## MALCOLM PIRNIE

HYDROGEOLOGIC ASSESSMENT TECHNICAL MEMORANDUM VOLUME II of III APPENDICES A - D

FOR THE
SPRING HILL CAMP STUDY AREA
OSCEOLA COUNTY, MICHIGAN

PREPARED FOR GREAT SPRING WATERS OF AMERICA

OCTOBER 2000

PREPARED BY

MALCOLM PIRNIE, INC.

1500 ABBOTT ROAD, SUITE 210

EAST LANSING, MICHIGAN 48823

# APPENDIX A LOCAL WATER SUPPLY WELL LOGS

MAR 4 1992 Manufacturer's name FinTRO Model number 121202 USE A 2ND SHEET IF RELIGEAU OF ENVIRONMENTAL AND 6. WATER WELL CONTRACTOR'S CERTIFICATION Capacity 15. Remarks, elevation, source of denaity PATIONAL HEALTH-GWOS This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief-17. Rig Operator's Name:

D67d 2/89

Well 1D = 9

AUTHORIZED REPRESENTATIVE Authority: Completion: Penalty:

Submersible

PRESSURE TANK

Act 368 PA 1978 Required Conviction of a violation of any provision is a

CEOLOGICAL SUBVEY NO			IMP RECORD PERMIT NUMBER
LOCATION OF WELL Township Name		Fraction	Section Number   Town Number   Range Number
0scaola (3640)	A	Nula	5/2 NEVA 16 18 N/8 8 E
distance And Direction From Road Intersection			3 OWNER OF WELL
9523 - 95th Avenue			Don Prichard
, , , , , , , , , , , , , , , , , , ,			Address 9528 - 95th Ave.
			Evant, '11. 40631
reer Address & City of Well Location			Address Same As Well Location? Yes No
ocate with X in Section Below	Sketch Map		4 WELL DEPTH: Date Completed New Well
	10 11/2		142 FT. 16 14 176 Replacement Well
	10 -		5 Cable tool Antary Driven Dug
X			Hollow rod Auger Jetted
			61155 7 7
			☐ Irrigation ☐ Type ila Public ☐ Heat pumo
			Test Well Type lib Public
			7 CASING Diameter Steel Threaded Height Apove/Below
1 MILE	-		Plastic Welded   Surfaceft
FORMATION DESCRIPTION	THICKNESS	BOTTOM OF	
1	STRATUM	STRATUM	Grouted Drill Hole Diameter
$\sim 1$		/	In to 10 ft depth   Drive Shoe Yes
( /AU & GVAUCE	74	74	in to ft. depth No
			8 SCREEN Not Installed
(-/A 1) - /	12	Zi	Type Howard South Diameter 37/"
			Slot/Gauer 10 Length 5'
Clayt Gravel	111	121	1 - 7 //7
127 + 0:12-1		121	Set betweenft. andft.  FITTINGS K-Packer Lead Packer Bremer Check
150010	11	141	Blank above screen 3 to Other
217 100	- //	112	9 STATIC WATER LEVEL
			15
	# PFIT	-1	fr below land surface
Vice.	Dept		
		in theth	62 ft. after hrs. pumping at 10 G.P.M
	SEP La ma		ft. after hrs. pumping at G.P.M.
	SEP 1.7 mg	5	
OLEC WAR			11 WELL HEAD Pitless adapter 12 above grade
2011	T FE WASHINGTON		Basement offset Approved pit
	THIN W. HEALT	PIN CIT	12 WELL GROUTED' No Yes From D to 1-30
		77.7	/ -
			Neat cement Bentonite Other
			No of bags of cement 10 Additives
			13 Nearest source of possible contamination
			Type Saptic Distance 60 H. Direction NE
			Well disinfected upon completion? Yes No
			Was old well plugged? Yes No
			14 PUMP Not installed Pump Installation Only
			1 1.
			Manufacturer's name At 100 HB Vo Volts 230
			Woder number
			Length of Drop Pipe ft. capacity G
			TYPE Submersible Jet
		1	PRESSURE TANK Manufacturer's name X - 1701
			Model number (UX) 02 46 Capacity 42 Gi
USE A 2ND SHEET IF NEEDED		16 10/075	ER WELL CONTRACTOR'S CERTIFICATION:
15. Remarks, elevation, source of data, etc.			rell was drilled under my jurisdiction and this report is true
			best of my knowledge and belief
		Kit Wa	aldron Well Drilling 0907
			REGISTERED BUSINESS NAME REGISTRATION NO.
17. Rig Operator's Name:	4	Addre	
GOLDON BISSETT			11/1/1/1/1/1/1/1
- 001 000 2100011		Signed	AUTHORIZED REPRESENTATIVE Date
674 2/89			Administration in the section in the

WELL 1D= 8

D67d 2/89

Authority: Completion: Penalty:

Act 368 PA 1978 Required Conviction of a violation of any provision is a

DEQ / MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION WATER WELL AND PUMP RECORD PERMIT NO: TAX NO: Completion is required under authority of Part 127 Act 368 PA 1978 67-12-16 Failure to comply is a misdemeanor LOCATION OF WELL 98-County SE 1/4 SF1/4 SU1/4 Osceola Osceola Distance and Direction from Road Intersection 3. OWNER OF WELL Michael Foster Address 9057 95th Avenue Evart, MI. 49631 Address Same as Well Location Yes ... No Street Address & City of Well Location 95th Avenue Locate with 'x' in Section Below Sketch Map 4. WELL DEPTH: Date Completed New Well 185 to 10 11- 198 Replacement Well Capie Tool X Rotary ☐ Driven ☐ Dug Hallow Roc Auger/Bored \_\_ Jetted 6. USE. X Household Type I Public Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat Pump Test Weil Type IIb Public 7. CASING: Steel Threaded Height: Above/Bolow Plastic Welded Surface: / ft DEPTH TO BOTTOM OF STRATUM THICKNESS FORMATION DESCRIPTION STRATUM Weight: Sor 17 lbs/ft. Diameter: 5 in. to 150 it. depth in. to 185 ft. depth Snull Beauch Drive Shoe BORE HOLE: Diameter: 7% in. to 160 ft. depth Shale Packer in. to 12 ft. depth 8. SCREEN: Not Installed M Gravel-Packed Type 570 ut 57 cl Diameter SlouGauze /D ft. and /8 = Set Between 120 K-Packer Bremer Check FITTINGS: Blank Above Screen 9. STATIC WATER LEVEL: ft. Below Land Surface Flowing 10. PUMPING LEVEL: Below Land Surface APING LEVEL: Below Call

April Pumping at // G.P.M.

✓ Air

▼ Air

▼ Test Pump / D G.P.M. Plunger 11. WELL HEAD COMPLETION: 12" Above Grade Pitless Adapter Well House Basement Offset ☐ No ☐ Yes From \_ 0 to \_/80 ft. 12. WELL GROUTED? Neat Cement X Bentonite No. of Bags : 8 Additives 13 NEAREST SOURCE OF POSSIBLE CONTAMINATION: Type Seattl Distance 50 t ft. Direction\_ Distance \_\_\_\_\_\_ft. Direction\_ USE A 2ND SHEET IF NEEDED 1.4. PUMP: Not Installed F. Pump Installation Only Manufacturer's Name Yes No 15. ABANDONED WELL PLUGGED? Model Number 4510 AD 205 HP 34 Volts 220 Casing Diameter \_\_\_\_\_in. Depth \_\_\_\_\_tt. Length of Droo Pipe \_\_\_\_\_\_ft. Capacity \_\_\_\_\_\_ /O\_\_\_G.P. M.
TYPE: X: Submersible \_\_\_\_\_ Jet \_\_\_\_ Other\_\_\_\_\_ Neat Cement Bentonite Siurry PLUGGING MATERIAL: Concrete Grout Bentonite Chips Cement/Bentonite Slurry Yes No Casing Removed? PRESSURE TANK: No. of Bags Manufacturer's Name Will V- Trul 16. REMARKS: (Elevation, Source of Data, etc.) Model Number U ( 250 Capacity // /s Gallons // 6 18 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my, knowledge and belief 17. DRILLING MACHINE OPERATOR: MEmployee Subcontractor Chase, MI FAIL CATTLE 

Weu ID - 7

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION WATER WELL AND PUMP RECORD TAX NO: PERMIT NO: Completion is required under authority of Part 127 Act 368 PA 1978 67-12-016-012-'98--0089Failure to comply is a misdemeanor LOCATION OF WELL County Township Name Town No. Range No. Osceola SE 1/4 SW1/4 SW1/4 18 N 8 W Osceola Distance and Direction from Road Intersection 3. OWNER OF WELL Kevin Beggs Address 7595 80th Avenue Evart. MI. 49681 Address Same as Weil Location Yes X No 9 Mile Street Address & City of Well Location Sketch Map Date Completed Locate with 'x' in Section Below New Well Replacement Well Cable Tool Rotary Driven Auger:Bored Hollow Rod \_\_ Jetted USE: Household Type I Public Type III Public Type IIa Public Heat Pump Iragation Test Well Type IIb Public Steel Threaded CASING: Height: Above Belov X Plastic Welded Surface: THICKNESS FORMATION DESCRIPTION Other 5 in. to 1 ft. depth STRATUM Weight: \_ Diameter: \_\_in. to \_\_\_ BORE HOLE: 8 Drive Shoe in. to \ Ft. depth Shale Packer \_in. to \_ ft. depth SCREEN: Not installed Gravei-Packed SlovGauze 110 Set Between fr and K-Packer ft. Other FITTINGS: Blank Above Screen \_ 9. STATIC WATER LEVEL: ft. Below Land Surface Flowing 10. PUMPING LEVEL: Below Land Surface S. Pumping at ft. After Air Plunger Bailer Test Pump 1 1 WELL HEAD COMPLETION: L Pitless Adapter 12" Above Grade ☐ Well House Basement Offset 12. WELL GROUTED? No Yes 加 Bentonite Neat Cement Other No. of Bags 10 Additives 35 13. NEAREST SOURCE OF POSSIBLE CONTAMINATION: \_ Distance 185 \_ft. Direction ft. Direction USE A 2ND SHEET IF NEEDED Pump Installation Only Not Installed 14. PUMP: Yes No :5. ABANDONED WELL PLUGGED? Manufacturer's Name Depth \_\_\_\_\_ Casing Diameter PLUGGING MATERIAL: Neat Cement Bentonite Slurry ft. Capacity Length of Drop Pipe 100 Other\_ Cement/Bentonite Slurry Concrete Grout Bentonite Chips Submersible Jet Yes No Casing Removed? PRESSURE TANK No. of Bags Manufacturer's Name None Home REMARKS: (Elevation, Source of Data, etc.; Capacity Model Number 18 . WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. 17. DRILLING MACHINE OPERATOR: Employee Subcontractor

WELL 10 = 4

Name Down

16 Justin

EOP 2017 (12/96)

Date

EOLOGICAL	SURVEY	SAMPLE	No

100M

0670

6-66

1 1

## WATER WELL RECORD

MICHIGAN DEPARTMENT OF

**ACT 294** PA 1965 PUBLIC HEALTH LOCATION OF WELL Range Section No. Fraction SENSE " SWA ance And Direction from Road Intersection 3 OWNER OF WELL: OWNER No. Street address & City of Well Location 4 WELL DEPTH: (completed) THICKNESS OF STRATUM BOTTOM OF FORMATION Rotary Driven 5 A Cable tool Jetted Bored 0\_ Hollow rod ☐ Industry 6 USE: Domestic Public Supply ☐ Irrigation ☐ Air Conditioning ☐ Commercial Test Well 7 CASING: Threaded Welded Height: Above/Below surface\_\_\_\_ft. \_\_\_ft. Depth \_lbs/ft. |Weight\_\_\_\_ Drive Shoe? Yes No ft. Depth \_\_\_in. to 8 SCREEN: \_Dia.:\_ Type:\_\_\_\_ \_\_Length\_ Set between\_\_\_\_ft. and\_\_\_\_ft. Fittings: 9 STATIC WATER LEVEL \_\_\_\_ft. below land surface 10 PUMPING LEVEL below land surface \_\_ft. after\_\_\_hrs. pumping\_\_\_ \_\_ft. after\_\_\_hrs. pumping\_\_ 11 WATER QUALITY in Parts Per Million: Iron (Fe)\_\_\_\_\_ Chlorides (CI)\_ Hardness 12 WELL HEAD COMPLETION: In Approved Pit Pitless Adapter 12" Above Grade 13 GROUTING: Well Grouted? Tes No Material: Neat Cement Depth: From\_\_\_ft. to\_\_\_ft. 14 SANITARY: Nearest Source of possible contamination \_\_\_\_feet \_\_\_\_Direction\_\_\_ Well disinfected upon completion Yes No 15 PUMP: Manufacturer's Name\_\_\_ Model Number\_\_\_\_ Length of Drop Pipe\_\_\_\_ft. capacity\_\_\_\_G.P.M. Type: Submersible Reciprocating ☐ Jet 17 WATER WELL CONTRACTOR'S CERTIFICATION: 16 Remarks, elevation, source of data, etc. This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. AUTHORIZED REPRESENTATIVE

.. MICHIGAN DEPARTMENT OF PUBLIC HEALTH

GEOLOGICAL SURVEY NO

## WATER WELL AND PUMP RECORD

				-
1	1	1 11		
				1
			DEDBAL	1

1 LOCATION OF WELL	PART 127 ACT 368	3. P.A. 1978
County Township Name	Fract	- 17
Distance And Direction From Road Intersection	A NE	3 OWNER OF WELL 2 12 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2
	女的工好	PIII GARGY
well on south side	ten.	Address R
way an -ours sae	DE M	FURRT, MICH
Street Address & City of Well Location		Address Same As Well Location?
Locate with 'A' in Section Below	etch Map	4 WELL DEPTH (completed) Date of Completion
	14-74	5 Character Reserve Dovern Down
		Boury Driven Dug
w		d'USE Destre Type i Public Type i Public
		gation Type IIa Public Heat bumb
		Test Well Type IIb Public
	BITAL	
1 MILE	THICKNESS DEPTH	Surface 7 II
2 FORMATION DESCRIPTION	OF BOTTO	M OF In to ft. depth
	. ,	Grouted Drill Hole Diameter  In to ft depth  Drive Shoe
SAND+ WAY KAD	17' 17	n toft depth No
	17/11	8 SCREEN Not Installed
SHAC & Refform	2 40	Type Johnson Diameter 17
- ANILIMECON	10 1	Slot:G Length
SAILET WILL	13	Ser between
1-PAVEL.	25 75	Sank above screen 18 11 Other
S.A.	,	9 STATIC WATER LEVEL
SAND GENORU	20 95	tt below land surface Flow
card and To	, /	1 22 1
27/1/2 W/1/2	7/10	trafter hrs. pumping at GPM
	,	ft after hrs. pumping at G.P.M
		11 WELL HEAD Pitless adapter hove grade
		Basement offset Approved pit
		13 WELL GROUTED? Yes From ft.
		Near cement Bentonite Other
		No of bags of cement Additives
		13 Nearest source of possible contamination
		Type SepTile March 6/34 Direction
	: 3	Well disinfected upon completion? Yes No
10 da Diction Public	1: ::::	
		installed Pump installation only
		Manufacturer's name
**************************************		Length of Drop Pipef: capacity G > M
		TYPE Summersible Jet
		PRESSURE TANK
**		Manufacturer's name
USE A 2ND SHEET F NEEDED	16	Model number Capacity Garden WATER WELL CONTRACTOR'S CERTIFICATION
15 Remarks elevation source of data, etc.		This well was drilled under my jurisdiction and this recort is true
90 1" 11ROF DIF-	e	to the best of my knowledge and belief
ADUED INFO BY DRILLER	R. ITEM NA	REGISTORED BUSINESS NAME REGISTRION TO
*CORRECTED BY 13F	-	Address RA/SIMES NAILA
/ *************************************		Signed Putt. Boulevelopate 4 5-82
D67d Rev 10 90. D62GU TO 2004	,	A LANTHORIZED REPRESENTATIVE

TOWNShip Name  Osceola  Stance and Direction from Road Intersection  The stand wast to 11  2 track of well Location  Greet Address & City of Well Location  FORMATION DESCRIPTION  FORMATION DESCRIPTION  USE A 2ND SHEET IF NEEDED  LOCATION OF WELL  The standard of the sta	o zł		Section No. Town No. Range No.  1/4 1/4 10 T12N PSU  3. OWNER OF WELL Pete Gruszecki Address 3785 Willow Drive Grand Rapide, MI. 49525  Address Same as Weil Location Yes No  4. WELL DEPTH: Date Completed Replacement Well  5. Cable Tool Rotary Driven Dug Hollow Rod Auger/Bored Jetted  6. USE: Housenold Type I Public Type III Public Irrigation Type IIa Public Heat Pump Test Weil Type IIb Public  7. CASING: Steel Threaded Height: Above/Below Plastic Welded Surface: It
Township Name  Osceola  Stance and Direction from Road Intersection  Township Name  Osceola  Stance and Direction from Road Intersection  Township Name  Osceola  Stance and Direction from Road Intersection  Township Name  Osceola  Stance III	OZA DAd Sketch Map THICKNESS STRATUM 30 L10	DEPTHTO BOTTOMOF STRATUM  30	Section No. Town No. Range No.  1/4 1/4 10 T13N PSW  3. OWNER OF WELL Pete Gruszecki Address 3785 Willow Drive Grand Rapide, MI. 49525  Address Same as Well Location Yes No  4. WELL DEPTH: Date Completed Replacement Well  5. Cable Tool Rotary Driven Dug Hollow Rod Auger/Bored Jetted   6. USE: Housenold Type I Public Type III Public Irrigation Type III Public Heat Pump  7. CASING: Steel Threaded Plastic Welded Surface: It  BORE HOLE Diameter: Not Installed Inc. to depth Inc. to It. depth Inc. t
Stance and Direction from Road Intersection  The standard wast to 11  T	Sketch Map  THICKNESS STRATUM  30  -10	DEPTHTO BOTTOMOF STRATUM  30	3. OWNEROF WELL Pete Gruszecki Address 3785 Willow Drive Grand Rapide, MI. 49525  Address Same as Well Location
Took Id to shift I see Address & City of Well Location 9 Mile Robotic With X in Section Below  FORMATION DESCRIPTION  Jane  Ja	Sketch Map  THICKNESS STRATUM  30  -10	30	Address 3785 Willow Drive Grand Rapide, MI. 49525  Address Same as Well Location
PORMATION DESCRIPTION  Sound  January  Colyntic  FORMATION DESCRIPTION  Sound  January  USE A 2ND SHEET IF NEEDED  To ABANDONED WELL PLUGGED?   Yes   No Casing Diameter   in Depth   ft	THICKNESS OF STRATUM	30	4. WELL DEPTH:    Date Completed   Replacement Well
FORMATION DESCRIPTION  Sand  Jane  J	THICKNESS STRATUM  30  410	30	Replacement Well   S   Cable Tool   Rotary   Driven   Dug
FORMATION DESCRIPTION  January  January	THICKNESS OF STRATUM	30	Hollow Rod
FORMATION DESCRIPTION  January  January  January  January  January  USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED?   Yes   No Casing Diameter   no Depth   ft	THICKNESS OF STRATUM	30	Irrigation   Type IIa Public   Heat Pump
FORMATION DESCRIPTION  January  January	THICKNESS OF STRATUM	30	Plastic Welded Surface:ft  Other  Diameter: S in. toft, depth  In. toft, depth  BORE HOLE:in. toft, depth  BORE HOLE:
USE A 2ND SHEET IF NEEDED  USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED?  Yes No Casing Diameterin. Depthft	30	30	BORE HOLE / Diameter: In. toft. depth   Drive Shoe   Shale Packer   Shale Packer   Diameter: In. toft. depth   Drive Shoe   Shale Packer   Shale Packer   Diameter   Diameter   ShowGauze   Length: I   Drive Shoe   Shale Packer   Diameter   Diam
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED? Yes No Casing Diameter in Depth ft	410	10	BORE HOLE   Drive Shoe   Shale Packer   Diameter   Shale Packer   Diameter   Shale Packer   Shal
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED? Yes No Casing Diameter in Depth ft	- 1 N. P.	-	Diameter:
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED? Yes No Casing Diameter in Depth ft	\0	80	8. SCREEN: Not Installed Type Sour Market Diameter SlovGauze Length: 1 O  Set Between It. and It. FITTINGS: K-Packer Bremer Chack Blank Above Screen It. Other  9. STATIC WATER LEVEL:  1
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED? Yes No Casing Diameter in Depth ft			SlovGauze Length: 1 O  Set Between tt. and ft.  FITTINGS: K-Packer Bremer Chack Blank Above Screen ft. Other  9. STATIC WATER LEVEL:  ft. Below Land Surface Flowing
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED? Yes No Casing Diameter in Depth ft			FITTINGS: K-Packer Bremer Chack!  Blank Above Screen ft. Other  9. STATIC WATER LEVEL:  1. It. Below Land Surface Flowing
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED? Yes No Casing Diameter in Depth ft			9. STATIC WATER LEVEL: ft. Below Land Surface
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED? Yes No Casing Diameter in Depth ft			LJO ft. Below Land Surface Flowing
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED? Yes No Casing Diameter in Depth ft			10. PUMPING LEVEL: Below Land Surface
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED?  Yes No Casing Diameterin. Depthft			☐ Plunger. ☐ Bailer ☐ Air ☐ Test Pump
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED?			11. WELL HEAD COMPLETION:    Pitless Adapter
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED?	-		12. WELL GROUTED? No Yes From to
USE A 2ND SHEET IF NEEDED  15. ABANDONED WELL PLUGGED?			No. of Bags Additives Additives
15. ABANDONED WELL PLUGGED? Yes No Casing Diameterin. Depthft		,	13. NEAREST SQURCE OF POSSIBLE CONTAMINATION:  Type Legitic Distance ( ft. Direction 7 5
Casing Diameterin. Depthft			14. PUMP: Not Installed, Pump Installation Only
PLUGGING MATERIAL:  Cement/Bentonite Slurry  No. of Bags  Casing Removed?	Bentoni	te Siurry te Chips	Manufacturer's Name Sta 12 Model Number HP 12 Volts 22 Model Number Length of Drop Pipe 65 ft. Capacity 10 G.P. M. TYPE: Submersible Jet Other PRESSURE TANK:
16. REMARKS: (Elevation, Source of Data, etc.)			Manufacturer's Name wall - x 7 Pol L  Model Number 10 1 Capacity (12 Gallons
17. DRILLING MACHINE OPERATOR:	This v	R WELL COI vell was drille edge and be	ONTRACTOR'S CERTIFICATION:  illed under my jurisdiction and this report is true to the best of my,  pelief  STANE  33  A DE LA LIVE LE LA LIVE
Name Well ID = 25	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		(40) 1/0 1/0 1/0 1/10/00/00/00/00/00/00/00/00/00/00/00/00

FEB 2 2 1980	WATER WELL RE	
LOCATION OF WELL	ACT 294 PA 19	OF PUBLIC HEALTH
ounty Township Name	Fraction	
istance And Direction from Road Intersections		7 8 W 8 19 18 N/S. 8 KW
Stance And Direction from Road Intersactions  J. Chance of Frank	& HOELAUE	Fred Dille
		Address 1210 mar sulle Ct
Locate Aith X in section below	Sketch Map;	4 WELL DEPTH: (completed) Date of Completion
X		10 = H. 9-11-79
h		5 Cable tool Rotary Driven Dug Hollow rod Jetted Bored
~ <del> </del>		6 USE: Doniestic Public Supply Industry
		Irrigation Air Conditioning Commercial
		7 CASING: Threaded We'ded Height: Above Balew
1 MILE		Dram. Surface / ft.
FORMATION	OF BOTTOM O	OF
	8'8'	8 SCREEN:
Ound		Slot Gauze 60 Length 48"
Clay	15' 23'	Set between 98 ft. and 102 ft.
Aund	15' 38'	Filtings:
11/1	22'60'	9 STATIC WATER LEVEL 4 C ft. below land surface
Clay		10 PLIMPING LEVEL below land surface
Dard-fine water	12' 72'	
Clay!	15' 87'	ft. after hrs. pumping g.o.m.  11 WATER QUALITY in Parts Per Million:
Mand & Colum	10' 97'	tron (Fe)Chlorides (CI)
1 -1	51 102	/
Dand waterhearing	51 102	12 WELL HEAD COMPLETION: In Approved Pit
U		Pitless Adapter 12" Above Grade
		13 Well Grouted? Yes No
		Depth: Fromft.
		14 Nearest Source of possible contamination
	-14	60 feet #5 Direction SepTic Ty Well disinfected upon completion X Yes □ No
		15 PUMP: Not installed
		Manufacturer's Name
		Model Number HP Volts Length of Drop Pipe ft. capacity G.P.M.
		Type: Submersible
		Jet Reciprocating
USE A 2ND SHEET IF NEEDED		
16 Remarks, elevation, source of data, etc.	17 WAT	ER WELL CONTRACTOR'S CERTIFICATION: well was drilled under my jurisdiction and this report is true
ADDED INFO BY DRILLER, ITEM NO.	80	well was drilled under my jurisdiction and this report is true of the structure of the stru
*CORRECTED BY ST	9	EGISTERED BUSINESS NAME REGISTRATION NO.
FIEVATION	Addr	estovait, The 49631
OSSTU TO BOOK		7) E Willer Date 9-11-79

UL. LUCICAL SURVEY SAMPLE No.

## MICHIGAN DEPARTMENT OF PUBLIC HEALTH WATER WELL AND PUMP RECORD GEOLOGICAL SURVEY NO.

-				T	_
				- 1	
_	-	 BILL	MBE	0	

1 LOCATION OF WELL			1-	Section Number   Town Number   Range Number
County	Townshing Name		SE 1/4)	E VASEVA 20 18 N/S 8 BYW
Distance And Direction From Road In	tersection	1. 0	1	3 OWNER OF WELL: ENOCH CISON
Wast off	100, 2N8W	115 40	-	8mile Rd.
ON North	51d8		- 9	Address Fuart Michi
				Address Same As Well Location? Yes No
Street Address & City of Well Location Locate with "X" in Section Below	Ske	etch Map		4 WELL DEPTH: Date Completed New Well
Locate With X In Section Below				12 7 FT. 9 23 89 □ Replacement Well
	- 1			5 Cable (cal Rotary Driven Dug
	2/			Hollow rod Auger Jetted
	*	0 1		6 USE: Domestic Type   Public Type II! Public
		A MILLS	•	☐ Irrigation ☐ Type IIa Public ☐ Heat pump
		x w. 11		Test Well Type IIb Public
	1			7 CASING Steel Threaded Height: Above/Below Plastic Welded Surface ft
1 MILE		**********	DEPTH TO	4 in 122 ft depth 1
2 FORMATION DES	CRIPTION	THICKNESS OF	BOTTOM OF	in, toft, depth
	1	STRATUM	STRATUM	Grouted Drill Hole Diameter Drive Shoe Yes
5 4.	)	10	10	in, toft. depth
		1		8 SCREEN: Not Installed
-1114	( AU	41	110	Type Howard Smith Diameter 33/8"
				Slot/George / Length
(1) 4		10	110	Set between 122 ft. and 127 ft.
	6	1 14	1 111	FITTINGS: K-Packer Lead Packer Bremer Check
11. 4 t = x	JAUD	1/	127	Blank above screen 7 ft. Other 9 STATIC WATER LEVEL:
			/	Ппои
				ft. below land surface
	-	-	-	ft. after hrs. pumping at G.P.Mft. after hrs. pumping at G.P.M.
				ft. after ins. pumping at G
				11 WELL HEAD Pitless adapter 12" above grade
				COMPLETION Basement offset Approved pit
				12 WELL GROUTED? No Yes From to ft.
				Neat cement Bentonite Other
		÷		
				No. of bags of cement Additives  13 Nearest source of possible contamination
				Type 5 = x 1 C Distance 5 Oft. Direction 5 W
				Well disinfected upon completion? Yes No
				Was old well plugged? Yes No
	. RE		+	
	Mich. Des	CEIV		Manufacturer's name Harmotor
	-6,	of Pub	i D	Model number 1.75 HP 3/4 Volts 230
	JAN		Health	Length of Drop Pipe /// ft. capacity / G.P.M.
		3 100		TYPE: Submersible Jet
	BUREAU CE C	199	0	PRESSURE TANK:
	OCCUPATION EN	VIRONIEN		Manufacturer's name
USE A 2ND SHEE		LYTALTH	AL AND	Model number 774 377 Capacity 277 Gallons TER WELL CONTRACTOR'S CERTIFICATION:
15. Remarks, elevation, source	e of data, etc.		Thie	well was drilled under my jurisdiction and this report is true
			to the	e best of my knowledge and belief.
			lu	In Idvau Well Dr. 11. ug 0101
				REGISTEBED BUSINESS NAME REGISTRATION NO.
17. Rig Operator's Name:	1 1 1		Addr	ess
DIENT L	DAIDYON		Sign	ed Kal Wak (Tan) Date 7/23/11
D67d 12:85				Authority: Act 368 PA 1978

## MICHIGAN DEPARTMENT OF PUBLIC HEALTH GEOLOGICAL SURVEY NO WATER WELL AND PUMP RECORD PERMIT NUMBER PA=\* 127 ACT 368. PA 1978 LOCATION OF WELL Range Number Section Number Township Name Fraction NW VA HWIA NUSIA 3 OWNER OF WELL Distance And Direction From Road Intersection Address Address Same As Well Location? Yes No Street Address & City of Well Location 4 WELL DEPTH (completed) Date of Completion Skeite Mat Locate with "X" in Section Below 6-15 87 75 1 Cable tool Dug Driven Rotary Jetted Hollow rod Auger d SE Domestic Type III Public Type I Public Heat pump Irrigation Type IIa Public Test Well Type IIb Public CASING Steel Threaded Height Above/Below Plast c Welded Surface 4 ft 2 in to 71 it depth Weight 375 lbs./ft. DEPTH TO THICKNESS OF STRATUM FORMATION DESCRIPTION in to ft depth STRATUM Grouted Drill Hole Diameter Drive Shoe X Yes \_\_\_ in to \_\_\_\_\_ ft depth 8 SCREEN Not Installed Type # 148 5.5. Diameter 1/4 FITTINGS X R Packer Lead Packer Remer Check Blank above screen \_\_\_ 9 STATIC WATER LEVEL 20 20 It below land surface 20 It after / hrs pumping at / GPM \_\_ ft\_after \_\_\_\_\_ hrs\_pumping at \_\_\_\_\_ G P M 12° above grade 1: WELL HEAD Pittess adapter COMPLETION Approved pit Basement offset WELL GROUTED? No , Yes From \_\_\_ Bentante Other\_ Neat rement No of bags of cement \_\_\_\_\_ Additives 13 Nearest source of possible contamination Type Depter Distance 5 ft Direction 70 Yes No Well disinfected upon completion? 14 PUMP Pump Installation Only Manufacturer's name F + L Model number CAJOS Length of Drop Pipe \_\_\_\_\_ Submersible

