

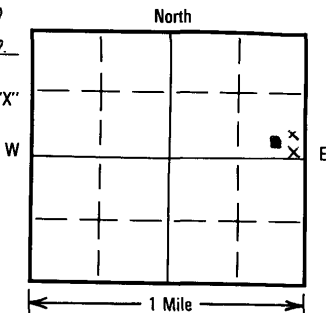
SOUTH DAKOTA WATER WELL COMPLETION REPORT

07-92

Location SE 1/4 NE 1/4 Sec 14 Twp 2N Rg 8E

County FENNINGTON Co.

Please mark well location with an "X"



Well Completion Date See attached forms

LOCATION:

Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)? \_\_\_\_\_ ft. from \_\_\_\_\_ (identify source).

PROPOSED USE:

- Domestic/Stock  Municipal  Business  Test Holes
 Irrigation  Industrial  Institutional  Monitoring well

METHOD OF DRILLING: OD = 10.25"
ID = 6.25"
HSA

CASING DATA:

- Steel  Plastic (PVC)  Other

If other describe \_\_\_\_\_

Table with columns: PIPEWEIGHT, DIAMETER, FROM, TO, HOLE DIAMETER. Row 1: 2 LB/FT, 2 IN, FT, FT, IN.

GROUTING DATA: See attached forms

Table with columns: Grout Type, No. of Sacks, Grout Weight, From, To. Row 1: Cement/Bentonite, lb./gal, ft.

Describe grouting procedure Grout pump & tremied

SCREEN:  Perforated pipe  Manufactured

Diameter 2 IN Length See attached FEET

Material See attached forms

Slot Size 0.010 Set From \_\_\_\_\_ Feet to \_\_\_\_\_ Feet

Other information \_\_\_\_\_

WAS A PACKER OR SEAL USED?  YES  NO

If so, what material? Bentonite

Describe packer(s) and location? See attached forms

DISINFECTION:

Was well disinfected upon completion? YES, How:
X NO, Why Not?
Monitoring use only

Laboratory sent to for water quality analysis \_\_\_\_\_

Well Owner: U.S. Air Force
Business Name: Ellsworth Air Force Base
Address: Ellsworth, S.D. 57706

WELL LOG: See attached forms

Table with columns: FORMATION, DEPTH (FROM, TO). Multiple rows for data entry.



STATIC WATER LEVEL See attached forms Feet

If flowing: closed in pressure N/A PSI
GPM flow N/A through N/A inch pipe
Controlled by  Valve  Reducers  Other N/A
Reduced Flowrate N/A GPM
Can well be completely shut in? N/A

WELL TEST DATA: N/A

- Pumped Describe:
 Bailed
 Other

Pumping Level Below Land Surface
\_\_\_\_\_ ft. After \_\_\_\_\_ Hrs. pumped \_\_\_\_\_ GPM
\_\_\_\_\_ ft. After \_\_\_\_\_ Hrs. pumped \_\_\_\_\_ GPM
If pump installed, pump rate \_\_\_\_\_ GPM

REMARKS Well Numbers:

