APPENDIX C BORING AND WELL CONSTRUCTION LOGS

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

WATER LEVEL: ♀ 7.28 ▼ ▼
DATE: 10-12-00
TIME: 1233

DRILLING CONTRACTOR: NA

DRILLING METHOD: Hand Auger DATE COMPLETED: June 29, 2000

GROUND SURFACE ELEVATION: 1097.2

DATUM: USGS

LOGGED BY: M.B. & J.H.

WELL CONSTRUCTION DETAILS	DEPTH ST	SYMBOL N	WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: NA Type: NA Interval: NA RISER CASING Diameter: 2" Type: PVC Interval: 1.6' agl to 3.4' bgl GROUT Type: Bentonite Chips Interval: 0.5' to 2.5' SEAL Type: None Interval: None SANDPACK Type: Filter pack sand Interval: 2.5' to 8.4' bgl SCREEN Diameter: 2" Type: Slotted PVC Interval: 3.4' to 8.4' bgl WELL DEVELOPMENT DATA DATE: 7/19/2000 LEGEND METHOD: Bailer GRAVELLY SAND TO TOP OF PROTECTIVE CASING TOP OF ISER CASING GS GROUND SURFACE BS BENTONITE SEAL FINE SAND BSC BOTTOM OF SCREEN TOTAL DEPTH	0	WAS		1098.75 0.0 0.5 2.5	TPC TRC	-1.59 1097,16	Filtered Sand Pack Bentonite Chips Filtered Sand Pack
SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY							

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-1s

PROJECT NO: 4085-001
PROJECT LOCATION: Osceola, MI

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA
DATE COMPLETED: June 27, 2000

GROUND SURFACE ELEVATION: 1097.7

DATUM: USGS

LOGGED BY: Ken Ewers

	STR	ATA	V	VELL	5.5		Z	
WELL CONSTRUCTION DETAILS		SYMBOL		TAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING						TPC	100	
Diameter: 4" Type: Stickup			1	7/ [1100.19	TRC	-2.53	
Interval: 2.5' agl to 2.5' bgl	0 -	E/GIE			0.0	GS	1097.66	,
RISER CASING	33		D	Pa	2.0		1095.66	Concrete
Diameter: 2" Type: PVC	1			7	2.0		1000.00	Natural Collapse
Interval: 2.5' agl to 103.5' bgl		3 (c)		立				
GROUT	5 -							
Type: Thick Bentonite Slurry Interval: 8' to 19' bgl and 50' to 99.5' bgl	1				8.0		1089.66	
SEAL		97.7	} }}}}	83353	0.0		1000.00	Bentonite Slurry
Type: None	10 -		\$\$\$\$	\$ \$\$\$\$				
Interval: None SANDPACK	1		\$\$\$\$\$	\$\$\$\$\$				
Type: Natural Collapse		15.00	}}}}	83333				
Interval: 99.5' to 109' bgl	15 -		{ {{{}{}	\$ \$\$\$\$				
SCREEN Diameter: 2"			}}}}	\$ \$\$\$\$				
Type: Slotted PVC	1		\$\$\$\$\$	\$5555	100		775	
Interval: 103.5' to 108.5' bgl	128		?????	22222	19.0		1078.66	Natural Collapse
WELL DEVELOPMENT DATA	20 -							rtaturar conapsc
DATE: 7/6/2000	1	1/1/						
LEGEND METHOD: Powered suction-lift pumpin	g							
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING	25 -							
COARSE SAND GS GROUND SURFACE BS BENTONITE SEAL	1 8	2.7						
MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN	1	4.4						
FINE SAND BSC BOTTOM OF SCREEN	30 -							
VERY FINE SAND TD TOTAL DEPTH		Jus						
SILT BENTONITE SEAL	1	1						
CLAY CONCRETE GRAVELLY CLAY FILTER PACK	25							
GRAVELLY CLAY FILTER PACK STATE THICK BENTONITE SLURRY GROUT	35 -	\mathcal{L}_{i}	(1) (1)					
TOPSOIL NATURAL COLLAPSE / SAND BACKFIL		77.7						
INTERBEDDED SAND, SILT, CLAY		1111	1.5	6.5056				

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-1d

PROJECT: GSWA Spring Hill Camp
PROJECT NO: 4065-001

PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1097.7

DATUM: USGS LOGGED BY: Ken Ewers

		STR	ATA	WELL		Z	
WELL CO	NSTRUCTION DETAILS	DEPTH (ft.)	DEPTH (ft.) SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
					(See P	age 1)	
		40 -					Natural Collapse (continued)
		45 -					
		50 -			50.0	1047.66	Bentonite Slurry
		55 -					
		60 -					
		65 -					
		70					
GRAVELLY SAND	TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL	75 -					
MEDIUM SAND FINE SAND VERY FINE SAND SILT	FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TD TOTAL DEPTH	80 -					
CLAY GRAVELLY CLAY ASPHALT TOPSOIL	BENTONITE SEAL CONCRETE FILTER PACK THICK BENTONITE SLURRY GROUT NATURAL COLLAPSE / SAND BACKFIL	85 -					
TOPSOIL INTERBEDDED SAI		i lu					

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COMPLETION REPORT OF WELL No. MW-1d

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1097.7

DATUM: USGS

LOGGED BY: Ken Ewers

	STR	ATA	MELL	E 1"	-	7	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)		WELL DETAILS ≸	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See	Page	1)	
	95 -						Bentonite Slurry (continued)
	100 -			99.5		998.16	Natural Collapse
	105 -						
	110 -			108.5		989,16	Natural Collapse
	115 -			115.0		982.66	
EGEND			7				
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GROUND SURFACE BS BENTONITE SEAL FINE SAND FOR TOP OF SCREEN TOP OF SCREEN BSC BOTTOM OF SCREEN TOTAL DEPTH							
SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY							

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COMPLETION REPORT OF WELL No. MW-1d

Sheet 3 of 3

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: June 27, 2000

GROUND SURFACE ELEVATION: 1098.4

DATUM: USGS

LOGGED BY: Ken Ewers

	STR	ATA	WELL			Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	DEPTH (ft.) SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl	0 -	where		1100.74 0.0	TPC TRC GS	-2.35 1098.39	
RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 33.5' bgl GROUT Type: Thick Bentonite Slurry Interval: 3' to 29' bgl	5 -	TYY		3.0		1095.39	Concrete Bentonite Slurry
SEAL Type: None Interval: None SANDPACK Type: Natural Collapse Interval: 29' to 39' bgl SCREEN Diameter: 2" Type: Slotted PVC Interval: 33.5' to 38.5' bgl	10 -						
WELL DEVELOPMENT DATA DATE: 7/6/2000 EGEND METHOD: Powered suction-lift pumpin GRAVELLY SAND TRC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FINE SAND FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN	20 - g 25 -			29.0		1069.39	Natural Collapse
VERY FINE SAND TO TOTAL DEPTH SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL	35 -			38.5		1059.89	
INTERBEDDED SAND, SILT, CLAY	- 54	2500		39:0			Natural Collapse

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COMPLETION REPORT OF WELL No. MW-1i

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

WATER LEVEL: ₹ 10.15 ₹

DATE: 10-12-00

TIME: 1237

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: June 28, 2000

GROUND SURFACE ELEVATION: 1101.7

DATUM: USGS

LOGGED BY: K.E. & J.H.

	STR	ATA	V	WELL			NO	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL		TAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING			6		1104.08	TPC		
Diameter: 4" Type: Stickup			19	P.	1104.08	TRC	-2.38	1
Interval: 2.5' agl to 2.5' bgl	0 -				0.0	GS	1101.70	
RISER CASING		444	D	Po	2.0		1000 70	Concrete
Diameter: 2"			0)		2.0	-	1099.70	Natural Collapse
Type: PVC Interval: 2.5' agl to 55' bgl								inaliaral assignment
GROUT	5 -							
Type: Thick Bentonite Slurry Interval: 37' to 49' bgl								
SEAL								
Type: None	10 -	7/		Δ	1 3			
Interval: None		1.7						
SANDPACK Type: Natural Collapse								
Interval: 49' to 101' bgl	15 -							
SCREEN Diameter: 2"		243.5						
Type: Slotted PVC		N 2 8 76						
interval: 55' to 60' bgl	1.	3.57						
WELL DEVELOPMENT DATA	20 -	1						
DATE: 7/6/2000		-7/2						
.EGEND METHOD: Drillers pump	1	0.0						
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING	25 -	V.V.						
GRAVELLY SAND TRC TOP OF RISER CASING GS GROUND SURFACE								
BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK								
TSC TOP OF SCREEN		14.7						
VERY FINE SAND TD TOTAL DEPTH	30 -	100						
SILT BENTONITE SEAL								
CLAY CONCRETE								
GRAVELLY CLAY FILTER PACK	35 -							
ASPHALT THICK BENTONITE SLURRY GROUT	33						last at	
TOPSOIL NATURAL COLLAPSE / SAND BACKFIL	1		2222	22228	37.0	-	1064.70	Bentonite Slurry
INTERBEDDED SAND, SILT, CLAY	+	2.79	לללל	KKKK				Dentonite Sidily

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-2

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1101.7

DATUM: USGS LOGGED BY: K.E. & J.H.

	STR	RATA	WELL				DI. K.L. G VIII.
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See	Page	1)	
	40 -	2/2/					Bentonite Slurry (continued)
	45 -						
	50 -			49.0		1052.70	Natural Collapse
	55 -						
	60 -			60.0		1041.70	Natural Collapse
	65 -						
	70 -						
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE	75 -						
COARSE SAND MEDIUM SAND FINE SAND GS BENTONITE SEAL FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TO TOTAL DEPTH	80 -						
SILT BENTONITE SEAL CLAY CONCRETE	85 -	7/2					
ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL							
INTERBEDDED SAND, SILT, CLAY				7 1			

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PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1101.7

DATUM: USGS LOGGED BY: K.E. & J.H.

		RATA	WELL		Z		
WELL CONSTRUCTION DETAILS	DEPTH	SYMBOL SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS	
				(See P	age 1)		
	95			101.0	1000.70	Natural Collapse (continued)	
EGEND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FP FILTER PACK							
FINE SAND TSC TOP OF SCREEN BOTTOM OF SCREEN TO TOTAL DEPTH SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT TOPSOIL NATURAL COLLAPSE / SAND BA INTERBEDDED SAND, SILT, CLAY	A						

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Sheet 3 of 3

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: June 28, 2000

GROUND SURFACE ELEVATION: 1107.0

DATUM: USGS

LOGGED BY: Ken Ewers

PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5 agl to 2.5' bgl RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 81' bgl GROUT Type: Thick Bentonite Slurry Interval: 2' to 75' bgl SEAL Type: None SANDPACK Type: Natural Collapse Interval: 75 to 102' bgl SCREEN Diameter: 2" Type: Slotted PVC Interval: 81' to 86' bgl WELL DEVELOPMENT DATA DATE: 6/29/2000 LEGEND METHOD: Drillers pump GRAVELLY SAND EGG GROUNT FOR PROTECTIVE CASING GRAVELLY SAND FINE SAND GROUND SUFFACE SIDE SAND FINE SAND FILTER PACK F
STASPHALL WITH THICK DENTONITE CLUDDY OBOUT

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-3

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1107.0
DATUM: USGS

LOGGED BY: Ken Ewers

STRATA ELEVATION (ft.) WELL DEPTH (ft.) SYMBOL DEPTH (ft.) DETAILS CONSTRUCTION WELL CONSTRUCTION DETAILS REMARKS (See Page 1) 40 Bentonite Slurry (continued) 50 55 60 65 70 LEGEND 75.0 1032.00 TOP OF PROTECTIVE CASING 75 **GRAVELLY SAND** Natural Collapse TRC TOP OF RISER CASING **GROUND SURFACE** GS COARSE SAND BENTONITE SEAL BS MEDIUM SAND FILTER PACK TSC TOP OF SCREEN FINE SAND BOTTOM OF SCREEN BSC 80 **VERY FINE SAND** TOTAL DEPTH SILT BENTONITE SEAL CLAY CONCRETE 85 **GRAVELLY CLAY** FILTER PACK 1021.00 86.0 **ASPHALT** THICK BENTONITE SLURRY GROUT Natural Collapse TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-3

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1107.0

DATUM: USGS LOGGED BY: Ken Ewers

	STR	ATA	WELL		Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See P	age 1)	
	95 -	6 %		102.0	1005.00	Natural Collapse (continued)
GRAVELLY SAND GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND SILT GRAVELLY CLAY GRAVELLY CLAY FILTER PACK CONCRETE GRAVELLY CLAY FILTER PACK CONCRETE FILTER PACK CONCRETE FILTER PACK TOP OF RISER CASING GROUND SURFACE BENTONITE SEAL TOP OF RISER CASING GROUND SURFACE BENTONITE SEAL COPORTEE FILTER PACK TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY						



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COMPLETION REPORT OF WELL No. MW-3

COMPLETION REPORT OF WELL No. MW-4s

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI DATE: 10-12-00

TIME: 1222

DRILLING CONTRACTOR: NA

DRILLING METHOD: Hand Auger DATE COMPLETED: June 29, 2000 GROUND SURFACE ELEVATION: 1090.1

DATUM: USGS

LOGGED BY: M.B. & J.H.

WELL CC	NSTRUCTION DETAILS	DEPTH ST.)	SYNBOL H	WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
LEGEND M GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND	3.7' bgl c Chips ck sand '' bgl	0 -	NS CALL THE		1091.38 0.0 0.5 2.5	TPC TRC GS	-1.32 1090.06	Filtered Sand Pack
CLAY GRAVELLY CLAY SASPHALT TOPSOIL INTERBEDDED SA	FILTER PACK THICK BENTONITE SLURRY GROUT NATURAL COLLAPSE / SAND BACKFII ND, SILT, CLAY	-						

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COMPLETION REPORT OF WELL No. MW-4s

COMPLETION REPORT OF WELL No. MW-4d

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

WATER LEVEL: **⊈Artesian ₹**DATE: 10-12-00

TIME: 1225

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: June 29, 2000

GROUND SURFACE ELEVATION: 1089.5

DATUM: USGS

LOGGED BY: Joel Henry

	DEPTH (ft.)	SYMBOL ATA	WELL	VAS DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4" Type: Stickup				1096.04	TPC		
Interval: 2.5' agl to 2.5' bgl	0 -	TUTT		0.0	GS	1089.51	Concrete
RISER CASING Diameter: 2"		\$\$\$\$\$	9 4	2.0		1087.51	
Type: PVC				4.0		1085.51	Natural Collapse
Interval: 2.5' agl to 73' bgl	5 -		3333				Bentonite Slurry
GROUT Type: Thick Bentonite Slurry Interval: 4' to 68' bgl							
SEAL Type: None Interval: None	10 -						
SANDPACK Type: Natural Collapse Interval: 68' to 78' bgl	15 -						
SCREEN Diameter: 2" Type: Slotted PVC Interval: 73' to 78' bgl							
WELL DEVELOPMENT DATA	20 -		83333 8333	}			
DATE: 06/29/2000			83333 8333	3			
EGEND METHOD: Submersible Grundfos Pump)		\$\$\$\$ \$ \$\$\$\$	8			
GRAVELLY SAND TC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FINE SAND FINE SAND FOR TOP OF SCREEN BSC BOTTOM OF SCREEN TOTAL DEPTH	25						
SILT BENTONITE SEAL CLAY CONCRETE							
GRAVELLY CLAY FILTER PACK	35	3.7	\$\$\$\$\$ \$ \$\$\$\$	8			
THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL	L						

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-4d

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1089.5

DATUM: USGS LOGGED BY: Joel Henry

STRATA EVATION (ft.) WELL DEPTH (ft.) DETAILS CONSTRUCTION SYMBOL DEPTH (ft.) WELL CONSTRUCTION DETAILS REMARKS (See Page 1) 40 Bentonite Slurry (continued) 50 65 1021.51 68.0 Natural Collapse 70 LEGEND TOP OF PROTECTIVE CASING **GRAVELLY SAND** TRC TOP OF RISER CASING **GROUND SURFACE** COARSE SAND BENTONITE SEAL 1011.51 78.0 BS FILTER PACK FΡ MEDIUM SAND Natural Collapse TSC TOP OF SCREEN FINE SAND 80 **BOTTOM OF SCREEN BSC** TOTAL DEPTH **VERY FINE SAND** SILT BENTONITE SEAL CLAY CONCRETE **GRAVELLY CLAY** FILTER PACK **ASPHALT** THICK BENTONITE SLURRY GROUT **TOPSOIL** NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY

MALCOLM PIRNIE 1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-4d

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1089.5

DATUM: USGS

LOGGED BY: Joel Henry

	STR	ATA	WELL	1.1		N	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
COARSE SAND MEDIUM SAND FINE SAND FINE SAND SILT GRAVELLY CLAY GRAVELLY CLAY WELL CONSTRUCTION DETAILS TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FILTER PACK TOP OF SCREEN TOTAL DEPTH BENTONITE SEAL CONCRETE GRAVELLY CLAY FILTER PACK	DEPT (ft.)	SYMBG	DETAILS		Page		REMARKS
ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SII T, CI AY							

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COMPLETION REPORT OF WELL No. MW-4d

Sheet 3 of 3

COMPLETION REPORT OF WELL No. MW-5d

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI DATE: 10-12-00 TIME: 1143

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 20, 2000

GROUND SURFACE ELEVATION: 1149.4

DATUM: USGS

LOGGED BY: Joel Henry

Type: PVC Interval: 2.5' agl to 153' bgl GROUT Type: Thick Bentonite Slurry Interval: 2' to 149' bgl SEAL Type: None Interval: None SANDPACK Type: K&E Well Gravel #0 Interval: 149' to 152' bgl SCREEN Diameter: 2" Type: Slotted PVC Interval: 153' to 158' bgl WELL DEVELOPMENT DATA DATE: 07/21/2000 LEGEND METHOD: Air Sparging GRAVELLY SAND TRC TOP OF PROTECTIVE CASING GRAVELLY SAND TRC TOP OF RISER CASING	WELL CONSTRUCTION DETAILS	DEPTH ST.	SYMBOL AT	WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
COARSE SAND S GS GROUND SURFACE BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN FINE SAND BSC BOTTOM OF SCREEN VERY FINE SAND TD TOTAL DEPTH SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY	PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 153' bgl GROUT Type: Thick Bentonite Slurry Interval: 2' to 149' bgl SEAL Type: None Interval: None SANDPACK Type: K&E Well Gravel #0 Interval: 149' to 152' bgl SCREEN Diameter: 2" Type: Slotted PVC Interval: 153' to 158' bgl WELL DEVELOPMENT DATA DATE: 07/21/2000 LEGEND METHOD: Air Sparging GRAVELLY SAND FOR TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GROUND SURFACE BS BENTONITE SEAL FINE SAND FILTER PACK TOP OF SCREEN BSC BOTTOM OF SCREEN TOTOAL DEPTH BENTONITE SEAL	0 - 5 - 10 - 15 - 20 - 25 - 30	SAMBOL	DETAILS	1147.43	TRC	1.97 1149.40	REMARKS

1500 Abbott Road, Suite 210 East Lansing, MI 48823

Telephone: (517) 337-0111 Fax: (517) 337-0417

COMPLETION REPORT OF WELL No. MW-5d

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1149.4

DATUM: USGS

LOGGED BY: Joel Henry

40 45 - 50 - □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	ELEVATION (#)	DEPTH (ft.)	VAS DEPTH (ft.)	STRATA WELL ON DETAILS	1	NSTRUCTION DETAILS	WELL CO
LEGEND GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TOP OF RISER CASING GROUND SURFACE BENTONITE SEAL TOP OF SCREEN TOP OF SCREEN TOT OF SCREEN TOP OF SCREEN TOT TOTAL DEPTH SILT BENTONITE SEAL CONCRETE GRAVELLY CLAY CONCRETE GRAVELLY CLAY FILTER PACK 85 - SAPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY			(See Pag	40 45 50 60 65 70 75	NG	TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TD TOTAL DEPTH BENTONITE SEAL CONCRETE FILTER PACK	GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND SILT CLAY

MALCOLM PIRNIE 1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-5d

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1149.4

DATUM: USGS LOGGED BY: Joel Henry

STRATA EVATION (ft.) DEPTH (ft.) DEPTH (ft.) CONSTRUCTION SYMBOL DETAILS WELL CONSTRUCTION DETAILS **REMARKS** 핍 (See Page 1) Bentonite Slurry (continued) 105 110 115 120 LEGEND 125 TPC TOP OF PROTECTIVE CASING **GRAVELLY SAND** TRC TOP OF RISER CASING **GROUND SURFACE** GS COARSE SAND BS BENTONITE SEAL MEDIUM SAND FΡ **FILTER PACK** TSC TOP OF SCREEN **FINE SAND** 130 BOTTOM OF SCREEN BSC TOTAL DEPTH **VERY FINE SAND** SILT BENTONITE SEAL CLAY CONCRETE 135 **GRAVELLY CLAY** FILTER PACK ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY



