

APPENDIX C

BORING AND WELL CONSTRUCTION LOGS

COMPLETION REPORT OF WELL No. MW-1s

PROJECT: **GSWA Spring Hill Camp**
 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	STRATA		WELL DETAILS	V.A.S.	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
PROTECTIVE CASING Diameter: NA Type: NA Interval: NA					TPC 1098.75	TRC -1.59	
	0			0.0	GS 1097.16		
RISER CASING Diameter: 2" Type: PVC Interval: 1.6' agl to 3.4' bgl	0.5			0.5	1096.66		Filtered Sand Pack Bentonite Chips
	2.5			2.5	1094.66		
GROUT Type: Bentonite Chips Interval: 0.5' to 2.5'	5			5			Filtered Sand Pack
SEAL Type: None Interval: None			8.4	1088.76			
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 METHOD: Bailer							
LEGEND							
	GRAVELLY SAND	TPC TOP OF PROTECTIVE CASING					
	COARSE SAND	TRC TOP OF RISER CASING					
	MEDIUM SAND	GS GROUND SURFACE					
	FINE SAND	BS BENTONITE SEAL					
	VERY FINE SAND	FP FILTER PACK					
	SILT	TSC TOP OF SCREEN					
	CLAY	BSC BOTTOM OF SCREEN					
	GRAVELLY CLAY	TD TOTAL DEPTH					
	ASPHALT		BENTONITE SEAL				
	TOPSOIL		CONCRETE				
	INTERBEDDED SAND, SILT, CLAY		FILTER PACK				
			THICK BENTONITE SLURRY GROUT				
			NATURAL COLLAPSE / SAND BACKFILL				

CONSTRUCTION LOG GSWA-SHC.GPJ MP MI.GDT 10/18/00

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**COMPLETION REPORT OF
 WELL No. MW-1s**

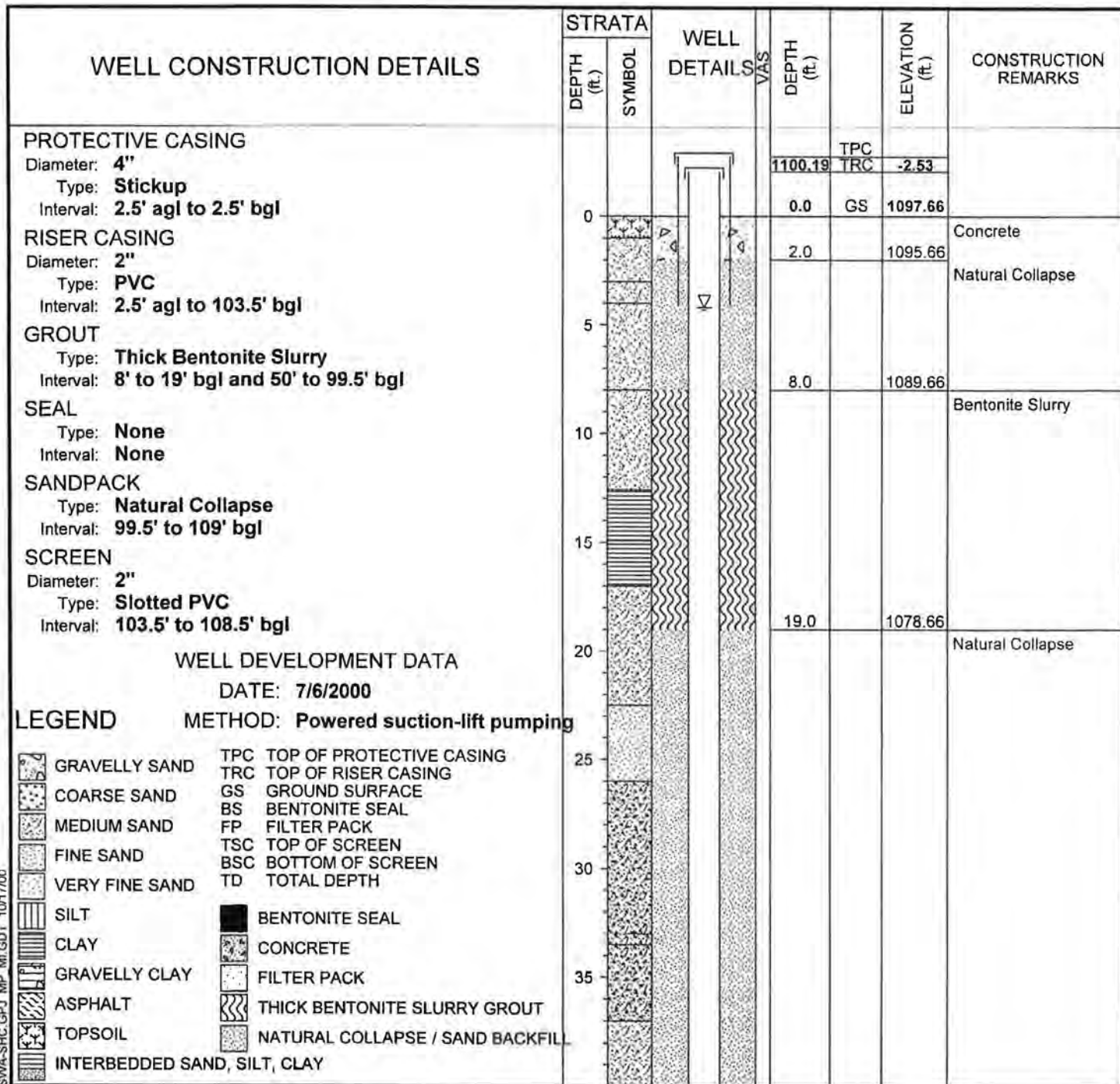
COMPLETION REPORT OF WELL No. MW-1d

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4085-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ▽ **4.20** ▼ _____ ▼ _____
 DATE: **10-12-00** _____
 TIME: **1231** _____

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**



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



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**COMPLETION REPORT OF
 WELL No. MW-1d**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	V.A.S.	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
					(See Page 1)		
	40						Natural Collapse (continued)
	45						
	50				50.0	1047.66	Bentonite Slurry
	55						
	60						
	65						
	70						
	75						
	80						
	85						

LEGEND

- | | | | |
|--|------------------------------|-----|----------------------------------|
| | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| | COARSE SAND | TRC | TOP OF RISER CASING |
| | MEDIUM SAND | GS | GROUND SURFACE |
| | FINE SAND | BS | BENTONITE SEAL |
| | VERY FINE SAND | FP | FILTER PACK |
| | SILT | TSC | TOP OF SCREEN |
| | CLAY | BSC | BOTTOM OF SCREEN |
| | GRAVELLY CLAY | TD | TOTAL DEPTH |
| | ASPHALT | | BENTONITE SEAL |
| | TOPSOIL | | CONCRETE |
| | INTERBEDDED SAND, SILT, CLAY | | FILTER PACK |
| | | | THICK BENTONITE SLURRY GROUT |
| | | | NATURAL COLLAPSE / SAND BACKFILL |

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

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	95	[Symbol: Horizontal lines]	[Symbol: Horizontal lines]			Bentonite Slurry (continued)
	100	[Symbol: Dotted pattern]	[Symbol: Dotted pattern]	99.5	998.16	Natural Collapse
	105	[Symbol: Dotted pattern]	[Symbol: Dotted pattern]	108.5	989.16	Natural Collapse
	110	[Symbol: Dotted pattern]	[Symbol: Dotted pattern]			
	115	[Symbol: Dotted pattern]	[Symbol: Dotted pattern]	115.0	982.66	

LEGEND

- | | | | |
|--|------------------------------|----------------------------|----------------------------------|
| [Symbol: Gravelly Sand] | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| [Symbol: Coarse Sand] | COARSE SAND | TRC | TOP OF RISER CASING |
| [Symbol: Medium Sand] | MEDIUM SAND | GS | GROUND SURFACE |
| [Symbol: Fine Sand] | FINE SAND | BS | BENTONITE SEAL |
| [Symbol: Very Fine Sand] | VERY FINE SAND | FP | FILTER PACK |
| [Symbol: Clay] | CLAY | TSC | TOP OF SCREEN |
| [Symbol: Gravelly Clay] | GRAVELLY CLAY | BSC | BOTTOM OF SCREEN |
| [Symbol: Asphalt] | ASPHALT | TD | TOTAL DEPTH |
| [Symbol: Topsoil] | TOPSOIL | [Symbol: Solid Black] | BENTONITE SEAL |
| [Symbol: Interbedded Sand, Silt, Clay] | INTERBEDDED SAND, SILT, CLAY | [Symbol: Dotted Pattern] | CONCRETE |
| | | [Symbol: Horizontal Lines] | FILTER PACK |
| | | [Symbol: Wavy Lines] | THICK BENTONITE SLURRY GROUT |
| | | [Symbol: Dotted Pattern] | NATURAL COLLAPSE / SAND BACKFILL |

CONSTRUCTION LOG GSWA-SHC.GPJ MP_ML.GDT 10/17/00



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**COMPLETION REPORT OF
 WELL No. MW-1d**

COMPLETION REPORT OF WELL No. MW-1i

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **6.35** ∇ _____ ∇ _____
 DATE: **10-12-00** _____
 TIME: **1230** _____

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**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS																																																				
	DEPTH (ft.)	SYMBOL																																																								
<p>PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl</p> <p>RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 33.5' bgl</p> <p>GROUT Type: Thick Bentonite Slurry Interval: 3' to 29' bgl</p> <p>SEAL Type: None Interval: None</p> <p>SANDPACK Type: Natural Collapse Interval: 29' to 39' bgl</p> <p>SCREEN Diameter: 2" Type: Slotted PVC Interval: 33.5' to 38.5' bgl</p> <p style="text-align: center;">WELL DEVELOPMENT DATA DATE: 7/6/2000</p> <p>LEGEND METHOD: Powered suction-lift pumping</p> <table style="width: 100%; font-size: small;"> <tr> <td style="width: 20%;"></td> <td>GRAVELLY SAND</td> <td style="width: 20%;"></td> <td>TPC TOP OF PROTECTIVE CASING</td> </tr> <tr> <td></td> <td>COARSE SAND</td> <td></td> <td>TRC TOP OF RISER CASING</td> </tr> <tr> <td></td> <td>MEDIUM SAND</td> <td></td> <td>GS GROUND SURFACE</td> </tr> <tr> <td></td> <td>FINE SAND</td> <td></td> <td>BS BENTONITE SEAL</td> </tr> <tr> <td></td> <td>VERY FINE SAND</td> <td></td> <td>FP FILTER PACK</td> </tr> <tr> <td></td> <td>SILT</td> <td></td> <td>TSC TOP OF SCREEN</td> </tr> <tr> <td></td> <td>CLAY</td> <td></td> <td>BSC BOTTOM OF SCREEN</td> </tr> <tr> <td></td> <td>GRAVELLY CLAY</td> <td></td> <td>TD TOTAL DEPTH</td> </tr> <tr> <td></td> <td>ASPHALT</td> <td></td> <td>BENTONITE SEAL</td> </tr> <tr> <td></td> <td>TOPSOIL</td> <td></td> <td>CONCRETE</td> </tr> <tr> <td></td> <td>INTERBEDDED SAND, SILT, CLAY</td> <td></td> <td>FILTER PACK</td> </tr> <tr> <td></td> <td></td> <td></td> <td>THICK BENTONITE SLURRY GROUT</td> </tr> <tr> <td></td> <td></td> <td></td> <td>NATURAL COLLAPSE / SAND BACKFILL</td> </tr> </table>								GRAVELLY SAND		TPC TOP OF PROTECTIVE CASING		COARSE SAND		TRC TOP OF RISER CASING		MEDIUM SAND		GS GROUND SURFACE		FINE SAND		BS BENTONITE SEAL		VERY FINE SAND		FP FILTER PACK		SILT		TSC TOP OF SCREEN		CLAY		BSC BOTTOM OF SCREEN		GRAVELLY CLAY		TD TOTAL DEPTH		ASPHALT		BENTONITE SEAL		TOPSOIL		CONCRETE		INTERBEDDED SAND, SILT, CLAY		FILTER PACK				THICK BENTONITE SLURRY GROUT				NATURAL COLLAPSE / SAND BACKFILL
	GRAVELLY SAND		TPC TOP OF PROTECTIVE CASING																																																							
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	MEDIUM SAND		GS GROUND SURFACE																																																							
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	INTERBEDDED SAND, SILT, CLAY		FILTER PACK																																																							
			THICK BENTONITE SLURRY GROUT																																																							
			NATURAL COLLAPSE / SAND BACKFILL																																																							
				<table style="width: 100%; font-size: x-small;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">TPC</td> <td style="width: 50%;"></td> </tr> <tr> <td style="text-align: center;">1100.74</td> <td style="text-align: center;">TRC</td> <td style="text-align: center;">-2.35</td> </tr> <tr> <td style="text-align: center;">0.0</td> <td style="text-align: center;">GS</td> <td style="text-align: center;">1098.39</td> </tr> </table>		TPC		1100.74	TRC	-2.35	0.0	GS	1098.39																																													
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1100.74	TRC	-2.35																																																								
0.0	GS	1098.39																																																								
			0			Concrete																																																				
			3.0		1095.39	Bentonite Slurry																																																				
			5																																																							
			10																																																							
			15																																																							
			20																																																							
			25																																																							
			30		1069.39	Natural Collapse																																																				
			35																																																							
			38.5		1059.89																																																					
			39.0		1059.39	Natural Collapse																																																				

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



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**COMPLETION REPORT OF
 WELL No. MW-1i**

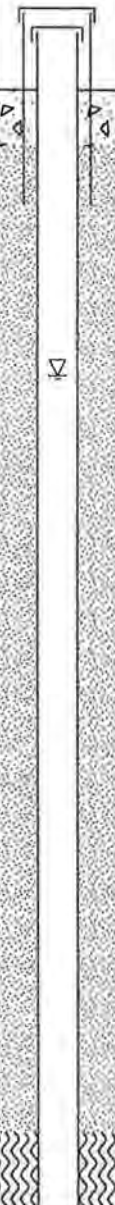





















COMPLETION REPORT OF WELL No. MW-2

PROJECT: **GSWA Spring Hill Camp**
 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.**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl				TPC TRC GS	-2.38 1101.70	
RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 55' bgl	0			2.0	1099.70	Concrete
GROUT Type: Thick Bentonite Slurry Interval: 37' to 49' bgl	5					Natural Collapse
SEAL Type: None Interval: None	10					
SANDPACK Type: Natural Collapse Interval: 49' to 101' bgl	15					
SCREEN Diameter: 2" Type: Slotted PVC Interval: 55' to 60' bgl	20					
WELL DEVELOPMENT DATA						
	DATE: 7/6/2000					
	METHOD: Drillers pump					
LEGEND						
 GRAVELLY SAND  COARSE SAND  MEDIUM SAND  FINE SAND  VERY FINE SAND  SILT  CLAY  GRAVELLY CLAY  ASPHALT  TOPSOIL  INTERBEDDED SAND, SILT, CLAY	 BENTONITE SEAL  CONCRETE  FILTER PACK  THICK BENTONITE SLURRY GROUT  NATURAL COLLAPSE / SAND BACKFILL	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 TD TOTAL DEPTH	25			
				37.0	1064.70	Bentonite Slurry

CONSTRUCTION LOG GSWA-SHC-SP1.MP.MI.GDT 10/17/00

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COMPLETION REPORT OF WELL No. MW-2

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	49.0			49.0	1052.70	
	50					Natural Collapse
	55					
	60			60.0	1041.70	Natural Collapse
	65					
	70					
	75					
	80					
	85					

LEGEND

- | | | | |
|---|------------------------------|---|----------------------------------|
|  | GRAVELLY SAND |  | TPC TOP OF PROTECTIVE CASING |
|  | COARSE SAND |  | TRC TOP OF RISER CASING |
|  | MEDIUM SAND |  | GS GROUND SURFACE |
|  | FINE SAND |  | BS BENTONITE SEAL |
|  | VERY FINE SAND |  | FP FILTER PACK |
|  | SILT |  | TSC TOP OF SCREEN |
|  | CLAY |  | BSC BOTTOM OF SCREEN |
|  | GRAVELLY CLAY |  | TD TOTAL DEPTH |
|  | ASPHALT |  | BENTONITE SEAL |
|  | TOPSOIL |  | CONCRETE |
|  | INTERBEDDED SAND, SILT, CLAY |  | FILTER PACK |
| | |  | THICK BENTONITE SLURRY GROUT |
| | |  | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. MW-2**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	V.A.S.	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
							(See Page 1)
	95						Natural Collapse (continued)
	100				101.0	1000.70	

LEGEND

- | | | | |
|--|------------------------------|-----|----------------------------------|
| | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| | COARSE SAND | TRC | TOP OF RISER CASING |
| | MEDIUM SAND | GS | GROUND SURFACE |
| | FINE SAND | BS | BENTONITE SEAL |
| | VERY FINE SAND | FP | FILTER PACK |
| | SILT | TSC | TOP OF SCREEN |
| | CLAY | BSC | BOTTOM OF SCREEN |
| | GRAVELLY CLAY | TD | TOTAL DEPTH |
| | ASPHALT | | BENTONITE SEAL |
| | TOPSOIL | | CONCRETE |
| | INTERBEDDED SAND, SILT, CLAY | | FILTER PACK |
| | | | THICK BENTONITE SLURRY GROUT |
| | | | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. MW-2**

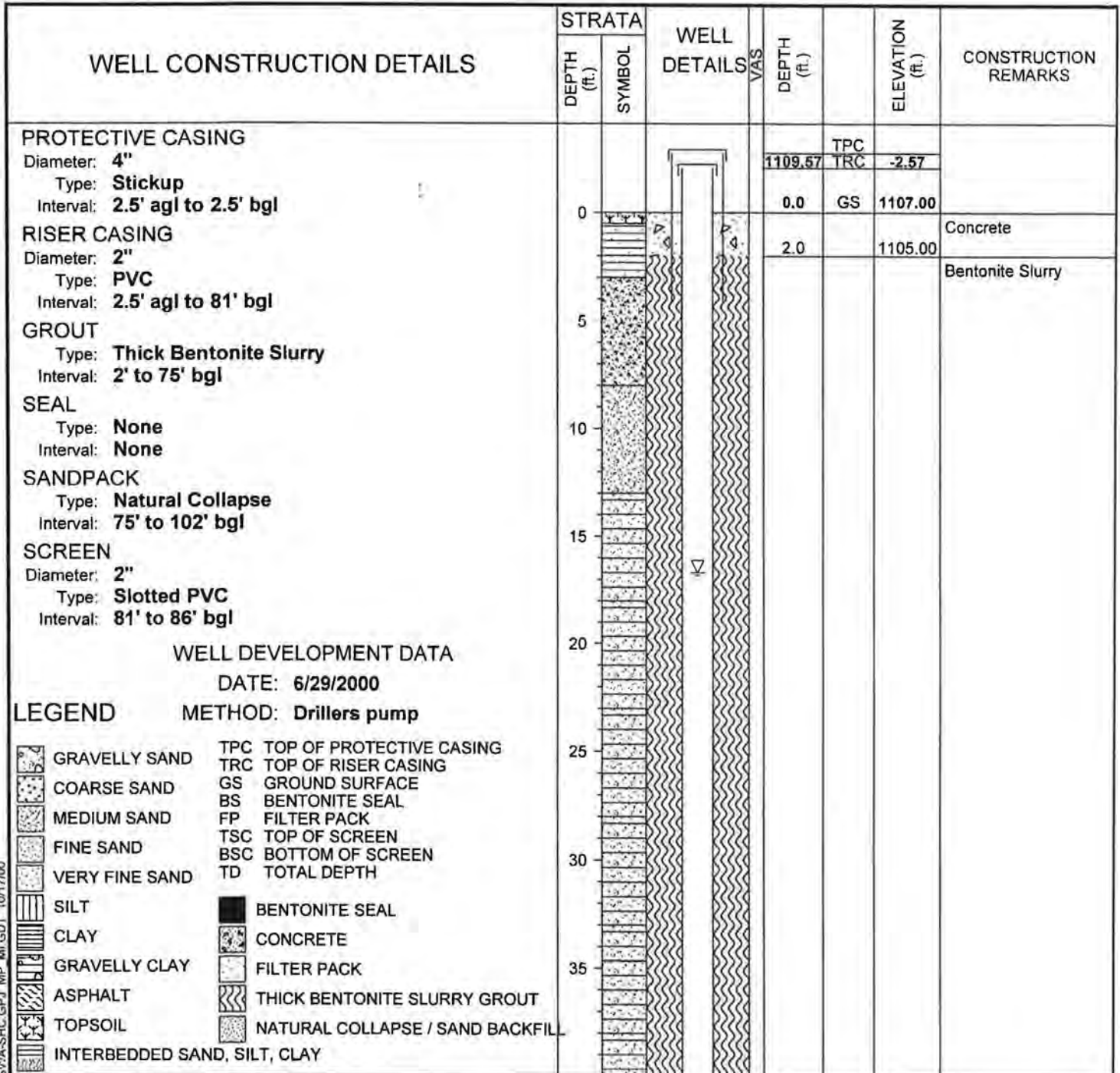
COMPLETION REPORT OF WELL No. MW-3

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **16.69** ∇ _____
 DATE: **10-12-00** _____
 TIME: **1218** _____

