

*Guide for Using the Hydrogeologic Classification System for Logging Water Well Boreholes by Thomas M. Hanna NGWA Press

2.2 Equipment and Functional Description of System Components

2.2.1 Raw Water Well

Raw water is supplied to Pump Station 4 from a well approximately one-half mile west of the Pump Station near Tea Lake. The multi-casing well is 171 feet deep and is fed by an artesian aquifer that flows at 600 gpm at 40 psig. The water temperature out of the well is approximately 44°F. A permafrost layer exists to a depth of 85 ft. and this section of casing is insulated with urethane. A 15.5 ft long 0.040" slotted 6" telescoping screen is in place at the bottom of the well.

An above ground heat traced pipe approximately 2,300 ft. long extends from the well house to the water treatment room. If the temperature drops below set point, the RIC-WIL Control Cabinet (34-HTP-2), located in the LL generator room, will generate an alarm.

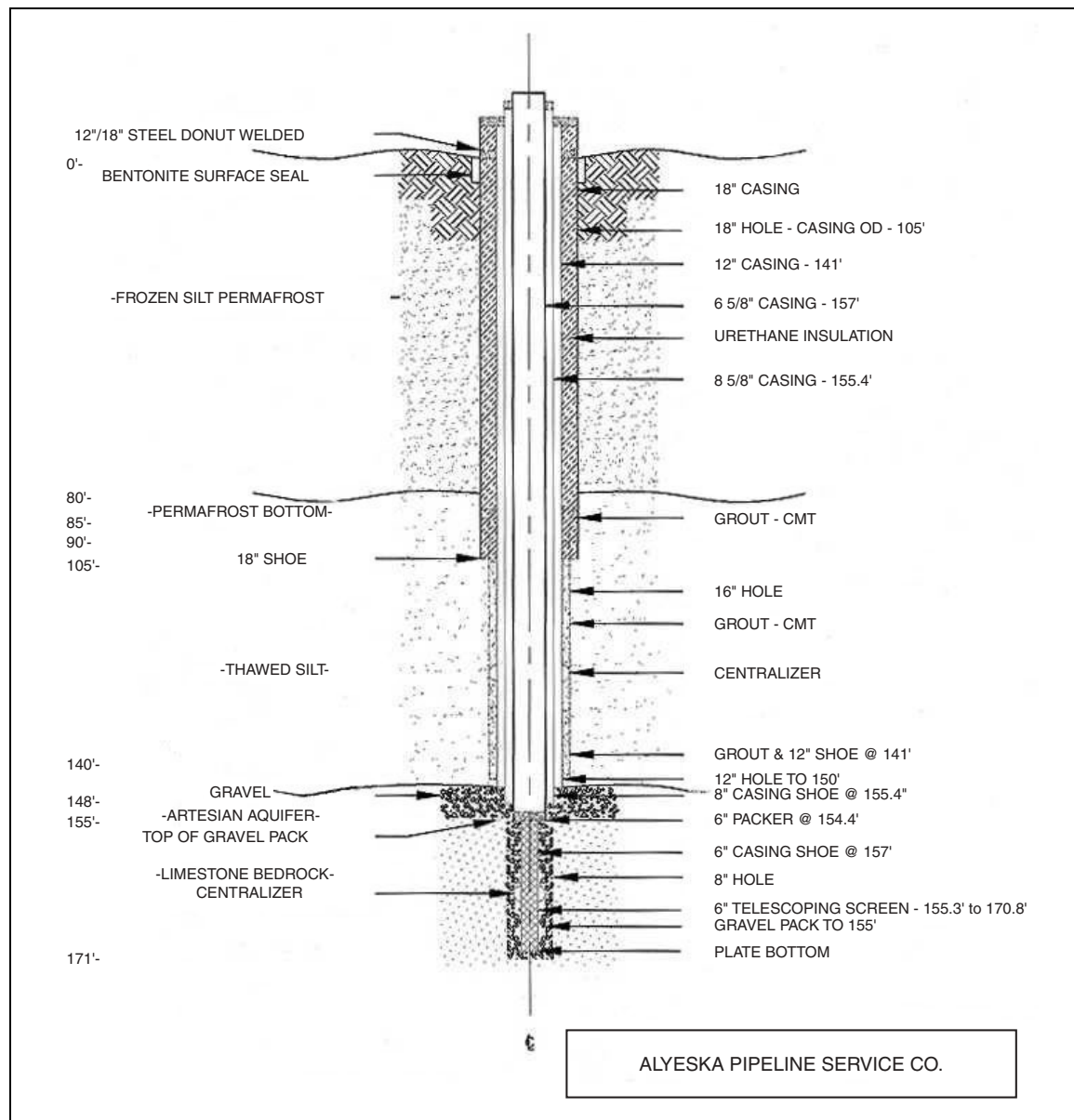
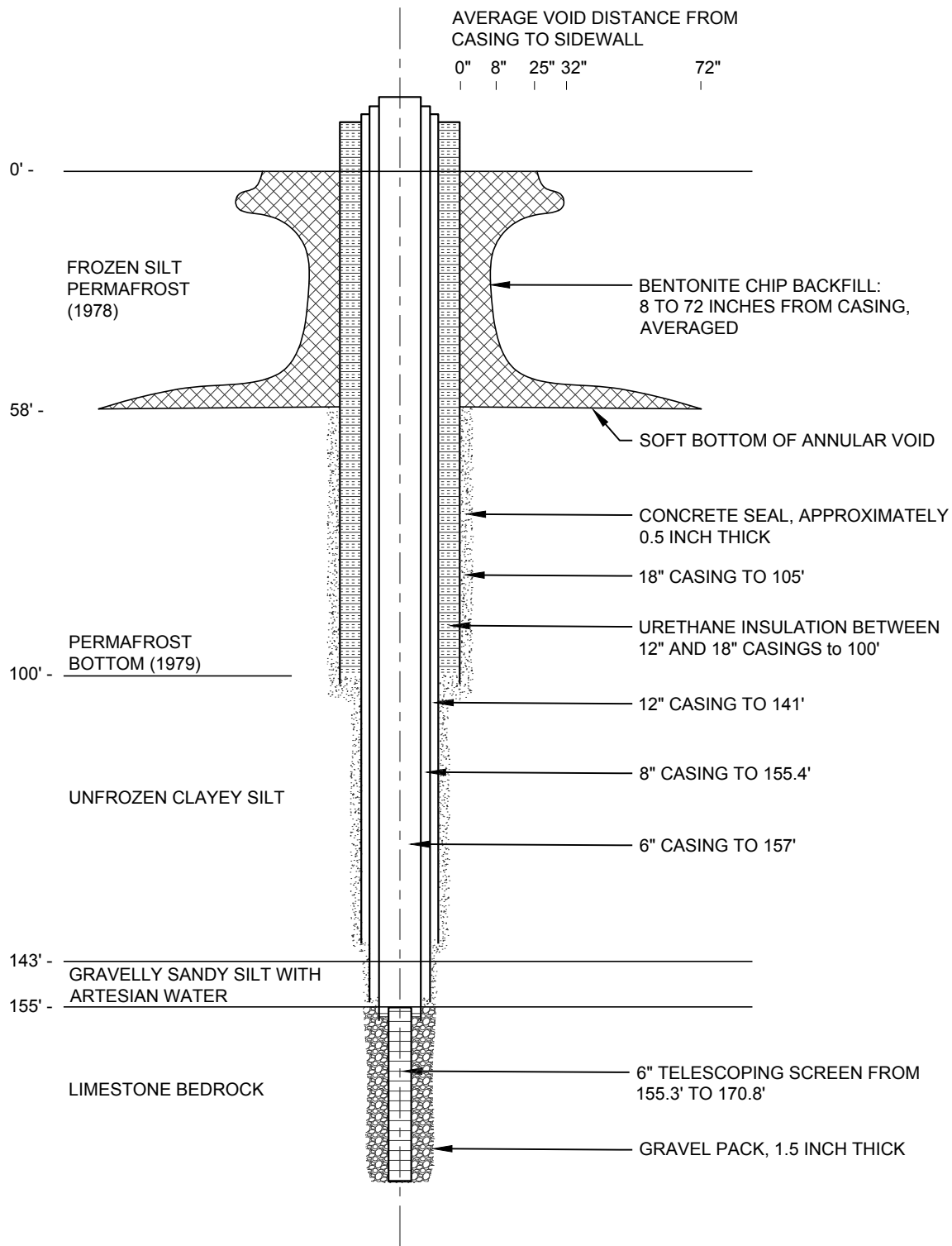


