

WATER WELL RECORD

Form WWC-5

Division of Water Resources App. No.

1 LOCATION OF WATER WELL: County: Ottawa	Fraction ¼ ¼ SW ¼ NE ¼	Section Number 16	Township No. T 11 S	Range Number R 2 <input type="checkbox"/> E <input checked="" type="checkbox"/> W
Street/Rural Address of Well Location; if unknown, distance & direction from nearest town or intersection: If at owner's address, check here <input type="checkbox"/> Former Atlas Missile site S-1 located at intersection of Justice Rd. and N. 210th Rd.		Global Positioning System (GPS) information: Latitude: .279344.8' (Northing)..... (in decimal degrees) Longitude: 144.1570.4' (Easting)..... (in decimal degrees) Elevation: 1383.9'..... Datum: <input type="checkbox"/> WGS 84, <input checked="" type="checkbox"/> NAD 83, <input type="checkbox"/> NAD 27 Collection Method: <input type="checkbox"/> GPS unit (Make/Model:) <input type="checkbox"/> Digital Map/Photo, <input type="checkbox"/> Topographic Map, <input checked="" type="checkbox"/> Land Survey Est. Accuracy: <input checked="" type="checkbox"/> <3 m, <input type="checkbox"/> 3-5 m, <input type="checkbox"/> 5-15 m, <input type="checkbox"/> >15 m		
2 WATER WELL OWNER: Army Corps of Engineers RR#, Street Address, Box #: 601 E. 12th St. City, State, ZIP Code : Kansas City, MO 64106				

3 LOCATE WELL WITH AN "X" IN SECTION BOX: N <table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <tr><td>W</td><td> </td><td> </td><td> </td><td>E</td></tr> <tr><td> </td><td>NW</td><td> </td><td>NE</td><td> </td></tr> <tr><td> </td><td>X</td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td>SW</td><td> </td><td>SE</td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td>S</td></tr> </table> <p style="text-align: center;"> -----1 mile----- </p>	W				E		NW		NE			X					SW		SE						S	4 DEPTH OF COMPLETED WELL 83.0..... ft. Depth(s) Groundwater Encountered (1)..... ft. (2)..... ft. (3)..... ft. WELL'S STATIC WATER LEVEL 64.19..... ft. below land surface measured on mo/day/yr. 9/19/2011..... Pump test data: Well water was..... ft. after..... hours pumping..... gpm EST. YIELD..... gpm. Well water was..... ft. after..... hours pumping..... gpm Bore Hole Diameter 6..... in. to .83..... ft., and..... in. to..... ft. WELL WATER TO BE USED AS: <input type="checkbox"/> Public water supply <input type="checkbox"/> Geothermal <input type="checkbox"/> Injection well <input type="checkbox"/> Domestic <input type="checkbox"/> Feedlot <input type="checkbox"/> Oil field water supply <input type="checkbox"/> Dewatering <input type="checkbox"/> Other (Specify below) <input type="checkbox"/> Irrigation <input type="checkbox"/> Industrial <input type="checkbox"/> Domestic-lawn & garden <input checked="" type="checkbox"/> Monitoring well MW-05 Was a chemical/bacteriological sample submitted to Department? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, mo/day/yr sample was submitted..... Water well disinfected? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
W				E																						
	NW		NE																							
	X																									
	SW		SE																							
				S																						

5 TYPE OF CASING USED: Steel PVC Other

CASING JOINTS: Glued Clamped Welded Threaded

Casing diameter .2..... in. to .59.6..... ft., Diameter..... in. to..... ft., Diameter..... in. to..... ft.
 Casing height above land surface .3..... in., Weight..... lbs./ft., Wall thickness or gauge No.

TYPE OF SCREEN OR PERFORATION MATERIAL:
 Steel Stainless Steel PVC Other (Specify)

Brass Galvanized Steel None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:
 Continuous slot Mill slot Gauze wrapped Torch cut Drilled holes None (open hole)
 Louvered shutter Key punched Wire wrapped Saw cut Other (specify)

SCREEN-PERFORATED INTERVALS: From...79.6..... ft. to .59.6..... ft., From..... ft. to..... ft.
 From..... ft. to..... ft., From..... ft. to..... ft.

GRAVEL PACK INTERVALS: From...83..... ft. to .56.3..... ft., From..... ft. to..... ft.
 From..... ft. to..... ft., From..... ft. to..... ft.

6 GROUT MATERIAL: Neat cement Cement grout Bentonite Other

Grout Intervals: From 51.7..... ft. to 1.0..... ft., From..... ft. to..... ft., From..... ft. to..... ft.

What is the nearest source of possible contamination:
 Septic tank Lateral lines Pit privy Livestock pens Insecticide storage Other (specify below)
 Sewer lines Cesspool Sewage lagoon Fuel storage Abandoned water well
 Watertight sewer lines Seepage pit Feedyard Fertilizer storage Oil well/gas well missile complex
 Direction from well Distance from well

FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	15.5	clay/silt/sand overburden			
15.5	20.1	interbedded shale/sandstone			
20.1	83	sandstone w/ occasional claystone			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo/day/year) 06/29/2011..... and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. This Water Well Record was completed on (mo/day/year) 12/09/2011..... under the business name of US Army COE..... by (signature) *[Signature]*

INSTRUCTIONS: Use typewriter or ball point pen. PLEASE PRESS FIRMLY and PRINT clearly. Please fill in blanks and check the correct answers. Send three copies (white, blue, pink) to Kansas Department of Health and Environment, Bureau of Water, Geology Section, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367. Telephone 785-296-5524. Send one copy to WATER WELL OWNER and retain one for your records. Include fee of \$5.00 for each constructed well. Visit us at <http://www.kdheks.gov/waterwell/index.html>.