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**



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



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**COMPLETION REPORT OF
 WELL No. MW-3**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	50					
	55					
	60					
	65					
	70					
	75			75.0	1032.00	Natural Collapse
	80					
	85			86.0	1021.00	Natural Collapse

LEGEND

- | | | | |
|---|------------------------------|---|----------------------------------|
|  | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
|  | COARSE SAND | TRC | TOP OF RISER CASING |
|  | MEDIUM SAND | GS | GROUND SURFACE |
|  | FINE SAND | BS | BENTONITE SEAL |
|  | VERY FINE SAND | FP | FILTER PACK |
|  | SILT | TSC | TOP OF SCREEN |
|  | CLAY | BSC | BOTTOM OF SCREEN |
|  | GRAVELLY CLAY | TD | TOTAL DEPTH |
|  | ASPHALT |  | BENTONITE SEAL |
|  | TOPSOIL |  | CONCRETE |
|  | INTERBEDDED SAND, SILT, CLAY |  | FILTER PACK |
| | |  | THICK BENTONITE SLURRY GROUT |
| | |  | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. MW-3**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	95					Natural Collapse (continued)
	100					
				102.0	1005.00	

LEGEND

- | | | | |
|--|------------------------------|-----|----------------------------------|
| | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| | COARSE SAND | TRC | TOP OF RISER CASING |
| | MEDIUM SAND | GS | GROUND SURFACE |
| | FINE SAND | BS | BENTONITE SEAL |
| | VERY FINE SAND | FP | FILTER PACK |
| | SILT | TSC | TOP OF SCREEN |
| | CLAY | BSC | BOTTOM OF SCREEN |
| | GRAVELLY CLAY | TD | TOTAL DEPTH |
| | ASPHALT | | BENTONITE SEAL |
| | TOPSOIL | | CONCRETE |
| | INTERBEDDED SAND, SILT, CLAY | | FILTER PACK |
| | | | THICK BENTONITE SLURRY GROUT |
| | | | NATURAL COLLAPSE / SAND BACKFILL |

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

COMPLETION REPORT OF WELL No. MW-4s

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **6.91** ∇ _____ ∇ _____
 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 CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS																																																																																																																															
	DEPTH (ft.)	SYMBOL																																																																																																																																			
<p>PROTECTIVE CASING Diameter: NA Type: NA Interval: NA</p> <p>RISER CASING Diameter: 2" Type: PVC Interval: 1.3' agl to 3.7' bgl</p> <p>GROUT Type: Bentonite Chips Interval: 0.5' to 2.5'</p> <p>SEAL Type: None Interval: None</p> <p>SANDPACK Type: Filter pack sand Interval: 2.5' to 8.7' bgl</p> <p>SCREEN Diameter: 2" Type: Slotted PVC Interval: 3.7' to 8.7' bgl</p> <p style="text-align: center;">WELL DEVELOPMENT DATA DATE: 7/19/2000</p> <p>LEGEND METHOD: Bailer</p> <table style="font-size: small; width: 100%;"> <tr> <td></td> <td>GRAVELLY SAND</td> <td>TPC</td> <td>TOP OF PROTECTIVE CASING</td> </tr> <tr> <td></td> <td>COARSE SAND</td> <td>TRC</td> <td>TOP OF RISER CASING</td> </tr> <tr> <td></td> <td>MEDIUM SAND</td> <td>GS</td> <td>GROUND SURFACE</td> </tr> <tr> <td></td> <td>FINE SAND</td> <td>BS</td> <td>BENTONITE SEAL</td> </tr> <tr> <td></td> <td>VERY FINE SAND</td> <td>FP</td> <td>FILTER PACK</td> </tr> <tr> <td></td> <td>SILT</td> <td>TSC</td> <td>TOP OF SCREEN</td> </tr> <tr> <td></td> <td>CLAY</td> <td>BSC</td> <td>BOTTOM OF SCREEN</td> </tr> <tr> <td></td> <td>GRAVELLY CLAY</td> <td>TD</td> <td>TOTAL DEPTH</td> </tr> <tr> <td></td> <td>ASPHALT</td> <td></td> <td>BENTONITE SEAL</td> </tr> <tr> <td></td> <td>TOPSOIL</td> <td></td> <td>CONCRETE</td> </tr> <tr> <td></td> <td>INTERBEDDED SAND, SILT, CLAY</td> <td></td> <td>FILTER PACK</td> </tr> <tr> <td></td> <td></td> <td></td> <td>THICK BENTONITE SLURRY GROUT</td> </tr> <tr> <td></td> <td></td> <td></td> <td>NATURAL COLLAPSE / SAND BACKFILL</td> </tr> </table>		GRAVELLY SAND	TPC	TOP OF PROTECTIVE CASING		COARSE SAND	TRC	TOP OF RISER CASING		MEDIUM SAND	GS	GROUND SURFACE		FINE SAND	BS	BENTONITE SEAL		VERY FINE SAND	FP	FILTER PACK		SILT	TSC	TOP OF SCREEN		CLAY	BSC	BOTTOM OF SCREEN		GRAVELLY CLAY	TD	TOTAL DEPTH		ASPHALT		BENTONITE SEAL		TOPSOIL		CONCRETE		INTERBEDDED SAND, SILT, CLAY		FILTER PACK				THICK BENTONITE SLURRY GROUT				NATURAL COLLAPSE / SAND BACKFILL		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> </table>																																																																														<p>TPC _____</p> <p>TRC -1.32</p> <p>GS 1090.06</p> <p>1091.38</p> <p>0.0</p> <p>0.5 1089.56</p> <p>2.5 1087.56</p> <p>5</p> <p>8.7 1081.36</p>	<p>Filtered Sand Pack Bentonite Chips</p> <p>Filtered Sand Pack</p>
		GRAVELLY SAND	TPC	TOP OF PROTECTIVE CASING																																																																																																																																	
		COARSE SAND	TRC	TOP OF RISER CASING																																																																																																																																	
		MEDIUM SAND	GS	GROUND SURFACE																																																																																																																																	
		FINE SAND	BS	BENTONITE SEAL																																																																																																																																	
		VERY FINE SAND	FP	FILTER PACK																																																																																																																																	
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		GRAVELLY CLAY	TD	TOTAL DEPTH																																																																																																																																	
		ASPHALT		BENTONITE SEAL																																																																																																																																	
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CONSTRUCTION LOG GSWA-SHC.GPJ MP MI.GDT 10/19/00



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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**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl				TPC 1096.04 TRC -6.53	GS 1089.51	
RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 73' bgl	0			2.0	1087.51	Concrete
GROUT Type: Thick Bentonite Slurry Interval: 4' to 68' bgl	5			4.0	1085.51	Natural Collapse Bentonite Slurry
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	20					
WELL DEVELOPMENT DATA DATE: 06/29/2000 METHOD: Submersible Grundfos Pump						
LEGEND						
 GRAVELLY SAND  COARSE SAND  MEDIUM SAND  FINE SAND  VERY FINE SAND  SILT  CLAY  GRAVELLY CLAY  ASPHALT  TOPSOIL  INTERBEDDED SAND, SILT, CLAY	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 TD TOTAL DEPTH  BENTONITE SEAL  CONCRETE  FILTER PACK  THICK BENTONITE SLURRY GROUT  NATURAL COLLAPSE / SAND BACKFILL		25			
	30					
	35					

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



























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**COMPLETION REPORT OF
 WELL No. MW-4d**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	50					
	55					
	60					
	65					
	68.0			68.0	1021.51	Natural Collapse
	70					
	75					
	78.0			78.0	1011.51	Natural Collapse
	80					
	85					

LEGEND

-  GRAVELLY SAND
-  COARSE SAND
-  MEDIUM SAND
-  FINE SAND
-  VERY FINE SAND
-  SILT
-  CLAY
-  GRAVELLY CLAY
-  ASPHALT
-  TOPSOIL
-  INTERBEDDED SAND, SILT, CLAY
-  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
-  TD TOTAL DEPTH
-  BENTONITE SEAL
-  CONCRETE
-  FILTER PACK
-  THICK BENTONITE SLURRY GROUT
-  NATURAL COLLAPSE / SAND BACKFILL

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



















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**COMPLETION REPORT OF
 WELL No. MW-4d**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	V.A.S.	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
					(See Page 1)		
					91.0	998.51	

LEGEND

- | | | | |
|---|------------------------------|---|----------------------------------|
|  | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
|  | COARSE SAND | TRC | TOP OF RISER CASING |
|  | MEDIUM SAND | GS | GROUND SURFACE |
|  | FINE SAND | BS | BENTONITE SEAL |
|  | VERY FINE SAND | FP | FILTER PACK |
|  | SILT | TSC | TOP OF SCREEN |
|  | CLAY | BSC | BOTTOM OF SCREEN |
|  | GRAVELLY CLAY | TD | TOTAL DEPTH |
|  | ASPHALT |  | BENTONITE SEAL |
|  | TOPSOIL |  | CONCRETE |
|  | INTERBEDDED SAND, SILT, CLAY |  | FILTER PACK |
| | |  | THICK BENTONITE SLURRY GROUT |
| | |  | NATURAL COLLAPSE / SAND BACKFILL |

CONSTRUCTION LOG GSWA-SHC.GPJ MP_MIGDT 10/17/00



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**COMPLETION REPORT OF
 WELL No. MW-4d**

COMPLETION REPORT OF WELL No. MW-5d

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ▽ **52.56** ▽ _____ ▽ _____
 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**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS																																												
	DEPTH (ft.)	SYMBOL																																																
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl	0	[Symbol]	[Diagram]	0.0	GS 1149.40																																													
RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 153' bgl	2.0	[Symbol]		2.0	1147.40	Concrete																																												
GROUT Type: Thick Bentonite Slurry Interval: 2' to 149' bgl	5	[Symbol]				Bentonite Slurry																																												
SEAL Type: None Interval: None	10	[Symbol]																																																
SANDPACK Type: K&E Well Gravel #0 Interval: 149' to 152' bgl	15	[Symbol]																																																
SCREEN Diameter: 2" Type: Slotted PVC Interval: 153' to 158' bgl	20	[Symbol]																																																
WELL DEVELOPMENT DATA DATE: 07/21/2000 METHOD: Air Sparging																																																		
LEGEND <table style="width: 100%; border: none;"> <tr> <td style="width: 20%;">[Symbol] GRAVELLY SAND</td> <td style="width: 20%;">[Symbol] TPC TOP OF PROTECTIVE CASING</td> <td style="width: 20%;">[Symbol] BENTONITE SEAL</td> <td style="width: 40%;"></td> </tr> <tr> <td>[Symbol] COARSE SAND</td> <td>[Symbol] TRC TOP OF RISER CASING</td> <td>[Symbol] CONCRETE</td> <td></td> </tr> <tr> <td>[Symbol] MEDIUM SAND</td> <td>[Symbol] GS GROUND SURFACE</td> <td>[Symbol] FILTER PACK</td> <td></td> </tr> <tr> <td>[Symbol] FINE SAND</td> <td>[Symbol] BS BENTONITE SEAL</td> <td>[Symbol] THICK BENTONITE SLURRY GROUT</td> <td></td> </tr> <tr> <td>[Symbol] VERY FINE SAND</td> <td>[Symbol] FP FILTER PACK</td> <td>[Symbol] NATURAL COLLAPSE / SAND BACKFILL</td> <td></td> </tr> <tr> <td>[Symbol] SILT</td> <td>[Symbol] TSC TOP OF SCREEN</td> <td></td> <td></td> </tr> <tr> <td>[Symbol] CLAY</td> <td>[Symbol] BSC BOTTOM OF SCREEN</td> <td></td> <td></td> </tr> <tr> <td>[Symbol] GRAVELLY CLAY</td> <td>[Symbol] TD TOTAL DEPTH</td> <td></td> <td></td> </tr> <tr> <td>[Symbol] ASPHALT</td> <td></td> <td></td> <td></td> </tr> <tr> <td>[Symbol] TOPSOIL</td> <td></td> <td></td> <td></td> </tr> <tr> <td>[Symbol] INTERBEDDED SAND, SILT, CLAY</td> <td></td> <td></td> <td></td> </tr> </table>							[Symbol] GRAVELLY SAND	[Symbol] TPC TOP OF PROTECTIVE CASING	[Symbol] BENTONITE SEAL		[Symbol] COARSE SAND	[Symbol] TRC TOP OF RISER CASING	[Symbol] CONCRETE		[Symbol] MEDIUM SAND	[Symbol] GS GROUND SURFACE	[Symbol] FILTER PACK		[Symbol] FINE SAND	[Symbol] BS BENTONITE SEAL	[Symbol] THICK BENTONITE SLURRY GROUT		[Symbol] VERY FINE SAND	[Symbol] FP FILTER PACK	[Symbol] NATURAL COLLAPSE / SAND BACKFILL		[Symbol] SILT	[Symbol] TSC TOP OF SCREEN			[Symbol] CLAY	[Symbol] BSC BOTTOM OF SCREEN			[Symbol] GRAVELLY CLAY	[Symbol] TD TOTAL DEPTH			[Symbol] ASPHALT				[Symbol] TOPSOIL				[Symbol] INTERBEDDED SAND, SILT, CLAY			
[Symbol] GRAVELLY SAND	[Symbol] TPC TOP OF PROTECTIVE CASING	[Symbol] BENTONITE SEAL																																																
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CONSTRUCTION LOG GSWA-SHC.GPJ MP MI.GDT 10/17/00



















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COMPLETION REPORT OF WELL No. MW-5d

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
					(See Page 1)	
				40		Bentonite Slurry (continued)
				45		
				50		
				55		
				60		
				65		
				70		
				75		
				80		
				85		

LEGEND

- | | | | |
|---|------------------------------|---|----------------------------------|
|  | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
|  | COARSE SAND | TRC | TOP OF RISER CASING |
|  | MEDIUM SAND | GS | GROUND SURFACE |
|  | FINE SAND | BS | BENTONITE SEAL |
|  | VERY FINE SAND | FP | FILTER PACK |
|  | SILT | TSC | TOP OF SCREEN |
|  | CLAY | BSC | BOTTOM OF SCREEN |
|  | GRAVELLY CLAY | TD | TOTAL DEPTH |
|  | ASPHALT |  | BENTONITE SEAL |
|  | TOPSOIL |  | CONCRETE |
|  | INTERBEDDED SAND, SILT, CLAY |  | FILTER PACK |
| | |  | THICK BENTONITE SLURRY GROUT |
| | |  | NATURAL COLLAPSE / SAND BACKFILL |

CONSTRUCTION LOG GSWA-SHC:GFJ MP MI.GDT 10/17/00



















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**COMPLETION REPORT OF
 WELL No. MW-5d**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
				95		Bentonite Slurry (continued)
				100		
				105		
				110		
				115		
				120		
				125		
				130		
				135		
				140		

LEGEND

- | | | | |
|---|------------------------------|---|----------------------------------|
|  | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
|  | COARSE SAND | TRC | TOP OF RISER CASING |
|  | MEDIUM SAND | GS | GROUND SURFACE |
|  | FINE SAND | BS | BENTONITE SEAL |
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|  | SILT | TSC | TOP OF SCREEN |
|  | CLAY | BSC | BOTTOM OF SCREEN |
|  | GRAVELLY CLAY | TD | TOTAL DEPTH |
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|  | TOPSOIL |  | CONCRETE |
|  | INTERBEDDED SAND, SILT, CLAY |  | FILTER PACK |
| | |  | THICK BENTONITE SLURRY GROUT |
| | |  | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. MW-5d**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	V.A.S.	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
							(See Page 1)
	145						Bentonite Slurry (continued)
	149.0				149.0	1000.40	
	150						K & E Well Gravel
	152.0				152.0	997.40	
	155						Natural Collapse
	158.0				158.0	991.40	
	160						Natural Collapse
	160.2				160.2	989.20	

LEGEND

- | | | | |
|--|------------------------------|-----|----------------------------------|
| | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| | COARSE SAND | TRC | TOP OF RISER CASING |
| | MEDIUM SAND | GS | GROUND SURFACE |
| | FINE SAND | BS | BENTONITE SEAL |
| | VERY FINE SAND | FP | FILTER PACK |
| | SILT | TSC | TOP OF SCREEN |
| | CLAY | BSC | BOTTOM OF SCREEN |
| | GRAVELLY CLAY | TD | TOTAL DEPTH |
| | ASPHALT | | BENTONITE SEAL |
| | TOPSOIL | | CONCRETE |
| | INTERBEDDED SAND, SILT, CLAY | | FILTER PACK |
| | | | THICK BENTONITE SLURRY GROUT |
| | | | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. MW-5d**

COMPLETION REPORT OF WELL No. MW-5i

PROJECT: **GSWA Spring Hill Camp**
 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**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS																																																																														
	DEPTH (ft.)	SYMBOL																																																																																		
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl	0	[Symbol]	[Diagram]	0.0	1148.75																																																																															
RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 90' bgl	2.0	[Symbol]	[Diagram]	2.0	1146.75	Concrete																																																																														
GROUT Type: Thick Bentonite Slurry Interval: 2' to 85' bgl	5	[Symbol]	[Diagram]			Bentonite Slurry																																																																														
SEAL Type: None Interval: None	10	[Symbol]	[Diagram]																																																																																	
SANDPACK Type: Filter Pack Sand Interval: 85' to 100' bgl	15	[Symbol]	[Diagram]																																																																																	
SCREEN Diameter: 2" Type: Slotted PVC Interval: 90' to 100' bgl	20	[Symbol]	[Diagram]																																																																																	
WELL DEVELOPMENT DATA DATE: 07/21/2000 METHOD: Air Sparging																																																																																				
LEGEND																																																																																				
<table border="0"> <tr><td>[Symbol]</td><td>GRAVELLY SAND</td></tr> <tr><td>[Symbol]</td><td>COARSE SAND</td></tr> <tr><td>[Symbol]</td><td>MEDIUM SAND</td></tr> <tr><td>[Symbol]</td><td>FINE SAND</td></tr> <tr><td>[Symbol]</td><td>VERY FINE SAND</td></tr> <tr><td>[Symbol]</td><td>SILT</td></tr> <tr><td>[Symbol]</td><td>CLAY</td></tr> <tr><td>[Symbol]</td><td>GRAVELLY CLAY</td></tr> <tr><td>[Symbol]</td><td>ASPHALT</td></tr> <tr><td>[Symbol]</td><td>TOPSOIL</td></tr> <tr><td>[Symbol]</td><td>INTERBEDDED SAND, SILT, CLAY</td></tr> </table>	[Symbol]	GRAVELLY SAND	[Symbol]	COARSE SAND	[Symbol]	MEDIUM SAND	[Symbol]	FINE SAND	[Symbol]	VERY FINE SAND	[Symbol]	SILT	[Symbol]	CLAY	[Symbol]	GRAVELLY CLAY	[Symbol]	ASPHALT	[Symbol]	TOPSOIL	[Symbol]	INTERBEDDED SAND, SILT, CLAY	<table border="0"> <tr><td>[Symbol]</td><td>TPC TOP OF PROTECTIVE CASING</td></tr> <tr><td>[Symbol]</td><td>TRC TOP OF RISER CASING</td></tr> <tr><td>[Symbol]</td><td>GS GROUND SURFACE</td></tr> <tr><td>[Symbol]</td><td>BS BENTONITE SEAL</td></tr> <tr><td>[Symbol]</td><td>FP FILTER PACK</td></tr> <tr><td>[Symbol]</td><td>TSC TOP OF SCREEN</td></tr> <tr><td>[Symbol]</td><td>BSC BOTTOM OF SCREEN</td></tr> <tr><td>[Symbol]</td><td>TD TOTAL DEPTH</td></tr> <tr><td>[Symbol]</td><td>BENTONITE SEAL</td></tr> <tr><td>[Symbol]</td><td>CONCRETE</td></tr> <tr><td>[Symbol]</td><td>FILTER PACK</td></tr> <tr><td>[Symbol]</td><td>THICK BENTONITE SLURRY GROUT</td></tr> <tr><td>[Symbol]</td><td>NATURAL COLLAPSE / SAND BACKFILL</td></tr> </table>	[Symbol]	TPC TOP OF PROTECTIVE CASING	[Symbol]	TRC TOP OF RISER CASING	[Symbol]	GS GROUND SURFACE	[Symbol]	BS BENTONITE SEAL	[Symbol]	FP FILTER PACK	[Symbol]	TSC TOP OF SCREEN	[Symbol]	BSC BOTTOM OF SCREEN	[Symbol]	TD TOTAL DEPTH	[Symbol]	BENTONITE SEAL	[Symbol]	CONCRETE	[Symbol]	FILTER PACK	[Symbol]	THICK BENTONITE SLURRY GROUT	[Symbol]	NATURAL COLLAPSE / SAND BACKFILL	<table border="0"> <tr><td style="text-align: center;">1147.09</td><td>TPC</td><td style="text-align: center;">1.66</td></tr> <tr><td style="text-align: center;">1147.09</td><td>TRC</td><td></td></tr> </table>	1147.09	TPC	1.66	1147.09	TRC		<table border="0"> <tr><td style="text-align: center;">1147.09</td><td>TPC</td><td style="text-align: center;">1.66</td></tr> <tr><td style="text-align: center;">1147.09</td><td>TRC</td><td></td></tr> </table>	1147.09	TPC	1.66	1147.09	TRC		<table border="0"> <tr><td style="text-align: center;">1147.09</td><td>TPC</td><td style="text-align: center;">1.66</td></tr> <tr><td style="text-align: center;">1147.09</td><td>TRC</td><td></td></tr> </table>	1147.09	TPC	1.66	1147.09	TRC		<table border="0"> <tr><td style="text-align: center;">1147.09</td><td>TPC</td><td style="text-align: center;">1.66</td></tr> <tr><td style="text-align: center;">1147.09</td><td>TRC</td><td></td></tr> </table>	1147.09	TPC	1.66	1147.09	TRC		<table border="0"> <tr><td style="text-align: center;">1147.09</td><td>TPC</td><td style="text-align: center;">1.66</td></tr> <tr><td style="text-align: center;">1147.09</td><td>TRC</td><td></td></tr> </table>	1147.09	TPC	1.66	1147.09	TRC	
[Symbol]	GRAVELLY SAND																																																																																			
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CONSTRUCTION LOG GSWA-SHC.GPJ MP MI.GDT 10/17/00



