Figure 2. Raw Water Well

Last Edited By: cvallentine Date: 2019-04-10 Time: 9:50:27 AM | Printed By: cvallentine Date: 2019-04-10 Time: 9:52:18 AM
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NOTE(S)

1. NOT TO SCALE, APPROXIMATE HORIZONTAL EXAGGERATION FOR CASING OF 10:1 AND VOID OF 5:1.
2. WELL CONSTRUCTION DETAILS AND SUBSURFACE PROFILE FROM 1978 AS-BUILT AND BORING LOG DOCUMENTATION
3. CURRENT (2019) EXTENT OF PERMAFROST IS UNDEFINED.

CLIENT

ALYESKA PIPELINE SERVICE COMPANY

CONSULTANT



GOLDER

YYYY-MM-DD 2019-03-06

DESIGNED

-

PREPARED

CAV/APG

REVIEWED

CAV

APPROVED

-

PROJECT

PS04 TEA LAKE WALL REPAIR

PUMP STATION 4

TITLE

PS04 WATER WELL BACKFILL AS-BUILT SCHEMATIC

PROJECT NO.
18114404

CONTROL

REV.
A

FIGURE
1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

BORING LOG

25090

Alaska Pump Station 4

WELL No. 7

HOLE Ø 18"

DATE 9/25/10/2-10/7/78

TYPE DRILLING AUGER TUS' COW

WEATHER CLEAR

RIG

EDITION: STAR 72, m: w DEL.

COLD: 10°F 5k wind from S.

WATER LEVEL

SURF. ENCOUNTERED @ 143'

PAGE

1 OF 5

DEPTH	DRILL RATE	FRZ.	SOIL SYM.	SAMP TYPE	DESCRIPTION	COMMENTS
1			0.0	AUGER CUT	8-25-78 DRILL AND: ROAD BED MATERIAL - 3" MINUS	DEL w/ 18" AUGER TO 5' on 9-25-78
			0.0			STOP ON BULL. WHICH CAN'T REMOVE ON DEPTH
5	0900			AUG	ORGANICS: FEAT. ROOTS, WOODY DEBRIS	BEGIN W/ CABLE TOOL 10-2-78
	1300				ml, SILT w/ GRAVEL; BE, 15% vis. ice, brnsh-grey	2500 BIT BIT 17" BAILING w/ 10" p SAND PUMP
	2ft/hr			BAIL	BOULDER 5-6 1/2' IN SIDEWALL NO RETURNS	DEL ~ 3' AHEAD OF CASING
10	1630				ml, SILT w/ GRAVEL, BE 20% VISIBLE ICE (AS PODS 1/8 TO 3/8") BRNSH-GREY, NON-CALL	
	PS15				10-4-78	
	1000			BAIL	ml, sandy silt w/ ~5% 1/4" ROUNDED GRAVEL, BE, VIS ICE XLS, brnsh-grey	CSC DOWN @ 55' w/ 4t
	1030			BAIL	sand fn grained, round to subround, PREDOMINANTLY QTZ. Sand ~20% of sample	
15				BAIL	SAME AS ABOVE	
	1230			BAIL	ml, sandy silt, AS ABOVE BUT w/ ONLY OCCASIONAL GRAVELS 10-15%	1st joint down @ 1230
	2ft/hr			BAIL	VIS. ICE PODS (1/4-3/8"), NO CALL	
20					ml, SILT w/ SOME SAND, BE OCCASIONAL ICE XLS., GREY SAND VERY FN, ROUNDED, 47% NON-CALL.	DRIVE 1st 12ft (19-21), CSC FALL DURING DEL TO 25'
	8ft/hr			BAIL		
25	1515			BAIL	ml, SILT w/ OCCASIONAL MINUTE ICE XLS., B.E., NON-CALL, GREY	SHUT DOWN FOR DINNER DELN 24hr DEL
	1700					
	1.5ft/hr			BAIL	ml, silt w/ small % sand & occasional gravel, B.E., NO VISIBLE ICE GRAU. ANG-POSSIBLE LH CHIPS (DALL SAYS HAS HIT NO RLS.) NON-CALL, GREY	DALL NOTES NO ICE ON BIT THIS RUN
30						
	2245					
35	43ft/hr					DALLS SPENT 10-5 PLUMBING CSC, BACK BIT 10-5, PLUMBING CSC 10-6; REAMER BIT 10-6.
						SHIFT CHANGE
40	2400			BAIL	10-7-78 ml, SILT w/ 5-10% sand and occasional 1/4" ROUNDED GRAVEL, BN., NO VISIBLE ICE, brnsh-grey. VERY SLIGHT CALL (APPEARS TO BE REACTING w/ NG AND GRUIN)	
	1445					
	1800					