MW 930411
0412

This well was drilled under license # 565

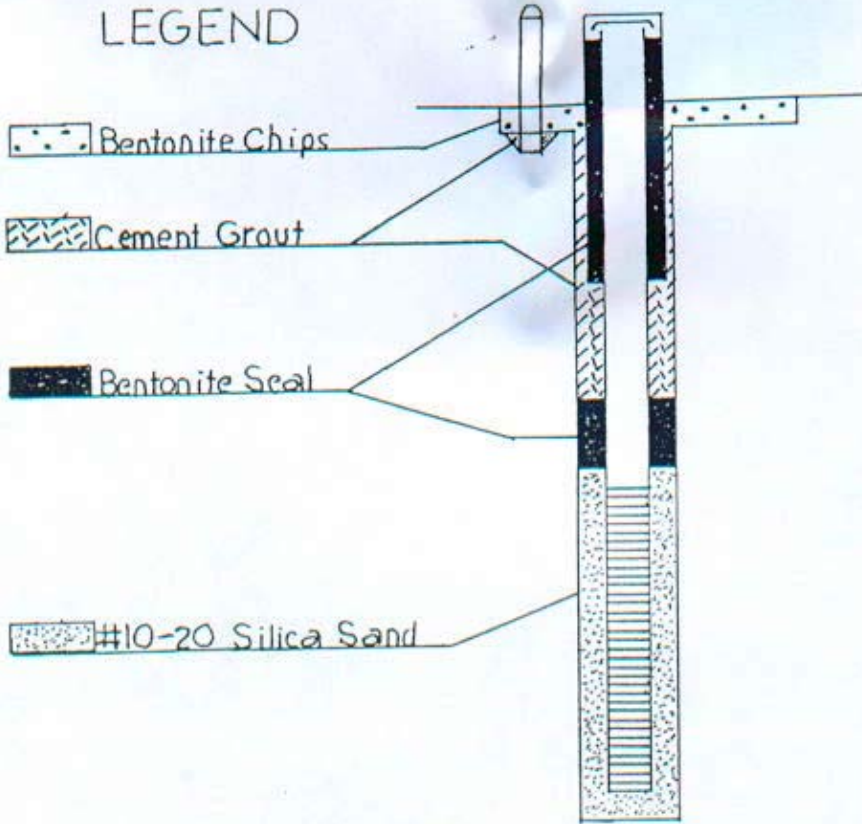
And this report is true and accurate.
Drilling firm Twin City Testing Corp.

Signature of License Representative:
[Signature]

Signature of Well Owner or Equitable Property Holder:

