5	No Class LL PL PI	23
			Seam of red, sandy clay with Quartz pebbles.		5	2 SM Insuf mat 20	20
				20.1	5	7 SM-H 50 32 13	30
					5	11 SM 47 46 1	30
					5	14 SP-SMNP NP NP	22
					5	UD-1 SM 48 43 5	22
					5	UD-2 SP NP NP NP	20
	20				6		28
					6		24
					6		24
	25				7		23
					7		24
					7		22
					7		12
					7		9
					7		16
651.0	30		Gray mica increase to 40%. Continued on sheet 2		8		
			NOTE: Soils field classified in accordance with the Unified Soil Classification System.				
						BLOWS PER FOOT: Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".	

DRILLING LOG (Cont Sheet)			ELEVATION TOP OF HOLE +681.0' ±		Hole No. CLD-9		
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 2 of 6 SHEETS		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	Mois- ture	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
651.0	30 _b	c	MH-Sandy silt (continued)			NOTE: Due to excessive mica content, MH could be classified as SM.	29
			Seam of yellow, sandy silt.				22
	35		Decrease in clay content, increase in sand.		9		22
							31
							39
							39
	40		Stringers of pink, sandy clay. Kaolinite pockets.		10		31
							26
							25
	45		Seams of reddish yellow, sandy silt, very little clay.	21.8	11		28
							29
							33
			Pinkish red, sandy silt, occasional Quartz gravel.				33
	50		Stringers of red and yellow, sandy clay.				30
							31
							42
	55						34
							26
			Kaolinite pockets with Quartz pebbles.				37
	60		Seam of red, sandy clay.				29
							37
							37
							17
	65			42.9	UD-9-1		43
							pushed
			Seam of lavender, fat clay (CH).			Undisturbed sample successful 65.0' to 66.0' using 5" x 3' shelby tube.	32
	70						21
611.0			Continued on sheet 3				

DRILLING LOG (Cont Sheet)

(ION TOP OF HOLE +681.0 ±

Hole No. CLD-9

SHEET 3
OF 6 SHEETS

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% Mois- ture	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	B BLOWS
611.0	70	c	d				22
609.3			MH-Pinkish red, sandy silt (continued) 71.7		12	Undisturbed sample	24
			SM-Brownish gray, fine, silty sand.		13	unsuccessful with shelby tube at 75.0' to 75.5'. Using	37
	75			19.5	UD- 9-2	Osterberg sampler, sample was obtained from 75.5' to pushed 77.5'.	34
	80					NOTE: 3"x5' spoon with 300 lb. hammer used at 84.0' cleaned to 87.0'. Spoon refusal en- countered at 87.0.	63 52 42
597.0			84.0	9.4	14	NOTE: 6" casing set at 87.2' to begin core at 87.0'	84 87
	85		GM-Coarse, brownish gray, silty, sandy gravel. 87.0' to 89.9' alluvial gravels and very soft, very badly weathered, grayish brown Granite Gneiss with brown stain.		3 RQD 0	Pull 1 From 87.0' to 89.9' Run 2.9' Rec 0.1' CL 2.8'	140
591.1	90		Top of Rock 89.9'	100	BOX 1	Pull 2 From 89.9' to 94.9' Run 5.0' Rec 5.0' CL 0.0'	
	91		Granite Gneiss-Medium grain- ed Quartz-Feldspar and Bio- tite existing in alternating hands, well foliated, Musco- vite and Garnet (red) are also prominent with numerous very closely to closely spaced joints, staining is brown and varies in degree.	RQD 0		NOTE: Scale change at 90.0'.	
	92		89.9' to 101.1' Grayish brown, very soft, easily crumbled, very badly to badly weathered with brown stain.				
	93		93.1' to 94.9' very badly weathered with numerous Quartz veins, rusty brown stain.				
587.0	94		Continued on sheet 4				

DRILLING LOG (Cont Sheet)		TOP OF HOLE +681.0' ±		Hole No. CLD-9				
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 4 OF 6 SHEETS			
ELEVATION f 87.0	DEPTH 94	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		
			Granite Gneiss-(continued) Numerous joints, nearly horizontal, very closely to closely spaced with brown stain existing in this section.		BOX 1	Pull 2 (continued) 94.9		
	95			94.9				
						84	BOX 2	Pull 3 From 94.9' to 99.9' Run 5.0' Rec 4.2' CL 0.8'
	96				RQD 0			
						96.5		
	97							
	98							
	99							
	100							
	101							
	102							
579.0			101.0' Approx. Top of Firm Rock, 101.1' to 104.3' brown, moderately weathered with heavy brown stain. Joints are horizontal to low angle with high angle joint at 103.4'.			Pull 4 From 99.9' to 104.3' Run 4.4' Rec 4.6' CG 0.2'		
			Continued on sheet					

DRILLING LOG (Cont Sheet)

TION TOP OF HOLE

+681.0' +

Hole No. CLD-9

PROJECT		INSTALLATION		SHEET			
Clemson Lower Dam		Hartwell Lake		5 OF 6 SHEETS			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
579.0	102	c	d	e	f	g	
	103		Granite Gneiss (continued) Joints are very closely to closely spaced with rusty brown stain.		BOX 2		
	104		104.3' to 111.8' greenish gray, hard, moderately to slightly weathered with slight brown stain. Joints low angle to high angle are common with high angle joints at 104.7', 105.3', 108.0', and 108.3'. Joints are very closely to closely spaced with brown stain. Healed fracture from 108.3' to 109.1'.	104.5	98	BOX 3	Pull 5 From 104.3' to 109.2' Run 4.9' Rec 4.8' CL 0.1'
	106			109.1	65	ROD 0	Pull 6 From 109.2' to 111.8' Run 2.6' Rec 1.7' CL 0.9'
	108			110.9			
	110			111.8	100	BOX 4	Pull 7 From 111.8' to 115.6' Run 3.8' Rec 4.2' CG 0.4'
	112			116.0		ROD 98	
	114						
	116						
565.0				Continued on sheet 6			

DRILLING LOG (Cont Sheet)

ION TOP OF HOLE +681.0' +

Hole No. CLD-9

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 6
OF 6 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
565.0	115.6		Granite Gneiss - (continued)	100	BOX 4	Pull 8 (continued) From 115.6' to 120.0' Run 4.4' Rec 5.1' CG 0.7'	
	118		117.1' to 117.7' fracture zone, very soft, very badly weathered with dark greenish brown stain, numerous low angle, closely spaced joints with dark greenish brown stain.	RQD 88	118.1		
	120		117.7' to 124.7' very hard, light gray, slightly weathered to unweathered with very slight green stain to unstained, low angle joints with slight brown stain, very closely to closely spaced. High angle joint exists from 118.4' to 118.7' with light rust stain.		120.7		
	122		120.1' to 120.4' fracture zone, very slightly weathered.	100			
	124		121.4' low angle joint with prominent brown stain. 122.8' to 123.2' fracture zone with high angle joints intersecting nearly horizontal joints, rusty brown stain is prominent, moderately hard, slightly weathered.	RQD 89			
556.3			123.6' to 123.8' Quartz-Feldspar vein with high angle, undulating joint, brown stain.				
	126						Pull 9 From 120.0' to 124.7' Run 4.7' Rec 4.8' CG 0.1'
				Bottom of Boring 124.7'			Pressure test results are as follows: With 3' packer set at 88.5', hole took 1 gal. of water in 10 minutes.

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 7 SHEETS
1. PROJECT Clemson Lower Dam		10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon & 4x5 1/2" core		
2. LOCATION (Coordinates or Station) Sta. 12+50, 5.0' upstream of centerline		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL		
3. DRILLING AGENCY Savannah District		12. MANUFACTURER'S DESIGNATION OF DRILL Falling 314		
4. HOLE NO. (As shown on drawing title and file number) CLD-10		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		UNDISTURBED
5. NAME OF DRILLER C. L. Hall		DISTURBED 13		0
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES 7		
7. THICKNESS OF OVERBURDEN 87.5'		15. ELEVATION GROUND WATER +647.0±		
8. DEPTH DRILLED INTO ROCK 60.2'		16. DATE HOLE		STARTED 28 Jul 80 COMPLETED 24 Aug 80
9. TOTAL DEPTH OF HOLE 147.7'		17. ELEVATION TOP OF HOLE +681.0'+		
		18. TOTAL CORE RECOVERY FOR BORING 85 %		
		19. SIGNATURE OF INSPECTOR ROBERT GREEN		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	W.C. %	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS	
681.0	0							
677.0	4.0	c	SM-Brown, medium to fine grained, silty sand.	5.0	1		56	
							18	
670.5	10.5	c	MH-Brown, clayey silt	13.6	2		11	
			7.5' seam of GM.					24
			8.0' color change to red. 8.5' color change to orange, micaceous.					28
669.0	12.0	c	SM-Brown to red, medium to fine grained, silty sand.	13.6	3		30	
								35
657.0	24.0	c	MH-Reddish brown, fine grain- ed silt.	13.6	4		33	
			13.5' micaceous.					20
			21.0' seam of dark gray SM.					16
652.5	28.5	c	SM-Reddish brown, medium to fine grained, silty sand.	13.6	5		25	
								14
651.0	30	c	MH-Reddish brown, clayey silt.	13.6	6		28	
								23
Continued on sheet 2						Sample Lab		
NOTE: Soils field classified in accordance with the Unified Soil Classification System.						No Class LL PL PI		
						2 SM - - -	28	
						6 SM 49 44 5	28	
						12 SM NP NP NP	23	
						13 SM-SC - - -	13	
							36	
							15	
							12	
							11	
						BLOWS PER FOOT:		
						Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".		

DRILLING LOG (Cont Sheet) ION TOP OF HOLE +681.0+ Hole No. CLD-10

PROJECT: **Clemson Lower Dam** INSTALLATION: **Hartwell Lake** SHEET 2 OF 7 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	W.C. % e	BOX OR SAMPLE NO. LAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	B	BLOWS
651.0	30b	c	MH-Reddish brown, clayey silt (continued) 30.5' micaceous					12
	35					W. T. 34.0' During drilling 29 Jul 80.		11
	40		40.0' seam of gray SM					10
	45		45.5' seam of brown SM					19
	47.5'		47.5' seam of GM					19
	48.5'		48.5' seam of purple MH					28
	51.5'		51.5' seam of black SM					14
	52.0'		52.0' seam of black MH, organics					12
	53.0'		53.0' seam of gray SM					17
	53.5'		53.5' seam of gray MH					22
	55							22
	60			61.5	10		27	
619.5	60		SM-Black, medium to fine grained, silty sand.					10
	65							40
	67.0'		67.0' increase grain size.					14
	70							11
611.0	70		Continued on sheet 3					9
								13
								25
								33

DRILLING LOG (Cont Sheet)

NON TOP OF HOLE +681.0+

Hole No. CLD-10

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 3
OF 7 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	W.C. %	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
611.0	70b	c	d	e	JAR	g	
608.5			SM-Black, silty sand. (continued)	72.5			18
			MH-Black, clayey silt.		11		13
	75						17
							21
							17
602.5			GM-Gray, medium to fine, silty gravel. 81.5' seam of gray SM.	78.5			52
	80			10.9	12		53
			83.5' color change to brown.				81
							65
595.0	85			86.0		NOTE: Scale change at 90.0'.	42
593.5			MH-Brown, clayey silt. Top of Rock 87.5'	17.4	13		58
			Granite Gneiss (Saprolite) Very badly weathered to slightly clayey SM, very soft, crumbles when handled. 87.5' to 104.0' brown.	% Core Recov 93	BOX 1	Pull 1 From 87.5' to 91.5' Run 4.0' Rec 3.7' CL 0.3'	50
	90			RQD 0			
				91.5			91.5
	92			71		Pull 2 From 91.5' to 97.0' Run 5.5' Rec 3.9' CL 1.6'	
				RQD 0			
	94						
	96						
				97.0	97.0		97.0
				100	BOX 2	Pull 3 From 97.0' to 99.0' Run 2.0' Rec 2.0' CL 0.0'	
583.0	98			RQD 0			

Continued on sheet 4

DRILLING LOG (Cont Sheet)			ION TOP OF HOLE +681.0'±		Hole No. CLD-10	
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 4 OF 7 SHEETS	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
533.0	98	c	Granite Gneiss (continued)			Pull 3 (continued)
				99.0		99.0
	100			100		Pull 4 From 99.0' to 104.0' Run 5.0' Rec 5.0' CL 0.0'
				RQD 0		
	102					
				104.0		104.0
	104		104.0' to 108.7' brown, very badly weathered, friable, soft.	43		Pull 5 From 104.0' to 108.7' Run 4.7' Rec 2.0' CL 2.7'
				RQD 0	105.3 BOX 3	
	106					
				108.7		108.7
	108		108.7' to 116.9' brown, very badly weathered, very soft.	74		Pull 6 From 108.7' to 113.7' Run 5.0' Rec 3.7' CL 1.3'
				RQD 0		
	110		110.0' to 110.1' seam of white Quartz Feldspar.			
			111.0' to 111.5' vein of white Quartz Feldspar.			
	112					
				113.7		113.7
567.0	114		Continued on sheet 5			Pull 7 (continued)

DRILLING LOG (Cont Sheet)

ION TOP OF HOLE +681.0'+

Hole No. CLD-10

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 5
OF 7 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
567.0	114	c	d			
			Granite Gneiss (continued)	100		Pull 7 (continued) From 113.7' to 118.7' Run 5.0' Rec 5.0' CL 0.0'
	116			RQD 0		
			116.9' to 125.7' brown, very badly weathered, friable, soft.		116.9 BOX 4	
	118		118.7' to 123.7' widely spaced, high angle joints, brown stained.			
			119.7' to 119.9' seam of white Quartz Feldspar.	118.7 100		Pull 8 From 118.7' to 123.7' Run 5.0' Rec 5.0' CL 0.0'
	120			RQD 0		
	122					
	124		124.2' to 124.7' vein of greenish white Feldspar.	123.7 99		Pull 9 From 123.7' to 133.7' Run 10.0' Rec 9.9' CL 0.1'
			125.7' to 133.7' brown, very badly weathered, very soft.	RQD 0	124.7 BOX 5	
	126					
	128					
551.0	130					