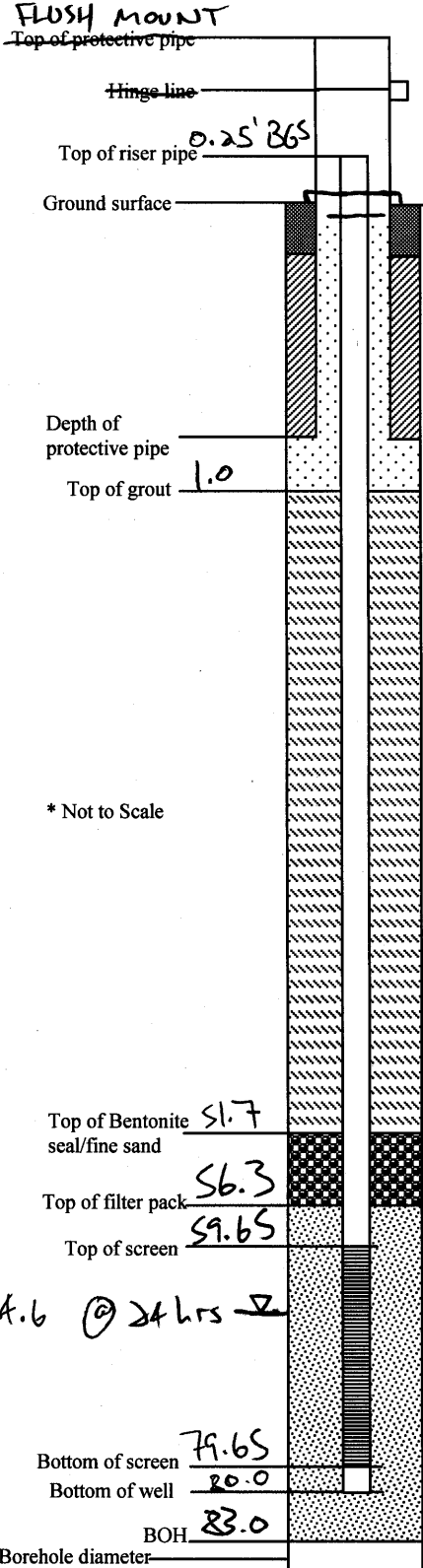
MONITORING WELL INSTALLATION FORM

Project Schilling S-1
 Boring Number MW-05

Well Number MW-05
 Date Installed 6/29/11

Type of riser pipe & diameter Sch 40 2" PVC

Type of screen & slot size PVC 20 slot



Measurements:

Length of riser pipe 79.65
 Length of screen 20.0
 Length of end blank 0.35
 Total length of well installation 80.0
 Bottom depth of borehole 83.0
 Length of riser pipe stickup ^{Below} above ground surface 0.25 BGS

Centralizers:

Total number of centralizers 2
 Depth(s) of centralizer(s) BGS 39.65, 59.65

Protective Pipe:

Date set FLUSH MOUNT SURFACE COMPLETION
 Size and type of protective pipe _____
 Number of weep holes drilled in protective pipe _____

Well Pad:

Dimensions of well pad 3' x 3'
 Number and size of protective posts around well 0

Filter Pack:

Type and grain size of filter pack material 20/40 silica sand

Grout Mix (es):

Type of grout mix and locations used in the well installation
1:1 Portland grout with SI Bentonite

Amount and type of grout materials used for each mix

Other:

Portland:
 Bentonite (specify type):
 Water:

1. Material used to fill annular space between borehole and protective pipe Grout
2. Material used to fill void between protective pipe and well riser pipe Cement