1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-5d

Sheet 3 of 4

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1149.4

DATUM: USGS LOGGED BY: Joel Henry

STRATA LEVATION (ft.) SYMBOL DEPTH (ft.) CONSTRUCTION DETAILS WELL CONSTRUCTION DETAILS **REMARKS** 딦 (See Page 1) Bentonite Slurry (continued) 145 149.0 1000.40 K & E Well Gravel 150 152.0 997.40 Natural Collapse 155 158.0 991.40 Natural Collapse 160.2 989.20 160 LEGEND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING **GRAVELLY SAND GROUND SURFACE** GS COARSE SAND BS **BENTONITE SEAL** FP MEDIUM SAND **FILTER PACK** TOP OF SCREEN TSC **FINE SAND** BSC **BOTTOM OF SCREEN TOTAL DEPTH** TD **VERY FINE SAND** SILT **BENTONITE SEAL** CLAY CONCRETE **GRAVELLY CLAY FILTER PACK ASPHALT** THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY

MALCOLM PIRNIE

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Sheet 4 of 4

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

WATER LEVEL: ₹ 52.96 ₹

DATE: 10-12-00

TIME: 1145

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 20, 2000

GROUND SURFACE ELEVATION: 1148.8

DATUM: USGS

LOGGED BY: Joel Henry

	DEPTH (#)	SYMBOL AT	WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 90' bgl GROUT Type: Thick Bentonite Slurry Interval: 2' to 85' bgl SEAL Type: None Interval: None SANDPACK Type: Filter Pack Sand Interval: 85' to 100' bgl SCREEN Diameter: 2" Type: Slotted PVC Interval: 90' to 100' bgl WELL DEVELOPMENT DATA DATE: 07/21/2000 LEGEND METHOD: Air Sparging	10 - 15 - 20 - 20 - 3	SYMBC	DETAILS	1147.09 0.0 2.0	TPC TRC GS	1.66	REMARKS
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING TRC TOP OF RISER CASING GROUND SURFACE BS BENTONITE SEAL FILTER PACK TOP OF SCREEN TOP OF SCREEN TOTAL DEPTH SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY	25 - 30 - 35 -						

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-5i

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

CROUND SURFACE ELEVATION: 1148.8

DATUM: USGS LOGGED BY: Joel Henry

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-5i

PROJECT NO: 4065-001

GROUND SURFACE ELEVATION: 1148.8 DATUM:

USGS

PROJECT LOCATION: Osceola, MI LOGGED BY: Joel Henry **STRATA** ELEVATION (ft.) WELL DEPTH (ft.) DETAILS CONSTRUCTION WELL CONSTRUCTION DETAILS REMARKS (See Page 1) Filtered Sand Pack (continued) 100.0 1048.75 100 LEGEND TPC TOP OF PROTECTIVE CASING **GRAVELLY SAND** TRC TOP OF RISER CASING **GROUND SURFACE** GS COARSE SAND BS BENTONITE SEAL MEDIUM SAND FΡ FILTER PACK TSC TOP OF SCREEN **FINE SAND** BSC BOTTOM OF SCREEN 10/17/00 TD **TOTAL DEPTH VERY FINE SAND** SILT BENTONITE SEAL CLAY CONCRETE **GRAVELLY CLAY FILTER PACK ASPHALT** THICK BENTONITE SLURRY GROUT



INTERBEDDED SAND, SILT, CLAY

TOPSOIL

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NATURAL COLLAPSE / SAND BACKFILL

COMPLETION REPORT OF WELL No. MW-5i

Sheet 3 of 3

COMPLETION REPORT OF WELL No. MW-6

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 17, 2000

GROUND SURFACE ELEVATION: 1142.4

DATUM: USGS

LOGGED BY: Joel Henry

	STR	АТА	WELL	1		NO	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	CAMYS	DETAILS	DEPTH (f)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4"				1139.96	TPC TRC	2.48	4
Type: Stickup Interval: 2.5' agl to 2.5' bgl				0.0	GS	1142,44	
RISER CASING	0 -		D D				Concrete
Diameter: 2"	1		חוות חווו	2.0	-	1140.44	Bentonite Slurry
Type: PVC			\$\$\$\$\$ \$ \$\$\$\$				Demonite oldry
Interval: 2.5' agl to 70' bgl GROUT	5		\$\$\$\$\$ \$ \$\$\$\$				
Type: Thick bentonite slurry			\$\$\$\$\$ \$ \$\$\$\$				
Interval: 2' to 64' bgl	4		3333 8333				
SEAL Type: None	10 -	×11	 				
Interval: None	10		83333 83333				
SANDPACK			\$\$\$\$\$ \$ \$\$\$\$				
Type: Natural Collapse Interval: 64' to 80' bgl	1		B B B B B B B B B B B B B B B B B B B				
SCREEN	15 -		83334 83333				
Diameter: 2"			B}}}} B				
Type: Slotted PVC Interval: 70' to 80' bg!	3		\$		1		
WELL DEVELOPMENT DATA	20 -						
DATE: 7/20/2000			\$\$\$\$\$ \$ \$\$\$\$				
LEGEND METHOD: Air Sparging			83333 B3333				
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING	25 -		83333 83333				
COARSE SAND GS GROUND SURFACE	1		83338 83358				
BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK			\$\$\$\$\$ \$\$\$\$ \$				
FINE SAND TSC TOP OF SCREEN BSC BOTTOM OF SCREEN	30 -		\$\$\$\$\$ \$ \$\$\$\$				
VERY FINE SAND TO TOTAL DEPTH	30		B3333 B3333				
SILT BENTONITE SEAL			83334 8355				
CLAY CONCRETE			\$\$\$\$\$ \$ \$\$\$\$				
GRAVELLY CLAY FILTER PACK	35		\$ \$\$\$\$ \$ \$\$\$\$				
ASPHALT THICK BENTONITE SLURRY GROUT			8				
TOPSOIL NATURAL COLLAPSE / SAND BACKFI	4		B3333 B335				
INTERBEDDED SAND, SILT, CLAY		100	KKKKA KKKKA				

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-6

PROJECT: **GSWA Spring Hill Camp**PROJECT NO: **4065-001**

Osceola, MI PROJECT LOCATION:

GROUND SURFACE ELEVATION: 1142.4 DATUM: USGS

LOGGED BY: Joel Henry

		ATA	WELL	F	N _O	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (#)	CONSTRUCTION REMARKS
				(See	Page 1)	
	40 -		33333 3333			Bentonite Slurry (continued)
			};;;;			
	45 -					
	50 -					
	55 -					
	60 -					
				64.0	1078	.44 Filtered Sand Pack
	65					
	70					
LECEND		100				
LEGEND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING	75					
COARSE SAND GS GROUND SURFACE BS BENTONITE SEAL FP FILTER PACK TO THE PACK TO						
FINE SAND TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TD TOTAL DEPTH TOTAL DEPTH	80	393		80.0	1062	.44
SILT BENTONITE SEAL CONCRETE						
GRAVELLY CLAY FILTER PACK STATE OF THICK BENTONITE SLURRY GROUT						
VERY FINE SAND TD TOTAL DEPTH SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT TOPSOIL NATURAL COLLAPSE / SAND BACKFI INTERBEDDED SAND, SILT, CLAY	L					V



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COMPLETION REPORT OF WELL No. MW-6

COMPLETION REPORT OF WELL No. MW-7

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

WATER LEVEL:

53.19	▼	▼
DATE:	10-12-00	
TIME:	1241	

GROUND SURFACE ELEVATION: 1149.2

DATUM: USGS

LOGGED BY: Jeff Groncki

DRILLING CONTRACTOR: Stearns
DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 18, 2000

WELL CONSTRUCTION DETAILS	DEPTH (ft.)		WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 0.5' bgl RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 89' bgl GROUT Type: Thick Bentonite Slurry Interval: 0.5' to 84' bgl SEAL Type: None Interval: None SANDPACK Type: Natural Collapse Interval: 84' to 99' bgl SCREEN Diameter: 2" Type: Slotted PVC Interval: 89' to 99' bgl WELL DEVELOPMENT DATA DATE: 7/20/2000 LEGEND METHOD: Air Sparging GRAVELLY SAND GRAVELLY SAND GRAVELLY SAND GRAVELLY SAND FINE SAND FINE SAND BSC BOTTOM OF SCREEN TOP OF SCREEN BSC BOTTOM OF SCREEN TOTAL DEPTH SILT BENTONITE SEAL CLAY GRAVELLY CLAY FILTER PACK	130 0	NAS NAS		1147.28 0.0 0.5	TPC TRC		Concrete Bentonite Slurry
ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFII INTERBEDDED SAND, SILT, CLAY							

MALCOLM PIRNIE 1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-7

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1149.2

DATUM: USGS

LOGGED BY: Jeff Groncki

		STRATA WE			Z	
WELL CONSTRUCTION DETAILS	SYMBOL OFFTH	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS		
				(See	Page 1)	
	40 -					
	40					Bentonite Slurry (continued)
	1		::::			
	45 -					
	1					
	1-3					
	50 -		???? ?			
	55 -	4	\$\$\$\$\$\frac{1}{2}\$			
	55 -					
	60 -				. 1	
		0.0				
		000	B}}}} B			
	65 -					
		37.7		1	- 1	
	70 -		}}}}}			
EGEND	T.					
TDC TOD OF DDOTECTIVE CACING	75 -					
GRAVELLY SAND TRC TOP OF RISER CASING COARSE SAND GS GROUND SURFACE						
MEDIUM SAND FP FILTER PACK						
FINE SAND TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TO TOTAL DEPTH	80 -	3.7				
VERY FINE SAND TO TOTAL DEPTH SILT BENTONITE SEAL		- 7				
CLAY CONCRETE		3000	K K K K K K K K K K	84.0	1065.2	3 Natural Collapse
GRAVELLY CLAY FILTER PACK	85 -					Maturar Collapse
ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACK						
TOPSOIL NATURAL COLLAPSE / SAND BACK INTERBEDDED SAND, SILT, CLAY		11.0				

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COMPLETION REPORT OF WELL No. MW-7

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1149.2

DATUM: USGS

LOGGED BY: Jeff Groncki

	Osceola, IVII		_		_		SED BY: Jell Groncki
WELL CONS	STRUCTION DETAILS	DEPTH ST.	SYMBOL STA	WELL DETAILS	DEPTH (ft.)	ELEVATION	CONSTRUCTION REMARKS
GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND SILT CLAY GRAVELLY CLAY ASPHALT	TPC TOP OF PROTECTIVE CASING RC TOP OF RISER CASING GROUND SURFACE BENTONITE SEAL TOP OF SCREEN TOTAL DEPTH BENTONITE SEAL CONCRETE FILTER PACK THICK BENTONITE SLURRY GROUT NATURAL COLLAPSE / SAND BACKFI, SILT, CLAY	95 -			99.0 101.0	1050 1044	Natural Collapse (continued)



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COMPLETION REPORT OF WELL No. MW-8

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 18, 2000

GROUND SURFACE ELEVATION: 1113.5

DATUM: USGS

LOGGED BY: Joel Henry

WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL A	WELL DETAILS	DЕРТН (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4" Type: Stickup				1110.52	4.65	2.96	
Interval: 3' agl to 2' bgl RISER CASING Diameter: 2" Type: PVC	0 -			4.0	GS	1109.49	Concrete
Interval: 2' agl to 75' bgl GROUT Type: Thick bentonite slurry grout Interval: 4' to 68' bgl	5 -			4.0		1100.40	Bentonite Slurry
SEAL Type: None Interval: None SANDPACK	10 -						
Type: Natural Collapse Interval: 68' to 86' bgl SCREEN	15 -						
Diameter: 2" 'Type: Slotted PVC Interval: 75' to 85' bgl WELL DEVELOPMENT DATA	20 -		▼				
DATE: 7/19/2000 LEGEND METHOD: Drillers pump							
GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GROUND SURFACE BS BENTONITE SEAL TOP OF SCREEN BSC BOTTOM OF SCREEN TO TOTAL DEPTH	25						
SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK	35						
ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY							

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PROJECT: **GSWA Spring Hill Camp** PROJECT NO: **4065-001**

PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1113.5

DATUM: USGS LOGGED BY: Joel Henry

STRATA EVATION (ft.) WELL DEPTH (ft.) DEPTH DETAILS CONSTRUCTION SYMBOL WELL CONSTRUCTION DETAILS REMARKS (See Page 1) 40 Bentonite Slurry (continued) 50 60 65 68.0 1045.49 Natural Collapse LEGEND 75 TPC TOP OF PROTECTIVE CASING **GRAVELLY SAND** TOP OF RISER CASING **TRC GROUND SURFACE** GS COARSE SAND BS BENTONITE SEAL MEDIUM SAND **FILTER PACK** TSC TOP OF SCREEN FINE SAND 80 BSC **BOTTOM OF SCREEN TOTAL DEPTH VERY FINE SAND** SILT **BENTONITE SEAL** CLAY CONCRETE 85.0 1028.49 85 **GRAVELLY CLAY FILTER PACK ASPHALT** THICK BENTONITE SLURRY GROUT **TOPSOIL** NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY

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COMPLETION REPORT OF WELL No. MW-9

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI WATER LEVEL:

28.63

▼

DATE: 10-12-00 TIME: 1126

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 20, 2000

GROUND SURFACE ELEVATION: 1125.3

DATUM: USGS

LOGGED BY: Jeff Groncki

WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL T	WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 65' bgl GROUT Type: Thick bentonite slurry grout Interval: 0.5' to 60' bgl SEAL Type: None Interval: None SANDPACK Type: #5 Sand Interval: 60' to 75' bgl SCREEN Diameter: 2" Type: Slotted PVC Interval: 65' to 75' bgl	0 - 5 - 10 -			1122.97 0.0 0.5	TPC TRC	2,32 1125.29	Concrete Bentonite Slurry
WELL DEVELOPMENT DATA DATE: 7/21/2000 LEGEND METHOD: Powered suction-lift pumpir TPC TOP OF PROTECTIVE CASING TOP OF RISER CASING TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL TOP OF SCREEN FINE SAND TOTOP OF SCREEN TOP OF SCREEN TOP OF SCREEN TOTAL DEPTH BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT TOPSOIL INTERBEDDED SAND, SILT, CLAY	30						

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COMPLETION REPORT OF WELL No. MW-9

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1125.3
DATUM: USGS

LOGGED BY: Jeff Groncki

WELL CONSTRUCTION DETAILS	DEPTH C	SYMBOL Y	WELL DETAILS &	DEРТН (ft.)	•	ELEVATION (ft.)	CONSTRUCTION REMARKS
LEGEND GRAVELLY SAND TC TOP OF PROTECTIVE CASING TC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL GRAVELLY SAND FP FILTER PACK FINE SAND SEC BOTTOM OF SCREEN VERY FINE SAND SIT CLAY GRAVELLY CLAY ASPHALT TOPSOIL INTERBEDDED SAND, SILT, CLAY INTERBEDDED SAND, SILT, CLAY	40 - 45 - 50 - 65 - 70 -	SW SW			Page	1065.29	Filtered Sand Pack

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COMPLETION REPORT OF WELL No. MW-10

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

WATER LEVEL: ₹ 20.12 ₹ ▼

DATE: 10-12-00

TIME: 1136

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 18, 2000

GROUND SURFACE ELEVATION: 1120.5

DATUM: USGS

LOGGED BY: Jeff Groncki

WELL CONSTRUCTION DETAILS	STR (#)	SYMBOL T	WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 52' bgl GROUT Type: Thick Bentonite Slurry Interval: 0.5' to 45' bgl SEAL Type: None Interval: None SANDPACK Type: Natural Collapse Interval: 45' to 65' bgl SCREEN Diameter: 2" Type: Slotted PVC Interval: 52' to 62' bgl WELL DEVELOPMENT DATA DATE: 7/20/200 LEGEND METHOD: Powered suction-lift pumpin GRAVELLY SAND GRAVELLY SAND GRAVELLY SAND FINE SAND SERIOR SERIOR FINE SAND SERIOR SERIOR SERIOR FINE SAND SERIOR SERIO	0 - 5 - 10 - 15 - 20 - 25 - 30 - 35	SYMBC	DETAILS	1117.67 0.0 0.5	TPC TRC GS	2.87 1120.54	Concrete Bentonite Slurry

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-10

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1120.5

DATUM: USGS

LOGGED BY: Jeff Groncki

PROJECT LOCATION. Osceola, WII	STR	АТА	T	-			BT: Jell Glotick
WELL CONSTRUCTION DETAILS	DEPTH (ft.)		WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See	Page) 1)	
	40 -	7.07					Bentonite Slurry (continued)
	45 -		\$\$\$\$ \$ \$\$\$[45.0		1075.54	
	10						Natural Collapse
	50 -	10.0					
	55 -						
	60 -						
				62.0		1058.54	Natural Collapse
	65 -			65.0		1055.54	
							ļ.
_EGEND							
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN							
VERY FINE SAND TO TOTAL DEPTH SILT BENTONITE SEAL							
CLAY CONCRETE GRAVELLY CLAY FILTER PACK							
ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFII INTERBEDDED SAND, SILT, CLAY							



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COMPLETION REPORT OF WELL No. MW-10

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 21, 2000

GROUND SURFACE ELEVATION: 1166.7

DATUM: USGS

LOGGED BY: Jeff Groncki

WELL CONSTRUCTION DETAILS		SYMBOL A		VELL TAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4"			1	-11	1164.08	TPC TRC	2.58	
Type: Stickup Interval: 2.5' agl to 2.5' bgl	0 -				0.0	GS	1166.66	
RISER CASING	0 -		22223	25555	0.5		1166,16	Concrete
Diameter: 2"			} }}}}	88888				Bentonite Slurry
Type: PVC			88833	\$\$\$\$				
Interval: 2.5' agl to 70' bgl	5 -	OM COM	3333	83333				
GROUT Type: Thick Bentonite Slurry			\$\$\$\$\$	85553				
Interval: 0.5' to 65' bgl			55555	55555				
SEAL			\$ \$\$\$8	83333				
Type: None	10 -		88888	\$\$\$\$\$			1	
Interval: None			33333	83333				
SANDPACK Type: #5 Filter Pack Sand	1 3		85555	85555				
Interval: 65' to 80' bgl	45	9186	88888	85555	1			
SCREEN	15 -		\$ \$\$\$\$	\$\$\$\$\$				
Diameter: 2"			\$\$\$\$\$	\$\$\$\$\$				
Type: Slotted PVC Interval: 70' to 80' bgl	n 3 - 3		83333	83333				15
WELL DEVELOPMENT DATA	20 -		\$\$\$\$\$	\$5555				
		10	\$\$\$\$\$	\$5558)	
DATE: 8/7/2000			83333	83333				
LEGEND METHOD: Submersible Grund			} }}}}	\$\$\$\$\$				
GRAVELLY SAND TPC TOP OF PROTECTIVE CAS TRC TOP OF RISER CASING	ING 25 -		BSSSS	83333				
COARSE SAND GS GROUND SURFACE			85555	855558				
MEDIUM SAND FP FILTER PACK			§\$\$\$\$§	\$55558				
FINE SAND TSC TOP OF SCREEN BSC BOTTOM OF SCREEN	30 -	17.7	<i>}}}}}</i>	83333				
VERY FINE SAND TO TOTAL DEPTH	30	0.7	8333\$	83333				
SILT BENTONITE SEAL			\$\$\$\$\$	\$\$\$\$\$				
CLAY CONCRETE		0/10/20	} }}}}	85555				
GRAVELLY CLAY FILTER PACK	35 -	14.7	}	\$\$\$\$\$				
ASPHALT THICK BENTONITE SLURRY	GROUT	1950	33333	83333				
TOPSOIL NATURAL COLLAPSE / SAN	D BACKFILL		\$\$\$\$\$	\$5555				
INTERBEDDED SAND, SILT, CLAY		1	X	KKKK				

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-11

PROJECT: GSWA Spring Hill Camp PROJECT NO: 4065-001

PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1166.7

DATUM: USGS

LOGGED BY: Jeff Groncki

	DEPTH ST (ft.)	SYMBOL T	WELL DETAILS≸	DEPTH (ft,)		ELEVATION (ft.)	CONSTRUCTION REMARKS
	40 -			(See	Page	∌ 1)	
	45 - 50 - 60 -		abla				Bentonite Slurry (continued)
	65 -			65.0		1101.66	Filtered Sand Pack
.EGEND	70 -	30.0					
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL BS BENTONITE SEAL FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN	75 - 80 -			80.0		1086.66	Natural Collapse
VERY FINE SAND TO TOTAL DEPTH SILT BENTONITE SEAL				83.0		1083.66	
CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY							

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COMPLETION REPORT OF WELL No. MW-12d

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 25, 2000

GROUND SURFACE ELEVATION: 1163.2

DATUM: USGS

LOGGED BY: J.Henry/G.Fox

	DEPTH (ft.)		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 3.0' agl to 2.0' bgl RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 105' bgl GROUT Type: Thick Bentonite Slurry Interval: 2.0' to 102' bgl SEAL Type: None Interval: None SANDPACK Type: #5 Filter Pack Sand Interval: 103' to 115' bgl SCREEN Diameter: 2" Type: Slotted PVC Interval: 105' to 115' bgl WELL DEVELOPMENT DATA DATE: 7/27/00 LEGEND METHOD: Air Sparging TPC TOP OF PROTECTIVE CASING TPC TOP OF PROTECTIVE CASING GRAVELLY SAND SG GROUND SURFACE BS BENTONITE SEAL FINE SAND SG GROUND SURFACE BS BENTONITE SEAL FILTER PACK TOP OF SCREEN TOTO OF SCREEN SECTION OF SCREEN TOTAL DEPTH BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT THICK BENTONITE SLURRY GROUT NATURAL COLLAPSE / SAND BACKFIL	0 - 5 - 10 - 20 - 25 -	S S S S S S S S S S S S S S S S S S S		1160.79 0.0 2.0	型 2.42 1163.21 1161.21	Concrete Bentonite Slurry

MALCOLM PIRNIE

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Sheet 1 of 3

PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI GROUND SURFACE ELEVATION: 1163.2

DATUM: USGS

LOGGED BY: J.Henry/G.Fox

	STR	ATA	WELL		Z	
WELL CONSTRUCTION DETAILS	CEPTH (ft)	SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
WELL CONSTRUCTION DETAILS	(#) 40 - 45 - 50 -	SYMBG	DETAILS \$		Page 1)	REMARKS Bentonite Slurry (continued)
ECEND	65 -					
GRAVELLY SAND GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND SILT GRAVELLY CLAY ASPHALT INTERBEDDED SAND, SILT, CLAY TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TO TOTAL DEPTH BENTONITE SEAL CONCRETE THICK BENTONITE SLURRY GROUT NATURAL COLLAPSE / SAND BACKFIL	75 - 80 -	0 0.0 0.0				

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COMPLETION REPORT OF WELL No. MW-12d

Sheet 2 of 3

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1163.2

DATUM: USGS

LOGGED BY: J.Henry/G.Fox

	STR	ATA	WELI			Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAI	LSAY	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
					(See P	age 1)	
	95 -						Bentonite Slurry (continued)
	100 -				102.0 103.0	1061.21 1060.21	Natural Collapse
	105						Filtered Sand Pack
	110						
	115				115.0	1048.21	
GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GROUND SURFACE BS BENTONITE SEAL TOP OF SCREEN BSC BOTTOM OF SCREEN TOTAL DEPTH							
SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT TOPSOIL NATURAL COLLAPSE / SAND BACKFI INTERBEDDED SAND, SILT, CLAY	L.						