Continued on sheet 6

DRILLING LOG (Cont Sheet)			FROM TOP OF HOLE +681.0±		Hole No. CLD-10	
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 6 OF 7 SHEETS	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
551.0	130	c	d Granite Gneiss (continued)			Pull 9 (continued)
	132					
	134		133.7' to 135.3' brown, badly weathered, moderately hard.	133.7	68	Pull 10 From 133.7' to 140.3' Run 6.6' Rec 4.4' CL 2.2'
	136		135.3' to 140.3' brown, badly weathered, friable, soft.	RQD 0	135.3 BOX 6	
	138					
	140		140.3' to 145.0' brown, badly weathered, moderately hard 141.3' to 142.3' vertical joint, brown stained.	140.3	92	Pull 11 From 140.3' to 147.7' Run 7.4' Rec 6.8' CL 0.6'
	142			RQD 0		
	144					
	146		145.5' to 147.7' brown, very badly weathered, very soft.		145.0 BOX 7	
535.0	146		Continued on sheet 7			

DRILLING LOG (Cont Sheet)

ION TOP OF HOLE +681.0+

Hole No. CLD-10

PROJECT: **Clemson Lower Dam** INSTALLATION: **Hartwell Lake** SHEET **7**
OF 7 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
		c	d	e	f	g

535.0	146		Granite Gneiss (continued)			Pull 11 (continued)
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533.3	148		Bottom of Boring 147.7'	147.7		147.7
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Pressure Test

Depth	Air Pressure	Water Pressure	Gals/8 Min
91.0	98	40	59 Leak in casing.
96.0	98	40	3

NOTE: Depth indicated is depth of bottom of packer.

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 4 SHEETS
	1. PROJECT Clemson Lower Dam	10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 4x5 1/2 core tbl
2. LOCATION (Coordinates or Station) Sta. 17+50, 5.0' upstream of centerline	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 314	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 16 UNDISTURBED 0
3. DRILLING AGENCY Savannah District	14. TOTAL NUMBER CORE BOXES 4	15. ELEVATION GROUND WATER Not recorded	
4. HOLE NO. (As shown on drawing title and file number) CLD-11	16. DATE HOLE	STARTED 24 Aug 80	COMPLETED 5 Sep 80
5. NAME OF DRILLER C. L. Hall	17. ELEVATION TOP OF HOLE +681.0'		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.	18. TOTAL CORE RECOVERY FOR BORING 86 %		
7. THICKNESS OF OVERBURDEN 85.5'	19. SIGNATURE OF INSPECTOR ROBERT GREEN		
8. DEPTH DRILLED INTO ROCK 26.0'			
9. TOTAL DEPTH OF HOLE 111.5'			

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	W.C. %	BOX OR SAMPLE NO. / FT	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS	
681.0	0			2.7	1		36	
674.0	5		SM-Tan to gray, medium to fine grained, silty sand, organics first 0.5'. 4.0' lenses of red to brown SC		2		33	
	10			7.0	3		23	
	15				24.5	4		26
	20			SC-Red, medium to fine grain ed clayey sand, slightly micaceous. 15.5' increase in coarse sand.		5		35
660.0	25		SM-Purple to brown, medium to fine grained, silty sand, slightly micaceous. 23.0' to 24.0' lenses of SC. 24.5' very micaceous, infrequent fine gravel. 27.0' slightly clayey.		6		34	
	30			21.0	7		27	
	30			30.0' seam of brown CL		8		24
651.0	30		Continued on sheet 2 NOTE: Soils field classified in accordance with the Unified Soil Classification System.				24	

Sample No	Lab Class	LL	PL	PI
1	SM	26	24	2
5	SM-H	51	43	8
9	ML	48	32	16
16	SM	NP	NP	NP

BLOWS PER FOOT:
Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE +681.0' ±		Hole No. CLD-11			
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 2 Of 4 SHEETS		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	W. C. %	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
651.0	30b	c	d		JAR	g	
			SM-Purple brown, fine to medium grained.	20.9	9		11
							16
							17
645.0	35		SM-Red to brown, medium to fine grained, clayey sand, very micaceous, some coarse sand, seams of SM throughout.	36.0	10		55
					11		64
641.5	40		MB-Purple to tan, clayey silt, very micaceous, seams of SC throughout.		12		48
			43.5' dark gray to black.				25
							38
	45		45.5' red to tan.				33
							17
			47.0' dark red.				14
			48.5' purple to tan.				20
	50		51.0' seam of gray SC				16
			52.5' dark red.				27
			53.5' seam of brown SC.				36
	55		54.0' purple to brown, very micaceous.				30
			57.0' dark red.				34
			58.5' dark brown to gray.				28
	60						11
							13
							14
			63.5' brown.				16
	65						12
							10
612.0				69.0			16
611.0	70		SM-Brown, silty sand.				17
			Continued on sheet 3				

DRILLING LOG (Cont Sheet)

NON TOP OF HOLE

+681.0' ±

Hole No. CLD-11

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 3
OF 4 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description) d	W.C. % e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant!) g	BLOWS
611.0	70		69.0 SM-Brown, medium to fine grained silty sand.		13		18
610.5			MH-Brown, clayey silt.		14		21
			70.5				18
			73.5		15		28
607.5	75		SM-Brown, medium to fine grained, silty sand.				23
			79.0' gray.				22
			81.5' red.				29
			83.0' gray.				27
			83.5				31
597.5			GM-Brown, coarse grained, silty gravel.			NOTE: Scale change at 90.0'.	53
595.5	85		Top of Rock 85.5'	4.2	16		100+
			Granite Gneiss -	% Core	BOX	Pull 1	
			85.5' to 85.7' seam of Quartz.	Recov	1	From 85.5' to 93.5'	
			85.7' to 89.8' brown, very badly weathered, very soft.	100		Run 8.0' Rec 8.0'	
			89.8' to 91.6' brown, badly weathered soft.	RQD		CL 0.0'	
			91.6' to 92.4' seam of Biotite, soft.	0			
			92.4' to 93.5' white, slight to moderately weathered, hard.				
			92.4' Approx Top of Firm Rock				
			93.5' to 94.9' brown, slight to moderately weathered, hard.				93.5
587.5	94		94.9' to 95.4' brown, bad to moderately weathered, soft.	93.5		Pull 2	
			95.4' to 97.0' white slightly weathered, very hard.	100		From 93.5' to 101.5'	
				RQD		Run 8.0' Rec 8.0'	
				74		CL 0.0'	
			97.0' to 97.4' black, predominately Biotite, badly weathered, soft.				
583.0	98						

Continued on sheet 4

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE +681.0' ±		Hole No. CLD-11		
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 4 OF 4 SHEETS	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
583.0	98	c	Granite Gneiss-White, slightly weathered, very hard. 97.4' to 111.3' white.			Pull 2 (continued)
	100				99.5	
					BOX 3	
579.5				101.5		101.5
	102			84		Pull 3 From 101.5' to 106.5' Run 5.0' Rec 4.2' CL 0.8'
				ROD 83		
	104		103.9' to 104.9' high angle joint.			
	106			106.5		106.5
574.5				58		Pull 4 From 106.5' to 111.5' Run 5.0' Rec 2.9' CL 2.1'
	108			ROD 91	107.5	
					BOX 4	
	110					
			111.3' to 111.5' layer of Biotite, hard.			
569.5			Bottom of Boring 111.5'	111.5	111.5	111.5
			<u>Pressure Test</u> Air Water Gal/ Depth Pressure Pressure 8 Min 86.0 96 40 42 leak in casing. 91.0 100 40 49 96.0 100 40 12 101.0 100 40 41 leak in casing. 104.0 100 40 41 110.0 100 40 38 NOTE: Depth indicated is depth of bottom of packer.			

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 4 SHEETS
	1. PROJECT Clemson Lower Dam		10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &
2. LOCATION (Coordinates or Station) Sta. 5+75; 3.0' upstream of centerline		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 4x5 1/2 core box	
3. DRILLING AGENCY Savannah District		12. MANUFACTURER'S DESIGNATION OF DRILL Failing 314	
4. HOLE NO. (As shown on drawing title and file number) CLD-14		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 18 UNDISTURBED 0
5. NAME OF DRILLER Eddy Woods		14. TOTAL NUMBER CORE BOXES 2	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER Not recorded	
7. THICKNESS OF OVERBURDEN 84.0'		16. DATE HOLE	STARTED 27 Jan 81 COMPLETED 30 Jan 81
8. DEPTH DRILLED INTO ROCK 13.0'		17. ELEVATION TOP OF HOLE 680.36 ⁺	
9. TOTAL DEPTH OF HOLE 97.0'		18. TOTAL CORE RECOVERY FOR BORING 88 %	
		19. SIGNATURE OF INSPECTOR ROBERT GREEN	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
680.36	0		SM-Brown, fine grained, silty sand.		1	W.T. not recorded Date 27 Jan 81 Depth to water during drilling.	27 18 24
675.36	5		SC-Red, fine grained, clayey sand, micaceous.		2	W.T. not recorded Water table reading 24 hrs. after hole completed.	19 13 17
669.86	10		SM-Orange to brown, fine grained, silty sand, micaceous.		3		25
	15				4		28 19
	20				5		22 16 18 22
	25		Very micaceous		6		20 21
653.86	26.5				7		31 34
	30		SC-Brown to orange, fine grained, clayey sand.		8		31 36
650.36			Continued on Sheet 2		9		25
NOTE: Soils field classified in accordance with the Unified Soil Classification System.						BLOWS PER FOOT: Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".	

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE +680.36±

Hole No. CLD-14

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 2
OF 4 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
650.36	30		SC-Brown to orange, fine grained, clayey sand.				21
647.86			32.5				36
	35		SM-Brown, fine grained, silty sand, micaceous.		10		41
					11		22
							29
							27
	40				12		43
							15
							35
	45		Lenses of red SC		13		30
							33
							16
					14		9
	50						21
							29
							33
	55						21
							20
							35
620.36	60		SC-Dark brown to red, fine grained, clayey sand, micaceous.		15		32
							46
							32
							25
615.36	65		Seams of brown SM				38
			MH-Black, plastic, silt, slightly micaceous.		16		22
							34
611.36							69.0
610.36	70		SM-Brown, fine grained, silty Continued on Sheet 3				10

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE +680.36 ±		Hole No. CLD-14			
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 3 OF 4 SHEETS		
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV. ERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
610.36	70		SM-(continued) sand with some organics.		17		37
							17
							44
	75			Color change to black.			22
							52
				Seam of organics			23
	80			Coarsening of sand			53
							37
				Color change to brown			
596.36				Top of Rock 84.0'		18	NOTE: Scale change at 85.0'
	85		Granite Gneiss-	83	BOX	Pull 1 From 84.0' to 88.0' Run 4.0' Rec 3.3' CL 0.7'	
			84.0'-85.0' brown, very badly weathered, very soft.	RQD	1		
			85.0'-86.1' brown, badly weathered, soft.	82			
			86.9'-88.3' brown, slightly weathered, very hard.				
	87		86.9' approximate top of firm rock.				
			88.3'-91.8' brown, slight to moderately weathered, moder- ately hard.	88.0			
				107			
	89			RQD		Pull 2 From 88.0' to 92.6' Run 4.6' Rec 4.9' CG 0.3'	
				80			
	91						
			91.8'-92.6' very badly weathered, very soft.		91.8		
			92.6'-95.0' badly weathered, soft.		BOX		
				92.6	2		
	93			74		Pull 3 From 92.6' to 97.0' Run 4.4' Rec 3.2' CL 1.2'	
				RQD			
				70			
585.36	95		Continued on Sheet 4				

DRILLING LOG (Cont Sheet)

EL. ION TOP OF HOLE +680.36±

Hole No. CLD-14

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 4
OF 4 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
585.36	95		Granite Gneiss - 95.0'-97.0'-slightly weathered, hard. 96.5'-96.8' very closely spaced, horizontal joints, brown stained.		BOX 2	Pull 3 continued
583.36	97		Bottom of Boring 97.0'			

DRILLING LOG		DIVISIO. South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 2 SHEETS
1. PROJECT Clemson Lower Dam			10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon and	
2. LOCATION (Coordinates or Station) Sta 23+50, 3.0' downstream centerline			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 4x5 1/2 core b MSL	
3. DRILLING AGENCY Savannah District			12. MANUFACTURER'S DESIGNATION OF DRILL Failing 314	
4. HOLE NO. (As shown on drawing title and file number) CLD-15		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 5 UNDISTURBED 0
5. NAME OF DRILLER C. D. Fuller			14. TOTAL NUMBER CORE BOXES 1	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Not encountered	
7. THICKNESS OF OVERBURDEN 55.5'			16. DATE HOLE STARTED 4 Dec 80 COMPLETED 9 Dec 80	
8. DEPTH DRILLED INTO ROCK 11.0'			17. ELEVATION TOP OF HOLE +681.0+	
9. TOTAL DEPTH OF HOLE 66.5'			18. TOTAL CORE RECOVERY FOR BORING 100 %	
			19. SIGNATURE OF INSPECTOR CHARLES WHITTEN, Geologist	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
681.0	0b	c	d	e	JAR	g	
		●	SM-Brown, fine to medium sand, clayey, silt in upper few inches.		1		14
		●					33
676.0	5	●	ML-Red, sandy silt, micaceous, quartz and weathered feldspar, gravel scattered throughout.		2		18
		●					41
		●					42
		●					42
	10	●					25
		●					23
		●					23
	15	●					27
		●					27
		●					29
		●					28
	20	●					29
		●					24
		●					30
	25	●					30
		●					29
		●					32
651.0	30	●					30

Continued on sheet 2
NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT:
Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".