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 Telephone: (517) 337-0111
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**COMPLETION REPORT OF
 WELL No. MW-5i**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
					(See Page 1)	
	40					Bentonite Slurry (continued)
	45					
	50					
	55					
	60					
	65					
	70					
	75					
	80					
	85			85.0	1063.75	Filtered Sand Pack

LEGEND

- | | | | |
|---|------------------------------|---|----------------------------------|
|  | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
|  | COARSE SAND | TRC | TOP OF RISER CASING |
|  | MEDIUM SAND | GS | GROUND SURFACE |
|  | FINE SAND | BS | BENTONITE SEAL |
|  | VERY FINE SAND | FP | FILTER PACK |
|  | SILT | TSC | TOP OF SCREEN |
|  | CLAY | BSC | BOTTOM OF SCREEN |
|  | GRAVELLY CLAY | TD | TOTAL DEPTH |
|  | ASPHALT |  | BENTONITE SEAL |
|  | TOPSOIL |  | CONCRETE |
|  | INTERBEDDED SAND, SILT, CLAY |  | FILTER PACK |
| | |  | THICK BENTONITE SLURRY GROUT |
| | |  | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. MW-5i**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	V.A.S.	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
					(See Page 1)		
	95						Filtered Sand Pack (continued)
	100				100.0	1048.75	

LEGEND

- | | | | |
|--|------------------------------|-----|----------------------------------|
| | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| | COARSE SAND | TRC | TOP OF RISER CASING |
| | MEDIUM SAND | GS | GROUND SURFACE |
| | FINE SAND | BS | BENTONITE SEAL |
| | VERY FINE SAND | FP | FILTER PACK |
| | SILT | TSC | TOP OF SCREEN |
| | CLAY | BSC | BOTTOM OF SCREEN |
| | GRAVELLY CLAY | TD | TOTAL DEPTH |
| | ASPHALT | | BENTONITE SEAL |
| | TOPSOIL | | CONCRETE |
| | INTERBEDDED SAND, SILT, CLAY | | FILTER PACK |
| | | | THICK BENTONITE SLURRY GROUT |
| | | | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. MW-5i**

COMPLETION REPORT OF WELL No. MW-6

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **43.97** ∇ _____ ∇ _____
 DATE: **10-12-00** _____
 TIME: **1245** _____

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**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	VAS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl	0	▲	▲	▲	0.0	GS	1142.44
RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 70' bgl	2.0	▲	▲	▲	2.0	GS	1140.44
GROUT Type: Thick bentonite slurry Interval: 2' to 64' bgl	5	▲	▲	▲	5	GS	1140.44
SEAL Type: None Interval: None	10	▲	▲	▲	10	GS	1140.44
SANDPACK Type: Natural Collapse Interval: 64' to 80' bgl	15	▲	▲	▲	15	GS	1140.44
SCREEN Diameter: 2" Type: Slotted PVC Interval: 70' to 80' bgl	20	▲	▲	▲	20	GS	1140.44
WELL DEVELOPMENT DATA DATE: 7/20/2000 METHOD: Air Sparging	25	▲	▲	▲	25	GS	1140.44
LEGEND	30	▲	▲	▲	30	GS	1140.44
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 TD TOTAL DEPTH	35	▲	▲	▲	35	GS	1140.44
BENTONITE SEAL CONCRETE FILTER PACK THICK BENTONITE SLURRY GROUT NATURAL COLLAPSE / SAND BACKFILL	40	▲	▲	▲	40	GS	1140.44
INTERBEDDED SAND, SILT, CLAY	45	▲	▲	▲	45	GS	1140.44

CONSTRUCTION LOG GSWA-SHC.GPJ MP 141 GDT 10/17/00



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**COMPLETION REPORT OF
 WELL No. MW-6**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	50					
	55					
	60					
	64.0			64.0	1078.44	
	65					Filtered Sand Pack
	70					
	75					
	80.0			80.0	1062.44	

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY
- 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
- TD TOTAL DEPTH
- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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



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**COMPLETION REPORT OF
 WELL No. MW-6**

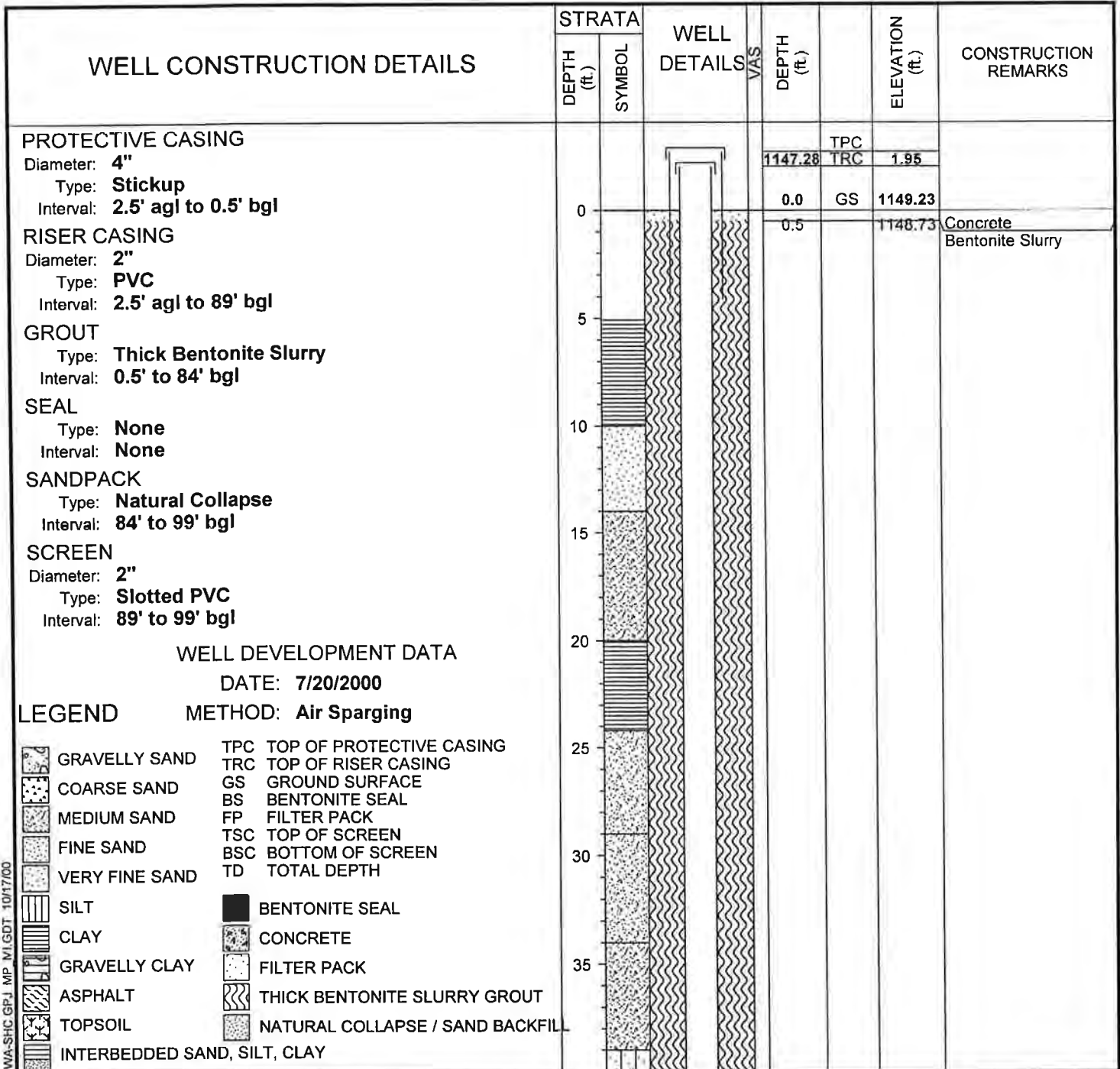
COMPLETION REPORT OF WELL No. MW-7

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **53.19** ∇ _____ ∇ _____
 DATE: **10-12-00** _____
 TIME: **1241** _____

DRILLING CONTRACTOR: **Stearns**
 DRILLING METHOD: **4 1/4" HSA**
 DATE COMPLETED: **July 18, 2000**

GROUND SURFACE ELEVATION: **1149.2**
 DATUM: **USGS**
 LOGGED BY: **Jeff Groncki**



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



























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**COMPLETION REPORT OF
 WELL No. MW-7**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	50					
	55					
	60					
	65					
	70					
	75					
	80					
	85			84.0	1065.23	Natural Collapse

LEGEND

-  GRAVELLY SAND
-  COARSE SAND
-  MEDIUM SAND
-  FINE SAND
-  VERY FINE SAND
-  SILT
-  CLAY
-  GRAVELLY CLAY
-  ASPHALT
-  TOPSOIL
-  INTERBEDDED SAND, SILT, CLAY
-  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
-  TD TOTAL DEPTH
-  BENTONITE SEAL
-  CONCRETE
-  FILTER PACK
-  THICK BENTONITE SLURRY GROUT
-  NATURAL COLLAPSE / SAND BACKFILL

CONSTRUCTION LOG GSWA-SHC.GPJ_MP_MI.GDT 10/17/00



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**COMPLETION REPORT OF
 WELL No. MW-7**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	V.A.S.	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
					(See Page 1)		
	95						Natural Collapse (continued)
	100				99.0	1050.23	
					101.0	1048.23	

LEGEND

- | | | | |
|--|------------------------------|-----|----------------------------------|
| | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| | COARSE SAND | TRC | TOP OF RISER CASING |
| | MEDIUM SAND | GS | GROUND SURFACE |
| | FINE SAND | BS | BENTONITE SEAL |
| | VERY FINE SAND | FP | FILTER PACK |
| | SILT | TSC | TOP OF SCREEN |
| | CLAY | BSC | BOTTOM OF SCREEN |
| | GRAVELLY CLAY | TD | TOTAL DEPTH |
| | ASPHALT | | BENTONITE SEAL |
| | TOPSOIL | | CONCRETE |
| | INTERBEDDED SAND, SILT, CLAY | | FILTER PACK |
| | | | THICK BENTONITE SLURRY GROUT |
| | | | NATURAL COLLAPSE / SAND BACKFILL |

CONSTRUCTION LOG GSWA-SHC.GPJ MP_ML.GDT 10/17/00



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**COMPLETION REPORT OF
 WELL No. MW-7**

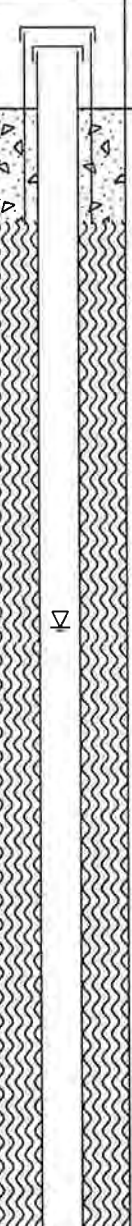
COMPLETION REPORT OF WELL No. MW-8

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **18.42** ∇ _____ ∇ _____
 DATE: **10-12-00** _____
 TIME: **1251** _____

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	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 3' agl to 2' bgl	0	[Symbol]		0.0	GS	1113.49
RISER CASING Diameter: 2" Type: PVC Interval: 2' agl to 75' bgl	4.0	[Symbol]		1110.52	TPC	2.96
GROUT Type: Thick bentonite slurry grout Interval: 4' to 68' bgl	5	[Symbol]	1109.49			Bentonite Slurry
SEAL Type: None Interval: None	10	[Symbol]				
SANDPACK Type: Natural Collapse Interval: 68' to 86' bgl	15	[Symbol]				
SCREEN Diameter: 2" Type: Slotted PVC Interval: 75' to 85' bgl	20	[Symbol]	∇			
WELL DEVELOPMENT DATA DATE: 7/19/2000 METHOD: Drillers pump	25	[Symbol]				
LEGEND	30	[Symbol]				
[Symbol] GRAVELLY SAND [Symbol] COARSE SAND [Symbol] MEDIUM SAND [Symbol] FINE SAND [Symbol] VERY FINE SAND [Symbol] SILT [Symbol] CLAY [Symbol] GRAVELLY CLAY [Symbol] ASPHALT [Symbol] TOPSOIL [Symbol] INTERBEDDED SAND, SILT, CLAY	35	[Symbol]				
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 TD TOTAL DEPTH [Symbol] BENTONITE SEAL [Symbol] CONCRETE [Symbol] FILTER PACK [Symbol] THICK BENTONITE SLURRY GROUT [Symbol] NATURAL COLLAPSE / SAND BACKFILL						

CONSTRUCTION LOG GSWA-SHC.GPJ MP_ML.GDT 10/17/00



























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 Telephone: (517) 337-0111
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**COMPLETION REPORT OF
 WELL No. MW-8**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	V.A.S.	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
					(See Page 1)		
	40						Bentonite Slurry (continued)
	45						
	50						
	55						
	60						
	65						
	68.0					1045.49	Natural Collapse
	70						
	75						
	80						
	85					1028.49	

LEGEND

-  GRAVELLY SAND
-  COARSE SAND
-  MEDIUM SAND
-  FINE SAND
-  VERY FINE SAND
-  SILT
-  CLAY
-  GRAVELLY CLAY
-  ASPHALT
-  TOPSOIL
-  INTERBEDDED SAND, SILT, CLAY
-  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
-  TD TOTAL DEPTH
-  BENTONITE SEAL
-  CONCRETE
-  FILTER PACK
-  THICK BENTONITE SLURRY GROUT
-  NATURAL COLLAPSE / SAND BACKFILL

CONSTRUCTION LOG: GSWA-SHC.GPJ MP: ALL.GDT: 10/17/00



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**COMPLETION REPORT OF
 WELL No. MW-8**

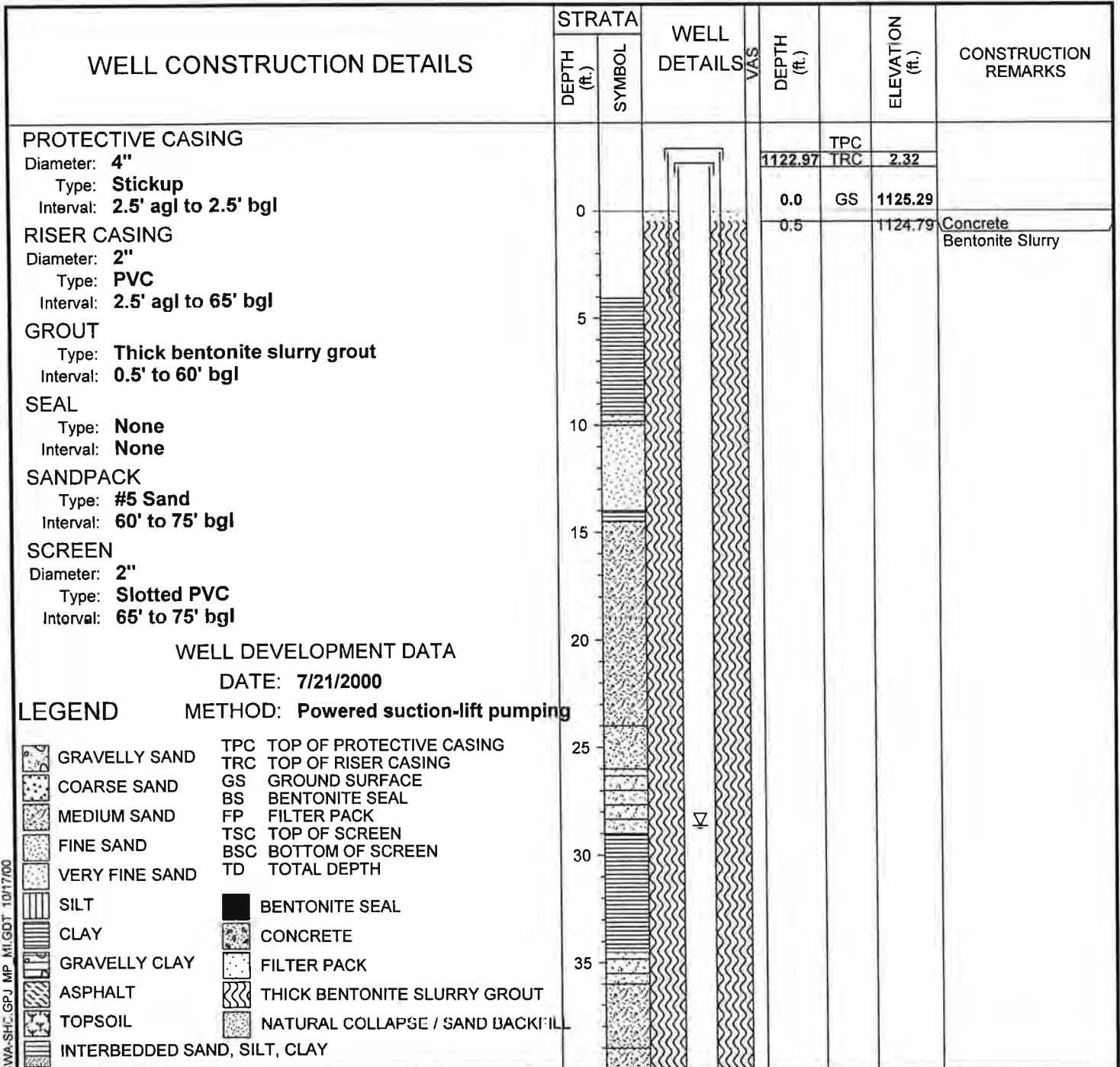
COMPLETION REPORT OF WELL No. MW-9

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**



CONSTRUCTION LOG GSWA-SHE.GPJ MP MI.GDT 10/17/00



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**COMPLETION REPORT OF
WELL No. MW-9**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	50					
	55					
	60			60.0	1065.29	Filtered Sand Pack
	65					
	70					
	75			75.0	1050.29	
				76.0	1049.29	Natural Collapse