PRESSURE TANK

Manufacturer's name Digital

AUTHORIZED REPRESENTATIVE

Capacity

D67d Rev 10-801

USE A 2ND SHEET IF NEEDED

1

AX NO:	MICHIGAN DEP WATER WE			TETROLI
County SCEO/A	Township Name  5 C E O A		Fraction W	Town No. Range Ng.
	ith ot 8m West side	1.12		3. OWNER OF WELL Address Saring/F,i/1 Camp 4859 South 93th Avenue Evart, Ni. 49631 Address Same as Well Location Yes No
Locate with 'x' in Section Below	8 m : 1 =	etch Map		4. WELL DEPTH: Date Completed New Well  ft. 196 Replacement Well  5. Cable Tool Rotary Driven Dug  Hollow Rod Auger/Bored Jetted  6. USE: Household Type I Public Type III Public    Irrigation Type IIa Public Heat Pump  Test Well Type IIb Public
2. FORMATION DESCRIPTION  SAA  C/A	Jd Graus	THICKNESS OF STRATUM  40	DEPTH TO BOTTOM OF STRATUM	7. CASING: Steel Threaded
5 A 1.	1 L	9	5-4	8. SCREEN: Not Installed Gravel-Packed  Type O
	5			tt. Below Land Surface Flowing  10. PUMPING LEVEL: Below Land Surface ft. After hrs. Pumping at Plunger Bailer Air Test Pump
	JAN ISSE			11. WELL HEAD COMPLETION:  Pitless Adapter
				No. of Bags Additives  13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:  Type Distance ft. Direction  Type Distance ft. Direction
USE A 2ND SHEE  15. ABANDONED WELL PLUGGED Casing Diameter	? Yes No	Bentonite Bentonite Yes	Chips	14. PUMP: Not Installed Pump Installation Only  Manufacturer's Name A r m o f v v  Model Number A / 2 HP Volts  Length of Drop Pipe ft. Capacity G.P  TYPE: Submersible Jet Other  PRESSURE TANK:  Manufacturer's Name X - T r û
16. REMARKS: (Elevation, Source		This we	WELL CON	TRACTOR'S CERTIFICATION: d under my jurisdiction and this report is true to the best of my
Name Subcontra	ctor , o	REGISTER Address Signed_	Ki	19 2 2111119

MICHIGAN DEPARTMENT OF PUBLIC HEALTH GEOLOGICAL SURVEY NO

	1			
1	1		1	
1	1	-	1	

WATER WELL	AND P	UMP	RECORD
------------	-------	-----	--------

1 LOCATION OF WELL	PARI 127 A	C1 300. FA	
County. Township Name		Fraction 551/4/	$V_{\Sigma 1/4} N_{\Sigma 1/4} = 0$ Section Number Town Number Range Number $V_{\Sigma 1/4} N_{\Sigma 1/4} = 0$ Section Number $V_{\Sigma 1/4} $
Distance And Direction from Road Intersection			3 OWNER OF WELL
1/87. ide 5 of 9 mile Re 95th au	d or		Address RR 3- 95th aue Event The 49631
Street Address & City of Well Location			Address Same As Well Location? 💢 'res 🔲 No
ocate with "x" " Section Below Ske	eror Mac		4 WELL DEPTH (completed) Date of Completion
			Solution   Steel   Threaded   He gnt   Above/Below   Surface   4 ft   Frederic   Surface   4 ft   Frederic   Surface   4 ft   Frederic   Surface   Frederic   Frede
2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	on to 26 ft. depth  Grouted Drill Hole Diameter  Drive Shoe
Clay	16'	16'	n to t depth No
Dand + grand	44	60'	8 SCREEN Not Installed  Type Clayton machineter 114"
Don 1 + Color	10'	70'	Set between 76 ft and 20 tt
Dan la Gours	10'	80'	FITTINGS X K-Packer Lead Packer X Bremer Check Blank above screen ft Other
Justia harrie	10	-	9 STATIC WATER LEVEL
wantspring			60 tt. below land surface Flow
			10 PUMPING LEVEL below land surface
	1		10000
	-		
			ft_after hrs_pumping at G P M
-			1.1 WELL HEAD COMPLETION Basement offset Approved pit
			12 WELL GROUTED' No Tyes From 10
			Ned tement Bentowite Other
			Adding:
			No of page of cementAdditives
			Type Septe: Distance 10 tt Direction 5.W
			Well disinfected upon completion? Yes No
(20) (V.)	i		14 PUMP Not installed Pump Installation Only  Manufacturer's name Dourse
The Secret Page	1 1		Model numberHPHP
			TYPE Submersible X Jet
			Manufacturer's name aqua - Coin
\$ p. 20 \$ 10 p. 10		4	
			11/2 00
USE A 2ND SMEET IF NEEDED.		16 MAT	Model number W-60 Cacacity 42 Gall
	- 2	16 WAT	Model number W-60 Cacacity 42 Gall ER WELL CONTRACTOR'S CERTIFICATION
USE A 2ND SHEET IF NEEDED.		This	Model number W-60 Cacacity 42 Gall
USE A 2ND SHEET IF NEEDED.		This	Model number W-LO Cacacity 42 Gall  ER WELL CONTRACTOR'S CERTIFICATION  vell was drilled under my jurisdiction and this recort is true  best of my knowledge and belief.
USE A 2ND SHEET IF NEEDED-	3 5	This	Model number W-60 Cacacity 42 Gall ER WELL CONTRACTOR'S CERTIFICATION vell was drilled under my jurisdiction and this recort is the
USE A 2ND SHEET IF NEEDED	3 5	This	Model number W-LO Cacacity 42 Gall  ER WELL CONTRACTOR'S CERTIFICATION  vell was drilled under my jurisdiction and this recort is true  best of my knowledge and celled.  ALCUMAN DELLEGISTRATION NO.  REGISTERED BUSINESS NAME  REGISTERED BUSINESS NAME  REGISTERATION NO.  ALCUMAN DELLEGISTRATION NO.  REGISTERED BUSINESS NAME  REGISTERATION NO.
USE A 2ND SMEET IF NEEDED.	3 5	This v	Model number V-60 Cacacity 42 Gall ER WELL CONTRACTOR'S CERTIFICATION vell was drilled under my jurisdiction and this recort is true best of my knowledge and celed.  All Man Della REGISTERED BUSINESS NAME

	0504071	AFNIT OF	DUDI IC USALTU
ATOLOGICAL CURVEY NO			MP RECORD PERMIT NUMBER
1 LOCATION OF WELL			
County ScalA Township Name		NE 1/4	SW1/45W/4 21 Town Number Range Number 18 N/S 8 5/W
Distance And Direction From Road Intersection		1	3 OWNER OF WELL
0 0	J 95 1	ÂUE	Gary Gilders  Address Evart, Mi. 49631
12 mile ON EAST SIZE			Address Same As Well Location? Yes XX No
Street Address & City of Well Location  Locate with "X" in Section Below Sk	etch Map		4 WELL DEPTH: Date Completed New Well
	1	ERL	// FT. 7 / 4 92   Replacement Well
<u></u>	1		5 Cable rool Aotary Driven Dug
*	x w= 11		6 USE Domestic Type   Public Type III Public   Heat pump
7			Test Well Type IIb Public
S S I MILE			Diameter Steel Fineaded Height Above/hammer
2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	in toft. depthlbs./ft.
5 , ]	1/0	41)	Grouted Drill Hole Diameter in to ft depth
) ADC	70		8 SCREEN Not Installed
Clay + Sauce	43	83	Slot/Gante Length 5
WATERSAND	25	110	Set between 105 ft. and 110 ft.
			Blank above screen3ft. Other
			9 STATIC WATER LEVEL.
			10 PUMPING LEVEL: below land surface
			ft. after hrs. pumping at G.P.M.
			11 WELL HEAD Pitless adapter 12" above grade COMPLETION Basement offset Approved pit
	+		12 WELL GROUTED? No Yes From to t.
	+		Neat cement Bentonite Other
			No of bags of cement Additives
			13 Nearest source of possible contamination  Type
			Well disinfected upon completion? Yes No
	-		Was old well plugged?
			Manufacturer's name # # 12 20 to 12 20
-			Model number 4 - 100 HP Volts 230  Length of Drop Pipe 8 1 ft. capacity GP.M.
			TYPE Submersible Jet

15. Remarks, elevation, source of data, etc.

USE A 2ND SHEET IF NEEDED

16. WATER WELL CONTRACTOR'S CERTIFICATION:

Manufacturer's name

This well was drilled under my jurisdiction and this report is true

Model number

to the best of my knowledge and belief.

AUTHORIZED REPRESENTATIVE

Date .

D67d 2/89

17. Rig Operator's

WELL 1D=16

Authority: Completion: Penalty:

Capacity \_

Act 368 PA 1978 Required Conviction of a violation of any provision is a

Gallons

MICHIGAN DEPARTMENT OF PUBLIC HEALTH GEOLOGICAL SURVEY NO WATER WELL AND PUMP RECORD PERMIT NUMBER PART 127 ACT 368. PA 1978 LOCATION OF WELL Section Number Town Number Range Number (escea JUNIA JULIA NEVA Distance And Direction From Road Intersection 3 OWNER OF WELL 1/2 mi n. of 8 mi on 95th - E. side ED Address 90 Darwen Books COMETREY Well Street Address & Cry of Well Location Locate with "X" n Section Below WELL DEPTH (completed) Sketch Mag Date of Completion 6-7-82 5 Caple tool Rotary Driven Hallow rod Jetted Auger 6 USE Domestic Type | Public Type III Public 8 mile X irrigation Type IIa Public Heat pump 52 Test Well Type IIb Public CASING Steel Threaded | Height Above/Below Plastic Welded 1 MILE Surface 1/2 to 2 in to 50 ft depth DEPTH TO Weight 375 lbs./ft FORMATION DESCRIPTION OF STRATUM STRATUM Grouted Drill Hole Diameter Drive Shoe Yes ☐ No in to \_\_\_\_\_ft depth 8 SCREEN Not Installed Type Clayton muchameter 11/21" Slot/Gaure 80 Length 48. Set between \_ 50 It and 54 It FITTINGS - X K-Packer Lead Packer K Bremer Check Blank above screen \_\_\_\_\_ ft Other \_\_\_\_\_ 9 STATIC WATER LEVEL 28 It below land surface 10 PUMPING LEVEL below land surface 28 It after \_\_\_\_ hrs. pumping at \_\_\_\_\_\_ GPM \_\_\_\_\_\_fr after \_\_\_\_\_\_hrs. pumping at \_\_\_\_\_\_ G.P.M. 11 WELL HEAD 12" above grade Pitless adapter COMPLETION Basement offset 12 WELL GROUTED? No . Yes From \_ Near cement Bentonite Other \_ No of bags of cement \_\_\_\_\_ Additives 13 Nearest source of possible contamination \_\_ Distance \_\_\_\_\_\_tr\_ Direction \_ Well disinfected upon completion? Yes No 14 PUMP Pump Installation Only Not Installed Manufacturer's name Baker (Hand Puras)

TYPE Submersible Jet

PRESSURE TANK

Manufacturer's name

USE A 2ND SHEET IF NEEDED

Model number Capacity

15 Remarks, elevation, source of data, etc

16 WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

17 PE Submersible Jet

PRESSURE TANK

Manufacturer's name

Capacity

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

PRESSURE TANK

Manufacturer's name

Capacity

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Address

PRESSURE TANK

Manufacturer's name

Capacity

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Address

PRESSURE TANK

Manufacturer's name

Capacity

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Address

PREGISTERED BUSINESS NAME

REGISTERED BUSINESS NAME

REGISTERED

WellID = 15

Hev 10-80

Length of Drop Pipe \_\_\_\_

\_\_ ft capacity \_\_\_\_\_

Gallons

NORTH DINING HALL

LOCATION OF WELL	WATERW	LLLA				93670	1	
nty	Township Name		Fraction		Section No.	Town N	lo.	Range No.
Jacepla ance and Direction from Road // ails South ins wills				3. OWNER C	FWELL SUF		7 ± 7	<i>)</i> 123
et Address & City of Well Loca				Address S			-	
ate with 'x' in Section Below	1 9 m	Sketch Map		4. WELL DE	PTH: Date (	0.0000000000000000000000000000000000000	New W	
	iati (	~ (	my y	5. Cable Hollow	Tool A	otary uger/Bored	Driven Detted	Dug
-   -   -   1 MI.		1	Come		Household T	ype IIa Public ype IIb Public	Heat Pu	mp
1 MILE	1 1/2	/ \		7. CASING:	Steel T		Height: Abo Surface:	
FORMATION DESCRIPTION		THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	Diameter	Other		Weight:	j lbs.
rown Sand		50	50	BOREHO			Drive Sh	1 - E C C E C E
ink Clay		1:5	7.5	Diameter	: <u>9</u> in. to 2	15 ft. depth ft. depth	Shale Pa	acker
rown Sand		113	190	8. SCREEN:	☐ Not Installed		el-Packed	
ray Sand		4.5	215	Type <u>SUBIRLESS</u> Diameter SlovGauze <u>10-15-3/12's</u> Length:				5" 25"
•				Set Betwe	en 150	ft. and	215	
				FITTING:	Above Screen	ker Bren		
<u> </u>					WATER LEVEL:		Flowing	
4.5			-	10. PUMPIN	G LEVEL: Below	Land Surface		
1.				□ Plung	ft. After			G.P.I Test Pump
		+	-	-	AD COMPLETION			
		-		☐ Pitless Adapter ☐ 12" Above Gi ☐ Basement Offset ☐ Well House				
				Neat Cement				_ to <u>180</u>
				Туре	ST SOURCE OF PO	istance 1:00		ion_N.E
USE A 2ND SH	EET IF NEEDED			Type 14. PUMP:	☐ Not Installe	oistancePu	mp Installat	
Casing Diameter	in. Depth ft.  Neat Cement Concrete Grout Casing Removed?	Bentonit Yes	e Chips	Manufac Model No Length o TYPE: PRESSI	turer's Name Rumber 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ed Jack H 47 ft C e □Jet [ -tanks	apacity Other	Volts <u>230</u> 340 G.P
top to bottom y" stadi y' bu	10-12-15-12-12 ried baker etg	188 WATE This w	R WELL CON	d under my juri		report is true to		0.0
7. DRILLING MACHINE OPER DEmployee Subcon	ATOR:	knowle	edge and beli	et vell bx:	allin.		1324	TRATION NO.
	illigs-kick at		AND SECTION OF THE PARTY OF THE		. Bright	ou, Mi.		
2-228 9/93		_	$\cap$		200en	- Da		7.77

EOLOGICAL SURVEY SAMPLE NO.			
MAR 12108:	WATER V	VELL REC	CORD MICHIGAN DEPARTMENT
LOGITION OF WELL	ACT 294		
LOCATION OF WELL Township Name		Fraction	Section Number   Town Number   Range Number
Osceola Coreses		NE 1/2	E MANE 14 21 18 N/8. 8 K/W.
istance And Direction from Road Intersections 1/6 Timble Ao of 9 mule on 90 t	LAME -		3 OWNER OF WELL:
16 Trule do of 9 nice on			Address Richard Surger
W Dick of Kd			Evait m 49631
	etch Map:		4 WELL DEPTH: (completed) Date of Completion
			118 tt. 8-29-80
			5 Cable tool X Rotary Driven Dug Hollow rod Jetted Bored
· L			Hollow rod Jetted Bored GUSE: Domestic Public Supply Industry
			Irrigation Air Conditioning Commercial
			Test Well
			7 CASING: Threaded Welded Height: Above/Below
1 MILE	THICKNESS	DEPTH TO	2 in. to 114 ft. Depth   Weight 375 lbs./ft.
FORMATION	OF STRATUM	BOTTOM OF	
			8 SCREEN:
Dand - Clay	40'	40'	Stot/Gauze Co Length 48.  Set between 44 ft. and 18 ft.
00	21	70'	Slot/Gauze 60 Length 48
Clay	30	10	
Dand-trous	30'	100	Fittings:
Dand & Grucel	10'	110'	9 STATIC WATER LEVEL 60 ft. below land surface
Grand- Tient dearing	8'	1181	10 PUMPING LEVEL below land surface  60 ft. after hrs. pumping 10 g.p.m.
france be and			
		1	ft. after hrs. pumping g.p.m.  11 WATER QUALITY in Parts Per Million:
		(	
	_		Iron (Fe)
			HardnessOther
		-	12 WELL HEAD COMPLETION: In Approved Pit
		1-1	Pitless Adapter 12" Above Grade
		,	13 Well Grouted? Yes No
	_	_	Depth: Fromft. toft.
			14 Nearest Source of possible contamination
			70 feet W Direction Septia Type
	-		Well disinfected upon completion Yes No
			VOI NOT INSTANCE
			Manufacturer's Name HP Voits
			Length of Drop Pipeft. capacityG.P.M.
			Type: Submersible
			Jet Reciprocating
16 Remarks, elevation, source of data, etc.			R WELL CONTRACTOR'S CERTIFICATION:
To hemarks, elevation, society of data, etc.			
. The angle ST		wal	pest of my knowledge and belief. It is report is true the state of the
र को क्षेत्र ए <b>वर</b>		REG	GISTEREO BUSINESS NAME REGISTRATION NO.
FI CV IFT'N		Addres	ss 6 Vall, Mi 49631
DISTS 10 BOCK		4	2, 6 2 Taldion Date 8-29-10
		Signed	AUTHORIZED REPRESENTATIVE Date

100M (Rev. 12-68)

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION WATER WELL AND PUMP RECORD TAX NO: PERMIT NO: Completion is required under authority of Part 127 Act 368 PA 1978 38-60900589 96-11-0325 Failure to comply is a misdemeanor 1. LOCATION OF WELL County Township Name Section No. Town No Range No. NE 1/4 NW 1/4 NW4 OCEOLA OCEOLA Distance and Direction from Road Intersection 3. OWNER OF WELL SPRING HILL CAMP 1/8 MILE SOUTH EAST CORNER OF Address LOGIH AVENUE AND EIGHT MILE 7717 95 TH AVENUE EVART, MI. 49831 NINTY FIFTH AVE. 7717 Address Same as Well Location X Yes No Street Address & City of Well Location Locate with 'x' in Section Below Sketch Map 4. WELL DEPTH: Date Completed New Well 04, 09,97 Replacement Well 95th 5. Cable Tool Rotary ☐ Dua Hollow Roa Auger/Bored Jetted 6. USE: Household Type I Public Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat Pump Test Well Type IIb Public 7. CASING: .Steel .Threaded Height: Aboye/Below Plastic Welded Surface: DEPTH TO BOTTOM OF STRATUM THICKNESS FORMATION DESCRIPTION STRATUM 5 in. to 235 depth Weight: 3 Diameter: in. to \_\_\_ft. depth BROWN CLAY 17 Drive Shoe BORE HOLE: Diameter: B in. to \_\_\_ft. depth 73 90 Shale Packer BROWN SAND \_in. to \_\_\_\_ft. depth 19 GRAY BROWN SAND FINE 109 8. SCREEN: Not Installed Gravel-Packed Type FLASTIC HARD GRAY CLAY 12 121 Diameter 5 in. SlovGare 12 Length: ft. and \_\_\_\_ MEDIUM BORWN GRAY SAND 135 Set Between SEE #2 14 K-Packer Bremer Check Blank Above Screen ft. Other GRAY CLAY AND SAND 140 150 9. STATIC WATER LEVEL: GRAY CLAY Flowing 24 tt. Below Land Surface GRAY CLAY AND SAND 153 10. PUMPING LEVEL: Below Land Surface 24 ft. After 2 hrs. Pumping at \_\_ 150 G.P.M. GRAY SAND 154 Plunger Bailer 11. WELL HEAD COMPLETION: HARD GRAY CLAY 155 XPitless Adapter 12" Above Grade GRAY CLAY AND SAND 170 Well House Basement Offset 172 90 ft. 12. WELL GROUTED? ☐ No ☑ Yes From @ HARD GRAY CLAY 180 Neat Cement Other GRAY SAND Bentonite Additives PLYMER No. of Bags 14 HARD GRAY CLAY 182 13. NEAREST SOURCE OF POSSIBLE CONTAMINATION: Type SEPTIC Distance 75 ft. Direction CO MEDIUM HARDGRAY CLAY 191 Distance \_\_\_\_\_ft. Direction\_ USE A 2ND SHEET IF NEEDED 14. PUMP: Not Installed Pump Installation Only Yes No 15. ABANDONED WELL PLUGGED? Manufacturer's Name\_RED\_JACKET Casing Diameter \_\_\_\_\_in. HP 5 Volts 230 Model Number 10EC PLUGGING MATERIAL: ☐ Neat Cement Bentonite Slurry Length of Drop Pipe <u>SØ</u> ft. Capacity <u>BØ</u> G.P. M. TYPÉ: Submersible Jet Other Concrete Grout Cement/Bentonite Slurry Bentonite Chips Yes No Casing Removed? No. of Bags\_\_\_\_ PRESSURE TANK: Manufacturer's Name CUSTOMER TO INSTALL 16. REMARKS: (Elevation, Source of Data, etc.) \_\_\_Capacity\_\_\_\_\_ Gallons Model Number\_

SEE PAGE TWO FOR REST OF FORMATION DESCRIPTION

17. DRILLING MACHINE OPERATOR: Employee Subcontractor

Name JEFF ALLSHOUSE

18 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my. knowledge and belief.

REGISTERED BUSINESS NAME Well Drilling Inc. 3766 Noble

Brighton MI 48116

WELL 1D:79

AX NO:	DRINKING WATER	R & RADIOLOG				PERMIT NO:	To	
AX NO: -2.96.09.0586	Completion is req	uired under author	ority of Pa	Part 127 Act 368 PA 1978				
LOCATION OF WELL		Failure to comply is a misde				96-11-0325		
County DCEOLA	Township Name OCEOLA		Fraction NE <sub>1/NW</sub>	1/4 NW/4	Section No. 28	Town No.	Range No.	
Distance and Direction from Road Int 1/8 MILE SOUTH/EAST AVENUE AND EIGHT MILE	CORNER OF 190 LE.			3. OWNER (	SERING 7717 S	S HILL CAMP STH AVENUE MI. 4963		
ocate with 'x' in Section Below	on NINTY FIFTH	Sketch Map	1/	4. WELL DE			New Well	
Scale With X in Section Below	1 8 Ma	le /		235	ft. 04/ (	19/97 DF	Replacement Well	
-+	D. V	950	ch		Tool Au	tary D ger/Bored D	The second secon	
	e X	Con	·e·		Household Tyles Ty	pe IIa Public 🔲 H		
1 MLE —	1			7. CASING	Steel Th		nt: Above/Below	
2. FORMATION DESCRIPTION		THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	Diameter	Otherin. to	ft. depth Weig	-	
DOCE NO.				BOREHO	in. to		rive Shoe	
PAGE #2 GRAY SAND		2	193	Diamete	r:in. to in. to		hale Packer	
HARD GRAY CLAY		1	194		Not Installed			
GRAY SAND		1	195		re			
MEDIUM HARD GRAY C	CLAY	2	197	Set Betw FITTING	een	tt. ander Bremer C	ft.	
GRAY SAND		19	199 218		WATER LEVEL:			
GRAY CLAY			LID		ft. Below Land	Surface	Flowing	
FINE GRAY SAND		17	235		IG LEVEL: Below L		2211	
HARD SRAY CLAY		10	245	Plun	ft. After ger Bailer	hrs. Pumping Air	atG.P.M. Test Pump	
*SCREENS*				11. WELLH	EAD COMPLETION	-		
GRAVEL PACKED WELL		90	110		ss Adapter ement Offset	☐ 12" Abo	ve Grade	
90 FT TO 235 FT. 90 FT TOTAL LENGTH	1 OF	120 170	140	12. WELL G	ROUTED? N	Sentonite	other	
SCREEN AREA		195	235		ST SOURCE OF PO			
	0.000				Di:	stanceft	Direction	
USE A 2ND SHEE				14. PUMP:	Not Installed	Pump I	nstallation Only	
15. ABANDONED WELL PLUGGE Casing Diameter PLUGGING MATERIAL: Cement/Bentonite Slurry No. of Bags	n. Depth Neat Cement Concrete Gro	tt	Chips	Model N Length TYPE: PRESS	Submersible	HPft. Capac	tyG.P. I	
16. REMARKS: (Elevation, Source	ce of Data, etc.)			Manufa	cturer's Name	Canacia	Gallons	
PAGE THO OF FORM	ATIONS	Ca Alam	والمساول			Capacity	Out of the	
96-1!-0325		This we	WELL COM was drilled tige and be	d under my jui	ERTIFICATION:	eport is true to the	best of my.	
17. DRILLING MACHINE OPERA  Employee Subcontra			41 0000		rilling In	c.	REGISTRANONNO	

		ACT 368, P.A	UMP RECORD PERMIT NUMBER
CATION OF WELL Township Name		Fraction	Section Number   Town Number   Range Number
	112		
and Direction From Boad Intersection	0//7	182 14/	NEVANE/A & 9 /8 N/8 8 8/
INTERSECTION  dre is & City of Well Location	STOOK	NER	Address Same As Well Location? Tes \( \begin{array}{c ccccccccccccccccccccccccccccccccccc
ith "X" in Section Below	Skeich Map		4 WELL DEPTH (completed) Date of Completion
i K			77 " 110-23-87
			5 Cable tool Dotary Driven Dug
	3-1	mile	Hollow rod Auger Jetted
- T	1007h. AV	e	6 USE Domestic Type I Public Type III Public    Irrigation Type III Public Heat pump   Test Well Type III Public   Heat pump   Tope III Public   Heat pump
FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	Grouted Drill Hole Diameter
14 Red	5'	51	in_toft_depth
AND YEllow	18'	23	8 SCREEN Not installed .  Type My MUES Trameter 1 Ty
PAVEL	121	351	Set hetween 73 ft and 72 ft
gndyellow	- 30'	651	FITTINGS L K-Packer Lead Packer Remer Check  Blank above screen ft Other
			9 STATIC WATER LEVEL
AND WhITE	12	771	60 It. below land surface Flow
			10 PUMPING LEVEL below land surface
			ft_afterhrs. pumping at G.P.M
			11 WELL HEAD Pitless adapter 12-above grade COMPLETION Basement offset Approved pit
	~		12 WELL GROUTED? No Wes From 10
			Neat cement
			No of bags of cement Additives
			13 Nearest source of possible contamination  Type Septic Distance 79tt Direction 500
RECEIVED			Well disinfected upon completion?
Mich. Depr. of Public Health	1 3		14 PUMP Pump Installation Only
DEC 1 4 1987		+	Manufacturer's name

15. Remarks, elevation, source of data, etc.

D67d

1Rev 10-801

USE A ZND SHEET IF NEEDED

Eureau of Environmental and

"ecupational Health - GWOS

16. WATER WELL CONTRACTOR'S CERTIFICATION:

Length of Drop Pipe \_\_\_\_\_

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Submersible

Model number \_

PRESSURE TANK Manufacturer's name \_

\_\_ Volts \_

ft capacity \_\_\_\_\_ G P M.

Capacity .