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COMPLETION REPORT OF WELL No. MW-12i

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA
DATE COMPLETED: July 27, 2000

GROUND SURFACE ELEVATION: 1162.5

DATUM: USGS LOGGED BY: Greg Fox

WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL A	WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4" Type: Stickup				1160.15		2,32	
Interval: 2.5' agl to 2.5' bgl RISER CASING	0		D D	2.0	GS	11 62.47	Concrete
Diameter: 2" Type: PVC Interval: 2.5' agl to 52' bgl GROUT Type: Thick Bentonite Slurry Interval: 0.5' to 48' bgl SEAL Type: None Interval: None SANDPACK Type: Filter pack sand Interval: 48' to 62' bgl.	5 -			_ 2.0		1160.47	Bentonite Slurry
SCREEN Diameter: 2" Type: Slotted PVC Interval: 52' to 62' bgl. WELL DEVELOPMENT DATA DATE: 8/8/2000	20 -	72.77					
GRAVELLY SAND COARSE SAND METHOD: Submersible Grundfos Pump TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GROUND SURFACE BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN VERY FINE SAND TD TOTAL DEPTH	25 -						
SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY	35 -						

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Sheet 1 of 2

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1162.5

DATUM: USGS LOGGED BY: Greg Fox

WELL CONSTRUCTION DETAILS	DEPTH ST. (ft.)	SYMBOL T	WELL DETAILS≸	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	40 - 45 - 50 - 60 - 60 -			48.0 52.0	1114.47 1110.47	Filtered Sand Pack
GRAVELLY SAND GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND SILT BENTONITE SEAL TOP OF RISER CASING GROUND SURFACE BS BENTONITE SEAL TOP OF SCREEN TOP OF SCREEN TOTAL DEPTH BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK TOPOOF SCREEN TOTAL DEPTH BENTONITE SEAL CONCRETE GRAVELLY CLAY THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFILE INTERBEDDED SAND, SILT, CLAY						



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Sheet 2 of 2

COMPLETION REPORT OF WELL No. MW-13

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

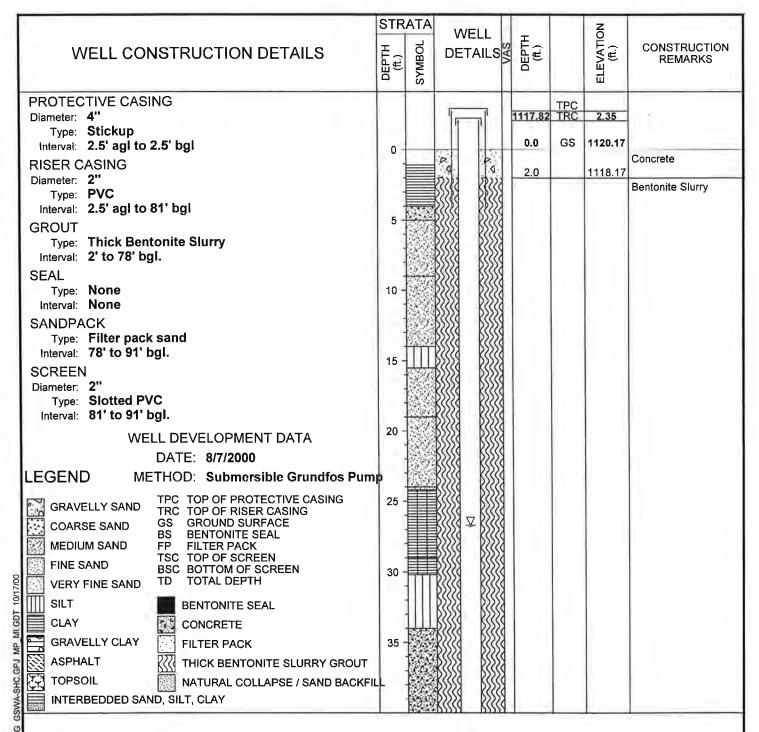
DATE COMPLETED: July 27, 2000

GROUND SURFACE ELEVATION: 1120.2

DATUM: USGS

LOGGED BY: J.Henry/G.Fox

Sheet 1 of 3



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Sheet 1 of 3

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1120.2

DATUM: USGS

LOGGED BY: J.Henry/G.Fox

		SIK	ATA	14/1	ELL			Z	
WELL CONSTRU	JCTION DETAILS	DEPTH (ft.)	SYMBOL		AILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
						(See	Pag	e 1)	
GRAVELLY SAND GRAVELLY SAND TRC TC GS GI BS BE BS BE TSC TC BSC BC TC TSC TC TSC TC BSC BC TSC TC TSC TC BSC BC TSC TC BSC BC TSC TC TSC TC	OP OF PROTECTIVE CASING OP OF RISER CASING ROUND SURFACE ENTONITE SEAL LTER PACK OP OF SCREEN OTTOM OF SCREEN OTAL DEPTH NTONITE SEAL INCRETE LTER PACK ICK BENTONITE SLURRY GROUT ITURAL COLLAPSE / SAND BACKFIL	40				78.0		1042.17	Bentonite Slurry (continued) Filtered Sand Pack



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COMPLETION REPORT OF WELL No. MW-13

Sheet 2 of 3

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1120.2

DATUM: USGS

LOGGED BY: J.Henry/G.Fox

Thousand poor the state of the	STR	ATA	WELL		-		Dr. Girlolliyi Gir G
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	WELL DETAILS \$	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See	Page	∌ 1)	
	1	00		91.0		1029.17	Natural Collapse
	95 -	6					
	100 -						
	105 - -						
	110 -						
				113.0		1007.17	
LEGEND							
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL BS BENTONITE SEAL TSC TOP OF SCREEN TSC TOP OF SCREEN BSC BOTTOM OF SCREEN							
VERY FINE SAND TO TOTAL DEPTH SILT BENTONITE SEAL							
CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT THICK BENTONITE SLURRY GROUT							
TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY	-						



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COMPLETION REPORT OF WELL No. TW-1

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

DRILLING CONTRACTOR: Stearns

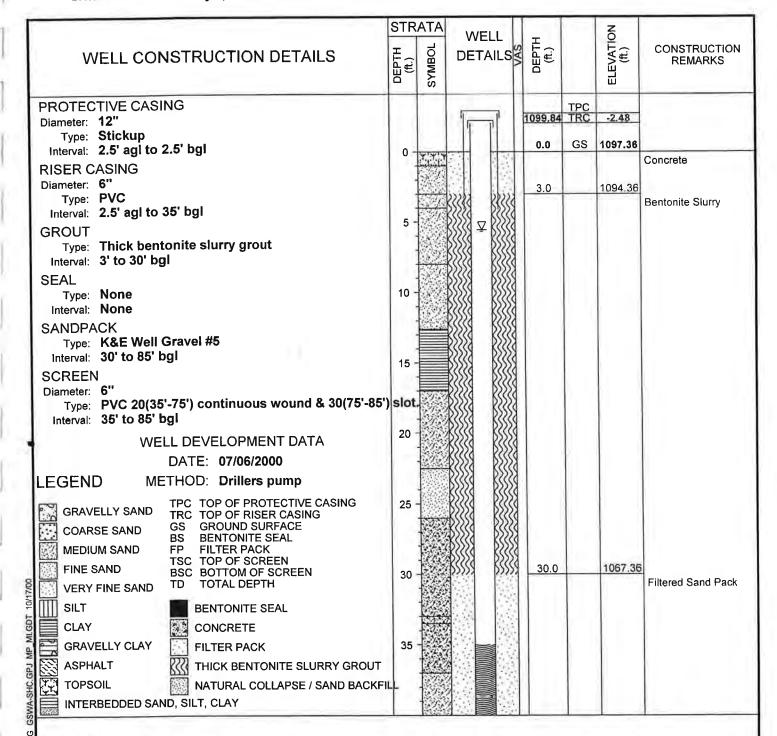
DRILLING METHOD: 10 1/4" HSA

DATE COMPLETED: July 6, 2000

GROUND SURFACE ELEVATION: 1097.4

DATUM: USGS

LOGGED BY: Joel Henry



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Sheet 1 of 2

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1097.4

DATUM; USGS LOGGED BY; Joel Henry

1	DEPTH ST (ft.)	SYMBOL AT	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	H) 40	SYM			Page 1)	Filtered Sand Pack (continued)
LEGEND GRAVELLY SAND TC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FILTER PACK TOP OF SCREEN BSC BOTTOM OF SCREEN TOTAL DEPTH SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK THICK BENTONITE SLURRY GROUT TOPSOIL INTERBEDDED SAND, SILT, CLAY	70 - 75 - 80 - 85 -			85.0	1012.30	

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Sheet 2 of 2

COMPLETION REPORT OF WELL No. TW-2

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

WATER LEVEL: \$\frac{7}{24.00}\$ \$\frac{7}{10-12-00}\$ TIME: \$\frac{10-12-00}{1216}\$

DRILLING CONTRACTOR: Stearns

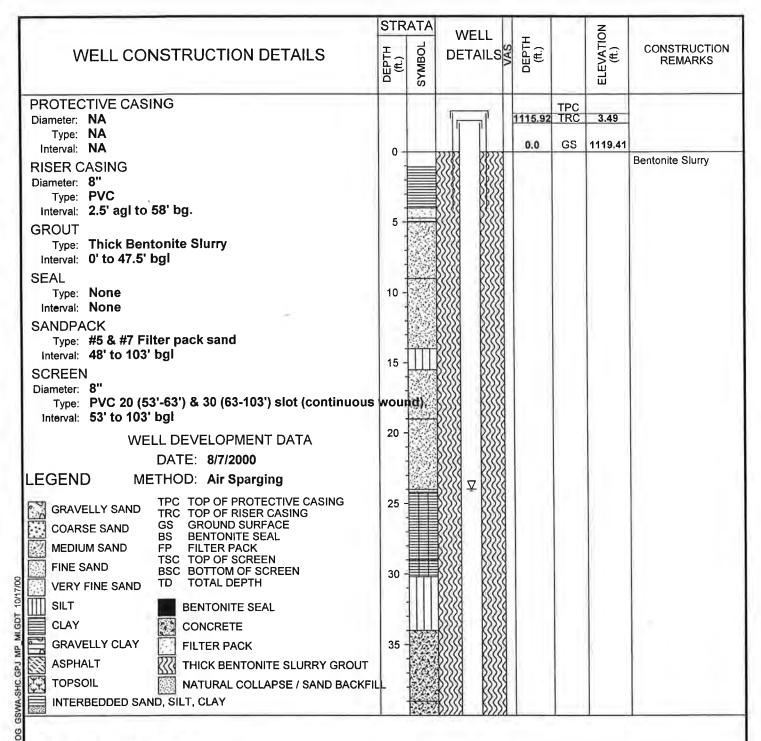
DRILLING METHOD: 10 1/4" HSA

DATE COMPLETED: August 2, 2000

GROUND SURFACE ELEVATION: 1119.4

DATUM: USGS

LOGGED BY: M.B. & G.Fox



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Sheet 1 of 3

PROJECT: **GSWA Spring Hill Camp**PROJECT NO: 4065-001

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1119.4
DATUM: USGS

LOGGED BY: M.B. & G.Fox

WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL AT	WELL	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
LEGEND GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND FINE SAND VERY FINE SAND SILT GRAVELLY CLAY THICK BENTONITE SLURRY GROUT	40 - 45 - 50 - 55 - 60 - 70 - 75 - 80 - 85 - 85 - 85 - 85 - 85 - 85 - 8	SYMB			e Pag	e 1)	Bentonite Slurry (continued) Natural Collapse Filtered Sand Pack

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WELL No. TW-2

Sheet 2 of 3

COMPLETION REPORT OF

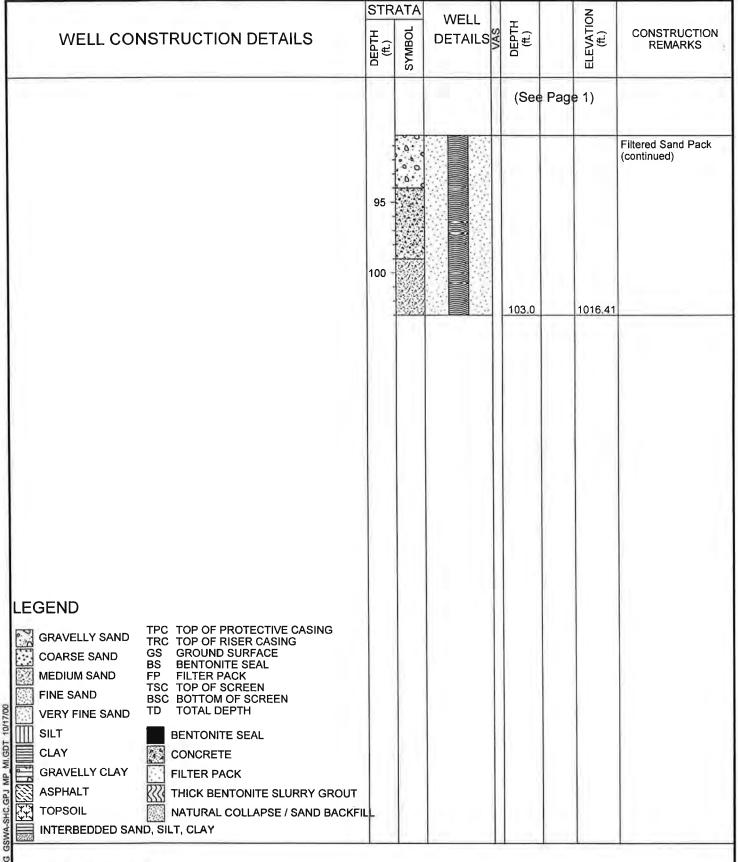
PROJECT: GSWA Spring Hill Camp PROJECT NO: 4065-001

PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1119.4

DATUM: USGS

LOGGED BY: M.B. & G.Fox





1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. TW-2

COMPLETION REPORT OF WELL No. TW-3

PROJECT: GSWA Spring Hill Camp

PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI DATE: 10-12-00 TIME: 1146

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 10 1/4" HSA DATE COMPLETED: July 28, 2000 **GROUND SURFACE ELEVATION: 1148.6**

DATUM: USGS

LOGGED BY: Joel Henry

WELL CONSTRUCTION DETAILS	DEPTH (ft.)		WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: NA Type: NA Interval: NA RISER CASING Diameter: 8"	0 -		2	0.0	TPC TRC GS	2.82 1148.57 1146.57	
Type: PVC Interval: 2.5' agl to 82' bgl GROUT Type: Thick Bentonite Slurry Interval: 0' to 74' bgl SEAL Type: None Interval: None SANDPACK Type: Global Filter Pack Sand Interval: 74' to 122' bgl SCREEN Diameter: 8" Type: PVC 20 (82'-92') & 30 (92'-122') slot (continuous Interval: 82' to 122' bgl WELL DEVELOPMENT DATA DATE: 8/2/2000	10 - 15 - wou	and).					Bentonite Slurry
GRAVELLY SAND GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND SILT GRAVELLY CLAY GRAVELLY CLAY ASPHALT TOP OF PROTECTIVE CASING TOP OF RISER CASING GROUND SURFACE BS BENTONITE SEAL FOR OF SCREEN TOP OF SCREEN TOTAL DEPTH BENTONITE SEAL CONCRETE FILTER PACK TOP OF SCREEN TOTAL DEPTH TOTAL DEPTH TOTAL DEPTH NATURAL COLLAPSE / SAND BACKFIII INTERBEDDED SAND, SILT, CLAY	30						

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Fax: (517) 337-0417

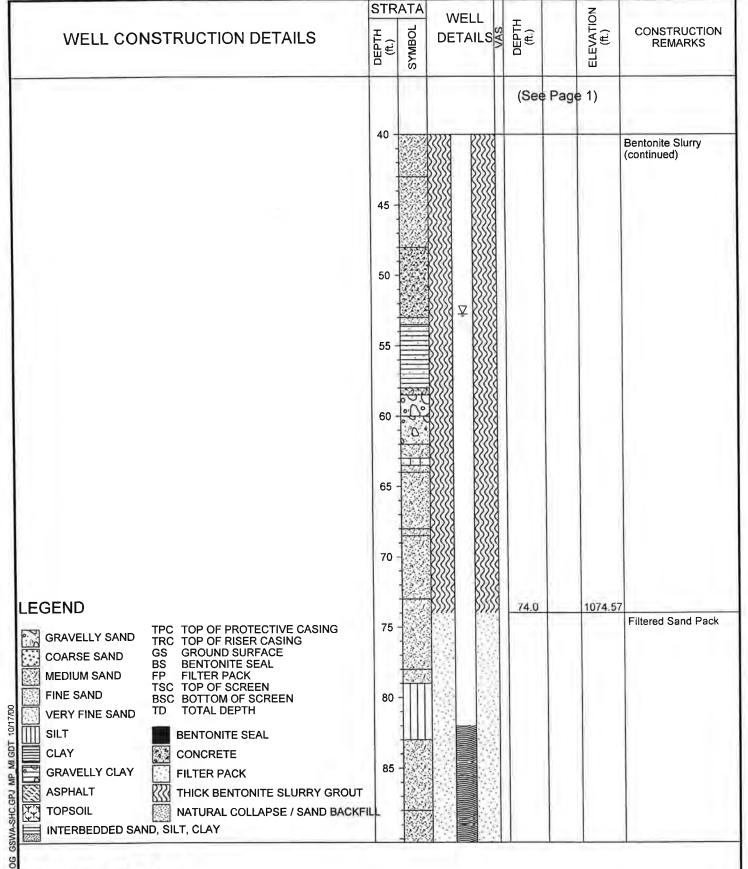
COMPLETION REPORT OF WELL No. TW-3

Sheet 1 of 3

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1148.6

DATUM: USGS LOGGED BY: Joel Henry



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Sheet 2 of 3

PROJECT NO: 4065-001
PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1148.6

DATUM: USGS

LOGGED BY: Joel Henry

	STR	ATA	WELL			z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See	Page) 1)	
	95 - 100 - 105 - 110 -	\$000 1		122.2		1026.37	Filtered Sand Pack (continued)
GRAVELLY SAND TRC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING COARSE SAND GS GROUND SURFACE BS BENTONITE SEAL FINE SAND FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TOTAL DEPTH SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK ASPHALT TICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFI	L						

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COMPLETION REPORT OF WELL No. TW-3

Sheet 3 of 3

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MW-1s BORING NO.