Date: 2/3/94

LEGEND

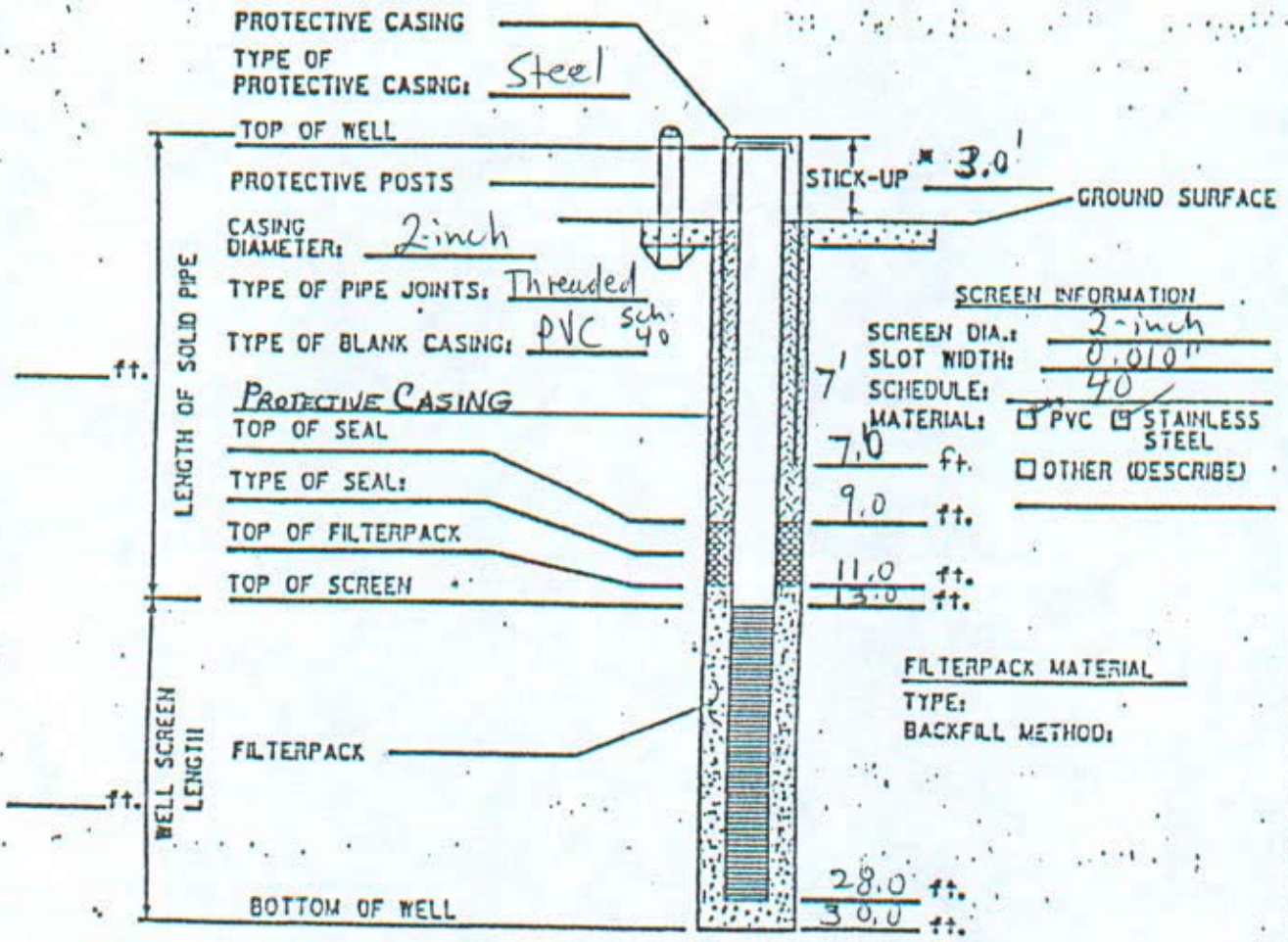


TITLE: MONITORING WELL MATERIALS DIAGRAM EA ENGINEERING ELLSWORTH AIR FORCE BASE	
PROJECT #: TCT NO. 6100-93-0130	
DATE: 1-28-94	SCALE: NONE
DRAWN BY: TSO	CHECKED BY: SDS

ELEVATION GROUND WATER			PROJECT
DATE INSTALLED	STARTED	COMPLETED	LOCATION (Coordinates or Station)
9-4-93	8-23-93	8-24-93	Boetke Property
ELEVATION TOP OF HOLE			SIGNATURE OF INSPECTOR
TOTAL DEPTH OF HOLE			HOLE NO. (as shown on drawing title and file number)
			MW930411

## MONITORING WELL CONSTRUCTION DIAGRAM SB 93 04 18

(ALL MEASUREMENTS FROM GROUND SURFACE)



### WELL DEVELOPMENT

METHOD: \_\_\_\_\_  
 TIME SPENT DEVELOPMENT: \_\_\_\_\_  
 VOLUME OF WATER REMOVED: \_\_\_\_\_  
 VOLUME OF WATER ADDED: \_\_\_\_\_  
 DESCRIPTION OF PREDEVELOPMENT WATER: \_\_\_\_\_  
 \_\_\_\_\_  
 DESCRIPTION OF POST DEVELOPMENT WATER: \_\_\_\_\_  
 \_\_\_\_\_

### WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS  
 DATE/TIME/LEVEL 10-28-93 20.16 TOC  
 \_\_\_\_\_  
 \_\_\_\_\_

DEPTH FROM TOP CASING  
 AFTER DEVELOPMENT: \_\_\_\_\_

HTW DRILLING LOG

SB930418

Boring No. SB930418 MW18  
Sheet 1 of 6

1. Company Name: EA Engineering		7. Drilling Sub: TCT	
3. Project: Ellsworth AFB		4. Location: OFFSITE OA 4	
5. Name of Driller: HJ		6. Drill Rig Designation: CME 75	
7. Sizes and Types of Drilling and Sampling Equipment	6 1/4 HSA	8. Hole Location: ~ 40ft NE 'SB930418B	
	6 in x 5 ft	9. Surface Elevation:	
	Continuous Split Spoon Sample	10. Date Started: 23 AUG 1993	
12. Surface Composition: GRASS		11. Date Completed: 24 Aug 1993	
13. Depth to Top Shale: ~ 17' (?)		15. Depth Groundwater Encountered (from samples): Dry	
14. Total Depth of Hole: 38'		16. Depth to Water & Time After Drilling Completed: - Det	
18. Geotechnical sample		17. Other Water Level Measurements/Times: @ 1700 hrs 24 AUG - 36.7'	
Disturbed		Undisturbed	
20. Samples for Chemical Analyses: Direct push - field lab		19. Number & type of Cores Taken:	
VOC		Metals	
Other		Other	
Other		Other	