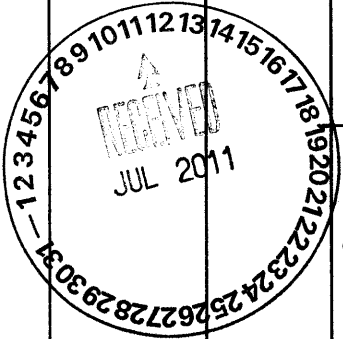
64.6 @ 24 hrs ✓

HTW DRILLING LOG

HOLE NO.
MW-05

1. COMPANY NAME USACE -MRK		2. DRILLING SUBCONTRACTOR			SHEET 1 OF 4 SHEETS	
3. PROJECT Schilling S-1			4. LOCATION Schilling S-1			
5. NAME OF DRILLER D. Marquis			6. MANUFACTURER'S DESIGNATION OF DRILL Buckeye Cable Tool / Dietrich D-90 Track Mount			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	6" ID Drive Barrel		8. HOLE LOCATION KS state Dme 1501			
	6" ID Straight Shoe		279344.840 N 1441570.778 E NAD 83			
	4" ID Drive Barrel/Shoe		9. SURFACE ELEVATION 1383.922			
	4" ID Double Tube Core Barrel		10. DATE STARTED 06/22/11			
			11. DATE COMPLETED 6/28/11			
12. OVERBURDEN THICKNESS 15'			15. DEPTH GROUNDWATER ENCOUNTERED			
13. DEPTH DRILLED INTO ROCK 83.5'			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED			
14. TOTAL DEPTH OF HOLE 98.5'			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES		DISTURBED <input checked="" type="checkbox"/>	UNDISTURBED N/A	19. TOTAL NUMBER OF CORE BOXES 7		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <input checked="" type="checkbox"/>	METALS N/A	OTHER (SPECIFY) N/A	OTHER (SPECIFY) N/A	
				OTHER (SPECIFY) N/A	21. TOTAL CORE RECOVERY 66 %	
22. DISPOSITION OF HOLE		BACKFILLED N/A	MONITORING WELL <input checked="" type="checkbox"/>	OTHER (SPECIFY) N/A	23. SIGNATURE OF INSPECTOR D. Merricks ; Ian Bowen	

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	1	Sand Silt - Top Soil Dark Brown Damp - low-plasticity - rootlets	Measured w/ PLD 0.0ppm	N/A	N/A	20	Drive-1 6" ID DB 6" ID SS D-2 R-2
	2	Clayey Silt Reddish Brown Damp - low plasticity - rootlets				2	2'
	3					23	Drive-2 6" ID DB 6" ID SS D-2 R-2
	4					2	2'
	4	Fat Clay; Mottled-brown, reddish brown, gray; damp; med stiff; sandy	0.1ppm				
	4	Sandy Silt; mottled gray, reddish brown, yellowish brown; damp; low plasticity	0.0ppm			60	Drive-3 6" ID DB 6" ID SS
	5	SANDY SILT, Reddish orange-yellowish, orange; Damp; low-plasticity; occ. fine gravel	0.0ppm				D-1.8 R-1.8



HTW DRILLING LOG

HOLE NO.
MW-05

PROJECT
Schilling S-1

INSPECTOR
D. Merrick

SHEET 2
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SILTY SAND - fine grained REDDISH BROWN DAMP - slightly cohesive	0.1 ppm	N/A	N/A	60	Drive-3 cont. 6" ID DB 6" ID SS
	6	- pulverized highly weathered sandstone - occ ironstone layering	5.8'			5.8	0-1.8 R-1.8 5.8'
	6.2	CLAYEY SAND - fine grained MOTTLED - Gray, Reddish Orange, Brick Red, Light Brown Damp - low-plasticity	0.1 ppm		6.2'	400	Drive-4 4" ID DB 4" ID SS
	6.8		0.4 ppm		MW-05- SB-01		D-2.2 R-1.7
	7		6.8		6.8'		
	8	SILTY SAND TAN DAMP non-plastic - ~ 10% fine gravel - fine-grained sand	0.2 ppm		N/A		
	8		8'			8'	8'
	8.3	CLAYEY SAND/SANDY CLAY, mottled - Dark Gray, Gray, Tan, Damp Very Stiff; fine-grained	0.4 ppm			165	Drive-5 4" ID DB 4" ID SS
	9		8.3				D-2' R-2'
	10	SILTY SAND REDDISH BROWN DAMP - non-plastic - fine-grained - pulverized highly weathered sandstone	0.2 ppm				
	10		10'			10'	10'
	10.3	FAT CLAY, GRAY, V. STIFF, DAMP; interbedded w/ ironstone, sandy	0.3 ppm				Drive-6 4" ID DB 4" ID SS
	11	SILTY SAND REDDISH ORANGE-WHITE DAMP - fine-grained - poorly-graded - non-plastic	10.5'			300	D-2' R-1.6'
	11		0.2 ppm				
	12	CLAYEY SAND, GRAY-TAN; DAMP; low-plasticity, fine- grained, poorly-graded	12'		12'	12'	12'
	12.5		7.0 ppm		MW-05- SB-02	400	Drive-6 4" ID DB 4" ID SS
	13	SILTY SAND GRAY-TAN DAMP - fine-grained - poorly-graded	12.5'		12.5		D-1.5 R-1.5
	13		0.8 ppm		N/A		
	13.5					13.5	13.5'
	14					400	Drive-7 4" ID DB 4" ID SS
	14						D-1.0 R-0