SHEET 1 OF 1

PROJECT

GSWA Spring Hill Camp

LOCATION PROJECT NO. Osceola, MI 4065-001

COORDINATES N 227,267.5 E 1,746,801.7

SURFACE ELEVATION 1097.16

DATUM USGS

LOGGED BY

M.B. & J.H.

NA DRILL Han	ING CON ING MET d Auger ING STAI /00	HOD E	R EQUIPM Auger ENDED 6/29/00		LC	See Report Figures fo	rloc	ations	
	AND CLAY GRAVEL		∭ Sı	EAT		oce neport rigares to	Loc	ations	
Depth feet	SAMP Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)		Strata	DESCRIPTION	USCS	REMARKS	Elevation
5						Brown loam (TOPSOIL). Red, MEDIUM TO FINE SAND, little silt. Light brown, FINE TO MEDIUM SAND, little silt, moist. Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet. Light brown, FINE TO MEDIUM SAND, little fine to medium gravel, little silt, poorly sorted, round and spherical, loose.	SM SM SM	Stratigraphic information taken from MW-1d boring log. MW-1s drilled approx. 10' from MW-1s. Hand auger to 8' bgl to clear utilities. End of boring - 8.4' bgl.	1096. 1094. 1093. 1089.

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MW-1d BORING NO.

SHEET

1 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

PROJECT NO.

4065-001 **Ken Ewers**

COORDINATES N 227,272.7 E 1,746,801.0

SURFACE ELEVATION 1097.66 DRILLING CONTRACTOR

DRILLING METHOD

EQUIPMENT CME 1050 DATUM USGS

LOCATION DESCRIPTION:

LOGGED BY

DRILLING STARTED ENDED

6/26/00

SAND CLAY

4 1/4" HSA

Stearns

6/27/00

SILT

PEAT

STRATA KEY

See Report Figures for Locations

	SAMP	LE	INFO	ORMA'	TION		_				5
Depth feet	Lab Sample		nple /pe	Blow Counts (300 lb. Ham- mer)	Rec- overy %	(ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
4							***	Brown loam (TOPSOIL). Red, MEDIUM TO FINE SAND, little silt.	SM SM	Hand auger to 8' bgl to clear utilities.	1097.66 1096.66
-			and uger					Light brown, FINE TO MEDIUM SAND, little silt, moist.	SM	4,0	1094.66
5-			age i					Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.	SM		1030.00
10-		c s	SS	3-4 7-7	100			Light brown, FINE TO MEDIUM SAND, little fine to medium gravel, little silt, poorly sorted, round and spherical, loose, wet at 9.5'- 2" clayey gravel and silt seam.	SP	0.25" clay seam at 9.6' bgl	1089.66
15-		cc s	SS	3-6 10-11	95		NICES SE	Gray to brown, CLAY, trace silt and fine sand, medium plasticity, firm to hard, dry to moist clay.	CL	Driller notes change at 12.5' bgl.	1085.06
20-		CC S	ss	1-0 1-6	100			Grayish brown, MEDIUM SAND, some silt and clay, sand is round and spherical, very loose, moist to wet.	sc	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K. Interbedded/gradation band per driller.	1080.66
25-		c s	ss	10-13 15-16	100			Grayish brown, FINE SAND, some silt,trace medium sand, medium density, round and spherical, moist with wet sandier seams, 1/4" seam of clay at 22.75', gray 1" seam of silt at 23',1" seam	SM	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1075.16
30-		C S	SS	1-1 8-6	100			of medium sand with little silt at 23.5'. Buff to light brown, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose, wet.	SP	Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.	1071.66
		g s	ss	3-0 3-5	75			Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose,	SP	Granite fragments.	1064.66 1064.16
35 -		=						wet. Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, few medium angular gravel,	SP		
		g s	ss	2-4 8-10	75			subrounded, spherical to elongate, loose, wet. Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is	SP		1060.66

MALCOLM

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PROJECT

COORDINATES N 227,272.7 E 1,746,801.0

DATUM USGS SURFACE ELEVATION 1097.66

BORING NO. MW-1d

GSWA Spring Hill Camp

SHEET 2 OF 3

LOCATION Osceola, MI

4065-001 PROJECT NO.

LOGGED BY Ken Ewers

	SAMPLE INFORMATION Blow Roc- W						,				uo
epth feet			ample Type	Blow Counts (300 lb. Ham- mer)		PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
45-		ונון	sss	1-4 5-8	88			subangular and elongate, loose, poorly sorted, wet. Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is subangular and elongate, loose, poorly sorted, wet. (continued) Buff, MEDIUM SAND, few fine sand, round and spherical, poorly sorted, loose, wet. Buff, MEDIUM TO COARSE SAND, little coarse	SP SP SP	Outwash or glaciofluvial.	1054.1 1053.1
50-		וננו	SSS	5-6 6-3	60			sand, few fine gravel, subrounded and subspherical, poorly sorted, loose, wet. Buff, COARSE SAND, little medium sand, few fine gravel, round and subspherical, poorly sorted, loose, wet.	SP	Outwash or glaciofluvial.	1049.6
55-		1111	SSS	8-6 4-5	50			Buff, MEDIUM TO COARSE SAND, little fine to medium sand, few coarse sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP	Bail approx. 3.25' heave from augers.	1044.6
60-		וווע	SSS	4-5 9-8	80			Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP		1039.6
65-		נננע	SSS	4-5 5-11	85			Buff, MEDIUM SAND, little medium to coarse sand, few fine sand, trace coarse sand, round and very spherical, poorly sorted, loose, wet.	SP	Bail approx, 3' heave from augers.	1034.6
70-		1111	sss	0-2 5-9	70			Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP	Bail approx. 2' heave from augers.	1029.6
75-		1111	sss	0-0 0-0	90			Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, trace fine gravel, round and very spherical, sorted, very loose, wet.	SP	Bail approx. 2.5' heave from augers.	1024.6
80-		1111	sss	1-5 12-13	50			Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP	Bail approx. 1.9' heave from augers.	1019.66
85-		וננו	sss	1-0 1-0	55			Buff, FINE TO MEDIUM SAND, few fine sand, round and spherical, sorted, very loose, wet.	SP	Bail approx. 2.5' heave from augers.	1014.60
		7	sss	5-15	90			Buff, FINE SAND, round and spherical, well sorted,	SP	Possible till at 89' bgl.	1009.60
90-		~	500	20-27				Cloose, medium density, wet. Gray, VERY FINE SANDY SILT, trace fine to medium gravel, poorly sorted, moist to wet.	SM	Bail approx. 1.0' heave from augers.	1008.66



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BORING NO. MW-1d

SHEET

3 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

PROJECT NO

4065-001

COORDINATES N 227,272.7 E 1,746,801.0

SURFACE ELEVATION 1097.66

DATUM USGS

LOGGED BY Ken Ewers

	SAM	PLI		ORMA Blow			Strata	DESCRIPTION	uscs	DEMARKO	Elevation
epth feet			ample Type	Blow Counts (300 lb. Ham- mer)	overy %	AV (pp			0868	REMARKS	Eleva
95-		11.11	SSS	9-17 44-59	100			Gray, SILTY CLAY, trace fine sand and fine to medium gravel, low to medium plasticity, hard, dry to moist. (continued)	CL	Varved 93-95' bgl.	1004.6
00-		1111	SSS	5-12 11-12	25			Brown to gray, FINE TO MEDIUM SAND, trace silt and clay, loose, round and spherical, wet.	SP	Driller notes change at 97' bgl.	1000.6
105-		1111	SSS	3-4 10-11	90			Buff, MEDIUM TO COARSE SAND, little fine sand, few coarse sand, trace gray sand and clay, round and spherical, poorly sorted, loose, wet.	SP	Bail approx. 1.0' heave from augers.	994.5
10-		1111	SSS	4-12 18-28	100			Buff, MEDIUM TO COARSE SAND, little fine sand, trace fine gravel, subrounded and elongate to spherical, poorly sorted, loose, wet, 1" gray clay stringers at 109.5' and at 110' bgl.	SP	Bail approx. 0.5' heave from augers.	989.6
- - 115-		111	sss	6-5 29-52	95			Buff, MEDIUM TO COARSE SAND, little fine sand, trace fine gravel, subrounded and subspherical, poorly sortyed, loose, wet.	SP	End of boring - 115' bgl.	984.6 983.1

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MW-1i BORING NO.

SHEET 1 OF 1

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

PROJECT NO.

4065-001

Ken Ewers

COORDINATES N 227,278.5 E 1,746,804.4

SURFACE ELEVATION 1098.39 DRILLING CONTRACTOR

DRILLING METHOD

EQUIPMENT

CME 1050

DATUM USGS

LOGGED BY

LOCATION DESCRIPTION:

STRATA KEY

DRILLING STARTED ENDED

SAND

6/26/00

Stearns

4 1/4" HSA

SILT

6/27/00

CLAY

PEAT

See Report Figures for Locations

	SAMF	LE INF	ORMA'	TION						ے
Depth feet		Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS PIQ	(3 O Strata	DESCRIPTION	uscs	REMARKS	Elevation
5-						¥.}	Brown loam (TOPSOIL). Red,medium to fine SAND,little silt. Light brown,fine to medium SAND,little silt,moist. Light brown,fine to medium SAND,little silt,trace fine to medium gravel,poorly sorted,round and spherical,wet.	SM SM SM	Stratigraphic information taken from MW-1d boring log. MW-1i drilled approx. 10' from MW-1d.	1098.39 1097.39 1095.39 1094.39
10-							Light brown,fine to medium SAND,little fine to medium gravel,little silt,poorly sorted,round and spherical,loose,wet,at 9.5'- 2" clayey gravel and silt seam.	SP	0.25" clay seam at 9.6' bgl	1090.39
15-							Gray to brown,CLAY,trace silt and fine sand,medium plasticity,firm to hard,dry to moist clay.	CL	Driller notes change at 12.5' bgl.	1085.79
20-							Grayish brown,medlum SAND,some slit and clay,sand is round and spherical,very loose,moist to wet.	sc	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K. Interbedded/gradation band per driller.	1081.39
25-							Grayish brown,fine SAND,some silt,trace medium sand,medium density,round and spherical,moist with wet sandier seams,1/4" seam of clay at 22.75',gray 1" seam of silt at 23',1" seam of	SM	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1075.89
30-							medium sand with little silt at 23.5'. Buff to light brown,medium to coarse SAND,few fine to medium gravel,subrounded and spherical,loose,wet.	SP	Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.	1072.39
35-							Buff,medium to coarse SAND,few fine to medium gravel,subrounded and spherical,loose,wet. Buff,medium to coarse SAND,few fine to medium gravel,few medium angular	SP SP	Granite fragments.	1065.39 1064.89
							gravel, subrounded, spherical to elongate, loose, wet. Buff, medium SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is subangular and elongate, loose, poorly sorted, wet.	SP	End of boring - 39' bgl.	1061.39

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MW-2 BORING NO.

SHEET 1 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

COORDINATES N 227,226.8 E 1,746,937.5

SURFACE ELEVATION 1101.70

DATUM USGS

PROJECT NO. LOGGED BY

4065-001 K.E. & J.H.

DRILLING CONTRACTOR

Stearns

DRILLING METHOD 4 1/4" HSA

EQUIPMENT CME 1050

DRILLING STARTED ENDED

6/27/00

6/27/00

SAND

STRATA KEY

LOCATION DESCRIPTION:

See Report Figures for Locations

CLAY

PEAT

SILT

	GRAVEL			FII	LL ———						
Depth feet		s	E INFo	Blow Counts (300 lb. Ham- mer)	Rec-	1	0,	DESCRIPTION	USCS	REMARKS	Elevation
								Dark brown,loamy TOPSOIL (silty sand). Red,medium SAND,some silt,few clay,round and spherical,poorly sorted,loose,moist.	SM SM		101.70
5-			Hand Auger					Medium brown,medium SAND,some silt,little clay,round and spherical,poorly sorted,loose,moist. Red,CLAY,some silt,few fine sand,medium plasticity,moist. Buff,fine to medium SAND,little silt,few clay,round	SP CL SP		1098.20
		177	SSS	2-1 1-0	100			and spherical,loose,moist. Red,CLAY,some medium sand,little silt,low to medium plasticity,soft,very moist.	CL	Not similar to clay at	1093.60
10-		Ĩ						Buff,fine to medium SAND,some fine sand,few coarse sand,trace fine gravel,very rounded and spherical,loose, wet.	SP		1092.20
- 15-		111	SSS	2-2 3-3	50			Buff,fine to very fine SAND,some fine sand,trace silt and fine gravel,rounded and	SP		1087.70
		_					***************************************	spherical,loose,wet. Buff to gray,CLAY,some fine sand,low plasticity,soft,wet. Buff,medium to coarse SAND,some fine sand,little	CL	Clay/Sand contact at 18' inferred from cuttings and driller's	1085.80
20-		1111	SSS	2-2 3-2	50			coarse sand,few silt,angular to round and subspherical to spherical,poorly sorted,loose,wet.	SP	Gravelly 22-24' bgl per driller.	1000.7
25 — -		1111	sss	1-1 1-0	95			Buff,medium SAND,some medium to coarse sand,little fine sand,few silt,trace fine to medium gravel,rounded to subrounded and spherical,loose,wet,1" clayey silty fine sand stringer at 25.5'.	SP		1077.70
30-		ונונש	SSS	0-1 5-5	100			Buff,medium to coarse SAND,some fine sand,little silt,rounded and spherical,loose,wet,poorly sorted,1" red silt stringers at 30' and 30.5'.	SP		1072.76
35-		1111	SSS	1-2 7-9	25			Buff,medium SAND,few coarse sand,few silt,rounded and spherical,loose,wet.	SP	No Recovery at 39-41' interval due to 2" piece of gravel.	1067.70
		2		5-7							

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COORDINATES N 227,226.8 E 1,746,937.5

SURFACE ELEVATION 1101.70 DATUM USGS

MW-2 BORING NO.

GSWA Spring Hill Camp

2 OF 3

SHEET

PROJECT

Osceola, MI LOCATION

4065-001 PROJECT NO.

LOGGED BY K.E. & J.H.

	SAMP	LE	E INF	ORMA	TION						5
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	(ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
		11111	SSS	12-10 4-7 11-13	0 50			Buff,fine to medium SAND,trace fine gravel,rounded to subrounded,loose,wet.	SP SP	Bailed approx. 0.5' heave from augers.	1060.7
45		1111	SSS	2-6 11-12	50			Buff,fine to medium SAND,trace fine gravel,rounded,loose,wet.	SP		1057.7
50 –		CCC	sss	5-12 13-16	60			Buff,fine to medium SAND,trace fine rounded gravel,rounded to subrounded,loose,wet.	SP	Bailed approx. 1.0' heave from augers.	1052.7
55 -		1111	sss	4-9 15-16	60			Buff,medium SAND,trace fine sand,fine to medium rounded gravel,rounded to subrounded,loose,wet.	SP		1047.7
60-		רננו	sss	6-10 13-11	75			Buff,fine to medium SAND,trace fine gravel,rounded to subrounded,loose,wet.	SP	Bailed approx. 0.5' heave from augers.	1042.7
65 -		ונונו	sss	6-10 16-20	75			Buff,fine to medium SAND,trace coarse sand,trace fine rounded gravel,dense,few coarse sand stringers,rounded to subrounded.	SP		1037.7
70-		11111	SSS	5-9 22-25	90			Buff,fine to medium SAND,trace fine gravel,medium density,rounded to subrounded,2" seam of buff fine sand in tip of spoon.	SP		1032.7
75-		1111	SSS	6-12 22-23	40			Buff,fine to medium SAND,trace fine to medium gravel,medium density,rounded to subrounded.	SP	Tough drilling 74-76' bgl.	1027.7
80-		1111	sss	7-17 18-25	100			Buff,fine to medium SAND,medium density,loose. Buff,clayey SAND,(fine to medium sand,little clay).	SP		1022.7
80 - 85 -									SP		
85 -		11111	sss	6-15 23-26	80			Buff,medium SAND,rounded to subrounded,trace fine sand,medium density.	SP		1017.7
90-		1111	sss	2-8 19-27	60			Buff,medium SAND,trace fine sand,rounded to subrounded,loose to medium density.	SP		1012.7

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MW-2 BORING NO.

SHEET 3 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

PROJECT NO.

4065-001

COORDINATES N 227,226.8 E 1,746,937.5

SURFACE ELEVATION 1101.70

DATUM USGS

LOGGED BY K.E. & J.H.

	SAIVIE	LEI		DRMA'						틸
Depth feet	Lab Sample	San Ty	ple pe	Blow Counts (300 lb. Ham- mer)	Rec- overy %	(ppm	DESCRIPTION	USCS	REMARKS	Elevation
95-		C S	SS	2-7 14-20	80		Buff,fine to medium SAND,rounded to subrounded,loose to medium density.	SP		1007.7
100 –		í s	SS	4-8 18-19	80		Buff,fine to medium SAND,roudned to subrounded,loose to medium density.	SP	End of boring - 101' bgl	1002.7

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MW-3 BORING NO.

SHEET 1 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION PROJECT NO.

Osceola, MI 4065-001

COORDINATES N 227,144.9 E 1,746,836.6

SURFACE ELEVATION 1107.00

DATUM USGS

LOGGED BY

Ken Ewers

DRILLING CONTRACTOR

Stearns

DRILLING METHOD 4 1/4" HSA

EQUIPMENT CME 1050 DRILLING STARTED ENDED

6/28/00

6/28/00

LOCATION DESCRIPTION:

STRATA KEY

SAND

SILT

CLAY

PEAT

GRAVEL

FILL

See Report Figures for Locations

	SAMF	LE	INF	ORMA							5
epth feet	Lab Sample		ample I ype	Blow Counts (300 lb. Ham- mer)	Rec- overy %	SPID (ppm	Strata	DESCRIPTION	uscs	REMARKS	Elevation
							ψιψις	TOPSOIL. Medium reddish brown, SANDY CLAY,slightly moist.	CL SM		1107.0 1106.5
5-			AUG					Light brown FINE TO COARSE SAND.	SP		1104.0
10-		ALLI	SSS	5-5 4-4	100			Buff,interbedded lenses of fine to coarse SAND,with lenses of buff sandy clay and clayey sand.	SP		1099.0
15-		11111	SSS	2-3 6-7	100			Medium buff,clayey SAND/sandy CLAY,soft,damp,could roll to about 5",trace fine rounded gravel,	sc		1094.0
20-		1111	SSS	5-6 4-4	100			Medium buff,clayey SAND,hard,damp to moist,(till?).	sc		1089.0
25-		1111	SSS	2-3 4-4	80			Medium buff,clayey SAND,hard,damp to moist,stringers of medium to coarse saturated sand	sc		1084.0
30-		LLL	SSS	3-3 4-4	100			Medium gray,clayey SAND,hard,damp,trace fine rounded gravel, (till?).	sc		1079.00
35-		LLLL	SSS	5-7 7-8	100			Medium gray,clayey SAND,hard,damp,trace fine rounded gravel,(till?).	sc		1074.00
1		111	SSS	5-9 10-12	100			Medium gray,clayey SAND,hard,damp,trace fine rounded gravel,(till?).	sc		1069.00

MALCOLM PIRNIE

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BORING NO. MW-3 SHEET 2 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

PROJECT NO.

4065-001

SURFACE ELEVATION 1107.00

COORDINATES N 227,144.9 E 1,746,836.6

DATUM USGS

LOGGED BY **Ken Ewers**

	SAMF	L	E INF	ORMA	TION		[1	8
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
45-		ונינו	SSS	6-4 4-4	10			Buff,clayey fine to medium SAND,soft,trace gravel.	sc	Rock wedged in tip of 43-45' sample.	1067.
50-		וווע	SSS	1-2 2-2	100			Buff,clayey fine to medium SAND,soft,few rounded gravel,saturated.	sc	40-50' sample is much softer than 43-45' sample.	1059.
55 –		וננו	SSS	1-2 1-6	100			Buff,clayey fine to medium SAND,soft,few rounded gravel,saturated.	sc		1054.
- 60-		LLL	SSS	1-1 1-1	20			Buff,medium SAND,loose,trace fine and coarse sand,trace fine rounded gravel,rounded to subrounded,saturated .	SP		1049.
65-		וננע	SSS	1-1 3-2	100			Buff,medium SAND,loose,trace fine and coarse sand,trace clay,rounded to subrounded,saturated.	SP		1044.
70-		LILL	SSS	1-1 2-2	100			Buff,fine to medium SAND,trace coarse sand and fine gravel,loose,rounded to subrounded,saturated.	SP		1039.
75-		LLL	SSS	1-4 2-7	40			Buff,medium SAND,trace fine and coarse sand,loose,rounded to subrounded,saturated.	SP		1034.
- 80-		1111	SSS	3-3 4-5	90			Buff,fine to medium SAND,loose,saturated,trace coarse sand and silt,trace fine gravel.	SP		1029.
- 85 –		ונונו	SSS	1-2 2-3	100			Buff,medium SAND,loose,rounded to subrounded,saturated,with lenses of fine and coarse sand. Coarse to very coarse SAND,fine to medium gravel,little medium sand.	SP SP		1024.
90-		1111	SSS	2-2 2-3	100			Buff,fine to medium SAND,loose,rounded to subrounded,saturated,trace coarse sand.	SP		1019.0

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COORDINATES N 227,144.9 E 1,746,836.6

SUBFACE FLEVATION 1107.00 DATUM USGS

MW-3 BORING NO.