105

DRILLING LOG (Cont Sheet)

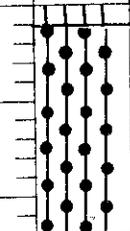
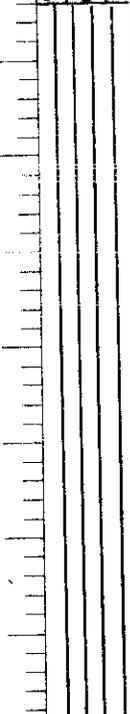
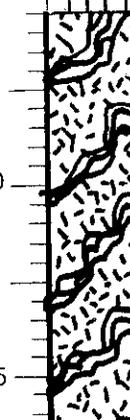
ATION TOP OF HOLE +681.0' ±

Hole No. CLD-15

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 2
OF 2 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS	
651.0	30	c	(continued) ^d	e	JAR	g		
650.5			SM-Brown, fine to medium sand with some silt.		3		22	
			30.5			4		63 60
645.0	35		ML-Red, sandy silt, micaceous, quartz and weathered feldspar scattered throughout.				35	
			36.0				27 16	
	40						34 72	
	45						55 59	
	50			49.5' to 52.5' high clay content.		5	36 53 55	
625.5	55		Top of Rock at 55.5'				33	
			Granite Gneiss (Saprolite) Soft, crumbles when picked up, SM, foliation can be seen, color varies from a weathered orange to white, quartz and mica most prominent minerals, with feldspar.				1 3/8" splitspoon samples from 55.5' to 61.5'	19 24 22
619.5	60				100	61.5		21
					RQD 0	BOX 1	Pull 1 From 61.5' to 66.5' Run 5.0' Rec 5.0' CL 0.0	
614.5	65		Bottom of Boring 66.5'		66.5	Backfilled with cement grout to top of rock at 55.5'. ML from top of rock to surface. ML material was put-in in 5' lifts and packed.		

106

Hole No. CLD-18

DRILLING LOG		DIVISION	INSTALLATION	SHEET 1 OF 5 SHEETS		
1. PROJECT Clemson Lower Dam		South Atlantic	Hartwell Lake	10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon & 4x5 1/2 co		
2. LOCATION (Coordinates or Station) Sta. 11+25, 3.0' upstream of centerline				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL		
3. DRILLING AGENCY Savannah District				12. MANUFACTURER'S DESIGNATION OF DRILL Fairing 314		
4. HOLE NO. (As shown on drawing title and file number) CLD-18				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 4 UNDISTURBED 0	
5. NAME OF DRILLER Gerald Matthews				14. TOTAL NUMBER CORE BOXES 5		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER Not recorded		
7. THICKNESS OF OVERBURDEN 87.5'				16. DATE HOLE	STARTED 23 Apr 81 COMPLETED 4 May 81	
8. DEPTH DRILLED INTO ROCK 33.9'				17. ELEVATION TOP OF HOLE +681.0+		
9. TOTAL DEPTH OF HOLE 121.4'				18. TOTAL CORE RECOVERY FOR BORING 99 %		
				19. SIGNATURE OF INSPECTOR JAMES D. KOTTI		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
681.0	0b	c	d	e	f	g
	0		No samples taken from 0' to 50.0' - see previous boring logs.			
	5					
	10					
	15					
	20					
	25					
	30					
651.0			Continued on sheet 2			
			NOTE: Soils field classified in accordance with the Unified Soil Classification System.			
						NOTE: Hole drilled to 50.0' with a 8" rock bit. Soil sampling began at 50.0' using a 1 3/8" split-spoon.
						BLOWS PER FOOT: Number required to drive 1 3/8" ID splitspoon / 140 lb. hammer falling 30".

L 126

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No. CLD-18		
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 2 OF 5 SHEETS	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
651.0	30	c	d	e	f	R
	35					
	40					
	45					
	50					NOTE: Began split-spooning at 50.0'.
631.0	50				JAR	50.0 BLOWS
			SC-Tannish red, fine to medium grained, clayey sand, slightly moist to dry, 30% micaceous.		1	35
						41
						36
			Occasional Quartz gravel.		2	33
						31
						36
						30
619.8	60					
			SM-Dark brownish gray, fine grained, silty sand, moist, 15% micaceous.		3	32
						83
						40
						39
			Occasional Quartz gravel.			36
						32
611.0	70					
			Continued on sheet 3			

112

E 107

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No.			
PROJECT		INSTALLATION		SHEET 3			
Clemson Lower Dam		Hartwell Lake		OF 5 SHEETS			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
611.0	70	c	d	e	JAR	f	
			SM-Dark brownish gray, fine grained, silty sand, moist, 15% micaceous.				32
						NOTE: Began 3" spoon at 86.0'.	39
							34
	75					NOTE: Top of rock at 87.0'. Casing set at 87.4'. Began coring at 87.5'.	31
							29
			Gray, wood chips.				30
							30
	80						28
			Gray, yellow, fine to medium, frequent Quartz gravel up to 1 3/8". Some gravel mixed with very badly weathered Granite Gneiss.		4		29
							57
	85						62
593.5				87.5		87.5	100
			Granite Gneiss - Tannish brown, yellowish tan stain, very badly weathered, very soft, fine to medium grained, micaceous.	1.00 RQD 0	BOX 1	Pull 1 From 87.5' to 89.4' Run 1.9' Rec 1.9' CL 0.0'	89.
	90		88.1', 87.7' low angle, open joints, brown stain.	95			
			90.6' low angle joint, partially healed.	RQD 0		Pull 2 From 89.4' to 93.7' Run 4.3' Rec 4.1' CL 0.2'	
	92		91.1' Quartz zone.			NOTE: Scale change at 90.0'.	
			92.7' badly to very badly weathered, soft to very soft below 93.7'.				93.7
			93.9' low angle, open joint, orangish tan stain.	93.7			
	94		94.7' to 95.2', 95.8' to 96.1' high angle, healed joints.	89		Pull 3 From 93.7' to 98.5' Run 4.8' Rec 4.2' CL 0.6'	
			97.3' to 97.8' nearly horizontal, very closely spaced, open joints, brown stain.	RQD 0	BOX 2		
	96						
583.0	98		Continued on sheet 4				

113

E 108

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE

+681.0+

Hole No. CLD-18

PROJECT

Clemson Lower Dam

INSTALLATION

Hartwell Lake

SHEET 4

of 5 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
583.0	98	c	d			
			Granite Gneiss - Brown, gray, moderately to badly weathered, moderately hard to soft below 98.5'. 98.9', 99.4', 99.9', 100.2', 101.1', 102.1' nearly horizontal, open joints, brown stain. 99.5' to 100.1' high angle, open joint, brown stain. 102.0' to 102.4' Quartz zone.	98.5 100		Pull 3 continued
	100			RQD 0		Pull 4 From 98.5' to 102.9' Run 4.4' Rec 5.0' CG 0.6'
	102				102.1	
					BOX 3	
			103.4', 103.7', 104.4', 104.6', 104.8', 105.3', 106.0', 107.2' nearly horizontal, open joints, brown stain. 103.8' to 104.2' near vertical joint, partially healed. 105.3' to 105.5' orangish brown zone.	102.9 90		Pull 5 From 102.9' to 107.7' Run 4.8' Rec 4.4' CL 0.4'
	104			RQD 0		NOTE: Top of firm rock at 106.0'.
	106		105.5' brownish gray, moderately weathered, moderately hard, badly weathered, soft in micaceous areas below 105.5'. 106.7' to 108.2' near vertical joint, partially healed.			
			108.4' to 108.8' nearly horizontal and high angle, open, intersecting joints, brown stain.	107.7		107.7
	108			100		Pull 6 From 107.7' to 112.2' Run 4.5' Rec 4.8' CG 0.3'
			109.2' to 109.5' dark brown, badly weathered, soft.		108.8	
	110			RQD 0	BOX 4	
			108.8' to 110.7' dark brown stain. 108.9' to 109.3', 109.8' to 110.3' high angle, open joints, brown stain.			
	112		110.4' to 110.7' Quartz zone.	112.2		112.2
			109.3', 109.5', 110.7', 111.1', 111.3', 111.9', 112.5', 113.7', 113.8' nearly horizontal, open joints, brown stain.	100		Pull 7 From 112.2' to 116.8' Run 4.6' Rec 4.6' CL 0.0'
			113.8' to 114.2' high angle, open joint, brown stain.	RQD 0		
567.0	114		Continued on sheet 5			

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		+681.0+		Hole No.		CLD-18																
PROJECT				INSTALLATION				SHEET																
Clemson Lower Dam				Hartwell Lake				5																
								OF 5 SHEETS																
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)																		
567.0	114	c	d	e	f	R																		
			Granite Gneiss-Brownish gray, moderately weathered, moderately hard, badly weathered, soft in micaceous areas.			Pull 7 continued																		
	116		114.3', 115.8', 115.9' nearly horizontal, open joints, brown stain.		115.8																			
			114.6' to 114.9', 114.9' to 115.2' high angle, open joints, brown stain.	116.8	BOX 5	116.8																		
	118		116.8' gray, white, slightly weathered, hard, joint areas are moderately weathered, moderately hard below 116.8'.	100		Pull 8																		
			116.8', 118.4', 118.5', 118.9', 119.0', 121.3', 121.4' nearly horizontal, open joints, brown stain.	RQD 93		From 116.8' to 121.4' Run 4.6' Rec 4.6' CL 0.0'																		
	120					121.4																		
559.6	122		Bottom of Boring 121.4'			Pressure test resulted with the hole taking the following amounts of water at the corresponding depths.																		
						<table border="1"> <thead> <tr> <th>Depth of Packer</th> <th>Water Pressure (psi)</th> <th>Water Pumped in gal/10 min</th> </tr> </thead> <tbody> <tr> <td>89.0</td> <td>40 psi</td> <td>130</td> </tr> <tr> <td>94.0</td> <td>40 psi</td> <td>181</td> </tr> <tr> <td>99.0</td> <td>40 psi</td> <td>46</td> </tr> <tr> <td>104.0</td> <td>20 psi</td> <td>0</td> </tr> </tbody> </table>				Depth of Packer	Water Pressure (psi)	Water Pumped in gal/10 min	89.0	40 psi	130	94.0	40 psi	181	99.0	40 psi	46	104.0	20 psi	0
Depth of Packer	Water Pressure (psi)	Water Pumped in gal/10 min																						
89.0	40 psi	130																						
94.0	40 psi	181																						
99.0	40 psi	46																						
104.0	20 psi	0																						
						NOTE: Depth indicated for pressure test is depth of bottom of packer.																		

Hole No. CLD-19

DRILLING LOG		DIV South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 6 SHEETS
1. PROJECT Clemson Lower Dam			10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &	
2. LOCATION (Coordinates or Station) Sta. 13+75, 3.0' upstream of centerline			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 4x5 1/2 core bit MSL	
3. DRILLING AGENCY Savannah District			12. MANUFACTURER'S DESIGNATION OF DRILL Falling 314	
4. HOLE NO. (As shown on drawing title and file number) CLD-19			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 9 UNDISTURBED 0
5. NAME OF DRILLER Gerald Matthews			14. TOTAL NUMBER CORE BOXES 7	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN 87.0'			16. DATE HOLE	STARTED 7 May 81 COMPLETED 27 May 81
8. DEPTH DRILLED INTO ROCK 55.8'			17. ELEVATION TOP OF HOLE +681.02 +	
9. TOTAL DEPTH OF HOLE 142.8'			18. TOTAL CORE RECOVERY FOR BORING 88 %	
			19. SIGNATURE OF INSPECTOR JAMES D. KOTTI	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
681.0	0b	c	d	e	f	g
	0		No samples taken from 0' to 50.0' - see previous boring logs.			NOTE: Hole drilled to 50.0' with 6" rock bit.
	5					W.T. not recorded
	10					Date 8 May 81
	15					Depth to water during drilling.
	20					
	25					
651.0	30		Continued on sheet 2			<u>BLOWS PER FOOT:</u>
			NOTE: Soils field classified in accordance with the Unified Soil Classification System.			Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".