HTW DRILLING LOG

HOLE NO.
MW-05

PROJECT
Schilling S-1

INSPECTOR
D. Merrick

SHEET 3
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SILTYSAND GRAY-TAN DAMP - fine-grained - poorly-graded - non-plastic		N/A	N/A	900 14.5	Drive - 7 4" ID DB 4" ID SS D-1.0 R-0
	15	Top of Bedrock ↓ 15'				200	Drive - 8 4" ID DB 4" ID SS D-0.5 R-0
	16	SANDSTONE WHITISH TAN FINE-GRAINED MED. BEDDED - poorly-cemented - thin-layer fut clay w 15.7-15.8	0.0 ppm			N/A	End: 06/22/11 Start: 06/27/11 Pull-1 4" ID OCB Start: 1330 Stop: 1340 Run: Sol Recd: 1.6 Loss: 3.5 LOW: 0 UL: 3.5 CO: 20
	17	SANDSTONE - SOFT REDDISH ORANGE FINE-GRAINED MED. BEDDED - poorly-cemented 16.4				N/A	RQD: 0 Drilled by Ken Wood
LOSS	18	SHALE - SOFT GRAY BANDED VERY-FINE GRAINED - Highly weathered - Sandy - Fe-oxide staining					
	19						
	20			20.1			20.1' O
LOSS	21	SANDSTONE REDDISH ORANGE THIN-MEDIUM BEDDED FINE-GRAINED SOFT - poorly-cemented - occ. pitted/vugged		Box 1			Pull 2 4" ID PTCB Start 1358 Stop 1408 Run: 8.6 Recd: 8.1 Loss: 0.5 LOW: 0 UL: 0.279: 28.4 RQD: 69%
	22						
	23						

14
15
16
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18
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20
21
22
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LOSS

LOSS

LOSS

HTW DRILLING LOG

HOLE NO.
MW-05

PROJECT *Schilling 5-1*

INSPECTOR *D. Merricks / Fran Bowen*

SHEET *4*
OF 14 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	Same as Above SANDSTONE REDDISH ORANGE THIN TO MEDIUM BEDDED	Measured w/ PTD			N/A	FULL 2 cont. 4" ID OTCB Start 13.8 Stop 14.09 Run 8.6 Rec'd 8.1 Loss 0.5 LDN 0 UL 0.2 CD 28.4 RQP: 61%
	24	FINE GRAINED SOFT Poorly cemented Pitted to vuggy		Box-1	N/A		
	25						
	26		0.0ppm	26'			
	27			Box-2			
	28						
	29						28.7
88	29.4	SHALE WITH SANDSTONE PARTINGS GREY WITH REDDISH BROWN PARTINGS FINE GRAINED SOFT			29.6 MW-0538-04 29.7		FULL 3 4" ID OTCB Start 14.50 Stop 14.06 Run 10.2 Rec'd 7.5 Loss 2.7 LDN 0 UL 1.6 RQP = 37%
MB	30	SANDSTONE REDDISH ORANGE TO TAN THIN TO MEDIUM BEDDED SOFT FINE GRAINED Poorly cemented angular bedding				N/A	
MB	31	SHALE SOFT GREY V. FINE GRAINED THIN BEDDED					
MB	31.4						
MB	31.7						
MB	32	SEE NEXT PAGE FOR DESCRIPTION					

HTW DRILLING LOG

HOLE NO.
MW-05

PROJECT *Schilling S-1*

INSPECTOR *D. Menick / Ian Bowen*

SHEET *6*
OF 14 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41				N/A	N/A	<i>PWT - 5 cont.</i> <i>4" ID DTEB</i> <i>Start: 0804 Stop: 0815</i> <i>Run: 9.7 Rec'd: 8.8</i> <i>Loss 0.9 CDW:</i> <i>UC: 0.8 CD: 49.5</i> <i>RQD: 59%</i> <i>15.8 gal/min</i>
	42	SANDSTONE FINE-GRAINED TAN THIN-MED BEDDED - poorly cemented - pitted	0.0ppm	Box 3	N/A	N/A	
	43						
	43.8						
	44						
	45						
	46						
	47						
	48						
	49						
	49.5'						
	50	SANDSTONE SEE NEXT PG FOR DESCRIPTION					

HTW DRILLING LOG

HOLE NO.
MW-05
SHEET 7
OF 14 SHEETS

PROJECT Schilling S-1

INSPECTOR D. Merricks / B. Harmon

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
50	50			Box 4		N/A	Pull-5 cont Start: 0804 Stop: 0815 Run: 9.7 Rec'd: 8.8 Loss: 0.9 LOW UL: 0.8 CO: 47.5 50.1
	51	ironstone layer SANDSTONE FINE-GRAINED TAN MED. BEDDED - pitted - Fe-oxide staining - occ ironstone layers			N/A		
	52		0.0ppm	52.1 Box 5			Pull-6 4" ID PTCB Start: 0838 Stop: 0850 Run: 10.1 Rec'd: 9.6 Loss: 0.5 LOW UL: 0.7 CO: 52.7 RAP: 45% 15.8 gal/min
	53						
	54						
	55						
	56						
	57	fractd ironstone layer					
	58						
	59						