22. Disposition of Soil Boring	Backfilled	Monitoring Well	Other	23. Signature of Inspector
				<i>[Signature]</i>

Depth (a)	Analyt. Sample (b)	Heads pace (c)	Lith Column (d)	Lithologic Description (e)	Remarks (h)
1		Ø	OH/ML	DK BROWN ( 104R/3/3 ), ORGANIC MATTER, GRASS ROOTS, CLAYEY SILT, SL. MOIST TO DAT. FIRM, SL PLASTIC NO TOUGHNESS. (50% ORG & SL, 15% CL)	BEGIN @ 1430
2		Ø	ML/CL	GRAY ( 104R/5/3 ), CLAYEY SILT, SOME ORG. MATTER ROOTS - STRONG REACTION TO ACID (NITRIC), little fractures: (50-50% CL & SILT)	
3			ML/CL	SAME AS ABOVE WITH 1/2 W. POWERY CALC. CRYSTALS. SILTY CLAY. SOME FRACTURES. DRY. VERY HARD - STRONG CEMENTATION. SL. PLASTICITY; LOW TOUGHNESS.	
4				TAN ( 104R/5/2 ), SILTY & CLAY. SAME AS ABOVE - MORE CALCITE IN PART OF SPOON.	
5					NO RECOVERY 4-5'

# HTW DRILLING LOG

 Boring No: SB930418  
~~BLW930418~~

Project: Ellsworth AFB

offsite on 4

Inspector:

ES

Sheet 2 of 6

Depth (a)	Analyt. Sample (b)	Head pace (c)	Lith Column (d)	Lithologic Description (e)	Remarks (h)
			?		
5			ML	Brown (10YR 5/4), <u>SILT</u> , trace med sub-rounded gravel, very fine-powdery weak cementation, SL. MOIST to DRY.	
6		⊕			
7			?		
8					No Recovery 7.5-10'
9					
10					
11		⊕	GM	Brown mottled (10YR 4/3), <u>Gravelly SAND</u> , f-c sub rounded to rounded gravels in a m-c sand, silty sand matrix. Fairly well sorted. DRY to SL. MOIST, (40-50% GvLS, 50-60% SAND & SILT)	
12			GM	Brown/lt gray (10YR 3/3), silty gravel. f-c gravels sub x, in a silty clay matrix. MOIST. (60% GvLS, 30% Matrix)	

HTW DRILLING LOG

Boring No: SB930418

Project: Ellsworth AFB

offsite on 4

Inspector: EJ

Sheet 3 of 6

Depth (a)	Analyt. Sample (b)	Heads pace (c)	Lith Column (d)	Lithologic Description (e)	Remarks (h)
			GM		
13			?		No Recovery.
14					
15			?		
16		⊕	GM/GC	Bony (1042/5/4 ?), <u>CLAYY/SILT GRAVEL</u> , Fe sub & gravels & cobbles ~ 4-5 in dia, with silty clay matrix. Moist. Tip of spoon looks a little wet. (70% Gues, 30% Matrix)	15-17' Recovery.
17					No Recovery 17-20'
18			WSH		Driller SAYS HIT SHALE @ 17'
19					
20					

HTW DRILLING LOG

Boring No: 58930418

Project: Ellsworth AFB

OFFSITE 004

Inspector: ES

Sheet 1 of 6

Depth (a)	Analyt. Sample (b)	Heads pace (c)	Lith Column (d)	Lithologic Description (e)	Remarks (h)
20			?		Picked up Brown @ 20ft - No sample, Maybe taking a COBBLE down as we drill. Will drill down 2' w/o sample. Lift auger & see if can get cobble out.
21			(sh?) WSH		
22			?		
23					
24		3.8	clay weather shale WSH	GRAY (10% 4/3) & brown, CLAY SHALE - Dense - Very firm, WEATHERED SHALE. DRY.	1730 - <del>END</del> DRILLING FINISHED
25					
26			clay weather shale WSH	DK GRAY (10% 3/3), CLAY SHALE, VERY HARD, DRY to SL. MOIST, WEATHERED. Little to no FRACTURES.	
27					24 AUGUST - 0740 - 6 inches Borehole - DRY. Will continue Drilling