LOGGED BY: R. HARRIS

UD 12-12-8 BA

BORING LOG

Alyeska Pump Station 4

HOLE Ø 18"

TYPE DRILLING CABLE TOOL

RIG STAR 72 M.W.D.C.

WATER LEVEL 0, ENCOUNTERED @ 145'

WELL No. 7

DATE 10/7-10/10/78

WEATHER CLOUDY

+ 8°F Calm

PAGE 2 OF 5

DEPTH	DRILL DATE	FRZ?	SOIL SYM	SAMP TYPE	DESCRIPTION	COMMENTS
41	754/ 1-45			BAIL	m1, SILT w/ SAND: OCCASIONAL GRAVEL, B.N. BENISH GRAY. SAND 10% 15%, U.F. TO COARSE, RUB. MEDIUM, SUB- 10-2-78 ANG. TO SUBEND. GRAU 5 TO 1/2" AU 1/4" COMPOSED OF 2 GRAINED SS OR SLTST, NON-CALL. (AS IS THE SAND)	DAL STEADY, OCC. RKS ENCOUNTERED
45	754/ 0400 0515 0645 0830 754/ 1100 1245			BAIL	m1, SAME AS ABOVE	THE LOG HAS BEEN FALLING BY ITS OWN WEIGHT - NO DRIVING IS NECESSARY
50	754/ 1700 2215 754/ 2345 0100			BAIL	m1, SILT w/ SOME SAND, B.N. BENISH GRAY. SAND U.F. TO COARSE, RUB FINE, MOSTLY SUBROUND, NON- CALL. SAND 5 TO 10%	REPAIR BIT 1700-2115
55	754/ 1700 2215 754/ 2345 0100			BAIL	m1, SILT w/ SOME SAND AND CLAY, B.N. BENISH-GRAY, NON- CALL. SAND ~10%, CLAY ~5% 1/8" THREADS, SLIGHTLY COHESIVE WHEN DRY. SAND U.F. TO COARSE, AU FINE. MUCH OF COARSE SAND: THE OCCASIONAL GRAVELS APPEAR TO BE 2H. CHIPS RATHER THAN THE IN-SITU (ROUNDED) PARTICLES	HANDRAIL BIT 2345-0100
60	754/ 0500 0630					
65	754/ 1100 1515			BAIL	m1, CLAYEY SILT w/ SAND, B.N. BENISH GRAY CLAY ~10-15%, SAND ~5%, U.F. TO MEDIUM, SUBANG TO SUBROUND, COMPOSED OF U.F. SS. OR SLTST. 1/8" THREADS, SL. COHESION	HANDRAIL BIT 1100-1350 (1 hr out for lunch DALLING HARDER THAN LAST 13')
70	754/ 2130 2230 0045 0145 0315 0430 754/ 0630 1430 1800 1845			BAIL	m1, CLAYEY SILT w/ SAND, AS ABOVE EXCEPT CLAY FRACTION INCREASING TO ~15% ROCK CHIPS w/ CLAYEY SILT. CHIPS TO 2" INCRUSTED IN CLAYEY SILT. ROCK TYPE VC SS MED GRAY SAND FRACTION 15% LITH CHANGE, DESCRIPTION NEXT PAGE	DONE GOR 6 1/4" DENT IN LOG. THAT CAUGHT BIT, ROCK ROLLED INTO LOG: CAUSING DENT. DOWN TIME 5 HRS BEN DEL EASIER
75						
80						