HTW DRILLING LOG

HOLE NO.
MW-05

PROJECT
Schilling S-1

INSPECTOR
D. Merrill / B. Harmon

SHEET 8
OF 14 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
11-6	59	SAME AS ABOVE SANDSTONE, TAN, FINE-GRAINED MED-BEDDED, pitted, Fe-oxide staining, occ. ironstone layers, SOFT, poorly cemented	0.0 ppm	Box 5	MW-05-SB-05 59.1	N/A	PULL 6, cont. 4" ID OTCB Start: 0938 Stop: 0950 Run: 10.1 Rec'd: 9.6 Loss: 0.5 LW: CD UL: 0.7 CD: 59.8 RSD: 75% 60.2
11-6	60						60.8
11-6	61	SANDSTONE WITH IRONSTONE PARTINGS REDDISH BROWN FINE GRAINED THIN BEDDED SOFT TO Hard - Angular bedding - Well cemented	0.0 ppm	Box 6			62.0
11-6	62						Vertical fracture
11-6	63	Vertical fracture					64.7
11-6	64						PULL 8 Start: 0955 Stop: 1007 Run: 3.3 Rec'd: 1.8 Loss: 1.9 LW: CD UL: 1.9 CD: 67.4 RSD: 38% 15.8 gal/min
11-6	65	SANDSTONE, TAN, FINE-GRAINED, SOFT, THIN BEDDED, poorly cemented, FE-OXIDE staining					67.4
11-6	66						68.0
11-6	67						CD
11-6	68						CD

HTW DRILLING LOG

HOLE NO.
MW-05

PROJECT
Schilling S-1

INSPECTOR
D. Menick / B. Harmon

SHEET 9
OF 14 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
Loss	68	SAME AS ABOVE		Box 6	N/A	N/A	PULL 9
fract'd		SANDSTONE, TAN, FINE GRAINED, THIN-BEDDED, poorly cemented, Fe-oxide staining, SOFT	0.0ppm				4" ID DTCB Start: 1047 Stop: 1059 Run: 1.7 Reel: 1.2 ROP: 57% (1.7m) 17s / 59s Loss: 0.5 UL: 1.0 CD: 6.6 Drilled by Danny Morris 69.7'
	69						
	70						
	70.3'						
		SANDSTONE interbedded w/ Ironstone Redish Orange - Black Banded FINE GRAINED Hard - well cemented 70.8'		70.8			Pull-10 4" ID DTCB Start: 1235 Stop: 1257 Run: 7.0 Reel: 2.7 Loss LOW: UL: 3.4 CD: 8.7 ROP: 37%
	71						
	72	SANDSTONE TAN FINE-GRAINED THIN BEDDED SOFT - poorly cemented		Box 7			
LOSS	73		.6 4				
	74						
	75						
fract'd							
	75.2'						
	75.6'						
	76						
LOSS	76						
	77						
							76.7' Pull-11

HTW DRILLING LOG

HOLE NO.
MW-05

1. COMPANY NAME USACE-NWK		2. DRILLING SUBCONTRACTOR		SHEET 10 OF 14 SHEETS			
3. PROJECT Schilling S-1			4. LOCATION				
5. NAME OF DRILLER D. Margolis			6. MANUFACTURER'S DESIGNATION OF DRILL Diedrich D-90				
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		8. HOLE LOCATION		9. SURFACE ELEVATION			
		10. DATE STARTED 06/28/11		11. DATE COMPLETED			
		12. OVERBURDEN THICKNESS		15. DEPTH GROUNDWATER ENCOUNTERED			
		13. DEPTH DRILLED INTO ROCK		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED			
14. TOTAL DEPTH OF HOLE		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)					
18. GEOTECHNICAL SAMPLES		DISTURBED <input checked="" type="checkbox"/>	UNDISTURBED N/A	19. TOTAL NUMBER OF CORE BOXES			
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <input checked="" type="checkbox"/>	METALS N/A	OTHER (SPECIFY) N/A	OTHER (SPECIFY) N/A	OTHER (SPECIFY) N/A	21. TOTAL CORE RECOVERY %
		22. DISPOSITION OF HOLE		BACKFILLED N/A	MONITORING WELL <input checked="" type="checkbox"/>	OTHER (SPECIFY) N/A	

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	77	SAME AS ABOVE SANDSTONE TAN FINE-GRAINED THIN-BEDDED SOFT -poorly cemented	0.0ppm	Box 7	N/A	N/A	Pull-11 cont. Start: 1318 Stop: 1330 Run: 9.0 Reel: 0 Loss: 9.0LWD! UC: 7.0 CD: 82.5' ROD: 0
	78						
	79						
	80						
	81						
	82						

HTW DRILLING LOG

HOLE NO.
MW-05

1. COMPANY NAME
USAKE - MWK

2. DRILLING SUBCONTRACTOR

SHEET 1/
OF 4 SHEETS

3. PROJECT
Schilling S-1

4. LOCATION

5. NAME OF DRILLER

6. MANUFACTURER'S DESIGNATION OF DRILL
Diedrich 0-90

7. SIZES AND TYPES OF DRILLING
AND SAMPLING EQUIPMENT

8. HOLE LOCATION

9. SURFACE ELEVATION

10. DATE STARTED
06/28/11

11. DATE COMPLETED

12. OVERBURDEN THICKNESS

15. DEPTH GROUNDWATER ENCOUNTERED

13. DEPTH DRILLED INTO ROCK

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED

14. TOTAL DEPTH OF HOLE

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES

DISTURBED
✓

UNDISTURBED
N/A

19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS

VOC

METALS

OTHER (SPECIFY)

OTHER (SPECIFY)

OTHER (SPECIFY)

✓

N/A

N/A

N/A

N/A

21. TOTAL CORE
RECOVERY
%

22. DISPOSITION OF HOLE

BACKFILLED

MONITORING WELL

OTHER (SPECIFY)