GSWA Spring Hill Camp

3 OF 3

SHEET

PROJECT LOCATION

Osceola, MI

4065-001

PROJECT NO. LOGGED BY

Ken Ewers

SURI	ACE ELI	Ē٧	ATION	1107	.00	DATU	JM L	JSGS		LO	GGED BY	Ken	Ewers		
Depth feet		5	E INF Sample Type	Blow Counts (300 lb. Ham- mer)		PID (ppm)	Strata		DES	CRIPTIC	N		USCS	REMARKS	Elevation
95-		LLU	SSS	6-7 7-9	100			Buff,fine subround (continue	to medium led,saturate ed)	SAND,loos ed,trace co	e,rounded arse sand	i to ·	SP		
00-		LILLACTER	SSS	5-6 7-9 6-9 13-15	100 50			fine to m Gray,fine Gray fine	arse SAND edium sand SAND,hard to medium s,silt,clay till	,very satur d,few clay a SAND me	ated.trace	clav.	SP SP SP	End of boring - 102' bo	1009 1008 1007

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BORING NO.

MW-4s

SHEET 1 OF 1

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

PROJECT NO.

4065-001

COORDINATES N 227,190.7 E 1,746,649.2

SURFACE ELEVATION 1090.06

DATUM USGS

LOGGED BY

M.B. & J.H.

DRILLING CONTRACTOR

EQUIPMENT DRILLING METHOD Auger **Hand Auger**

DRILLING STARTED 6/29/00

ENDED 6/29/00 LOCATION DESCRIPTION:

STRATA KEY

SAND

SILT

CLAY

PEAT

See Report Figures for Locations

	SAMF	PLE INF) = '	50
Depth feet		Sample Type	Ham-	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
5-			mer)	%		77.7	Dark yellow to brown,TOPSOIL,clayey sand,moist. Buff,medium SAND,rounded to subrounded,moist to wet,trace fine sand. Buff,medium SAND,rounded to subrounded,moist to wet,trace fine sand.	SP SP SP	Stratigraphic information taken from MW-4d boring log. MW-4s drilled approx. 10' from MW-4d. End of boring - 8.7' bgl.	1090.0 1088.0 1086.0

MALCOLM PIRNIE

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Fax: (517)-337-0417

BORING NO. MW-4d

SHEET 1 OF 2

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

PROJECT NO.

4065-001 Joel Henry

COORDINATES N 227,193.5 E 1,746,646.7

SURFACE ELEVATION

1089.51

DATUM USGS

DRILLING CONTRACTOR

Stearns

DRILLING METHOD
4 1/4" HSA

EQUIPMENT CME 1050

DRILLING STARTED 6/29/00

ENDED 6/29/00

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

SAND

SILT

CLAY

PEAT

F GRAVEL

FILL

	SAMF	LE	INF	ORMA	TION	1			1			E
epth feet	Lab Sample		ample Гуре	Blow Counts (300 lb. Ham- mer)	Rec- overy %	S	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
6.0			Hand Auger				7,7,70		Dark yellow to brown,TOPSOIL,clayey sand,moist. Buff,medium SAND,rounded to subrounded,moist to wet,trace fine sand.	SP SP		1089.5 1087.5
5-		נננו	SSS	4-4 2-2	80		277		Buff,medium SAND,rounded to subrounded,moist to wet,trace fine sand.	SP		1085.5
10-		וווו	SSS	1-1 1-2	40				Buff,fine to medium SAND,rounded to subrounded,loose,saturated,trace rounded coarse sand,trace clay.	SP		1080.5
15-		ווון	SSS	6-4 3-1	90				Buff,medium SAND,loose,saturated,trace coarse sand,little fine to medium subrounded gravel,trace clay (gravelly sand).	SP		1075.5
20-		1111	SSS	4-7 8-8	60			3939	Light buff,sandy CLAY,hard,moist,few subrounded to subangular fine to medium gravel.	CL		1070.5
25~		11111	SSS	2-2 3-4	50				Buff,fine to coarse SAND,loose,saturated,few fine to medium subrounded gravel,trace clay (gravelly sand).	SP		1065.5
30-		1	SSS	3-5 4-5	60	11			Buff,medium to coarse SAND,loose,saturated,little fine to coarse rounded to subrounded gravel.	SP ML		1060.5 1059.5
		41114	SSS	1-1 1-1	50			111	Light buff,sandy SILT,soft,saturated,trace fine angular to subangular gravel. Light buff,silty clayey fine to medium SAND,very soft,moist to wet,trace subrounded to subangular	SC		1058.5
30 - 35 -		1111	SSS	1-1 2-2	90				gravel. Light buff,silty clayey fine to medium SAND,firm,moist to wet,trace gravel.	sc		1055.5
		1		1-1		Ш						

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COORDINATES N 227,193.5 E 1,746,646.7

SURFACE ELEVATION 1089.51 DATUM USGS

MW-4d BORING NO.

PROJECT

GSWA Spring Hill Camp

2 OF 2

SHEET

LOCATION Osceola, Mi

4065-001 PROJECT NO.

Joel Henry LOGGED BY

	SAMPLE INFORMATION										tion t
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Hec- overy %	PID (ppm)	Strata	DESCRIPTION	USCS	REMAHKS	Elevation
		CU	SSS	2-3	100			Light buff,silty clayey fine to medium SAND,firm,moist to wet,trace gravel. (continued)	sc		
45 –		רננע	SSS	1-1 1-1	50			Light buff,silty clayey fine to medium SAND,loose, rounded to subrounded,saturated.	sc		1045.
50-		2111	sss	2-3 2-2	75			4" to 6" interbedded lenses of light buff silty clayey fine to medium,loose,saturated,SAND and buff medium,saturated SAND with trace fine sand and clay.	sc		1040.
55 -		ונונק	SSS	1-1 3-3	75			Light buff,silty clayey fine to medium SAND,soft,saturated.	sc		1035.
60-		נננע	SSS	1-3 5-6	90			Interbedded lenses of very soft, saturated silty clayey fine to medium SAND and buff medium to coarse rounded to subrounded SAND.	sc		1030.
65-		1111	SSS	1-2 3-4	100			Light buff,silty clayey fine to medium SAND,saturated,trace fine gravel (less silt and clay content than previous spoon). Light buff,clayey fine to medium SAND,hard,moist.	SC SC		1025. 1023.
70-		רננע	SSS	2-3 4-5	70			Light buff,silty clayey fine to medium SAND,saturated.	sc		1020.
75-		נננט	SSS	1-0 1-3	100			Buff,fine to medium SAND,loose,rounded to subrounded,saturated,trace coarse sand and gravel,little rust colored banding.	SP		1015.
80-		נננש	SSS	3-6 6-7	100			Buff,medium SAND,loose,rounded to subrounded,saturated,trace fine and coarse sand,significant orange rust banding and staining.	SP		1010.
85-			sss	4-4 9-10	75			Buff to light brown,interbedded fine to medium SAND,with silt,saturated. Light gray to brown,medium to coarse SAND,saturated,trace fine sand,trace fine	SP SP	Driller felt till at 86' bgl.	1005. 1005. 1003.
90-		1111111	sss sss	4-10 17-22	60 100			subangular gravel. Medium gray to brown,fine to medium SAND,silt (till?),identical to unit encountered at 100' at MW-3. Medium gray,clay TILL,very firm,moist.	CL	End of boring - 91' bgl.	1000.

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COORDINATES N 227,283.9 E 1,747,399.4

SURFACE ELEVATION 1149.40

DATUM USGS

BORING NO.

MW-5d

1 OF 4 SHEET

GSWA Spring Hill Camp PROJECT

Osceola, MI

4065-001 PROJECT NO.

Joel Henry LOGGED BY

LOCATION

	DRILLING CONTRACTOR Stearns							LOCATION DESCRIPTION:						
DRIL 4 1/	PRILLING METHOD EQUIPMENT 4 1/4" HSA CME 95 PRILLING STARTED ENDED 7/18/00 7/19/00							See Report Figures for Locations						
	SAND CLAY GRAVEL	\$		SI	LT EAT LL			oce heport righted for Eccutions						
1			_				+				T			
Depth feet	Lab	s	ample Type	Blow Counts (300 lb. Ham- mer)	1		1 "	DESCRIPTION	uscs	REMARKS	Elevation			
5-		1111	SSS	3-4 4-6	100			Medium brown SANDY CLAY, soft, damp to dry. Interbedded medium brown SANDY CLAY with light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.	CL CL		1146.40 1144.90			
10-		נננע	SSS	19-20 12-4	25			Medium brown SANDY CLAY. Light buff, dry, loose, FINE TO MEDIUM SAND, subangular to subrounded.	CL SP	Prove rock.	1141.40 1141.20			
15-		1111	SSS	2-3 4-4	100			Dry, loose, light buff, MEDIUM SAND, trace fine sand, subrounded.	SP		1136.40			
20-		1111	sss	4-5 5-5	70			Dry, loose, light buff MEDIUM SAND, trace fine sand, subrounded. One <1/2" lens medium brown silt @ 19.5' bgl. No silt in remaining sample.	SP		1131.40			
25-		1111	sss	2-2 4-6	60			Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.	SP		1126.40			
30 -		11111	sss	14-9 11-15	100			Saturated medium dense light yellow brown SANDY SILT. Dry hard medium yellow brown SILTY/SANDY CLAY.	SM/ML CL		1121.40 1120.40			
35		1111	sss	4-8 10-14	100			Dry/damp, hard medium grey CLAY, trace silt partings. Color change to light yellow brown SILTY CLAY, dry and hard.	CL CL	Felt lithology change at 36' bgl.	1116.40 1114.90			
OHING		1111	sss	1-8 12-16	40			Saturated, light yellow brown, soft, SILT AND CLAY. Water may have entered spoon from	CL SP	Water may have entered spoon from	1111.40			

MALCOLM

SURFACE ELEVATION 1149.40

COORDINATES N 227,283.9 E 1,747,399.4

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DATUM USGS

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PROJECT

BORING NO.

GSWA Spring Hill Camp

SHEET

2 OF 4

Osceola, MI LOCATION

MW-5d

4065-001 PROJECT NO.

Joel Henry LOGGED BY

	SAMF	۱Lا	E INF	ORMA	TION		m l				5
epth feet	l		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
								perched zone. Dry light buff loose MEDIUM SAND, trace fine sand. (continued)	SP	herched zone.	
45 –		רננע	sss	2-5 7-10	60			Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.	SP		1106.
- - 50-		1111	SSS	3-4 6-9	60			Dry, loose, light buff MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, one fine to medium gravel stringer @ 48.5'.	SP		1101.
55-		1111	SSS	0-0 1-1	50			Saturated, loose light yellow brown MEDIUM TO FINE SAND, trace medium rounded gravel. Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP SP/SC		1096. 1095.
-		17.7	SSS	2-3 5-5	80		0.00	Saturated, loose light yellow brown MEDIUM TO COARSE, trace fine sand, trace gravel.	SP		1091.
-08		7	SSS	4-70/6"	40		0.	Saturated loose subangular to subrounded FINE TO COARSE GRAVEL. Mixed FINE TO MEDIUM GRAVEL AND FINE TO	GP		1089.
4		7	SSS	9-14 19-22	100			MEDIUM SAND, saturated. May be slough. Poor lirecovery, seemed to be pushing a cobble.	SP		1087.
35 -		11111	SSS	2-4 11-14	50			Saturated light yellow brown FINE TO MEDIUM SAND with some fine subangular to subrounded gravel. Moist medium yellow brown FINE SAND AND SILT, firm.	SP SP		1086. 1085. 1085.
- -0'-		נננע	SSS	2-4 5-5	60			Saturated light yellow brown, FINE TO MEDIUM SAND trace silt. Saturated light yellow brown, FINE TO MEDIUM SAND, trace silt, subangular to subrounded. Saturated light yellow MEDIUM TO FINE SAND,	SP SP		1081. 1080.
75-		CCCA	SSS	0-1 6-10	60			rounded to subrounded. Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay. Saturated light yellow brown MEDIUM TO FINE SAND, trace fine to medium subrounded gravel.	SP		1076.
- 30 –		נוננו	SSS 78-80 Grain size nalysis	4-11 18-26	100			Saturated light yellow brown MEDIUM TO FINE SAND. Saturated light yellow brown SILT, some fine to medium sand.	SP ML		1071.4
35-		1111	SSS 83-85 Grain slze nalysis	1-2 4-6	100			Saturated light yellow brown FINE TO MEDIUM SAND, trace to few silt, trace clay	SP		1066.4
90-		11111	SSS	2-2 2-3	50			Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.	SP		1061.4

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COORDINATES N 227,283.9 E 1,747,399.4

SURFACE ELEVATION 1149.40 DATUM USGS BORING NO. MW-5d

PROJECT

GSWA Spring Hill Camp

SHEET

3 OF 4

LOCATION Osceola, MI

4065-001 PROJECT NO.

Joel Henry LOGGED BY

00.11		-					1		_	-	_
	SAMF	L	E INF	ORMA			_				8
Depth feet	Lab Sample		Sample Counts (300 lb. over Hammer)	Rec- overy %	(ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation	
95-		CC CC	SSS 93-95 Grain size nalysis	1-2 3-5	60			Saturated light yellow brown MEDIUM TO COARSE SAND, little to some fine subangular to subrounded gravel, trace clay (gravelly sand). (continued)	SP		1056.4
100-		11111	SSS	3-5 7-10	40		50000	Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, trace gravel, trace clay. Saturated subangular to subrounded GRAVEL, trace fine to medium sand. One large gravel (1") wedged in bottom of spoon.	SP GP		1051.4 1050.9
105-			SSS	1-4 9-15	100			Saturated light yellow brown FINE TO COARSE SAND, finer at bottom, coarse sand with few fine gravel @104' bg.	sw		1046.4
110-		ILLI	SSS	Pushed	40			Saturated light yellow brown MEDIUM SAND, subrounded to rounded.	SP	Pushed sample. Couldn't get hammer on spoon, too close to rig.	1041.40
115-		ונננ	SSS	2-3 6-10	100			Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand.	SP		1036.4
120- -		11111	SSS 18-120 Grain size nalysis		100			Saturated, loose, light yellow brown MEDIUM SAND, trace fine gravel.	SP		1031.40
1		7	SSS	2-4	3100			Saturated, light yellow brown FINE TO COARSE SAND, interbedded lenses.	sw		1026.4
125 <i>-</i>				8-20				Medium grey fine to very fine SILTY SAND, trace clay. Saturated, loose.	SM		1024.90
130-		נננו	SSS	4-11 23-31	50			Moist medium grey hard and dense, SANDY/SILTY CLAY. Resembles till. *May be same unit as MW-1, 93-95' bgl.	CL	Unit sandy enough so no problems turning augers.	1021.40
- 135 <i>-</i> -		1111	sss	0-0 0-2	100			Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, trace coarse sand, rounded and subrounded.	SP	No change felt in drilling.	1016.40
								Moist moderate grey CLAY, sandy/silty clay (till?)	CL		1014.60
- 140 <i>-</i> -		1111	sss	7-10 14-22	70			Dry moderate grey CLAY, trace silt, very hard.	CL	Drilled hard 140-142', then looser 142' on.	1011.40
145-		LLLA	sss	2-2 3-4	100			Interbedded moist moderate grey CLAY with moderate grey sandy clay (medium to coarse sand). Sandy clay is firm; clay is soft.	CL		1006.40

COORDINATES N 227,283.9 E 1,747,399.4

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BORING NO. MW-5d

SHEET **GSWA Spring Hill Camp**

4 OF 4

PROJECT LOCATION

Osceola, MI

4065-001 PROJECT NO.

	SAM	٦L	E INF	ORMA				_a				5
epth leet			Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
50-		1111	sss	4-8 13-18	100			30.39	Wet moderate grey CLAY with little to some medium to coarse sand (sandy clay), firm. Saturated light yellow brown loose MEDIUM TO	CL CL	Drilling behavior reflects that forward on alternates between hard	1001.4 999.9
-									COARSE SAND interbedded with sandy silt lenses.	SP	and soft zones.	
55-		וננע	SSS	5-12 15-20	100				Saturated light yellow brown loose MEDIUM TO COARSE SAND, trace to few silt and clay.	SP		996.4
-06		1111	sss	3-6 11	100				Saturated light yellow brown loose MEDIUM SAND trace fine and coarse sand, trace clay toward	SP CL	End of boring - 160.2'	989.4
											bgl.	

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MW-5i BORING NO.

SHEET 1 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

COORDINATES N 227,274.3 E 1,747,404.0

4065-001 PROJECT NO.

LOGGED BY Joel Henry SURFACE ELEVATION 1148.75 DATUM USGS DRILLING CONTRACTOR LOCATION DESCRIPTION: Stearns

DRILLING METHOD **EQUIPMENT**

4 1/4" HSA

CME 95

DRILLING STARTED ENDED 7/18/00

7/20/00

STRATA KEY

SAND

SILT

CLAY

PEAT

See Report Figures for Locations

	SAMF	LE INF	ORMA	TION		_				5
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	(ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
5-							Medium brown SANDY CLAY, soft, damp to dry. Interbedded medium brown SANDY CLAY with	CL	Stratigraphic information taken from MW-5d boring log.	1145.7
-							light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.	CL	MW-5i drilled approx. 10' from MW-5d.	
10-							Medium brown SANDY CLAY. Light buff, dry, loose, FINE TO MEDIUM SAND, subangular to subrounded.	CL SP	Prove rock.	1140.75 1140.55
15-							Dry, loose, light buff, MEDIUM SAND, trace fine sand, subrounded.	SP		1135.75
20-							Dry, loose, light buff MEDIUM SAND, trace fine sand, subrounded. One <1/2" lens medium brown silt @ 19.5' bgl. No silt in remaining sample.	SP		1130.7
25-							Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.	SP		1125.75
-						Ήť	Saturated medium dense light yellow brown	SM/ML		1120.75
30-							SANDY SILT. Dry hard medium yellow brown SILTY/SANDY CLAY.	CL		1119.75
1							Dry/damp, hard medium grey CLAY, trace silt partings.	CL		1115.75
35-							Color change to light yellow brown SILTY CLAY, dry and hard.	CL	Felt lithology change at 36' bgl.	1114.25
-							Saturated, light yellow brown, soft, SILT AND CLAY. Water may have entered spoon from	CL SP	Water may have Pentered spoon from [1110.75 1109.75

SURFACE ELEVATION 1148.75

COORDINATES N 227,274.3 E 1,747,404.0

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DATUM USGS

BORING NO.

MW-5i

SHEET

2 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION PROJECT NO.

Osceola, MI 4065-001

Joel Henry LOGGED BY

	SAMP	LE INF	ORMA	TION						c
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	(ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
1							perched zone. Dry light buff loose MEDIUM SAND, trace fine sand. (continued)	SP	herched zone.	
45-							Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.	0.0		1105.7
0								SP		
50-							Dry, loose, light buff MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, one fine to medium gravel stringer @ 48.5'.	SP		1100.7
1.1							Saturated, loose light yellow brown MEDIUM TO /FINE SAND, trace medium rounded gravel.	SP		1095.7 1095.2
55-							Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC		1085.2
60-						300	Saturated, loose light yellow brown MEDIUM TO COARSE, trace fine sand, trace gravel. Saturated loose subangular to subrounded FINE	SP GP		1090.7
-						0	TO COARSE GRAVEL. Mixed FINE TO MEDIUM GRAVEL AND FINE TO MEDIUM SAND, saturated. May be slough. Poor	GP SP		1088.7
65-							recovery, seemed to be pushing a cobble. Saturated light yellow brown FINE TO MEDIUM SAND with some fine subangular to subrounded gravel.	SP		1085.7 1085.2 1084.7
							Moist medium yellow brown FINE SAND AND SILT, firm. Saturated light yellow brown, FINE TO MEDIUM	SP SP		1080.7
70-							SAND trace silt. Saturated light yellow brown, FINE TO MEDIUM SAND, trace silt, subangular to subrounded. Saturated light yellow MEDIUM TO FINE SAND,	SP		1080.2
75							rounded to subrounded. Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay. Saturated light yellow brown MEDIUM TO FINE			1075.7
75-							SAND, trace fine to medium subrounded gravel.	SP		
l.					1 4		Saturated light yellow brown MEDIUM TO FINE SAND.	SP		1070.7
80-							Saturated light yellow brown SILT, some fine to medium sand.	ML	0	1000.7
85-							Saturated light yellow brown FINE TO MEDIUM SAND, trace to few silt, trace clay	SP		1065.79
90-							Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel	S.D.		1060.7
1 1 1 4							SAND, trace to few silt, trace clay Saturated, light yellow brown MEDIUM SAND,	SP		

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BORING NO. MW-5i **GSWA Spring Hill Camp** PROJECT

SHEET

3 OF 3

LOCATION

Osceola, MI

4065-001

PROJECT NO COORDINATES N 227,274.3 E 1,747,404.0

Joel Henry LOGGED BY SURFACE ELEVATION 1148.75 DATUM USGS

Depth			-		ਲ				.⊵
feet	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
95-						Saturated light yellow brown MEDIUM TO COARSE SAND, little to some fine subangular to subrounded gravel, trace clay (gravelly sand). (continued)	SP		1055.7
100-					000	Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, trace gravel, trace clay. Saturated subangular to subrounded GRAVEL,	SP GP	End of boring - 100' bgl.	1050.7 1050.2
						Saturated subangular to subrounded GRAVEL, trace fine to medium sand. One large gravel (1") wedged in bottom of spoon.			