LEGEND

- | | | | |
|--|------------------------------|-----|----------------------------------|
| | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| | COARSE SAND | TRC | TOP OF RISER CASING |
| | MEDIUM SAND | GS | GROUND SURFACE |
| | FINE SAND | BS | BENTONITE SEAL |
| | VERY FINE SAND | FP | FILTER PACK |
| | SILT | TSC | TOP OF SCREEN |
| | CLAY | BSC | BOTTOM OF SCREEN |
| | GRAVELLY CLAY | TD | TOTAL DEPTH |
| | ASPHALT | | BENTONITE SEAL |
| | TOPSOIL | | CONCRETE |
| | INTERBEDDED SAND, SILT, CLAY | | FILTER PACK |
| | | | THICK BENTONITE SLURRY GROUT |
| | | | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. MW-9**

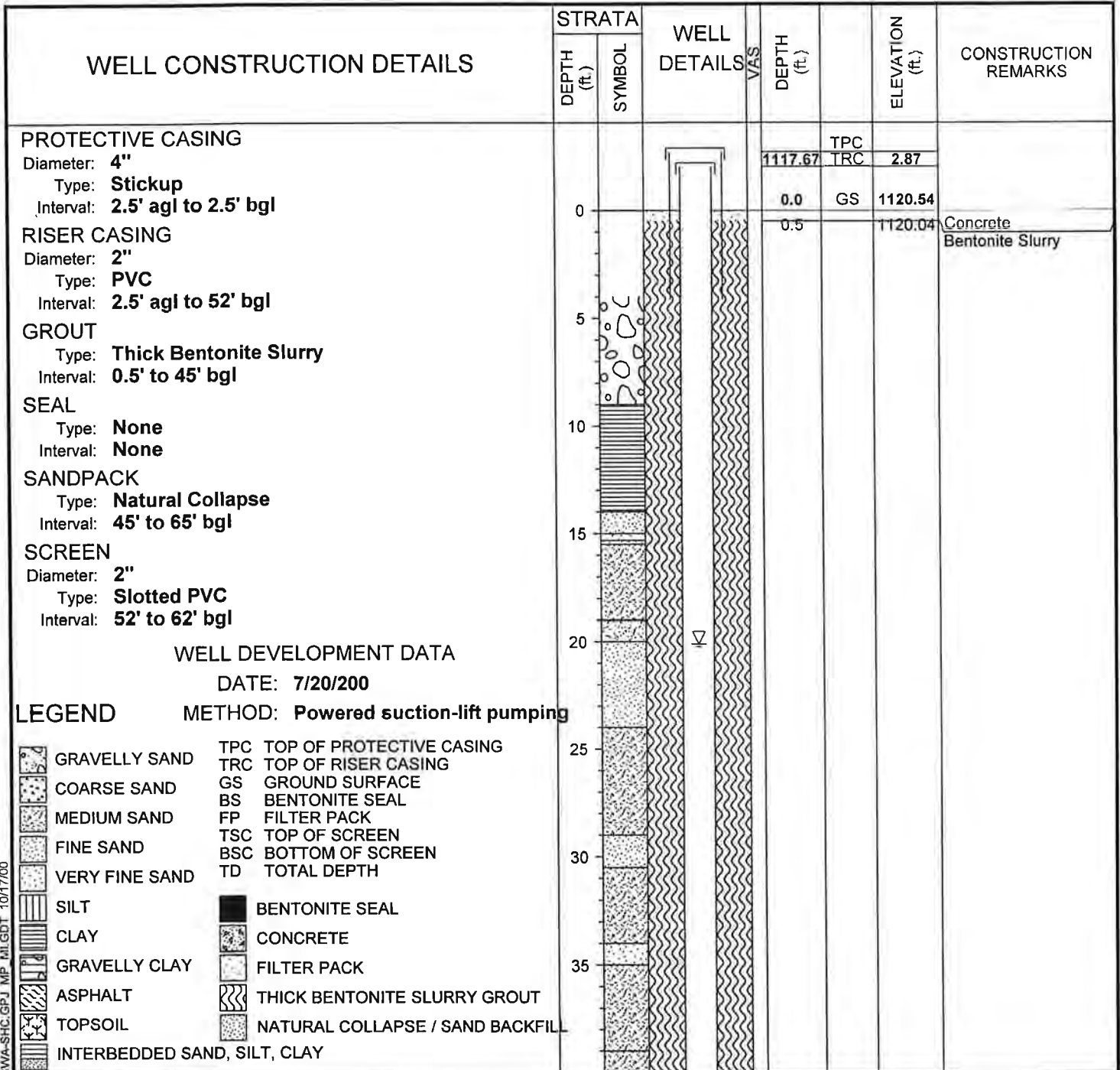
COMPLETION REPORT OF WELL No. MW-10

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**



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

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45			45.0	1075.54	Natural Collapse
	50					
	55					
	60			62.0	1058.54	Natural Collapse
	65			65.0	1055.54	

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY
- 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
- TD TOTAL DEPTH
- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

CONSTRUCTION LOG GSWA-SHC.GPJ MP ANI.GDT 10/17/00



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**COMPLETION REPORT OF
 WELL No. MW-10**

COMPLETION REPORT OF WELL No. MW-11

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **51.24** ∇ _____
 DATE: **10-12-00** _____
 TIME: **1307** _____

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	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl				TPC 1164.08 TRC 2.58	GS 1166.66	
RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 70' bgl	0			0.5	1166.16	Concrete Bentonite Slurry
GROUT Type: Thick Bentonite Slurry Interval: 0.5' to 65' bgl	5					
SEAL Type: None Interval: None	10					
SANDPACK Type: #5 Filter Pack Sand Interval: 65' to 80' bgl	15					
SCREEN Diameter: 2" Type: Slotted PVC Interval: 70' to 80' bgl	20					
WELL DEVELOPMENT DATA						
DATE: 8/7/2000						
LEGEND		METHOD: Submersible Grundfos Pump				
GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND SILT CLAY GRAVELLY CLAY ASPHALT TOPSOIL INTERBEDDED SAND, SILT, CLAY	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 TD TOTAL DEPTH BENTONITE SEAL CONCRETE FILTER PACK THICK BENTONITE SLURRY GROUT NATURAL COLLAPSE / SAND BACKFILL	25				
		30				
		35				

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



















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**COMPLETION REPORT OF
 WELL No. MW-11**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	50					
	55					
	60					
	65.0			65.0	1101.66	Filtered Sand Pack
	70					
	75					
	80			80.0	1086.66	Natural Collapse
				83.0	1083.66	

LEGEND

- | | | | |
|---|------------------------------|---|----------------------------------|
|  | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
|  | COARSE SAND | TRC | TOP OF RISER CASING |
|  | MEDIUM SAND | GS | GROUND SURFACE |
|  | FINE SAND | BS | BENTONITE SEAL |
|  | VERY FINE SAND | FP | FILTER PACK |
|  | SILT | TSC | TOP OF SCREEN |
|  | CLAY | BSC | BOTTOM OF SCREEN |
|  | GRAVELLY CLAY | TD | TOTAL DEPTH |
|  | ASPHALT |  | BENTONITE SEAL |
|  | TOPSOIL |  | CONCRETE |
|  | INTERBEDDED SAND, SILT, CLAY |  | FILTER PACK |
| | |  | THICK BENTONITE SLURRY GROUT |
| | |  | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. MW-11**

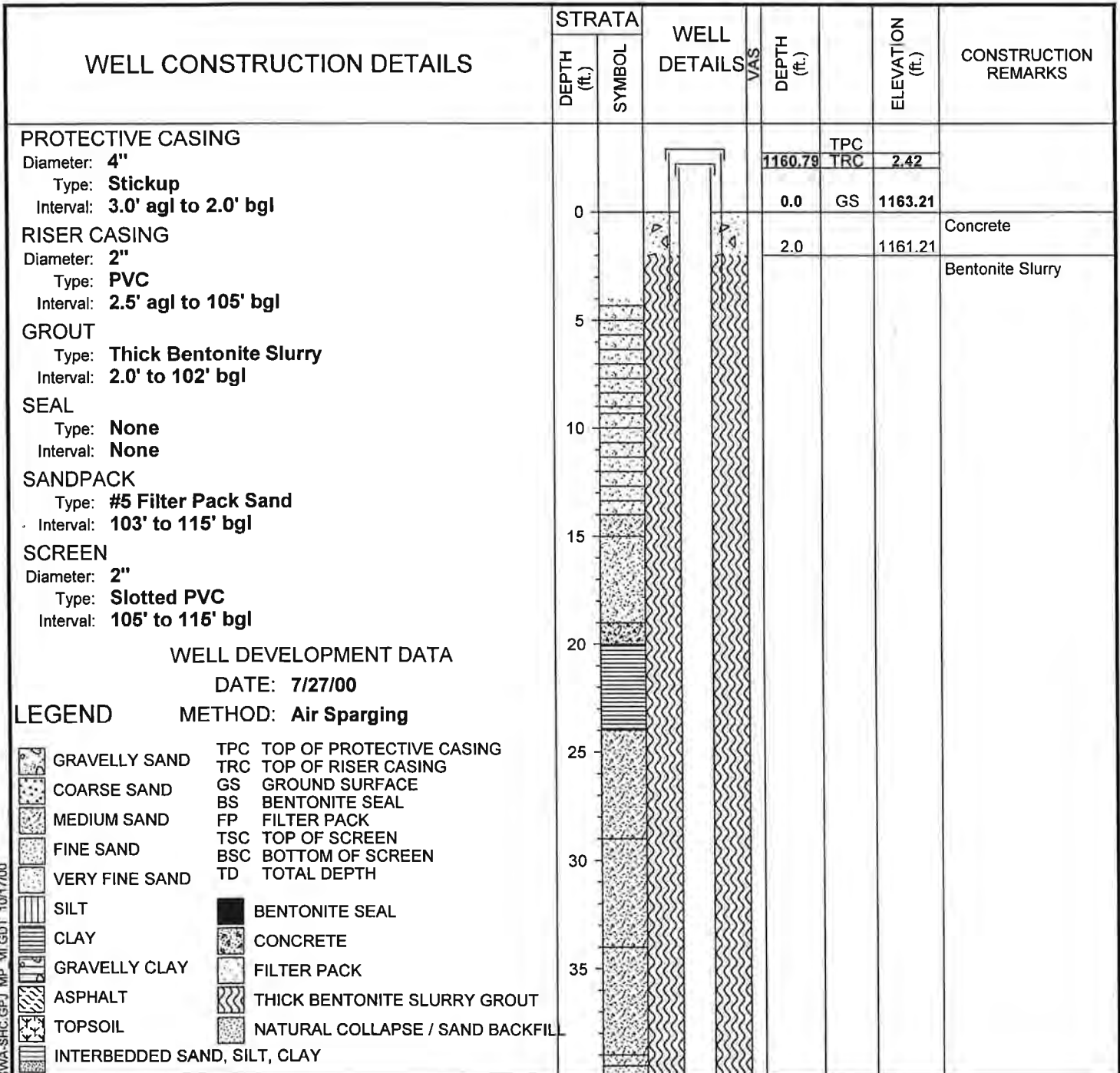
COMPLETION REPORT OF WELL No. MW-12d

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **46.33** ∇ _____ ∇ _____
 DATE: **10-12-00** _____
 TIME: **1316** _____

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**



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



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COMPLETION REPORT OF WELL No. MW-12d

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	50					
	55					
	60					
	65					
	70					
	75					
	80					
	85					

LEGEND

- | | | | |
|--|------------------------------|-----|----------------------------------|
| | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| | COARSE SAND | TRC | TOP OF RISER CASING |
| | MEDIUM SAND | GS | GROUND SURFACE |
| | FINE SAND | BS | BENTONITE SEAL |
| | VERY FINE SAND | FP | FILTER PACK |
| | SILT | TSC | TOP OF SCREEN |
| | CLAY | BSC | BOTTOM OF SCREEN |
| | GRAVELLY CLAY | TD | TOTAL DEPTH |
| | ASPHALT | | BENTONITE SEAL |
| | TOPSOIL | | CONCRETE |
| | INTERBEDDED SAND, SILT, CLAY | | FILTER PACK |
| | | | THICK BENTONITE SLURRY GROUT |
| | | | NATURAL COLLAPSE / SAND BACKFILL |

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



















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**COMPLETION REPORT OF
 WELL No. MW-12d**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
				(See Page 1)		
	95					Bentonite Slurry (continued)
	100			102.0	1061.21	
				103.0	1060.21	Natural Collapse
	105					Filtered Sand Pack
	110					
	115			115.0	1048.21	

LEGEND

	GRAVELLY SAND	TPC	TOP OF PROTECTIVE CASING
	COARSE SAND	TRC	TOP OF RISER CASING
	MEDIUM SAND	GS	GROUND SURFACE
	FINE SAND	BS	BENTONITE SEAL
	VERY FINE SAND	FP	FILTER PACK
	SILT	TSC	TOP OF SCREEN
	CLAY	BSC	BOTTOM OF SCREEN
	GRAVELLY CLAY	TD	TOTAL DEPTH
	ASPHALT		BENTONITE SEAL
	TOPSOIL		CONCRETE
	INTERBEDDED SAND, SILT, CLAY		FILTER PACK
			THICK BENTONITE SLURRY GROUT
			NATURAL COLLAPSE / SAND BACKFILL

CONSTRUCTION LOG GSWA-SHC-GPJ_MP_MI.GDT 10/17/00



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**COMPLETION REPORT OF
 WELL No. MW-12d**

COMPLETION REPORT OF WELL No. MW-12i

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **45.46** ∇ _____ ∇ _____
 DATE: **10-12-00** _____
 TIME: **1315** _____

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	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
PROTECTIVE CASING Diameter: 4" Type: Stickup Interval: 2.5' agl to 2.5' bgl	0	[Symbol]	[Diagram]	0.0	GS	Concrete
RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 52' bgl	2.0	[Symbol]	[Diagram]	2.0	1160.47	Bentonite Slurry
GROUT Type: Thick Bentonite Slurry Interval: 0.5' to 48' bgl	5	[Symbol]	[Diagram]			
SEAL Type: None Interval: None	10	[Symbol]	[Diagram]			
SANDPACK Type: Filter pack sand Interval: 48' to 62' bgl.	15	[Symbol]	[Diagram]			
SCREEN Diameter: 2" Type: Slotted PVC Interval: 52' to 62' bgl.	20	[Symbol]	[Diagram]			
WELL DEVELOPMENT DATA DATE: 8/8/2000 METHOD: Submersible Grundfos Pump	25	[Symbol]	[Diagram]			
LEGEND	30	[Symbol]	[Diagram]			
[Symbol] GRAVELLY SAND [Symbol] COARSE SAND [Symbol] MEDIUM SAND [Symbol] FINE SAND [Symbol] VERY FINE SAND [Symbol] SILT [Symbol] CLAY [Symbol] GRAVELLY CLAY [Symbol] ASPHALT [Symbol] TOPSOIL [Symbol] INTERBEDDED SAND, SILT, CLAY	35	[Symbol]	[Diagram]			
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 TD TOTAL DEPTH [Symbol] BENTONITE SEAL [Symbol] CONCRETE [Symbol] FILTER PACK [Symbol] THICK BENTONITE SLURRY GROUT [Symbol] NATURAL COLLAPSE / SAND BACKFILL				1160.15	TRC	2.32

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



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**COMPLETION REPORT OF
 WELL No. MW-12i**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	V.A.S.	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
							(See Page 1)
	40						Bentonite Slurry (continued)
	45						
	48.0				48.0	1114.47	Filtered Sand Pack
	50						
	52.0				52.0	1110.47	
	55						
	60						
	62.0				62.0	1100.47	

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY
- 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
- TD TOTAL DEPTH
- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

CONSTRUCTION LOG GSWA-SHC.GPJ MP M. GDT 10/17/00



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**COMPLETION REPORT OF
 WELL No. MW-12i**

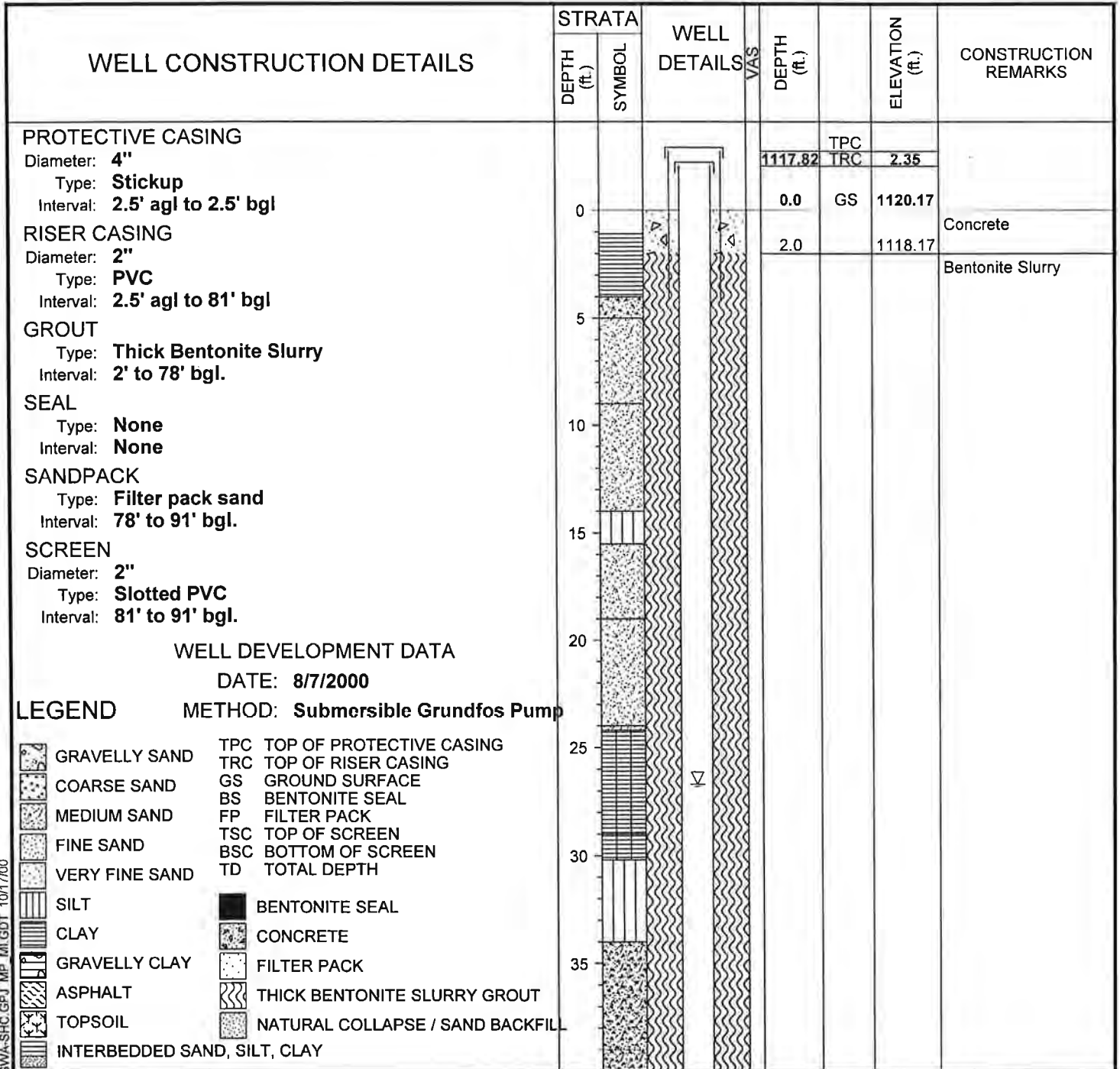
COMPLETION REPORT OF WELL No. MW-13

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **26.69** ∇ _____ ∇ _____
 DATE: **10-12-00** _____
 TIME: **1325** _____

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**



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



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COMPLETION REPORT OF WELL No. MW-13

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	50					
	55					
	60					
	65					
	70					
	75					
	78.0			78.0	1042.17	Filtered Sand Pack
	80					
	85					

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY
- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL
- 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
- TD TOTAL DEPTH

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



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**COMPLETION REPORT OF
 WELL No. MW-13**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	91.0			91.0	1029.17	Natural Collapse
	95					
	100					
	105					
	110					
	113.0			113.0	1007.17	