115

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		+681.0+		Hole No. CLD-19	
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake			SHEET 2 OF 6 SHEETS	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
651.0	30	c	d	e	f	NOTE: Hole drilled to 50.0' with 6" rock bit where splitspooning began.	
	35						
	40						
	45						
631.0	50		SC-Red, fine grained, very clayey sand, slightly moist, 25% micaceous.		JAR 1	BL	23
							25
626.5	55		SM-Pinkish tan, fine to medium grained, silty sand, slightly moist, 30% micaceous.	54.5	2		40
							33
							33
							27
	60		Brownish gray, fine to very fine grained, slightly moist, 10% micaceous.	62.0	3	NOTE: Top of alluvium at 62.0'.	24
619.0			MI-Black, brown, plastic silt, moist.		4		32
					5		29
	65						10
							6
							13
							19
611.0	70		Continued on sheet 3		6		

117

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No.			
PROJECT Clemson Lower Dam		+681.0+		CLD-19			
INSTALLATION Hartwell Lake		SHEET 3 OF 6 SHEETS					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc. if significant)	BLOWS
611.0	70		MH-Black, brown, plastic silt, moist.		6		15
						NOTE: Began using splitspoon and 300 lb. hammer at 83.0'.	20
	73.0		SM-Brownish tan, fine grained, very silty sand, moist, 25% micaceous.		7		11
	75		Seams of gray plastic silt.			NOTE: Top of rock at 87.0'. Casing set at 87.7' and coring began at 87.5'.	22
			Tan, fine, decrease in silts and mica.		8		14
	80						16
			Gray, fine to medium grained, moist, frequent Quartz gravel up to 1 3/4".		9		35
							34
							72
							43
	85						49
593.5							68
			Granite Gneiss-Yellowish tan, white, very badly weathered, very soft, fine to medium grained, micaceous.	100	BOX 1	Pull 1 From 87.5' to 91.7' Run 4.2' Rec 4.2' CL 0.0'	
	90		88.0' to 88.4' high angle joint, partially healed.	RQD 0		NOTE: Scale change at 90.0'.	91.7
			87.9', 89.4', 90.7', 93.2' nearly horizontal open joint, no stain.	91.7			
	92			100		Pull 2 From 91.7' to 96.4' Run 4.7' Rec 4.7' CL 0.0'	
			93.8' to 94.6' nearly vert- ical, open joint, no stain.	RQD 0			
	94				94.6		
			95.0' to 95.4', 95.6' to 96.0' high angle, open joint, no stain.		BOX 2		
	96			96.4			96.4
			97.0' to 97.6' high angle joint, partially healed.	71		Pull 3 From 96.4' to 101.2' Run 4.8' Rec 3.4' CL 1.4'	
583.0	98			RQD 0			
			Continued on sheet 4				

E 113

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE +681.0'±		Hole No. CLD-19		
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 4 OF 6 SHEETS	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
583.0	98		d Granite Gneiss—Yellowish tan, white, very badly weathered, very soft, fine to medium grained, micaceous.			Pull 3 continued
	100					
	102		101.6' to 102.1', 101.8' to 102.3' high angle, open joints, light brown stain. 102.7' to 103.0' high angle, open joint, green stain. 102.3' to 102.6', 103.3' to 103.7' high angle joints, healed.	95		Pull 4 From 101.2' to 105.6' Run 4.4' Rec 4.2' CL 0.2'
	104		102.9' to 103.6', 103.1' to 103.8', 103.4' to 103.9', 104.2' to 104.7' near vertical joints, partially healed.	RQD 0	103.0 BOX 3	
	106		104.7' to 105.0', 105.1' to 105.4' high angle open joints, green and orangish brown stain. 106.4' to 106.7' high angle joint, healed.	94		Pull 5 From 105.6' to 109.2' Run 3.6' Rec 3.4' CL 0.2'
	108		107.0' badly weathered, soft below 107.0'. 107.0' to 107.1' orangish brown zone.	RQD 0		
	110		107.3' to 107.4' Quartz-Feldspar zone. 107.2' to 107.5' high angle, open joint, rusty brown stain.			
	112		107.6' to 108.3' dark brownish green. 107.0' to 108.0' near vertical, open joint, light brown stain. 108.2' to 108.8' near vertical joint, healed. 108.3' near horizontal, open joint, orange stain.	96	109.2 110.5 BOX 4	Pull 6 From 109.2' to 114.0' Run 4.8' Rec 4.6' CL 0.2'
567.0	114		Continued on sheet 5			

119

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE

+681.0+

Hole No. CLD-19

PROJECT

Clemson Lower Dam

INSTALLATION

Hartwell Lake

SHEET 5

OF 6 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
567.0	114		Granite Geniss-Yellowish tan, white, badly weathered, soft. 109.8' to 110.2', 110.5' to 110.9', 111.4' to 111.8', 112.3' to 112.5' high angle joints, partially healed. 112.0' to 112.3' orangish tan zone. 114.0' to 114.4', 115.2' to 115.6' high angle joints, partially healed. 115.2' to 116.7' white, Quartz-Feldspar zones. 117.8' orangish brown, white below 117.8'. 118.9' to 121.4' numerous, intersecting, high angle and near vertical, open joints, dark brown stain.	90		Pull 7 From 114.0' to 118.9' Run 4.9' Rec 4.4' CL 0.5'
	116			RQD 0	117.8	
	118				BOX 5	
					118.9	118.9
	120			52		Pull 8 From 118.9' to 123.7' Run 4.8' Rec 2.5' CL 2.3'
	122			RQD 0		
			123.7' to 124.2' high angle, open joint, brown stain.		123.7	123.7
	124		124.0' to 125.3' near vertical joint, partially healed. 125.2' to 126.1' near vertical joint, partially healed. 126.4' to 127.7' several intersecting, high angle and nearly vertical, open joints, dark brown stain.	87		Pull 9 From 123.7' to 128.3' Run 4.6' Rec 4.0' CL 0.6'
	126			RQD 0		
			128.4' to 128.7' high angle, open joint, dark brown stain. 128.7' orangish and yellowish gray, white below 128.7'. 128.9' to 129.3', 129.4' to 129.8', 129.6' to 130.1' high angle joints, partially healed.		127.2	
	128				BOX 6	128.3
				100		Pull 10 From 128.3' to 132.9' Run 4.6' Rec 4.7' CG 0.1'
				RQD 0		
551.0	130		Continued on sheet 6			

E 115

120

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE +681.0+		Hole No. CLD-19																
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 6 OF 6 SHEETS															
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)														
551.0	130	c	d	e	f	g														
			Granite Gneiss—Orangish and yellowish gray, white, badly weathered, soft.			Pull 10 continued														
			130.0' to 130.8', 131.5' to 132.1' near vertical joints, healed.																	
	132		131.4' to 131.8', 132.5' to 132.9' high angle joints, partially healed.		132.9															
			132.9' to 133.7' near vertical joint, partially healed.		92		Pull 11													
			133.9' to 134.5' closely spaced, nearly horizontal, open joints, dark brown stain.				From 132.9' to 137.9'													
	134		135.0' to 135.4', 135.2' to 135.5', 135.6' to 135.7', 136.4' to 136.8' high angle joints, partially healed.		RQD 0	135.0	Run 5.0' Rec 4.6'													
			135.5' to 136.2' high angle joint, healed.			BOX 7	CL 0.4'													
	136		136.7' to 137.0' white, Quartz Feldspar zone.																	
			137.1' to 137.5' high angle, open joint, dark brown stain.																	
	138		138.2' to 138.6', 138.6' to 139.0' high angle joints, partially healed.		137.9		Pull 12													
		139.2' to 139.8' near vertical joint, healed.		94		From 137.9' to 142.8'														
		139.1' to 139.3', 139.8' to 140.1' black zones.				Run 4.9' Rec 4.6'														
	140	140.1' to 140.8' gray, white zone.		RQD 0		CL 0.3'														
		140.8' to 141.5', 140.9' to 141.4', 141.4' to 142.0', 141.8' to 142.6' near vertical joints, partially healed.				NOTE: Top of firm rock at 141.7'.														
	142	141.7' to 142.0' gray, white, moderately weathered and hard.																		
538.2			Bottom of Boring 142.8'		142.8															
	144					Pressure test resulted with the hole taking the following amounts of water at the corresponding depths:														
						<table border="1"> <thead> <tr> <th>Depth</th> <th>Water Pumped in</th> </tr> </thead> <tbody> <tr> <td>89.2</td> <td>210 gal/10 min</td> </tr> <tr> <td>94.2</td> <td>205 gal/10 min</td> </tr> <tr> <td>99.2</td> <td>24 gal/10 min</td> </tr> <tr> <td>104.2</td> <td>34 gal/10 min</td> </tr> <tr> <td>109.2</td> <td>66 gal/10 min</td> </tr> <tr> <td>114.2</td> <td>3 gal/10 min</td> </tr> </tbody> </table>	Depth	Water Pumped in	89.2	210 gal/10 min	94.2	205 gal/10 min	99.2	24 gal/10 min	104.2	34 gal/10 min	109.2	66 gal/10 min	114.2	3 gal/10 min
Depth	Water Pumped in																			
89.2	210 gal/10 min																			
94.2	205 gal/10 min																			
99.2	24 gal/10 min																			
104.2	34 gal/10 min																			
109.2	66 gal/10 min																			
114.2	3 gal/10 min																			
			NOTE: Depth indicated for pressure test is depth of bottom of packer. Water Pressure 40 psi.																	

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 5 SHEETS
1. PROJECT Clemson Lower Dam		10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &		
2. LOCATION (Coordinates or Station) Sta. 16+25, 1.0' upstream of centerline		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 4x5 1/2 core bbl		
3. DRILLING AGENCY Savannah District		12. MANUFACTURER'S DESIGNATION OF DRILL Failing 314		
4. HOLE NO. (As shown on drawing title and file number) CLD-20		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 8	UNDISTURBED 0
5. NAME OF DRILLER Gerald Matthew		14. TOTAL NUMBER CORE BOXES 4		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER +619.5+		
7. THICKNESS OF OVERBURDEN 86.0'		16. DATE HOLE		
8. DEPTH DRILLED INTO ROCK 29.4'		STARTED 1 Jun 81 COMPLETED 4 Jun 81		
9. TOTAL DEPTH OF HOLE 115.4'		17. ELEVATION TOP OF HOLE +681.0+		
		18. TOTAL CORE RECOVERY FOR BORING 91 %		
		19. SIGNATURE OF INSPECTOR JAMES D. KOTTI		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
681.0	0	c	d	e	f	g
	5		No sample taken from 0' to 50' - see previous boring logs.			NOTE: Hole was drilled to 50.0' with 6" rock bit.
	10					W.T. 61.5'
	15					Date 2 Jun 81
	20					Depth to water during drilling.
	25					
651.0	30		Continued on sheet 2			BLOWS PER FOOT:
			NOTE: Soils field classified in accordance with the Unified Soil Classification System.			Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".

122

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE +681.0±		Hole No. CLD-20		
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake			
			SHEET 2 OF 5 SHEETS			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
651.0	30	c	d	e	f	g
	35					
	40					
	45					
631.0	50		SC-Red, fine to medium grained, clayey sand, slightly moist, 25% micaceous, occasional Quartz gravel.		JAR	BLOWS
					1	24
						26
						30
	55		Seam of tan, fine to medium grained, silty sand, 55.0' to 56.0'.		2	28
					3	33
						29
621.5	60		ML-Grayish brown, lean silt, slightly moist to dry, 10% micaceous. 59.5		4	NOTE: Top of alluvium at 59.5'. 26
						28
618.7			MH-Tannish gray, plastic silt, moist, 10% micaceous. 62.3		5	
						8
	65					8
614.2			SM-Tan, fine to very fine grained, very silty sand, moist, 20% micaceous. 66.8		6	12
						10
611.0	70					9
			Continued on sheet 3			

123

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE +681.0+

Hole No. CLD-20

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 3
OF 5 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
611.0	70	c	d	e	JAR	g	
			SM-Tan, fine to very fine grained, very silty sand, moist, 20% micaceous.				13
			Fine, decrease in silt, 25% micaceous.			NOTE: 3" spoon began at 83.0'.	12 24
	75					NOTE: Top of rock at 85.5'. Casing set at 86.3'. Coring began at 86.0'.	34 35 34 37
	80		Tannish gray, fine to medium grained, slightly moist, frequent Quartz gravel, 1 1/2".		7		38 41
			Top of rock 85.0'		8		43 40
595.0	85		Granite Gneiss-Light grayish tan, very badly weathered, very soft, fine to medium grained, micaceous.	75 RQD 0	BOX 1	Pull 1 From 86.0' to 88.0' Run 2.0' Rec 1.5' CL 0.5'	88.0
	90		90.2' yellowish and orangish tan, white below 90.2'. 90.7' to 91.8' near vertical joint, healed. 92.5' to 93.0' near vertical joint, healed.	89 RQD 0		Pull 2 From 88.0' to 92.5' Run 4.5' Rec 4.0' CL 0.5'	
	92		92.8' to 94.1' near vertical joint, healed. 94.2' brown, orange below 94.2'	92.5		NOTE: Scale change at 90.0'.	92.5
	94		94.2' to 94.5', 95.0' to 95.3' high angle joint, partially healed.	80 RQD 0	94.1 BOX 2	Pull 3 From 92.5' to 97.0' Run 4.5' Rec 3.6' CL 0.9'	
	96			97.0			97.0
583.0	98			94 RQD 0		Pull 4 From 97.0' to 101.8' Run 4.8' Rec 4.5' CL 0.3'	

Continued on sheet 4

5

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE +681.0'±

Hole No. CLD-20

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 4
OF 5 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
583.0	98	c	d Granite Gneiss-Brown, orange, very badly weathered, very soft. 98.8' tannish gray, white below 98.8'. 98.6' to 99.0' high angle joint, healed. 99.5' to 100.5' near vertical joint.			Pull 4 continued
	100					
	102		103.3' badly weathered, soft below 103.3'. 102.6' to 103.6', 103.4' to 104.3' near vertical joints, healed. 104.4' to 104.7' high angle joint, healed. 105.4' to 105.7' white, Quartz-Feldspar zone with a nearly horizontal, open joint at 105.5', light orange stain.	101.8 100		Pull 5 From 101.8' to 106.4' Run 4.6' Rec 4.6' CL 0.0'
	104		107.1' to 107.5' white, Quartz-Feldspar zone with nearly horizontal, open joints at 107.2' and 107.3', light orange stain. 108.0' gray, white, black, moderately to badly weathered, moderately hard to soft below 108.0'. 108.6', 109.6', 109.7', 109.8', 110.0', 110.5' nearly horizontal, open joints, light brown stain.	RQD 0	102.6 BOX 3	
	106		109.7' gray, black, white, moderately weathered, moderately hard below 109.7'. 110.9', 111.0', 111.3', 111.5', 111.7', 112.5' nearly horizontal, open joints, light brown stain. 113.4' to 114.1' Quartz-Feldspar zone.	106.4 89		Pull 6 From 106.4' to 110.9' Run 4.5' Rec 4.0' CL 0.5'
	108			RQD 0		NOTE: Top of firm rock at 109.7'.
	110				109.8	
	112			110.9	BOX 4	Pull 7 From 110.9' to 115.4' Run 4.5' Rec 4.5' CL 0.0'
	114			100		
567.0			Continued on sheet 5			

WS

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Hartwell Lake	SHEET 1 OF 4 SHEETS
	1. PROJECT Clemson Lower Dam		10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &
2. LOCATION (Coordinates or Station) Sta. 18+75, 1.0' upstream of centerline		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY Savannah District		12. MANUFACTURER'S DESIGNATION OF DRILL Failing 314	
4. HOLE NO. (As shown on drawing title and file number) CLD-21		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 6
5. NAME OF DRILLER Gerald Matthews		UNDISTURBED 0	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES 2	15. ELEVATION GROUND WATER 619.0'
7. THICKNESS OF OVERBURDEN 89.0'	8. DEPTH DRILLED INTO ROCK 13.1'	16. DATE HOLE	STARTED 8 Jun 81
9. TOTAL DEPTH OF HOLE 102.1'		COMPLETED 11 Jun 81	
		17. ELEVATION TOP OF HOLE +681.0+	
		18. TOTAL CORE RECOVERY FOR BORING 89 %	
		19. SIGNATURE OF INSPECTOR JAMES D. KOTTI	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
681.0	0		No samples taken 0'-50'. See previous boring logs.			NOTE: Hole drilled to 50.0' with 6" rock bit.
	5					
	10					
	15					W.T. 62.0' Date 9 Jun 81 Depth to water during drilling.
	20					
	25					
651.0	30		Continued on sheet 2			BLOWS PER FOOT: Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".
			NOTE: Soils field classified in accordance with the Unified Soil Classification System.			