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MW-6 BORING NO.

1 OF 2 SHEET

Fax: (517)-337-0417

PROJECT LOCATION **GSWA Spring Hill Camp**

COORDINATES N 227,522.4 E 1,747,396.4

1142.44 DATUM USGS

Osceola, MI PROJECT NO. 4065-001

Joel Henry LOGGED BY

SURFACE ELEVATION
DRILLING CONTRACTOR

Stearns

DRILLING METHOD **EQUIPMENT** 4 1/4" HSA

CME 95

DRILLING STARTED 7/17/00

ENDED 7/17/00 LOCATION DESCRIPTION:

SAND

STRATA KEY SILT

CLAY

PEAT

GRAVEL

FILL

See Report Figures for Locations

	CANA		= INIE	ORMA	TION		m				Î
Depth feet	Lab Sample	s	ample Type	Blow Counts (300 lb. Ham- mer)		PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
5-		נננו	SSS	3-5 5-6	80			Saturated yellow brown medium Sand, trace fine sand.	SP		1139,4
1 1 1		-	sss	2-2 3-2	75			Saturated, light yellow brown medium Sand, inc. percentage of clay. Light yellow brown Clay, trace fine sand, dry	SP		1134.9
10-		e							CL		4400.0
15-		111	SSS	4-9 14-19	100			Dry medium grey brown Clay, trace fine sand, very stiff.	CL		1129.9
20-		1111	SSS	3-5 6-7	80			Dry light yellow brown medium Sand, trace coarse sand, trace fine gravel, rounded and subrounded grains.	SP	Drilling easier at 17' bgl.	1124.9
25-		1111	SSS	11-14 17-25	90			Interbedded (varved?) layers of very clean, light brown to cream colored medium Sand, with layers of light yellow brown silty fine to medium sand, trace clay. Very tight.	-		1119.9
30-		וונש	SSS	9-16 24-26	90				SM		
35-		וווש	sss	7-17 18-28	70			Interbedded layers of cream, dry medium to fine sand, and layers of dry light yellow brown fine to medium Sand and Silt (mostly silt). Layers 1/2 to 4" each.	SM-ML		1109.9
		1111	sss	6-13 18-19	70			Damp, light yellow grown fine to medium Sand, trace silt, rounded and subrounded, loose.	SM		1104.9

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COORDINATES N 227,522.4 E 1,747,396.4

SURFACE ELEVATION 1142.44 DATUM USGS

MW-6 BORING NO.

GSWA Spring Hill Camp

SHEET

2 OF 2

PROJECT LOCATION

Osceola, MI

4065-001 PROJECT NO.

Joel Henry LOGGED BY

	SAME	LE		ORMA		1	ta				Ę Į
Depth feet			ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
45-		CCCA	SSS	4-7 14-18	60			Damp, light yellow grown fine to medium Sand, trace silt, rounded and subrounded, loose. (continued) Light yellow brown, saturated lenses of medium to coarse Sand, and fine to medium sand, with one lens (1") of light yellow brown silt.	SM		1099.9 ¥
50-		1111	SSS	1-7 12-12	80			Saturated light yellow brown fine to medium Sand, rounded and subrounded, trace silt.	SM		1094.9
ij		7		3-5				Saturated light yellow brown fine to medium Sand, increase percentage of silt and clay.	SM		1089.9
55-		111	SSS	10-14	100			Saturated light yellow brown silt. Moderate grey brown Silt, clay in tip of spoon.	ML ML		1088.4 1087.5
60-		נננע	SSS	1-3 7-7	100			Saturated light yellow brown medium to fine Sand, rounded and subrounded. Saturated light yellow brown fine to very fine Sand, silt, trace clay.	SP SP		1084.9 1083.4
65-		נונע	SSS	5-7 13-19	80			Saturated light yellow brown fine to medium Sand, with few thin lenses (1-3") of silt or clayey sand.	SM/SC		1079.9
70-		1111	SSS	2-2 6-6	100			Saturated light yellow brown fine to medium Sand, rounded and subrounded, trace clay.	SP		1074.9
75-		נננש	sss	2-2 3-5	100			Saturated light yellow brown medium to coarse Sand, trace fine sand, trace fine to medium subangular gravel, one 2" lens silty fine to medium sand.	SP		1069.9
80-		1111	SSS	1-3 10-22	100			Saturated light yellow brown medium Sand, rounded and subrounded, trace clay, trace coarse sand, trace fine subrounded gravel.	SP	End of boring -80' bgl.	1064.9
80-		נננו	SSS	1-3 10-22	100			rounded and subrounded, trace clay, trace coarse	SP		

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Fax: (517)-337-0417

BORING NO. MW-7

SHEET 1 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION Osceola, MI

PROJECT NO. 4065-001

LOGGED BY

Jeff Groncki

COORDINATES N 227,527.9 E 1,746,900.2

SURFACE ELEVATION

1149.23

DATUM USGS

DRILLING CONTRACTOR

Stearns

DRILLING METHOD EQUIPMENT

DRILLING METHOD
4 1/4" HSA

CME 1050

DRILLING STARTED

ENDED

7/18/00

SAND CLAY

BORING LOG GSWA-SHC.GPJ MP_MI.GDT 10/17/00

7/19/00

SILT

PEAT

STRATA KEY

LOCATION DESCRIPTION:

See Report Figures for Locations

	GRAVEL		₩ F	ILL						
Depth feet		Sample Type	FORMA Blow Counts (300 lb Ham- mer)	Rec-	P P	Strata	DESCRIPTION	uscs	REMARKS	Elevation
5-		SSS SSS	2.2	75			Brown, stiff CLAY, dry-moist.	CL		1144.2
10-		sss sss	4-7 9-10	40			Light brown FINE TO VERY FINE SAND, with trace medium to coarse sand, dry.	SP		1139.2
15-		SSS	4-6 10-10	75			Light brown, medium SAND, large to medium gravel, coarse sand, dry.	SP		1135.2
20 - -		SSS	2-4 8-9	80			Brown, stiff to very stiff CLAY, dry.	CL		1129.2
25- -		SSS	5-7 12-13	60			Light brown, medium to fine SAND, some medium to fine gravel, little coarse gravel.	SP		1125.00
30-		SSS	6-10 14-21	60			Light brown, medium to fine SAND, some medium to fine gravel, little coarse gravel, two 1/4" clay lenses, one at 29 ft. bgl, one at 31.5 ft. bgl.	SP		1120.23
35- -		g sss	24-28 18-32	5			Light brown, medium SAND, some coarse sand, fine gravel.	SP	Driller comment: Pushed stone 34-36 ft. bgl.	1115.23
-			7-19			Ŷ.				1110.2

SURFACE ELEVATION 1149.23

COORDINATES N 227,527.9 E 1,746,900.2

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DATUM USGS

BORING NO. MW-7 SHEET 2 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

4065-001 PROJECT NO.

Jeff Groncki LOGGED BY

	SAME	L	E INF	ORMA	TION						c
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
4 40 4		U	SSS	28-26	90			Brown clay 2", Light brown, fine silty sand 2", Light brown very FINE SAND, very dry. <i>(continued)</i>	SM		
45-		נננו	SSS	7-12 17-45	90			Brown clay 2", Light brown, fine silty sand 2", Light brown very FINE SAND, very dry.	SM		1105.2
50-		וווע	SSS	10-11 14-16	90			Light brown VERY FINE SILTY SAND, 6" very stiff brown CLAY, brown VERY FINE CLAYEY SAND, with many thin (1/8-1/4") clay lenses.	sc	Driller comment: Hard drilling 52-53 ft, bgl.	1100.2
/4		H	_	7-14				Brown FINE CLAYEY SAND, wet.	sc		1095.2
55-	9.	7	SSS	15-18	90		2.500.00	Brown CLAY, wet, trace fine sand.	CL	Wet at 59' bgl.	1094.2
		_						Light brown FINE SAND, brown wet clay with little fine to very fine sand.	SP	wet at 59 bgi.	1093.7
60-		1111	sss	1-2 4-7	60			Light brown MEDIUM SAND, with some coarse and fine sand and little fine gravel. 1/2" of brown clay at approx. 61 ft. bgl.	SP		1090.2
1		נונש	SSS	3-4 7-9	100		0.000	FINE GRAVEL, with some medium gravel and coarse sand.	GP	Sand bailed auger.	1088.2
65-		11111	SSS	5-5 9-13	70			Light brown MEDIUM TO FINE SAND, with some coarse sand, trace fine gravel. 2" brown clay approx. 65.6 ft. bgl., light brown medium to coarse sand approx. 66 ft. bgl.	SP	Sand bailed auger.	1085.2
70-		11.11	SSS	4-9 15-18	90			Light brown MEDIUM SAND, with some coarse and fine sand, little fine gravel, becomes clayey approx. 71' bgl.	SP	Sand bailed auger.	1080.2
75- -		1111	SSS	11-13 16-18	90			Light brown MEDIUM TO COARSE SAND, with some fine gravel and little to trace fine sand and medium gravel. 6" gravel seam approx. 75 ft. bgl.	SP	Sand bailed auger.	1075.2
80-		1111	SSS	8-21 18-23	90			Brown CLAYEY SAND, with coarse gravel.	sc	Driller comment: Easier drilling 83-84' bgl.	1069.2
85-		111	SSS	4-7 14-20	80		7/17	Light brown MEDIUM SAND, with little to some coarse sand. 3/4" brown clay with some fine sand	SP		1065.2
		=		17-20				approx 86 ft. bgl. Light brown MEDIUM TO COARSE SAND, trace fine to medium gravel.	SP		1063.73
90-		111	sss	6-11 13-15	80			Light brown MEDIUM SAND, little to some coarse sand.	SP	Sand bailed auger.	1060.23
		<i>c</i> :						Light brown COARSE SAND, with some fine gravel and trace medium gravel and medium sand.	SP		1058.73

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COOHDINATES N 227,527.9 E 1,746,900.2

SURFACE ELEVATION 1149.23

DATUM USGS

BORING NO.

MW-7

SHEET **GSWA Spring Hill Camp**

3 OF 3

PROJECT LOCATION

Osceola, MI

PROJECT NO.

4065-001

LOGGED BY

Jeff Groncki

	SAME	LE	EINF	ORMA				tā			A	roi +
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
95-		1111	SSS	12-16 27-0	50			3237 2337	Light brown MEDIUM TO COARSE SAND, with 2" fine to medium gravel. Brown CLAY, alternating with gravel.	SP	Sand balled auger,	1055.2
-									Blown CLAT, alternating with gravel.	CL		1033.
00-		1111	sss	5-11 32-0					Light brown MEDIUIM SAND, with some fine to coarse sand, trace fine gravel.	SP	End of boring - 101' bgl.	1050.2
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8-WM BORING NO.

1 OF 2 SHEET

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

4065-001

SURFACE ELEVATION

1113.49

COORDINATES N 227,562.3 E 1,746,466.4

DATUM USGS

PROJECT NO. LOGGED BY

Joel Henry

DRILLING CONTRACTOR

Stearns

DRILLING METHOD EQUIPMENT 4 1/4" HSA

CME 95

DRILLING STARTED 7/18/00

ENDED 7/18/00 LOCATION DESCRIPTION:

See Report Figures for Locations

SAND

STRATA KEY

SILT

CLAY

PEAT

	SAMF	PLE	E INFO	ORMA	TION						5
Depth feet			ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
		K	AUG	11				Topsoil.	SP-SM		1113.49
5-		ונונו	SSS	2-2 1-2	60			Dry, medium orange-brown, MEDIUM SAND, trace fine sand, subangular to subrounded, loose.	SP		1110.49
-		1111	sss	3-5 8-10	80			Dry, loose, light brown, FINE TO MEDIUM SAND, subrounded.	SP		1105.49
10-								Silty, very firm, dry SANDY CLAY.	CL		1103.49
15-		ננננ	SSS	3-6 10-12	100			SANDY CLAY, stiff, very firm, dry.	CL	Felt lithology change @17 ft. bgl.	1100.49
20-		נננו	SSS	1-1 2-3	10			Saturated, light yellow brown, MEDIUM SAND with lens of light yellow brown SANDY SILT.	SM-ML		1096.49 ¥
25-		נננע	SSS	1-3 5-6	40			Saturated, light yellow brown, MEDIUM SAND, rounded to subrounded, trace fine sand, trace coarse sand, trace clay.	SP		1090.49
30-		וננע	SSS	3-3 5-8	50			Saturated, light yellow brown, MEDIUM SAND, rounded to subrounded, trace fine sand.	SP		1085.49
		177	sss	4-9 12-13	100			Saturated, light yellow brown, MEDIUM TO FINE SAND, rounded to subrounded.	SP		1080.49
35-								Saturated, light yellow brown SILT, few fine to very fine sand.	ML		
		3	SSS	6-3 6-10	100				SP	-=	1075.49

SURFACE ELEVATION

COORDINATES N 227,562.3 E 1,746,466.4

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DATUM USGS 1113.49

BORING NO.

PROJECT

8-WM

GSWA Spring Hill Camp

2 OF 2

SHEET

Osceola, MI LOCATION

4065-001 PROJECT NO.

Joel Henry LOGGED BY

	SAMF	PLE	E INF	ORMA			nd l				ا ا
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	vy PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
).							Saturated light yellow brown, FINE TO MEDIUM SAND, trace sand, rounded to subrounded, one silt pocket at 39.5' bgl (1" thick). (continued)	SP		
- 45- -		CECT	SSS	2-3 4-6	90			Saturated, light yellow brown, MEDIUM TO FINE SAND, rounded and subrounded. Saturated, light yellow brown, SILTY FINE SAND.	SP		1070.4
50-		ונננע	SSS	2-5 7-10	100			Saturated, light yellow brown, MEDIUM TO FINE SAND, rounded and subrounded. One 2" lens of gravel, rounded at 49' bgl.	SP		1065.4
55-		וננע	SSS	4-7 8-8	100			Saturated, light yellow brown, MEDIUM TO FINE SAND, lenses of silt, coarse sand imbedded in fine to medium sand. Light yellow brown MEDIUM TO FINE SAND, saturated, thin lenses of silt, coarse sand imbedded	SP SP		1060.4 1059.4
60-		1111	SSS	5-11 13-17	100			in fine to medium sand. Light yellow brown SANDY SILT, trace fine gravel, saturated. Dry light yellow brown SANDY CLAY, with stringers of dry light brown fine sand.	SM-ML CL		1055.4 1054.4
1		1	SSS	1-2	100			Saturated light yellow brown MEDIUM SAND, trace fine sand, trace coarse sand.	SP	Felt lithology change at 62.5' bgl.	1050.9
65-		11	000	4-8				Saturated light yellow brown FINE TO VERY FINE SAND and silt.	SM		1048.9
70-		נננש	SSS	1-3 3-6	100			Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace coarse sand, loose.	SP		1045.4
75-		11111	SSS	1-3 4-6	90			Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, loose.	SP		1040.4
80-		rrry	SSS	2-3 5-7	40			Saturated light yellow brown MEDIUM SAND, trace fine sand, rounded and subrounded, loose.	SP		1035.49
85-		1111	SSS	2-3 5-8	90			Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand, subrounded.	SP	End of boring -85' bgl.	1030.49

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BORING NO.

MW-9

SHEET 1 OF 2

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

			•		
COORDINATES N 227,063.9 E 1,74	7,879.5	PROJECT NO.	4065-001		
SURFACE ELEVATION 1125.29	DATUM	USGS LOGGED BY	Jeff Groncki		
DRILLING CONTRACTOR Stearns	L	OCATION DESCRIPTION:			
DRILLING METHOD EQUIPMENT 4 1/4" HSA CME 1050 DRILLING STARTED ENDED 7/19/00 7/20/00		Soo Poport Figu	iros for Locat	ione	
STRATA KEY SAND SILT CLAY PEAT		See Report Figu	ires for Local	lions	
GRAVEL FILL					
SAMPLE INFORMATION					ç
[(300 lb.lovery]≰	Strata	DESCRIPTION	USCS	REMARKS	Elevation
5 - E SSS 1-1 50		Brown stiff CLAY, saturated/moist	CL		1121.2

5-	ii ss	S 1-1 3-2	50	Brown stiff CLAY, saturated/moist	CL	1121.29
10-	i ss	S 3-4 5-6	50	Light brown, VERY FINE CLAYEY SAND. Light brown FINE TO VERY FINE SAND, with trace coarse sand and fine gravel.	SC	1115.79 1115.29
15-	E ss	S 4-8 8-10	50	Brown soft CLAY, saturated/moist. Light brown MEDIUM SAND, with some fine to mediuim gravel.	CL SP	
20-	E ss	S 3-6 8-8	60	Light brown MEDIUM SAND, with some fine to coarse gravel, saturated/moist. Two inch thick brown CLAY lens at 20.5' bgl.	SP	1106.29
25-	E ss	S 2-2 2-4	75	Light brown FINE TO MEDIUM SAND, wet at 25' Light brown CLAYEY SAND, trace medium gravel.	SP	1101.29
30-	E ss	S 2-2 3-4	100	Brown CLAY with little to some medium sand, trace fine gravel, moist.	sc	1096.29
35-	g ss	S 3-7 14-17	100	Brown FINE CLAYEY SAND, interbedded with silty layers, wet at 35' bgl.	SC-SM	1090.79
			1 1	Light brown MEDILIM SAND with some coarse		1080 20

MI.GDT 10/17/00 GSWA-SHC.GPJ MP. BORING LOG

1096.29 1090.79 1089.29 Light brown MEDIUM SAND, with some coarse sand. SP SP 1086.29



COORDINATES N 227,063.9 E 1,747,879.5

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MW-9 BORING NO.

SHEET 2 OF 2

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI 4065-001

PROJECT NO.

	SAMF	PLE	E INF	ORMA		_	g				figur
Depth feet			ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
1000		10	SSS	9-10	90			Light brown MEDIUM SAND, with some fine sand, little coarse sand, becoming clayey toward 41' bgl. (continued)	SP		
45 -		1111	SSS	5-5 7-11	80			Light brown MEDIUM SAND, with some coarse sand, trace fine gravel.	SP		1081.2
50-		1111	SSS	4-7 10-10	90			Light brown MEDIUM SAND, with some coarse sand, trace fine gravel, with some clayey lenses (1/8" thick).	SP		1076.2
9		占	000	7-12	100						
55-		N.	SSS	18-19	100			Brown CLAY. Light brown MEDIUM TO FINE CLAYEY SAND.	SC		1070.2 1069.9
60-		וננו	SSS	8-9 13-7	100			Light brown MEDIUM SAND, with little fine sand, becoming clayey toward 60 ft. bgl. Light brown MEDIUM SAND with some coarse sand, becoming clayey toward 61 ft. bgl.	sc sc		1066.2 1065.2
65-		נונש	SSS	1-3 4-11	90			Light brown MEDIUM SAND, with little to some coarse sand and fine gravel.	SP		1061.2
70-		1111	sss	5-10 26-37	90			Light brown MEDIUM SAND, with some coarse sand and fine gravel, little medium to coarse gravel, One thin (1/8" thick) clay lens at 70 ft. bgl.	SP		1056.2
				2.6				Light brown MEDIUM SAND, with some coarse	SP		1051.2
75-		111	SSS	3-6 11-24	90	-		\sand, some medium gravel, few iron oxide stained \lambda aminations, some medium to fine gravel lenses. Brownish gray SILTY CLAY.	CL	End of boring - 76' bgl	1050.4
										•	

11-10 16-24

100

100

SSS

SSS

30-

35-

BORING LOG GSWA-SHC.GFJ MP

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BORING NO. **PROJECT**

MW-10

1 OF 2 SHEET

1091.54

1090.04

1086.54

1085.54

1081.54

GSWA Spring Hill Camp

LOCATION

Osceola, Mi

	RDINATE						PROJECT NO. 4065-0			
DRILI Ste DRILI 4 1/ DRILI 7/18	FACE ELE LING CON arns LING MET 4" HSA LING STA B/00	TRACT HOD RTED	EQUIPM CME 1 ENDED 7/18/00	1ENT 1050	DATU	1	DISS LOGGED BY Jeff GOOGATION DESCRIPTION: See Report Figures for	r Loca	tions	
	CLAY GRAVEL		□ PE	EAT						
Depth feet	Lab	Sample Type	16.500 10			Strata	DESCRIPTION	uscs	REMARKS	Elevation
5		SSS	2-4 2-2	30		30000	Medium to coarse GRAVEL, with some light brown medium to coarse sand, dry.	GP		1116.5
10-		sss	1-2 4-8	70			Brown, soft, wet CLAY, with light brown very fine to fine sand interbedded. Clay becomes sandy from 11 ft. to 14 ft. bgl, dry to moist.	CL		1111.5
15-		SSS	1-2 4-7	60			Lihgt brown fine SAND. 1/8" brown clay seam underlain by light brown, clayey FINE SAND. Light brown medium SAND, with some iron oxide stained laminations, moist to dry.	SP SC SP		1106.5 1105.5 1105.0
20 -		g sss	1 (18")-6	100			Light brown MEDIUM TO FINE SAND, with some very fine sand, wet to very moist. Brown, very FINE SAND, with little to some clay, wet.	SP SP		1101.5 1100.5
25-		[sss	3-12 10-13	40			Light brown, MEDIUM SAND, with trace to little fine sand, wet.	SP		1096.5

Light brown FINE SAND, with some medium to coarse sand seams, with trace to little fine grave. Light brown MEDIUM SAND.