# HTW DRILLING LOG

Boring No: 58930418

Project: Ellsworth AFB

offsite 0u4

Inspector: ES

Sheet 5 of 6

Depth (a)	Analyt. Sample (b)	Heads pace (c)	Lith Column (d)	Lithologic Description (e)	Remarks (h)
28					No Recovery 27.5 - 30ft
29					
30					
31			HIGHLY FRACT. WEATH. CL	GRAY, CL/SILT. HIGHLY FRACTURED <del>30.5-31</del> WEATHERED, MOIST. SOFT. <del>no fractures</del> <del>@ 30.5-31'</del>	
32				WEATHERED, CLAY - NO FRACTURES - MED STIFFNESS	No Recovery 31.5 - 40'
33					
34					
35					



# HTW DRILLING LOG

Boring No: 58930418

Project: Ellsworth AFB

OFFSITE 004

Inspector: EJ

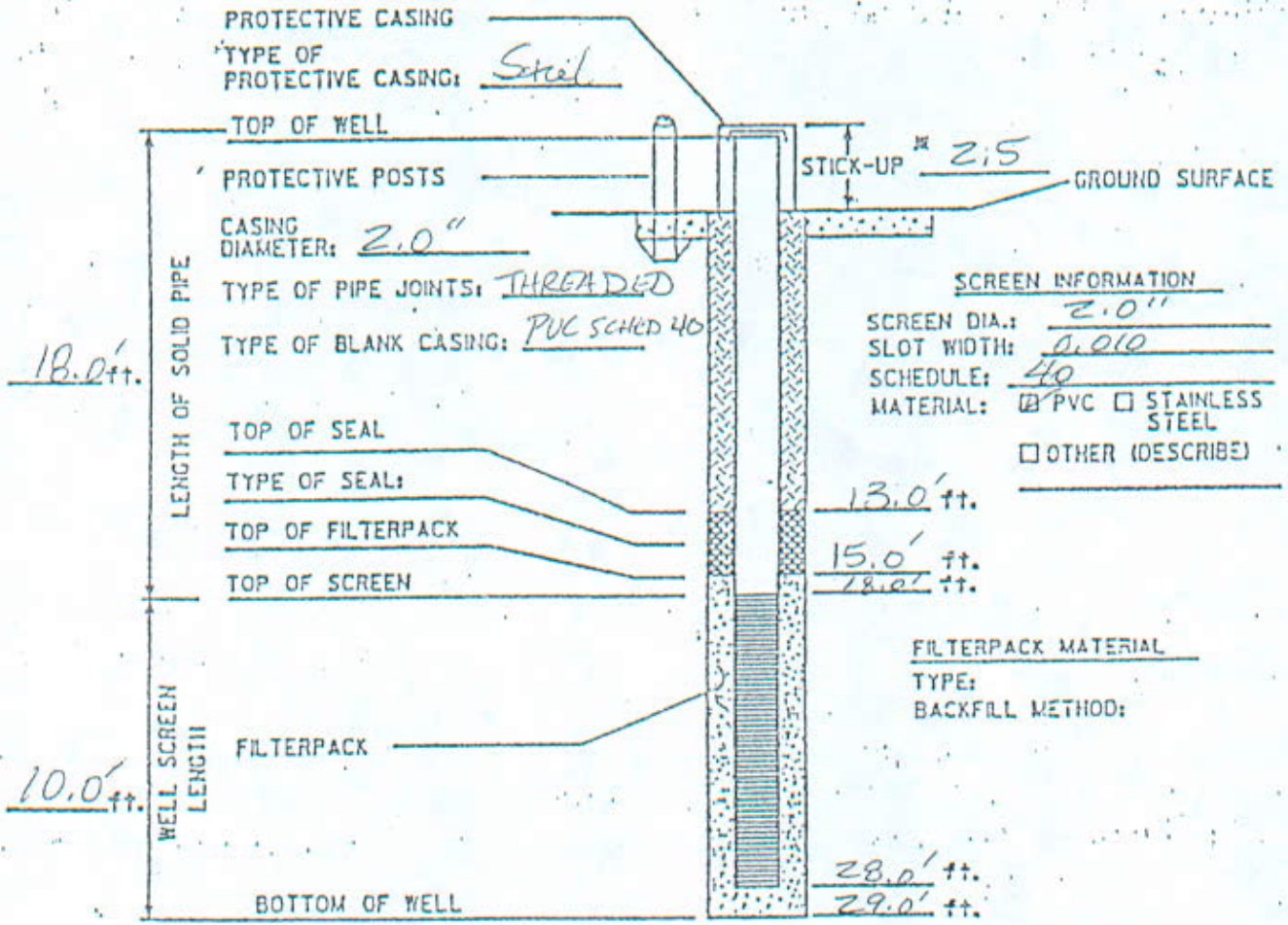
Sheet 6 of 6

Depth (a)	Analyt. Sample (b)	Heads pace (c)	Lith Column (d)	Lithologic Description (e)	Remarks (h)
35				DK GRAY (104RB) 2, FRACTURED SHALE - WATER IN FRACTURES. FIRM.	
37					
38					CBM @ 38'
39					
40					pulled up 10' & gauge water recharge 1200 hrs - No water some mud & bottoms pull up boxes to 10ft.

ELEVATION GROUND WATER			PROJECT <u>EAAPB RIF'S</u>
DATE INSTALLED <u>19 AUG 93</u>	STARTED <u>18 AUG 93</u>	COMPLETED <u>19 AUG 93</u>	LOCATION (Coordinates or Station) <u>OU-4 OFF-SITE</u>
ELEVATION TOP OF HOLE			SIGNATURE OF INSPECTOR <u>[Signature]</u>
TOTAL DEPTH OF HOLE <u>29.0'</u>			HOLE NO. as shown on drawing title and file number) <u>S13930419</u> <u>MW930412</u>

### MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)



#### WELL DEVELOPMENT

METHOD: \_\_\_\_\_  
 TIME SPENT DEVELOPMENT: \_\_\_\_\_  
 VOLUME OF WATER REMOVED: \_\_\_\_\_  
 VOLUME OF WATER ADDED: \_\_\_\_\_  
 DESCRIPTION OF PREDEVELOPMENT WATER:  
 \_\_\_\_\_  
 DESCRIPTION OF POST DEVELOPMENT WATER:  
 \_\_\_\_\_

#### WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS  
 DATE/TIME/LEVEL 8/24/93 (0805) 17.25'  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 DEPTH FROM TOP CASING  
 AFTER DEVELOPMENT: 27.25'

HTW DRILLING LOG

MW12

Boring No.

SB930419

Sheet 1 of 4

1. Company Name: EA Engineering		7. Drilling Sub: TCT	
3. Project: Ellsworth AFB		4. Location: OFF SITE DU-4	
5. Name of Driller: CURTIS HOWE		6. Drill Rig Designation: CME 75	
7. Sizes and Types of Drilling and Sampling Equipment	6 1/4 ID HSA		8. Hole Location: SB930419 / MW930412
	6", 5' long		9. Surface Elevation:
	SPUT BARREL		10. Date Started: 18 AUG
		11. Date Completed: 19 AUG	
12. Surface Composition:		15. Depth Groundwater Encountered (from samples):	
13. Depth to Top Shale:		16. Depth to Water & Time After Drilling Completed:	
14. Total Depth of Hole: 29.0'		17. Other Water Level Measurements/Times:	
18. Geotechnical smpls	Disturbed	Undisturbed	19. Number & type of Cores Taken:
20. Samples for Chemical Analyses	VOC	Metals	Other
			Other