N/A

✓

N/A


23. SIGNATURE OF INSPECTOR

[Signature] B. Harmon

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
LOSS	82	Same As Above SANDSTONE TAN FINE-GRAINED THIN-BEDDED SOFT - poorly cemented	0.0 MPa	Box 7	N/A	N/A	Pull-11 con t. 4" ID DTGB Start 1318 End 1339 Run 90 Rev. 0 Loss: 8.0 UDW: 6L: 7.0 O: 8.7' R QD: 0
LOSS	83						
	84						
	85						PULL 1 J 4" ID DTGB Start 1406 Stop 1450 Run 5.0 Rev 2.0 Loss 3.0 CD 29' DAD 25% LDCW UL: 4.3' change tomorrow 06/29/11
	86						
	87						

HTW DRILLING LOG

HOLE NO.
MW-05

1. COMPANY NAME USACE-NWU		2. DRILLING SUBCONTRACTOR		SHEET 12 OF 14 SHEETS			
3. PROJECT Schilling S-1			4. LOCATION				
5. NAME OF DRILLER D. Marquis			6. MANUFACTURER'S DESIGNATION OF DRILL Diedrich D-90				
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		8. HOLE LOCATION		9. SURFACE ELEVATION			
		10. DATE STARTED		11. DATE COMPLETED			
		12. OVERBURDEN THICKNESS		15. DEPTH GROUNDWATER ENCOUNTERED			
		13. DEPTH DRILLED INTO ROCK		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED			
14. TOTAL DEPTH OF HOLE		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)					
18. GEOTECHNICAL SAMPLES		DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
		✓	N/A	N/A	N/A	N/A	
22. DISPOSITION OF HOLE		BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR		
		N/A	✓	N/A	 J. Marquis / B. Harmon		

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	87	Same as Above					
MB		SANDY SHALE		Box 7	N/A	N/A	PULL 12 Core
MB		GREY + ORANGE/BROWN					4" ID OTCB
MB		SOFT	0.0 ppm				Start 145 Stop 145
MB	88	V. FINE GRAINED					Run: 5.0 Rec'd: 2.0
MB		THEN BEDDED					Loss: 3.0 L/W:
MB		- Highly weathered			89.4		UL: 4.3 CD: 89
MB		- ironstone lumps interbedded			88.5		RQP: 25'
MB							CD
MB	89	SANDSTONE					15.8 gal/min
MB		TAN					27.7
MB		THIN-MED BEDDED					PULL 13
MB		FINE-GRAINED					4" ID OTCB
MB	90	SOFT					Start 145 Stop 160
MB		- clay inclusions					Run 8.8 Rec'd: 6.9
MB							RQP 48% L/W:
MB							Loss: 1.9 CD 96.7
MB	91						UL: 0.8
MB							
MB							
MB							
MB							
MB	92						

HTW DRILLING LOG

HOLE NO.
MW-05
SHEET 13
OF 24 SHEETS

1. COMPANY NAME USACE-NWK		2. DRILLING SUBCONTRACTOR					
3. PROJECT Schilling S-1		4. LOCATION					
5. NAME OF DRILLER Denny Marquis		6. MANUFACTURER'S DESIGNATION OF DRILL Diedrich D-90					
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION		9. SURFACE ELEVATION				
	10. DATE STARTED		11. DATE COMPLETED				
	12. OVERBURDEN THICKNESS		15. DEPTH GROUNDWATER ENCOUNTERED				
	13. DEPTH DRILLED INTO ROCK		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED				
14. TOTAL DEPTH OF HOLE		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)					
18. GEOTECHNICAL SAMPLES		DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
22. DISPOSITION OF HOLE		BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR		
		N/A	✓	N/A	D. Merricks / B. Harmon		

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
MB	92	Same As Above SANDSTONE TAN THEN - MED BEDDED FINE GRAINED SOFT - Clay Inclusions	0.0ppm	Box 7	N/A	N/A	Pull 13 core 4" ZO OTCB Start: 1545 Stop: 1610 Run: 8.8 Recd: 6.9 Loss: 1.9 LDW: UL: 0.8 CD: 9.7 ROP 48'
MB	93						
MB	94						
MB	95						
MB	96						
MB	97						

HTW DRILLING LOG

HOLE NO.
MW-05
SHEET 14
OF 14 SHEETS

1. COMPANY NAME USACE-NWK		2. DRILLING SUBCONTRACTOR		
3. PROJECT Schilling S-1		4. LOCATION		
5. NAME OF DRILLER		6. MANUFACTURER'S DESIGNATION OF DRILL		
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION		9. SURFACE ELEVATION	
	10. DATE STARTED			11. DATE COMPLETED
	12. OVERBURDEN THICKNESS		15. DEPTH GROUNDWATER ENCOUNTERED	
	13. DEPTH DRILLED INTO ROCK		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)		

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES		
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	✓	N/A	N/A	N/A	
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR D. M. Erickson / B. Harmon	
	N/A	✓	N/A		