107

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE
681.0'+

Hole No. CLD-21

PROJECT
Clemson Lower Dam

INSTALLATION
Hartwell Lake

SHEET 2
OF 4 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
651.0	30b	c	d	e	f	g
	35					
	40					
	45					
	50				JAR	NOTE: Began sampling at 50.0' with 1 3/8" splitspoon.
631.0	50		SM-Pinkish tan, fine to medium grained, silty sand, slightly moist, 30% mica-ceous.		1	
	55					
	60		Gray, fine, decrease in silt.		2	
	618.5		Brown, very fine to fine, very silty, moist, 20% mica MH-Brown, plastic silt, 62.5 moist, 10% micaceous.		3	NOTE: Top of alluvium at 58.7'.
	65					
611.0	70		Continued on sheet 3			

BLOWS

29
30
30
32
33
33
35
30
16
15
17
15
8

128

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE 681.0'+		Hole No. CLD-21			
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 3 OF 4 SHEETS		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant!) g	BLOWS
611.0	70	c	MH-Brown, plastic silt, moist, 10% micaceous.				8
606.5	74.5					NOTE: Began using 3" spoon and 300 lb. hammer at 86.0'.	7
	75		SM-Tan, fine, silty sand, moist, 10% micaceous.		4		8
							22
							24
							34
							37
	80						32
			Tannish gray, fine to medium grained, 15% micaceous.				34
							31
	85		Frequent Quartz gravel up to 1 1/2".		5		45
						NOTE: Top of rock encountered at 88.5'. Casing set to 89.1'. Coring started at 89.0'.	63
592.0			Top of Rock 88.5'	89.0'	6		100
	90		Granite Gneiss-Gray, yellow and orange tan, badly to very badly weathered, soft to very soft, medium to fine grained, micaceous.	100	BOX 1	Pull 1 From 89.0' to 93.4' Run 4.4' Rec 4.4' CL 0.0'	
			89.8', 90.1', 90.6', 92.2' nearly horizontal, open joints with light brown stain.	RQD 25		NOTE: Scale change at 90.0'.	
	92		91.4' to 91.7' brownish gray, moderately weathered, moderately hard.				93.4
			92.5' brownish gray moderately hard below 92.5'.				
	94		92.5', 92.9', 93.2', 93.4' nearly horizontal, open undulated joints, light brown stain.	89		Pull 2 From 93.4' to 97.9' Run 4.5' Rec 4.0' CL 0.5'	
			93.8' to 94.8' nearly vertical joint, healed.	RQD 73	95.6	NOTE: Top of firm rock at 92.5'.	
	96		94.6', 96.9', 97.4' nearly horizontal, open joints, light brown stain.		BOX 2		
			95.6' to 96.7' orange tan, badly weathered, soft.				
583.0	98			97.9			97.9
			Continued on sheet 4				

129

PROJECT Clemson Lower Dam INSTALLATION Hartwell Lake SHEET 4 OF 4 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
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583.0	98	c	d	76	BOX 2	Pull 3 continued From 97.9' to 102.1' Run 4.2' Rec 3.2' CL 1.0'
	100		Granite Gneiss-Brownish gray, moderately weathered, moderately hard. 99.0', 99.6' nearly horizontal, open, undulated joints, light brown stain. 99.0' to 99.2' white, Quartz-Feldspar zone. 99.0' to 100.2', 99.1' to 99.8' nearly vertical joints, healed.	ROD 84		
578.9	102		100.7' to 101.2' white, Quartz-Feldspar zone with nearly horizontal, open joints at 100.7'. 100.9', 101.1' yellowish tan stain.	102.1		102.1

104 Bottom of Boring 102.1'

NOTE: Hole was pressure tested with a 5" packer set at 125 psi; air pressure. Water was pumped into hole at 10 minutes per depth interval. At 90.5' packer would not maintain position in hole with 40 psi; water pressure. Water pressure was lowered to 20 psi and test continued.

Depth of Packer	Water Pumped In	Water Pressure	Leakage
90.5	0 gal	20 psi	0 gal

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Clemson, S.C.	SHEET 1 OF 2 SHEETS
1. PROJECT Clemson Lower Dam Seismic Study		10. SIZE AND TYPE OF BIT 1 3/8" splitspoon, 5 1/2"		
2. LOCATION (Coordinates or Station) Sta. 12+50, 145' Rt. of centerline of dam		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL fishtail bit, 7 1/4" rock bit		
3. DRILLING AGENCY Savannah District		12. MANUFACTURER'S DESIGNATION OF DRILL CME 55		
4. HOLE NO. (As shown on drawing title and file number) CLD-508		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 31	UNDISTURBED 0
5. NAME OF DRILLER Perry Rountree		14. TOTAL NUMBER CORE BOXES N/A		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER N/A		
7. THICKNESS OF OVERBURDEN 48.0'		16. DATE HOLE STARTED 19 Sept 1988 COMPLETED 21 Sept 1988		
8. DEPTH DRILLED INTO ROCK 1.5'		17. ELEVATION TOP OF HOLE 641.3'		
9. TOTAL DEPTH OF HOLE 49.5'		18. TOTAL CORE RECOVERY FOR BORING N/A %		
		19. SIGNATURE OF INSPECTOR Charles D. Griffin		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
641.3'	0b	c	d	e		g
			(ML) Red, brown, tan, inorganic SILT. Sandy, saprolitic.		1	No water level recorded due to the use of drilling fluid. Used 7 1/4" rock bit to penetrate through rocks to 6.0'. Claude Robbins operated catline/hammer throughout boring using 1 3/4" wraps.
638.3'			Inorganic silt & sand mixture.		2	
636.8'	5		(SM) Brown, tan, grey, silty SAND. Saprolitic, fine grained.		3	
635.3'			Rocks & boulders.		4	
			(ML) Red, brown, tan, inorganic, SILT. Sandy & micaceous, saprolitic.		5	
629.3'	10		Brown & orange.		6	
627.8'			Reddish brown, sandy & micaceous, saprolitic.		7	
			Red & brown, w/a thin layer of silty sand, trace of gravel saprolitic.		8	
623.3'	15		(SM) Dark orange & brown, fine grained, silty SAND. Saprolitic.		9	
621.8'	20		(ML) Brown, red, orange, white, inorganic SILT. Saprolitic, sandy & micaceous.		10	
618.8'			Red, micaceous.		11	
617.3'	25		(MH) Red clayey SILT.		12	
			(ML) Red & brown, inorganic SILT. Micaceous.		13	
612.8'			Red & reddish brown, sandy & micaceous, saprolitic.		14	
611.3'	30		(SP) Brown & tan, med. grained, poorly graded SAND.		15	
			(SM) Brown, fine to med. grained, silty SAND.		16	
			Fine grained.		17	
			MH-Brown clayey SILT.		18	
						BLOWS PER 0.5 FOOT: Number required to drive 1 3/8" ID splitspoon w/140 lb. hammer falling 30". NOTE: Soils visually field classified in accordance with the

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE

641.3'

Hole No.

CLD-508

PROJECT
Clemson Lower Dam Seismic Study

INSTALLATION
Clemson, S,C,

SHEET 2
of 2 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
611.3'	30'	c	d	e			
			(MH) Brown, clayey SILT. Soft.		19		233
					20		113
					21		123
	35		Black & grey, w/alternating lenses of fine grained sand.		22		112
					23		212
			(SM) Grey, fine grained, silty SAND.		24		122
					25		235
600.8'	40		(SP) Grey, fine to med. grained, poorly graded SAND. w/some gravel.		26		223
					27	NOTE: Unable to penetrate boring beyond 49.5' w/fishtail bit.	1215
597.8'			Med. grained, w/some gravel.		28		71527
	45		(SM-GM) Grey & tan, med. to coarse grained, silty SAND & GRAVEL.		29		151524
594.8'					30		213641
593.3'			(CRANITE-SAPROLITE) Yellowish tan & grey, intensely wea. rock, easily crumbled.		31		293140
591.8'							

Bottom of Boring 49.5'

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Clemson, S.C.	SHEET 1 OF 2 SHEETS
1. PROJECT Clemson Lower Dam Seismic Study		10. SIZE AND TYPE OF BIT 1 3/8" splitspoon, 5 1/2"		
2. LOCATION (Coordinates or Station) Sta. 20+00, 280' Rt. of centerline of dam		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL, fishtail bit, 7 1/4" rock bit		
3. DRILLING AGENCY Savannah District		12. MANUFACTURER'S DESIGNATION OF DRILL CME 55		
4. HOLE NO. (As shown on drawing title and file number) CLD-509		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 23	UNDISTURBED 0
5. NAME OF DRILLER Perry Rountree		14. TOTAL NUMBER CORE BOXES N/A		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER N/A		
7. THICKNESS OF OVERBURDEN 31.5'		16. DATE HOLE STARTED 22 Sept 1988 COMPLETED 22 Sept 1988		
8. DEPTH DRILLED INTO ROCK 3.0'		17. ELEVATION TOP OF HOLE 630.2'		
9. TOTAL DEPTH OF HOLE 34.5'		18. TOTAL CORE RECOVERY FOR BORING N/A %		
		19. SIGNATURE OF INSPECTOR Charles Griffin		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
630.2'	0b	c	d	e	JAR	g	
628.7'			(ML) Red, inorganic SILT. Sandy & micaceous.		1	No water level recorded due to the use of drilling fluid. Claude Robbins operated catline/hammer throughout boring using 1 3/4" wraps.	24 5
627.2'			(SM) Brown, fine & med. grained, silty SAND.		2		9 10 21
	5		(SP) Tan, fine grained, poorly graded SAND. Coarse grained.		3		14 15 15
622.7'			(SM) Dark brown, very fine grained, silty SAND.		4		14 10 7
	10		(MH) Brown, clayey SILT. Soft. Very fine, sandy.		5		2 3 5
619.7'			(SM) Brown, very fine grained, silty SAND.		6	0 Blows indicate that sampler w/drill rods & 140 lb. hammer penetrated 0.5 w/o a hammer drop.	2 2 2
	15		(MH) Brown, clayey SILT. Soft very fine, sandy.		7		2 1 2
612.2'			(SM) Brown, very fine grained, silty SAND.		8		0 0 0
	20		(MH) Brown, clayey SILT. Soft very fine, sandy.		9		0 1 2
609.2'			(SM) Brown, very fine grained, silty SAND.		10		1 1 2
	25		(MH) Brown, clayey SILT. Soft very fine, sandy.		11		1 1 1
604.7'			(SM) Brown, fine grained, silty SAND. Brown & tan.		12		1 2 1
	30		(SM) Brown, very fine grained, silty SAND.		13		1 1 2
600.2'			(MH) Brown, clayey SILT. Soft very fine, sandy.		14		2 2 2
			(SM) Brown, very fine grained, silty SAND.		15		1 1 1
			(MH) Brown, clayey SILT. Soft very fine, sandy.		16		2 1 1
			(SM) Brown, very fine grained, silty SAND.		17		1 2 2
			(MH) Brown, clayey SILT. Soft very fine, sandy.		18		5 9 9
			(SM) Brown, very fine grained, silty SAND.		19		4 4 12
			(MH) Brown, clayey SILT. Soft very fine, sandy.		20		9 10 13
Continued on sht 2 NOTE: Soils visually field classified in accordance with the Unified Soil Classification System.						BLOWS PER 0.5 FOOT: Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".	