LEGEND

- | | | | |
|--|------------------------------|-----|----------------------------------|
| | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| | COARSE SAND | TRC | TOP OF RISER CASING |
| | MEDIUM SAND | GS | GROUND SURFACE |
| | FINE SAND | BS | BENTONITE SEAL |
| | VERY FINE SAND | FP | FILTER PACK |
| | SILT | TSC | TOP OF SCREEN |
| | CLAY | BSC | BOTTOM OF SCREEN |
| | GRAVELLY CLAY | TD | TOTAL DEPTH |
| | ASPHALT | | BENTONITE SEAL |
| | TOPSOIL | | CONCRETE |
| | INTERBEDDED SAND, SILT, CLAY | | FILTER PACK |
| | | | THICK BENTONITE SLURRY GROUT |
| | | | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. MW-13**

COMPLETION REPORT OF WELL No. TW-1

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **5.55** ∇ _____ ∇ _____
 DATE: **10-12-00** _____
 TIME: **1235** _____

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**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS																																																	
	DEPTH (ft.)	SYMBOL																																																					
PROTECTIVE CASING Diameter: 12" Type: Stickup Interval: 2.5' agl to 2.5' bgl	0	[Symbol]		0.0	1097.36	Concrete Bentonite Slurry Filtered Sand Pack																																																	
RISER CASING Diameter: 6" Type: PVC Interval: 2.5' agl to 35' bgl	3.0	[Symbol]																																																					
GROUT Type: Thick bentonite slurry grout Interval: 3' to 30' bgl	5	[Symbol]																																																					
SEAL Type: None Interval: None	10	[Symbol]																																																					
SANDPACK Type: K&E Well Gravel #5 Interval: 30' to 85' bgl	15	[Symbol]																																																					
SCREEN Diameter: 6" Type: PVC 20(35'-75') continuous wound & 30(75'-85') slot. Interval: 35' to 85' bgl	20	[Symbol]																																																					
WELL DEVELOPMENT DATA DATE: 07/06/2000 METHOD: Drillers pump			25	30.0	1067.36																																																		
LEGEND			30																																																				
<table style="width: 100%; border: none;"> <tr> <td style="width: 20px; text-align: center;">[Symbol]</td> <td>GRAVELLY SAND</td> <td style="width: 20px; text-align: center;">[Symbol]</td> <td>TPC TOP OF PROTECTIVE CASING</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>COARSE SAND</td> <td style="text-align: center;">[Symbol]</td> <td>TRC TOP OF RISER CASING</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>MEDIUM SAND</td> <td style="text-align: center;">[Symbol]</td> <td>GS GROUND SURFACE</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>FINE SAND</td> <td style="text-align: center;">[Symbol]</td> <td>BS BENTONITE SEAL</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>VERY FINE SAND</td> <td style="text-align: center;">[Symbol]</td> <td>FP FILTER PACK</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>SILT</td> <td style="text-align: center;">[Symbol]</td> <td>TSC TOP OF SCREEN</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>CLAY</td> <td style="text-align: center;">[Symbol]</td> <td>BSC BOTTOM OF SCREEN</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>GRAVELLY CLAY</td> <td style="text-align: center;">[Symbol]</td> <td>TD TOTAL DEPTH</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>ASPHALT</td> <td style="text-align: center;">[Symbol]</td> <td></td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>TOPSOIL</td> <td style="text-align: center;">[Symbol]</td> <td></td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>INTERBEDDED SAND, SILT, CLAY</td> <td style="text-align: center;">[Symbol]</td> <td></td> </tr> </table>	[Symbol]	GRAVELLY SAND	[Symbol]	TPC TOP OF PROTECTIVE CASING	[Symbol]	COARSE SAND	[Symbol]	TRC TOP OF RISER CASING	[Symbol]	MEDIUM SAND	[Symbol]	GS GROUND SURFACE	[Symbol]	FINE SAND	[Symbol]	BS BENTONITE SEAL	[Symbol]	VERY FINE SAND	[Symbol]	FP FILTER PACK	[Symbol]	SILT	[Symbol]	TSC TOP OF SCREEN	[Symbol]	CLAY	[Symbol]	BSC BOTTOM OF SCREEN	[Symbol]	GRAVELLY CLAY	[Symbol]	TD TOTAL DEPTH	[Symbol]	ASPHALT	[Symbol]		[Symbol]	TOPSOIL	[Symbol]		[Symbol]	INTERBEDDED SAND, SILT, CLAY	[Symbol]		<table style="width: 100%; border: none;"> <tr> <td style="width: 20px; text-align: center;">[Symbol]</td> <td>BENTONITE SEAL</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>CONCRETE</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>FILTER PACK</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>THICK BENTONITE SLURRY GROUT</td> </tr> <tr> <td style="text-align: center;">[Symbol]</td> <td>NATURAL COLLAPSE / SAND BACKFILL</td> </tr> </table>	[Symbol]	BENTONITE SEAL	[Symbol]	CONCRETE	[Symbol]	FILTER PACK	[Symbol]	THICK BENTONITE SLURRY GROUT	[Symbol]	NATURAL COLLAPSE / SAND BACKFILL
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CONSTRUCTION LOG GSWA-SHC.GPJ MP_MLGD.T 10/17/00



























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

COMPLETION REPORT OF WELL No. TW-1

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
					(See Page 1)	
	40					Filtered Sand Pack (continued)
	45					
	50					
	55					
	60					
	65					
	70					
	75					
	80					
	85			85.0	1012.36	

LEGEND

-  GRAVELLY SAND
-  COARSE SAND
-  MEDIUM SAND
-  FINE SAND
-  VERY FINE SAND
-  SILT
-  CLAY
-  GRAVELLY CLAY
-  ASPHALT
-  TOPSOIL
-  INTERBEDDED SAND, SILT, CLAY
-  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
-  TD TOTAL DEPTH
-  BENTONITE SEAL
-  CONCRETE
-  FILTER PACK
-  THICK BENTONITE SLURRY GROUT
-  NATURAL COLLAPSE / SAND BACKFILL

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



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**COMPLETION REPORT OF
 WELL No. TW-1**

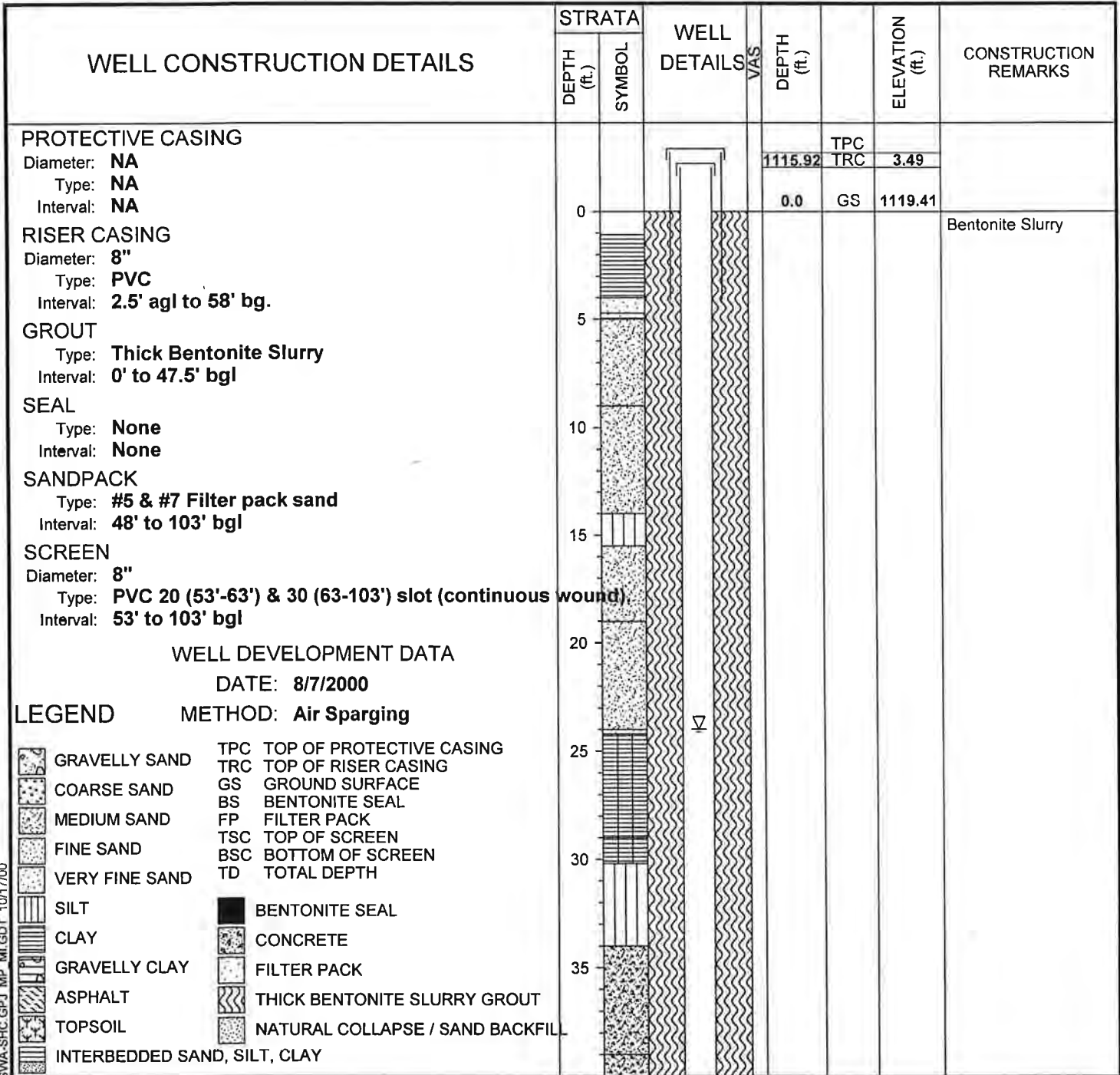
COMPLETION REPORT OF WELL No. TW-2

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **24.00** ∇ _____ ∇ _____
 DATE: **10-12-00** _____
 TIME: **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**



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



















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**COMPLETION REPORT OF
 WELL No. TW-2**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	47.5			47.5	1071.91	
	48.0			48.0	1071.41	Natural Collapse Filtered Sand Pack
	50					
	55					
	60					
	65					
	70					
	75					
	80					
	85					

LEGEND

- | | | | |
|---|------------------------------|---|----------------------------------|
|  | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
|  | COARSE SAND | TRC | TOP OF RISER CASING |
|  | MEDIUM SAND | GS | GROUND SURFACE |
|  | FINE SAND | BS | BENTONITE SEAL |
|  | VERY FINE SAND | FP | FILTER PACK |
|  | SILT | TSC | TOP OF SCREEN |
|  | CLAY | BSC | BOTTOM OF SCREEN |
|  | GRAVELLY CLAY | TD | TOTAL DEPTH |
|  | ASPHALT |  | BENTONITE SEAL |
|  | TOPSOIL |  | CONCRETE |
|  | INTERBEDDED SAND, SILT, CLAY |  | FILTER PACK |
| | |  | THICK BENTONITE SLURRY GROUT |
| | |  | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. TW-2**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	V.A.S.	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL					
							(See Page 1)
	95						Filtered Sand Pack (continued)
	100				103.0	1016.41	

LEGEND

- | | | | |
|--|------------------------------|------------------------------|----------------------------------|
| | GRAVELLY SAND | TPC TOP OF PROTECTIVE CASING | |
| | COARSE SAND | TRC TOP OF RISER CASING | |
| | MEDIUM SAND | GS GROUND SURFACE | |
| | FINE SAND | BS BENTONITE SEAL | |
| | VERY FINE SAND | FP FILTER PACK | |
| | SILT | TSC TOP OF SCREEN | |
| | CLAY | BSC BOTTOM OF SCREEN | |
| | GRAVELLY CLAY | TD TOTAL DEPTH | |
| | ASPHALT | | BENTONITE SEAL |
| | TOPSOIL | | CONCRETE |
| | INTERBEDDED SAND, SILT, CLAY | | FILTER PACK |
| | | | THICK BENTONITE SLURRY GROUT |
| | | | NATURAL COLLAPSE / SAND BACKFILL |

CONSTRUCTION LOG GSWA-SHC.GPJ_MP_MI.GDT 10/17/00

COMPLETION REPORT OF WELL No. TW-3

PROJECT: **GSWA Spring Hill Camp**
 PROJECT NO: **4065-001**
 PROJECT LOCATION: **Osceola, MI**

WATER LEVEL: ∇ **52.78** ∇ _____ ∇ _____
 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	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS																																																									
	DEPTH (ft.)	SYMBOL																																																													
PROTECTIVE CASING Diameter: NA Type: NA Interval: NA			VAS		TPC 1145.75 TRC 2.82																																																										
RISER CASING Diameter: 8" Type: PVC Interval: 2.5' agl to 82' bgl	0	▲	▲	0.0	GS 1148.57	Concrete																																																									
GROUT Type: Thick Bentonite Slurry Interval: 0' to 74' bgl	5	▲	▲	2.0	1146.57	Bentonite Slurry																																																									
SEAL Type: None Interval: None	10	▲	▲																																																												
SANDPACK Type: Global Filter Pack Sand Interval: 74' to 122' bgl	15	▲	▲																																																												
SCREEN Diameter: 8" Type: PVC 20 (82'-92') & 30 (92'-122') slot (continuous wound) Interval: 82' to 122' bgl	20	▲	▲																																																												
WELL DEVELOPMENT DATA DATE: 8/2/2000 METHOD: Air Sparging																																																															
LEGEND																																																															
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CONSTRUCTION LOG GSWA-SHC.GPJ MP MI.GDT 10/17/00



























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**COMPLETION REPORT OF
 WELL No. TW-3**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
						(See Page 1)
	40					Bentonite Slurry (continued)
	45					
	50					
	55					
	60					
	65					
	70					
	75			74.0	1074.57	Filtered Sand Pack
	80					
	85					

LEGEND

-  GRAVELLY SAND
-  COARSE SAND
-  MEDIUM SAND
-  FINE SAND
-  VERY FINE SAND
-  SILT
-  CLAY
-  GRAVELLY CLAY
-  ASPHALT
-  TOPSOIL
-  INTERBEDDED SAND, SILT, CLAY
-  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
-  TD TOTAL DEPTH
-  BENTONITE SEAL
-  CONCRETE
-  FILTER PACK
-  THICK BENTONITE SLURRY GROUT
-  NATURAL COLLAPSE / SAND BACKFILL

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



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**COMPLETION REPORT OF
 WELL No. TW-3**

WELL CONSTRUCTION DETAILS	STRATA		WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	DEPTH (ft.)	SYMBOL				
				(See Page 1)		
	95	[Symbol]	[Symbol]			Filtered Sand Pack (continued)
	100	[Symbol]	[Symbol]			
	105	[Symbol]	[Symbol]			
	110	[Symbol]	[Symbol]			
	115	[Symbol]	[Symbol]			
	120	[Symbol]	[Symbol]			
				122.2	1026.37	

LEGEND

- | | | | |
|----------|------------------------------|----------|----------------------------------|
| [Symbol] | GRAVELLY SAND | TPC | TOP OF PROTECTIVE CASING |
| [Symbol] | COARSE SAND | TRC | TOP OF RISER CASING |
| [Symbol] | MEDIUM SAND | GS | GROUND SURFACE |
| [Symbol] | FINE SAND | BS | BENTONITE SEAL |
| [Symbol] | VERY FINE SAND | FP | FILTER PACK |
| [Symbol] | SILT | TSC | TOP OF SCREEN |
| [Symbol] | CLAY | BSC | BOTTOM OF SCREEN |
| [Symbol] | GRAVELLY CLAY | TD | TOTAL DEPTH |
| [Symbol] | ASPHALT | [Symbol] | BENTONITE SEAL |
| [Symbol] | TOPSOIL | [Symbol] | CONCRETE |
| [Symbol] | INTERBEDDED SAND, SILT, CLAY | [Symbol] | FILTER PACK |
| | | [Symbol] | THICK BENTONITE SLURRY GROUT |
| | | [Symbol] | NATURAL COLLAPSE / SAND BACKFILL |

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



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**COMPLETION REPORT OF
 WELL No. TW-3**

MALCOLM PIRNIE

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BORING NO. **MW-1s** SHEET 1 OF 1
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **M.B. & J.H.**

COORDINATES **N 227,267.5 E 1,746,801.7**

SURFACE ELEVATION **1097.16** DATUM **USGS**


DRILLING CONTRACTOR
NA
DRILLING METHOD EQUIPMENT
Hand Auger Auger
DRILLING STARTED ENDED
6/29/00 6/29/00

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Rec-covery %	VAS	PID (ppm)					
5								Brown loam (TOPSOIL). Red, MEDIUM TO FINE SAND, little silt.	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.	1097.16
								Light brown, FINE TO MEDIUM SAND, little silt, moist.	SM		1096.16
							Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.	SM	1094.16		
							Light brown, FINE TO MEDIUM SAND, little fine to medium gravel, little silt, poorly sorted, round and spherical, loose.	SP	1089.16		
										End of boring - 8.4' bgl.	1093.16



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BORING NO. **MW-1d** SHEET **1 OF 3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Ken Ewers**

COORDINATES **N 227,272.7 E 1,746,801.0**

SURFACE ELEVATION **1097.66** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
 DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 1050**
 DRILLING STARTED **6/26/00** ENDED **6/27/00**

LOCATION DESCRIPTION:

 See Report Figures for Locations

STRATA KEY

SAND	SILT
CLAY	PEAT
GRAVEL	FILL

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	PID (ppm)					
0-5		Hand Auger					Brown loam (TOPSOIL). Red, MEDIUM TO FINE SAND, little silt.	SM	Hand auger to 8' bgl to clear utilities.	1097.66
5-9.6							Light brown, FINE TO MEDIUM SAND, little silt, moist.	SM		1096.66
9.6-9.9							Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.	SM		1094.66
9.9-10.0										1093.66
10-12.5		SSS	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
12.5-15		SSS	3-6 10-11	95			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
15-18							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
18-22.75		SSS	1-0 1-6	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 of medium sand with little silt at 23.5'.	SM	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1075.16
22.75-26		SSS	1-1 8-6	100			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
26-35							Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose, wet.	SP	Granite fragments.	1064.66
35-38		SSS	3-0 3-5	75			Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, few medium angular gravel, subrounded, spherical to elongate, loose, wet.	SP		1064.16
38-40		SSS	2-4 8-10	75			Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is	SP		1060.66

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



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BORING NO. **MW-1d** SHEET **2 OF 3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Ken Ewers**

COORDINATES **N 227,272.7 E 1,746,801.0**

SURFACE ELEVATION **1097.66** DATUM **USGS**

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	PID (ppm)					
45		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)	SP	Outwash or glaciofluvial.	1054.16	
						Buff, MEDIUM SAND, few fine sand, round and spherical, poorly sorted, loose, wet.	SP		1053.16	
50		SSS	5-6 6-3	60		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.	SP	Outwash or glaciofluvial.	1049.66	
55		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.	1044.66	
60		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		1039.66	
65		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.	1034.66	
70		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.	1029.66	
75		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.	1024.66	
80		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		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.	1014.66	
90		SSS	5-15 20-27	90		Buff, FINE SAND, round and spherical, well sorted, loose, medium density, wet.	SP	Possible till at 89' bgl.	1009.66	
						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

BORING LOG GSWA-SHC.GFJ_MP_ML.GDT 10/17/00



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BORING NO. **MW-1d** SHEET **3** OF **3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO **4065-001**
 LOGGED BY **Ken Ewers**

COORDINATES **N 227,272.7 E 1,746,801.0**

SURFACE ELEVATION **1097.66** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Rec-covery %	VAS	PID (ppm)					
95		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.	1004.66	
100		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.	1000.66	
105		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.	994.56	
110		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.	989.66	
115		SSS	6-5 29-52	95			Buff, MEDIUM TO COARSE SAND, little fine sand, trace fine gravel, subrounded and subspherical, poorly sorted, loose, wet.	SP		984.66	
							Gray, SILT, little medium sand, dense, moist.	SM	End of boring - 115' bgl.	983.16	

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BORING NO. **MW-1i** SHEET **1** OF **1**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Ken Ewers**

COORDINATES **N 227,278.5 E 1,746,804.4**

SURFACE ELEVATION **1098.39** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 1050**
DRILLING STARTED **6/26/00** ENDED **6/27/00**










LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND  SILT
 CLAY  PEAT
 GRAVEL  FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet	
5								Brown loam (TOPSOIL). Red, medium to fine SAND, little silt.	SM	Stratigraphic information taken from MW-1d boring log. MW-1i drilled approx. 10' from MW-1d.	1098.39	
									SM		1097.39	
									Light brown, fine to medium SAND, little silt, moist.		SM	1095.39
									Light brown, fine to medium SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.		SM	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, 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.	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 medium sand with little silt at 23.5'.	SM	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1075.89	
30								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.	SP	Granite fragments.	1065.39	
								Buff, medium to coarse SAND, few fine to medium gravel, few medium angular	SP		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