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	97	SAME AS ABOVE SANDSTONE TAN THIN-MED BEDDED FINE GRAINED SOFT	0.0ppm	Box 7	N/A	N/A	PULL 15 CONT. 4" ID DTOS Start: 1545 Stop: 160 Run: 8.8 Recd: 6.9 Loss: 1.9 CDW: UL: 0.8 CD: 96.7 WL = 31.2 BGS 98.5 (200 40%)
	98	- Clay Inclusions	98.5	98.5	98.5	98.5	End: 06/28/11 1.0/11
	99	98.5 BOH					
	100						
	101						
	102						

Well Development Form

Project Name: <u>Schilling S-1</u>		Project Number:		Well Number: <u>MW-05</u>	
Project Information				Elevation of Well	
Facility Name: <u>Schilling S-1</u>				Ground Surface Elevation: <u>1384.184</u>	
Location: <u>N 279344.810 E 1441570.378</u>				Top of Casing Elevation (TOC): <u>1383.922</u>	
Well Information				Borehole Volume Calculation:	
Date and Time Well Seal Installed: <u>6/24/2011</u>				$\frac{79.9}{64.25} \cdot 15.65 \cdot 0.0408 \cdot 36 = 23 \text{ gal}$ <small>1 borehole volume (gallons) = initial height of water column (ft) x 0.0408 x (borehole diameter (in))² initial height of water column = total depth (ft) - initial depth to water (ft)</small>	
Total Depth of Well: <u>80.0</u> feet from <u>865</u>					
Depth to Top of Screen: <u>59.65</u> feet from <u>865</u>					
Length of Casing Screened: <u>20</u> feet					
Type of Formation Screened: <u>Sandstone</u>				Volume of Water Lost During Drilling and Well Installation:	
Well development Method description				Development Completion Criteria	
Surge: <u>Surged with 1" surge block</u>				Field parameter stabilized? <input checked="" type="checkbox"/> N	
Bail:				Turbidity < 50 NTU? <input checked="" type="checkbox"/> N	
Pump: <u>Pumped with Grundfos submersible</u>				Volume of water removed during development: <u>220</u> gallons	
Other:				Other:	

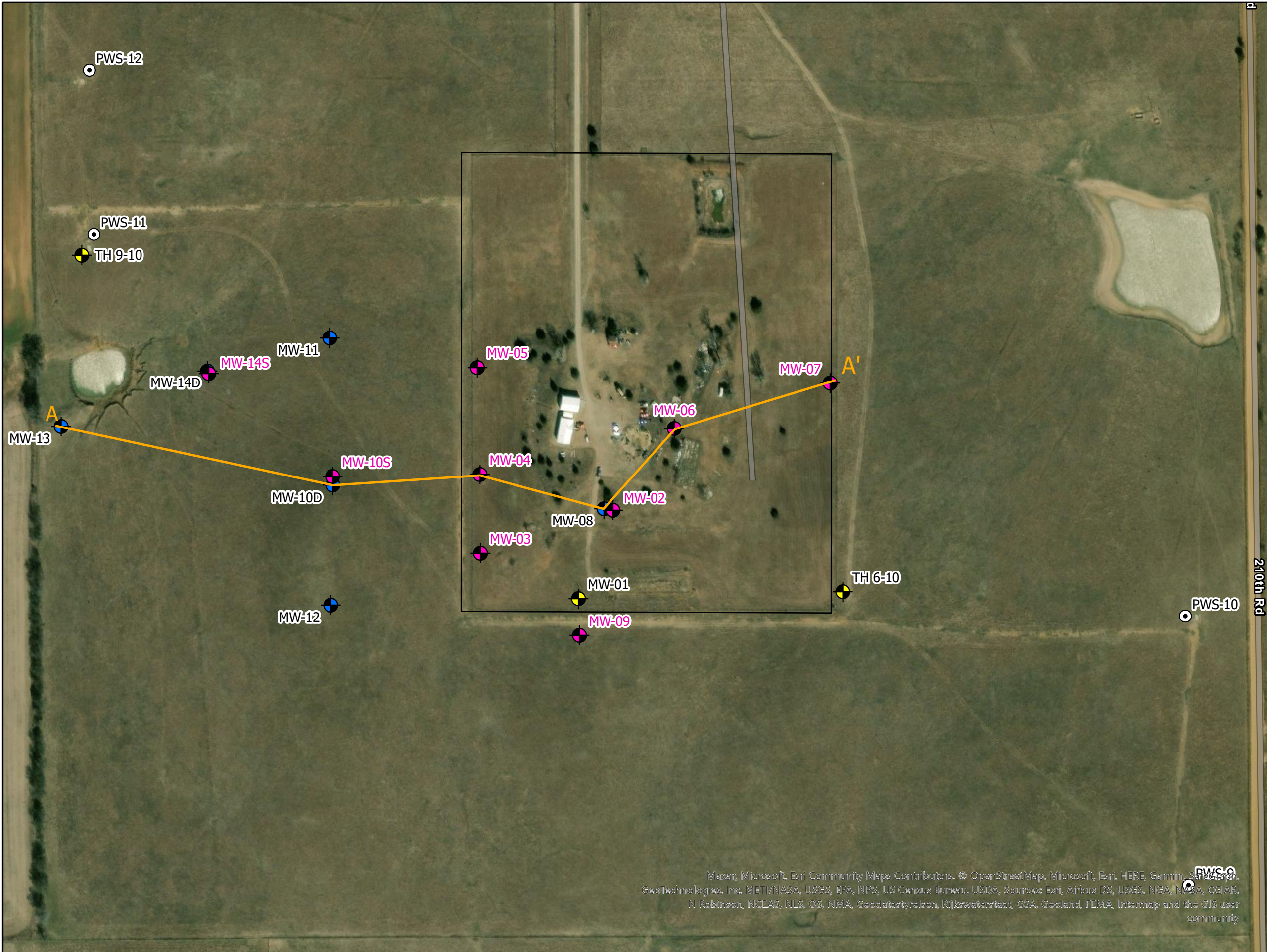
Observations During Well Development													
Date	Start time	End time	Depth to water	Total depth	Water removed		Temp (degree F)	pH (units)	S.C. (µS/cm)	Turbidity (NTU)	ORP (mV)	DO (mg/L)	Remarks (Color, Odor, Particulates)
					Gallons	Total							
7/7/11	0900	0915											Surged 15 min
	0920	0950			SS								Light Brown
	1007	1022											Surged 15 min
	1030	1100			SS								Light Brown
	1230	1245											Surged 15 min
8/4/11	1255	1225			110								Light Brown, cleared up at end
	0233												
	0237					18.61	5.54	.495	215	210	11.63		
	0240					17.52	5.95	.528	301	182	12.01		
	0243					17.4	6.09	.312	251	24	11.24		
	0246					16.9	6.14	.317	178	125	12.18		
	0249					16.67	6.16	.315	129	174	12.23		
	0251					16.43	6.16	.316	102	177	12.34		
	0254					16.42	6.18	.319	102	177	12.17		
	0257					16.59	6.14	.320	81.8	181	12.12		
	0900					16.51	6.16	.319	69.1	184	12.28		
	0902					16.45	6.21	.316	47.8	178	12.26		