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No.		
PROJECT		INSTALLATION		SHEET 2		
Clemson Lower Dam Seismic Study		Clemson, S.C.		OF 2 SHEETS		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
600.2'	30'	c	d	e		BLOWS
598.7'	35		(SM-GM) Tan & brown, silty SAND & GRAVEL.		21	37
			(GRANITE-SAPROLITE) Tan, brown, white, intensely wea., rock, easily crumbled.		22	100/0.3
			Tan.		23	15
595.7'						23
			Bottom of Boring 34.5'			38
						46
						52

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Clemson, S.C.	SHEET 1 OF 2 SHEETS
1. PROJECT Clemson Lower Dam Seismic Study			10. SIZE AND TYPE OF BIT 3/8" splitspoon, 5 1/2"	
2. LOCATION (Coordinates or Station) Sta. 12+50, 280' Rt. of centerline of dam			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY Savannah District			12. MANUFACTURER'S DESIGNATION OF DRILL CME 55	
4. HOLE NO. (As shown on drawing title and file number) CLD-510			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 20
5. NAME OF DRILLER Perry Pountree			14. TOTAL NUMBER CORE BOXES	UNDISTURBED 0
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER N/A	
7. THICKNESS OF OVERBURDEN 28.5'			16. DATE HOLE STARTED 23 Sept 1988 COMPLETED 23 Sept 1988	
8. DEPTH DRILLED INTO ROCK 1.5'			17. ELEVATION TOP OF HOLE 622.1'	
9. TOTAL DEPTH OF HOLE 30.0'			18. TOTAL CORE RECOVERY FOR BORING N/A %	
19. SIGNATURE OF INSPECTOR Charles Griffin				

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
622.1'	0'	c	(ML) Red & brown, inorganic SILT. Silty sand mixture.		1	No water level recorded, due to the use of drilling fluid. Claude Robbins operated catline/hammer throughout boring using 1 3/4" wraps. 0 Blows indicate that sampler, w/drill rods & 140 lb. hammer, penetrated 0.5' w/o a hammer drop.	4
620.6'			(SM) Brown, w/traces of grey, fine grained, silty SAND.		2		12
619.1'			(ML) Red to grey, inorganic SILT. Very sandy.		3		19
617.6'	5		(SM) Grey & tan, very fine grained, silty SAND.		4		12
616.1'			(ML) Dark brown & grey, inorganic SILT. Very fine, sandy.		5		10
614.6'	10		(MH) Dark brown, clayey SILT. Mod. soft.		6		8
610.1'			Dark brownish grey, very soft. Very fine, sandy.		7		6
607.1'	15		(SM) Dark greyish brown, very fine grained, silty SAND.		8		5
			(SP) Grey, fine grained, poorly graded SAND.		9		3
	20				10		0
					11		1
					12		1
					13		1
					14		1
					15		2
					16		4
	22		With a stump or log encountered at 22.5' to 24.0'.				4
							6
							5
598.1'	24		Continued on sht 2 NOTE: Soils visually field classified in accordance with the Unified Soil Classification System.				30
							100/0.2

BLOWS PER 0.5 FOOT:
Number required to drive 1 3/8" ID splitspoon w/ 140 lb hammer falling 30".

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No.			
PROJECT Clemson Lower Dam Seismic Study		INSTALLATION Clemson, S.C.		SHEET 2 OF 2 SHEETS			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY e	BOX OR SAMPLE NO. f JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
598.1'	24'		(GP) Tan & grey, coarse grained poorly graded SAND & GRAVEL.		17		13 16
			Tan, river gravel, w/some saprolitic sand.				12
	26		(SM) Yellowish tan, fine & med. grained, silty SAND. Saprolitic, w/traces of gravel.		18		12 10 13
595.1'			(GRANITE-SAPROLITE) Greenish tan to brown, intensely wea. rock, sandy & saprolitic, easily crumbled.		19		NOTE: Fishtail refusal at 30.0'. 18
593.6'					20		51 45 60
592.1'	30		Bottom of Boring 30.0'				

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No.		
PROJECT		INSTALLATION		SHEET 2		
Clemson Lower Dam Seismic Study		Clemson, S.C.		OF 2 SHEETS		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
612.6'	30'	c	d	e	JAR	g BLOWS
		[Vertical lines]	(MH) Dark brown, clayey SILT. Brown, very soft.		22	2 12
					23	0 0 0
608.1'	35		[Vertical lines]	(SM) Dark greyish brown, very fine grained, silty SAND. Slightly micaceous.		24
				Brown.		25
		[Vertical lines]	(MH) Dark grey, clayey SILT. Very fine, sandy & micaceous.		26	1 1 1
605.1'	37			No Recovery.		27
603.6'	39	[X]	(SM) Grey & tan, fine & med. grained, silty SAND. With some gravel.			NOTE: Scale change @ 35.0'. 6 15 18
602.1'	41	[Vertical lines]	Fine to coarse grained, w/ abundant		28	9 24 40
				(GP) Tan, med. to coarse grained sand & poorly graded GRAVEL.		
599.1'	43	[Vertical lines]	(SP) Tan, med. to coarse grained, poorly graded SAND. With some gravel.		30	29 32 23
				(GRANITE-Saprolite) Grey & white, intensely wea. rock.		31
596.1'	47	[Dotted]			32	13 15 54
594.6'					33	100/0.2
594.4'			Bottom of Boring 48.2'			

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Clemson, S.C.	SHEET 1 OF 2 SHEETS
1. PROJECT Clemson Lower Dam Seismic Study			10. SIZE AND TYPE OF BIT 1 3/8" splitspoon, 5 1/2"	
2. LOCATION (Coordinates or Station) Sta. 8+00, 339.0' Rt. of centerline of dam			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL fishtail bit, 6" rock bit	
3. DRILLING AGENCY Savannah District			12. MANUFACTURER'S DESIGNATION OF DRILL CME 55	
4. HOLE NO. (As shown on drawing title and file number) CLD-512			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 19
5. NAME OF DRILLER Perry Rountree			UNDISTURBED 0	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			14. TOTAL NUMBER CORE BOXES N/A	
7. THICKNESS OF OVERBURDEN 27.8'			15. ELEVATION GROUND WATER N/A	
8. DEPTH DRILLED INTO ROCK 0.4'			16. DATE HOLE STARTED 29 Sept 1988 COMPLETED 29 Sept 1988	
9. TOTAL DEPTH OF HOLE 28.2'			17. ELEVATION TOP OF HOLE 619.9'	
			18. TOTAL CORE RECOVERY FOR BORING N/A %	
			19. SIGNATURE OF INSPECTOR Charles D. Griffin	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO. GAP	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
619.9'	0	c	d	a			
			(SM) Reddish brown, fine grained silty SAND. w/ loose rocks & gravel.		1	No water level recorded due to the use of drilling fluid. Claude Robbins operated catline/ hammer throughout boring using 1 1/4 wraps. 0 Blows indicate that sampler w/ drill rods & 140 lb. hammer penetrated 0.5' w/o a hammer drop.	24.2
					2		22
616.9'	5		Reddish brown to dark brown very fine grained, w/ some rocks.		3		100/0
			(SC) Dark brown, fine grained, clayey SAND.		4		10
			Grey & brown, silty & clayey very fine to fine grained.		5		15
610.9'	10		Dark brown, w/ some gravel.		6		35
609.4'			(SM) Dark greyish brown, very fine grained, silty SAND.		7		54
			(GP) Grey, tan, poorly graded, loose gravel.		8		32
			No sample recovery from 12.0' to 15.0'.		9		21
604.9'	15		(SM) Dark grey, fine grained, silty SAND.		10		22
			Very fine grained, w/ clayey silt layers & some decomposed wood particles.		11		13
			Micaceous.		12		28
598.9'	20		(MH) Dark grey, clayey SILT. w/ alternating fine sand lenses soft, micaceous.		13		1
597.4'	22		(SM-SP) Grey, very fine to fine & med. grained, silty & poorly graded SAND.		14		1
						2	
595.9'	24		Continued on sht 2 NOTE: Soils visually field classified in accordance with the Unified Soil Classification System.			5	
						BLOWS PER 0.5 FOOT: Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".	

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No.		
PROJECT		INSTALLATION		SHEET		
Clemson Lower Dam Seismic Study		Clemson, S.C.		OF 2 SHEETS		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
595.9'	24'	c	d	e		g BLOWS
			(SM) Grey, fine grained, silty SAND. Micaceous.		15	2
			(SP) Grey, fine & med. grained, poorly graded SAND.			2
594.4'			(GP) Tan, grey, orange, sand & poorly graded GRAVEL.		16	3
593.9'	26		(SM-GM) Yellowish tan, to tan, fine & med. grained, silty SAND & GRAVEL. Saprolitic.		17	6
592.9'			(GRANITE) Saprolite, grey & white, intensely wea. rock, easily crumbled.		18	28
592.1'					19	39
591.7'	28					80
			Bottom of Boring 28.2'			86
	30					100/0.2

DRILLING LOG		DIVISION <i>South Atlantic</i>	INSTALLATION <i>Clemson, SC</i>	SHEET 1 OF 2 SHEETS	
1. PROJECT <i>Clemson Lower Dam Seismic Evaluation</i>			10. SIZE AND TYPE OF BIT <i>1 3/8" ID splitspoon</i>		
2. LOCATION (Coordinates or Station) <i>19+85 150' D/S G</i>			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) <i>MSL</i>		
3. DRILLING AGENCY <i>Savannah District</i>			12. MANUFACTURER'S DESIGNATION OF DRILL <i>CME 55</i>		
4. HOLE NO. (As shown on drawing title and file number) <i>CLD-513</i>			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED
5. NAME OF DRILLER <i>Perry Rountree</i>			14. TOTAL NUMBER CORE BOXES <i>N/A</i>		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE		STARTED <i>1 AUG 89</i>
7. THICKNESS OF OVERBURDEN <i>42.5'</i>			17. ELEVATION TOP OF HOLE <i>642.5</i>		
8. DEPTH DRILLED INTO ROCK <i>-</i>			18. TOTAL CORE RECOVERY FOR BORING <i>not applicable</i>		
9. TOTAL DEPTH OF HOLE <i>42.5</i>			19. SIGNATURE OF INSPECTOR <i>Ben Foreman</i>		

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	BLOWS h
	17		<i>Fishtailed without sampling</i>			<i>No groundwater level recorded due to use of drilling fluid from start of drilling.</i>	
	18		<i>(ML) Reddish-brown slightly sandy clayey SILT, micaceous</i>	<i>0.4'</i>			<i>4</i>
	20		<i>(SM) Grayish-brown fine-medium grained silty SAND w/trace sm. gravels & 2 1" gravels and 2 dk gray slightly sandy SILT lenses</i>	<i>0.6'</i>			<i>5</i>
	20		<i>grayish-dk. brown, v. fine grained, micaceous w/20-30% nonplastic fines</i>	<i>0.4'</i>			<i>6</i>
	22		<i>(ML) Brown very fine grained sandy SILT, slightly plastic</i>	<i>1.1'</i>			<i>9</i>
	24		<i>moderately plastic</i>	<i>1.1'</i>			<i>18</i>
	24		<i>slightly more plastic</i>	<i>1.2'</i>			<i>11</i>
	26		<i>plasticity grades from slightly plastic to moderately plastic</i>	<i>1.0'</i>			<i>2</i>
	28		<i>(SM) Brown v. fine grained silty SAND</i>				<i>2</i>
			<i>Continued on sheet #2</i>				

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVER- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
	28		<i>Brown v. fine grained silty SAND</i>	<i>1.4'</i>			1 1 3
	30		<i>Fishtailed without sampling</i>				
	32		<i>(sm) Brown v. fine grained silty SAND</i>	<i>1.5'</i>			0 1 2
	34		<i>Fishtailed without sampling</i>				
	34		<i>same as above except may be sandy SILT w/ black streaks</i>	<i>1.5'</i>			1 1 2
	36		<i>brown w/ dark & light mottling</i>	<i>1.5'</i>			4 6 8
	36		<i>only slightly silty, fine grained</i>				
	38		<i>very fine → fine grained</i>	<i>0.7'</i>			0 1 2
	40		<i>slightly silty → silty</i>	<i>0.4'</i>			2 11 14
	42		<i>slightly silty</i>	<i>0.4'</i>			6 11 11

Bottom of boring @ 42.5'

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Clemson, SC	SHEET / OF / SHEETS
1. PROJECT Clemson Lower Dam Seismic Evaluation		10. SIZE AND TYPE OF BIT 1 3/8" ID SPLITSPOON		
2. LOCATION (Coordinates or Station) STA. 8+00 265' D/S & of DAM		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL		
3. DRILLING AGENCY Savannah District		12. MANUFACTURER'S DESIGNATION OF DRILL CBAE 55		
4. HOLE NO. (As shown on drawing title and file number) CLD-519		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 6	UNDISTURBED 0
5. NAME OF DRILLER Perry Roundtree		14. TOTAL NUMBER CORE BOXES N/A		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER see remarks		
7. THICKNESS OF OVERBURDEN 22.5'		16. DATE HOLE STARTED 16 Aug 89 COMPLETED 16 Aug 89		
8. DEPTH DRILLED INTO ROCK -		17. ELEVATION TOP OF HOLE ~622.0		
9. TOTAL DEPTH OF HOLE 22.5'		18. TOTAL CORE RECOVERY FOR BORING not applicable%		
		19. SIGNATURE OF INSPECTOR Ben Foreman		

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
622.0			Fishtailed without sampling (NOT TO SCALE)			No groundwater level recorded due to use of drilling fluid from start of drilling
612.0	10		(SM) Charcoal gray very fine grained silty SAND, slightly plastic	NR		
609.5	12		No Recovery	NR		1 blow for 2.2' drive → 1
607.0	14					soils visually classified in accordance with the unified soil classification system.
	16		same as above except very slightly plastic	0.17'		NR = No Recovery.
	18			0.08'		WH = Weight of Hammer.
	20		silty to slightly silty, fine → medium grained with wood throughout and occ. small zones & pockets clean sand	1.5'		WH 1 2
	22		1" layer of wood			
599.5			gray, slightly silty, medium → coarse grained w/occ. sm. gravels	0.8'		2 4 10
			2.1' of borina @ 22.5'			