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

COORDINATES **N 227,226.8 E 1,746,937.5**
SURFACE ELEVATION **1101.70** DATUM **USGS**

DRILLING CONTRACTOR Stearns DRILLING METHOD 4 1/4" HSA EQUIPMENT CME 1050 DRILLING STARTED 6/27/00 ENDED 6/27/00	LOCATION DESCRIPTION: <p style="text-align: center; font-size: 1.2em;">See Report Figures for Locations</p>
STRATA KEY SAND SILT CLAY PEAT GRAVEL FILL	

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	PID (ppm)					
		Hand Auger				Dark brown, loamy TOPSOIL (silty sand).	SM		1101.70	
						Red, medium SAND, some silt, few clay, round and spherical, poorly sorted, loose, moist.	SM		1099.90	
5						Medium brown, medium SAND, some silt, little clay, round and spherical, poorly sorted, loose, moist.	SP		1098.20	
						Red, CLAY, some silt, few fine sand, medium plasticity, moist.	CL		1096.90	
						Buff, fine to medium SAND, little silt, few clay, round and spherical, loose, moist.	SP		1096.70	
10		SSS	2-1 1-0	100		Red, CLAY, some medium sand, little silt, low to medium plasticity, soft, very moist.	CL	Not similar to clay at MW-1.	1093.60	
						Buff, fine to medium SAND, some fine sand, few coarse sand, trace fine gravel, very rounded and spherical, loose, wet.	SP		1092.20	
15		SSS	2-2 3-3	50		Buff, fine to very fine SAND, some fine sand, trace silt and fine gravel, rounded and spherical, loose, wet.	SP		1087.70	
						Buff to gray, CLAY, some fine sand, low plasticity, soft, wet.	CL	Clay/Sand contact at 18' inferred from cuttings and driller's comments.	1085.80	
20		SSS	2-2 3-2	50		Buff, medium to coarse SAND, some fine sand, little coarse sand, few silt, angular to round and subspherical to spherical, poorly sorted, loose, wet.	SP	Gravelly 22-24' bgl per driller.	1083.70	
25		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		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		1072.70	
35		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	
			5-7							

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



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BORING NO. **MW-2** SHEET **2 OF 3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **K.E. & J.H.**

COORDINATES **N 227,226.8 E 1,746,937.5**

SURFACE ELEVATION **1101.70** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet	
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)						
		SSS	12-10	0				SP				
		SSS	4-7 11-13	50				Buff, fine to medium SAND, trace fine gravel, rounded to subrounded, loose, wet.	SP	Bailed approx. 0.5' heave from augers.		1060.70
45		SSS	2-6 11-12	50				Buff, fine to medium SAND, trace fine gravel, rounded, loose, wet.	SP			1057.70
50		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.		1052.70
55		SSS	4-9 15-16	60				Buff, medium SAND, trace fine sand, fine to medium rounded gravel, rounded to subrounded, loose, wet.	SP			1047.70
60		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.		1042.70
65		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			1037.70
70		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			1032.70
75		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.		1027.70
80		SSS	7-17 18-25	100				Buff, fine to medium SAND, medium density, loose. Buff, clayey SAND, (fine to medium sand, little clay).	SP SP			1022.70 1021.20
85		SSS	6-15 23-26	80				Buff, medium SAND, rounded to subrounded, trace fine sand, medium density.	SP			1017.70
90		SSS	2-8 19-27	60				Buff, medium SAND, trace fine sand, rounded to subrounded, loose to medium density.	SP			1012.70

BORING LOG GSWA-SHC.GFJ MP.ML.GDT 10/17/00



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BORING NO. **MW-2** SHEET **3** OF **3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **K.E. & J.H.**

COORDINATES **N 227,226.8 E 1,746,937.5**
 SURFACE ELEVATION **1101.70** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID (ppm)					
95		SSS	2-7 14-20	80			[Patterned Box]	Buff, fine to medium SAND, rounded to subrounded, loose to medium density.	SP		1007.70
100		SSS	4-8 18-19	80				Buff, fine to medium SAND, rounded to subrounded, loose to medium density.	SP	End of boring - 101' bgl.	1002.70

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

COORDINATES **N 227,144.9 E 1,746,836.6**

SURFACE ELEVATION **1107.00** DATUM **USGS**

DRILLING CONTRACTOR

Stearns

DRILLING METHOD EQUIPMENT

4 1/4" HSA CME 1050

DRILLING STARTED ENDED

6/28/00 6/28/00

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								TOPSOIL.	SM		1107.00
								Medium reddish brown, SANDY CLAY, slightly moist.	CL		1106.50
5		AUG						Light brown FINE TO COARSE SAND.	SP		1104.00
10		SSS	5-5 4-4	100				Buff, interbedded lenses of fine to coarse SAND, with lenses of buff sandy clay and clayey sand.	SP		1099.00
15		SSS	2-3 6-7	100				Medium buff, clayey SAND/sandy CLAY, soft, damp, could roll to about 5", trace fine rounded gravel,	SC		1094.00
20		SSS	5-6 4-4	100				Medium buff, clayey SAND, hard, damp to moist, (till?).	SC		1089.00
25		SSS	2-3 4-4	80				Medium buff, clayey SAND, hard, damp to moist, stringers of medium to coarse saturated sand	SC		1084.00
30		SSS	3-3 4-4	100				Medium gray, clayey SAND, hard, damp, trace fine rounded gravel, (till?).	SC		1079.00
35		SSS	5-7 7-8	100				Medium gray, clayey SAND, hard, damp, trace fine rounded gravel, (till?).	SC		1074.00
		SSS	5-9 10-12	100				Medium gray, clayey SAND, hard, damp, trace fine rounded gravel, (till?).	SC		1069.00



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BORING NO. **MW-3** SHEET **2 OF 3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Ken Ewers**

COORDINATES **N 227,144.9 E 1,746,836.6**

SURFACE ELEVATION **1107.00** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
							Buff, clayey fine to medium SAND, soft, trace gravel.		Rock wedged in tip of 43-45' sample.	1067.00	
45		SSS	6-4 4-4	10				SC			
50		SSS	1-2 2-2	100			Buff, clayey fine to medium SAND, soft, few rounded gravel, saturated.		40-50' sample is much softer than 43-45' sample.	1059.00	
55		SSS	1-2 1-6	100			Buff, clayey fine to medium SAND, soft, few rounded gravel, saturated.			1054.00	
60		SSS	1-1 1-1	20			Buff, medium SAND, loose, trace fine and coarse sand, trace fine rounded gravel, rounded to subrounded, saturated.			1049.00	
65		SSS	1-1 3-2	100			Buff, medium SAND, loose, trace fine and coarse sand, trace clay, rounded to subrounded, saturated.			1044.00	
70		SSS	1-1 2-2	100			Buff, fine to medium SAND, trace coarse sand and fine gravel, loose, rounded to subrounded, saturated.			1039.00	
75		SSS	1-4 2-7	40			Buff, medium SAND, trace fine and coarse sand, loose, rounded to subrounded, saturated.			1034.00	
80		SSS	3-3 4-5	90			Buff, fine to medium SAND, loose, saturated, trace coarse sand and silt, trace fine gravel.			1029.00	
85		SSS	1-2 2-3	100			Buff, medium SAND, loose, rounded to subrounded, saturated, with lenses of fine and coarse sand.			1024.00	
							Coarse to very coarse SAND, fine to medium gravel, little medium sand.			1022.50	
90		SSS	2-2 2-3	100			Buff, fine to medium SAND, loose, rounded to subrounded, saturated, trace coarse sand.			1019.00	

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



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BORING NO. **MW-3** SHEET **3** OF **3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Ken Ewers**

COORDINATES **N 227,144.9 E 1,746,836.6**

SURFACE ELEVATION **1107.00** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet	
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)						
95		SSS	6-7 7-9	100				Buff, fine to medium SAND, loose, rounded to subrounded, saturated, trace coarse sand. (continued)	SP			
100		SSS	5-6 7-9	100				Mix of coarse SAND and fine GRAVEL seams in fine to medium sand, very saturated, trace clay.	SP			1009.00
		SSS	6-9 13-15	50				Gray, fine SAND, hard, few clay and silt (till?). Gray, fine to medium SAND, medium hardness, silt, clay till.	SP	End of boring - 102' bgl.		1007.00



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BORING NO. **MW-4s** SHEET 1 OF 1
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **M.B. & J.H.**

COORDINATES **N 227,190.7 E 1,746,649.2**

SURFACE ELEVATION **1090.06** DATUM **USGS**

DRILLING CONTRACTOR
NA
 DRILLING METHOD **Hand Auger** EQUIPMENT **Auger**
 DRILLING STARTED **6/29/00** ENDED **6/29/00**

LOCATION DESCRIPTION:

 See Report Figures for Locations

STRATA KEY

- SAND
- CLAY
- GRAVEL
- SILT
- PEAT
- FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Rec- overy %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
5								Dark yellow to brown, TOPSOIL, clayey sand, moist.	SP	Stratigraphic information taken from MW-4d boring log. MW-4s drilled approx. 10' from MW-4d. End of boring - 8.7' bgl.	1090.06
							Buff, medium SAND, rounded to subrounded, moist to wet, trace fine sand.	SP	1088.06		
								Buff, medium SAND, rounded to subrounded, moist to wet, trace fine sand.	SP		1086.06

BORING LOG GSWA-SHC.GPJ_MP_MI.GDT 10/18/00

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BORING NO. **MW-4d**

SHEET **1** OF **2**

PROJECT **GSWA Spring Hill Camp**

LOCATION **Osceola, MI**

PROJECT NO. **4065-001**

LOGGED BY **Joel Henry**

COORDINATES **N 227,193.5 E 1,746,646.7**

SURFACE ELEVATION **1089.51** DATUM **USGS**

DRILLING CONTRACTOR

Stearns

DRILLING METHOD EQUIPMENT

4 1/4" HSA CME 1050

DRILLING STARTED ENDED

6/29/00 6/29/00

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Rec-covery %	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		Hand Auger					Dark yellow to brown, TOPSOIL, clayey sand, moist.	SP		1089.51
							Buff, medium SAND, rounded to subrounded, moist to wet, trace fine sand.	SP		1087.51
5		SSS	4-4 2-2	80			Buff, medium SAND, rounded to subrounded, moist to wet, trace fine sand.	SP		1085.51
10		SSS	1-1 1-2	40			Buff, fine to medium SAND, rounded to subrounded, loose, saturated, trace rounded coarse sand, trace clay.	SP		1080.51
15		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		1075.51
20		SSS	4-7 8-8	60			Light buff, sandy CLAY, hard, moist, few subrounded to subangular fine to medium gravel.	CL		1070.51
25		SSS	2-2 3-4	50			Buff, fine to coarse SAND, loose, saturated, few fine to medium subrounded gravel, trace clay (gravelly sand).	SP		1065.51
30		SSS	3-5 4-5	60			Buff, medium to coarse SAND, loose, saturated, little fine to coarse rounded to subrounded gravel.	SP ML		1060.51 1059.51
		SSS	1-1 1-1	50			Light buff, sandy SILT, soft, saturated, trace fine angular to subangular gravel.	SC		1058.51
35		SSS	1-1 2-2	90			Light buff, silty clayey fine to medium SAND, very soft, moist to wet, trace subrounded to subangular gravel.	SC		1055.51
			1-1				Light buff, silty clayey fine to medium SAND, firm, moist to wet, trace gravel.	SC		

BORING LOG GSWA-SHC.GPJ_MP_ML.GDT 10/17/00



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BORING NO. **MW-4d** SHEET **2 OF 2**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Joel Henry**

COORDINATES **N 227,193.5 E 1,746,646.7**

SURFACE ELEVATION **1089.51** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
		SSS	2-3	100			Light buff, silty clayey fine to medium SAND, firm, moist to wet, trace gravel. (continued)	SC			
45		SSS	1-1 1-1	50			Light buff, silty clayey fine to medium SAND, loose, rounded to subrounded, saturated.	SC		1045.51	
50		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		1040.51	
55		SSS	1-1 3-3	75			Light buff, silty clayey fine to medium SAND, soft, saturated.	SC		1035.51	
60		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		1030.51	
65		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		1025.51 1023.81	
70		SSS	2-3 4-5	70			Light buff, silty clayey fine to medium SAND, saturated.	SC		1020.51	
75		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		1015.51	
80		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		1010.51	
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 subangular gravel.	SP SP		1005.51 1005.01	
		SSS	4-10 17-22	60			Medium gray to brown, fine to medium SAND, silt (till?), identical to unit encountered at 100' at MW-3.	CL	Driller felt till at 86' bgl.	1003.51	
90		SSS		100			Medium gray, clay TILL, very firm, moist.	CL	End of boring - 91' bgl.	1000.51	

BORING LOG GSWA-SHC.GPJ_MP_MI.GDT 10/17/00

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BORING NO. **MW-5d** SHEET **1 OF 4**

PROJECT **GSWA Spring Hill Camp**

LOCATION **Osceola, MI**

PROJECT NO. **4065-001**

LOGGED BY **Joel Henry**

COORDINATES **N 227,283.9 E 1,747,399.4**

SURFACE ELEVATION **1149.40** DATUM **USGS**

DRILLING CONTRACTOR

Stearns

DRILLING METHOD EQUIPMENT

4 1/4" HSA CME 95

DRILLING STARTED ENDED

7/18/00 7/19/00

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

	SAND		SILT
	CLAY		PEAT
	GRAVEL		FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
5		SSS	3-4 4-6	100				Medium brown SANDY CLAY, soft, damp to dry.	CL		1146.40
								Interbedded medium brown SANDY CLAY with light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.	CL		1144.90
10		SSS	19-20 12-4	25				Medium brown SANDY CLAY.	CL	Drove rock.	1141.40
								Light buff, dry, loose, FINE TO MEDIUM SAND, subangular to subrounded.	SP		1141.20
15		SSS	2-3 4-4	100				Dry, loose, light buff, MEDIUM SAND, trace fine sand, subrounded.	SP		1136.40
20		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		SSS	2-2 4-6	60				Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.	SP		1126.40
30		SSS	14-9 11-15	100				Saturated medium dense light yellow brown SANDY SILT.	SM/ML		1121.40
								Dry hard medium yellow brown SILTY/SANDY CLAY.	CL		1120.40
35		SSS	4-8 10-14	100				Dry/damp, hard medium grey CLAY, trace silt partings.	CL		1116.40
								Color change to light yellow brown SILTY CLAY, dry and hard.	CL	Felt lithology change at 36' bgl.	1114.90
								Saturated, light yellow brown, soft, SILT AND CLAY. Water may have entered spoon from	CL		1111.40
		SSS	1-8 12-16	40					SP	Water may have entered spoon from	1110.40

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

COORDINATES **N 227,283.9 E 1,747,399.4**

SURFACE ELEVATION **1149.40** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Flow Counts (300 lb. Hammer)	Rec- overy %	VAS	PID (ppm)					
							perched zone.			perched zone.	
							Dry light buff loose MEDIUM SAND, trace fine sand. (continued)	SP			
45		SSS	2-5 7-10	60			Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.	SP			1106.40
50		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			1101.40
55		SSS	0-0 1-1	50			Saturated, loose light yellow brown MEDIUM TO FINE SAND, trace medium rounded gravel.	SP			1096.40
							Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC			1095.90
60		SSS	2-3 5-5	80			Saturated, loose light yellow brown MEDIUM TO COARSE, trace fine sand, trace gravel.	SP GP			1091.40
							Saturated loose subangular to subrounded FINE TO COARSE GRAVEL.	GP			1090.90
		SSS	4-70/6"	40			Mixed FINE TO MEDIUM GRAVEL AND FINE TO MEDIUM SAND, saturated. May be slough. Poor recovery, seemed to be pushing a cobble.	GP			1089.40
		SSS	9-14 19-22	100			Saturated light yellow brown FINE TO MEDIUM SAND with some fine subangular to subrounded gravel.	SP			1087.40
65		SSS	2-4 11-14	50			Moist medium yellow brown FINE SAND AND SILT, firm.	ML			1086.40
							Saturated light yellow brown, FINE TO MEDIUM SAND trace silt.	SP			1085.90
70		SSS	2-4 5-5	60			Saturated light yellow brown, FINE TO MEDIUM SAND, trace silt, subangular to subrounded.	SP			1080.90
							Saturated light yellow MEDIUM TO FINE SAND, rounded to subrounded.				
		SSS	0-1 6-10	60			Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay.				1076.40
							Saturated light yellow brown MEDIUM TO FINE SAND, trace fine to medium subrounded gravel.	SP			
80		SSS 78-80 Grain size analysis	4-11 18-26	100			Saturated light yellow brown MEDIUM TO FINE SAND.	SP			1071.40
							Saturated light yellow brown SILT, some fine to medium sand.	ML			1070.40
85		SSS 83-85 Grain size analysis	1-2 4-6	100			Saturated light yellow brown FINE TO MEDIUM SAND, trace to few silt, trace clay.				1066.40
							Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.	SP			1061.40

COORDINATES **N 227,283.9 E 1,747,399.4**

SURFACE ELEVATION **1149.40** DATUM **USGS**

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)					
95		SSS 93-95 Grain size analysis	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). <i>(continued)</i>	SP		1056.40
100		SSS	3-5 7-10	40			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		1051.40 1050.90
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' bgl.	SW		1046.40
110		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		SSS	2-3 6-10	100			Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand.	SP		1036.40
120		SSS 18-120 Grain size analysis	1-2 3-5	100			Saturated, loose, light yellow brown MEDIUM SAND, trace fine gravel.	SP		1031.40
125		SSS	2-4 8-20	3100			Saturated, light yellow brown FINE TO COARSE SAND, interbedded lenses. Medium grey fine to very fine SILTY SAND, trace clay. Saturated, loose.	SW SM		1026.40 1024.90
130		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		SSS	0-0 0-2	100			Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, trace coarse sand, rounded and subrounded. Moist moderate grey CLAY, sandy/silty clay (till?)	SP CL	No change felt in drilling.	1016.40 1014.60
140		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		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



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BORING NO. **MW-5d** SHEET **4 OF 4**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Joel Henry**

COORDINATES **N 227,283.9 E 1,747,399.4**
 SURFACE ELEVATION **1149.40** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
150		SSS	4-8 13-18	100			Wet moderate grey CLAY with little to some medium to coarse sand (sandy clay), firm.	CL	Drilling behavior reflects that forward on alternates between hard and soft zones.	1001.40	
							Saturated light yellow brown loose MEDIUM TO COARSE SAND interbedded with sandy silt lenses.	SP		999.90	
155		SSS	5-12 15-20	100			Saturated light yellow brown loose MEDIUM TO COARSE SAND, trace to few silt and clay.	SP		996.40	
160		SSS	3-6 11	100			Saturated light yellow brown loose MEDIUM SAND trace fine and coarse sand, trace clay toward bottom.	SP		991.40	
							Hard moist SANDY CLAY at 160.2 ft. bgl.	CL	End of boring - 160.2' bgl.	989.40	

COORDINATES **N 227,274.3 E 1,747,404.0**

SURFACE ELEVATION **1148.75** DATUM **USGS**

DRILLING CONTRACTOR

Stearns

DRILLING METHOD EQUIPMENT

4 1/4" HSA CME 95

DRILLING STARTED ENDED

7/18/00 7/20/00














LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
5								Medium brown SANDY CLAY, soft, damp to dry.	CL	Stratigraphic information taken from MW-5d boring log. MW-5i drilled approx. 10' from MW-5d.	1145.75
								Interbedded medium brown SANDY CLAY with light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.	CL		1144.25
10								Medium brown SANDY CLAY.	CL	Over rock.	1140.75
								Light buff, dry, loose, FINE TO MEDIUM SAND, subangular to subrounded.	SP		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		1130.75
25								Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.	SP		1125.75
30								Saturated medium dense light yellow brown SANDY SILT.	SM/ML		1120.75
								Dry hard medium yellow brown SILTY/SANDY CLAY.	CL		1119.75
35								Dry/damp, hard medium grey CLAY, trace silt partings.	CL	Felt lithology change at 36' bgl.	1115.75
								Color change to light yellow brown SILTY CLAY, dry and hard.	CL		1114.25
								Saturated, light yellow brown, soft, SILT AND CLAY. Water may have entered spoon from	CL	Water may have entered spoon from	1110.75
									SP		1109.75