LOGGED BY: R. HARRIS

AD 12-12-8 BA

DORING LOG

Alyeska Pump Station 4

WELL No. 7 25090
 DATE 10/10 - 10/14
 WEATHER (10/10) LT SNOW
+1°F, 2K 4000 N.
 PAGE 3 OF 5

HOLE Ø 18" (TO 106') : 16"
 TYPE DRILLING CAULF TOOL
 RIG STAR 72. MW
 WATER LEVEL Ø: ENCOUNTERED @ 143'

DEPTH	DRILL RATE	FRZ? SOIL SAMP. SYM. TYPE	DESCRIPTION	COMMENTS
81	1.8 FT/HR 2215 2230		SM, SILTY SAND W/SOME CLAY, B.E. ICE RICH, VISIBLE ICE PEEPS TO 2 1/8" ICE 20%; SAND UP TO MED, SUBSAND TO SUBANGULAR, 60% OF SAND, NON-CALL. THAW UNSTABLE	DEL RATE INCREASE
85	6.7 FT/HR 2315 2315	CHUCKS OUT OF BIT	M.I., SANDY SILT, B.E. ICE RICH. VISIBLE ICE PEEPS TO 2 1/8" ICE 50%, ≈ 40 P.C.F. SAND UP TO M, SUBSAND TO SUBANG, 15% of sample, LT BROWN-GRAY, NON-CALL. THAW UNSTABLE	HAND BILED SAND UNDISTURBED
90	4 FT/HR 0030 1100		10-10-78 10-10-78 NO SAMPLE REPRESENTATIVE BECAUSE OF SLOP FROM C.B.C. OPERATION	SHIFT CHANGE DR. STUCK IN C.B.C. BEGIN PUMPING C.B.C. 10/11-10/12
95	1130		M.I., SILT W/SOME SAND, B.E. ICE RICH - VISIBLE ICE PEEPS TO 3 1/8" ICE ≈ 50%. SAND UP TO R, SUBSAND TO SUBANG, ≈ 10% SAND, BROWN-GRAY, NON-CALL	
100	1.8 FT/HR 1845 1845 1.6 FT/HR 2000 2135	BIT CUTTING	CL- SILTY CLAY, THAWED, SOFT, STICKY, DEPENDS HIGH PLASTICITY. THAWED TO 1/16", NON-CALL, BROWN-GRAY	DEL CHARACTERISTICS CHANGING. DEL PAUSE TOP @ 101' FINDS LUMP ON TOP OF BIT
105	3 FT/HR 2330 0230	BIT CUTTING	CL-CH SILTY CLAY-THAWED. SOFT, STICKY, PLASTICITY HIGH, THAWED TO < 1/16" NON-CALL, BROWN-GRAY	← 105.30' B.M. 18' C.B.C. FOR C.B.C. 17' STICK UP B.M. 16" HOLE
110	0.15 FT/HR 1.5 FT/HR			DEL COMMENTS THAT FORMATION IS VERY STICKY
115	0.730 0.730 0.900 1.200	BIT CUTTING	CL- SILTY CLAY, THAWED, SOFT, STICKY, MOD PLASTICITY, THAWED TO < 1/16", NON-CALL, BROWN-GRAY A ROCK 4" x 4" x 2" ALSO CAME UP ON BIT. METAMORPHIC - F. L. ANDERSON LT GRAY, ROUNDED, CUBIC (THE WELL)	DEL COMMENTS THAT FORMATION IS VERY STICKY DEL COMMENTS THAT FORMATION IS VERY STICKY
120	1.4 FT/HR			DEL NOTES THAT P.M. IS DEL A LITTLE DIFF.