Light brown MEDIUM SAND, with little to some

Light brown VERY FINE to FINE SAND.

coarse sand.

SP

SP

SP

SP

GSWA Spring Hill Camp

SHEET

2 OF 2

MW-10

LOCATION Osceola, MI

PROJECT NO. 4065-001

BORING NO.

PROJECT

Jeff Groncki LOGGED BY

COORDINATES N 227,478.6 E 1,747,980.1

SURFACE ELEVATION 1120.54 DATUM USGS

SAMPLE INFORMATION Elevation Blow Rec-DESCRIPTION USCS REMARKS Counts PID Depth Lab Sample 300 lb. overy (ppm) feet Sample Туре Ham-% SSS 13-17 100 Light brown MEDIUM SAND, with some fine sand and trace to little coarse sand. (continued) SP Light brown FINE to MEDIUIM SAND, with some SP 1076.5 2-6 70 SSS 45 coarse sand. 10-16 1075.5 One inch silty layer, then light brown FINE to MEDIUM SAND, with some coarse sand and iron SP oxide colored laminations. Light brown MEDIUM SAND. SP 1071.54 3-6 90 50 SSS 12-16 Light brown FINE SAND, with some medium sand SP 1070.54 and clay. 1070.24 Light brown MEDIUM to COARSE SAND, with SP some medium to coarse gravel. 1066.54 Light brown MEDIUM SAND, with some coarse SSS 90 55 sand and fine gravel, trace medium to coarse 16-19 gravel. SP Light brown MEDIUM to COARSE SAND, with SP 1061.54 5-10 SSS 90 60 some fine to medium gravel. Brown FINE to VERY FINE SAND, with some clay. 17-19 060.54 SP 059.54 5-12 Light brown MEDIUM to FINE SAND, with some SSS 100 1058.54 17-24 SC coarse sand. Light brown VERY FINE CLAYEY SAND. 1057.54 End of boring - 66' 7-13 SSS 35 Light brown FINE TO MEDIUM SAND, with little to 26-27 SP some coarse sand and fine gravel. 65 GSWA-SHC.GFJ MP_MI.GDT BORING LOG

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MW-11 BORING NO.

1 OF 2 SHEET

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

4065-001

COORDINATES N 229,202.3 E 1,746,172.8

SURFACE ELEVATION 1166.66

DATUM USGS

PROJECT NO. LOGGED BY

Jeff Groncki

	ING CON	ITF	RACTO	R			LC	OCATION DESCRIPTION:			
DRILI 4 1/	ING MET 4" HSA ING STA		ED E	EQUIPM CME 1 ENDED 7/21/0	050			Coo Donart Eiguraa fo	vr I o o	ations	
eseri.		5	STRAT					See Report Figures fo) LOC	ations	
	SAND				LT						
	CLAY				EAT						
	GRAVEL			FI	LL			1		0	
	SAMP	LE	E INF	ORMA	TION						5
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	(ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
1.1.4											
5-		7	SSS	2-2	80		ewytw.	Orangish-brown FINE SAND.	SP		1162. 1162.
5-		1	333	3-3	00			Soft, brown, moist CLAY, with little fine sand.	CL		
1		Ш							CL		
4		7		8-10				Stiff, brown, dry CLAY, with little fine gravel and			1157.
10-		1	SSS	10-11	80			trace medium gravel and fine sand.	CL		
1									CL		
15~		7	sss	8-15	70		340	Light brown VERY FINE SILTY SAND.	SM		1152.0
10-		L Q	333	21-22	70			Light brown FINE TO MEDIUM SAND, with trace coarse sand.		Pushed rock in 19 to 21 ft. sample (no recovery). Cutting shoe banged up; gravel present 19 to 21 ft. bgl.	1151.
20-		1111	SSS	9-50	0				SP	,	
25-		וננע	SSS	8-13 21-29	60			Light brown FINE TO VERY FINE SAND, with some seams (2" thick) of medium sand with some coarse sand, very dry.	SP		1142.
30-		111	sss	8-12 15-22	60			Light brown MEDIUM SAND, with little coarse sand, dry.	SP		1137.
							0,66%	Light brown FINE SAND, with some silt and clay, wet.	SP		1135.
. 19								Brown CLAY, moist at the top, dry at the bottom.	CL		100.
35-		7	SSS	7-7 11-17	80		12c.V	Light brown MEDIUM SAND, dry. Silty brown CLAYEY FINE SAND.	SP		1132. 1132.
1		, u		11-17				Stiff brown CLAY, dry. Light brown MEDIUM SAND, dry.	CL		1131.
		Ц									
		2		10-24			T. 1.	Brown stiff CLAY.	CL		1127

BORING NO. MW-11

PROJECT

SHEET

2 OF 2

GSWA Spring Hill Camp

Osceola, MI LOCATION 4065-001 PROJECT NO.

Jeff Groncki LOGGED BY

COORDINATES N 229,202.3 E 1,746,172.8

SUBFACE FLEVATION 1166-66 DATUM USGS

SAMF	LE	INF	ODMAN.							
		_ 11 41	ORMA	HON						۔
Lab Sample			1 100111	Rec- overy %	PII (ppi	1 "	DESCRIPTION	uscs	REMARKS	Elevation
	7	SSS	29-34	70		134	Light brown to brown SILTY FINE SAND, with	SM		1127.1
							Light brown FINE SAND, with some medium sand, dry.	SP		1125.6
	וווע	SSS	2-8 28-30	80			Brown SILTY VERY FINE SAND.	SM		1122.6
	-		5-10			11	Light brown FINE SAND, with little to some clay,	SP		1117.6
	רנת	SSS	13-24	90			wet. Brown stiff CLAY, dry.	CL		1117.1
	11111	SSS	10-15 21-24	90			Brown stiff CLAY, with some 1" thick layers of light brown fine sand throughout.	CL		1112.6
	11111	SSS	3-8 11-12	100			Light brown FINE SAND, with little medium sand, with 1/8" brown clay layers.	SP		1107.6
	17	000	2-5	100			Light brown MEDIUM SAND, with 1/2" brown clay	SP		1102.6
	10	333	8-8	100			Nayer. Brown CLAYEY FINE SAND. Light brown MEDIUM TO FINE SAND.	SC		1101.6 1100.8
			2.0			Tax.	Light brown FINE TO VERY FINE SAND	ęp.		1097.6
	7	SSS	11-13	80	У	20.	FINE GRAVEL, with 1/8" clay lens at 70,25 ft, bol.	GP		1096.6
	-						Light brown FINE TO VERY FINE SAND.	SP		1096.1
	1111	SSS	2-7 13-19	75			Light brown MEDIUM SAND, with some coarse sand and fine gravel.	SP		1092.6
							MEDIUM TO FINE GRAVEL. Brown CLAY.	CL GP		1090.8
	,		2-13	-		3203	Light brown MEDIUM SAND.	SP		1087.6
	3	SSS	15-14	100		TI.	Grayish-brown SILTY FINE SAND, with some clay.	SM		1086.6
	1111	sss	4-7 13-16	25			Brownish-gray CLAY, with little fine sand. Grayish SILTY CLAY, stiff.	CL	End of boring - 83	1086.1 1085.6
		Sample	Sample Type SSS SSS SSS SSS SSS SSS SSS SSS SSS	SSS 29-34 SSS 29-34 SSS 29-34 SSS 29-34 SSS 29-34 SSS 29-34 SSS 10-15 21-24 SSS 3-8 11-12 SSS 2-5 8-8 SSS 2-7 13-19 SSS 2-7 13-19	SSS 29-34 70 SSS 29-34 70 SSS 29-34 70 SSS 28-30 80 SSS 5-10 90 SSS 10-15 21-24 90 SSS 3-8 11-12 100 SSS 8-8 100 SSS 2-5 8-8 100 SSS 2-7 13-19 75 SSS 2-7 13-19 75	Sample Type (300 lb. overy % (ppl mer) % 70	Sample Type (Ham-mer) % (ppm)	Sample Type Hain 95 (ppm) SSS 29-34 70	Sample Type (Hamble Well) (ppm) (ppm	Sample Type Ham- Man- Man-

10/17/00

MI.GDT

MΡ

GSWA-SHC.GF.

BORING LOG

5-11

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BORING NO. MW-12d

SHEET 1 OF 3

1124.21

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

4065-001

COORDINATES N 229,163.2 E 1,747,490.7

SURFACE ELEVATION 1163.21

DATUM USGS

PROJECT NO. LOGGED BY

J.Henry/G.Fox

DRILLING CONTRACTOR LOCATION DESCRIPTION: Stearns DRILLING METHOD **EQUIPMENT** 4 1/4" HSA **CME 1050** DRILLING STARTED ENDED 7/24/00 7/25/00 See Report Figures for Locations STRATA KEY SAND SILT CLAY **PEAT** GRAVEL FILL SAMPLE INFORMATION Elevation Feet Blow Rec-DESCRIPTION USCS REMARKS Counts PID Depth Lab Sample 300 lb. feet Sample Type (ppm) Ham-% mer) 1159.21 Moderate reddish-brown, cohesive CLAYEY FINE 3-3 SSS 50 5 TO COARSE SAND, clast supported, dry to moist. SC Moist to wet, soft CLAYEY FINE TO COARSE 1154.21 SSS 70 SAND, cohesive, trace fine gravel. SC Moist to wet, semi-cohesive, light yellow brown SP 1149.2 SSS 100 15 MEDIUM SAND, trace coarse sand, trace gravel. 1(12") 1148.2 trace clay. Saturated, very loose, light yellow brown FINE TO SP MEDIUM SAND, trace silt, trace clay. Saturated, very loose, MEDIUM TO COARSE SP 1144.21 1-0 SSS 100 SAND, light yellow brown, trace coarse gravel, 0-61143.21 trace silt. Moist, stiff to hard moderate yellow brown CLAY, CL with trace medium sand, very cohesive. Dry, light buff MEDIUM SAND, trace fine sand. 139.21 SSS 75 25 trace coarse sand, trace gravel, rounded to 16-27 subrounded. SP Dry, light buff MEDIUM SAND, dense, well packed, 1134.21 8-15 30 SSS 75 light/dark banding at 30.5 ft. bgl (light buff to medium buff, 1/4" bands). 33-28 SP Dry, light buff, MEDIUM SAND, medium dense, 1129.21 8-8 35 SSS 75 subrounded. 16-25 SP

Dry, light buff, MEDIUIM SAND, loose.

MALCOLM

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COORDINATES N 229,163.2 E 1,747,490.7

SURFACE ELEVATION 1163.21 DATUM USGS

MW-12d BORING NO.

SHEET 2 OF 3

PROJECT **GSWA Spring Hill Camp**

LOCATION Osceola, MI

4065-001 PROJECT NO.

LOGGED BY J.Henry/G.Fox

	SAMF	^L L	E INF	ORMA							5
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	%	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
4 4		C C	SSS	24-29	75			Dry, light buff, FINE SAND, loose. (continued)	SP		1123.7
45-		1111	sss	5-8 14-19	75			Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace silt and clay. Dry to moist, stiff, moderate yellow brown SILTY	SP		1119.2
-								CLAY,	CL		
50-		1111	SSS	5-8 9-9	75			Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel, trace clay, rounded to subrounded.	SP		1114.2
55 —		1111	SSS	3-6 9-13	60			Saturated, loose, light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand.	SP		1109.2
60-		נננש	SSS	5-5 16-23	60			Saturated, loose, light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace fine gravel, rounded to subrounded, subangular gravel.	SP		1104.2
65-		7	SSS	6-18	100		22	Saturated, loose, light yellow brown MEDIUM TO	SP		1099.2
-		L.		50(4")				COARSE SAND, trace gravel. Saturated, loose, light yellow brown FINE TO VERY FINE SAND, some silt.	SM		1098.2
70- -		11.11	SSS	10-14 30-34	100			Saturated, loose, light yellow brown, interbedded layers of MEDIUM TO COARSE SAND, and FINE SAND.	SP		1094.2
75-		7	SSS	23-50	100		30	Saturated loose, light yellow brown MEDIUM TO	SP		1089.2
2		1	000	(6")				COARSE SAND (probably fallback). Wet, stiff and very hard, light yellow brown CLAYEY MEDIUM SAND.	SP-SC		1088.2
- 80- -		נונע	SSS	6-26 50 (5"0	50			Wet, stiff, dense, MEDIUM SAND, with few clay, cohesive.	SP		1084.2
			-	28-50				Saturated light yellow brown MEDIUM SAND.	SP		1079.2
85-		רנט	SSS	(6")	60		0.00.00	Saturated, rounded to subrounded, FINE GRAVEL, trace medium sand.	GP		1078.2
90-		נננ	SSS		100		0.	Light yellow brown MEDIUM SAND, saturated, loose, medium dense. Three inches coarse sand and fine to medium rounded gravel lens at 90 ft. bgl.	SP SP	Did not get blow counts, rig line blew. Very hard drilling 90-93' bgl.	1074.2 1073.2

MALCOLM

COORDINATES N 229,163.2 E 1,747,490.7

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BORING NO. MW-12d SHEET

3 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI 4065-001

PROJECT NO.

	SAMF	PLE	INF	ORMA		_	Strata	DECORIDATION	uscs	DEMARKS	Elevation Feet
Depth feet			ample Type	Blow Counts (300 lb. Ham- mer)	overy	PID (ppm)		DESCRIPTION	0303	REMARKS	Elev
95-		וננש	SSS	8-12 18-18	80			MEDIUM SAND, with moderate yellow brown dry to molst slit. Lenses approx. 3-5" each. Interbedded light yellow brown, saturated FINE SAND, and light yellow brown dry silt. Light yellow brown FINE TO MEDIUM SAND, few silt, wet, soft.	48 48		1069.2 1068.7
00-		וננוש	SSS	13-17 28-32	100			Light yellow brown FINE TO MEDIUM SAND, trace coarse sand, few silt, saturated, dense, semi-cohesive.	SP		1064.2
05-		1111	SSS	24-50 (6")	50			Moderate gray brown, moist SILTY CLAY, not varved. Light yellow brown moist SILT.	CL-ML ML		1059.2 1058.6
110-		ונונש	SSS	2-6 16-17	50			Light yellow brown FINE TO COARSE SAND, one lens varved gray/brown, moist silt at 109.8 ft. bgl.	SP		1054.2
115-		1111	SSS	14-32 50 (5")	75			Light yellow brown FINE TO MEDIUM SAND, saturated, increasing silt content and density from 115 to 115.5 ft. bgl.	SP	End of boring - 115.5'	1049.2

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Telephone: (517) 337-0111 Fax: (517)-337-0417 BORING NO. MW-12i

SHEET 1 OF 2

1123.47

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, Mi

COORDINATES N 229,155.3 E 1,747,490.7

PROJECT NO. 4065-001

SURFACE ELEVATION 1162.47		JSGS LOGGED BY Greg	Fox		
DRILLING CONTRACTOR Stearns DRILLING METHOD EQUIPMENT 4 1/4" HSA CME 1050 DRILLING STARTED ENDED 7/27/00 7/27/00	LC	OCATION DESCRIPTION: See Report Figures fo	or Loc	ations	
STRATA KEY SAND SILT CLAY PEAT GRAVEL FILL		See Neport rigures re		440110	
SAMPLE INFORMATION Depth Lab Sample Sample Type Ham-		DESCRIPTION	USCS	REMARKS	Elevation
feet Sample Type (300 lb. overy Hammer) %	(ppm)				<u> </u>
5-	577	Moderate reddish-brown, cohesive CLAYEY FINE TO COARSE SAND, clast supported, dry to moist.	sc	Stratigraphic Information taken from MW-12d boring log. MW-12i drilled approx. 10' from MW-12d.	1158.
10-	30.4	Moist to wet, soft CLAYEY FINE TO COARSE SAND, cohesive, trace fine gravel.	sc		1153.
15-		Moist to wet, semi-cohesive, light yellow brown MEDIUM SAND, trace coarse sand, trace gravel, trace clay. Saturated, very loose, light yellow brown FINE TO MEDIUM SAND, trace silt, trace clay.	SP		1148. 1147.
20-		Saturated, very loose, MEDIUM TO COARSE SAND, light yellow brown, trace coarse gravel, trace silt. Moist, stiff to hard moderate yellow brown CLAY, with trace medium sand, very cohesive.	SP		1143. 1142.
25-		Dry, light buff MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, rounded to subrounded.	SP		1138.
30-		Dry, light buff MEDIUM SAND, dense, well packed, light/dark banding at 30.5 ft. bgl (light buff to medium buff, 1/4" bands).	SP		1133.
35-		Dry, light buff, MEDIUM SAND, medium dense, subrounded.	SP		1128.

Dry, light buff, MEDIUIM SAND, loose.



BORING NO. MW-12i

SHEET **GSWA Spring Hill Camp**

2 OF 2

PROJECT LOCATION

Osceola, MI

PROJECT NO.

4065-001

COORDINATES N 229,155.3 E 1,747,490.7

SURFACE ELEVATION 1162.47

DATUM USGS

Greg Fox LOGGED BY

	SAMP	LE INF				B				ē ,
epth feet		Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
-			men				Dry, light buff, FINE SAND, loose. (continued)	SP		1122.9
45 —							Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace silt and clay.	SP		1118.4
				Н			coarse sand, trace silt and clay. Dry to moist, stiff, moderate yellow brown SILTY CLAY.	CL		1116.
0-					A OTHER		Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel, trace clay, rounded to subrounded.	SP		1113.
5							Saturated, loose, light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand.	SP		1108.
io-							Saturated, loose, light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace fine gravel, rounded to subrounded, subangular gravel.	SP	End of boring - 62'	1103.

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MW-13 BORING NO.

1 OF 3 SHEET

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI 4065-001

COORDINATES N 227,193.1 E 1,747,065.5

PROJECT NO. LOGGED BY

	ACE ELE			1120.	.17	DATU	м U	SGS LOGGED BY J.Henr	y/G.Fo	х	
Stea DRILL 4 1/4	ING MET 4" HSA ING STA	HC	DD E	R EQUIPMI CME 1 ENDED 7/26/00	050		LC	CATION DESCRIPTION: See Report Figures fo	rloc	ations	
	SAND CLAY GRAVEL	S		∭ sıı	AT.			See Report Figures to		ations	
Depth feet	SAMF Lab Sample	s	INFO ample Type	Blow Counts (300 lb. Ham-	Rec-	, DID	Strata	DESCRIPTION	uscs	REMARKS	Elevation Feet
			AUG	mer)				Moderate reddish brown CLAY, damp to moist, soft, trace fine sand.	СН	Based on drill cuttings.	1119.17
5-		מנוניו	SSS	3-4 7-8	90			Moderate yellow brown FINE TO COARSE SAND, stiff and cohesive, few clay and silt, damp. Moderate yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, cohesive, stiff.	sc sc	7.5-5-0	1116.1 1115.1
10-		1111	SSS	3-4 7-9	100			Moderate yellow brown FINE TO MEDIUM SAND, trace fine to medium rounded gravel, trace to few clay and silt, moist, clast supported.	sc		1111.1
15-		1	SSS	4-7	100			Moderate yellow brown FINE TO MEDIUM SAND AND SILT, trace clay, moist. Seam of wet	ML	4	1106.1
20-		וווון	sss	3-5 5-3	100			moderate yellow brown medium sand, trace fine gravel at 15 ft. bgl. Light yellow brown MEDIUM TO FINE SAND, moist to damp, loose, subround to subangular. Light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, moist, cohesive, stiff, with the following two seams: 19.7-20' Light yellow brown MEDIUM TO COARSE SAND, loose, wet, round and subround; 20.7-21' Moderate	SP		1104.6
25-		1111	sss	2-6 8-8	100			orange brown MEDIUM TO COARSE SAND, wet, one large gravel. Moderate yellow brown FINE TO MEDIUM SAND, some clay and silt, moist. Kark yellow gray SILTY CLAY, trace fine sand.	cL		1096.1 1095.9
30-		6111	SSS	2-4 11-11	100			Dark yellow gray SILTY CLAY, stringers of light <u>gray silt_dry to damp.</u> Light gray SILT, dry, moderately dense.	CL ML		1091.1 1089.9
35		LILLILL	SSS	1-0 0-0 2 (24")	0 80			Light yellow brown MEDIUM TO COARSE SAND, loose, saturated, subrounded to subangular, with fine angular gravel at 38 ft. bgl.	SP	No recovery in 34-36' split spoon sample, saturated	1086.1
DAING		-		1-1					SP	Gauged well @36-38'	1081.1

SURFACE ELEVATION

COORDINATES N 227,193.1 E 1,747,065.5

1120.17

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DATUM USGS

MW-13 BORING NO.