Gallons

Well 1D = 27

MICHIGAN	DEPART	MENT OF	PUBLIC HEALTH
GEOLOGICAL SURVEY NO. WATER	WELL A	ND PU	MP RECORD PERMIT NUMBER
1 LOCATION OF WELL			TEMMIT NOMBER
County Townsprp Name /		Fraction	Section Number   Town Number   Range Number
6/2001		1/1/11	1. 1 00 15/
Oscapla // 5 C 2 O / A Distance And Direction From Road Intersection		WW 14.	3 OWNER OF WELL
10897 - 8 Hile Road			Bill Weinberg Address 10397 - 8 Mile Rd.
			Evart, Mi. 49631
Street Address & City of Well Location			Address Same As Well Location? Yes No
Locate with "X" in Section Below Sk	elch Map		4 WELL DEPTH: Date Completed New Well
X	i		1/FT. 15 2196 Replacement Well
L_1_1_1_	1		5 Cable tool Rotary Driven Dug
	1011,		Hollow rog Auger Jetted
V			RUCE CO
			Test Well Type IIs Public Heat cump
			Diameter Steel Threaded Height Above/Below
1 MILE			Plastic Welded Surfaceft.
2 FORMATION DESCRIPTION	THICKNESS	DEPTH TO BOTTOM OF	
	STRATUM	STRATUM	in, toft, depth Groyted Drill Hole Diameter
$\alpha / \alpha /$	,		in, to 20 It, depth Drive Shoe Yes
( AY+ (XXAUE)	10	11)	in. toft. depth No
7 1			8 SCREEN.   Not logralled,
(" ) = 11	10	20	Type Harlard )n. Horameter 3/19
- /		10.73	1700 - Unamerical - 17
Saldis (TVAII)	20	40	
1, 200		-	
	=	42	
900		1-	Blank above screen ft Other
	-1	211	
1 / Y + (JV AUSI	1	10	ft. below land surface Flow
-/ / Abi	on. OF	E/11	10 PUMPING LEVEL: below land surface
) 4 Nd a (120:7"	cn. 96 t	art.	ft. after hrs. pumping at GPM
		C1 ,1.11.	ft. after hrs. pumping at G.P.M.
	SED	7 -	
	UCP	13 1995	11 WELL HEAD Pitless adapter 12 above grade
BURE	All the same		Basement offset Approved but
000	ווסידוביין	HOMMENT	12.WELL GROUTED? No Yes From () to 1 ft.
	UPATIONAL	HEALTH	iving tes from 10 22 in
			Neat cement Bentonite Other
			4
		-	No of bags of cement Additives
			5
	-		
			Well disinfected upon completion?
			Was old well plugged?
			14 PUMP Not installed Pump installation Only
			Manufacturer's name Air no To
			Model number A-12 HP 1/2 Volts 230
			Length of Drop Pipeft. capacity G.P.M.
			TYPE Submersible Jet
			PRESSURE TANK.
			Manufacturer's name Y-/: )
USE A 2ND SHEET IF NEEDED			Model number 10 × 202 Capacity 41 Gallons
15. Remarks, elevation, source of data, etc.		16 WATE	R WELL CONTRACTOR'S CERTIFICATION:
15. Hallians, Elevation, Source of Gala, etc.		10 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ell was drilled under my jurisdiction and this report is true
			pest of my knowledge and belief.
		Kit	Waldron Well Drilling 0907
			REGISTERED BUSINESS NAME REGISTRATION NO.
17. Rig Operator's Name:		Address	s 10770/- 8 Mile Rd Evart, MI.
Gordan Bissitt			1/1/1/1/1/ 1/1/1/1/1/
		Signed	AUTHORIZED REPRESENTATIVE Date

Ø67d 2/89

WELL ID=26

AUTHORIZED REPRESENTATIVE
Authority:
Completion:
Penalty:

Act 368 PA 1978
Required
Conviction of a violation
of any provision is a

ACT 294 PA 1965 MICHIGAN DEPARTMENT OF

LOCATION OF WELL				PUBLIC HEALTH
County	Twp.	-M	Fraction	Section No. Town Range 74 NWA 28 18 N/8. 8 9/W.
DSPENDA  Distance And Direction fro  TWIN CIECK  Street address & City of W  2	Road Intersections	OWNER NO.	DEPTH TO ВОТТОМ ОБ	3 OWNER OF WELL: Spr, Ng Hill Bible CAMP Address EVART Michigan  4 WELL DEPTH: (completed) Date of Completion
		30	30	45 ft. /3/17/68  5 □ Cable tool □ Rotary □ Driven □ Dug  Hollow rod □ Jetted □ Bored □ □
SAWJ - E. Clay - White-area	(0:08	7	37	6 USE: Domestic Public Supply Industry    Irrigation Air Conditioning Commercial   Test Well
White-are	s=SANd- be	Aten 8	45	7 CASING: Threaded Welded Height: Abov/Below Diam.  Zin. to 4 ft. Depth surface 4 ft. Weight 7 J lbs/ft.
				Fittings:  9 STATIC WATER LEVEL  2/ ft. below land surface  10 PUMPING LEVEL below land surface  ft. after / hrs. pumping / 0 g.p.m.
			71	ft. afterhrs. pumpingg.p.m.  11 WATER QUALITY in Parts Per Million:  Iron (Fe)Chlorides (CI)  Hardness
				12 WELL HEAD COMPLETION: In Approved Pit    Pitless Adapter   12" Above Grade  13 GROUTING:   Well Grouted?   Yes   No   Material:   Neat Cement     Depth: Fromft. toft.  14 SANITARY:
				Nearest Source of possible contamination feetDirectionType Well disinfected upon completion Yes No  15 PUMP:  Manufacturer's NameModel NumberHP
	DOED INFO. ANGLER. I DORRECTED BY  ADDITION BY.	ITEM NO.	This we	WELL CONTRACTOR'S CERTIFICATION:  ell was drilled under my jurisdiction and this report is true best of my knowledge and belief.  ALLE DESCRIPTION NO.  REGISTERED BUSINESS NAME  REGISTRATION NO.  LUCLIAN HOLIZED REPRESENTATIVE

100M

D67D

MICHIGAN DEPARTMENT OF PUBLIC HEALTH 3 2 1982 WATER WELL AND PUMP RECORD PERMIT NUMBER LOCATION OF WEL ownship Name County Address Street Addres / Lity of Well Location Address Same As Well Location? WELL DEPTH (completed) Locate win X n Section Below Sketch Man Cable tool Rotary Dug Hollow rod Auger 6 USE Domestic Type I Public Type III Public × irrigation Type IIa Public Heat pump } M1. Test Well Type IIb Public CASING Steel Threaded Height Above/Balow Plastic Welded Surface / 2 in to 80 ft. depth THICKNESS DEPTH TO BOTTOM OF Weight 3/25/bs./ft. FORMATION DESCRIPTION OF STRATUM in to \_\_\_\_\_ ft, depth STRATUM Grouted Drill Hole Diameter Drive Shoe \_\_ in to \_\_\_\_ ft. depth it depth Not installed Type Johnson Diameter\_ FITTINGS K.Packer Lead Packer Bremer Check Blank above screen 1511 9 STATIC WATER LEVEL \_\_\_\_ ft. below land surface 10 PUMPING LEVEL, below land surface 62 It after 1 hrs. pumping at 13 GPM \_\_\_\_ hrs pumping at \_\_\_\_\_ G P M 11 WELL HEAD Pitless adapter 12" above grade COMPLETION Approved pit Basement offset 12 WELL GROUTED No Yes From Bentonite Other Near cement No of pags of cement \_\_\_\_\_\_ Additives \_\_\_\_\_\_

13 Nearest source of possible confamination Type 5 e P T/ Distance 60tt Direction W Well disinfected upon completion? Yes No 14 PUMP Pump Installation Only Length of Drop Pipe \_ ft capacity \_ Submersible PRESSURE TANK

USE A 2ND SHEET IF NEEDED 15 Remarks elevation, source of CHESE PINFO BY DRILLER, ITEM NO. \*CORRECTED BY -" YB NCITION BY / ELEVATION DEPTH TO ROCK

Rev 10-801

2

16 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true

to the best of my knowledge and belief

OLOGICAL SURVEY SAMPLE NO.						
4-2 FEB 2 C 1976	WATER V	VELL RECO	RD	MICHIGAN DEPARTMENT OF PUBLIC HEALTH		
LOCATION OF WELL Township Name		Fraction	Sect	on Number	Town Number	Range Number
OSCEOLA OSCEOLA OSCEOLA Astance And Direction from Road Intersections  A. 7 A N e f-6-1 abo. No a	A	NERNE		2/	/ > N/\$.	8 dw.
Stance And Direction from Road Intersections	5441 KA	- 1221: 3	OWNER OF WELL:	MAS	DIANK	CIAFF
ver on south side of	for long	124.5	Address		6.112	* 6 - 2.
treut address & City of Well Location			- 1.0-			7, 50
Locate with "X" in section below     Sk	ketch Map:		WELL DEPTH: 100			
	fencha	Rd 5	57 □ Cable tool	Z Botan	2 - /3 v Drive	
			Hollow rod	Jette	d Bore	d 🗆
*		6	USE: Oomestii			Industry
	£1		Test Wel		conditioning	_ Commercial
Soum	in Ad.	7	CASING: Thread	ed Welded		1
1 MILE	THICKNESS				7	ft.
FORMATION	OF STRATUM	BOTTOM OF	in. to	55 ft. Depti		2 Yes No
	,	8	SCREEN:			
SAND Yellow.	15	151	Type: 527 Sigh/Gauze	-	Dia.: 1 4	. "
5 AND AND Some C'AY Les	6 10'	25'	Set between 5	7 to and	Length	7
SAND HAD SAME ON A	10		Fittings:	5_ II. and _	5/-"	
5 AND Yellow.	25	50	STATIC WATER L	en u	chec	
SANDINGTE.	-1		and the second second	3.1,22.31	rface .	
SANO WALLE.	1	5/ 1	O PUMPING LEVE			
			50 ft. a	fter / hrs.	pumping	g.p.m.
			ft, a	after hrs.	pumping	g.p.m.
		1	1 WATER QUALIT	y in Parts Per	Million:	
			Iron (Fe)	Chlo	rides (CI)	
			Hardness	Othe	r	
graf allegations		1	2 WELL HEAD CO			Pit
		1		s Adapter	Above C	Grade
		ľ	Well Grouted? Neat Ceme		The same of the sa	
			Depth: From_	ft.	toft	
		1	4 Nearest Source			- 1 Tu
1					etion Ques	
*		1	5 PUMP:		Not installed	
			Manufacturer's			A
					HP Vo	
7			Type: Sub			
			_ Jet		Reciprocation	9
T6 Remarks, elevation, source of data, etc.	1 1		ELL CONTRACT			Lau dee
Use 50' DE Blok	PIFE	This well to the bes	was drilled under	my jurisdict e and belief.	on and this repo	rt is true
Use 50' OF Dlap	1-11	HEGIS.	TERED BUSINESS N	AME S	REGIS	TRATION NO.
1 1/2 11 107 67	U 100.	Address	SH,	14	160 1	1116
The state of the s	* * * * * * * * * * * * * * * * * * * *		//		11 - 11	11.6 7
2	in the site	J.	1. 1 1			

ELEVATION

EOLOGICAL SURVEY SAMPLE No.		
7	WATER WELL REC	ORD MICHIGAN DEPARTMENT
LOCATION OF WELL	ACT 294 PA198	5 OF PUBLIC HEALTH
Township Name	Fraction	Section Number Town Number Range Number
O SCRO/A O SCRO!	A SEL	
Edellon west side	50014 2504ds	Address R #
itreet address & City of Well Location	01-10	EVATT MILL
	etch Map:	4 WELL DEPTH: (completed) Date of Completion
		47 11, 9 521-74
		5 Cable tool Rotary Driven Dug
×		6 USE: Formestic Public Supply Industry
1   1   7   1	4.7	Irrigation Air Conditioning Commercial
	AUMAN	Test Well
	116	7 CASING: Threaded Welded Height: Above/Below
1 MILE	THICKNESS DEPTH TO	Surface ft.  2 In. to 44 ft. Depth Weight 3,7 Hbs./ft.
FORMATION	OF BOTTOM OF STRATUM	in. toft. Depth   Drive Shoe? Yes
	1	8 SCREEN:
SAND YEllous	4 4	Type:Dia.:
E 0 - 1 1 0 1 1	2'6'	Slot/Gauze Length
SAND TC/AU.	2 6	Set between 43 ft. and 47 ft.
Clay feet.	10' 16'	- 1
4	1-1/201	9 STATIC WATER LEVEL
SAND Yellow-	22 38	ft, below land surface  10 PUMPING LEVEL below land surface
	+ 401	40 ft. after 1 hrs. pumping 12 g.p.m.
Chy 10	7 , 50	
SAND Yellow	7/47	ft. after hrs. pumping g.p.m.
	. /	11 WATER QUALITY in Parts Per Million:  Iron (Fe) Chlorides (CI)
		Tron (Fe) Cinorides (C)/
		HardnessOther
and granter for the second		12 WELL HEAD COMPLETION: In Approved Pit
		Pitless Adapter 12" Above Grade  13 Well Grouted? Yes No.
		Neat Cement Bentonite
		Depth: Fromft. toft.
		14 Nearest Source of possible contamination
		feetDirection NONETyp  Well disinfected upon completion GYes No
		15 PUMP: Not installed
		Manufacturer's Name
		Model Number HP Volts
Mary September	fal.	Length of Drop Pipeft. capacity G.P.M.
	*	Type: Submersible
		Jet Reciprocating
USE A 2ND SHEET IF NEEDED		
16 Remarks, elevation, source of data, etc.		R WELL CONTRACTOR'S CERTIFICATION: ell was drilled under my jurisdiction and this report is true
1 tom Tapport	1/e to the	hest of my knowledge and helief.
Flora Talla.	RE	GISTERED BUSINESS NAME REGISTRATION NO.
	Addres	is f#1 6 kg f = MICH
15-16		Foliat Done Date 11-504. 24
		AUTHORIZED REPRESENTATIVE Date
D67d 100M (Rev. 12-68)	1D = 18	
WELL	10 - 10	

OLOGICAL SURVEY SAMPLE No.					
FEB 2 0 1976	WATER WELL	RECORD	MIC	CHIGAN DEPART OF PUBLIC HEALT	0.000
LOCATION OF WELL OUNTY Township Name	Fee	action .	Section Number T		inge Number
21.111 01.	11 4	in Alexander		18 N/S!	X Nw.
istance And Direction from Road Intersections	(A27	3 OWNER OF	WELL:		
To TAKE LUART AN	5 5 5 50 14	Address	21/1/	1-114	-6-
	£*,				~
treet address & City of Well Location	Sketch Map:	A WELL DER	TH: (completed) Da	7 /1 /1/	10
Locality with the second secon	skettin Mab.		7.7	. 1 A. 2	
	- Panshi	5 Cable			Dug
		Hollov	-	=	
*		6 USE: D	romestic Public	Supply	ndustry
×//		=		onditioning [	Commercial
	valt Ad		Threaded Welded	Height: Above	/Relow
I MILE	VA4	Diam.	medded Welded	Surface /	
		TOM OF 2 in. to	Q 5ft. Depth	Weight 3. 7	96s./ft.
FORMATION		RATUMin. to	ft. Depth	Drive Shoe? Y	es No
- 1 11 11 -		8 SCREEN:	- · - T	1	1 1
SANATOLAY	360 3	4Type:	5 et	Dia.:	, ,
1 1A4 Fed	15:15		eft. and	/	
1		, Fittings:	10	1	
Cort NO te AY,	30 8	9 STATIC W	5 flmis	chee	7
111111 6211	10'0		ft. below land surf	face	
21114 5-111191	14 71	10 PUMPINI	G LEVEL below land s	urface	
SANA USIOW.	7 9	9 10	t. after / hrs. p	umping	g.p.m.
	6 /	/		,	
			ft. after hrs. p		g.p.m.
			Chlor		
			sOther		
			EAD COMPLETION:	In Approved Pit	
			Pitless Adapter [ outed? Yes No	Above Grad	le .
			at Cement Bentoni		
			Fromft. t		
			Source of possible co		
			feet Direction		TAAM
		15 PUMP:		lot installed	
		Manufac	turer's Name	THE FAL	11
			Number 412	HP/ Volts	200
		Length	of Drop Pipe 70 ft		
		Type:	Submersible	7.62	
			L Jet	Reciprocating	
USE A 2ND SHEET .F NEEDED		_1			
16 Remarks, elevation, source of data, etc.	17		TRACTOR'S CERTIFI		s true
TEN A TEN DATES	TEM NO.	to the best of my kn	owholge and belief.		10
* ***		REGISTERED BASI	NESS NAME	REGISTRA	TION NO.
- 10.1 SY-V		Address	11 211	Menn.	1/1
ELEVATION DEPTH TO ROCK		1/1	- 17	1111	- /
Derin to nock		Signed Tol	Typelle	Date 1:	10.23
D67d 100M (Rev. 12-68)		AUTHORIZE	REPRESENTATIVE		

WELL 1D=12

GEOLOGICAL SURVEY NO WATER WELL AND PUMP RECORD PERMIT NUMBER PART 127 ACT 368, P.A. 1978 LOCATION OF WELL SE1/4 N Section Number Town Number County 56801 North of Evart on Evart Rd. 3 OWNER OF WELL ON WEST SIDE OF Rd. Evant, Mich Address Address Same As Well Location? Street Address & City of Well Location WELL DEPTH (completed) Locate with 'X" in Section Below 115 Rotary Dover 5 Cable tool Dug Hollow rod Auger 6 USE Domestic Type III Public Type I Public Irrigation Type IIa Public Heat oumo Test Well Type IIb Public Steel Threaded Height Asset Below Plastic Welded Surface \_ in to 105 tt depth THICKNESS DEPTH TO Weight \_\_ FORMATION DESCRIPTION BOTTOM OF OF in to \_\_ ft depth STRATUM STRATUM Grouted Drill Hole Diameter Drive Shoe \_ in to \_\_\_\_\_ ft. depth ☐ No ft. depth UULNSOW Diameter Type \_ 12 105 Lead Packer Bremer Check Blank above screen 9 STATIC WATER LEVEL \_\_\_ fr. below land surface 10 PUMPING LEVEL below land surface \_ ft after \_\_\_\_\_ hrs pumping at \_\_\_\_\_ G P M \_\_\_ ft after \_\_\_\_\_ hrs pumping at \_\_\_\_\_ GPM 11 WELL HEAD Pitless adapter 12 above grade COMPLETION Approved pit Basement offset 12 WELL GROUTED? No Yes From\_ Neat cement Bentonite No of bags of cement \_\_\_\_ \_\_\_ Additives 13 Nearest source of possible contamination Type Septic Distance 50 tt Direction Warth RECEIVED Well disinfected upon completion? Yes No Mich. Bent of Public Health 14 PUMP Not installed Pump installation Only Manufacturer's name 51809 HP 3/4 Volts 2 \_ !! :apacity \_\_ SALES OF LAND IN HOLE Submersible PRESSURE TANK Manufacturer's name . Gallons \_ Capacity \_ USE A 2ND SHEET IF NEEDED 16. WATER WELL CONTRACTOR'S CERTIFICATION: 15 Remarks, elevation, source of data, etc. This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief ron Well REGISTERED BUSINESS NAME Rev 10-80 D674 WELL ID = 13

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

OLOGICAL SURVEY SAMPLE No.			
W	ACT 294	PA 1965	RD MICHIGAN DEPARTMENT OF
LOCATION OF WELL			PUBLIC HEALTH
Sceola Osceola  stance And Direction from Road Intersections  Ow		Fraction VEW DE	Section No. Town Range 8 17 18 N/8. 8 8/W.
stance And Direction from Road Intersections	NER No		3 OWNER OF WELL:
Lucas Rd- EVART. mich			Address R. #3
eet address & City of Well Location FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	4 WELL DEPTH: (completed) Date of Completion 148 ft. 4/15/69
SANd-	181	181	5 Cable tool Rotary Driven Dug
		90'	6 USE: Domestic Public Supply Industry   Irrigation Air Conditioning Commercial
FINE-brown-SANA-WATERDAM	.50	140'	Test Well Test Welded Height: Above/Below
MAY el & SAND-WATER DEARING	81	148'	Digm. Inreaded Welded Height Above Below surface 5 ft. Weight 375 lbs/ft.
/			in. toft. Depth Drive Shoe? Yes No
			8 SCREEN: Type: 129(5.5.) Dia.: 11/4 Slot/Gauze 80 Length 48'
			Set between 144 ft. and 148 ft.
			Fittings:
			9 STATIC WATER LEVEL
			10 PUMPING LEVEL below land surface  80 ft. after 1 hrs. pumping 10 g.p.m.
			ft. afterhrs. pumpingg.p.m.
			11 WATER QUALITY in Parts Per Million:
			Iron (Fe)Chlorides (CI)
			12 WELL HEAD COMPLETION: Tin Approved Pit
			Pitless Adapter 12" Above Grade
	1		13 GROUTING: Well Grouted? Yes No
			Material: Neat Cement  Depth: Fromft. toft.
			14 SANITARY:
			Nearest Source of possible contamination  75 feet Source Type
			Well disinfected upon completion Yes No
			15 PUMP:
	-	-	Manufacturer's Name /
			Length of Drop Pipeft. capacityG.P.M.
			Type: Submersible Reciprocating
Remarks, elevation, source of data, etc.	1		WELL CONTRACTOR'S CERTIFICATION:
Address thing the second of the second		200000000000000000000000000000000000000	ell was drilled under my jurisdiction and this report is true lest of my knowledge and belief.  MAN 2441 Milling 0935
<b>≪CO</b> RFESSE, y		Crac.	REGISTERED BUSINESS NAME REGISTRATION NO.
Some see. P.		Addres	Start, Mich!
Actionation the		Signed	AUTHORIZED REPRESENTATIVE DOIS 4/30/69
067D 100M 6-66 Well D=	3,000		VEN CORN

EOLOGICAL SURVEY SAMPLE No.			
	WATER V		
LOCATION OF WELL County Township Name		Terren	PUBLIC HEALTH
05 Ceo LA OS Ceo LA Distance And Direction from Road Intersections		SE14	Section Number Town Number Range Number 18 N/9. 8 N/9. 3 OWNER OF WELL:
200 FT NORTH OF PENASA	49 Rd. 0		Address Address
Street address & City of Well Location 17014 2  Locate with "X" in section below Sket	ch Map:		14 WELL DEPTH: (completed) Date of Completion
/v/\	172143,4	and.	72 ft. /1/3.76  5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug
w	מות מונינו	2100	Hollow rod Jetted Bored 5  6 USE: Domestic Public Supply Industry
	Se MANT	01	Irrigation Air Conditioning Commercial
	THICKNESS	DEPTH TO	CASING: Threaded Welded Height: Above/Below Surfaceft.
2 FORMATION	OF STRATUM	BOTTOM OF STRATUM	in. toft. Depth   Drive Shoe? Yes No
SURFACE SAND	2	2	Slot/Gauze 60 Length 4 FeeT
SAND & GRAVEL	70"	72"	Set between 68 ft. and 72 ft. Fittings:
			9 STATIC WATER LEVEL  1t. below land surface
			10 PUMPING LEVEL below land surface  28 ft. after 2 hrs. pumping g.p.m.
			ft. after hrs. pumping g.p.m.  11 WATER QUALITY in Parts Per Million;
			Iron (Fe) Chlorides (CI)
			HardnessOther
			Pitless Adapter X 12" Above Grade
			13 Well Grouted? Yes No Neat Cement Bentonite
			Depth: Fromft. toft.  14 Nearest Source of possible contamination
			56 feet Direction Typ.  Well disinfected upon completion Yes No
		-7	15 PUMP: Not installed  Manufacturer's Name
			Model Number HP Volts Length of Drop Pipe ft. capacity G.P.M.
			Type: Submersible  Jet Reciprocating
USE A 2ND SHEET IF NEEDED			
16 Remarks, elevation, source of data, etc.		This we	WELL CONTRACTOR'S CERTIFICATION:  Ill was drilled under my jurisdiction and this report is true  test of pay knowledge and bylef.  ON CONTRACTOR'S CERTIFICATION:  ISTEREO BUSINESS NAME  REGISTRATION NO.
-31			ISTEREO BUSINESS NAME REGISTRATION NO.
S JUNION BY	4.0	Address Signed	1 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
D67d 100M (Rev. 12-68) Well 1	D=5	_	AUTHORIZED REPRESENTA

SEOLOGICAL SURVEY SAMPLE No.					
3\$"   70 g	WATER	WELL DEC			
	WATER \		65 — OF		
1 LOCATION OF WELL Country Township Name	,	Fraction	SC. SCO PUBLIC HEALTH    Section Number   Town Number   Range Number		
1.SCEO/A 1 SCEO	A	500,5	17 18 N/S. 8 EN		
Distance And Direction from Road/Intersections	11 27	-1/	3 OWNER OF WELL:		
12 mile EAST OF INGERS	STALL ALL	1	Address Enat Wind		
PENASMA KU VHS	15-1115	+	Address Evart, Mich.		
Street address & City of Well Location K# 5  Locats with "X" in section below Ske	etch Map:		4 WELL DEPTH: (completed) Date of Completion		
			134 11 - 4/1/71		
		1	5 Cable tool Rotary Driven Du		
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	X 2 N 45 h A A		Hollow od Jetted Bored		
	2 10 10 11 1	C. /	6 USE: Domestic Public Supply Industry    Irrigation		
			☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ☐		
Lixi I W			7 CASING: Threaded Welded Height: Above/Below		
1 MILE	T amamaa.		Surfaceft.		
2 FORMATION	THICKNESS OF STRATUM	BOTTOM OF	in. to /2/ft. Depth   Weight 3.75 lbs./ft.		
<u> </u>	JIMIUM	Z.RATUM.	8 SCREEN:		
SANd	40	40	Type: 5/A/N/ESS Dia.: 14		
Plant a said	100	131)	Slot/Gauze 80 Length, 4		
CIAY 4 SANC	70	130	Set between 130 ft. and 134 ft.		
SAND 4 GRAVE	4	1:4	Fittings:		
27.00		/-/-	9 STATIC WATER LEVEL		
			ft. below land surface		
			10 PUMPING LEVEL below land surface		
			ft. after hrs. pumping g.p.m.		
			ft. after hrs. pumping g.p.m.		
			11 WATER QUALITY in Parts Per Million:		
		-	Iron (Fe) Chlorides (CI)		
			HardnessOther		
	-		12 WELL HEAD COMPLETION: In Approved Pit		
			Pitless Adapter 12" Above Grade		
			13 Well Grouted? Yes No		
			Depth: Fromft,		
	0.0		14 Nearest Source of possible contamination		
			50 feet SW Direction SEPTIC HUNT		
			Well disinfected upon completion Yes No		
			Manufacturer's Name		
·			Model Number HP Volts		
0			Length of Drop Pipeft. capacityG.P.M.		
			Type: Submersible		
		-	Jet Reciprocating		
USE A 2ND SHEET IF NEEDED		12.3			
16 Remarks, elevation, source of data, etc.			R WELL CONTRACTOR'S CERTIFICATION:		
- Marie		to the b	ell was drilled under my jurisdiction and this, report is true best of my knowledge and belief		
		REGI	REGISTERED SUSINESS NAME REGISTRATION NO.		
***			s EVArt Mich.		
, t			V. 1.161 . 11.11		
· C.		Signed	AUTHORIZED REPRESENTATIVE Date ////		
D67d 100M (Rev. 12-68)	D 1		AUTHORIZED REPRESENTATIVE		

WELL ID = 1

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY Carrier St. DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION WATER WELL AND PUMP RECORD PERMIT NO: TAX NO: Completion is required under authority of Part 127 Act 368 PA 1978 Failure to comply is a misdemeanor 00-0097 LOCATION OF WELL Township Name County Ceceola Distance and Direction from Road Intersection 3. OWNER OF WELL Spring Hill Camps Address About .5 mile North of 8 Mile Road and 7717 95th Avenue Evart) MI 49631 about .35 mile West & South of 100th Address Same as Well Location Yes No Street Address & City of Well Location 4: WELL DEPTH Date Completed Sketch-Map Sketch-Map Locate with 'x' in Section Below New Well 4 18 00 Replacement Well Cable Tool Driven Rotary Dug LINE OF SE SEE SE Auger/Bored Hollow Rod Jetted ? 1 6. USE: Household Type I Public 8 Type III Public USE: Household Type II Public Heat Pump

Test Well Type IIb Public CASING: Sieel Threaded Height: Above/Below Surface: 1 Surface: 1 DEPTHTO BCTTOM DI STRATUM one Cone THICKNESS FORMATION DESCRIPTION STRATUM Weight: 3 75 lbs/ft.

Drive Shoe
Shale Packer Diameter: \_\_\_\_\_\_in. to \_\_\_\_\_ ft depth in. to ft. depth 22 Sand Diameter in to ft depth in to ft depth Sand & Red Clay 8. SCREEN: Not Installed Gravel Packed 3.5 Sand Flue Clay 50 52 9. STATIC WATER LEVELS 52 Fine 28 tt. Below Land Surface Flowing 80 10. PUMPING LEVEL: Below Land Surface Blue Clay ft. After hrs. Pumping at G.P.M.

Plunger Bailer Air Test Pump 87 Sand 11. WELL HEAD COMPLETION: WELL HEAD COMPLETION:

Pitless Adapter

Pitless Adapter

Well House x x Arages No Yes
Bentonite 12. WELL GROUTED? JUN - 7 2000 Neat Cement Additives No. of Bags 13. NEAREST SOURCE OF POSSIBLE CONTAMINATION: Type Cray wat extende 75 ft. Direction NE
Type Distance ft. Direction USE A 2ND SHEET IF NEEDED 14. PUMP: Not Installed Pump Installation Only Manufacturer's Name **Paker - Rand Pump**HP Volts Yes No 15. ABANDONED WELL PLUGGED? Casing Diameter \_\_\_\_\_ ☐ Neat Cement PLUGGING MATERIAL: Bentonite Slurry Length of Drop Pipe \_\_\_ ft. Capacity Concrete Grout Bentonite Chips TYPE: Submersible Jet Other Cement/Bentonite Slurry Yes No Casing Removed? PRESSURE TANK: Manufacturer's Name 16. REMARKS: (Elevation, Source of Data, etc.) Model Number Capacity 18. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my. knowledge and belief. 17. DRILLING MACHINE OPERATOR: HEGS END WESS MOLL Drilling 67 BENEFERTON NO ☐ Employee ☐ Subcontractor Hoover Rd., Big Rapids, NI rederick Pekrul

EOP 2017 (12/96)

TAX NO:	WATER WE					The Principal Control of the Principal Control	PERMITN	O:	end of the
1. LOCATION OF WELL			ND I O	IVII	TILO		-4X -	02	ONHY
County Scenta To	whship Name		Fraction NW 1/45	wh	SEM	Section No.	Jown	No.	Range No.
Distance, and Direction from Road Interse	coion Sonthe Ave. 65th Ave.	eas Ever	+	Sept. M.	OWNER C Address	FWELL 1200 EVELVE ame as Well Loc	#ve +, 1/1 auon 20	* 1/90 */90	Mey
ocate with 'x' in Section Below	SI	ketch Map		4.	WELL DE	TH: Date (	ompleted	Ne	w Well
	X	. A.V.	10 y≇	5.	Cable Hollow	and the second second second second	otary uger/Bored	_	en Dug
*		16		6.	USE: 🛣	Household Trigation Trigation Trest Well	pe I Public	☐ Type	e III Public
1905			最高性的	7.	CASING:	Steel T	readed	I station frame in	Above/Below
FORMATION DESCRIPTION		THICKNESS OF STRATUM	DERTH TO BOTTOM OF STRATUM	1.46	Diameter:	Plastic W Other		Surface	47413647643
clay		276	270	59.16	, comme	in. toft. depth	WAR LONG	Weight: lbs/l	
Sand	\$ 1.00 mm	5.5	275	n y.	BORE HOL Diameter:	U a in to	15(I. depth		e Shoe e Packer
	R TT			8.	SCREEN:	☐ Not Installed	Gra	vel-Packe	- 1975.
1110 to 161		Court S	4733		Type Storing Slot/Gauze Set Between		<u> </u>	Diameter Length:	
**************************************	<i>1</i> 5	· January Barry		- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1			t:an		
					Blank Above Screen 11. Other.				1,5
weel for a late.	Lecouse			9.	3.00	ft. Below Land	Surface	Flov	ving
us more mater of	were water for find			10. PUMPING LEVEL: Below Land Surface ft. After hrs. Pumping at G.P.M.					
exident thousands			min Pr		Plunger Bailer Air Test Pump				
					WELL HEAD COMPLETION:  Pitless Adapter 12" Above Grade  Basement Offset Well House				
		g*=		12	12. WELL GROUTED? DNo M		o 🗷 Yes	Yes From 15 to C	
				No. of Bags Additives		Set	<u>E</u> :-		
2514	new wel	1		13. NEAREST SOURCE OF POSSIBLE CONTAMINA  Type Distance ft. D			TION:		
USE A 2ND SHEET IF NEED	ED J				Туре	Dis	tance		ection
Casing Diameterin. D PLUGGING MATERIAL: Cement/Bentonite Slurry	Concrete Grout	Yes No  htt.  Neat Cement Bentonite Slurry  Concrete Grout Bentonite Chips				14. PUMP: Not Installed Pump Installation Only  Manufacturer's Name  Model Number HP Volts  Length of Drop Pipe ft. Capacity G.P. I  TYPE: Submersible Jet Other  PRESSURE TANK:			
6 REMARKS: (Elevation, Source of Data	etc.)				Manufactu	rer's Name			*
	18	This well	VELL CONT was drilled e and belief	unde	Model Nun TOR'S CEF	RTIFICATION:		the bes	Gallons
7. DRILLING MACHINE OPERATOR:    Employee   Subcontractor   Name   Subcontractor		HEN	BUSINESS NAM	()		Kimps			-1807

MICHIGAN	DEPART	MENT OF	PUBLIC HEALTH			
GEOLOGICAL SURVEY NO WATER	WELL	194 - 4 - 14 AZ AS AS A	MP RECORD PERMIT NUMBER			
1 LOCATION OF WELL Township Name		The second named in column 2 is not a second	08 20 00 2   Section Number   Town Number   Theres Number			
County SCLOIA SCEOTA	Na a Maria	SE 1/2)	£ 1/4 SE1/4 20 18 NS STAN			
	1. 0	1	3 OWNER OF WELL: ENOCH () SON SECTION			
Distance And Direction From Hoad intersections.	٠,,, ٤		Andrees 8mil 2 Pd			
ON HOLLY JUST	14'50		Evait Mick.			
Street Address & City of Well Location		r Life and Li	Address Same As Well Location? Tyes No No			
Locate with X in Section Below	ketch Map:		4 WELL DEPTH: Date Completed New Well			
L_1	م أمياخ أو أورا	to the style of	5 Cebie tool Protery Driven Duc			
Some series	i same	- F. K. 184	Hollow rod Auger Jetted			
	6 USE: Domestic Type I Public Type III Public					
	Xw: 11	1.272	Test Well Type 16 Public			
	45.00	reservations.	7 CASING: Steel Threaded Height Above/6510W			
- I-MILE	THICKNESS	DEPTH TO	Plastic Welded Surface / 11			
2 FORMATION DESCRIPTION	OF STRATUM	STRATUM	n to the depth Weight bis./fi. Grouted Drill Hole Diameter			
1.00	74	11	Grouted Drill Hole Diameterin. toft_ depth			
			8 SCREEN: Not installed			
SAUD 4 ClAY	10	160	Type Howard Smith Diameter 3%			
-20	10	111	Slot/Gertre Length Sort hetween 122			
	70	7 42	Set between tt and tt.  FITTINGS: K-Packer Lead Packer Bremer Check			
Mater DADE	17	107	Blank above screen ft. Other			
	Patilifyen de Pantifyelser		It. below land surface			
	Tarakawa ing	at in many	10 PUMPING LEVEL: below land surface			
			ft. afterhrs. pumping atG PM			
		and section with the section of the	tt. after hrs. pumping at6.P.M			
			11 WELL HEAD. Pitless adapter 1 12, above grade			
			Basement offset Approved pit			
	T.	48,7	No ☐ Yes From toft.			
webs.	The Sales		Nest cement Bentonite Other			
	1944 P4114	V 20 1/18-	No. of bags of cement Additives			
			Type Distance _ Oft. Direction _ O			
		o zrito.	Well disinfected upon completion? Yes No Was old well plugged? Yes No			
	100	1.0	14 PUMP: Not installed Pump installation Only.			
			Manufacturer's name AEYM of OY			
	1.	4	Model number			
1 ×			Length of Drop Pipe			
			PRESSURE TANK: Manufacturer's name X - 1+3			
USE A 2ND SHEET IF NEEDED			Model number 10x203 Capacity 80 Gallons			
15. Remarks, elevation, source of data, etc.		16. WATE	R WELL CONTRACTOR'S CERTIFICATION:			
		to the b	ell was drilled under my jurisdiction and this report is true best of my knowledge and belief.			
		10	REGISTERED BUSINESS NAME REGISTRATION NO.			
17. Rig Operator's Name:		Address	t u = +			
Brent Undrow		Signed	Ket W. Potron Dave 9/25/89			
674 12/85		วเกินลด	AUTHORIZED REPRESENTATIVE			

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

# APPENDIX B EDR DATABASE SEARCH REPORT



The EDR-Radius Map with GeoCheck®

Spring Hill Camp 100 Avenue and 9 Mile Evart, MI 49631

Inquiry Number: 0542941.1r

September 20, 2000

# The Source For Environmental Risk Management Data

3530 Post Road Southport, Connecticut 06490

**Nationwide Customer Service** 

Telephone: 1-800-352-0050 Fax: 1-800-231-6802 Internet: www.edrnet.com

## **TABLE OF CONTENTS**

SECTION	PAGE
Executive Summary.	ES1
Overview Map.	2
Detail Map.	. 3
Map Findings Summary.	_ 4
Map Findings.	_ 5
Orphan Summary.	. 6
Government Records Searched/Data Currency Tracking	GR-1
GEOCHECK ADDENDUM	
Physical Setting Source Addendum	A-1
Physical Setting Source Summary.	. A-2
Physical Setting Source Map.	_ A-7
Physical Setting Source Map Findings.	A-8
Physical Setting Source Records Searched	A-11

Thank you for your business.
Please contact EDR at 1-800-352-0050 with any questions or comments.