DRILLING LOG		DIVISION <i>South Atlantic</i>	INSTALLATION <i>Clemson, SC</i>	SHEET 1 OF 2 SHEETS
1. PROJECT <i>Clemson Lower Dam Seismic Evaluation</i>		10. SIZE AND TYPE OF BIT <i>1 3/8" ID SPLITSPoon</i>		
2. LOCATION (Coordinates or Station) <i>STA 7495 265' DIS of $\frac{1}{2}$ DAM</i>		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) <i>MSL</i>		
3. DRILLING AGENCY <i>Savannah District</i>		12. MANUFACTURER'S DESIGNATION OF DRILL <i>CME 55</i>		
4. HOLE NO. (As shown on drawing title and file number) <i>CLD-520</i>		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED <i>12</i>	UNDISTURBED <i>0</i>
5. NAME OF DRILLER <i>Perry Roundtree</i>		14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER <i>Not recorded</i>		
7. THICKNESS OF OVERBURDEN <i>28.5'</i>		16. DATE HOLE STARTED <i>17 AUG 89</i> COMPLETED <i>17 AUG 89</i>		
8. DEPTH DRILLED INTO ROCK <i>-</i>		17. ELEVATION TOP OF HOLE <i>622.0</i>		
9. TOTAL DEPTH OF HOLE <i>28.5'</i>		18. TOTAL CORE RECOVERY FOR BORING <i>Not applicable</i>		
		19. SIGNATURE OF INSPECTOR <i>Ben Roseman</i>		

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
622.0			Fishtailed without sampling (Not to SCALE)			No groundwater level recorded due to use of drilling fluid from the start of drilling. Soils visually classified in accordance with the unified soil classification system.
617.0	5		(SM) Brown fine grained silty SAND w/trace of organics	0.5'		5 6 3 NR = No Recovery
615.5	6		NO RECOVERY	NR		1 blow for 12" → 1 1 blow for 12" → 1
613.5	8		(SM) Dark charcoal gray fine grained very silty SAND or very fine Sandy SILT w/trace rootlets and one 1/4" root			0 0 1 blow for 16" → 1
611.5	10		NO RECOVERY	NR		weight hammer for 2.5' → WH
610.0	12		Fishtailed without sampling			
609.0	14		(SM) Dark charcoal gray very fine grained silty SAND, slightly plastic	0.04'		weight hammer for 2.0' → WH
			see sheet #2			

PROJECT Clemson Lower Dam Seismic Evaluation INSTALLATION Clemson, SC SHEET 2 OF 2 SHEETS

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
605.0	15	●●●●●	dark charcoal gray fine silty SAND, mottled silty → very slightly silty	0.4'		1 blow for 14" → 1 1 blow for 10" → 1
	16		No RECOVERY	NR		1 blow for 12" → 1
603.5	18		Fishtailed without sampling			
603.0	20	●●●●●	same as above except fine → medium grained with wood throughout and occ. pocket of clean sand towards bottom	1.5'		WH 1
	22		trace wood w/zones of very fine sandy SILT gray slightly silty → clean medium SAND w/some coarse sand grains	1.5'		1 1 4
	24	●●●●●	dark gray slightly silty → silty medium sand w/few pockets dk. gray silt	0.6'		1 2 3
	26		slightly silty fine-medium, light & dark mottling w/organics and wood throughout gray silty → v. slightly silty fine w/trace organics	0.7'		2 2 5
593.5	28	●●●●●	Dk. charcoal brownish gray, silty mottled lt. gray & dk. gray, sl. silty → clean, medium grained w/occ. fine gravel			
			gray sl. silty → clean, medium → coarse grained w/many small gravels (1/2" max) & rock fragments (up to 1 1/2")	0.7'		14 11 7

Bottom of boring @ 28.5'

Hole No. **CLD523**

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Clemson, SC	SHEET 1
1. PROJECT Clemson Lower Dam Seismic Evaluation		10. SIZE AND TYPE OF BIT 1 3/8" ID SPLITSPoon		
2. LOCATION (Coordinates or Station) STA 19+85 7' D/S of DAM		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL		
3. DRILLING AGENCY Savannah District		12. MANUFACTURER'S DESIGNATION OF DRILL CME 55		
4. HOLE NO. (As shown on drawing title and file number) CLD-523		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 15	UNDISTURBED 0
5. NAME OF DRILLER Perry Roundtree		14. TOTAL NUMBER CORE BOXES N/A		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER see remarks		
7. THICKNESS OF OVERBURDEN 85.5'		16. DATE HOLE STARTED 3 NOV 89 COMPLETED 3 NOV 89		
8. DEPTH DRILLED INTO ROCK -		17. ELEVATION TOP OF HOLE ~ 680.0		
9. TOTAL DEPTH OF HOLE 85.5'		18. TOTAL CORE RECOVERY FOR BORING not applicable		
		19. SIGNATURE OF INSPECTOR <i>Ben Joeman</i>		

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
680.0			Fishtailed without sampling			No groundwater level recorded due to use of drilling fluid from start of drilling.
623.0	57		(ML) Reddish-brown slightly sandy clayey SILT w/occ. fine gravels EMBANKMENT FILL			soils visually classified in accordance with the unified soil classification system. ¹² ₁₅
	58		Dark brick red			
620.2	60		(ML) Brown very slightly clayey, very fine sandy SILT	1.2'		
	62		more plastic w/occ. zones of slightly sandy very fine sand	0.9'		7 13 19 4 5 5
616.0	64		(MH) Brown very plastic SILT	1.2'		WH WH 4
	66		very fine sandy	1.0'		3 6 6
	68		continued on sheet #2			4 5 6

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE $\approx 680.0'$ msl		Hole No. CLD-523		
PROJECT <i>Clemson Lower Dam Seismic Evaluation</i>			INSTALLATION <i>Clemson, SC</i>		SHEET 2 OF 2 SHEETS	
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
	68		increase in sand %	1.25'		3 3 4
	70		slightly sandy	1.35'		2 4 6
608.0	72		(ML) Brown mottled & streaked w/black slightly sandy SILT some zones more sandy than others	1.6'		2 5 6
605.0	74		increase % sand decrease % plasticity	1.5'		4 7 12
	76		(SM) Brown very fine grained silty SAND fine grained	0.5'		20 21 27
	78		Grayish-brown, micaceous	0.5'		17 25 31
	80			0.6'		13 18 18
	82		brown, increase in grain size	0.6'		18 25 25
	84		grayish-brown, one 3/8" chert gravel	0.5'		15 16 23
594.5			Bottom of boring @ 85.5			

DRILLING LOG		DIVISION SOUTH ATLANTIC	INSTALLATION HARTWELL LAKE	SHEET 1 OF 2 SHEETS
1. PROJECT CLEMSON LOWER DIVERSION DAM		10. SIZE AND TYPE OF BIT 6 - INCH UPWARD DISCHARGE FISHTAIL		
2. LOCATION (Coordinates or Station) STATION 12+73, 145 FT DOWNSTREAM OF C		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL		
3. DRILLING AGENCY SAVANNAH DISTRICT		12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314		
4. HOLE NO. (As shown on drawing title and file number) INCL 12		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 14	DISTURBED 14	UNDISTURBED 0
5. NAME OF DRILLER DAVID JUSTISS		14. TOTAL NUMBER CORE BOXES 0		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER SEE REMARKS		
7. THICKNESS OF OVERBURDEN 49.5 FT		16. DATE HOLE STARTED 19 MAR 1995 COMPLETED 19 MAR 1995		
8. DEPTH DRILLED INTO ROCK 0.0 FT		17. ELEVATION TOP OF HOLE 641		
9. TOTAL DEPTH OF HOLE 49.5 FT		18. TOTAL CORE RECOVERY FOR BORING N/A %		
19. SIGNATURE OF INSPECTOR				

ELEVATION a	DEPTH FT _b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	JAR OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
633	5		(ML) BROWN VERY FINE SANDY SILT, MICACEOUS		NO REC.	BOULDERS AND COBBLES FROM 2.5' TO 4.5'
629.7	10		WITH SEVERAL SML. GVLS., MAX. 3/8 INCH, SLIGHTLY MOIST, MICACEOUS		1	MUD ROTARY DRILLING WAS USED FROM THE TOP OF HOLE. THEREFORE, DEPTH TO GROUNDWATER WAS NOT RECORDED
626.7	15		BROWN TO SLIGHTLY REDDISH BROWN, TRACE SML. GVLS., MAX. 3/8 INCH, SLIGHTLY MOIST, VERY MICACEOUS		2	
623	20		REDDISH BROWN TO BRICK RED, SLIGHTLY SANDY, TRACE COARSE SAND, SL. MOIST, MICACEOUS		3	
620.5	25		(SM) BROWN SILTY FINE SAND, TRACE GVLS., MAX 1-INCH, SL. MOIST, VERY MICACEOUS		4	
617.7	30		GRAY SL. SILTY FINE-MED SAND, SL. MOIST, DENSE		5	
614.7	35		TOP 2 INCHES - MOTTLED REDDISH BROWN SDY. SILT AND GRAY MEDIUM SAND BOTTOM 8 INCHES - GRAY SILTY FINE SAND, WITH TRACE ROOTLETS		6	
611.7	40		GRAY SILTY FINE SAND, WITH TRACE ROOTLETS, MOIST, TRACE MICA		7	
	45		(ML)		8	ENCOUNTERED WOOD CLEANING OUT TO 30'
	50		CONTINUED ON SHEET 2			
			NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.			

BLOWCOUNT

5 5
6
7 6
5
6 7
12
5 9
13
7 8
10
19 26
27
8 22
25
7 8
9

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE
641

Hole No. INCL 12

PROJECT
CLEMSON LOWER DIVERSION DAM

INSTALLATION
HARTWELL LAKE

SHEET 2
OF 2 SHEETS

ELEVATION a	DEPTH 30 _b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	JAR OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			(ML) DARK GRAY VERY FINE SANDY SILT, TRACE OF ROOTLETS, TRACE MICA		9	
	35				10	DRILLER NOTED VERY SOFT 36.5 TO 38'
603			(SM) DARK GRAY SILTY VERY FINE SAND, WITH SML. WOOD PIECES, SL. MICACEOUS		11	DRILLER NOTED CONSIDERABLE WOOD 41-42'
599.7			FINE TO MEDIUM SAND, WITH TRACE SML. WOOD PIECES		12	
596.7			INCREASE IN MEDIUM SAND, WITH SEVERAL SML. GVLS., MAX. 1/2 INCH		13	
593.7			(SP) GRAYISH-BROWN SL. SILTY MEDIUM TO COARSE SAND, WITH GRAVEL, MAX. 1 INCH		14	
591.5	50		BOTTOM OF BORING AT 49.5 FEET			
			NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.	<p><u>BLOWCOUNT</u> BLOWCOUNTS SHOWN ARE THE NUMBER OF BLOWS PER 6 INCH INCREMENT REQUIRED TO DRIVE A 1 3/8 INCH ID SPLIT-BARREL SAMPLER WITH A 140 LB. HAMMER FALLING 30 INCHES. THE SUM OF THE NUMBER OF BLOWS REQUIRED TO DRIVE THE SAMPLER OVER THE DEPTH INTERVAL OF 6 TO 18 INCHES IS THE STANDARD PENETRATION TEST RESISTANCE, "N", IN BLOWS PER FOOT. (ASTM D1586)</p>		

DRILLING LOG		DIVISION SOUTH ATLANTIC	INSTALLATION HARTWELL LAKE	SHEET 1 OF 2 SHEETS
1. PROJECT CLEMSON LOWER DIVERSION DAM			10. SIZE AND TYPE OF BIT 6 - INCH UPWARD DISCHARGE FISHTAL	
2. LOCATION (Coordinates or Station) STATION 6+20, 135 FT. DOWNSTREAM OF C			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY SAVANNAH DISTRICT			12. MANUFACTURER'S DESIGNATION OF DRILL FALING 314	
4. HOLE NO. (As shown on drawing title and file number) INCL 15			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN : DISTURBED : 12 : UNDISTURBED : 0	
5. NAME OF DRILLER DAVID JUSTISS			14. TOTAL NUMBER CORE BOXES 0	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER SEE REMARKS	
7. THICKNESS OF OVERBURDEN 38.0 FT			16. DATE HOLE : STARTED : 21 MAR 1995 : COMPLETED : 22 MAR 1995	
8. DEPTH DRILLED INTO ROCK 0.0 FT			17. ELEVATION TOP OF HOLE 640	
9. TOTAL DEPTH OF HOLE 38.0 FT			18. TOTAL CORE RECOVERY FOR BORING N/A %	
			19. SIGNATURE OF INSPECTOR	

ELEVATION a	DEPTH FT _b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	JAR OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
636	5	(SM) DARK ORANGE AND BROWN SILTY VERY FINE SAND, TRACE OF MICA 3/4 INCH PIECE OF GRAVEL, MOIST, GRASS ROOTS AT SURFACE			1	BLOWCOUNT 7 6 12
631	10	(ML) DARK ORANGE FINE SANDY SILT, WITH PIECES OF SMALL GRAVEL (LESS THAN 1/4 INCH), VERY MICACEOUS, MOIST			2	MUD ROTARY DRILLING WAS USED FROM THE TOP OF HOLE. THEREFORE, DEPTH TO GROUNDWATER WAS NOT RECORDED 3 4 7
626.5	15	DARK ORANGE AND TAN, WITH A LITTLE SAND AND MICA, MODERATELY DRY			3	5 5 16
623	20	DARK ORANGE			4	6 6 11
618	25	VERY MICACEOUS, WITH SOME FINE SAND, AND A FEW PIECES HIGHLY WEATHERED ROCK, MAX. 1/2 INCH			5	4 5 6
615	25	(SP) GRAY FINE TO MEDIUM SAND, WITH A LITTLE SILT, VERY MOIST, WITH SOME GRAVEL, MAX. 1 INCH			6	17 10 12
612	30	(MH) GRAY TO REDDISH BROWN FINE SANDY SILT, VERY MOIST, WITH A LITTLE MICA AND FEW VERY FINE ROOTLETS			7	5 4 6
	30	(ML) BROWN AND DARK GRAY SILT, WITH A LITTLE VERY FINE SAND, VERY MOIST, TRACE OF MICA, A FEW VERY FINE ROOTLETS			8	1 1 2
			CONTINUED ON SHEET 2			
			NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.			