2 OF 3 SHEET

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI 4065-001

PROJECT NO.

LOGGED BY

J.Henry/G.Fox

	SAMF	PLE	INF	ORMA					6.1		noi *:
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
1		2	SSS	1-1	60			Light yellow brown MEDIUM TO COARSE SAND, trace fine gravel, trace moist silt pockets. (continued)	SP	spoon; water @31' bgl and rising in auger - confined aquifer.	
- 45 –		1111	sss	4-7 9-12 1-1	75			Moderate yellow brown SILTY CLAY, moist, hard, with numerous light yellow brown dry silt partings.	CL-ML		1077.1
Ĭ		1	SSS	1-2		1	77	Brown MEDIUM TO COARSE SAND, trace fine sand, saturated, medium dense, trace fine gravel,	SP		1074.1
		77	SSS	1-2 2-3				note: coarsens downward. Brown FINE TO COARSE SAND, trace fine gravel, note occasional thin clay (gray, silty CLAY, trace	SP-ML		1071.1
50 -		1	SSS					fine sand, trace coarse sand, moist, stiff), less than 0.3' thick, dense, saturated. FINE TO COARSE SAND, with fine to coarse gravel, saturated, note occasional gray silty clay			
55-		1111	SSS	1-2 2-4				with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick.	SP-ML		
60-		11111	SSS	1-1 1-1				FINE TO COARSE SAND, with fine to coarse gravel, saturated, note occasional gray silty clay with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick. Note: Gravelly seam 63.8-64.0' bgl.	SP-ML		1062.1
65 -		1111	SSS	3-3 6-9				Brown MEDIUM TO COARSE SAND, trace fine gravel, trace coarse gravel, saturated. Note: 0.2' thick clay seam, brown silty clay, trace fine sand, moist, stiff.			1056,
70-		11111	SSS	1-3 5-9		13			SP-ML		
75		ונננו	SSS	2-3 6-8				Brown MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, saturated.		No recovery in 84-86' split spoon sample.	1046.
80		1111	SSS	2-5 6-12					SP		
80 85 90		1111	sss	3-5 7-12							
90		1111	sss	3-4 7-13			0 0	Brown FINE TO COARSE SAND and FINE TO MEDIUM GRAVEL, trace coarse gravel, saturated. At 90.9' bgl: FINE SAND seam, trace silt, brown, saturated.	SP-GF		1031.

COORDINATES N 227,193.1 E 1,747,065.5

MW-13 **GSWA Spring Hill Camp** PROJECT

3 OF 3

SHEET

LOCATION Osceola, MI

4065-001 PROJECT NO.

BORING NO.

				ORMA			-	Strata	DESCRIPTION	USCS	REMARKS	Elevation
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	overy %	VAS	PID (ppm)	ţ,	DECOMI HON	0000	TKEW/ TKKO	Elev
95 –		רננע	sss	2-8 12-13					Brown FINE TO COARSE SAND, trace silt, trace fine gravel, saturated.	SP		1026.1
00-		נננש	sss ^W	OH-WC 6-6	Н				Brown MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, saturated. Note: Brown fine to coarse sand, trace fine to coarse gravel at 100.5 ft. bgl.	SP		1021.1
)5-		1111	SSS	3-4 10-10					Brown MEDIUM SAND, trace fine sand, trace coarse sand, trace fine gravel, trace silt, saturated.	SP		1016.
10-		122	sss	4-12 15-12					Gray SILTY CLAY AND MEDIUM SAND, saturated, dense.		End of boring - 113' bgl	1010.
			SSS	2-3 3-4				96.00	Saturateu, derise.	SP-SC		-

SURFACE ELEVATION 1097.36

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DATUM USGS

TW-1 BORING NO.

SHEET

1 OF 2

PROJECT LOCATION **GSWA Spring Hill Camp** Osceola, MI

4065-001 PROJECT NO.

Joel Henry LOGGED BY

DRILLING CONTRACTOR

Stearns

DRILLING METHOD 10 1/4" HSA

EQUIPMENT CME 1050

COORDINATES N 227,266.3 E 1,746,816.7

DRILLING STARTED ENDED 7/5/00

7/6/00

LOCATION DESCRIPTION:

See Report Figures for Locations

SAND

SILT

STRATA KEY

CLAY

PEAT

GRAVEL

FILL

	SAMP	LE INF		TION						Ę
Depth feet		Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	SW PIE	1 -7	DESCRIPTION	uscs	REMARKS	Elevation Feet
5-						}	Brown Ioam (TOPSOIL). Red, MEDIUM TO FINE SAND, little silt. Light brown, FINE TO MEDIUM SAND, little silt, moist. Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.	SM SM SM	Stratigraphic information taken from MW-1d boring log. TW-1 drilled approx. 15' from MW-1d. Hand auger to 8' bgl to clear utilities.	1097.36 1096.36 1094.36 1093.36
10-							Light brown, FINE TO MEDIUM SAND, little fine to medium gravel, little silt,poorly sorted, round and spherical, loose, wet at 9.5'- 2" clayey gravel and silt seam.	SP	0.25" clay seam at 9.6' bgl	1089.36
15-							Gray to brown, CLAY, trace silt and fine sand, medium plasticity, firm to hard, dry to moist clay	CL	Driller notes change at 12.5' bgl.	1084.76
20-							Grayish brown, MEDIUM SAND, some silt and clay, sand is round and spherical, very loose, moist to wet.	sc	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K. Interbedded/gradation band per driller.	1080.36
25-							Grayish brown, FINE SAND, some silt,trace medium sand, medium density, round and spherical, moist with wet sandier seams, 1/4" seam of clay at 22.75', gray 1" seam of silt at 23',1" seam	SM	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1074.86
30-							of medium sand with little silt at 23.5'. Buff to light brown, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose, wet.	SP	Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.	1071.36
35-							Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose, wet.	SP SP	Granite fragments.	1064.36 1063.86
							Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, few medium angular gravel, subrounded, spherical to elongate, loose, wet. Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is	SP		1060.36

SURFACE ELEVATION

COORDINATES N 227,266.3 E 1,746,816.7

1097.36

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DATUM USGS

TW-1 BORING NO.

SHEET **GSWA Spring Hill Camp**

2 OF 2

LOCATION

PROJECT

Osceola, MI

4065-001 PROJECT NO.

LOGGED BY **Joel Henry**

	mer)			subangular and elongate, loose, poorly sorted, wet. Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is subangular and elongate, loose, poorly sorted, wet. (continued) Buff, MEDIUM SAND, few fine sand, round and spherical, poorly sorted, loose, wet. Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine gravel, subrounded and subspherical, poorly sorted, loose, wet. Buff, COARSE SAND, little medium sand, few fine gravel, round and subspherical, poorly sorted, loose, wet. Buff, MEDIUM TO COARSE SAND, little fine to medium sand, few coarse sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP SP SP	Outwash or glaciofluvial Outwash or glaciofluvial Bail approx. 3.25' heave from augers.	1053.86 1052.86 1049.36
				Buff, COARSE SAND, little medium sand, few fine gravel, round and subspherical, poorly sorted, loose, wet. Buff, MEDIUM TO COARSE SAND, little fine to medium sand, few coarse sand, trace fine gravel.		glaciofluvial_ Bail approx. 3.25' heave	
				medium sand, few coarse sand, trace fine gravel,	SP	Bail approx. 3.25' heave from augers.	1044.30
		1	(C				
	1			Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP		1039.36
				Buff, MEDIUM SAND, little medium to coarse sand, few fine sand, trace coarse sand, round and very spherical, poorly sorted, loose, wet.	SP	Bail approx. 3' heave from augers.	1034.3
				Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP	Bail approx. 2' heave from augers.	1029.36
ō				Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, trace fine gravel, round and very spherical, sorted, very loose, wet.	SP	Bail approx. 2.5' heave from augers.	1024.36
				Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP	Bail approx. 1.9' heave from augers.	1019.36
				Buff, FINE TO MEDIUM SAND, few fine sand, round and spherical, sorted, very loose, wet.	SP	End of boring - 85' bgl.	1014.36
					Buff, FINE TO MEDIUM SAND, few fine sand, Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, trace fine sand, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet.	Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, trace fine sand, trace fine to medium sand, trace fine sand, trace fine sand, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet. SP Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet. SP	Sand, trace fine sand, round and very spherical, sorted, loose, wet. Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, trace fine gravel, round and very spherical, sorted, very loose, wet. SP Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet. SP Bail approx. 2.5' heave from augers. SP Bail approx. 1.9' heave from augers. SP Buff, FINE TO MEDIUM SAND, few fine sand, End of boring - 85' bgl.

DRILLING CONTRACTOR

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517)-337-0417

BORING NO. TW-2 SHEET

SP Gauged well @36-38'

1080.41

1 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

LOCATION DESCRIPTION:

4065-001 PROJECT NO.

COORDINATES N 227,207.0 E 1,747,037.4 SURFACE ELEVATION 1119.41 DATUM USGS

M.B. & G.Fox LOGGED BY

DRILI 10 1 DRILI	arns LING MET 1/4" HSA LING STA 3/00	RTED I	EQUIPM CME 1 ENDED 8/2/00	050/C	ME 95	See Report Figures for Locations						
-	SAND	STRAT	∭ sı	ILT			See Neport Figures 10	LUC	ations			
	CLAY			EAT								
	GRAVEL		FI FI	LL								
	SAMF	LE INF	ORMA	TION						5		
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation Feet		
			11101.				Moderate reddish brown CLAY, damp to moist, soft, trace fine sand.	СН	Stratigraphic information from MW-13 boring log.	1118.41		
5-							Moderate yellow brown FINE TO COARSE SAND, stiff and cohesive, few clay and silt, damp. Moderate yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, cohesive, stiff.	sc	TW-2 is located approx.	1115.41 1114.41		
10-							Moderate yellow brown FINE TO MEDIUM SAND, trace fine to medium rounded gravel, trace to few clay and silt, moist, clast supported.	sc		1110.41		
				1 1	l P	ŤΪ	Moderate yellow brown FINE TO MEDIUM SAND	ML		1105.41		
20-							AND SILT, trace clay, moist. Seam of wet moderate yellow brown medium sand, trace fine gravel at 15 ft. bgl. Light yellow brown MEDIUM TO FINE SAND, moist to damp, loose, subround to subangular. Light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, moist, cohesive, stiff, with the following two seams: 19.7-20' Light yellow brown MEDIUM TO COARSE SAND, loose, wet, round and subround; 20.7-21' Moderate	SP		1103.91		
25-							orange brown MEDIUM TO COARSE SAND, wet, one large gravel. Moderate yellow brown FINE TO MEDIUM SAND, some clay and silt, moist. Dark yellow gray SILTY CLAY, trace fine sand.	CL		1095.4 1095.2		
30-							Dark yellow gray SILTY CLAY, stringers of light gray silt, dry to damp Light gray SILT, dry, moderately dense.	CL ML		1090.4		
30 -							Light yellow brown MEDIUM TO COARSE SAND, loose, saturated, subrounded to subangular, with fine angular gravel at 38 ft. bgl.	SP	No recovery in 34-36' split spoon sample, saturated.	1085.4		

COORDINATES N 227,207.0 E 1,747,037.4

SURFACE ELEVATION 1119.41 DATUM USGS

TW-2 BORING NO.

PROJECT

GSWA Spring Hill Camp

2 OF 3

SHEET

Osceola, MI LOCATION

PROJECT NO. 4065-001

M.B. & G.Fox LOGGED BY

SAMPLE INFORMATION										6
epth feet	Lab Sample	Sample Type	Blow Counts (300 lb, Ham- mer)	Rec- overy	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
1					7		Light yellow brown MEDIUM TO COARSE SAND, trace fine gravel, trace moist silt pockets. (continued)	SP	spoon; water @31' bgl and rising in auger - confined aquifer,	
45-						140.446	Moderate yellow brown SILTY CLAY, moist, hard, with numerous light yellow brown dry silt partings.	CL-ML	7546355	1076.4
4.00							Brown MEDIUM TO COARSE SAND, trace fine sand, saturated, medium dense, trace fine gravel, note: coarsens downward. Brown FINE TO COARSE SAND, trace fine gravel, note occasional thin clay (gray, silty CLAY, trace	SP SP-ML		1073.4 1072.4 1070.4
55 –							fine sand, trace coarse sand, moist, stiff), less than 0.3' thick, dense, saturated. FINE TO COARSE SAND, with fine to coarse gravel, saturated, note occasional gray silty clay with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick.	SP-ML		
60-							FINE TO COARSE SAND, with fine to coarse gravel, saturated, note occasional gray silty clay with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick. Note: Gravelly seam 63.8-64.0' bgl.	SP-ML		1061.4
65 -							Brown MEDIUM TO COARSE SAND, trace fine gravel, trace coarse gravel, saturated. Note: 0.2' thick clay seam, brown silty clay, trace fine sand, molst, stiff.	SP-ML		1055.4
70-								SF-IVIL		
75-	-						Brown MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, saturated.		No recovery in 84-86' split spoon sample.	1045.4
80-								SP		
85-										
80 - 85 - 90 -						0 0 0 0	Brown FINE TO COARSE SAND and FINE TO MEDIUM GRAVEL, trace coarse gravel, saturated. At 90.9' bgl: FINE SAND seam, trace silt, brown, saturated.	SP-GP		1030.4



TW-2 BORING NO.

SHEET 3 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

PROJECT NO. LOGGED BY

4065-001 M.B. & G.Fox

COORDINATES N 227,207.0 E 1,747,037.4

SURFACE ELEVATION 1119.41

DATUM USGS

	SAMF	LE INF				m	DESCRIPTION		REMARKS	Elevat on Fee:
Depth feet		Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy	PID (ppm)	Strata		USCS		
95 —							Brown FINE TO COARSE SAND, trace silt, trace fine gravel, saturated.	SP		1025.41
100 -							Brown MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, saturated. Note: Brown fine to coarse sand, trace fine to coarse gravel at ; 100.5 ft. bgl.	SP	End of boring - 103' bgl.	1020.4
M, 601 101 101 100										
BORING LOG GSWA-SHC.GF. MP MILGD 1071700										
DRING LOG GSW										

DRILLING STARTED ENDED

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Fax: (517)-337-0417

BORING NO.

TW-3

SHEET 1 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

4065-001 PROJECT NO. COORDINATES N 227,257.0 E 1,747,420.1 Joel Henry LOGGED BY SURFACE ELEVATION 1148.57 DATUM USGS DRILLING CONTRACTOR LOCATION DESCRIPTION: **Stearns EQUIPMENT** DRILLING METHOD **CME 1050** 10 1/4" HSA

STRATA KEY

M SAND

SILT

7/27/00

CLAY

7/26/00

PEAT

GRAVEL

FILL

See Report Figures for Locations

	SAMP	LE INF	ORMA'	TION	1					8
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VA (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
1										
-							Medium brown SANDY CLAY, soft, damp to dry.	CL	Stratigraphic information from	1145
5-							Interbedded medium brown SANDY CLAY with light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.	CL	MW-5d boring log. TW-3 is located approx. 15' from MW-5.	1144
-							\Medium brown SANDY CLAY. Light buff, dry, loose, FINE TO MEDIUM SAND,	CL	Prove rock.	1140 1140
10-							subangular to subrounded.	SP		
-							Dry, loose, light buff, MEDIUM SAND, trace fine sand, subrounded.			1135
15-								SP		
-							Dry, loose, light buff MEDIUM SAND, trace fine sand, subrounded. One <1/2" lens medium brown			1130
20-							silt @ 19.5' bgl. No silt in remaining sample.	SP		
							Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.			1125
25-	1						SAND, trace line sand, rounded to subrounded.	SP		
9							Saturated medium dense light yellow brown	SM/ML		1120
30-							SANDY SILT. Dry hard medium yellow brown SILTY/SANDY CLAY.			1119
4.0								CL		
35							Dry/damp, hard medium grey CLAY, trace silt partings. Color change to light yellow brown SILTY CLAY,	CL	Felt lithology change at	1115
-							dry and hard.	CL	36' bgl.	
						II,	Saturated, light yellow brown, soft, SILT AND CLAY. Water may have entered spoon from	CL SP	Water may have Pentered spoon from [1110 1109

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COORDINATES N 227,257.0 E 1,747,420.1

SURFACE ELEVATION 1148.57 DATUM USGS

TW-3 BORING NO.

LOCATION

SHEET

2 OF 3

GSWA Spring Hill Camp PROJECT Osceola, MI

4065-001

PROJECT NO. LOGGED BY Joel Henry

	SAMF	PLE INF	ORMA	TION		_				5
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
3			THEIT				perched zone. Dry light buff loose MEDIUM SAND, trace fine sand. (continued)	SP	perched zone.	
9							Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.			1105.57
45-								- SP		
1							Dry, loose, light buff MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, one fine to			1100.57
50-							medium gravel stringer @ 48.5'.	SP		
1		Ш				si K	Saturated, loose light yellow brown MEDIUM TO	SP		₩
55-			8				FINE SAND, trace medium rounded gravel. Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC		1095.07
		Y.L.			1 8					
Į į						300	Saturated, loose light yellow brown MEDIUM TO COARSE, trace fine sand, trace gravel.	SP GP		1090.57
60-						o.	Saturated loose subangular to subrounded FINE TO COARSE GRAVEL. Mixed FINE TO MEDIUM GRAVEL AND FINE TO	GP		1088.57
1						艾花	MEDIUM SAND, saturated. May be slough. Poor	SP		1086.57
						1	Viecovery, seemed to be pushing a cobble. Saturated light yellow brown FINE TO MEDIUM	ML SP		1085.57 1085.07
65-							SAND with some fine subangular to subrounded gravel. Moist medium yellow brown FINE SAND AND	SP		1084.57
							SILT, firm. Saturated light yellow brown, FINE TO MEDIUM SAND trace silt. Saturated light yellow brown, FINE TO MEDIUM	SP		1080.57 1080.07
70-							Saturated light yellow blown, FINE TO MEDION SAND, trace silt, subangular to subrounded. Saturated light yellow MEDIUM TO FINE SAND, rounded to subrounded.	SP		
							Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay.			1075.57
75-							Saturated light yellow brown MEDIUM TO FINE SAND, trace fine to medium subrounded gravel.	SP		
							Saturated light yellow brown MEDIUM TO FINE	SP		1070.57
80-							SAND. Saturated light yellow brown SILT, some fine to medium sand.	ML		1069.57
						F397	Saturated light yellow brown FINE TO MEDIUM			1065.57
85-							SAND, trace to few silt, trace clay.	8P		1000.07
80- 85- 90-							Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.	SP		1060.57
								J SF		

COORDINATES N 227,257.0 E 1,747,420.1

SURFACE ELEVATION 1148.57 DATUM USGS BORING NO.

TW-3

3 OF 3 SHEET

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

PROJECT NO. LOGGED BY

4065-001 Joel Henry

SAMPLE INFORMATION Depth Lab Sample Counts (300 lb. overy (100 pm)) feet Sample Type Ham-							ū				t jou
Depth feet	Lab Sample	Sample Type	Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
95-			11820					Saturated light yellow brown MEDIUM TO COARSE SAND, little to some fine subangular to subrounded gravel, trace clay (gravelly sand). (continued)	SP		1055.5
9					Ш		÷ (Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, trace	SP		1050.5
100-							000	gravel, trace clay. Saturated subangular to subrounded GRAVEL, trace fine to medium sand. One large gravel (1") wedged in bottom of spoon.	GP		1050.0
- - 105 - -							C.	Saturated light yellow brown FINE TO COARSE SAND, finer at bottom, coarse sand with few fine gravel @104' bg.	sw		1045.5
110-								Saturated light yellow brown MEDIUM SAND, subrounded to rounded.	SP	Pushed sample. Couldn't get hammer on spoon, too close to rig.	1040.5
115-								Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand.	SP		1035.5
120-								Saturated, loose, light yellow brown MEDIUM SAND, trace fine gravel.	SP	End of boring - 122.2' bgl.	1030.