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## **EXECUTIVE SUMMARY**

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The report meets the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances are per ASTM standard or custom distances requested by the user.

#### TARGET PROPERTY INFORMATION

#### **ADDRESS**

100 AVENUE AND 9 MILE EVART, MI 49631

#### COORDINATES

Latitude (North): 43.938000 - 43° 56′ 16.8″ Longitude (West): 85.294500 - 85° 17′ 40.2″

Universal Tranverse Mercator: Zone 16 UTM X (Meters): 636884.0 UTM Y (Meters): 4866184.5

#### USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property: Source:

2443085-H3 EVART, MI USGS 7.5 min quad index

#### TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

#### DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ( "reasonably ascertainable ") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

### FEDERAL ASTM STANDARD

NPL National Priority List

Delisted NPL NPL Deletions

CERCLIS Comprehensive Environmental Response, Compensation, and Liability Information
System

CERC-NFRAP Comprehensive Environmental Response, Compensation, and Liability Information
System

CORRACTS Corrective Action Report

RCRIS-TSD Resource Conservation and Recovery Information System

RCRIS-TSD. Resource Conservation and Recovery Information System
RCRIS-LQG. Resource Conservation and Recovery Information System
RCRIS-SQG. Resource Conservation and Recovery Information System
ERNS. Emergency Response Notification System

#### STATE ASTM STANDARD

SHWS..... State Haz. Waste

SWF/LF..... Solid Waste Facilities Database

LUST..... Leaking Underground Storage Tank Sites

## **EXECUTIVE SUMMARY**

UST...... Underground Storage Tank Facility List

#### FEDERAL ASTM SUPPLEMENTAL

CONSENT CONSENT ROD ROD

FINDS...... Facility Index System/Facility Identification Initiative Program Summary Report

HMIRS..... Hazardous Materials Information Reporting System

MLTS..... Material Licensing Tracking System

MINES..... Mines Master Index File

NPL Lien...... NPL Liens

PADS..... PCB Activity Database System

TSCA...... Toxic Substances Control Act

#### STATE OR LOCAL ASTM SUPPLEMENTAL

AST..... Aboveground Tanks

#### **EDR PROPRIETARY DATABASES**

Coal Gas\_\_\_\_\_ Former Manufactured gas (Coal Gas) Sites.

#### SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

## **EXECUTIVE SUMMARY**

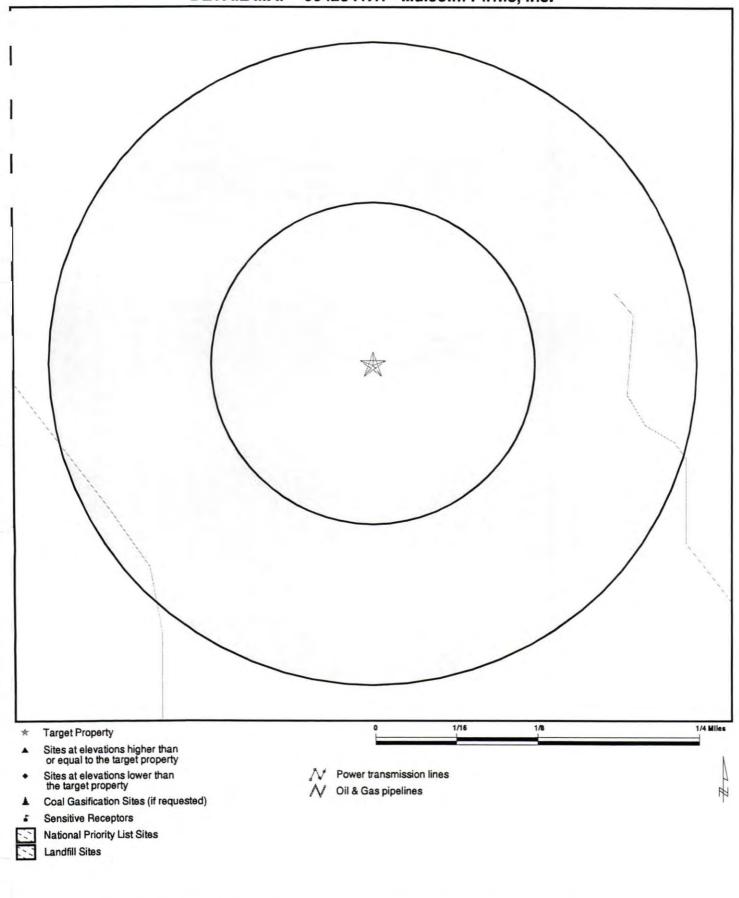
Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
AMERICAN LOGGING TOOL CORP	SHWS
ROHEN LANDFILL	SHWS
ROBINSON LANDFILL	SHWS
JOE'S SALES & SERVICE/EVART LF	SHWS
KALIUM CHEMICALS	SHWS
SEARS TIRE FIRE	CERCLIS, FINDS
SCHOOLEY LF	SWF/LF
EVERT CITY DUMP	SWF/LF
OSCEOLA COUNTY ROAD COMMISSION	UST,LUST
OLON BALDWIN	UST

OVERVIEW MAP - 0542941.1r - Malcolm Pirnie, Inc. 1/4 1/2 1 Miles **Target Property** Sites at elevations higher than or equal to the target property Sites at elevations lower than the target property Power transmission lines ✓ Oil & Gas pipelines Coal Gasification Sites (if requested) National Priority List Sites Landfill Sites

TARGET PROPERTY: ADDRESS: CITY/STATE/ZIP: LAT/LONG: Spring Hill Camp 100 Avenue and 9 Mile Evart MI 49631 43.9380 / 85.2945 CUSTOMER: CONTACT: INQUIRY #: DATE: Malcolm Pirnie, Inc. Shane McDonald 0542941.1r

September 20, 2000 2:43 pm



TARGET PROPERTY: ADDRESS: CITY/STATE/ZIP: LAT/LONG: Spring Hill Camp 100 Avenue and 9 Mile Evart MI 49631 43.9380 / 85.2945 CUSTOMER: CONTACT: INQUIRY #: DATE: Malcolm Pirnie, Inc. Shane McDonald 0542941.1r

September 20, 2000 2:43 pm

# MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL ASTM STANDARD	2							
NPL		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
CERCLIS		0.500	0	0	0	NR	NR	0
CERC-NFRAP		0.250	0	0	NR	NR	NR	0
CORRACTS		1.000	0	0	0	0	NR	0
RCRIS-TSD		0.500	0	0	0	NR	NR	0
RCRIS Lg. Quan. Gen.		0.250	0	0	NR	NR	NR	0
RCRIS Sm. Quan. Gen.		0.250	0	0	NR	NR	NR	0
ERNS		TP	NR	NR	NR	NR	NR	0
STATE ASTM STANDARD								
State Haz. Waste		1.000	0	0	0	0	NR	0
State Landfill		0.500	0	0	0	NR	NR	0
LUST		0.500	0	0	0	NR	NR	0
UST		0.250	0	0	NR	NR	NR	0
FEDERAL ASTM SUPPLEME	NTAL							
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	Ö	Ö	Ö	Ö	NR	Ö
FINDS		TP	NR	NR	NR	NR	NR	ő
HMIRS		TP	NR	NR	NR	NR	NR	o
MLTS		TP	NR	NR	NR	NR	NR	Ö
MINES		0.250	0	0	NR	NR	NR	Ö
NPL Liens		TP	NR	NR	NR	NR	NR	ő
PADS		TP	NR	NR	NR	NR	NR	Ö
RAATS		TP	NR	NR	NR	NR	NR	Ö
TRIS		TP	NR	NR	NR	NR	NR	Ö
TSCA		TP	NR	NR	NR	NR	NR	ő
STATE OR LOCAL ASTM SU	PPLEMENTA	L						
AST		TP	NR	NR	NR	NR	NR	0
EDR PROPRIETARY DATAB	ASES							
Coal Gas AQUIFLOW - see EDR Phy		1.000	0	0	0	0	NR	0

TP = Target Property

NR = Not Requested at this Search Distance

<sup>\*</sup> Sites may be listed in more than one database

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

### MAP FINDINGS

Database(s)

EDR ID Number EPA ID Number

Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.

NO SITES FOUND

#### ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)	Facility ID
EVART	U003319229	OSCEOLA COUNTY ROAD COMMISSION	110TH AVENUE	49631	UST, LUST	0-000230
EVART	U003324973	OLON BALDWIN	RT. 3 80TH AVE.	49631	UST	0-021704
EVART	1001201182	SEARS TIRE FIRE	10977 SOUTH M-66	49631	CERCLIS, FINDS	
EVART	S103594895	AMERICAN LOGGING TOOL CORP	302 N. MAIN ST.	49631	SHWS	670047
EVART	S103084576	ROHEN LANDFILL	NONE	49631	SHWS	670072
EVART	S103594897	ROBINSON LANDFILL	NONE	49631	SHWS	670073
EVART	S100070094	SCHOOLEY LF	3 MI S OF M115, M66 JUNCTION	49631	SWF/LF	67000009
EVART	\$100070558	EVERT CITY DUMP	WEST U.S. 10		SWF/LF	67000012
EVART	S103594885	JOE'S SALES & SERVICE/EVART LF	1611 W US 10	49631	SHWS	670008
HERSEY	S103594896	KALIUM CHEMICALS	P.O. BOX 290	49639	SHWS	670064

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement

of the ASTM standard.

#### FEDERAL ASTM STANDARD RECORDS

NPL: National Priority List

Source: EPA Telephone: N/A

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center

Date of Government Version: 06/13/00 Date Made Active at EDR: 07/06/00

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 06/27/00

Elapsed ASTM days: 9

Date of Last EDR Contact: 08/07/00

**DELISTED NPL: NPL Deletions** 

Source: EPA Telephone: N/A

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 06/13/00 Date Made Active at EDR: 07/06/00

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 06/27/00

Elapsed ASTM days: 9

Date of Last EDR Contact: 05/09/00

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

Source: EPA

Telephone: 703-413-0223

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 04/16/00 Date Made Active at EDR: 08/16/00 Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 06/05/00 Elapsed ASTM days: 72 Date of Last EDR Contact: 05/31/00

#### CERCLIS-NFRAP: No Further Remedial Action Planned

Source: EPA

Telephone: 703-413-0223

As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

Date of Government Version: 04/16/00 Date Made Active at EDR: 08/16/00 Database Release Frequency: Quarterly Date of Data Arrival at EDR: 06/05/00 Elapsed ASTM days: 72

Date of Last EDR Contact: 05/31/00

**CORRACTS:** Corrective Action Report

Source: EPA

Telephone: 800-424-9346

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 04/20/00 Date Made Active at EDR: 08/01/00

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 06/12/00

Elapsed ASTM days: 50

Date of Last EDR Contact: 06/12/00

RCRIS: Resource Conservation and Recovery Information System

Source: EPA/NTIS Telephone: 800-424-9346

Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery

Act (RCRA).

Date of Government Version: 05/18/00 Date Made Active at EDR: 08/01/00

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 06/01/00

Elapsed ASTM days: 61

Date of Last EDR Contact: 06/19/00

ERNS: Emergency Response Notification System

Source: EPA/NTIS Telephone: 202-260-2342

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous

substances

Date of Government Version: 08/08/00 Date Made Active at EDR: 09/06/00 Database Release Frequency: Quarterly Date of Data Arrival at EDR: 08/11/00

Elapsed ASTM days: 26

Date of Last EDR Contact: 08/02/00

#### FEDERAL ASTM SUPPLEMENTAL RECORDS

**BRS:** Biennial Reporting System

Source: EPA/NTIS Telephone: 800-424-9346

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG)

and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/97

Database Release Frequency: Biennially

Date of Last EDR Contact: 06/19/00

Date of Next Scheduled EDR Contact: 09/18/00

CONSENT: Superfund (CERCLA) Consent Decrees

Source: EPA Regional Offices

Telephone: Varies

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: N/A
Database Release Frequency: Varies

Date of Last EDR Contact: N/A

Date of Next Scheduled EDR Contact: N/A

ROD: Records Of Decision

Source: NTIS

Telephone: 703-416-0223

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical

and health information to aid in the cleanup.

Date of Government Version: 01/31/99

Database Release Frequency: Annually

Date of Last EDR Contact: 07/12/00

Date of Next Scheduled EDR Contact: 10/09/00

FINDS: Facility Index System/Facility Identification Initiative Program Summary Report

Source: EPA Telephone: N/A

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 10/13/99

Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/13/00

Date of Next Scheduled EDR Contact: 10/09/00

HMIRS: Hazardous Materials Information Reporting System

Source: U.S. Department of Transportation

Telephone: 202-366-4526

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 06/30/99 Database Release Frequency: Annually Date of Last EDR Contact: 07/25/00

Date of Next Scheduled EDR Contact: 10/23/00

MLTS: Material Licensing Tracking System Source: Nuclear Regulatory Commission

Telephone: 301-415-7169

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency,

EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/23/00 Database Release Frequency: Quarterly Date of Last EDR Contact: 07/10/00

Date of Next Scheduled EDR Contact: 10/09/00

MINES: Mines Master Index File

Source: Department of Labor, Mine Safety and Health Administration

Telephone: 303-231-5959

Date of Government Version: 08/01/98

Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/06/00

Date of Next Scheduled EDR Contact: 10/02/00

NPL LIENS: Federal Superfund Liens

Source: EPA

Telephone: 205-564-4267

Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/91

Date of Government version: 10/15/91

Database Release Frequency: No Update Planned

Date of Last EDR Contact: 05/22/00

Date of Next Scheduled EDR Contact: 08/21/00

PADS: PCB Activity Database System

Source: EPA

Telephone: 202-260-3936

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers

of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 01/01/00

Date of Last EDR Contact: 05/15/00

Date of Next Scheduled EDR Contact: 08/14/00

Database Release Frequency: No Update Planned

DOCKET-CRIM: Office of Criminal Enforcement Criminal Cases

Source: EPA Telephone: N/A

Information on all Criminal Cases dealing with Air, Water, Toxics, RCRA and CERCLA for all 10 EPA regions for the

year of 1994 to present.

Date of Government Version: N/A

Date of Last EDR Contact: N/A

Database Release Frequency: Semi-Annually

Date of Next Scheduled EDR Contact: N/A

RAATS: RCRA Administrative Action Tracking System

Source: EPA

Telephone: 202-564-4104

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/95

Database Release Frequency: No Update Planned

Date of Last EDR Contact: 06/12/00 Date of Next Scheduled EDR Contact: 09/11/00

TRIS: Toxic Chemical Release Inventory System

Source: EPA

Telephone: 202-260-1531

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and

land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/97

Database Release Frequency: Annually

Date of Last EDR Contact: 07/21/00

Date of Next Scheduled EDR Contact: 09/25/00

TSCA: Toxic Substances Control Act

Source: EPA

Telephone: 202-260-1444

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant

Date of Government Version: 12/31/98

Database Release Frequency: Every 4 Years

Date of Last EDR Contact: 07/25/00

Date of Next Scheduled EDR Contact: 10/23/00

#### STATE OF MICHIGAN ASTM STANDARD RECORDS

SHWS: Contaminated Sites

Source: Department of Environmental Quality

Telephone: 517-373-9541

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 09/14/99 Date Made Active at EDR: 10/26/99

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 09/29/99

Elapsed ASTM days: 27

Date of Last EDR Contact: 06/01/00

LF: Solid Waste Facilities Database

Source: Department of Environmental Quality

Telephone: 517-335-4035

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal

Date of Government Version: 08/01/00 Date Made Active at EDR: 09/14/00

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 08/08/00

Elapsed ASTM days: 37

Date of Last EDR Contact: 08/01/00

LUST: Leaking Underground Storage Tank Sites Source: Department of Environmental Quality

Telephone: 517-335-3075

Leaking Underground Storage Tank Incident Reports, LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 12/16/99 Date Made Active at EDR: 02/18/00

Database Release Frequency: Annually

Date of Data Arrival at EDR: 01/20/00

Elapsed ASTM days: 29

Date of Last EDR Contact: 07/20/00

UST: Underground Storage Tank Facility List Source: Department of Environmental Quality

Telephone: 517-373-8168

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 11/01/99 Date Made Active at EDR: 01/18/00

Database Release Frequency: Annually

Date of Data Arrival at EDR: 12/27/99

Elapsed ASTM days: 22

Date of Last EDR Contact: 07/11/00

#### STATE OF MICHIGAN ASTM SUPPLEMENTAL RECORDS

**AST:** Aboveground Tanks

Source: Department of Environmental Quality

Telephone: 517-373-8168

Registered Aboveground Storage Tanks.

Date of Government Version: 11/01/99
Database Release Frequency: Annually

Date of Last EDR Contact: 07/11/00

Date of Next Scheduled EDR Contact: 08/14/00

#### **EDR PROPRIETARY DATABASES**

Former Manufactured Gas (Coal Gas) Sites: The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. ©Copyright 1993 Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

#### Disclaimer Provided by Real Property Scan, Inc.

The information contained in this report has predominantly been obtained from publicly available sources produced by entities other than Real Property Scan. While reasonable steps have been taken to insure the accuracy of this report, Real Property Scan does not guarantee the accuracy of this report. Any liability on the part of Real Property Scan is strictly limited to a refund of the amount paid. No claim is made for the actual existence of toxins at any site. This report does not constitute a legal opinion.

#### HISTORICAL AND OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines/Electrical Transmission Lines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines and electrical transmission lines.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

**NWI:** National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 1999 from the U.S. Fish and Wildlife Service.

## GEOCHECK®- PHYSICAL SETTING SOURCE ADDENDUM

#### TARGET PROPERTY ADDRESS

SPRING HILL CAMP 100 AVENUE AND 9 MILE EVART. MI 49631

#### TARGET PROPERTY COORDINATES

Latitude (North): 43.938000 - 43\* 56' 16.8" Longitude (West): 85.294502 - 85\* 17' 40.2"

Universal Tranverse Mercator: Zone 16 UTM X (Meters): 636884.0 UTM Y (Meters): 4866184.5

EDR's GeoCheck Physical Setting Source Addendum has been developed to assist the environmental professional with the collection of physical setting source information in accordance with ASTM 1527-00, Section 7.2.3. Section 7.2.3 requires that a current USGS 7.5 Minute Topographic Map (or equivalent, such as the USGS Digital Elevation Model) be reviewed. It also requires that one or more additional physical setting sources be sought when (1) conditions have been identified in which hazardous substances or petroleum products are likely to migrate to or from the property, and (2) more information than is provided in the current USGS 7.5 Minute Topographic Map (or equivalent) is generally obtained, pursuant to local good commercial or customary practice, to assess the impact of migration of recognized environmental conditions in connection with the property. Such additional physical setting sources generally include information about the topographic, hydrologic, hydrogeologic, and geologic characteristics of a site, and wells in the area.

Assessment of the impact of contaminant migration generally has two principle investigative components:

- 1. Groundwater flow direction, and
- 2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata. EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

#### **GROUNDWATER FLOW DIRECTION INFORMATION**

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

#### TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

#### USGS TOPOGRAPHIC MAP ASSOCIATED WITH THIS SITE

Target Property:

2443085-H3 EVART, MI

Source: USGS 7.5 min quad index

#### GENERAL TOPOGRAPHIC GRADIENT AT TARGET PROPERTY

Target Property:

General SW

Source: General Topographic Gradient has been determined from the USGS 1 Degree Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

#### HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

#### **FEMA FLOOD ZONE**

FEMA Q3 Flood

Target Property County

Data Electronic Coverage

OSCEOLA, MI

NO

Flood Plain Panel at Target Property:

Not Reported

Additional Panels in search area:

Not Reported

#### NATIONAL WETLAND INVENTORY

**NWI Electronic** 

**NWI Quad at Target Property** 

Coverage

EVART

#### - 7

#### HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data\*:

Search Radius:

2.0 miles

Status:

Not found

#### **AQUIFLOW®**

Search Radius: 2.000 Miles.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

LOCATION

GENERAL DIRECTION

MAP ID

FROM TP

**GROUNDWATER FLOW** 

Not Reported

#### GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

### GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

#### **ROCK STRATIGRAPHIC UNIT**

#### GEOLOGIC AGE IDENTIFICATION

Category: Continental Deposits

Geologic Code:

Mesozoic

System:

Era:

Jurassic

Series:

Jurassic

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

#### DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name:

RUBICON

Soil Surface Texture:

sand

Hydrologic Group:

Class A - High infiltration rates. Soils are deep, well drained to

excessively drained sands and gravels.

Soil Drainage Class:

Excessively. Soils have very high and high hydraulic conductivity and low water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: LOW

Depth to Bedrock Min:

> 60 inches

Depth to Bedrock Max:

> 60 inches

	0		Soil Layer	Information		
	Bou	indary		Classi	fication	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)
1	0 inches	6 inches	sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COURSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 20.00 Min: 6.00
2	6 inches	18 inches	sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COURSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 20.00 Min: 6.00
3	18 inches	60 inches	sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COURSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand.	Max: 20.00 Min: 6.00

#### OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: mucky - sand

muck

loamy very fine sand mucky-peat

fine sand peat

silt loam

Surficial Soil Types: mucky - sand

muck

loamy very fine sand

mucky-peat fine sand peat silt loam

Shallow Soil Types: loamy fine sand

loamy sand fine sand muck silt loam

Deeper Soil Types:

stratified muck clay loam fine sand mucky-peat silt loam

#### ADDITIONAL ENVIRONMENTAL RECORD SOURCES

According to ASTM E 1527-00, Section 7.2.2, "one or more additional state or local sources of environmental records may be checked, in the discretion of the environmental professional, to enhance and supplement federal and state sources... Factors to consider in determining which local or additional state records, if any, should be checked include (1) whether they are reasonably ascertainable, (2) whether they are sufficiently useful, accurate, and complete in light of the objective of the records review (see 7.1.1), and (3) whether they are obtained, pursuant to local, good commercial or customary practice." One of the record sources listed in Section 7.2.2 is water well information. Water well information can be used to assist the environmental professional in assessing sources that may impact groundwater flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

#### WELL SEARCH DISTANCE INFORMATION

DATABASE SEARCH DISTANCE (miles)

Federal USGS 1.000

Federal FRDS PWS Nearest PWS within 1 mile

State Database 1.000

FEDERAL USGS WELL INFORMATION

LOCATION FROM TP

No Wells Found

MAP ID

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

WELL ID

MAP ID WELL ID LOCATION FROM TP

#### FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID

WELL ID

LOCATION FROM TP

No PWS System Found

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID

WELL ID

LOCATION FROM TP

No Wells Found

STATE OIL/GAS WELL INFORMATION

DISTANCE

FROM TP (Miles)

1/2 - 1 Mile WSW 1/4 - 1/2 Mile SSE 1/2 - 1 Mile South DISTANCE

FROM TP (Miles) 1/4 - 1/2 Mile SW

1/2 - 1 Mile SW 1/2 - 1 Mile SSW PHYSICAL SETTING SOURCE MAP - 0542941.1r S TTOTH AVE 1/2 2 Miles

Major Roads

/ Contour Lines

Water Wells

Public Water Supply Wells

↑ Groundwater Flow Direction

GI Indeterminate Groundwater Flow at Location

GV) Groundwater Flow Varies at Location

Cluster of Multiple Icons

Earthquake epicenter, Richter 5 or greater

(HD) Closest Hydrogeological Data

Oil, gas or related wells

TARGET PROPERTY: ADDRESS: CITY/STATE/ZIP: LAT/LONG: Spring Hill Camp 100 Avenue and 9 Mile Evart MI 49631 43.9380 / 85.2945 CUSTOMER: CONTACT: INQUIRY #: DATE: Malcolm Pirnie, Inc. Shane McDonald 0542941.1r

September 20, 2000 2:43 pm

#### GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

#### OTHER STATE DATABASE INFORMATION

010884 Permit Number: Not Reported Well Number: Permit Prefix: Not Reported **OSCEOLA** County:

Not Reported Owner:

PIERSON-STIPEK ETAL 4 Name of Lease:

12 Township Number: 08W E/W Range Number: 10 Acre Fraction: Not Reported SE 160 Acre Fraction: 1742484.88 X Coordinate:

Confidential Status: No 1993 Annual Gas Prod.: Not Reported Cummulative Gas Produced 12/31/93:

Cummulative Oil Produced 12/31/93:

Permit Number:

Well Number:

Well Type: Dry Hole DNR Owner/Operator Num: 0491

Permit Suffix: Not Reported Well Status: Abandoned

18N N/S Tier Number:

Not Reported

Abandoned

Section Number: 19 40 Acre Fraction: CN Not Reported Category:

226280.12 Y Coordinate: Zone: Central 1993 Annual Oil Prod.: Not Reported

Not Reported Not Reported

Well Type: Dry Hole Not Reported DNR Owner/Operator Num: 0491

Not Reported Permit Suffix: Permit Prefix: **OSCEOLA** Well Status: County:

Not Reported Owner:

KOEPPE & DAVY ETAL EVART Name of Lease:

011175

Township Number: 12 N/S Tier Number: 18N E/W Range Number: 08W Section Number: 20 10 Acre Fraction: Not Reported 40 Acre Fraction: CN SW Category:

Not Reported 160 Acre Fraction: X Coordinate: 1744900.50 Y Coordinate: 226229.27 Confidential Status: Central No Zone: 1993 Annual Gas Prod.: Not Reported 1993 Annual Oil Prod.: Not Reported

Cummulative Gas Produced 12/31/93: Not Reported Cummulative Oil Produced 12/31/93: Not Reported

Permit Number: 011189 Dry Hole Well Type: Not Reported DNR Owner/Operator Num: 0491 Well Number: Not Reported Permit Suffix: Not Reported Permit Prefix: County: **OSCEOLA** Well Status: Abandoned

Not Reported Owner: **BECKER & POLWARTH ET AL EVART** Name of Lease:

Township Number: N/S Tier Number: 18N **08W** E/W Range Number: Section Number: 20 CN 10 Acre Fraction: Not Reported 40 Acre Fraction:

160 Acre Fraction: SE Category: Not Reported 1747537.56 Y Coordinate: 226187.01 X Coordinate: Confidential Status: No Zone: Central 1993 Annual Gas Prod.: Not Reported 1993 Annual Oil Prod.: Not Reported

Cummulative Gas Produced 12/31/93: Not Reported Cummulative Oil Produced 12/31/93: Not Reported

## **GEOCHECK®- PHYSICAL SETTING SOURCE MAP FINDINGS**

#### OTHER STATE DATABASE INFORMATION

Permit Number: 010336
Well Number: Not Reported
Permit Prefix: Not Reported
County: OSCEOLA

Owner: Not Reported
Name of Lease: DAVY, VERNAL R C-1

Township Number: 12
E/W Range Number: 08W
10 Acre Fraction: N2
160 Acre Fraction: NW

160 Acre Fraction: NW
X Coordinate: 1744332.93
Confidential Status: No
1993 Annual Gas Prod.: Not Reported

Cummulative Gas Produced 12/31/93: Cummulative Oil Produced 12/31/93: Well Type: Dry Hole DNR Owner/Operator Num: 4906

Permit Suffix: Well Status: Not Reported Abandoned

N/S Tier Number: 18N Section Number: 29 40 Acre Fraction: NW

Category: Not Reported Y Coordinate: 224599.01
Zone: Central 1993 Annual Oil Prod.: Not Reported

Not Reported Not Reported

 Permit Number:
 011128
 Well Type:
 Gas Well

 Well Number:
 Not Reported
 DNR Owner/Operator Num: 0491

 Permit Prefix:
 Not Reported
 Permit Suffix:
 Not Reported

 County:
 OSCEOLA
 Well Status:
 Abandoned

Owner: Not Reported

Name of Lease: POLWARTH, ADAMS, & SCHADE EVART

Township Number: 12 N/S Tier Number: 18N E/W Range Number: 08W Section Number: 29 10 Acre Fraction: Not Reported 40 Acre Fraction: CN

CN 160 Acre Fraction: NE Category: Not Reported X Coordinate: 1747546.16 Y Coordinate: 223569.11 Confidential Status: No Zone: Central 1993 Annual Gas Prod.: Not Reported 1993 Annual Oil Prod.: Not Reported

Cummulative Gas Produced 12/31/93: Not Reported Cummulative Oil Produced 12/31/93: Not Reported

Permit Number: 010485 Well Type: Gas Well
Well Number: Not Reported DNR Owner/Operator Num: 0491
Permit Prefix: Not Reported Permit Suffix: Not Reported
County: OSCEOLA Well Status: Abandoned

Owner: Not Reported

Name of Lease: DAVEY-PIERSON W-EVART 1

 Township Number:
 12
 N/S Tier Number:
 18N

 E/W Range Number:
 08W
 Section Number:
 29

 10 Acre Fraction:
 Not Reported
 40 Acre Fraction:
 CN

160 Acre Fraction:NWCategory:Not ReportedX Coordinate:1744903.37Y Coordinate:223600.49Confidential Status:NoZone:Central1993 Annual Gas Prod.:Not Reported1993 Annual Oil Prod.:Not Reported

Cummulative Gas Produced 12/31/93: Not Reported Cummulative Oil Produced 12/31/93: Not Reported

# GEOCHECK®- PHYSICAL SETTING SOURCE MAP FINDINGS RADON

#### AREA RADON INFORMATION

Federal EPA Radon Zone for OSCEOLA County: 3

Note: Zone 1 indoor average level > 4 pCi/L.