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



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BORING NO. **MW-5i** SHEET **2 OF 3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **40G5-001**
 LOGGED BY **Joel Henry**

COORDINATES **N 227,274.3 E 1,747,404.0**

SURFACE ELEVATION **1148.75** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
							perched zone.			perched zone.	
							Dry light buff loose MEDIUM SAND, trace fine sand. (continued)	SP			
45							Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.	SP			1105.75
50							Dry, loose, light buff MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, one fine to medium gravel stringer @ 48.5'.	SP			1100.75
55							Saturated, loose light yellow brown MEDIUM TO FINE SAND, trace medium rounded gravel.	SP			1095.75
							Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC			1095.25
60							Saturated, loose light yellow brown MEDIUM TO COARSE, trace fine sand, trace gravel.	SP			1090.75
							Saturated loose subangular to subrounded FINE TO COARSE GRAVEL.	GP			1090.25
							Mixed FINE TO MEDIUM GRAVEL AND FINE TO MEDIUM SAND, saturated. May be slough. Poor recovery, seemed to be pushing a cobble.	GP			1088.75
							Saturated light yellow brown FINE TO MEDIUM SAND with some fine subangular to subrounded gravel.	SP			1086.75
65							Moist medium yellow brown FINE SAND AND SILT, firm.	ML			1085.75
							Saturated light yellow brown, FINE TO MEDIUM SAND trace silt.	SP			1085.25
70							Saturated light yellow brown, FINE TO MEDIUM SAND, trace silt, subangular to subrounded.	SP			1080.75
							Saturated light yellow MEDIUM TO FINE SAND, rounded to subrounded.	SP			1080.25
							Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay.				1075.75
75							Saturated light yellow brown MEDIUM TO FINE SAND, trace fine to medium subrounded gravel.	SP			
80							Saturated light yellow brown MEDIUM TO FINE SAND.	SP			1070.75
							Saturated light yellow brown SILT, some fine to medium sand.	ML			1069.75
85							Saturated light yellow brown FINE TO MEDIUM SAND, trace to few silt, trace clay.	SP			1065.75
90							Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.	SP			1060.75

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

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BORING NO. **MW-5i** SHEET **3 OF 3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO **4065-001**
 LOGGED BY **Joel Henry**

COORDINATES **N 227,274.3 E 1,747,404.0**

SURFACE ELEVATION **1148.75** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID (ppm)					
95								Saturated light yellow brown MEDIUM TO COARSE SAND, little to some fine subangular to subrounded gravel, trace clay (gravelly sand). <i>(continued)</i>	SP		1055.75
100								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	End of boring - 100' bgl.	1050.75 1050.25

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BORING NO. **MW-6** SHEET 1 OF 2
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

COORDINATES **N 227,522.4 E 1,747,396.4**
SURFACE ELEVATION **1142.44** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 95**
DRILLING STARTED **7/17/00** ENDED **7/17/00**

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	PID (ppm)					
5		SSS	3-5 5-6	80		Saturated yellow brown medium Sand, trace fine sand.	SP		1139.44	
10		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 CL		1134.94 1133.44	
15		SSS	4-9 14-19	100		Dry medium grey brown Clay, trace fine sand, very stiff.	CL		1129.94	
20		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.	1124.94	
25		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.	SM		1119.94	
30		SSS	9-16 24-26	90						
35		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		1109.94	
		SSS	6-13 18-19	70		Damp, light yellow grown fine to medium Sand, trace silt, rounded and subrounded, loose.	SM		1104.94	

BORING LOG GSWA-SHC.GPJ MP_MILGDT 10/17/00



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BORING NO. **MW-6** SHEET **2 OF 2**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Joel Henry**

COORDINATES **N 227,522.4 E 1,747,396.4**

SURFACE ELEVATION **1142.44** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
							Damp, light yellow brown fine to medium Sand, trace silt, rounded and subrounded, loose. (continued)	SM			
45		SSS	4-7 14-18	60			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			1099.94
50		SSS	1-7 12-12	80			Saturated light yellow brown fine to medium Sand, rounded and subrounded, trace silt.	SM			1094.94
55		SSS	3-5 10-14	100			Saturated light yellow brown fine to medium Sand, increase percentage of silt and clay.	SM			1089.94
							Saturated light yellow brown silt.	ML			1088.44
							Moderate grey brown Silt, clay in tip of spoon.	ML			1087.54
60		SSS	1-3 7-7	100			Saturated light yellow brown medium to fine Sand, rounded and subrounded.	SP			1084.94
							Saturated light yellow brown fine to very fine Sand, silt, trace clay.	SP			1083.44
65		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			1079.94
70		SSS	2-2 6-6	100			Saturated light yellow brown fine to medium Sand, rounded and subrounded, trace clay.	SP			1074.94
75		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			1069.94
80		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.		1064.94

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

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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
4 1/4" HSA CME 1050
DRILLING STARTED ENDED
7/18/00 7/19/00

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
5		SSS	2-3 4-4	75			Brown, stiff CLAY, dry-moist.	CL		1144.23	
10		SSS	4-7 9-10	40			Light brown FINE TO VERY FINE SAND, with trace medium to coarse sand, dry.	SP		1139.23	
15		SSS	4-6 10-10	75			Light brown, medium SAND, large to medium gravel, coarse sand, dry.	SP		1135.23	
20		SSS	2-4 8-9	80			Brown, stiff to very stiff CLAY, dry.	CL		1129.23	
25		SSS	5-7 12-13	60			Light brown, medium to fine SAND, some medium to fine gravel, little coarse gravel.	SP		1125.03	
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		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	
			7-12					SM		1110.23	

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

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BORING NO. **MW-7**

SHEET **2** 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**

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Rec- overy %	PID (ppm)					
		SSS	28-26	90			Brown clay 2", Light brown, fine silty sand 2", Light brown very FINE SAND, very dry. (continued)	SM		
45		SSS	7-12 17-45	90			Brown clay 2", Light brown, fine silty sand 2", Light brown very FINE SAND, very dry.	SM		1105.23
50		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.	1100.23
55		SSS	7-14 15-18	90			Brown FINE CLAYEY SAND, wet.	SC		1095.23
							Brown CLAY, wet, trace fine sand.	CL		1094.23
							Light brown FINE SAND, brown wet clay with little fine to very fine sand.	SP	Wet at 59' bgl.	1093.73
60		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		1090.23
		SSS	3-4 7-9	100			FINE GRAVEL, with some medium gravel and coarse sand.	GP	Sand bailed auger.	1088.23
65		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.	1085.23
70		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.	1080.23
75		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.	1075.23
80		SSS	8-21 18-23	90			Brown CLAYEY SAND, with coarse gravel.	SC	Driller comment: Easier drilling 83-84' bgl.	1069.23
85		SSS	4-7 14-20	80			Light brown MEDIUM SAND, with little to some coarse sand. 3/4" brown clay with some fine sand approx 86 ft. bgl. Light brown MEDIUM TO COARSE SAND, trace fine to medium gravel.	SP SP		1065.23 1063.73
90		SSS	6-11 13-15	80			Light brown MEDIUM SAND, little to some coarse sand. Light brown COARSE SAND, with some fine gravel and trace medium gravel and medium sand.	SP SP	Sand bailed auger.	1060.23 1058.73

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



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BORING NO. **MW-7** SHEET **3 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**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
95		SSS	12-16 27-0	50			Light brown MEDIUM TO COARSE SAND, with 2" fine to medium gravel.	SP	Sand balled auger.	1055.23	
							Brown CLAY, alternating with gravel.	CL		1053.73	
100		SSS	5-11 32-0				Light brown MEDIUM SAND, with some fine to coarse sand, trace fine gravel.	SP	End of boring - 101' bgl.	1050.23	

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BORING NO. **MW-8** SHEET **1 OF 2**

PROJECT **GSWA Spring Hill Camp**

LOCATION **Osceola, MI**

PROJECT NO. **4065-001**

LOGGED BY **Joel Henry**

COORDINATES **N 227,562.3 E 1,746,466.4**

SURFACE ELEVATION **1113.49** DATUM **USGS**

DRILLING CONTRACTOR

Stearns

DRILLING METHOD EQUIPMENT

4 1/4" HSA CME 95

DRILLING STARTED ENDED

7/18/00 7/18/00











LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Rec- overy %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		AUG						Topsoil.	SP-SM		1113.49
5		SSS	2-2 1-2	60				Dry, medium orange-brown, MEDIUM SAND, trace fine sand, subangular to subrounded, loose.	SP		1110.49
10		SSS	3-5 8-10	80				Dry, loose, light brown, FINE TO MEDIUM SAND, subrounded.	SP		1105.49
								Silty, very firm, dry SANDY CLAY.	CL		1103.49
15		SSS	3-6 10-12	100				SANDY CLAY, stiff, very firm, dry.	CL	Felt lithology change @ 17 ft. bgl.	1100.49
20		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		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		SSS	3-3 5-8	50				Saturated, light yellow brown, MEDIUM SAND, rounded to subrounded, trace fine sand.	SP		1085.49
35		SSS	4-9 12-13	100				Saturated, light yellow brown, MEDIUM TO FINE SAND, rounded to subrounded.	SP		1080.49
								Saturated, light yellow brown SILT, few fine to very fine sand.	ML		1079.49
		SSS	6-3 6-10	100					SP		1075.49

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



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BORING NO. **MW-8** SHEET **2 OF 2**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Joel Henry**

COORDINATES **N 227,562.3 E 1,746,466.4**

SURFACE ELEVATION **1113.49** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
							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		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 SM		1070.49 1069.49	
50		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		1065.49	
55		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 in fine to medium sand.	SP SP		1060.49 1059.49	
60		SSS	5-11 13-17	100			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		1055.49 1054.49	
65		SSS	1-2 4-8	100			Saturated light yellow brown MEDIUM SAND, trace fine sand, trace coarse sand.	SP	Felt lithology change at 62.5' bgl.	1050.99	
65							Saturated light yellow brown FINE TO VERY FINE SAND and silt.	SM		1048.99	
70		SSS	1-3 3-6	100			Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace coarse sand, loose.	SP		1045.49	
75		SSS	1-3 4-6	90			Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, loose.	SP		1040.49	
80		SSS	2-3 5-7	40			Saturated light yellow brown MEDIUM SAND, trace fine sand, rounded and subrounded, loose.	SP		1035.49	
85		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	

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

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BORING NO. **MW-9**

SHEET **1** OF **2**

PROJECT **GSWA Spring Hill Camp**

LOCATION **Osceola, MI**

PROJECT NO. **4065-001**

LOGGED BY **Jeff Groncki**

COORDINATES **N 227,063.9 E 1,747,879.5**

SURFACE ELEVATION **1125.29** DATUM **USGS**

DRILLING CONTRACTOR

Stearns

DRILLING METHOD EQUIPMENT

4 1/4" HSA CME 1050

DRILLING STARTED ENDED

7/19/00 7/20/00











LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

	SAND		SILT
	CLAY		PEAT
	GRAVEL		FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Rec. overy %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
5		SSS	1-1 3-2	50				Brown stiff CLAY, saturated/moist	CL		1121.29
10		SSS	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 SP		1115.79 1115.29
15		SSS	4-8 8-10	50				Brown soft CLAY, saturated/moist. Light brown MEDIUM SAND, with some fine to medium gravel.	CL SP		1111.29 1110.79
20		SSS	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		SSS	2-2 2-4	75				Light brown FINE TO MEDIUM SAND, wet at 25'.	SP		1101.29
								Light brown CLAYEY SAND, trace medium gravel.	SC		1099.29
30		SSS	2-2 3-4	100				Brown CLAY with little to some medium sand, trace fine gravel, moist.	CL		1096.29
35		SSS	3-7 14-17	100				Brown FINE CLAYEY SAND, interbedded with silty layers, wet at 35' bgl.	SC-SM		1090.79
								Light brown MEDIUM SAND, with some coarse sand.	SP		1089.29
			1-6						SP		1086.29

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



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BORING NO. **MW-9** SHEET **2 OF 2**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Jeff Groncki**

COORDINATES **N 227,063.9 E 1,747,879.5**

SURFACE ELEVATION **1125.29** DATUM **USGS**

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	PID (ppm)					
		SSS	9-10	90			SP			
45		SSS	5-5 7-11	80			Light brown MEDIUM SAND, with some coarse sand, trace fine gravel.	SP		1081.29
50		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		1076.29
55		SSS	7-12 18-19	100			Brown CLAY.	CL		1070.29
							Light brown MEDIUM TO FINE CLAYEY SAND.	SC		1069.99
60		SSS	8-9 13-7	100			Light brown MEDIUM SAND, with little fine sand, becoming clayey toward 60 ft. bgl.	SC		1066.29
							Light brown MEDIUM SAND with some coarse sand, becoming clayey toward 61 ft. bgl.	SC		1065.29
65		SSS	1-3 4-11	90			Light brown MEDIUM SAND, with little to some coarse sand and fine gravel.	SP		1061.29
70		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		1056.29	
75		SSS	3-6 11-24	90		Light brown MEDIUM SAND, with some coarse sand, some medium gravel, few iron oxide stained laminations, some medium to fine gravel lenses.	SP		1051.29	
						Brownish gray SILTY CLAY.	CL	End of boring - 76' bgl	1050.49	

BORING LOG GSWA-SHC GP. MP_ML.GDT 1c/17/00

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BORING NO. **MW-10** SHEET 1 OF 2
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Jeff Groncki**

COORDINATES **N 227,478.6 E 1,747,980.1**

SURFACE ELEVATION **1120.54** DATUM **USGS**

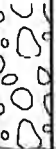









DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 1050**
DRILLING STARTED **7/18/00** ENDED **7/18/00**

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	PID (ppm)					
5		SSS	2-4 2-2	30			Medium to coarse GRAVEL, with some light brown medium to coarse sand, dry.	GP		1116.54
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		1111.54
15		SSS	1-2 4-7	60			Light brown fine SAND.	SP		1106.54
15							1/8" brown clay seam underlain by light brown, clayey FINE SAND.	SC		1105.54
15							Light brown medium SAND, with some iron oxide stained laminations, moist to dry.	SP		1105.04
20		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		1101.54 1100.54
25		SSS	3-12 10-13	40			Light brown, MEDIUM SAND, with trace to little fine sand, wet.	SP		1096.54
30		SSS	11-10 16-24	100			Light brown FINE SAND, with some medium to coarse sand seams, with trace to little fine grave. Light brown MEDIUM SAND.	SP SP		1091.54 1090.04
35		SSS	2-4 9-17	100			Light brown VERY FINE to FINE SAND. Light brown MEDIUM SAND, with little to some coarse sand.	SP SP		1086.54 1085.54
			3-7					SP		1081.54

BORING LOG GSWA-SHC.GFJ_MP_MI.GDT 10/17/00



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BORING NO. **MW-10** SHEET **2 OF 2**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Jeff Groncki**

COORDINATES **N 227,478.6 E 1,747,980.1**

SURFACE ELEVATION **1120.54** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
		SSS	13-17	100			Light brown MEDIUM SAND, with some fine sand and trace to little coarse sand. (continued)	SP			
45		SSS	2-6 10-16	70			Light brown FINE to MEDIUM SAND, with some coarse sand. One inch silty layer, then light brown FINE to MEDIUM SAND, with some coarse sand and iron oxide colored laminations.	SP SP			1076.54 1075.54
50		SSS	3-6 12-16	90			Light brown MEDIUM SAND. Light brown FINE SAND, with some medium sand and clay. Light brown MEDIUM to COARSE SAND, with some medium to coarse gravel.	SP SP SP			1071.54 1070.54 1070.24
55		SSS	4-9 16-19	90			Light brown MEDIUM SAND, with some coarse sand and fine gravel, trace medium to coarse gravel.	SP			1066.54
60		SSS	5-10 17-19	90			Light brown MEDIUM to COARSE SAND, with some fine to medium gravel. Brown FINE to VERY FINE SAND, with some clay.	SP SP			1061.54 1060.54
		SSS	5-12 17-24	100			Light brown MEDIUM to FINE SAND, with some coarse sand.	SC			1059.54 1058.54
65		SSS	7-13 26-27	35			Light brown VERY FINE CLAYEY SAND. Light brown FINE TO MEDIUM SAND, with little to some coarse sand and fine gravel.	SP	End of boring - 66'		1057.54

BORING LOG GSWA-SHC.GFJ_MP_MI.GDT 10/17/00



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BORING NO. **MW-11** SHEET **1 OF 2**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Jeff Groncki**

COORDINATES **N 229,202.3 E 1,746,172.8**

SURFACE ELEVATION **1166.66** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
 DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 1050**
 DRILLING STARTED **7/21/00** ENDED **7/21/00**

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

- SAND
- CLAY
- GRAVEL
- SILT
- PEAT
- FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
5		SSS	2-2 3-3	80				Orangish-brown FINE SAND.	SP		1162.66
								Soft, brown, moist CLAY, with little fine sand.	CL		1162.16
10		SSS	8-10 10-11	80				Stiff, brown, dry CLAY, with little fine gravel and trace medium gravel and fine sand.	CL		1157.66
15		SSS	8-15 21-22	70				Light brown VERY FINE SILTY SAND.	SM		1152.66
20		SSS	9-50	0				Light brown FINE TO MEDIUM SAND, with trace coarse sand.	SP	Pushed rock in 19 to 21 ft. sample (no recovery). Cutting shoe banged up; gravel present 19 to 21 ft. bgl.	1151.16
25		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		1142.66
30		SSS	8-12 15-22	60				Light brown MEDIUM SAND, with little coarse sand, dry.	SP		1137.66
								Light brown FINE SAND, with some silt and clay, wet.	SP		1135.66
								Brown CLAY, moist at the top, dry at the bottom.	CL		1135.16
35		SSS	7-7 11-17	80				Light brown MEDIUM SAND, dry.	SP		1132.66
								Silty brown CLAYEY FINE SAND.	SC		1132.16
								Stiff brown CLAY, dry.	CL		1131.16
								Light brown MEDIUM SAND, dry.	SP		1130.66
			10-24					Brown stiff CLAY.	CL		1127.66

BORING LOG GSWA-SHC.GFJ_MP_MI.GDT 10/17/00



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BORING NO. MW-11

SHEET 2 OF 2

PROJECT GSWA Spring Hill Camp

LOCATION Osceola, MI

PROJECT NO. 4065-001

LOGGED BY Jeff Groncki

COORDINATES N 229,202.3 E 1,746,172.8

SURFACE ELEVATION 1166.66 DATUM USGS

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	PID (ppm)					
		SSS	29-34	70			Light brown to brown SILTY FINE SAND, with some clay. (continued)	SM		1127.16
							Light brown FINE SAND, with some medium sand, dry.	SP		1125.66
45		SSS	2-8 28-30	80			Brown SILTY VERY FINE SAND.	SM		1122.66
50		SSS	5-10 13-24	90			Light brown FINE SAND, with little to some clay, wet. Brown stiff CLAY, dry.	SP CL		1117.66 1117.16
55		SSS	10-15 21-24	90			Brown stiff CLAY, with some 1" thick layers of light brown fine sand throughout.	CL		1112.66
60		SSS	3-8 11-12	100			Light brown FINE SAND, with little medium sand, with 1/8" brown clay layers.	SP		1107.66
65		SSS	2-5 8-8	100			Light brown MEDIUM SAND, with 1/2" brown clay layer. Brown CLAYEY FINE SAND.	SP SC		1102.66 1101.66
							Light brown MEDIUM TO FINE SAND.	SP		1100.86
70		SSS	3-9 11-13	80			Light brown FINE TO VERY FINE SAND. FINE GRAVEL, with 1/8" clay lens at 70.25 ft. bgl. Light brown FINE TO VERY FINE SAND.	SP GP SP		1097.66 1096.66 1096.16
75		SSS	2-7 13-19	75			Light brown MEDIUM SAND, with some coarse sand and fine gravel. MEDIUM TO FINE GRAVEL. Brown CLAY.	SP GP CL		1092.66 1090.86 1090.76
80		SSS	2-13 15-14 (4")	100			Light brown MEDIUM SAND. Grayish-brown SILTY FINE SAND, with some clay.	SP SM		1087.66 1086.66
		SSS	4-7 13-16	25			Brownish-gray CLAY, with little fine sand. Grayish SILTY CLAY, stiff.	CL CL	End of boring - 83	1086.16 1085.66

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

MALCOLM PIRNIE

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BORING NO. **MW-12d** SHEET **1 OF 3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **J.Henry/G.Fox**

COORDINATES **N 229,163.2 E 1,747,490.7**

SURFACE ELEVATION **1163.21** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 1050**
DRILLING STARTED **7/24/00** ENDED **7/25/00**











LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
5		SSS	3-3 5-6	50				Moderate reddish-brown, cohesive CLAYEY FINE TO COARSE SAND, clast supported, dry to moist.	SC		1159.21
10		SSS	7-1 3-5	70				Moist to wet, soft CLAYEY FINE TO COARSE SAND, cohesive, trace fine gravel.	SC		1154.21
15		SSS	3-2 1(12")	100				Moist to wet, semi-cohesive, light yellow brown MEDIUM SAND, trace coarse sand, trace gravel, trace clay.	SP		1149.21
								Saturated, very loose, light yellow brown FINE TO MEDIUM SAND, trace silt, trace clay.	SP		1148.21
20		SSS	1-0 0-6	100				Saturated, very loose, MEDIUM TO COARSE SAND, light yellow brown, trace coarse gravel, trace silt.	SP		1144.21
								Moist, stiff to hard moderate yellow brown CLAY, with trace medium sand, very cohesive.	CL		1143.21
25		SSS	5-8 16-27	75				Dry, light buff MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, rounded to subrounded.	SP		1139.21
30		SSS	8-15 33-28	75				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		1134.21
35		SSS	8-8 16-25	75				Dry, light buff, MEDIUM SAND, medium dense, subrounded.	SP		1129.21
			5-11					Dry, light buff, MEDIUM SAND, loose.	SP		1124.21

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



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BORING NO. **MW-12d** SHEET **2 OF 3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **J.Henry/G.Fox**

COORDINATES **N 229,163.2 E 1,747,490.7**
 SURFACE ELEVATION **1163.21** DATUM **USGS**

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS (ppm)					
		SSS	24-29	75			Dry, light buff, FINE SAND, loose. (continued)	SP		1123.71
45		SSS	5-8 14-19	75			Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace silt and clay.	SP		1119.21
							Dry to moist, stiff, moderate yellow brown SILTY CLAY.	CL		1117.71
50		SSS	5-8 9-9	75			Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel, trace clay, rounded to subrounded.	SP		1114.21
55		SSS	3-6 9-13	60			Saturated, loose, light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand.	SP		1109.21
60		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		1104.21
65		SSS	6-18 50(4")	100			Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel.	SP		1099.21
							Saturated, loose, light yellow brown FINE TO VERY FINE SAND, some silt.	SM		1098.21
70		SSS	10-14 30-34	100			Saturated, loose, light yellow brown, interbedded layers of MEDIUM TO COARSE SAND, and FINE SAND.	SP		1094.21
75		SSS	23-50 (6")	100			Saturated loose, light yellow brown MEDIUM TO COARSE SAND (probably fallback).	SP		1089.21
							Wet, stiff and very hard, light yellow brown CLAYEY MEDIUM SAND.	SP-SC		1088.21
80		SSS	6-26 50 (5"0)	50			Wet, stiff, dense, MEDIUM SAND, with few clay, cohesive.	SP		1084.21
85		SSS	28-50 (6")	60			Saturated light yellow brown MEDIUM SAND.	SP		1079.21
							Saturated, rounded to subrounded, FINE GRAVEL, trace medium sand.	GP		1078.21
90		SSS		100			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	Did not get blow counts, rig line blew.	1074.21
							Interbedded light yellow brown, saturated, FINE TO	SP	Very hard drilling 90-93' bgl.	1073.21



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



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BORING NO. **MW-12d** SHEET **3 OF 3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **J.Henry/G.Fox**

COORDINATES **N 229,163.2 E 1,747,490.7**
 SURFACE ELEVATION **1163.21** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Flow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
95		SSS	8-12 18-18	80			 MEDIUM SAND, with moderate yellow brown dry to moist silt. 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.	SP		1069.21 1068.71	
100		SSS	13-17 28-32	100				Light yellow brown FINE TO MEDIUM SAND, trace coarse sand, few silt, saturated, dense, semi-cohesive.	SP		1064.21
105		SSS	24-50 (6")	50			 Moderate gray brown, moist SILTY CLAY, not varved. Light yellow brown moist SILT.	CL-ML		1059.21 1058.61	
110		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		1054.21
115		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' bgl.	1049.21	



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BORING NO. **MW-12i** SHEET **1 OF 2**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Greg Fox**

COORDINATES **N 229,155.3 E 1,747,490.7**

SURFACE ELEVATION **1162.47** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
 DRILLING METHOD EQUIPMENT
4 1/4" HSA CME 1050
 DRILLING STARTED ENDED
7/27/00 7/27/00

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

SAND	SILT
CLAY	PEAT
GRAVEL	FILL

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	PID (ppm)					
5							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.	1158.47
10							Moist to wet, soft CLAYEY FINE TO COARSE SAND, cohesive, trace fine gravel.	SC		1153.47
15							Moist to wet, semi-cohesive, light yellow brown MEDIUM SAND, trace coarse sand, trace gravel, trace clay.	SP		1148.47
							Saturated, very loose, light yellow brown FINE TO MEDIUM SAND, trace silt, trace clay.	SP		1147.47
20							Saturated, very loose, MEDIUM TO COARSE SAND, light yellow brown, trace coarse gravel, trace silt.	SP		1143.47
							Moist, stiff to hard moderate yellow brown CLAY, with trace medium sand, very cohesive.	CL		1142.47
25							Dry, light buff MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, rounded to subrounded.	SP		1138.47
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		1133.47
35							Dry, light buff, MEDIUM SAND, medium dense, subrounded.	SP		1128.47
							Dry, light buff, MEDIUM SAND, loose.	SP		1123.47

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



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BORING NO. **MW-12i**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Greg Fox**

SHEET **2 OF 2**

COORDINATES **N 229,155.3 E 1,747,490.7**

SURFACE ELEVATION **1162.47** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
							Dry, light buff, FINE SAND, loose. <i>(continued)</i>	SP		1122.97	
45							Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace silt and clay.	SP		1118.47	
							Dry to moist, stiff, moderate yellow brown SILTY CLAY.	CL		1116.97	
50							Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel, trace clay, rounded to subrounded.	SP		1113.47	
55							Saturated, loose, light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand.	SP		1108.47	
60							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'	1103.47	

COORDINATES **N 227,193.1 E 1,747,065.5**

SURFACE ELEVATION **1120.17** DATUM **USGS**

DRILLING CONTRACTOR

Stearns

DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 1050**

DRILLING STARTED **7/26/00** ENDED **7/26/00**















LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		AUG						Moderate reddish brown CLAY, damp to moist, soft, trace fine sand.	CH	Based on drill cuttings.	1119.17
5		SSS	3-4 7-8	90				Moderate yellow brown FINE TO COARSE SAND, stiff and cohesive, few clay and silt, damp.	SC		1116.17
								Moderate yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, cohesive, stiff.	SC		1115.17
10		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		1111.17
15		SSS	4-7 7-5	100				Moderate yellow brown FINE TO MEDIUM SAND AND SILT, trace clay, moist. Seam of wet moderate yellow brown medium sand, trace fine gravel at 15 ft. bgl.	ML		1106.17
								Light yellow brown MEDIUM TO FINE SAND, moist to damp, loose, subround to subangular.	SP		1104.67
20		SSS	3-5 5-3	100				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 orange brown MEDIUM TO COARSE SAND, wet, one large gravel.	SP		1101.17
								Moderate yellow brown FINE TO MEDIUM SAND, some clay and silt, moist.	SC		1096.17
25		SSS	2-6 8-8	100				Kark yellow gray SILTY CLAY, trace fine sand.	CL		1095.97
								Dark yellow gray SILTY CLAY, stringers of light gray silt, dry to damp.	CL		1091.17
30		SSS	2-4 11-11	100				Light gray SILT, dry, moderately dense.	MI		1089.97
								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.	1086.17
35		SSS	1-0 0-0	0					SP		
									SP	Gauged well @36-38'	1081.17

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



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BORING NO. MW-13

SHEET 2 OF 3

PROJECT GSWA Spring Hill Camp

LOCATION Osceola, MI

PROJECT NO. 4065-001

LOGGED BY J.Henry/G.Fox

COORDINATES N 227,193.1 E 1,747,065.5

SURFACE ELEVATION 1120.17 DATUM USGS

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	PID (ppm)					
		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		SSS	4-7 9-12	75			Moderate yellow brown SILTY CLAY, moist, hard, with numerous light yellow brown dry silt partings.	CL-ML		1077.17
		SSS	1-1 1-2				Brown MEDIUM TO COARSE SAND, trace fine sand, saturated, medium dense, trace fine gravel, note: coarsens downward.	SP		1074.17
		SSS	1-2 2-3					SP-ML		1073.17
50		SSS					Brown FINE TO COARSE SAND, trace fine gravel, note occasional thin clay (gray, silty CLAY, trace fine sand, trace coarse sand, moist, stiff), less than 0.3' thick, dense, saturated.			1071.17
		SSS						SP-ML		
55		SSS	1-2 2-4				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.			
		SSS	1-1 1-1					SP-ML		1062.17
60		SSS					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.			
		SSS	3-3 6-9					SP-ML		1056.17
65		SSS	1-3 5-9				Brown MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, saturated.			
		SSS	2-3 6-8					SP	No recovery in 84-86' split spoon sample.	1046.17
75		SSS	2-5 6-12			Brown FINE TO COARSE SAND and FINE TO MEDIUM GRAVEL, trace coarse gravel, saturated.				
		SSS	3-5 7-12				SP			
80		SSS	3-4 7-13			Brown FINE TO COARSE SAND and FINE TO MEDIUM GRAVEL, trace coarse gravel, saturated.				
		SSS					SP-GP	At 90.9' bgl: FINE SAND seam, trace silt, brown, saturated.	1031.17	

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



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BORING NO. MW-13

SHEET 3 OF 3

PROJECT GSWA Spring Hill Camp

LOCATION Osceola, MI

PROJECT NO. 4065-001

LOGGED BY J.Henry/G.Fox

COORDINATES N 227,193.1 E 1,747,065.5

SURFACE ELEVATION 1120.17 DATUM USGS

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet	
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Rec-covery %	VAS	PID (ppm)						
95		SSS	2-8 12-13					SP		1026.17		
100		SSS	WOH-WCH 6-6							SP		1021.17
105		SSS	3-4 10-10							SP		1016.17
110		SSS	4-12 15-12							SP-SC	End of boring - 113' bgl	1010.17
		SSS	2-3 3-4									

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

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BORING NO. **TW-1** SHEET **1** OF **2**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

COORDINATES **N 227,266.3 E 1,746,816.7**







SURFACE ELEVATION **1097.36** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **10 1/4" HSA** EQUIPMENT **CME 1050**
DRILLING STARTED **7/5/00** ENDED **7/6/00**

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

-  SAND
-  SILT
-  CLAY
-  PEAT
-  GRAVEL
-  FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Rec-covery %	V.S	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								Brown loam (TOPSOIL). Red, MEDIUM TO FINE SAND, little silt.	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
							Light brown, FINE TO MEDIUM SAND, little silt, moist.	SM	1096.36		
5							Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.	SM	1094.36		
								SM	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 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.	SM	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1074.86	
30								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	Granite fragments.	1064.36	
							Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, few medium angular gravel, subrounded, spherical to elongate, loose, wet.	SP		1063.86	
							Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is	SP		1060.36	

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



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BORING NO. TW-1 SHEET 2 OF 2
 PROJECT GSWA Spring Hill Camp
 LOCATION Osceola, MI
 PROJECT NO. 4065-001
 LOGGED BY Joel Henry

COORDINATES N 227,266.3 E 1,746,816.7

SURFACE ELEVATION 1097.36 DATUM USGS

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
							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)	SP			
45							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.	SP	Outwash or glaciofluvial.	1053.86 1052.86	
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	Outwash or glaciofluvial.	1049.36	
55							Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP	Bail approx. 3.25' heave from augers.	1044.36	
60							Buff, MEDIUM SAND, little medium to coarse sand, few fine sand, trace coarse sand, round and very spherical, poorly sorted, loose, wet.	SP		1039.36	
65							Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP	Bail approx. 3' heave from augers.	1034.36	
70							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' heave from augers.	1029.36	
75							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.	1024.36	
80							Buff, FINE TO MEDIUM SAND, few fine sand, round and spherical, sorted, very loose, wet.	SP	Bail approx. 1.9' heave from augers.	1019.36	
85							Buff, FINE TO MEDIUM SAND, few fine sand, round and spherical, sorted, very loose, wet.	SP	End of boring - 85' bgl.	1014.36	

BORING LOG GSWA-SHC.GPJ_MP_MI.GDT 10/17/00

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BORING NO. TW-2

SHEET 1 OF 3

PROJECT GSWA Spring Hill Camp

LOCATION Osceola, MI

PROJECT NO. 4065-001

LOGGED BY M.B. & G.Fox

COORDINATES N 227,207.0 E 1,747,037.4

SURFACE ELEVATION 1119.41 DATUM USGS

DRILLING CONTRACTOR

Stearns

DRILLING METHOD EQUIPMENT

10 1/4" HSA CME 1050/CME 95

DRILLING STARTED ENDED

7/28/00 8/2/00













LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								Moderate reddish brown CLAY, damp to moist, soft, trace fine sand.	CH	Stratigraphic information from MW-13 boring log. TW-2 is located approx. 10' from MW-13.	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	1115.41		
10							Moderate yellow brown FINE TO MEDIUM SAND, trace fine to medium rounded gravel, trace to few clay and silt, moist, clast supported.	SC		1114.41	
15							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	
							Moderate yellow brown FINE TO MEDIUM SAND AND SILT, trace clay, moist. Seam of wet moderate yellow brown medium sand, trace fine gravel at 15 ft. bgl.	ML		1105.41	
							Light yellow brown MEDIUM TO FINE SAND, moist to damp, loose, subround to subangular.	SP		1103.91	
20							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 orange brown MEDIUM TO COARSE SAND, wet, one large gravel.	SP		1100.41	
25							Moderate yellow brown FINE TO MEDIUM SAND, some clay and silt, moist.	SC		1095.41	
							Dark yellow gray SILTY CLAY, trace fine sand.	CL		1095.21	
30							Dark yellow gray SILTY CLAY, stringers of light gray silt, dry to damp.	CL		1090.41	
							Light gray SILT, dry, moderately dense.	ML		1089.21	
35							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.	1085.41	
								SP	Gauged well @36-38'	1080.41	

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

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BORING NO. TW-2 SHEET 2 OF 3
PROJECT GSWA Spring Hill Camp
LOCATION Osceola, MI
PROJECT NO. 4065-001
LOGGED BY M.B. & G.Fox

COORDINATES N 227,207.0 E 1,747,037.4

SURFACE ELEVATION 1119.41 DATUM USGS

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb Hammer)	Rec- overy %	VAS	PID (ppm)					
							Light yellow brown MEDIUM TO COARSE SAND, trace fine gravel, trace moist silt pockets. <i>(continued)</i>	SP	spoon; water @31' bgl and rising in auger - confined aquifer.		
45							Moderate yellow brown SILTY CLAY, moist, hard, with numerous light yellow brown dry silt partings.	CL-ML		1076.41	
50							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 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 SP-ML		1073.41 1072.41 1070.41	
55								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		1061.41	
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, moist, stiff.	SP-ML		1055.41	
70								SP-ML			
75							Brown MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, saturated.		No recovery in 84-86' split spoon sample.	1045.41	
80								SP			
85											
90							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		1030.41	

BORING LOG GSWA-SHC.GPJ_MP_MI.GDT 10/17/00



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BORING NO. **TW-2** SHEET **3 OF 3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **M.B. & G.Fox**

COORDINATES **N 227,207.0 E 1,747,037.4**

SURFACE ELEVATION **1119.41** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
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.	1020.41

COORDINATES **N 227,257.0 E 1,747,420.1**







SURFACE ELEVATION **1148.57** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **10 1/4" HSA** EQUIPMENT **CME 1050**
DRILLING STARTED **7/26/00** ENDED **7/27/00**

LOCATION DESCRIPTION:

See Report Figures for Locations

STRATA KEY

 SAND	 SILT
 CLAY	 PEAT
 GRAVEL	 FILL

SAMPLE INFORMATION						Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	PID (ppm)					
5						Medium brown SANDY CLAY, soft, damp to dry.	CL	Stratigraphic information from MW-5d boring log. TW-3 is located approx. 15' from MW-5.	1145.57	
						Interbedded medium brown SANDY CLAY with light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.	CL		1144.07	
10						Medium brown SANDY CLAY. Light buff, dry, loose, FINE TO MEDIUM SAND, subangular to subrounded.	CL	Drove rock.	1140.57	
							SP		1140.37	
15						Dry, loose, light buff, MEDIUM SAND, trace fine sand, subrounded.			1135.57	
							SP			
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.			1130.57	
							SP			
25						Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.			1125.57	
							SP			
30						Saturated medium dense light yellow brown SANDY SILT.	SM/ML		1120.57	
						Dry hard medium yellow brown SILTY/SANDY CLAY.	CL		1119.57	
35						Dry/damp, hard medium grey CLAY, trace silt partings.	CL		1115.57	
						Color change to light yellow brown SILTY CLAY, dry and hard.	CL	Felt lithology change at 36' bgl.	1114.07	
							CL			
						Saturated, light yellow brown, soft, SILT AND CLAY. Water may have entered spoon from	CL	Water may have entered spoon from	1110.57	
							SP		1109.57	

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



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BORING NO. **TW-3** SHEET **2 OF 3**

PROJECT **GSWA Spring Hill Camp**

LOCATION **Osceola, MI**

PROJECT NO. **4065-001**

LOGGED BY **Joel Henry**

COORDINATES **N 227,257.0 E 1,747,420.1**

SURFACE ELEVATION **1148.57** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
							perched zone.			perched zone.	
							Dry light buff loose MEDIUM SAND, trace fine sand. (continued)	SP			
45-							Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.	SP			1105.57
50-							Dry, loose, light buff MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, one fine to medium gravel stringer @ 48.5'.	SP			1100.57
55-							Saturated, loose light yellow brown MEDIUM TO FINE SAND, trace medium rounded gravel.	SP			1095.57
							Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC			1095.07
60-							Saturated, loose light yellow brown MEDIUM TO COARSE, trace fine sand, trace gravel.	SP			1090.57
							Saturated loose subangular to subrounded FINE TO COARSE GRAVEL.	GP			1090.07
							Mixed FINE TO MEDIUM GRAVEL AND FINE TO MEDIUM SAND, saturated. May be slough. Poor recovery, seemed to be pushing a cobble.	GP			1088.57
65-							Saturated light yellow brown FINE TO MEDIUM SAND with some fine subangular to subrounded gravel.	SP			1086.57
							Moist medium yellow brown FINE SAND AND SILT, firm.	ML			1085.57
							Saturated light yellow brown, FINE TO MEDIUM SAND trace silt.	SP			1085.07
70-							Saturated light yellow brown, FINE TO MEDIUM SAND, trace silt, subangular to subrounded.	SP			1084.57
							Saturated light yellow brown MEDIUM TO FINE SAND, rounded to subrounded.				
							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 SAND.	SP			1070.57
80-							Saturated light yellow brown SILT, some fine to medium sand.	ML			1069.57
							Saturated light yellow brown FINE TO MEDIUM SAND, trace to few silt, trace clay.				1065.57
85-							Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.	SP			1060.57
90-								SP			

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



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BORING NO. **TW-3** SHEET **3** OF **3**
 PROJECT **GSWA Spring Hill Camp**
 LOCATION **Osceola, MI**
 PROJECT NO. **4065-001**
 LOGGED BY **Joel Henry**

COORDINATES **N 227,257.0 E 1,747,420.1**

SURFACE ELEVATION **1148.57** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
95								Saturated light yellow brown MEDIUM TO COARSE SAND, little to some fine subangular to subrounded gravel, trace clay (gravelly sand). <i>(continued)</i>	SP		1055.57
100								Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, trace gravel, trace clay.	SP		1050.57
								Saturated subangular to subrounded GRAVEL, trace fine to medium sand. One large gravel (1") wedged in bottom of spoon.	GP		1050.07
105								Saturated light yellow brown FINE TO COARSE SAND, finer at bottom, coarse sand with few fine gravel @ 104' bgl.	SW		1045.57
110								Saturated light yellow brown MEDIUM SAND, subrounded to rounded.	SP	Pushed sample. Couldn't get hammer on spoon, too close to rig.	1040.57
115								Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand.	SP		1035.57
120							Saturated, loose, light yellow brown MEDIUM SAND, trace fine gravel.	SP	End of boring - 122.2' bgl.	1030.57	