Measurements from TOC unless otherwise noted.





0905		16.42	6.17	.319	49.7	190	12.26
0906	110	16.41	6.24	.320	38.9	179	12.37
	220						

Table 1: MODFLOW Observation Data

Well	Northing	Easting	Ground Surface Elevation	TOC Corrected Elevation (USACE -0.49 ft)	Screen Mid Point Elevation	September 2011 Water Level Elevation
MW-02	279032.169	1441867.496	1397.73	1397.05	1316.95	1319.63
MW-03	278937.277	1441577.013	1385.01	1384.22	1315.62	1319.17
MW-04	279109.941	1441576.113	1389.43	1388.68	1312.68	1319.17
MW-05	279344.84	1441570.378	1384.18	1383.43	1313.78	1319.24
MW-06	279210.771	1442001.931	1405.08	1404.27	1312.87	1319.87
TH1-10	280513.40	1440693.08	1359.12	1361.58	1280.08	1315.79
TH2-10	278194.98	1440713.24	1355.61	1358.19	1278.19	1317.62
TH3-10	278198.09	1443127.10	1381.35	1383.58	1277.58	1321.05
TH4-10	280618.82	1443138.71	1377.74	1379.58	1276.58	1323.76
TH5-10	278778.84	1443158.88	1374.51	1377.21	1279.21	1321.72
TH6-10	278851.15	1442371.89	1388.27	1390.63	1285.63	1320.23
TH8-10	279917.13	1440699.72	1371.23	1373.77	1273.77	1316.68
TH9-10	279590.79	1440702.39	1363.79	1366.13	1275.13	1317.08
TH11-10	279108.87	1441553.16	1388.16	1390.93	1283.93	1319.36
TW10-10	279593.93	1440716.42	1364.36	1366.96	1275.96	1317.12
TW12-10	278201.09	1443112.03	1381.89	1384.31	1278.31	1321.07
TW13-10	279970.88	1440696.52	1371.57	1373.99	1277.99	1316.64
TW7-10	278797.28	1443161.43	1375.78	1378.21	1282.21	1321.76



Legend

-  Missile Property Boundary
-  Shallow Monitoring Well
-  Deep Monitoring Well
-  Other Monitoring Well
-  PWS Well

LTM - Long Term Monitoring
 Note: Cross-section A to A' shown on Figure 2-5

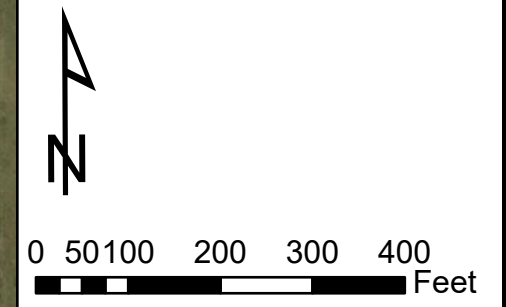


Figure 2-4
 LTM Network and Existing Wells
 2023 Annual Report
 Schilling Air Force Base Atlas Site S-01
 Bennington, Kansas

DESIGNED BY: SMC	CHECKED BY: SS
DRAWN BY: SMC	REVIEWED BY: SS
DATE: DECEMBER 2023	

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