: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.

: Zone 3 indoor average level < 2 pCi/L.

Zip Code: 49631

Number of sites tested: 3

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	Not Reported	Not Reported	Not Reported	Not Reported
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	0.933 pCi/L	100%	0%	0%

## PHYSICAL SETTING SOURCE RECORDS SEARCHED

#### HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 1999 from the U.S. Fish and Wildlife Service.

#### HYDROGEOLOGIC INFORMATION

### AQUIFLOW<sup>R</sup> Information System

Source: EDR proprietary database of groundwater flow information

EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

#### **GEOLOGIC INFORMATION**

#### Geologic Age and Rock Stratigraphic Unit

Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

#### STATSGO: State Soil Geographic Database

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the national Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

#### ADDITIONAL ENVIRONMENTAL RECORD SOURCES

#### FEDERAL WATER WELLS

PWS: Public Water Systems

Source: EPA/Office of Drinking Water

Telephone: 202-260-2805

Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data

Source: EPA/Office of Drinking Water

Telephone: 202-260-2805

Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

**USGS Water Wells:** In November 1971 the United States Geological Survey (USGS) implemented a national water resource information tracking system. This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on more than 900,000 wells, springs, and other sources of groundwater.

## PHYSICAL SETTING SOURCE RECORDS SEARCHED

#### STATE RECORDS

#### Michigan Public and Private Water Wells

Source: Michigan Department of Natural Resources

Locations of verified municipal and private water well sites compiled from Michigan Department of Public Health, Water Well and Pump Records. Available in the following MI counties: Calhoun, Eaton, Genesee, Ingham, Jackson, Kalamazoo, Kent, Midland, Muskegon, Oakland, Ottawaw, Saginaw, St. Clair, Washtenaw.

#### Michigan Oil and Gas Wells

Source: Michigan Department of Natural Resources
Locations of oil and gas wells are compiled from permit records on file at the Geological Survey Division (GSD),
Michigan Department of Natural Resources.

#### RADON

**Area Radon Information:** The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

**EPA Radon Zones:** Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

#### OTHER

Epicenters: World earthquake epicenters, Richter 5 or greater

Source: Department of Commerce, National Oceanic and Atmospheric Administration

# APPENDIX C BORING AND WELL CONSTRUCTION LOGS

1500 Abbott Road, Suite 210 East Lansing, MI 48823

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

BORING NO. MW-1s SHEET 1 OF 1

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

LOGGED BY

Osceola, MI

PROJECT NO.

4065-001

M.B. & J.H.

SURFACE ELEVATION	1097.16	DATUM	USG

COORDINATES N 227,267.5 E 1,746,801.7

DRILLING CONTRACTOR NA

DRILLING METHOD EQUIPMENT

Hand Auger

Auger DRILLING STARTED ENDED

6/29/00

6/29/00

STRATA KEY

LOCATION DESCRIPTION:

See Report Figures for Locations

	SAND	Olliva	∭ s	ILT		1				
	CLAY		₹ PI	EAT						
2	GRAVEL		FI FI	LL						
Depth		LE INF	Blow Counts (300 lb. Ham-		p PID	Strata	DESCRIPTION	USCS	REMARKS	Elevation
feet		Туре	(300 lb. Ham- mer)	overy %	(ppm)					a I
1						7,77	Brown loam (TOPSOIL). Red, MEDIUM TO FINE SAND, little silt.	SM SM	Stratigraphic information taken from MW-1d boring log. MW-1s drilled approx.	1097.1 1096.1
5-							Light brown, FINE TO MEDIUM SAND, little silt, moist. Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round	SM	10' from MW-1s. Hand auger to 8' bgl to clear utilities.	1094.1 1093.1
							and spherical, wet.	SM		¥
	•						Light brown, FINE TO MEDIUM SAND, little fine to medium gravel, little silt, poorly sorted, round and spherical, loose.	SP	End of boring - 8.4' bgl.	1089.1

SSS

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

MW-1d BORING NO.

SHEET 1 OF 3

1060.66

**PROJECT** 

**GSWA Spring Hill Camp** 

Osceola, MI

LOCATION

4065-001

	ORDINAT			7,272.7 1097	1000			PROJECT NO. 4065- JSGS LOGGED BY Ken E			
	LING CO				.00	DATE	T	OCATION DESCRIPTION:	WCIS		
DRIL 4 1/ DRIL 6/26	arns LING ME' 4" HSA LING STA 6/00  SAND CLAY	ART	ED E	□ PE	050			See Report Figures fo	r Loc	ations	
	GRAVEL			FI FI	LL						_
Depth feet	Lab	s	ample Type	Blow Counts (300 lb. Ham-	- 1	1	Strata	DESCRIPTION	uscs	REMARKS	Elevation
-			Hand Auger	mer)			7.77	Brown loam (TOPSOIL).  Red, MEDIUM TO FINE SAND, little silt.  Light brown, FINE TO MEDIUM SAND, little silt, moist.	SM SM SM	Hand auger to 8' bgl to clear utilities.	1097.6
5-								Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.	SM		
10-		1111	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	1089.6
15-		1111	SSS	3-6 10-11	95		20.22.10	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.	1085.0
20-		1111	SSS	1-0 1-6	100			Grayish brown, MEDIUM SAND, some silt and clay, sand is round and spherical, very loose, moist to wet.	sc	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K. Interbedded/gradation band per driller.	1080.6
25-		1111	SSS	10-13 15-16	100			Grayish brown, FINE SAND, some silt,trace medium sand, medium density, round and spherical, moist with wet sandier seams, 1/4" seam of clay at 22.75', gray 1" seam of silt at 23',1" seam	SM	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1075.1
30-		1111	SSS	1-1 8-6	100			of medium sand with little silt at 23.5'.  Buff to light brown, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose, wet.	SP	Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.	1071.6
35-		1111	SSS	3-0 3-5	75			Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose, wet. Buff, MEDIUM TO COARSE SAND, few fine to	SP SP	Granite fragments.	1064.6 1064.1

medium gravel, few medium angular gravel, subrounded, spherical to elongate, loose, wet.

gravel, sand is round and spherical, gravel is

Buff, MEDIUM SAND, little coarse sand, few fine

SP

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COORDINATES N 227,272.7 E 1,746,801.0

SURFACE ELEVATION 1097.66 DATUM USGS

MW-1d BORING NO.

SHEET 2 OF 3

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO. 4065-001

Ken Ewers LOGGED BY

	SAMF	LE	INF	ORMA	TION						c
Depth feet	Lab Sample	700	ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
45-		1111	SSS	1-4 5-8	88			subangular and elongate, loose, poorly sorted, wet. Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is subangular and elongate, loose, poorly sorted, wet. (continued) Buff, MEDIUM SAND, few fine sand, round and spherical, poorly sorted, loose, wet. Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine gravel, subrounded and	SP SP SP	Outwash or glaciofluvial.	1054.16 1053.16
50-		1111	SSS	5-6 6-3	60			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-		1111	SSS	8-6 4-5	50			Buff, MEDIUM TO COARSE SAND, little fine to medium sand, few coarse sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP	Bail approx. 3.25' heave from augers.	1044.66
60-		1111	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-		1111	SSS	4-5 5-11	85			Buff, MEDIUM SAND, little medium to coarse sand, few fine sand, trace coarse sand, round and very spherical, poorly sorted, loose, wet.	SP	Bail approx. 3' heave from augers.	1034.6
70-		1111	SSS	0-2 5-9	70			Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP	Bail approx. 2' heave from augers.	1029.6
75-		1111	sss	0-0 0-0	90			Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, trace fine gravel, round and very spherical, sorted, very loose, wet.	SP	Bail approx. 2.5' heave from augers.	1024.6
80-		1111	SSS	1-5 12-13	50			Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP	Bail approx. 1.9' heave from augers.	1019.66
85-		1111	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
85 -		1111	sss	5-15 20-27	90			Buff, FINE SAND, round and spherical, well sorted, loose, medium density, wet. Gray, VERY FINE SANDY SILT, trace fine to medium gravel, poorly sorted, moist to wet.	SP	Possible till at 89' bgl. Bail approx. 1.0' heave from augers.	1009.66



SURFACE ELEVATION 1097.66

COORDINATES N 227,272.7 E 1,746,801.0

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DATUM USGS

BORING NO. MW-1d

SHEET 3 OF 3

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

LOGGED BY

Ken Ewers

SAME	PLI	EINF								c
Lab Sample		100000	mer)	Rec- overy %	PID (ppm)		DESCRIPTION	uscs	REMARKS	Elevation
	1111	SSS	9-17 44-59	100			Gray, SILTY CLAY, trace fine sand and fine to medium gravel, low to medium plasticity, hard, dry to moist. (continued)	CL	Varved 93-95' bgl.	1004.6
	1111	SSS	5-12 11-12	25			Brown to gray, FINE TO MEDIUM SAND, trace silt and clay, loose, round and spherical, wet.	SP	Driller notes change at 97' bgl.	1000.6
	1111	SSS	3-4 10-11	90			Buff, MEDIUM TO COARSE SAND, little fine sand, few coarse sand, trace gray sand and clay, round and spherical, poorly sorted, loose, wet.	SP	Bail approx. 1.0' heave from augers.	994.5
	1111	SSS	4-12 18-28	100			Buff, MEDIUM TO COARSE SAND, little fine sand, trace fine gravel, subrounded and elongate to spherical, poorly sorted, loose, wet, 1" gray clay stringers at 109.5' and at 110' bgl.	SP	Bail approx. 0.5' heave from augers.	989.6
	1	SSS	6-5	95			Buff, MEDIUM TO COARSE SAND, little fine sand, trace fine gravel, subrounded and subspherical.	SP		984.6
	Lab	Lab S	Lab Sample Type  SSS  SSS  SSS  SSS  SSS	Lab Sample Type Hammer)  SSS 9-17 44-59  SSS 5-12 11-12  SSS 3-4 10-11  SSS 4-12 18-28	Lab Sample Type Counts (300 lb. Hammer) %  SSS 9-17 44-59 100  SSS 5-12 25  SSS 3-4 10-11 90  SSS 4-12 18-28 100	Sample Type Hammer) % (ppm)  SSS 9-17 44-59 100  SSS 5-12 11-12 25  SSS 3-4 10-11 90  SSS 4-12 18-28 100	Lab Sample Type Hammer! SSS 9-17 44-59 100 SSS 5-12 11-12 25 SSS 3-4 10-11 90 SSS 4-12 18-28 100	Lab Sample Type Recovery PID (ppm) 8 PID (	Lab Sample Counts (300 lb.) Hammer (100	Lab Sample Type Recounts Recount (2000 lb) Lovery (2000 lb) Recount (2000 lb) Recoun

SURFACE ELEVATION 1098.39

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DATUM USGS

BORING NO. MW-1i

SHEET 1 OF 1

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

4065-001

PROJECT NO.

Ken Ewers LOGGED BY

DRILLING CONTRACTOR

Stearns

DRILLING METHOD EQUIPMENT

4 1/4" HSA

**CME 1050** 

DRILLING STARTED ENDED

COORDINATES N 227,278.5 E 1,746,804.4

6/26/00

6/27/00

LOCATION DESCRIPTION:

STRATA KEY

SAND

SILT

E CLAY

PEAT

GRAVEL

FILL

See Report Figures for Locations

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

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BORING NO.

SHEET 1 OF 3

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

K.E. & J.H.

MW-2

PROJECT NO. LOGGED BY

4065-001

COORDINATES N 227,226.8 E 1,746,937.5

SURFACE ELEVATION 1101.70

DATUM USGS

DRILLING CONTRACTOR

DRILLING METHOD EQUIPMENT

4 1/4" HSA

Stearns

6/27/00

**CME 1050** 

DRILLING STARTED ENDED

6/27/00

SILT

STRATA KEY

CLAY

PEAT

SAND

GRAVEL

FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

	GHAVEE										
SAMPLE INFORMATION								pg		22.50.2	tion
epth feet	Lab Sample	1	mple ype	Counts (300 lb. Ham- mer)	Rec- overy %	(ppm)	0,	DESCRIPTION	USCS	REMARKS	Elevation
+		П					444	Dark brown,loamy TOPSOIL (silty sand).	SM		1101.7
-		.	5225	10				Red,medium SAND,some silt,few clay,round and spherical,poorly sorted,loose,moist.	SM		1099.9
-			Hand Auger					Medium brown,medium SAND,some silt,little clay,round and spherical,poorly sorted,loose,moist.	SP		1098.2
5-		П						Red,CLAY,some silt,few fine sand,medium	CL		1096.9
								plasticity,moist.   Buff,fine to medium SAND,little silt,few clay,round   and spherical,loose,moist.	SP		1096.7
		7	SSS	2-1 1-0	100			Red,CLAY,some medium sand,little silt,low to	CL	Not similar to clay at MW-1.	1093.6
10-		q			11			medium plasticity,soft,very moist. Buff,fine to medium SAND,some fine sand,few coarse sand,trace fine gravel,very rounded and spherical,loose, wet.	SP		1092.2
15-		1	SSS	2-2 3-3	50	1		Buff,fine to very fine SAND,some fine sand,trace silt and fine gravel,rounded and	SP		1087.7
								spherical,loose,wet.  Buff to gray,CLAY,some fine sand,low plasticity,soft,wet.	CL	Clay/Sand contact at 18' inferred from	1085.8
20-		1111	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	-cuttings and driller's comments. Gravelly 22-24' bgl per driller.	1083.7
25-		1111	SSS	1-1 1-0	95			Buff,medium SAND,some medium to coarse sand,little fine sand,few silt,trace fine to medium gravel,rounded to subrounded and spherical,loose,wet,1" clayey silty fine sand stringer at 25.5'.	SP		1077.
30-		1111	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.
35-		1111	SSS	1-2 7-9	25			Buff,medium SAND,few coarse sand,few silt,rounded and spherical,loose,wet.	SP	No Recovery at 39-41' interval due to 2" piece of gravel.	1067.
	1-			5-7							

COORDINATES N 227,226.8 E 1,746,937.5

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BORING NO.

MW-2

SHEET 2 OF 3

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI 4065-001

PROJECT NO. LOGGED BY

KE & IH

	SAMF	LE	INF	ORMA'	TION						_
epth feet	Lab Sample		imple ype	Blow Counts (300 lb. Ham- mer)	Rec- overy	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
		17	SSS	12-10 4-7 11-13	50			Buff,fine to medium SAND,trace fine gravel,rounded to subrounded,loose,wet.	SP SP	Bailed approx. 0.5' heave from augers.	1060.
45 <del>-</del>		1111	SSS	2-6 11-12	50			Buff,fine to medium SAND,trace fine gravel,rounded,loose,wet.	SP		1057.
50-		1111	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.
55 –		1111	SSS	4-9 15-16	60			Buff,medium SAND,trace fine sand,fine to medium rounded gravel,rounded to subrounded,loose,wet.	SP		1047.
60-		1111	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.
65-		1111	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-		1111	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
75-		11111	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
80		1111	SSS	7-17 18-25	100			Buff,fine to medium SAND,medium density,loose. Buff,clayey SAND,(fine to medium sand,little clay).	SP SP		1022 1021
80· 85		1111	SSS	6-15 23-26	80			Buff,medium SAND,rounded to subrounded,trace fine sand,medium density.	SP		1017
90	-	1111	sss	2-8 19-27	60			Buff,medium SAND,trace fine sand,rounded to subrounded,loose to medium density.	SP		1012



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MW-2 BORING NO.

SHEET 3 OF 3

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

	SAME	PLI	EINF	AMAC								5
epth eet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
95-		1111	SSS	2-7 14-20	80				Buff,fine to medium SAND,rounded to subrounded,loose to medium density.	SP		1007.
00-		1111	SSS	4-8 18-19	80				Buff,fine to medium SAND,roudned to subrounded,loose to medium density.	SP	End of boring - 101' bgl.	1002.

### MALCOLM

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MW-3 BORING NO.

SHEET 1 OF 3

PROJECT

GSWA Spring Hill Camp

LOCATION

Osceola, MI

4065-001

PROJECT NO. LOGGED BY

Ken Ewers

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:

STRATA KEY

SAND

SILT

E CLAY

PEAT

See Report Figures for Locations

	SAME	LE	INF	ORMA	TION						-
Depth feet	the control of		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
1							ψ.ψ.φ.	TOPSOIL.  Medium reddish brown, SANDY CLAY,slightly moist.	CL		1107.0
5-			AUG					Light brown FINE TO COARSE SAND.	SP		1104.0
10-		ALLIA	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-		1111	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-		1111	SSS	5-6 4-4	100			Medium buff,clayey SAND,hard,damp to moist,(till?).	sc		1089.00
25-		1111	SSS	2-3 4-4	80			Medium buff,clayey SAND,hard,damp to moist,stringers of medium to coarse saturated sand	sc		1084.00
30-		וווע	SSS	3-3 4-4	100			Medium gray,clayey SAND,hard,damp,trace fine rounded gravel, (till?).	sc		1079.00
35-		1111	SSS	5-7 7-8	100			Medium gray,clayey SAND,hard,damp,trace fine rounded gravel,(till?).	sc		1074.00
		777	SSS	5-9 10-12	100			Medium gray,clayey SAND,hard,damp,trace fine rounded gravel,(till?).	sc		1069.00

COORDINATES N 227,144.9 E 1,746,836.6

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

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

	SAME	PLE	E INF	ORMA	TION						-
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
45-		1111	SSS	6-4 4-4	10			Buff,clayey fine to medium SAND,soft,trace gravel.	sc	Rock wedged in tip of 43-45' sample.	1067.0
50-		1111	SSS	1-2 2-2	100			Buff,clayey fine to medium SAND,soft,few rounded gravel,saturated.	sc	48-50' sample is much softer than 43-45' sample.	1059.0
55-		1111	SSS	1-2 1-6	100			Buff,clayey fine to medium SAND,soft,few rounded gravel,saturated.	SC		1054.0
60-		1111	SSS	1-1	20			Buff,medium SAND,loose,trace fine and coarse sand,trace fine rounded gravel,rounded to subrounded,saturated .	SP		1049.0
65-		1111	SSS	1-1 3-2	100			Buff,medium SAND,loose,trace fine and coarse sand,trace clay,rounded to subrounded,saturated.	SP		1044.0
70-		1111	SSS	1-1 2-2	100			Buff,fine to medium SAND,trace coarse sand and fine gravel,loose,rounded to subrounded,saturated.	SP		1039.0
75-		1111	SSS	1-4 2-7	40			Buff,medium SAND,trace fine and coarse sand,loose,rounded to subrounded,saturated.	SP		1034.0
80-		1111	SSS	3-3 4-5	90			Buff,fine to medium SAND,loose,saturated,trace coarse sand and silt,trace fine gravel.	SP		1029.0
85-		LLLA	SSS	1-2 2-3	100			Buff,medium SAND,loose,rounded to subrounded,saturated,with lenses of fine and coarse sand. Coarse to very coarse SAND,fine to medium gravel,little medium sand.	SP SP		1024.0 1022.5
90-		1111	SSS	2-2 2-3	100			Buff,fine to medium SAND,loose,rounded to subrounded,saturated,trace coarse sand.	SP		1019.0



Fax: (517)-337-0417

BORING NO.

**MW-3** 

SHEET 3 OF 3

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

COORDINATES N 227,144.9 E 1,746,836.6 SURFACE ELEVATION 1107.00 DATUM USGS

LOGGED BY Ken Ewers

	SAME	LE I		ORMA			m				L C
epth feet	Lab Sample	Sam Typ	ple e	Blow Counts (300 lb. Ham- mer)	Rec- overy %	(ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
95-		SS SS	SS	6-7 7-9	100			Buff,fine to medium SAND,loose,rounded to subrounded,saturated,trace coarse sand. (continued)	SP		
-00			-	5-6 7-9 6-9 13-15	100 50			Mix of coarse SAND and fine GRAVEL seams in fine to medium sand, very saturated, trace clay. Gray, fine SAND, hard, few clay and silt (till?). Gray, fine to medium SAND, medium hardness, silt, clay till.	SP SP	End of boring - 102' bgl.	1009 1008 1007

Fax: (517)-337-0417

MW-4s BORING NO.

SHEET

1 OF 1

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

M.B. & J.H.

COORDINATES N 227,190.7 E 1,746,649.2 LOGGED BY SURFACE ELEVATION 1090.06

DRILLING	CONTRACTOR	

NA

DRILLING METHOD EQUIPMENT

**Hand Auger** DRILLING STARTED ENDED

Auger

6/29/00

6/29/00

STRATA KEY

LOCATION DESCRIPTION:

See Report Figures for Locations

	SAND		III sı	LT						
	CLAY		□ PE	EAT						
	GRAVEL		FI FI	LL .						
	SAME	LE INF				_				L.
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
BORING LOG GSWA-SHC.GPJ MP_MI.GDT 10/18/00			mer	9%		\$\frac{1}{2}\frac{1}{2	Dark yellow to brown, TOPSOIL, clayey sand, moist.  Buff, medium SAND, rounded to subrounded, moist to wet, trace fine sand.  Buff, medium SAND, rounded to subrounded, moist to wet, trace fine sand.	SP SP	Stratigraphic information taken from MW-4d boring log. MW-4s drilled approx. 10' from MW-4d. End of boring - 8.7' bgl.	1090.00 1088.00 1086.00

# MALCOLM PIRNIE

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MW-4d BORING NO.

SHEET 1 OF 2

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

SC

coc	ORDINATE	ES	N 22	7,193.5	5 E 1,	746,64	6.7	PROJECT NO. 4065-	001		
SURF	FACE ELE	VA	TION	1089	.51	DAT	JM L	JSGS LOGGED BY Joel H	lenry		
Stean DRILL 4 1/ DRILL 6/29	LING CON arns LING MET 14" HSA LING STA 9/00 SAND CLAY GRAVEL	rho	DD E	EQUIPM CME 1 ENDED 6/29/0 A KEY SI	050		LC	See Report Figures fo	or Locat	iions	
		01 10	= INIE	ORMA	TION						
Depth feet		s		Blow Counts (300 lb. Ham- mer)			Strata	DESCRIPTION	uscs	REMARKS	Elevation
		T	Hand	men			444	Dark yellow to brown,TOPSOIL,clayey sand,moist.	SP		1089.
1		Ц	Auger				1,1,1	Buff,medium SAND,rounded to subrounded,moist to wet,trace fine sand.	SP		1087.
5-		7	SSS	4-4 2-2	80			Buff,medium SAND,rounded to subrounded,moist to wet,trace fine sand.			1085.
		7		2-2				to work age time suits.	SP		
10-		1111	sss	1-1 1-2	40			Buff,fine to medium SAND,rounded to subrounded,loose,saturated,trace rounded coarse sand,trace clay.	SP		1080.
15-		1111	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.
20-		1111	sss	4-7 8-8	60		. Y. Y	Light buff,sandy CLAY,hard,moist,few subrounded to subangular fine to medium gravel.	CL		1070.
	1										
25-		1111	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.
30 -		-	SSS	3-5 4-5	60			Buff,medium to coarse SAND,loose,saturated,little fine to coarse rounded to subrounded gravel.	SP		1060.
MP N		=		1-1	-			Light buff,sandy SILT,soft,saturated,trace fine langular to subangular gravel.	ML		1059. 1058.
32 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		1	SSS	1-1	50			Light buff,silty clayey fine to medium SAND,very soft,moist to wet,trace subrounded to subangular gravel.	sc		
35·	-	2	sss	1-1 2-2	90			Light buff,silty clayey fine to medium  SAND firm moist to wet trace gravel			1055.

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MW-4d BORING NO.

SHEET 2 OF 2

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

SURFACE ELEVATION 1089.51

COORDINATES N 227,193.5 E 1,746,646.7

LOGGED BY Joel Henry

	SAMF	PLE	INF	ORMA	TION						_
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
1		P	SSS	2-3	100		3.7	Light buff,silty clayey fine to medium SAND,firm,moist to wet,trace gravel. (continued)	sc	T	
45-		1111	SSS	1-1	50			Light buff,silty clayey fine to medium SAND,loose, rounded to subrounded,saturated.	SC		1045.5
50-		1111	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		1040.5
55-		1111	SSS	1-1 3-3	75			Light buff,silty clayey fine to medium SAND,soft,saturated.	sc		1035.5
60-		נננע	SSS	1-3 5-6	90			Interbedded lenses of very soft, saturated silty clayey fine to medium SAND and buff medium to coarse rounded to subrounded SAND.	SC		1030.5
65-		1111	SSS	1-2 3-4	100			Light buff,silty clayey fine to medium SAND,saturated,trace fine gravel (less silt and clay content than previous spoon). Light buff,clayey fine to medium SAND,hard,moist.	sc sc		1025.5 1023.8
70-		1111	SSS	2-3 4-5	70			Light buff,silty clayey fine to medium SAND,saturated.	sc		1020.5
75-		1111	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		1015.5
80-		1111	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		1010.5
85-		1111	SSS	4-4 9-10	75			Buff to light brown,interbedded fine to medium SAND,with silt,saturated. Light gray to brown,medium to coarse SAND,saturated,trace fine sand,trace fine	SP SP	Driller felt till at 86' bgl.	1005.5 1005.0 1003.5
		111	sss	4-10 17-22	60			subangular gravel.  Medium gray to brown,fine to medium SAND,silt	CL		
90-		1111	sss		100			(till?),identical to unit encountered at 100' at MW-3. Medium gray,clay TILL,very firm,moist.	CL	End of boring - 91' bgl.	1000.5

## MALCOLM PIRNIE

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

COORDINATES N 227,283.9 E 1,747,399.4

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BORING NO. MW-5d SHEET 1 OF 4

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

SURF	FACE ELE	VA	NOITA	1149	.40	DA	ATU	м	JSGS LOGGED BY Joel H	lenry		
Stern DRILL 7/18	LING CON arns LING MET /4" HSA LING STA B/00 SAND	RT	OD TED	EQUIPM CME 9 ENDED 7/19/00 TA KEY SI PE	D LT EAT			LC	See Report Figures fo	r Loc	ations	
<u>E</u>	GRAVEL	1 6	E INE	ORMA		_		_				
Depth feet	Lab	s	ample Type	Blow	Rec-	AS P	D m)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
5-		1111	SSS	3-4 4-6	100				Medium brown SANDY CLAY, soft, damp to dry.  Interbedded medium brown SANDY CLAY with light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.	CL CL		1146.40 1144.90
10-		1111	SSS	19-20 12-4	25				Medium brown SANDY CLAY. Light buff, dry, loose, FINE TO MEDIUM SAND, subangular to subrounded.	CL SP	Prove rock.	1141.40 1141.20
15-		1111	SSS	2-3 4-4	100				Dry, loose, light buff, MEDIUM SAND, trace fine sand, subrounded.	SP		1136.40
20-		ונונ	SSS	4-5 5-5	70				Dry, loose, light buff MEDIUM SAND, trace fine sand, subrounded. One <1/2" lens medium brown silt @ 19.5' bgl. No silt in remaining sample.	SP		1131.40
25-		1111	SSS	2-2 4-6	60				Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.	SP		1126.40
30-		1111	SSS	14-9 11-15	100				Saturated medium dense light yellow brown SANDY SILT. Dry hard medium yellow brown SILTY/SANDY CLAY.	SM/ML CL		1121.40 1120.40
35-		1111	SSS	4-8 10-14	100				Dry/damp, hard medium grey CLAY, trace silt partings. Color change to light yellow brown SILTY CLAY, dry and hard.	CL	Felt lithology change at 36' bgl.	1116.40 1114.90
		111	SSS	1-8 12-16	40			3/53/	Saturated, light yellow brown, soft, SILT AND CLAY. Water may have entered spoon from	CL SP	Water may have	1111.40

SURFACE ELEVATION 1149.40

COORDINATES N 227,283.9 E 1,747,399.4

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DATUM USGS

BORING NO. MW-5d

SHEET 2 OF 4

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

4065-001

PROJECT NO.

LOGGED BY Joel Henry

	SAMF	PLE	E INF	ORMA	TION				1		-
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
1								perched zone.  Dry light buff loose MEDIUM SAND, trace fine sand. (continued)	SP	perched zone.	J
45-		111	SSS	2-5 7-10	60			Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.	SP		1106.4
50-		1111	SSS	3-4 6-9	60			Dry, loose, light buff MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, one fine to medium gravel stringer @ 48.5'.	SP		1101.4
55—		1111	SSS	0-0 1-1	50			Saturated, loose light yellow brown MEDIUM TO FINE SAND, trace medium rounded gravel. Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC		1096.4
- 3		1	SSS	2-3	80		3.00	Saturated, loose light yellow brown MEDIUM TO COARSE, trace fine sand, trace gravel.	SP		1091.40
60-		7	SSS	5-5 4-70/6"	40		.O.		GP		1090.9
		7	SSS	9-14 19-22	100			Mixed FINE TO MEDIUM GRAVEL AND FINE TO MEDIUM SAND, saturated. May be slough. Poor precovery, seemed to be pushing a cobble.	SP		1087.4
65-		11111	SSS	2-4 11-14	50			Saturated light yellow brown FINE TO MEDIUM SAND with some fine subangular to subrounded gravel.  Moist medium yellow brown FINE SAND AND SILT, firm.	SP SP		1086.40 1085.90 1085.40
70-		1111	SSS	2-4 5-5	60			Saturated light yellow brown, FINE TO MEDIUM SAND trace silt. Saturated light yellow brown, FINE TO MEDIUM SAND, trace silt, subangular to subrounded. Saturated light yellow MEDIUM TO FINE SAND, rounded to subrounded.	SP SP		1081.4 1080.9
75-		1111	SSS	0-1 6-10	60			Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay. Saturated light yellow brown MEDIUM TO FINE SAND, trace fine to medium subrounded gravel.	SP		1076.4
		7	SSS	4-11	100			Saturated light yellow brown MEDIUM TO FINE	SP		1071.40
80-			78-80 Grain size analysis	18-26				SAND. Saturated light yellow brown SILT, some fine to medium sand.	ML		1070.40
85-		11111	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.	SP		1066.4
90-		11111	SSS	2-2 2-3	50			Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.	SP		1061.4

COORDINATES N 227,283.9 E 1,747,399.4

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MW-5d BORING NO.