LOGGED BY: R. HARRIS

UD 12-12-8 BA

DORING LOG

25090

Alyeska Pump Station 4
 HOLE Ø 16" to 142.10" below
 TYPE DRILLING Cable Tool
 RIG Star 72 miw
 WATER LEVEL Ø: ENCOUNTERED @ 143'

WELL No. 7
 DATE 10/14-
 WEATHER Clear
 +8°F, Calm (10-14-78)
 PAGE 4 OF 5

DEPTH	DRILL DATE	FRZ?	SOIL SYM.	SAMP TYPE	DESCRIPTION	COMMENTS
121	1630 1645			BIT CUTTING	CL GRAVELY SILTY CLAY w/some sand, THAWED, SOFT TO STIFF (CUTTINGS NORMALLY), COARSE FRACTION < 50%; GRAVEL 1/2" to 1"; RARE TO SUBSAND, OBLONG, FRAG. 25 or 40%.	DEL SMOOTH & STEADY. DEL w/ HOLE FULL OF WATER
125	1800 1845			BIT CUTTING	CL 210% of sand. CLAY-SOFT, LOW PLAS., THREADS TO 1/16" NON-CALL, BROWN-GRAY, 100 PCF	
130	2000 2010			BIT CUTTING	SAME AS ABOVE GRADATIONAL CONTACT	DRILL COMMENT DEL. SLOWER & STEADYER
135	2230 2245			BIT CUTTING	CL SILTY CLAY w/12% SAND & OCL. GRAVEL. STIFF TO VERY STIFF, LOW PLAS., THREADS TO 1/16", NON-CALL BROWN-GRAY, 100 PCF	
140	2400 0100			BIT CUTTING	CL SILTY CLAY w/TRACE SAND, STIFF, LOW PLAS., THREADS TO 1/16" NON-CALL, BROWN-GRAY 100 PCF	
142	0300 1930			BIT CUTTING CIRCU CUTTING	CL SILTY CLAY w/TRACE F. SAND, STIFF, MOD PLAS. THREADS TO 1/16", NON-CALL, BROWN-GRAY, 100 PCF.	UNDERSTANDING 142 ← Btm 16" HOLE ALSO BROWN CEMENT PLUG Btm 10" HOLE DEL. w/ CIRCULATION WATER
143	1 FT/HR				SP- SAND, MED TO COARSE, WELL BOUNDED TO SUBSAND, OCL PLATES OF RTZ, W/SHOWN 20 FEET OF PREDOMINANTLY DARK GRAY SILTST. 22% RTZ GRAINS. OCL SILT PIECES. PREDOMINANT RETURNS (35%) ARE GRAY CEMENT & AN OCL PIECE OF ASPHALT ROOFING COMPOUND FROM INSULATION WORK	CIRCULATING PIPE 30 IMPOSSIBLE TO TELL EXACTLY WHAT DEL IS. FIRST INDICATIONS OF WATER @ 143 CONSIDERATION @ 144 FL RT 3/4-1 gpm EVEN UNDER WEIGHT OF 250' OF GELI 200' BASIC
144	2130 2150			CIRCU CUTTING	SW SAND, FINE TO COARSE, WELL BOUNDED TO SUBSAND, SPECIALIZED PLATES, FAIR SORTING (AV. COARSE). PREDOMINANTLY DARK GRAY SILTST. 50% OF RETURNS ARE CEMENT THIS SAND IS GENERALLY COARSER THAN THE SAND @ 143-144 SOME SILT IS GETTING THROUGH THE SAMPLE SCREEN. IT IS PROBABLY MATERIAL FOR THE SAND BUT IMPOSSIBLE TO EST %.	TO CONTROL WATER @ 144 USE 300' MORE BASIC + 2 1/2" EX THIN FLOW STILL 1/4 gpm
145	2200 2210					
146	2230 0100				10-21	

LOGGED BY R. HARRIS

WD 12-12-8 BA

BORING LOG

Algeska Pump Station 4

WELL No. 7

HOLE Ø

10" ? 8" (from 155' to T.O.)