PROJECT CLEMSON LOWER DIVERSION DAM INSTALLATION HARTWELL LAKE SHEET 2 OF 2 SHEETS

ELEVATION o	DEPTH 30 b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	JAR OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
608			(ML) GRAY SILT, WITH A LITTLE MICA ORANGISH BROWN		10 9	31.5 TO 32 WEIGHT OF RODS 32 TO 33 WEIGHT OF HAMMER AND RODS 0 0
606 604.5	35		GRAY WITH SOME VERY FINE SAND AND MICA (SP) GRAY FINE TO MEDIUM SAND, WITH A LITTLE SILT, AND SOME GRAVEL OR ROCK, MAX. 1 INCH		11	2 28 29
602	38	•••	GRAY, ORANGE AND TAN, TRACE OF SILT, WITH SOME MICA, MOIST, APPEARS TO BE WEATHERED ROCK		12	50/0.5
			<p>BOTTOM OF BORING AT 38.0 FEET</p> <p>NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.</p>			<p><u>BLOWCOUNT</u> BLOWCOUNTS SHOWN ARE THE NUMBER OF BLOWS PER 6 INCH INCREMENT REQUIRED TO DRIVE A 1 3/8 INCH ID SPLIT-BARREL SAMPLER WITH A 140 LB. HAMMER FALLING 30 INCHES. THE SUM OF THE NUMBER OF BLOWS REQUIRED TO DRIVE THE SAMPLER OVER THE DEPTH INTERVAL OF 6 TO 18 INCHES IS THE STANDARD PENETRATION TEST RESISTANCE, "N", IN BLOWS PER FOOT. (ASTM D1586)</p>

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE 642.8'		Hole No. MW-5			
PROJECT Clemson Lower Dam			INSTALLATION Hartwell Lake		SHEET 2 OF 2 SHEETS		
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	W.C. % e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
612.8	30		MH continued		8		7
			34.0				6
608.8	35		SM-Brown, medium to fine grained silty sand.	23.8	9		17
			37.0' coarse sand				17
							21
	40		41.5' color change to gray				16
							18
							21
							29
597.8	45		Bottom of Boring 45.0'				26

Hole No. PF-103

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Clemson Lower Dam	SHEET 1 OF 2 SHEETS
1. PROJECT Hartwell Lake			10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &	
2. LOCATION (Coordinates or Station) 9+35, 245' downstream of centerline			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 4x5 1/2 cc	
3. DRILLING AGENCY Savannah District			12. MANUFACTURER'S DESIGNATION OF DRILL MSL	
4. HOLE NO. (As shown on drawing title and file number) PF-103 UD-3			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED: 19 UNDISTURBED: 0	
5. NAME OF DRILLER T. W. Scott			14. TOTAL NUMBER CORE BOXES 2	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN 27.0'			16. DATE HOLE STARTED: 30 Oct 79 COMPLETED: 1 Nov 79	
8. DEPTH DRILLED INTO ROCK 15.0'			17. ELEVATION TOP OF HOLE +625.6'	
9. TOTAL DEPTH OF HOLE 42.0'			18. TOTAL CORE RECOVERY FOR BORING 92 %	
			19. SIGNATURE OF INSPECTOR CARD SMITH/GUSTAVE ANDERSON	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	W.C. % e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS h																																																
625.6	0		SM-Brown, silty fine sand	10.9	1		22																																																
					2		77																																																
					3		19																																																
621.1	5		MI-Pink micaceous silt	22.5	4		15																																																
					5		16																																																
					23.3	6		15																																															
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	10			25.5	8	<table border="1"> <tr><th colspan="6">Sample Lab</th></tr> <tr><th>No</th><th>Class</th><th>LL</th><th>Pl</th><th>PI</th><th></th></tr> <tr><td>2</td><td>SM</td><td>36</td><td>24</td><td>12</td><td></td></tr> <tr><td>6</td><td>SM-H</td><td>50</td><td>39</td><td>11</td><td>11</td></tr> <tr><td>10</td><td>SM</td><td>44</td><td>39</td><td>5</td><td>14</td></tr> <tr><td>13</td><td>SP-SM</td><td>NP</td><td>NP</td><td>NP</td><td></td></tr> <tr><td>18</td><td>SP</td><td>NP</td><td>NP</td><td>NP</td><td>9</td></tr> <tr><td>UD-3</td><td>SM-H</td><td>52</td><td>32</td><td>20</td><td></td></tr> </table>	Sample Lab						No	Class	LL	Pl	PI		2	SM	36	24	12		6	SM-H	50	39	11	11	10	SM	44	39	5	14	13	SP-SM	NP	NP	NP		18	SP	NP	NP	NP	9	UD-3	SM-H	52	32	20		
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				25.6	10																																																		
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607.6	20		SP-Tan, poorly graded sand	20.5	13		20																																																
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					17		21																																																
				25.8	18		15																																																
					19	NOTE: Scale change at 25.0'.	100																																																
598.6	27		Top of Rock at 27.0'																																																				
			Continued on Sheet 2 NOTE: Soils field classified in accordance with the Unified Soil Classification System. E 142 3																																																				
						BLOWS PER FOOT: Number required to drive 1 3/8" ID splitspoon 140 lb. hammer falling 30".																																																	

DRILLING LOG (Cont Shec)

SECTION TOP OF HOLE

+625.6

Hole No. PF-103

PROJECT

Hartwell Lake

INSTALLATION

Clemson Lower Dam

SHEET 2

OF 2 SHEETS

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
598.6	27		Top of Rock at 27.0' Granite Gneiss - Gray-white, medium grained, foliation poor to absent, garnetiferous. 27.0-28.0' hard to very hard, solid, slightly weathered with mechanical break along healed, near horizontal fracture 27.0-27.2'.	76	BOX 1	Pull 1 From 27.0' to 32.0' Run 5.0' Rec 3.8' CL 1.2'
	29		28.0-28.2 badly weathered, soft, crumbled. 28.2-29.0' solid, fresh.	RQD 53		
	31		29.0-29.3 moderately weathered 30.5-31.2' tan-gray, badly weathered, soft, crumbly. 31.2-32.0' moderately weathered with near horizontal fracture at 31.5. Weathered along fracture.	100		Pull 2 From 32.0' to 37.0' Run 5.0' Rec 5.0' CL 0.0'
	33		31.6-32.0 slightly weathered 45° joint with intersecting 20° joint 31.9-32.0. 32.0-33.0' slightly weathered, hard to very hard.	RQD 78	34.4 BOX 2	
	35		32.2 machine break along healed, near horizontal fracture. 33.0-33.2 coarse grained (pegmatite) moderately weathered. 33.2-37.8 moderately to slightly weathered with 20° weathered fracture 33.8-33.9.			
588.6	37		34.3-34.3 soft, weathered zone 36.2 near horizontal joint, slightly weathered (healed) 36.6-36.8 badly weathered, soft zone. 37.0 Mechanical break 37.2-37.8 60° open fracture.	100		Pull 3 From 37.0' to 42.0' Run 5.0' Rec 5.0' CL 0.0'
	39		37.8-42.0 slightly weathered to fresh, solid, very hard 38.2 Machine break. 38.9 near horizontal fracture, slightly weathered.	RQD 86		
	41		40.1-40.2 20° open fracture along mineralized surface, fresh.			
583.6			Bottom of Boring 42.0'		42.0	
	43					

DRILLING LOG		DIVISION <i>SOUTH ATLANTIC</i>	INSTALLATION <i>CLEMSON, S.C.</i>	SHEET 1 OF 1 SHEETS
1. PROJECT <i>CLEMSON LOWER DIVERSION DAM</i>			10. SIZE AND TYPE OF BIT <i>1 3/8" 20 SPLITSPOON</i>	
2. LOCATION (Coordinates or Station) <i>Sta. 9+35, 295' DOWNSTREAM of CE of</i>			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) <i>MSL</i>	
3. DRILLING AGENCY <i>SAVANNAH DISTRICT DAM</i>			12. MANUFACTURER'S DESIGNATION OF DRILL <i>FALLING 314</i>	
4. HOLE NO. (As shown on drawing title and file number) <i>PF-103-A</i>			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED <i>6</i>
5. NAME OF DRILLER <i>C.D. JUSTISS</i>			14. TOTAL NUMBER CORE BOXES <i>0</i>	UNDISTURBED <i>0</i>
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN <i>27.1'</i>			16. DATE HOLE	STARTED <i>6-DEC-1982</i>
8. DEPTH DRILLED INTO ROCK <i>0.0'</i>			COMPLETED <i>6-DEC-1982</i>	
9. TOTAL DEPTH OF HOLE <i>27.1'</i>			17. ELEVATION TOP OF HOLE <i>+625.6'</i>	18. TOTAL CORE RECOVERY FOR BORING <i>%</i>
			19. SIGNATURE OF INSPECTOR <i>Manuel Palma (GEOLOGIST)</i>	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
<i>+625.6'</i>	<i>0'</i>	<i>c</i>	<i>d</i>	<i>o</i>	<i>JAR</i>	<i>g</i>
			<i>5'- BROWN, MEDIUM GRAINED CLAYEY SAND.</i>		<i>1</i>	<i>15 1-4-11</i>
			<i>WITH COARSE GRAINED SANDS</i>			<i>55 19-25-30</i>
	<i>5'</i>		<i>5m- PINK, ORANGE, BROWN, BLACK, FINE GRAINED, VERY MICACEOUS, SILTY SAND WITH MINOR CLAYS.</i>		<i>2</i>	<i>W.T. 20.5' 15 4-7-8</i>
			<i>Pink</i>			<i>Date 6-DEC-82</i>
	<i>10'</i>					<i>Depth to water during drilling 15 4-5-8</i>
					<i>3</i>	<i>13 5-6-7</i>
						<i>W.T. 8.4' 15 5-5-10</i>
	<i>15'</i>		<i>VERY MOIST</i>		<i>4</i>	<i>Water table reading 6-6-6</i>
						<i>27 hrs. after hole completed. 15 4-4-9</i>
	<i>20'</i>		<i>GREEN AND GRAY</i>			<i>13 5-5-8</i>
			<i>GREEN & GRAY, MEDIUM GRAINED, LOOSE (ALLUVIAL)</i>		<i>5</i>	<i>5 3-3-2</i>
	<i>25'</i>					<i>5 1-2-3</i>
						<i>15 2-3-12</i>
						<i>47 12-22-25</i>
						<i>25 10-11-14</i>
						<i>21 4-9-12</i>
						<i>14 4-7-7</i>
					<i>6</i>	<i>11 2-6-8</i>

+598.1'

TOP OF ROCK: 27.1'
BOTTOM OF HOLE: 27.1'

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT:

Number required to drive 1 3/8" ID splitspoon w/140 lb. hammer falling 30".

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Clemson Lower Dam	SHEET 1 OF 3 SHEETS
1. PROJECT Hartwell Lake			10. SIZE AND TYPE OF BIT 1 3/8" ID splitspoon &	
2. LOCATION (Coordinates or Station) 9+20, 120' downstream of centerline			11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 4x5 1/2" core bbl	
3. DRILLING AGENCY Savannah District			12. MANUFACTURER'S DESIGNATION OF DRILL CME-75	
4. HOLE NO. (As shown on drawing title and file number) PF-107 (CLD UD-7A)			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	
5. NAME OF DRILLER A. Padgett			DISTURBED 35 UNDISTURBED 0	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			14. TOTAL NUMBER CORE BOXES 2	
7. THICKNESS OF OVERBURDEN 51.8'			15. ELEVATION GROUND WATER	
8. DEPTH DRILLED INTO ROCK 14.7'			16. DATE HOLE STARTED 8 Nov 79 COMPLETED 4 Dec 79	
9. TOTAL DEPTH OF HOLE 66.5'			17. ELEVATION TOP OF HOLE +644.9'	
			18. TOTAL CORE RECOVERY FOR BORING 87 %	
			19. SIGNATURE OF INSPECTOR CARD SMITH/GUSTAVE ANDERSON	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	W.C. % e	BOX OR SAMPLE NO. JAR f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS h
644.9	0		SM-Brown, silty fine sand with some binder	24.6	1		7
					2		6
640.9	5		MH-Pink micaceous silt		3		12
					4		10
			Tan		5		13
			Pink	20.3	6		13
	10				7		25
				20.9	UD-7B	Sample Lab	
				23.1	8	No Class LL PL PI	23
					9	2 ML * * *	36
			Tan with some sand		10	6 SM 42 37 5	32
	15			20.3	11	23 SM 44 36 8	25
				22.9	UD-7A	27 SM NP NP NP	24
					12	30 UD-7A SP-SMNP NP NP	24
					13	*UD-7B SC 38 24 14	51
	20			28.4	14	for test.	37
			Pink		15		31
					16		30
	25			22.9	17		26
					18		34
					19		28
	30			24.3	20		26

Continued on Sheet 2
 NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT:
 Number required to drive 1 3/8" ID splitspoon w/ 140 lb. hammer falling 30".