SHEET 3 OF 4

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

	SAME	PLI	E INFO	AMAC	TION		1,1				-
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
95-		1111	SSS 93-95 Grain size nalysis	1-2 3-5	60			Saturated light yellow brown MEDIUM TO COARSE SAND, little to some fine subangular to subrounded gravel, trace clay (gravelly sand). (continued)	SP		1056.4
100-		1111	SSS	3-5 7-10	40		0000	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 -		1111	SSS	1-4 9-15	100			Saturated light yellow brown FINE TO COARSE SAND, finer at bottom, coarse sand with few fine gravel @104' bg.	sw		1046.40
110-		1111	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-		וווע	SSS	2-3 6-10	100			Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand.	SP		1036.40
120-		וננון	SSS 18-120 Grain size analysis	0.0	100			Saturated, loose, light yellow brown MEDIUM SAND, trace fine gravel.	SP		1031.40
		7	SSS	2-4	3100			Saturated, light yellow brown FINE TO COARSE SAND, interbedded lenses.	SW		1026.40
125-		(		8-20				Medium grey fine to very fine SILTY SAND, trace clay. Saturated, loose.	SM		1024.90
130-		1111	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
		17.	SSS	0-0 0-2	100			Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, trace coarse sand, rounded	SP	No change felt in drilling.	1016.40
135-		4						and subrounded.  Moist moderate grey CLAY, sandy/silty clay (till?)	CL		1014.60
135-		1111	SSS	7-10 14-22	70			Dry moderate grey CLAY, trace silt, very hard.	CL	Drilled hard 140-142', then looser 142' on.	1011.40
145-		1111	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

COORDINATES N 227,283.9 E 1,747,399.4

SURFACE ELEVATION 1149.40

DATUM USGS

LOGGED BY Joel Henry

	SAME	L	E INF	ORMA			в				uo
Depth feet			ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS (pp	Strata	DESCRIPTION	uscs	REMARKS	Elevation
150-		1111	SSS	4-8 13-18	100			Wet moderate grey CLAY with little to some medium to coarse sand (sandy clay), firm. Saturated light yellow brown loose MEDIUM TO COARSE SAND interbedded with sandy silt lenses.	CL CL SP	Drilling behavior reflects that forward on alternates between hard and soft zones.	-
155-		1111	SSS	5-12 15-20	100			Saturated light yellow brown loose MEDIUM TO COARSE SAND, trace to few silt and clay.	SP		996.4
160-		1111	SSS	3-6 11	100			Saturated light yellow brown loose MEDIUM SAND trace fine and coarse sand, trace clay toward bottom.  Hard moist SANDY CLAY at 160.2 ft. bgl.	SP	End of boring - 160.2' bgl.	991.4 989.4

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MW-5i BORING NO.

SHEET 1 OF 3

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

COORDINATES N 227,274.3 E 1,747,404.0

PROJECT NO. 4065-001

100	FACE ELE							JSGS LOGGED BY Joel H	lenry		
Ste DRIL 4 1/2 DRIL 7/1	LING CON earns LING MET /4" HSA LING STA 8/00 SAND	THOD	EQUIPM CME 9 ENDED 7/20/0	95			LC	See Report Figures fo	r Loc	ations	
	GRAVEL		FI	LL							
	SAMF	LE INF	ORMA				a				uo
Depth	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
5-								Medium brown SANDY CLAY, soft, damp to dry.  Interbedded medium brown SANDY CLAY with light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.	CL CL	Stratigraphic information taken from MW-5d boring log. MW-5i drilled approx. 10' from MW-5d.	1145.78 1144.28
10-								Medium brown SANDY CLAY. Light buff, dry, loose, FINE TO MEDIUM SAND, subangular to subrounded.	CL SP	Prove rock.	1140.75 1140.55
15-								Dry, loose, light buff, MEDIUM SAND, trace fine sand, subrounded.	SP		1135.7
20-								Dry, loose, light buff MEDIUM SAND, trace fine sand, subrounded. One <1/2" lens medium brown silt @ 19.5' bgl. No silt in remaining sample.	SP		1130.7
25-								Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.	SP		1125.7
	1				П			Saturated medium dense light yellow brown	SM/ML		1120.7
30-								SANDY SILT. Dry hard medium yellow brown SILTY/SANDY CLAY.	CL		1119.7
30- 35-								Dry/damp, hard medium grey CLAY, trace silt partings. Color change to light yellow brown SILTY CLAY, dry and hard.	CL	Felt lithology change at 36' bgl.	1115.7

Saturated, light yellow brown, soft, SILT AND

CLAY. Water may have entered spoon from

Water may have

entered spoon from

CL

SP

1110.75

1109.75

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**PROJECT** 

MW-5i

SHEET 2 OF 3

BORING NO.

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

SURFACE ELEVATION 1148.75

COORDINATES N 227,274.3 E 1,747,404.0

DATUM USGS

LOGGED BY

Joel Henry

		LL IIVI	UNIVIA	TION		_				
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	(ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
-							perched zone.  Dry light buff loose MEDIUM SAND, trace fine sand. (continued)	SP	perched zone.	J
45-							Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.	SP		1105.7
50—							Dry, loose, light buff MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, one fine to medium gravel stringer @ 48.5'.	SP		1100.7
55-							Saturated, loose light yellow brown MEDIUM TO FINE SAND, trace medium rounded gravel. Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC		1095.7
							Saturated, loose light yellow brown MEDIUM TO	SP		1090.7
60-						.O.	COARSE, trace fine sand, trace gravel. Saturated loose subangular to subrounded FINE TO COARSE GRAVEL.	GP GP		1090.2
-							Mixed FINE TO MEDIUM GRAVEL AND FINE TO MEDIUM SAND, saturated. May be slough. Poor precovery, seemed to be pushing a cobble.	SP ML		1086.7
65-							Saturated light yellow brown FINE TO MEDIUM SAND with some fine subangular to subrounded gravel.  Moist medium yellow brown FINE SAND AND	SP SP		1085.2
- 70-							SILT, firm. Saturated light yellow brown, FINE TO MEDIUM SAND trace silt. Saturated light yellow brown, FINE TO MEDIUM SAND, trace silt, subangular to subrounded.	SP		1080.7
75-							Saturated light yellow MEDIUM TO FINE SAND, rounded to subrounded. Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay. Saturated light yellow brown MEDIUM TO FINE SAND, trace fine to medium subrounded gravel.	SP SP		1075.7
1							Saturated light yellow brown MEDIUM TO FINE	SP		1070.7
80-							Saturated light yellow brown SILT, some fine to medium sand.	ML		1069.7
85-							Saturated light yellow brown FINE TO MEDIUM SAND, trace to few silt, trace clay.	SP		1065.7
90-							Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.	SP		1060.7



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MW-5i BORING NO.

SHEET 3 OF 3

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

COORDINATES N 227,274.3 E 1,747,404.0

SURFACE ELEVATION 1148.75

DATUM USGS

PROJECT NO. LOGGED BY

Joel Henry

4065-001

	SAME	LE INF				_				5
Depth feet		Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
95-			e.,			, d	Saturated light yellow brown MEDIUM TO COARSE SAND, little to some fine subangular to subrounded gravel, trace clay (gravelly sand). (continued)  Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, trace	SP SP GP	End of boring - 100' bgl.	1055.7 1050.7 1050.2
100-						. \\c	Saturated subangular to subrounded GRAVEL, trace fine to medium sand. One large gravel (1") wedged in bottom of spoon.			1030.2
מחוועם בספר מספר אינו ביווימסי ומיווימסי										

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**PROJECT** 

MW-6

1 OF 2 SHEET

BORING NO.

**GSWA Spring Hill Camp** 

Osceola, MI

LOCATION

PROJECT NO.

4065-001

COORDINATES N 227,522.4 E 1,747,396.4 LOGGED BY Joel Henry SURFACE ELEVATION 1142.44 DATUM USGS

DRILLING	CONTRACTOR

Stearns

7/17/00

SAND

DRILLING METHOD EQUIPMENT **CME 95** 4 1/4" HSA

DRILLING STARTED ENDED

SILT

7/17/00

STRATA KEY

LOCATION DESCRIPTION:

### See Report Figures for Locations

	CLAY GRAVEL			四 PE	EAT LL							
	SAMF	LE	INF	ORMA				g				ion
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
5-		ונוע	SSS	3-5 5-6	80				Saturated yellow brown medium Sand, trace fine sand.	SP		1139.44
-				2-2		$\ $			Saturated, light yellow brown medium Sand, inc. percentage of clay.	SP		1134.94
10-			SSS	3-2	75				Light yellow brown Clay, trace fine sand, dry.	CL		1133.44
15-		1111	SSS	4-9 14-19	100				Dry medium grey brown Clay, trace fine sand, very stiff.	CL		1129.94
20-		1111	sss	3-5 6-7	80				Dry light yellow brown medium Sand, trace coarse sand, trace fine gravel, rounded and subrounded grains.	SP	Drilling easier at 17' bgl.	1124.94
25-		1111	SSS	11-14 17-25	90				Interbedded (varved?) layers of very clean, light brown to cream colored medium Sand, with layers of light yellow brown silty fine to medium sand, trace clay. Very tight.			1119.94
30-		1111	SSS	9-16 24-26	90					SM		
35-		1111	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
30-		111	SSS	6-13 18-19	70				Damp, light yellow grown fine to medium Sand, trace silt, rounded and subrounded, loose.	SM		1104.94



SURFACE ELEVATION 1142.44

COORDINATES N 227,522.4 E 1,747,396.4

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Fax: (517)-337-0417

DATUM USGS

BORING NO. MW-6

SHEET 2 OF 2

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

LOGGED BY

Joel Henry

epth Lab Sample		sss sss	Blow Counts (300 lb. Ham- mer) 4-7 14-18	60	(ppm)	Strata	Damp, light yellow grown fine to medium Sand, trace silt, rounded and subrounded, loose. (continued) Light yellow brown, saturated lenses of medium to coarse Sand, and fine to medium sand, with one lens (1") of light yellow brown silt.  Saturated light yellow brown fine to medium Sand, rounded and subrounded, trace silt.	SM	REMARKS	109 9.9 6.66 6.0 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7
50-	נננת נננת נננת	SSS	1-7 12-12	80			trace silt, rounded and subrounded, loose. (continued) Light yellow brown, saturated lenses of medium to coarse Sand, and fine to medium sand, with one lens (1") of light yellow brown silt.  Saturated light yellow brown fine to medium Sand,	SM		4
55-	נננון נננון		3-5				Saturated light yellow brown fine to medium Sand, rounded and subrounded, trace silt.			1094.9
	1111	SSS	3-5 10-14	400		200		SM		
	(4	555	10-14				Saturated light yellow brown fine to medium Sand, increase percentage of silt and clay.	SM		1089.
60-	Ш			100			Saturated light yellow brown silt.  Moderate grey brown Silt, clay in tip of spoon.	ML ML		1088.4
	1111	SSS	1-3 7-7	100			Saturated light yellow brown medium to fine Sand, rounded and subrounded. Saturated light yellow brown fine to very fine Sand, silt, trace clay.	SP SP		1084.9
65-	1111	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.
70-	1111	SSS	2-2 6-6	100			Saturated light yellow brown fine to medium Sand, rounded and subrounded, trace clay.	SP		1074.
75-	11111	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.
80-	1111	SSS	1-3 10-22	100			Saturated light yellow brown medium Sand, rounded and subrounded, trace clay, trace coarse sand, trace fine subrounded gravel.	SP	End of boring -80' bgl.	1064.9

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BORING NO. MW-7

SHEET 1 OF 3

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

SM

1110.23

COORDINATES N 227,527.9 E 1,746,900.2

PROJECT NO. 4065-001

SUR	FACE ELE	EVA	ATION	1149	9.23	DATU	JM L	JSGS LOGGED BY Jeff G	ronck	i .	
Ste DRIL 4 1/ DRIL	LLING COL Parns LLING ME' 1/4" HSA LLING STA 8/00	THO	OD	EQUIPM CME 1 ENDED 7/19/0 A KEY	1050		LO	See Report Figures fo	or Loc	ations	
	SAND CLAY GRAVEL		SIHAI	SI SI	ILT EAT ILL						
Depth feet	7 3 5	s	E INF Sample Type	Ham-			Strata	DESCRIPTION	uscs	REMARKS	Elevation Feet
5-		1111	SSS	2-3 4-4	75			Brown, stiff CLAY, dry-moist.	CL		1144.23
15-		ננת וננת	SSS	4-7 9-10 4-6 10-10	75			Light brown FINE TO VERY FINE SAND, with trace medium to coarse sand, dry.  Light brown, medium SAND, large to medium gravel, coarse sand, dry.	SP SP		1139.23
20-		111	SSS	2-4 8-9	80		9292	Brown, stiff to very stiff CLAY, dry.	CL		1129.23
25-		1111	SSS	5-7 12-13	60			Light brown, medium to fine SAND, some medium to fine gravel, little coarse gravel.	SP		1125.03
30-		1111	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-		1111	SSS	24-28 18-32				Light brown, medium SAND, some coarse sand, fine gravel.	SP	Driller comment: Pushed stone 34-36 ft. bgl.	1115.23

## MALCOLM PIRNIE

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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

	SAME	LE	INF	ORMA	TION						c
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	overy \$	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
-		P	SSS	28-26	90			Brown clay 2", Light brown, fine silty sand 2", Light brown very FINE SAND, very dry. (continued)	SM		
45-		ונונע	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-		1111	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
		H	72.5	7-14				Brown FINE CLAYEY SAND, wet.	sc		1095.23
55-		3	SSS	15-18	90			Brown CLAY, wet, trace fine sand.	CL	Wet at 59' bgl.	1094.23
-								Light brown FINE SAND, brown wet clay with little fine to very fine sand.	SP	wet at 59 bgt.	1093.73
60-		1111	SSS	1-2 4-7	60			Light brown MEDIUM SAND, with some coarse and fine sand and little fine gravel. 1/2" of brown clay at approx. 61 ft. bgl.	SP		1090.23
		1111	SSS	3-4 7-9	100		0.000	FINE GRAVEL, with some medium gravel and coarse sand.	GP	Sand bailed auger.	1088.23
65-		1111	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-		1111	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-		1111	SSS	11-13 16-18				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-		1111	SSS	8-21 18-23	90			Brown CLAYEY SAND, with coarse gravel.	SC	Driller comment: Easier drilling 83-84' bgl.	1069.23
85-		1111	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-		(1)	SSS	6-11 13-15	80			Light brown MEDIUM SAND, little to some coarse sand.	SP	Sand bailed auger.	1060.23
		-		15-15				Light brown COARSE SAND, with some fine gravel and trace medium gravel and medium sand.	SP		1058.73



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BORING NO. MW-7

SHEET 3 OF 3

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

SURFACE ELEVATION 1149.23

COORDINATES N 227,527.9 E 1,746,900.2

DATUM USGS

LOGGED BY

Jeff Groncki

	SAME	L	E INF	ORMA							_
Depth feet	Lab Sample		Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	VAS	PID (ppm)	DESCRIPTION	USCS	REMARKS	Elevation
95-		1111	SSS	12-16 27-0	50			Light brown MEDIUM TO COARSE SAND, with 2" fine to medium gravel.  Brown CLAY, alternating with gravel.	SP	Sand bailed auger.	1055.2
-									CL		
100-		1111	SSS	5-11 32-0				Light brown MEDIUIM SAND, with some fine to coarse sand, trace fine gravel.	SP	End of boring - 101' bgl.	1050.2



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BORING NO. MW-8

PROJECT

SHEET 1 OF 2

**GSWA Spring Hill Camp** 

LOCATION Osceola, MI

PROJECT NO. 4065-001

COORDINATES N 227,562.3 E 1,746,466.4

SURFACE ELEVATION 1113.49 DATUM USGS

LOGGED BY

Joel Henry

DRILLING CONTRACTOR
Stearns

DRILLING METHOD EQUIPMENT
4 1/4" HSA CME 95

DRILLING STARTED ENDED
7/18/00 7/18/00

STRATA KEY

SAND SILT

CLAY PEAT

FIGURE STRIPTION:

LOCATION DESCRIPTION:

See Report Figures for Locations

	SAME	PLI	E INF	ORMA	TION						_
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
		M	AUG					Topsoil.	SP-SM		1113.49
5-		1111	SSS	2-2 1-2	60			Dry, medium orange-brown, MEDIUM SAND, trace fine sand, subangular to subrounded, loose.	SP		1110.49
10-		1111	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-		1111	SSS	3-6 10-12	100			SANDY CLAY, stiff, very firm, dry.	CL	Felt lithology change @17 ft. bgl.	1100.49
20-		1111	SSS	1-1 2-3	10			Saturated, light yellow brown, MEDIUM SAND with lens of light yellow brown SANDY SILT.	SM-ML	5=5=5=	1096.49
25-		1111	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-		1111	SSS	3-3 5-8	50			Saturated, light yellow brown, MEDIUM SAND, rounded to subrounded, trace fine sand.	SP		1085.49
35-		1111	SSS	4-9 12-13	100			Saturated, light yellow brown, MEDIUM TO FINE SAND, rounded to subrounded. Saturated, light yellow brown SILT, few fine to very fine sand.	SP		1080.49
		111	SSS	6-3 6-10	100				SP		1075.49



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COORDINATES N 227,562.3 E 1,746,466.4

SURFACE ELEVATION 1113.49 DATUM USGS

MW-8 BORING NO.

SHEET 2 OF 2

PROJECT **GSWA Spring Hill Camp** 

LOCATION Osceola, MI

4065-001 PROJECT NO.

LOGGED BY Joel Henry

	SAME	PLE	INF	ORMA							5
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
_								Saturated light yellow brown, FINE TO MEDIUM SAND, trace sand, rounded to subrounded, one silt pocket at 39.5' bgl (1" thick). (continued)	SP		
45—		1111	SSS	2-3 4-6	90			Saturated, light yellow brown, MEDIUM TO FINE SAND, rounded and subrounded. Saturated, light yellow brown, SILTY FINE SAND.	SP		1070.4
50-		1111	SSS	2-5 7-10	100			Saturated, light yellow brown, MEDIUM TO FINE SAND, rounded and subrounded. One 2" lens of gravel, rounded at 49' bgl.	SP		1065.4
55-		1111	SSS	4-7 8-8	100			Saturated, light yellow brown, MEDIUM TO FINE SAND, lenses of silt, coarse sand imbedded in fine to medium sand.  Light yellow brown MEDIUM TO FINE SAND, saturated, thin lenses of silt, coarse sand imbedded	SP SP		1060.4 1059.4
-		1	000	5-11	100			in fine to medium sand.  Light yellow brown SANDY SILT, trace fine gravel.	SM-ML		1055.4
60-			SSS	13-17	100			saturated. Dry light yellow brown SANDY CLAY, with stringers of dry light brown fine sand.	CL		1054.4
		1	SSS	1-2	100	l Y		Saturated light yellow brown MEDIUM SAND, trace fine sand, trace coarse sand.	SP	Felt lithology change at 62.5' bgl.	1050.9
65-		1	000	4-8	100			Saturated light yellow brown FINE TO VERY FINE SAND and silt.	SM		1048.9
70-		1111	SSS	1-3 3-6	100			Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace coarse sand, loose.	SP		1045.4
75-		1111	SSS	1-3 4-6	90			Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, loose.	SP		1040.4
80-		1111	SSS	2-3 5-7	40			Saturated light yellow brown MEDIUM SAND, trace fine sand, rounded and subrounded, loose.	SP		1035.4
85-		1111	SSS	2-3 5-8	90			Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand, subrounded.	SP	End of boring -85' bgl.	1030.4

### MALCOLM 1500 Abbott Road, Suite 210 East Lansing, MI 48823

BORING NO.

MW-9

SP

SC

CL

SC-SM

SP

SP

SHEET 1 OF 2

1101.29

1099.29

1096.29

1090.79

1089.29

1086.29

CO	PII	RN ES N 2		9 E 1	Fax:	(517)	: (517) 337-0111 -337-0417	PROJECT LOCATION PROJECT NO.	Osceola	a, MI	Hill Camp	
SUR	FACE ELI	EVATION	1125	5.29	DATL	JM L	JSGS	LOGGED BY	Jeff Gro	ncki		
Ste DRIL 4 1/ DRIL	LING COI arns LING ME 4" HSA LING STA 9/00	THOD	EQUIPM CME ENDED 7/20/0	1050		LO	OCATION DESCRIPT	rion: Report Figu	ires for	Locat	ions	
	SAND CLAY GRAVEL	STRA	₩ P	ILT EAT ILL				, open inge		Local		
	SAME	PLE INF	ORMA	TION	ı							c
Depth feet	Lab Sample	Sample	Blow Counts (300 lb Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCR	IPTION	ı	JSCS	REMARKS	Elevation
5-		sss	1-1 3-2	50			Brown stiff CLAY, satur	ated/moist		CL		1121.2
10-		SSS	3-4 5-6	50			Light brown, VERY FIN Light brown FINE TO VI coarse sand and fine gr	ERY FINE SAND, w	ith trace	SC _		1115.7 1115.2
15-		SSS	4-8 8-10	50			Brown soft CLAY, satur Light brown MEDIUM S mediuim gravel.	ated/moist. AND, with some fine	e to	CL SP		1111.2
20-		SSS	3-6 8-8	60			Light brown MEDIUM S coarse gravel, saturated brown CLAY lens at 20.	/moist. Two inch th	e to nick	SP		1106.2

Light brown FINE TO MEDIUM SAND, wet at 25'.

Light brown CLAYEY SAND, trace medium gravel.

Brown CLAY with little to some medium sand, trace

Brown FINE CLAYEY SAND, interbedded with silty

layers, wet at 35' bgl.
Light brown MEDIUM SAND, with some coarse

fine gravel, moist.

sand.

25-

30-

35-

2-2 2-4

2-2 3-4

3-7

14-17

1-6

75

100

100

SSS

SSS

SSS

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



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MW-9 BORING NO.

SHEET 2 OF 2

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

SURFACE ELEVATION 1125.29 DATUM USGS

COORDINATES N 227,063.9 E 1,747,879.5

LOGGED BY Jeff Groncki

	SAME	PLE	E INF	ORMA			g	The state of the s			6 1
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	%	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
		DI	SSS	9-10	90			Light brown MEDIUM SAND, with some fine sand, little coarse sand, becoming clayey toward 41' bgl. (continued)	SP		
45 –		1111	SSS	5-5 7-11	80			Light brown MEDIUM SAND, with some coarse sand, trace fine gravel.	SP		1081.2
50 -		1111	SSS	4-7 10-10	90			Light brown MEDIUM SAND, with some coarse sand, trace fine gravel, with some clayey lenses (1/8" thick).	SP		1076.2
55-		揖	sss	7-12 18-19	100			Brown CLAY.	CL		1070.2
								Light brown MEDIUM TO FINE CLAYEY SAND.	sc		1069.9
60-		1111	SSS	8-9 13-7	100			Light brown MEDIUM SAND, with little fine sand, becoming clayey toward 60 ft. bgl. Light brown MEDIUM SAND with some coarse sand, becoming clayey toward 61 ft. bgl.	sc sc		1066.2 1065.2
65-		1111	SSS	1-3 4-11	90			Light brown MEDIUM SAND, with little to some coarse sand and fine gravel.	SP		1061.2
70-		1111	SSS	5-10 26-37	90			Light brown MEDIUM SAND, with some coarse sand and fine gravel, little medium to coarse gravel. One thin (1/8" thick) clay lens at 70 ft. bgl.	SP		1056.2
	1	-	2.22	3-6				Light brown MEDIUM SAND, with some coarse	SP		1051.2
75	1	1	SSS	11-24	90			sand, some medium gravel, few iron oxide stained laminations, some medium to fine gravel lenses.  Brownish gray SILTY CLAY.	CL	End of boring - 76' bgl	1050.4

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BORING NO. MW-10 SHEET 1 OF 2

PROJECT

GSWA Spring Hill Camp

Osceola, MI

LOCATION

4065-001

PROJECT NO.

COC	RDINATI	ES	N 22	7,478.6	E1,	747,98	0.1	PROJECT NO. 4065-0	001		
SURF	ACE ELE	VA	TION	1120	.54	DATU	IM L	JSGS LOGGED BY Jeff G	roncki		
Stean DRILLI 4 1/1 DRILLI 7/18	LING CON arns LING META 4" HSA LING STA B/00 SAND CLAY GRAVEL	rho	DD E	CME 1 ENDED 7/18/00 A KEY SI	050 D LT		LC	See Report Figures fo	r Locat	tions	
		OI F	INF	ORMA	TION		<u> </u>				
Depth feet		s	ample Type	Blow Counts (300 lb. Ham-			Strata	DESCRIPTION	uscs	REMARKS	Elevation
5- 5- 10-		ונונק נונק	SSS	2-4 2-2 1-2 4-8	70			Medium to coarse GRAVEL, with some light brown medium to coarse sand, dry.  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.	GP CL		1116.5
		1		1-2				Lihgt brown fine SAND.	- SP	12000	1106.5
15-		13	SSS	4-7	60		5.50.5	1/8" brown clay seam underlain by light brown,	SC		1105.5
								\text{\clayey FINE SAND.} Light brown medium SAND, with some iron oxide stained laminations, moist to dry.}	SP		1105.0
20-		1111	SSS	1 (18")-6	100			Light brown MEDIUM TO FINE SAND, with some very fine sand, wet to very moist.  Brown, very FINE SAND, with little to some clay, wet.	SP SP		1101.5
25-		1111	SSS	3-12 10-13	40			Light brown, MEDIUM SAND, with trace to little fine sand, wet.	SP		1096.5
30-		1111	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		1091.5
2 2 2	-								SP		
35°		1111	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		1086.5 1085.5
KING											1001 5

### MALCOLM

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PROJECT

MW-10 BORING NO. **GSWA Spring Hill Camp** 

SHEET 2 OF 2

LOCATION

Osceola, MI

PROJECT NO.

4065-001

COORDINATES N 227,478.6 E 1,747,980.1

SURFACE ELEVATION 1120.54

DATUM USGS

Jeff Groncki LOGGED BY

Depth feet	SAMF Lab Sample	s	E INFo	Blow Counts (300 lb. Ham- mer)		PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
1		4	SSS	13-17				Light brown MEDIUM SAND, with some fine sand and trace to little coarse sand. (continued)	SP		
45-		1111	SSS	2-6 10-16	70			Light brown FINE to MEDIUIM 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		1076.5 1075.5
50-		1111	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	SP SP		1071.5 1070.5 1070.2
55-		וווו	SSS	4-9 16-19	90			some medium to coarse gravel.  Light brown MEDIUM SAND, with some coarse sand and fine gravel, trace medium to coarse gravel.	SP		1066.5
- - - -		1111	sss	5-10 17-19	90		200	Light brown MEDIUM to COARSE SAND, with some fine to medium gravel.  Brown FINE to VERY FINE SAND, with some clay.	SP SP		1061.5
		1	SSS	5-12 17-24 7-13	100			Light brown MEDIUM to FINE SAND, with some coarse sand.  Light brown VERY FINE CLAYEY SAND.	sc	End of boring - 66'	1059.5 1058.5 1057.5
65 -				26-27				Light brown FINE TO MEDIUM SAND, with little to some coarse sand and fine gravel.	SP		

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BORING NO. MW-11 SHEET 1 OF 2

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

CO	ORDINAT	ES 1	1 22	9,202.	3 E 1	1,7	46,17	2.8	PROJECT NO. 4065-	001		
SUR	FACE EL	EVAT	ION	1166	6.66		DATU	JM I	USGS LOGGED BY Jeff C	Groncki		
Ste DRILL 4 1/2 DRILL 7/2	LING CO earns LING ME /4" HSA LING ST/ 1/00 SAND CLAY GRAVEL	THOD	D I	CME 1 ENDED 7/21/0 A KEY SI	050			Lo	See Report Figures fo	or Loc	ations	
	SAMI	PLE	INF	ORMA	TION	V						
Depth feet	Lab Sample		nple rpe	Blow Counts (300 lb. Ham- mer)	Rec- overy	VAS	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation Feet
1												
5-		7.	SS	2-2	80	$\ $		WANTEN	Orangish-brown FINE SAND.	SP		1162.66
		1	00	3-3	00				Soft, brown, moist CLAY, with little fine sand.	CL		1102.10
10-		CCC S	SS	8-10 10-11	80				Stiff, brown, dry CLAY, with little fine gravel and trace medium gravel and fine sand.	CL		1157.66
15-		7 s	SS	8-15 21-22	70	$\ $			Light brown VERY FINE SILTY SAND.	SM		1152.66
		2		21-22					Light brown FINE TO MEDIUM SAND, with trace coarse sand.		Pushed rock in 19 to 21 ft. sample (no recovery). Cutting shoe banged up; gravel	1151.16
20-		ii s	SS	9-50	0					SP	present 19 to 21 ft. bgl.	
25-		CC S	SS	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.	ep.		1142.66

BORING LOG GSWA-SHC.GPJ MP\_MI.GDT 10/17/00 30-35

8-12

15-22

11-17

10-24

60

80

SSS

SSS

Light brown MEDIUM SAND, with little coarse sand, dry. Light brown FINE SAND, with some silt and clay,

wet. Brown CLAY, moist at the top, dry at the bottom.

Light brown MEDIUM SAND, dry. Silty brown CLAYEY FINE SAND. Stiff brown CLAY, dry. Light brown MEDIUM SAND, dry.

Brown stiff CLAY.

SP SC CL SP

SP

SP

CL

CL

1137.66

1135.66 1135.16

1132.66 1132.16

1131.16

1127.66

# MALCOLM PIRNIE

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

COORDINATES N 229,202.3 E 1,746,172.8

SURFACE ELEVATION 1166.66 DATUM USGS

MW-11 BORING NO.

PROJECT

SHEET

2 OF 2

**GSWA Spring Hill Camp** 

LOCATION Osceola, MI

PROJECT NO. 4065-001

LOGGED BY Jeff Groncki

	_ab	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	imple type SSS SSS	Blow Counts (300 lb. Ham- mer) 29-34 2-8 28-30	Rec- overy 70 70	PID (ppm)	Strata	Light brown to brown SILTY FINE SAND, with some clay. (continued) Light brown FINE SAND, with some medium sand, dry. Brown SILTY VERY FINE SAND.	SM	REMARKS	1127.1 1125.6
50-			sss	2-8 28-30				\some clay. (continued) Light brown FINE SAND, with some medium sand, dry.			1125.6
50-				28-30 5-10	80			Light brown FINE SAND, with some medium sand, dry.	SP		
50-				28-30 5-10	80			Brown SILTY VERY FINE SAND.			1122.6
55-			SSS			1			SM		
55-			SSS					Light brown FINE SAND, with little to some clay,	SP		1117.6
					90	1		wet. Brown stiff CLAY, dry.		1	1117.1
		1						Blown still CEAT, dry.	CL		Ť
60-	- 1		SSS	10-15 21-24	90			Brown stiff CLAY, with some 1" thick layers of light brown fine sand throughout.			1112.6
60						1			CL		
7.5		7	SSS	3-8 11-12	100			Light brown FINE SAND, with little medium sand, with 1/8" brown clay layers.			1107.6
1									SP		
		4		2-5			39,39	Light brown MEDIUM SAND, with 1/2" brown clay	SP		1102.6
65		7	SSS	8-8	100			\layer. \frac{\frac}}}}}}}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\f{	SC		1101.6
-								Light brown MEDIUM TO FINE SAND.	SP		1100.
		士	000	3-9	00		2.5	Light brown FINE TO VERY FINE SAND.	SP		1097.6
70-		4	SSS	11-13	80		.00.0	FINE GRAVEL, with 1/8" clay lens at 70.25 ft. bgl.	GP		1096.6
-								Light brown FINE TO VERY FINE SAND.	SP		1096.1
75-		7	SSS	2-7 13-19	75			Light brown MEDIUM SAND, with some coarse sand and fine gravel.	SP		1092.6
1								MEDIUM TO FINE GRAVEL.  Brown CLAY.	GP		1090.8
-								Sidmi obiti.	CL		1090.
-		+	202	2-13			39/39	Light brown MEDIUM SAND.	SP		1087.6
80-		7	SSS	15-14	100			Gravish-brown SILTY FINE SAND, with some clay,	SM		1086.6
		7	SSS	4-7	25			Brownish-gray CLAY, with little fine sand. Grayish SILTY CLAY, stiff.	CL	End of boring - 83	1086.1
		4		13-16							

### MALCOLM

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DATUM USGS

BORING NO. MW-12d

SHEET 1 OF 3

PROJECT

LOGGED BY

**GSWA Spring Hill Camp** 

J.Henry/G.Fox

Osceola, MI LOCATION

4065-001 PROJECT NO.