DATE

10/21 - 10/26

TYPE DRILLING

Cable Tool w/air down to 125'

WEATHER

COLD, CLOUDY

RIG

Star 72

TO CLOUDY - 10 TO -15°F

WATER LEVEL

SUBP. FIRST EVENT @ 143'

PAGE

5 OF 5

DEPTH	DRILL RATE	FRZ?	SOIL SYM	SAMP TYPE	DESCRIPTION	COMMENTS
146	0100					
147	1.30% 0130			CIRC. CUTTING	SANDY SILT w/CLAY, 30:60 w/10% CLAY BANDS - heavy, occ. GRAVEL & 2" L' COBS ~100 P.F., HARD (2 DENSE) HIGH CALCAREOUS; SAND IS MED TO COARSE, ROUNDED TO ANG, SPHERICAL TO PLATES, FAIR SORTING. GRAVEL FOLLOWS SAME WIDE BANDS. POSSIBLE Thin GRANULAR FACIES composed of 10% QTZ, 30 LT:DR silty mudstone GRAINS, w/ occ. Limestone GRAINS.	DELS. HARDER These CALCAREOUS were LOOSED w/ air conditioning from BAIL SAMPLES @ 215'
148	0230					GAINING WATER @ 20 GAL/MIN
150	- 0515				6" BOULDER; 2' COBBS OF Limestone, conglomerate, AND QUARTZITE (GATH) FELL IN HOLE SOMEWHERE BTW. 145' & 155'	
152				CIRC. CUTTING	SANDY SILT w/CLAY AND OCCASIONAL GRAVEL AS ABOVE EXCEPT SAND IS GENERALLY COARSE.	GAINING WATER @ 20 GAL/MIN LOSING WATER SHOON
154	0945 0945 2.0% 1015 0730 3.0% 1100 2100				SILTY SAND w/CLAY; OCC. GRAVEL SAND UP TO COARSE AND TO ANGULAR. CONTACT	DELS COMMENT, 'DAMS LIKE BOAT'
156	1100 2100 7.0% 2400 0115			BAIL	10-24 SANDY LIMESTONE, . D. GRAY, U. WELL INDURATED, EXTREMELY HARD U. FINE TL, SAND U. FINE, ANG. TO ANGULAR, COMPOSED OF QTZ, IRON MINES. 20% SAND, 15% - 200, REST LINT SL.	Well blew out flow ~ 75 GPM Btm 5' SEC.
158	2400 0115 9.0% 0230 0530 3.0% 0530 0530				10-25 15'-15.7' L.S. IS SO HARD THAT RETURNS ARE ALL FN SAND SIZE PARTICLES, 15.7'-160' many 1/2" - 1" CHUNKS (RANDOM ANGULAR)	← TOP 6" SEC. ← Btm 6" SEC. FEATURED 20% EQUANTAL 10% PM
160	0230 0530 3.0% 0530 0530					VERY HARD BALL
165	2.0% 0600 0900 7.0% 1015 1300			BAIL	10-26 SANDY LIMESTONE, AS ABOVE, EXCEPT BREAKING UP INTO 1" PIECES.	DELS SAMPLED
170	4.0% 2115 4.0% 1030			BAIL	SANDY LIMESTONE, AS ABOVE, CUTTINGS ALL MED. SAND SIZE WITH OCC. 1/2" OR 1" PIECE.	DELS. HARD GRAVEL BASED, TAIL IN HOLE 2130 REMOVE 2145
					10-26 T.D. 171'	← Btm 6" SEC.

LOGGED BY R. HARRIS

WD 12-12-8 BA