22. Disposition of Soil Boring	Backfilled	Monitoring Well	Other	23. Signature of Inspector Will. Ford

Depth (a)	Analyt. Sample (b)	Heads pace (c)	Lith Column (d)	Lithologic Description (e)	Remarks (h)
			OH CL	VERY DARK GREEN	
1		1	CL	DARK GREYISH BROWN (10YR 4/2) SILTY CLAY w/ DENSE, DRY, LOW PLASTICITY, FRIABLE WHITE POWDERY CALCITE, ROOTS, WORM HOLES	
2			CL		
3				YELLOWISH BROWN (10YR 5/4) SILTY CLAY w/ TRACE FINE SAND, LOW PLASTICITY, DENSE FRIABLE, DRY, WHITE POWDERY CALCITE, ROOTS,	
4		0.3			
5					

HTW DRILLING LOG

Boring No:

SB930419 / mvl2

Project: Ellsworth AFB

Inspector:

*J. Howard [Signature]*

Sheet 2 of 4

Depth (a)	Analyt. Sample (b)	Heads pace (c)	Lith Column (d)	Lithologic Description (e)	Remarks (h)
6		0.4	CL	Brown (104R 4/3) Silty Clay w/ Trace Sand Firm to Hard, Low Plasticity, Dry	
7					
8				No Recovery	
9		1.3	NDPS	ENCOUNTERED GRAVEL @ 7' CUTTING DESCRIPTION: POORLY SORTED SUBROUNDED FINE TO COARSE GRAVEL w/ TRACE SILTY CLAY, NO PLASTICITY, DRY	
10					
11		4.0		POORLY SORTED SUBROUNDED GRAVEL w/ SOME SILTY CLAY AND FINE TO COARSE SAND, NO PLASTIC, DRY	
12			GC	"GRAVEL SIZE RANGE FROM FINE TO COARSE" "MAX DIA = 2 INCH OF THE COARSE GRAVEL"	
13		3.0			
14					

HTW DRILLING LOG

Boring No:

58930419 / MW12

Project: Ellsworth AFB

Inspector:

*[Handwritten Signature]*

Sheet 3 of 4

Depth (a)	Analyt. Sample (b)	Heads pace (c)	Lith Column (d)	Lithologic Description (e)	Remarks (h)
15				POORLY SORTED SUBROUNDED GRAVEL w/ SOME SILTY CLAY AND FINE TO COARSE SAND, NO PLASTICITY " GRAVEL SIZE RANGES FROM FINE TO COARSE" " MAX DIA OF GRAVEL IS ~ 5 INCHES "	GRAVEL BECOMES COARSER W/ DEPTH
16		0	CL	REDDISH BROWN (SYR 5/4) SILTY CLAY w/ SOME FINE SAND AND IRON OXIDE STAINING, SOME GYPSUM CRYSTAL, MEDIUM PLASTICITY, DRY, SOFT	
17					
18			---	NO RECOVERY FROM 17.5 TO 20'	
19		N/A	NDPS		SATURATED CONDITIONS ENCOUNTERED AT 18.0'
20			---		
21		4.5	CL	REDDISH BROWN (SYR 5/4) SILTY CLAY w/ SOME FINE SAND, SOME GYPSUM CRYSTAL, MEDIUM PLASTICITY, DRY, SOFT	
22					
23			---	NO RECOVERY	

HTW DRILLING LOG

Boring No:

513930419

MW 12

Project: Ellsworth AFB

Inspector

*[Signature]*

Sheet 4 of 4

Depth (a)	Analyt. Sample (b)	Heads pace (c)	Lith Column (d)	Lithologic Description (e)	Remarks (h)
24		N/A		POORLY SORTED FINE TO COARSE AND SOME COBBLE SIZE GRAVEL w/ TRALE SILTY CLAY (~20% FINE GRAVEL, 10% MEDIUM GRAVEL, 50% COARSE GRAVEL, 20% COBBLE GRAVEL) (MAX. DIA. OF COBBLE ~ 8 INCH DIA.)	NO RECOVERY FROM 22.5 TO 25
26		O	SH	weathered shale?	
27			<del>SH</del>		
28		O			
29				TD = 29' SCREEN = 28' TO 18' SANDPACK = 29' TO 16' BENTONITE = 15' TO 13'	