SURFACE ELEVATION 1163.21 DRILLING CONTRACTOR

COORDINATES N 229,163.2 E 1,747,490.7

Stearns

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

DRILLING STARTED ENDED

7/24/00 7/25/00

LOCATION DESCRIPTION:

STRATA KEY

SAND

SILT

E CLAY

T PEAT

See Report Figures for Locations

	SAME	LE		ORMA							
Depth feet	Lab Sample		mple /pe	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
5-		lil s	SS	3-3 5-6	50		3	Moderate reddish-brown, cohesive CLAYEY FINE TO COARSE SAND, clast supported, dry to moist.	SC		1159.2
10-		CC S	SS	7-1 3-5	70			Moist to wet, soft CLAYEY FINE TO COARSE SAND, cohesive, trace fine gravel.	SC		1154.2
15-		ii s	SS	3-2 1(12")	100			Moist to wet, semi-cohesive, light yellow brown MEDIUM SAND, trace coarse sand, trace gravel, trace clay. Saturated, very loose, light yellow brown FINE TO MEDIUM SAND, trace silt, trace clay.	SP SP		1149.2°
20-		(((g	SSS	1-0 0-6	100		2.4	Saturated, very loose, MEDIUM TO COARSE SAND, light yellow brown, trace coarse gravel, trace silt.  Moist, stiff to hard moderate yellow brown CLAY, with trace medium sand, very cohesive.	SP CL		1144.21
25-		i s	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-		(((s	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-		i s	SSS	8-8 16-25	75			Dry, light buff, MEDIUM SAND, medium dense, subrounded.	SP		1129.21
		-		5-11				Dry, light buff, MEDIUIM SAND, loose.	SP		1124.21



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SHEET 2 OF 3

BORING NO. PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

MW-12d

SURFACE ELEVATION 1163.21

COORDINATES N 229,163.2 E 1,747,490.7

DATUM USGS

LOGGED BY J.Henry/G.Fox

	SAME	PLE	INF	ORMA	TION						uc
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
		P	SSS	24-29	75			Dry, light buff, FINE SAND, loose. (continued)	SP		1123.7
45-		1111	SSS	5-8 14-19	75			Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace silt and clay.  Dry to moist, stiff, moderate yellow brown SILTY	SP		1119.2
								CLAY.	CL	-	* 117.7
50-		1111	SSS	5-8 9-9	75			Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel, trace clay, rounded to subrounded.	SP		1114.2
55-		1111	SSS	3-6 9-13	60			Saturated, loose, light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand.	SP		1109.2
60-		1111	SSS	5-5 16-23	60			Saturated, loose, light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace fine gravel, rounded to subrounded, subangular gravel.	SP		1104.2
65-		7	SSS	6-18	100		N.V	Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel.	SP		1099.2
		1		50(4")				Saturated, loose, light yellow brown FINE TO VERY FINE SAND, some silt.	SM		1098.2
70-		1111	SSS	10-14 30-34	100			Saturated, loose, light yellow brown, interbedded layers of MEDIUM TO COARSE SAND, and FINE SAND.	SP		1094.2
75-		1	SSS	23-50	100			Saturated loose, light yellow brown MEDIUM TO	SP		1089.2
75-		11	300	(6")	100			COARSE SAND (probably fallback). Wet, stiff and very hard, light yellow brown CLAYEY MEDIUM SAND.	SP-SC		1088.2
80-		1111	SSS	6-26 50 (5"0	50			Wet, stiff, dense, MEDIUM SAND, with few clay, cohesive.	SP		1084.2
		-		28-50				Saturated light yellow brown MEDIUM SAND.	SP		1079.2
85-		111	SSS	(6")	60		0.000	Saturated, rounded to subrounded, FINE GRAVEL, trace medium sand.	GP		1078.2
80- 85- 90-		1111	SSS		100		0	Light yellow brown MEDIUM SAND, saturated, loose, medium dense. Three inches coarse sand and fine to medium rounded gravel lens at 90 ft. bgl. Interbedded light yellow brown, saturated, FINE TO	SP SP	Did not get blow counts, rig line blew. Very hard drilling 90-93' bgl.	1074.2 1073.2



Fax: (517)-337-0417

SURFACE ELEVATION 1163.21 DATUM USGS

COORDINATES N 229,163.2 E 1,747,490.7

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

	SAMF	PLE	INF	ORMA			_				L.
Depth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy	(ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
95-		11111	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 SP		1069.2 1068.7
- 100 – - -		1111	SSS	13-17 28-32	100			Light yellow brown FINE TO MEDIUM SAND, trace coarse sand, few silt, saturated, dense, semi-cohesive.	SP		1064.2
105-		1111	SSS	24-50 (6")	50			Moderate gray brown, moist SILTY CLAY, not varved. Light yellow brown moist SILT.	CL-ML ML		1059.2 1058.6
10-		1111	SSS	2-6 16-17	50			Light yellow brown FINE TO COARSE SAND, one lens varved gray/brown, moist silt at 109.8 ft. bgl.	SP		1054.2
1115-		ונונו	SSS	14-32 50 (5")	75			Light yellow brown FINE TO MEDIUM SAND, saturated, increasing silt content and density from 115 to 115.5 ft. bgl.	SP	End of boring - 115.5'	1049.2

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MW-12i BORING NO.

SHEET 1 OF 2

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

COORDINATES N 229,155.3 E 1,747,490.7

SURFACE ELEVATION 1162.47	DATUM USGS	LOGGED BY	<b>Greg Fox</b>		
DRILLING CONTRACTOR  Stearns  DRILLING METHOD EQUIPMENT  4 1/4" HSA CME 1050  DRILLING STARTED ENDED  7/27/00  STRATA KEY  SAND SILT  CLAY PEAT  GRAVEL	LOCATION	N DESCRIPTION: See Report Figu	res for Locat	iions	
SAMPLE INFORMATION  Depth Lab Sample Counts (300 lb. overy)  feet Sample Type	Strata	DESCRIPTION	uscs	REMARKS	Elevation

	SAMF	LE INF	ORMA	TION						1_
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
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.	1158.4
10-					AA SA		Moist to wet, soft CLAYEY FINE TO COARSE SAND, cohesive, trace fine gravel.	sc		1153.4
15-							Moist to wet, semi-cohesive, light yellow brown MEDIUM SAND, trace coarse sand, trace gravel, trace clay. Saturated, very loose, light yellow brown FINE TO MEDIUM SAND, trace silt, trace clay.	SP		1148.4 1147.4
20-						22	Saturated, very loose, MEDIUM TO COARSE SAND, light yellow brown, trace coarse gravel, trace silt.  Moist, stiff to hard moderate yellow brown CLAY, with trace medium sand, very cohesive.	SP		1143.4 1142.4
25-							Dry, light buff MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, rounded to subrounded.	SP		1138.4
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		1133.4
35-							Dry, light buff, MEDIUM SAND, medium dense, subrounded.	SP		1128.4
30-	+	11				222	Dry, light buff, MEDIUIM SAND, loose.	SP		1123.4



SURFACE ELEVATION 1162.47

COORDINATES N 229,155.3 E 1,747,490.7

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PROJECT

MW-12i

SHEET 2 OF 2

BORING NO.

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

LOGGED BY **Greg Fox** DATUM USGS

	SAMP	LE INF				g			The same and	ion
epth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	(ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
-			mer				Dry, light buff, FINE SAND, loose. (continued)	SP		1122.9
45-							Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace silt and clay.  Dry to moist, stiff, moderate yellow brown SILTY	SP		1118.4 V
							CLAY.	CL		1116.9
50-							Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel, trace clay, rounded to subrounded.	SP		1113.4
55-							Saturated, loose, light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand.	SP		1108.4
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'	1103.4

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BORING NO. MW-13 SHEET 1 OF 3

1081.17

Gauged well @36-38'

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

4065-001

COORDINATES N 227,193.1 E 1,747,065.5

SURFACE ELEVATION 1120.17

DATUM USGS

PROJECT NO. LOGGED BY

J.Henry/G.Fox

DRILLING CONTRACTOR Stearns DRILLING METHOD EQUIPMENT 4 1/4" HSA CME 1050 DRILLING STARTED ENDED 7/26/00 7/26/00							LOCATION DESCRIPTION:						
	STRATA KEY SAND SILT CLAY PEAT GRAVEL FILL							See Report Figures for Locations					
	SAME	PLE	INF	ORMA	TION						u C		
Depth feet	(300 lb. lovery					40	Strata	DESCRIPTION	uscs	REMARKS	Elevation		
			AUG					Moderate reddish brown CLAY, damp to moist, soft, trace fine sand.	СН	Based on drill cuttings.	1119,17		
5-		1111	SSS	3-4 7-8	90			Moderate yellow brown FINE TO COARSE SAND, stiff and cohesive, few clay and silt, damp. Moderate yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, cohesive, stiff.	sc		1116.17 1115.17		
10-		1111	SSS	3-4 7-9	100			Moderate yellow brown FINE TO MEDIUM SAND, trace fine to medium rounded gravel, trace to few clay and silt, moist, clast supported.	sc		1111.17		
45		븀	SSS	4-7	4-7 100 Moderate yellow brown FINE TO MEDIUM SAND	ML		1106.1					
15-			333	7-5	100			AND SILT, trace clay, moist. Seam of wet moderate yellow brown medium sand, trace fine gravel at 15 ft. bgl.  Light yellow brown MEDIUM TO FINE SAND, moist to damp, loose, subround to subangular.	SP		1104.6		
20-		1111	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,	SP		1101.1		
25		1111	SSS	2-6 8-8	100			one large gravel. Moderate yellow brown FINE TO MEDIUM SAND, some clay and silt, moist. Kark yellow gray SILTY CLAY, trace fine sand.	CL		1096.1 1095.9 ¥		
30 32 35 35 36 36 36 36 36 36 36 36 36 36 36 36 36		1111	SSS	2-4 11-11	100			Dark yellow gray SILTY CLAY, stringers of light gray silt, dry to damp. Light gray SILT, dry, moderately dense.	_ CL ML		1091.1 1089.9		
35		111111	SSS	1-0 0-0 2 (24")	0			Light yellow brown MEDIUM TO COARSE SAND, loose, saturated, subrounded to subangular, with fine angular gravel at 38 ft. bgl.	SP	No recovery in 34-36' split spoon sample, saturated.	1086.1		



SURFACE ELEVATION 1120.17

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COORDINATES N 227,193.1 E 1,747,065.5

DATUM USGS

BORING NO.

MW-13

SHEET 2 OF 3

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO. 4065-001

J.Henry/G.Fox LOGGED BY

SAMPLE INFORMATION							_				LO .
epth feet	Lab Sample		ample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
		7	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-		1	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
		E	SSS	1-1			7.79	Brown MEDIUM TO COARSE SAND, trace fine	SP		1074.1
-		1	SSS	1-2 2-3				sand, saturated, medium dense, trace fine gravel, note: coarsens downward. Brown FINE TO COARSE SAND, trace fine gravel,	SP-ML		1073.1
50 -		P	SSS					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	SP-ML		1071.1
55 –		1111	SSS	1-2 2-4				with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick.	SP-IVIL		
60-		11111	SSS	1-1				FINE TO COARSE SAND, with fine to coarse gravel, saturated, note occasional gray silty clay with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick. Note: Gravelly seam 63.8-64.0' bgl.	SP-ML		1062.1
65-		1111	SSS	3-3 6-9				Brown MEDIUM TO COARSE SAND, trace fine gravel, trace coarse gravel, saturated. Note: 0.2' thick clay seam, brown silty clay, trace fine sand, moist, stiff.			1056.1
70-		1111	SSS	1-3 5-9					SP-ML		
75		1111	SSS	2-3 6-8				Brown MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, saturated.	-	No recovery in 84-86' split spoon sample.	1046.1
80		11111	SSS	2-5 6-12					SP		
85		1111	sss	3-5 7-12							
85		11111	SSS	3-4 7-13			0.0	Brown FINE TO COARSE SAND and FINE TO MEDIUM GRAVEL, trace coarse gravel, saturated. At 90.9' bgl: FINE SAND seam, trace silt, brown, saturated.	SP-GF		1031.1



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BORING NO. MW-13

SHEET 3 OF 3

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

SURFACE ELEVATION 1120.17

COORDINATES N 227,193.1 E 1,747,065.5

DATUM USGS

LOGGED BY

J.Henry/G.Fox

SAMPLE INFORMATION											c
	ab mple	Samp Type	le Co	llow ounts 00 lb. lam- ner)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
5-		SSS	3 12	2-8 2-13				Brown FINE TO COARSE SAND, trace silt, trace fine gravel, saturated.	SP		1026.
0-		SSS	WOF	-I-WC 6-6	Н			Brown MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, saturated. Note: Brown fine to coarse sand, trace fine to coarse gravel at 100.5 ft. bgl.	SP		1021
5-		SS	5 1	3-4 0-10				Brown MEDIUM SAND, trace fine sand, trace coarse sand, trace fine gravel, trace silt, saturated.	SP		1016
0-		g ss	1	1-12 5-12				Gray SILTY CLAY AND MEDIUM SAND, saturated, dense.		End of boring - 113' bgl	1010
-		SS	S	2-3 3-4		-			SP-SC		-

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TW-1 BORING NO.

SHEET 1 OF 2

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

COORDINATES N 227,266.3 E 1,746,8	6.7 PROJECT NO. 4065-0	001
SURFACE ELEVATION 1097.36 DATE	M USGS LOGGED BY Joel H	lenry
DRILLING CONTRACTOR Stearns  DRILLING METHOD EQUIPMENT 10 1/4" HSA CME 1050  DRILLING STARTED ENDED 7/5/00 7/6/00  STRATA KEY SAND SILT  CLAY PEAT	See Report Figures fo	r Locations
GRAVEL STILL		
SAMPLE INFORMATION		g
Depth Lab Sample Counts (300 lb. Hammer) % PID	DESCRIPTION	USCS REMARKS Elevation
5- 10- 15- 20-	Brown loam (TOPSOIL). Red, MEDIUM TO FINE SAND, little silt.  Light brown, FINE TO MEDIUM SAND, little silt, moist. Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.  Light brown, FINE TO MEDIUM SAND, little fine to medium gravel, little silt, poorly sorted, round and spherical, loose, wet at 9.5'- 2" clayey gravel and silt seam.  Gray to brown, CLAY, trace silt and fine sand, medium plasticity, firm to hard, dry to moist clay.  Grayish brown, MEDIUM SAND, some silt and clay, sand is round and spherical, very loose, moist to wet.	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. SM Driller notes change at 12.5' bgl. Soft from 18-19.5' bgl per driller and blow counts. Fairly low K. Interbedded/gradation 1097.36 1096.36
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.  Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose,	SM Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.  Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.  SP Granite fragments. 1064.38
35-	wet. Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, few medium angular gravel, subrounded, spherical to elongate, loose, wet.	SP 1060.36

Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is

SP



SURFACE ELEVATION

COORDINATES N 227,266.3 E 1,746,816.7

1097.36

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DATUM USGS

BORING NO. TW-1

SHEET 2 OF 2

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

LOGGED BY Joel Henry

	SAMP	LE INF	ORMA	TION	1					- c
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
45-							subangular and elongate, loose, poorly sorted, wet. Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is subangular and elongate, loose, poorly sorted, wet. (continued) Buff, MEDIUM SAND, few fine sand, round and	SP SP	Outwash or glaciofluvial.	1053.86
-							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	SP	Outwash or	1049.3
50-							gravel, round and subspherical, poorly sorted, loose, wet.	SP	glaciofluvial.	
55-							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.	1044.36
60-							Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP		1039,36
65-							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.	1034.36
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.	1029.36
75-							Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, trace fine gravel, round and very spherical, sorted, very loose, wet.	SP	Bail approx. 2.5' heave from augers.	1024.36
80- 80- - - 85-							Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP	Bail approx. 1.9' heave from augers.	1019.36
85-							Buff, FINE TO MEDIUM SAND, few fine sand, round and spherical, sorted, very loose, wet.	SP	End of boring - 85' bgl.	1014.36

COORDINATES N 227,207.0 E 1,747,037.4

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BORING NO. TW-2 SHEET 1 OF 3

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

4065-001 PROJECT NO.

M.B. & G.Fox LOGGED BY

SURF	ACE ELE	VATION	1119	.41	1	DATU	м U	SGS LOGGED BY M.B. &	G.Fox		
Stean DRILLI 10 1 DRILLI 7/28	LING CON arns LING MET I/4" HSA LING STA B/00 SAND CLAY GRAVEL	HOD E	EQUIPM CME 1 ENDED 8/2/00 A KEY SI	UT EAT	СМ	E 95	LO	CATION DESCRIPTION:  See Report Figures fo	r Loca	ations	
		LE INF	Lisaria								_
Depth feet	Lab	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec-	AS	PID ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation Feet
			mer					Moderate reddish brown CLAY, damp to moist, soft, trace fine sand.	СН	Stratigraphic information from MW-13 boring log.	1118.41
5-								Moderate yellow brown FINE TO COARSE SAND, stiff and cohesive, few clay and silt, damp. Moderate yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, cohesive, stiff.	sc sc	TW-2 is located approx. 10' from MW-13.	1115.41 1114.41
10-								Moderate yellow brown FINE TO MEDIUM SAND, trace fine to medium rounded gravel, trace to few clay and silt, moist, clast supported.	sc		1110.41
15-								Moderate yellow brown FINE TO MEDIUM SAND AND SILT, trace clay, moist. Seam of wet	ML		1105.41
20-								moderate yellow brown medium sand, trace fine gravel at 15 ft. bgl. Light yellow brown MEDIUM TO FINE SAND, moist to damp, loose, subround to subangular. Light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, moist, cohesive, stiff, with the following two seams: 19.7-20' Light yellow brown MEDIUM TO COARSE SAND, loose, wet, round and subround; 20.7-21' Moderate orange brown MEDIUM TO COARSE SAND, wet,	SP		1103.91
25-					П			one large gravel.  Moderate yellow brown FINE TO MEDIUM SAND,	sc		1095.41
								some clay and silt, moist.  Dark yellow gray SILTY CLAY, trace fine sand.	CL		
30-								Dark yellow gray SILTY CLAY, stringers of light gray silt, dry to damp. Light gray SILT, dry, moderately dense.	_ CL ML		1090.41
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.  Gauged well @36-38'	1085.41



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COORDINATES N 227,207.0 E 1,747,037.4

SURFACE ELEVATION 1119.41 DATUM USGS

BORING NO. TW-2

**PROJECT** 

**GSWA Spring Hill Camp** 

SHEET 2 OF 3

LOCATION Osceola, MI

PROJECT NO. 4065-001

LOGGED BY M.B. & G.Fox

	SAME	LE INF	ORMA	TION		_				L.
epth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
-							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-							Moderate yellow brown SILTY CLAY, moist, hard, with numerous light yellow brown dry silt partings.	CL-ML		1076.4
-							Brown MEDIUM TO COARSE SAND, trace fine sand, saturated, medium dense, trace fine gravel, note: coarsens downward.	SP SP-ML		1073.4 1072.4
50 -							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	SP-ML		1070.4
55 – -							angle to sand, less than 0.3' thick.			
60 -							FINE TO COARSE SAND, with fine to coarse gravel, saturated, note occasional gray silty clay with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick. Note: Gravelly seam 63.8-64.0' bgl.	SP-ML		1061.4
65-							Brown MEDIUM TO COARSE SAND, trace fine gravel, trace coarse gravel, saturated. Note: 0.2' thick clay seam, brown silty clay, trace fine sand, moist, stiff.			1055.
70-								SP-ML		
75-							Brown MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, saturated.		No recovery in 84-86' split spoon sample.	1045.4
80-								SP		
85										
85-						000	Brown FINE TO COARSE SAND and FINE TO MEDIUM GRAVEL, trace coarse gravel, saturated. At 90.9' bgl: FINE SAND seam, trace silt, brown, saturated.	SP-GF		1030.



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PROJECT

SHEET 3 OF 3

BORING NO.

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

PROJECT NO.

4065-001

TW-2

SURFACE ELEVATION 1119.41 DATUM USGS

COORDINATES N 227,207.0 E 1,747,037.4

LOGGED BY M.B. & G.Fox

	SAMP	LE INF				m l				no
Depth feet		Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy	PID (ppm)	Strata	DESCRIPTION	uscs	REMARKS	Elevation
95 -							Brown FINE TO COARSE SAND, trace silt, trace fine gravel, saturated.  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 SP	End of boring - 103' bgl.	1025.4
DONING COOK GOVERNOR OF THE THREE COOK OF THE COOK OF										

## MALCOLM PIRNIE

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**TW-3** BORING NO.

SHEET 1 OF 3

1110.57

1109.57

Water may have

entered spoon from

CL

**PROJECT** 

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

COORDINATES N 227,257.			PROJECT NO. 4065- USGS LOGGED BY Joel I	001 Henry		
DRILLING CONTRACTOR	.57 DATO	T	DCATION DESCRIPTION:	lenry		
☐ CLAY ☐ PI	050		See Report Figures fo	or Loc	ations	
SAMPLE INFORMA						
Blow	I Pop I I	Strata	DESCRIPTION	USCS	REMARKS	Elevation
5-			Medium brown SANDY CLAY, soft, damp to dry.  Interbedded medium brown SANDY CLAY with light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.  Medium brown SANDY CLAY.  Light buff, dry, loose, FINE TO MEDIUM SAND, subangular to subrounded.	CL CL SP	Stratigraphic information from MW-5d boring log. TW-3 is located approx. 15' from MW-5.	1145. 1144. 1140.
15-			Dry, loose, light buff, MEDIUM SAND, trace fine sand, subrounded.	SP		1135.
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.
25-			Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.	SP		1125.
		ΉÍ	Saturated medium dense light yellow brown SANDY SILT.	SM/ML		1120.
30-			Dry hard medium yellow brown SILTY/SANDY CLAY.	CL		1119.
35-			Dry/damp, hard medium grey CLAY, trace silt partings. Color change to light yellow brown SILTY CLAY, dry and hard.	CL	Felt lithology change at 36' bgl.	1115.

Saturated, light yellow brown, soft, SILT AND

CLAY. Water may have entered spoon from

SURFACE ELEVATION 1148.57

COORDINATES N 227,257.0 E 1,747,420.1

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Fax: (517)-337-0417

DATUM USGS

TW-3 BORING NO.

SHEET 2 OF 3

PROJECT

**GSWA Spring Hill Camp** 

LOCATION

Osceola, MI

4065-001 PROJECT NO.

LOGGED BY Joel Henry

	SAMP	LE INF	ORMA	TION				-		E
epth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	(ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
-							perched zone. Dry light buff loose MEDIUM SAND, trace fine sand. (continued)	SP	perched zone.	
45-							Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.	SP		1105.
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.
55-							Saturated, loose light yellow brown MEDIUM TO FINE SAND, trace medium rounded gravel. Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC		1095. 1095.
-							Saturated, loose light yellow brown MEDIUM TO	SP		1090.
- -06	S 1					000	COARSE, trace fine sand, trace gravel.  Saturated loose subangular to subrounded FINE	GP		1090.
-						<i>.</i> 0.	TO COARSE GRAVEL. Mixed FINE TO MEDIUM GRAVEL AND FINE TO	GP		1088.
		П				7	MEDIUM SAND, saturated. May be slough. Poor	SP		1086
_							recovery, seemed to be pushing a cobble. Saturated light yellow brown FINE TO MEDIUM	ML SP		1085. 1085.
65-							SAND with some fine subangular to subrounded gravel.  Moist medium yellow brown FINE SAND AND SILT, firm.	SP		1084
70-							Saturated light yellow brown, FINE TO MEDIUM SAND trace silt. 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. Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay. Saturated light yellow brown MEDIUM TO FINE SAND, trace fine to medium subrounded gravel.	SP SP		1075.
							Saturated light yellow brown MEDIUM TO FINE	SP		1070.
80-							SAND. Saturated light yellow brown SILT, some fine to medium sand.	ML		1069.
85-							Saturated light yellow brown FINE TO MEDIUM SAND, trace to few silt, trace clay.	SP	,-,	1065.
90-							Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.	SP		1060.



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TW-3 BORING NO.

SHEET 3 OF 3

**GSWA Spring Hill Camp** 

LOCATION

PROJECT

Osceola, MI

4065-001 PROJECT NO.

COORDINATES N 227,257.0 E 1,747,420.1

SURFACE ELEVATION 1148.57

DATUM USGS

LOGGED BY Joel Henry

	SAMP	LE INF				a			77,00	uo
epth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham- mer)	Rec- overy %	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation
95 –			mer				Saturated light yellow brown MEDIUM TO COARSE SAND, little to some fine subangular to subrounded gravel, trace clay (gravelly sand). (continued)	SP		1055.5
00-							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")	SP GP		1050.5 1050.0
05-						ζ.	wedged in bottom of spoon.  Saturated light yellow brown FINE TO COARSE SAND, finer at bottom, coarse sand with few fine gravel @104' bg.	sw		1045.5
10-							Saturated light yellow brown MEDIUM SAND, subrounded to rounded.	SP	Pushed sample. Couldn't get hammer on spoon, too close to rig.	1040.5
- 15-							Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand.	SP		1035.5
20-							Saturated, loose, light yellow brown MEDIUM SAND, trace fine gravel.	SP	End of boring - 122.2' bgl.	1030.5

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

DRILLING CONTRACTOR: NA

DRILLING METHOD: Hand Auger

DATE COMPLETED: June 29, 2000

GROUND SURFACE ELEVATION: 1097.2

DATUM: USGS

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

WELL CONSTRUCTION DETAILS	DEPTH (ft.)		WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING  Diameter: NA Type: NA Interval: NA  RISER CASING  Diameter: 2" Type: PVC Interval: 1.6' agl to 3.4' bgl  GROUT Type: Bentonite Chips Interval: 0.5' to 2.5'  SEAL Type: None Interval: None  SANDPACK Type: Filter pack sand Interval: 2.5' to 8.4' bgl  SCREEN  Diameter: 2" Type: Slotted PVC Interval: 3.4' to 8.4' bgl  WELL DEVELOPMENT DATA	O 5 (ft.)	SYMBO	DETAILS	1098.75 0.0 0.5 2.5	TPC TRC GS	-1.59 1097.16	REMARKS Filtered Sand Pack Bentonite Chips Filtered Sand Pack
DATE: 7/19/2000  LEGEND METHOD: Bailer  TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING COARSE SAND GS GROUND SURFACE BS BENTONITE SEAL FINE SAND FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TOTOTAL DEPTH  SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK TSC TOP OF SCREEN TO TOTAL DEPTH  BENTONITE SEAL CLAY CONCRETE THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY							

MALCOLM PIRNIE

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

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

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: June 27, 2000

GROUND SURFACE ELEVATION: 1097.7

DATUM: USGS

LOGGED BY: Ken Ewers

	STR	ATA	1/	VEL	i.			z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS			DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING			-		7	1100 10	TPC	0.50	
Diameter: 4" Type: Stickup			15	1		1100.19	TRC	-2.53	
Interval: 2.5' agl to 2.5' bgl	0 -					0.0	GS	1097.66	
RISER CASING		<u> </u>	D	-	0				Concrete
Diameter: 2"			-	1	1	2.0		1095.66	Natural Collapse
Type: PVC				V					Matural Collapse
Interval: 2.5' agl to 103.5' bgl	5 -			*					
GROUT Type: Thick Bentonite Slurry						1			
Interval: 8' to 19' bgl and 50' to 99.5' bgl	- 1					8.0		1089.66	
SEAL		., · /.	{{{{}	K	<b>?</b> ????				Bentonite Slurry
Type: None	10 -		\$\$\$\$\$	8	SSSS				
Interval: None	1		}}}}}	K	???? <b>?</b>				
SANDPACK			\$\$\$\$\$	K	· SSSS				
Type: Natural Collapse Interval: 99.5' to 109' bgl			}}}}}	K	????				
	15 -		\$\$\$\$\$		\$\$\$\$				
SCREEN Diameter: 2"			}}}}	K	????				
Type: Slotted PVC			\$\$\$\$\$		SSSS				
Interval: 103.5' to 108.5' bgl		1000	?????		2222	19.0		1078.66	Natural Callance
WELL DEVELOPMENT DATA	20 -								Natural Collapse
DATE: 7/6/2000									
_EGEND METHOD: Powered suction-lift pumpin	g	-							
TPC TOP OF PROTECTIVE CASING	25								
GRAVELLY SAND TRC TOP OF RISER CASING GS GROUND SURFACE		22.27							
BS BENTONITE SEAL		100							
MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN									
FINE SAND BSC BOTTOM OF SCREEN	30								
VERY FINE SAND TD TOTAL DEPTH		10							
SILT BENTONITE SEAL									
CLAY CONCRETE		3.7							
GRAVELLY CLAY FILTER PACK	35	1.4.7							
ASPHALT THICK BENTONITE SLURRY GROUT									
TOPSOIL NATURAL COLLAPSE / SAND BACKFIL	1	1.7							
INTERBEDDED SAND, SILT, CLAY		186							

MALCOLM PIRNIE

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

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

PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1097.7
DATUM: USGS

LOGGED BY: Ken Ewers

		STR	ATA	WELL		z	
WELL CON	STRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
					(See P	age 1)	
		40 -	12/13/1 12/13/1				Natural Collapse (continued)
							(continued)
		45 -					
		50 -			50.0	1047.66	
						1	Bentonite Slurry
		55 -					
		60 -					
		65					
		70					
EGEND							
GRAVELLY SAND	TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING	75					
COARSE SAND MEDIUM SAND	GS GROUND SURFACE BS BENTONITE SEAL FP FILTER PACK TSC TOP OF SCREEN						
FINE SAND VERY FINE SAND	BSC BOTTOM OF SCREEN TD TOTAL DEPTH	80					
SILT	BENTONITE SEAL  CONCRETE	6.5					
GRAVELLY CLAY ASPHALT	FILTER PACK  THICK BENTONITE SLURRY GROUT	85					
TOPSOIL  INTERBEDDED SAN	NATURAL COLLAPSE / SAND BACKFII D, SILT, CLAY	+		######################################			



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Sheet 2 of 3

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

GROUND SURFACE ELEVATION: 1097.7
DATUM: USGS
LOGGED BY: Ken Ewers

STRATA ELEVATION (ft.) WELL DEPTH (ft.) DETAILS CONSTRUCTION DEPTH (ft.) SYMBOL WELL CONSTRUCTION DETAILS REMARKS (See Page 1) Bentonite Slurry (continued) 99.5 998.16 100 Natural Collapse 105 108.5 989.16 Natural Collapse 110 115.0 982.66 115 LEGEND TPC TOP OF PROTECTIVE CASING **GRAVELLY SAND** TRC TOP OF RISER CASING GS **GROUND SURFACE** COARSE SAND BS BENTONITE SEAL MEDIUM SAND FILTER PACK TOP OF SCREEN BOTTOM OF SCREEN TSC FINE SAND BSC TOTAL DEPTH VERY FINE SAND SILT BENTONITE SEAL CLAY CONCRETE **GRAVELLY CLAY** FILTER PACK **ASPHALT** GSWA-SHC.GPJ THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY



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

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

	STR	ATA	۱۸/	ELL			Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL		TAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4"					1100.74	TPC	-2.35	
Type: Stickup Interval: 2.5' agl to 2.5' bgl			T.	1	0.0	GS	1098.39	
RISER CASING	0 -	Y'Y'Y	D	Þ	0.0	00	1030.33	Concrete
Diameter: 2"	-		00	4 4	3.0		1095.39	
Type: PVC Interval: 2.5' agl to 33.5' bgl		, 7	\$\$\$\$	\$\$\$\$\$	3.0		1095.39	Bentonite Slurry
GROUT	5 -		\$\$\$\$	\$\$\$\$\$				
Type: Thick Bentonite Slurry			}}}}}	Z }}}}}				
Interval: 3' to 29' bgl			<b>}</b>	83333				
SEAL Type: None	10 -		83333	<b>\$</b> \$\$\$\$				
Interval: None			\$\$\$\$ <u>\$</u>	\$\$\$\$\$				
SANDPACK			}}}}	33333				
Type: Natural Collapse Interval: 29' to 39' bgl			<b>}</b> }}}}	83333				
SCREEN	15 -		\$\$\$\$\$	<b>\$</b> \$\$\$\$				
Diameter: 2"		887887	\$\$\$\$\$	XXXX				
Type: Slotted PVC Interval: 33.5' to 38.5' bgl			}}}}	33333				
WELL DEVELOPMENT DATA	20 -		<b>}</b>	83333				
DATE: 7/6/2000			\$\$\$\$\$	85558				
EGEND METHOD: Powered suction-lift pumpin	q ·		<b>\$\$\$\$\$</b>	\$\$\$\$\$				
TRC TOP OF PROTECTIVE CASING	25 -		\$\$\$\$\$	\$\$\$\$\$				
GRAVELLY SAND TRC TOP OF RISER CASING COARSE SAND GS GROUND SURFACE		.0.0	<b>\$</b>	B3333				
BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK		10.7	<b>}</b> }}}}	83333				
TSC TOP OF SCREEN		11.1	SSSSS	SSSSS	29.0		1069.39	Natural Collapse
VERY FINE SAND TOTAL DEPTH	30 -							reatural Collapse
SILT BENTONITE SEAL								
CLAY CONCRETE			=					
GRAVELLY CLAY FILTER PACK	35 -	107						
ASPHALT THICK BENTONITE SLURRY GROUT								
TOPSOIL NATURAL COLLAPSE / SAND BACKFIL	-		E		38.5		1059.89	
INTERBEDDED SAND, SILT, CLAY		100 2100	686686	202000	39.0		1059.39	Natural Collapse

MALCOLM PIRNIE

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

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

TIME: 1237

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: June 28, 2000

GROUND SURFACE ELEVATION: 1101.7

DATUM: USGS

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

	STR	ATA	1	VELI	T			z		
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAIL			DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS	
PROTECTIVE CASING Diameter: 4"			Tr		1	1104.08	TPC TRC	-2.38		
Type: Stickup Interval: 2.5' agl to 2.5' bgl	0 -					0.0	GS	1101.70		
RISER CASING Diameter: 2" Type: PVC Interval: 2.5' agl to 55' bgl			٥	1980	4	2.0		1099.70	Concrete  Natural Collapse	
GROUT Type: Thick Bentonite Slurry Interval: 37' to 49' bgl	5 -									
SEAL Type: None Interval: None	10 -			Ā						
SANDPACK Type: Natural Collapse Interval: 49' to 101' bgl	15 -								,	
SCREEN Diameter: 2" Type: Slotted PVC Interval: 55' to 60' bgl		22.9								
WELL DEVELOPMENT DATA DATE: 7/6/2000	20 -									
EGEND METHOD: Drillers pump		V/S								
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL	25 -									
MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN VERY FINE SAND TD TOTAL DEPTH	30			2,000,000						
SILT BENTONITE SEAL										
CLAY CONCRETE										
GRAVELLY CLAY FILTER PACK	35		1							
ASPHALT THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKEI			2111		2225	37.0		1064.70	Bentonite Slurry	
TOPSOIL NATURAL COLLAPSE / SAND BACKFII INTERBEDDED SAND, SILT, CLAY			<b>}</b> }}}	3 8	3333				Domonic Outry	

MALCOLM PIRNIE

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

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

GROUND SURFACE ELEVATION: 1101.7 DATUM: USGS LOGGED BY: K.E. & J.H.

STRATA ELEVATION (ft.) WELL DEPTH (ft.) SYMBOL DETAILS CONSTRUCTION WELL CONSTRUCTION DETAILS REMARKS (See Page 1) 40 Bentonite Slurry (continued) 45 49.0 1052.70 Natural Collapse 50 55 60.0 1041.70 60 Natural Collapse 65 70 LEGEND 75 TPC TOP OF PROTECTIVE CASING **GRAVELLY SAND** TRC TOP OF RISER CASING GS **GROUND SURFACE** COARSE SAND BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN FINE SAND BSC BOTTOM OF SCREEN 80 TOTAL DEPTH VERY FINE SAND SILT BENTONITE SEAL MI.GDT CLAY CONCRETE **GRAVELLY CLAY** FILTER PACK CONSTRUCTION LOG GSWA-SHC.GPJ MP **ASPHALT** THICK BENTONITE SLURRY GROUT **TOPSOIL** NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY

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

COMPLETION REPORT OF WELL No. MW-2

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

GROUND SURFACE ELEVATION: 1101.7
DATUM: USGS
LOGGED BY: K.E. & J.H.

STRATA EVATION (ft.) WELL DEPTH (ft.) SYMBOL DETAILS CONSTRUCTION WELL CONSTRUCTION DETAILS REMARKS H (See Page 1) Natural Collapse (continued) 95 100 101.0 1000.70 LEGEND TPC TOP OF PROTECTIVE CASING **GRAVELLY SAND** TRC TOP OF RISER CASING GS **GROUND SURFACE** COARSE SAND BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN FINE SAND BSC BOTTOM OF SCREEN TD TOTAL DEPTH VERY FINE SAND SILT BENTONITE SEAL CLAY CONCRETE **GRAVELLY CLAY** FILTER PACK **ASPHALT** THICK BENTONITE SLURRY GROUT **TOPSOIL** NATURAL COLLAPSE / SAND BACKFILL GSWA-SHC INTERBEDDED SAND, SILT, CLAY



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

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

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: June 28, 2000

GROUND SURFACE ELEVATION: 1107.0

DATUM: USGS

LOGGED BY: Ken Ewers

	STR	ATA	WELL		Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING  Diameter: 4"  Type: Stickup  Interval: 2.5' agl to 2.5' bgl	0 -			1109.57	-2.57 1107.00	
RISER CASING		Ψ'Ψ'Ψ	D D	2.0	1105.00	Concrete
Diameter: 2" Type: PVC Interval: 2.5' agl to 81' bgl  GROUT Type: Thick Bentonite Slurry Interval: 2' to 75' bgl  SEAL	5 -					Bentonite Slurry
Type: None Interval: None SANDPACK Type: Natural Collapse	10 -					
Interval: 75' to 102' bgl  SCREEN  Diameter: 2"  Type: Slotted PVC Interval: 81' to 86' bgl	15 -		↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓			
WELL DEVELOPMENT DATA	20 -	13 T				
DATE: 6/29/2000  LEGEND METHOD: Drillers pump						
GRAVELLY SAND  TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL BS BENTONITE SEAL TSC TOP OF SCREEN TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TOTAL DEPTH	25 -					
SILT  BENTONITE SEAL  CLAY  CONCRETE  GRAVELLY CLAY  FILTER PACK  ASPHALT  TOPSOIL  NATURAL COLLAPSE / SAND BACKFIL	35					
TOPSOIL NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY	1	5				

MALCOLM PIRNIE

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

PROJECT: GSWA Spring Hill Camp PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI GROUND SURFACE ELEVATION: 1107.0

DATUM: USGS

LOGGED BY: Ken Ewers

STRATA ELEVATION (ft.) WELL SYMBOL DEPTH (ft.) DETAILS CONSTRUCTION WELL CONSTRUCTION DETAILS REMARKS (See Page 1) 40 Bentonite Slurry (continued) 45 50 55 60 65 70 LEGEND 75.0 1032.00 TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING 75 **GRAVELLY SAND** Natural Collapse TRC GS **GROUND SURFACE** COARSE SAND BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN FINE SAND BOTTOM OF SCREEN 80 BSC TOTAL DEPTH VERY FINE SAND SILT BENTONITE SEAL CLAY CONCRETE **GRAVELLY CLAY** FILTER PACK 1021.00 86.0 **ASPHALT** THICK BENTONITE SLURRY GROUT Natural Collapse **TOPSOIL** NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY

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

PROJECT: GSWA Spring Hill Camp PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI GROUND SURFACE ELEVATION: 1107.0
DATUM: USGS
LOGGED BY: Ken Ewers

STRATA ELEVATION (ft.) WELL DEPTH (ft.) SYMBOL DETAILS CONSTRUCTION DEPTH (ft.) WELL CONSTRUCTION DETAILS REMARKS (See Page 1) Natural Collapse (continued) 95 100 102.0 1005.00 LEGEND TPC TOP OF PROTECTIVE CASING **GRAVELLY SAND** TRC TOP OF RISER CASING GS **GROUND SURFACE** COARSE SAND BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN FINE SAND BSC BOTTOM OF SCREEN TOTAL DEPTH TD VERY FINE SAND SILT BENTONITE SEAL CLAY CONCRETE **GRAVELLY CLAY** FILTER PACK **ASPHALT** GSWA-SHC.GPJ THICK BENTONITE SLURRY GROUT **TOPSOIL** NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY



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

Sheet 3 of 3

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.

	STR	ATA	WELL			Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING  Diameter: NA Type: NA Interval: NA  RISER CASING  Diameter: 2" Type: PVC Interval: 1.3' agl to 3.7' bgl  GROUT Type: Bentonite Chips Interval: 0.5' to 2.5'	0 - 5 -	777		0.0 0.5 2.5	TPC TRC	-1.32 1090.06	Filtered Sand Pack Bentonite Chips Filtered Sand Pack
SEAL Type: None Interval: None  SANDPACK Type: Filter pack sand Interval: 2.5' to 8.7' bgl  SCREEN Diameter: 2" Type: Slotted PVC Interval: 3.7' to 8.7' bgl  WELL DEVELOPMENT DATA DATE: 7/19/2000				8.7		1081.36	
GRAVELLY SAND  TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TO TOTAL DEPTH  SILT  BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TO TOTAL DEPTH  BENTONITE SEAL CONCRETE TOPSOIL  NATURAL COLLAPSE / SAND BACKFIL INTERBEDDED SAND, SILT, CLAY							

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

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

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

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

	STR	ATA	WELL	П			Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	VAS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING	1			T		TPC	L	
Diameter: 4"				1	096.04	TRC	-6.53	
Type: Stickup Interval: 2.5' agl to 2.5' bgl					0.0	GS	1089.51	
RISER CASING	0 -	7777	D D					Concrete
Diameter: 2"		47474	-0 10		2.0		1087.51	Salar Sa
Type: PVC					4.0		1085.51	Natural Collapse
Interval: 2.5' agl to 73' bgl		707	22222 2222	1	4.0		1005.51	Bentonite Slurry
GROUT	5 -	17.7	}}}}}	3				
Type: Thick Bentonite Slurry			\$\$\$\$8 \$\$\$\$	8				
Interval: 4' to 68' bgl		11.7	\$\$\$\$ <b>\$</b> \$\$\$	1 8				
SEAL None		1	\$\$\$\$\$ \$\$\$\$	8				
Type: None Interval: None	10 -		8888   \$888	1 8				
SANDPACK			88888 - 18888	58 1				
Type: Natural Collapse			8333   \$333	[5				
Interval: 68' to 78' bgl	15 -	17.7	88888 8888	58 1				
SCREEN	15	1000	8353 83558	1 \$				
Diameter: 2"		17.7	\$\$\$\$9 \$\$\$	58 1				
Type: Slotted PVC		100	83538 83558	1 8				
Interval: 73' to 78' bgI	20 -		\$\$\$\$\$ \$\$\$\$	SSI				
WELL DEVELOPMENT DATA	20		\$\$\$\$ <b>\$</b> \$\$\$	\$\$				
DATE: 06/29/2000			\$\$\$\$\$ \$\$\$\$	SSI				
LEGEND METHOD: Submersible Grundfos Pum	p	-	\$\$\$\$ \$\$\$\$	18				
TPC TOP OF PROTECTIVE CASING	25		BSSSS BSSS	55				
GRAVELLY SAND TRC TOP OF RISER CASING GS GROUND SURFACE	-		\$\$\$ \$\$\$\$	\$				
BS BENTONITE SEAL			\$\$\$\$\$ \$\$\$	SS				
MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN			\$\$\$\$\$ <b>\$</b> \$\$\$	\$				
FINE SAND BSC BOTTOM OF SCREEN	30	2237	\$\$\$\$\$ \$\$\$	SS				
VERY FINE SAND TO TOTAL DEPTH  SILT BENTONITE SEAL		HIL	\$\$\$\$\$ <b>\$</b> \$\$	>>				
SILT BENTONITE SEAL		130	\$\$\$\$\$ \$\$\$	55				
CLAY CONCRETE		1	\$\$\$\$\$ \$\$\$	53				
GRAVELLY CLAY FILTER PACK	35	1.57	\$\$\$\$\$ B\$\$	55				
ASPHALT THICK BENTONITE SLURRY GROUT			333 B335\$	88				
TOPSOIL NATURAL COLLAPSE / SAND BACKFI	1	1.5	\$\$\$\$\$ B\$\$	355				
INTERBEDDED SAND, SILT, CLAY	1		\$\$\$ \$\$\$\$£	18				
		197.4	K(((() K()	(()				

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

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

PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1089.5
DATUM: USGS

LOGGED BY: Joel Henry

	DEPTH (ft.)	SYMBOL AT	WELL DETAILS S	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
	40 - 45 - 50 - 55 - 60 -			(See	e Page	1021.51	Bentonite Slurry (continued)  Natural Collapse
GRAVELLY SAND  GROUND SURFACE  GRAVELLY SAND  GROUND SURFACE  GRAVELLY SAND  GROUND SURFACE  GRAVELLY SAND  GRAVELY SAND  GRAVELLY SAND  GRAVELY SAND  GRAVELY SAND  GRAVELY SAND  GRAVELY SAND  GRAVELY	75 80 85			78.0		1011.51	Natural Collapse



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

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

GROUND SURFACE ELEVATION: 1089.5

DATUM: USGS

LOGGED BY: Joel Henry

	STR	ATA	WELL		Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See F	age 1)	
				91.0	998.51	
GRAVELLY SAND TRC TOP OF PROTECTIVE CASING						
COARSE SAND GS GROUND SURFACE BS BENTONITE SEAL						
MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN						
VERY FINE SAND TD TOTAL DEPTH  SILT BENTONITE SEAL						
CLAY CONCRETE  GRAVELLY CLAY FILTER PACK						
ASPHALT THICK BENTONITE SLURRY GROUNT TOPSOIL NATURAL COLLAPSE / SAND BACK						
INTERBEDDED SAND, SILT, CLAY						



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

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

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	DEPTH (ft.)	SYMBOL AT	WELL	17.50	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING Diameter: 4" Type: Stickup					1147.43			
Interval: 2.5' agl to 2.5' bgl	0 -				0.0	GS	1149.40	Concrete
RISER CASING				٥	2.0		1147.40	Concrete
Diameter: 2" Type: PVC Interval: 2.5' agl to 153' bgl GROUT	5 -							Bentonite Slurry
Type: Thick Bentonite Slurry Interval: 2' to 149' bgl								
SEAL Type: None Interval: None	10 -			***				
SANDPACK Type: K&E Well Gravel #0 Interval: 149' to 152' bgl	15 -			***				
SCREEN Diameter: 2" Type: Slotted PVC Interval: 153' to 158' bgl								
WELL DEVELOPMENT DATA	20 -		\$}}}}	<b>}</b>				
DATE: 07/21/2000			\$55558 \$5					
LEGEND METHOD: Air Sparging		1	\$3333 B3	333				
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL	25							
MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TD TOTAL DEPTH	30							
SILT BENTONITE SEAL			<b>3</b>	}}}				
CLAY CONCRETE			\$ \$335E	>>>				
GRAVELLY CLAY FILTER PACK	35		\$\$\$\$\$ B	\$\$\$\$				
ASPHALT WITH THICK BENTONITE SLURRY GROUT			<b>3</b> 3333	}}}}				
TOPSOIL NATURAL COLLAPSE / SAND BACKFI INTERBEDDED SAND, SILT, CLAY	LL		\$ \$335E	<b>}</b> }}}				
INTERBEDUED SAND, SILT, CLAY		979	X < < < < < < < < < < < < < < < < < < <	5554		1		

MALCOLM PIRNIE

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

PROJECT: GSWA Spring Hill Camp PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI GROUND SURFACE ELEVATION: 1149.4

DATUM: USGS

LOGGED BY: Joel Henry

STRATA ELEVATION (ft.) WELL SYMBOL DEPTH (ft.) DETAILS CONSTRUCTION WELL CONSTRUCTION DETAILS REMARKS (See Page 1) 40 Bentonite Slurry (continued) 70 LEGEND TPC TOP OF PROTECTIVE CASING 75 **GRAVELLY SAND** TOP OF RISER CASING TRC GS **GROUND SURFACE** COARSE SAND BENTONITE SEAL BS MEDIUM SAND FILTER PACK TSC TOP OF SCREEN FINE SAND BOTTOM OF SCREEN 80 BSC TOTAL DEPTH VERY FINE SAND TD SILT BENTONITE SEAL CLAY CONCRETE 85 **GRAVELLY CLAY** FILTER PACK GP.I **ASPHALT** THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY



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

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

GROUND SURFACE ELEVATION: 1149.4
DATUM: USGS

LOGGED BY: Joel Henry

		STR	ATA	WELL			Z	
WELL CON	ISTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
					(See	Page	e 1)	
		95 -						Bentonite Slurry (continued)
		100 -	 .0°					
			000					
		105 -						
		110 -						
		115 -						
-05-115		120 -						
GEND GRAVELLY SAND COARSE SAND	TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL	125 -						
MEDIUM SAND FINE SAND VERY FINE SAND	FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TD TOTAL DEPTH	130						
SILT CLAY GRAVELLY CLAY	BENTONITE SEAL CONCRETE FILTER PACK	135						
ASPHALT TOPSOIL INTERBEDDED SAN	THICK BENTONITE SLURRY GROU  NATURAL COLLAPSE / SAND BACK ID. SILT. CLAY							

MALCOLM PIRNIE

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

Sheet 3 of 4

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

GROUND SURFACE ELEVATION: 1149.4
DATUM: USGS

LOGGED BY: Joel Henry

WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL AT	WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
	145 - 150 -	S		149.0 152.0 158.0 160.2	Page		Bentonite Slurry (continued)  K & E Well Gravel  Natural Collapse
LEGEND  GRAVELLY SAND GRAVELLY SAND COARSE SAND BS BENTONITE SEAL FINE SAND FP FILTER PACK TSC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL TOP OF SCREEN BSC BOTTOM OF SCREEN TO TOTAL DEPTH  BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKE							



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

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

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

	STR	ATA	WELL			Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING				1147.09	TPC		
Diameter: 4" Type: Stickup				1147.09	TRC	1.66	
Interval: 2.5' agl to 2.5' bgl				0.0	GS	1148.75	
RISER CASING	0 -		D D				Concrete
Diameter: 2"	116		אנינת גונית	2.0		1146.75	B 1 1 01
Type: PVC	17	-	83349 84339				Bentonite Slurry
Interval: 2.5' agl to 90' bgl	5 -		85559 855559				
GROUT Type: Thick Bentonite Slurry			85558 85558				
Interval: 2' to 85' bgl	1	-	\$5558 \$5558				
SEAL		37	\$\$\$\$\$ \$\$\$\$\$				
Type: None	10 -		R**** R****				
Interval: None			R3333 R3333				
SANDPACK			R3333 R3333				
Type: Filter Pack Sand Interval: 85' to 100' bgl			83333 83333	1			
SCREEN	15 -		B3333 B3333				
Diameter: 2"			83333 83333				
Type: Slotted PVC		1.7.	83333 83333				
Interval: 90' to 100' bgl			\$\$\$\$\$ \$\$\$\$\$				
WELL DEVELOPMENT DATA	20 -		\$\$\$\$\$ \$\$\$\$\$				
DATE: 07/21/2000		100	\$\$\$\$\$ \$\$\$\$\$				
LEGEND METHOD: Air Sparging			83333 83333				
GRAVELLY SAND TRC TOP OF PROTECTIVE CASING	25 -		B3333 B333\$				
COARSE SAND GS GROUND SURFACE	1	100	<b>B</b> SSSS9 BSSSS9				
BS BENTONITE SEAL			85558 85558				
TSC TOP OF SCREEN		Ш	\$\$\$\$\$ \$\$\$\$\$				
FINE SAND BSC BOTTOM OF SCREEN  VERY FINE SAND TD TOTAL DEPTH	30 -		R	1			
TID			\$\$\$\$\$ <b>\$\$\$\$\$</b>				
SILT BENTONITE SEAL			<b>8</b>				
CLAY CONCRETE			83333 83358				
GRAVELLY CLAY FILTER PACK	35 -		\$\$\$\$\$ <b>\$</b> \$\$\$\$				
ASPHALT THICK BENTONITE SLURRY GROUT			\$\$\$\$\$ \$\$\$\$\$				
TOPSOIL NATURAL COLLAPSE / SAND BACKFI	4		\$\$\$\$\$ <b>\$</b> \$\$\$\$				
INTERBEDDED SAND, SILT, CLAY		13/32	85555				

MALCOLM PIRNIF

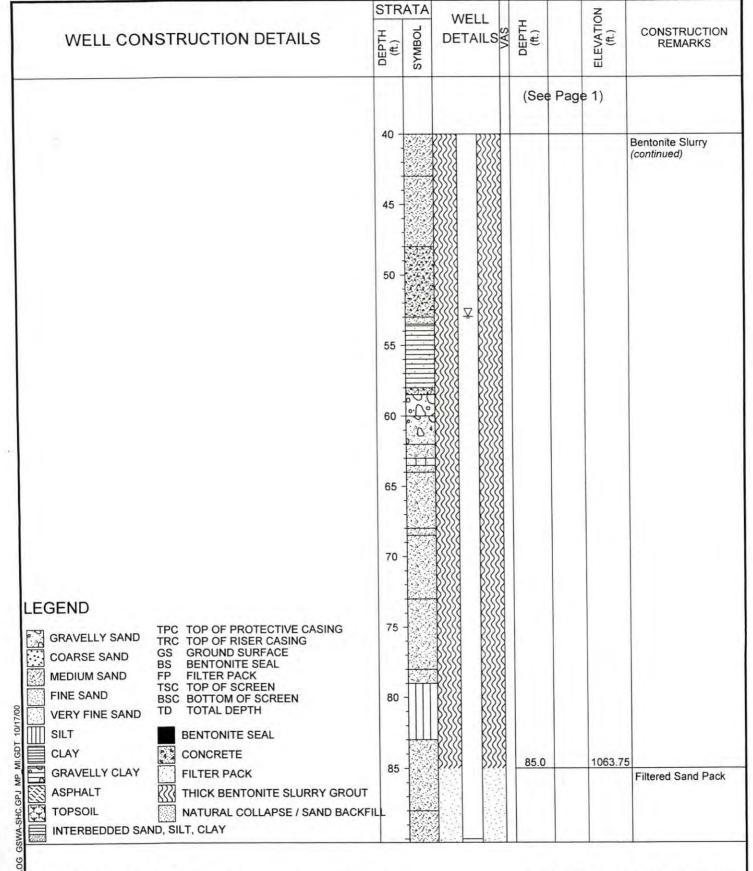
1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417

COMPLETION REPORT OF WELL No. MW-5i

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

GROUND SURFACE ELEVATION: 1148.8

DATUM: USGS LOGGED BY: Joel Henry





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

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

GROUND SURFACE ELEVATION: 1148.8
DATUM: USGS

LOGGED BY: Joel Henry

WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL AT	WELL DETAILS S	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
	95 - 100 -	WS DC			Page		Filtered Sand Pack (continued)
LEGEND  GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND SILT GRAVELLY CLAY GRAVELLY SAND SENTONITE SEAL FILTER PACK TOP OF SCREEN TOTAL DEPTH TOTAL DEPTH  BENTONITE SEAL CONCRETE GRAVELLY CLAY FILTER PACK TOP OF SCREEN TOTAL DEPTH							

MALCOLM PIRNIE

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

Sheet 3 of 3

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

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 17, 2000

GROUND SURFACE ELEVATION: 1142.4

DATUM: USGS

LOGGED BY: Joel Henry

STR	ATA	WELL				N	
DEPTH (ft.)	SYMBOL		NAS	DEPTH (ft.)		ELEVATIC (ft.)	CONSTRUCTION REMARKS
				1139.96	TPC TRC	2.48	
0 -				0.0	GS	1142.44	
		0 0	1	2.0		1140.44	Concrete
5 -							Bentonite Slurry
		<b>\$</b> \$\$\$\$ <b>\$</b> \$\$					
10 -	0.20.2						
15 -							
10							
20 -		\$\$\$\$\$ \$\$					
		\$\$\$\$\$ \$\$	<b>}</b>				
		\$\$\$\$\$ \$\$					
30			<b>&gt;&gt;&gt;</b>				
		\$\$\$\$\$ <b>\$</b> \$	<b>\$</b>				
1	] '	\$\$\$\$\$\$ \$\$	<b>}</b>				
35		\$}}}}	333				
		B}}}}	333				
4	1	855558	355				
	(t)) 0 - 0 - 10 - 15 - 20 - 25 - 30	10 20 - 25 - 30 - 35 -	HELL DETAIL  NELL DETAIL  10  15  20  25  30  35  35	HL(g) DETAILS NAME OF THE PARTY	### DETAILS OF ###################################	WELL DETAILS & Hage TPC 1139.96 TRC 0.0 GS 2.0 15 - 35 - 35 - 35 - 35 - 35 - 35 - 35 -	### DETAILS   Page   DE

MALCOLM PIRNIE

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

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

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

GROUND SURFACE ELEVATION: 1142.4

DATUM: USGS LOGGED BY: Joel Henry

	STR	ATA	WELL			Z O	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
	40 - 45 - 50 - 60 - 60 -	S	□ Image: A section of the content of the conten	(See	Page		
GRAVELLY SAND  GRAVELLY SAND  COARSE SAND  MEDIUM SAND  FINE SAND  VERY FINE SAND  SILT  GRAVELLY CLAY  ASPHALT  TOPSOIL  TOP OF PROTECTIVE CASING TOP OF RISER CASING GROUND SURFACE BS BENTONITE SEAL FILTER PACK TOP OF SCREEN BOTTOM OF SCREEN TOTAL DEPTH  BENTONITE SEAL CONCRETE FILTER PACK THICK BENTONITE SLURRY GROUT NATURAL COLLAPSE / SAND BACKFIL  INTERBEDDED SAND, SILT, CLAY	70 - 75 - 80			80.0		1062.44	Filtered Sand Pack

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

## COMPLETION REPORT OF WELL No. MW-7

PROJECT: GSWA Spring Hill Camp

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

DRILLING CONTRACTOR: Stearns

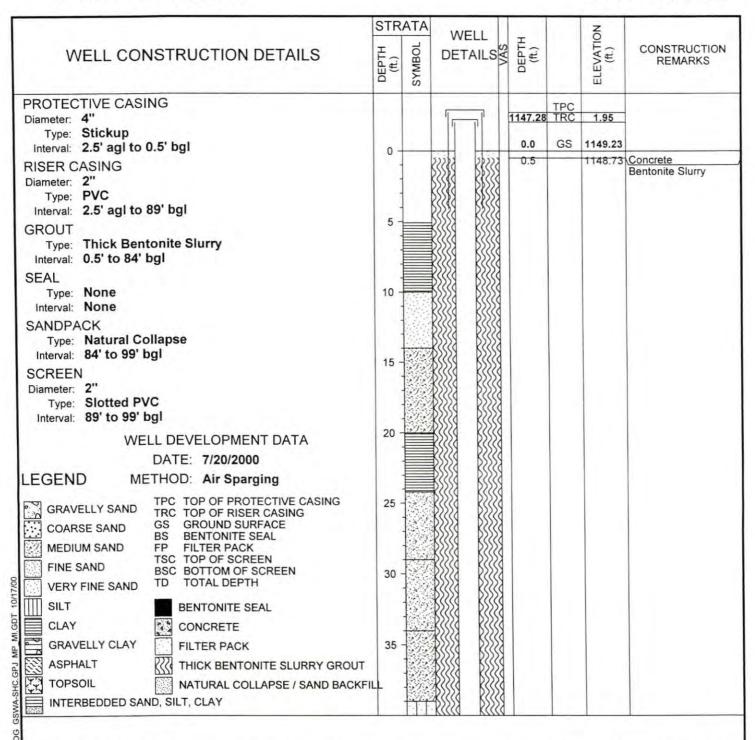
DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 18, 2000

GROUND SURFACE ELEVATION: 1149.2

DATUM: USGS

LOGGED BY: Jeff Groncki



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

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

GROUND SURFACE ELEVATION: 1149.2

DATUM: USGS

LOGGED BY: Jeff Groncki

STRATA ELEVATION (ft.) WELL DEPTH (ft.) DETAILS CONSTRUCTION WELL CONSTRUCTION DETAILS REMARKS (See Page 1) 40 Bentonite Slurry (continued) 55 60 65 70 LEGEND 75 TPC TOP OF PROTECTIVE CASING **GRAVELLY SAND** TRC TOP OF RISER CASING **GROUND SURFACE** GS COARSE SAND BS BENTONITE SEAL MEDIUM SAND FILTER PACK TOP OF SCREEN TSC FINE SAND BOTTOM OF SCREEN BSC TOTAL DEPTH VERY FINE SAND SILT BENTONITE SEAL 84.0 1065.23 CLAY CONCRETE Natural Collapse 85 **GRAVELLY CLAY** FILTER PACK **ASPHALT** THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY

MALCOLM PIRNIE

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

Sheet 2 of 3

PROJECT: GSWA Spring Hill Camp PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI GROUND SURFACE ELEVATION: 1149.2
DATUM: USGS

LOGGED BY: Jeff Groncki

		STR	ATA	MELL		Z	
WELL CONSTR	UCTION DETAILS	DEPTH (ft.)	SYMBOL	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
					(See P	age 1)	
		95 -			99.0	1050.23	
GRAVELLY SAND TRC GS BS MEDIUM SAND FP TSC BSC TD VERY FINE SAND SILT CLAY GRAVELLY CLAY ASPHALT	TOP OF PROTECTIVE CASING TOP OF RISER CASING GROUND SURFACE BENTONITE SEAL FILTER PACK TOP OF SCREEN BOTTOM OF SCREEN TOTAL DEPTH SENTONITE SEAL CONCRETE FILTER PACK THICK BENTONITE SLURRY GROUND	11/15/14					



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

Sheet 3 of 3

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

DRILLING CONTRACTOR: Stearns

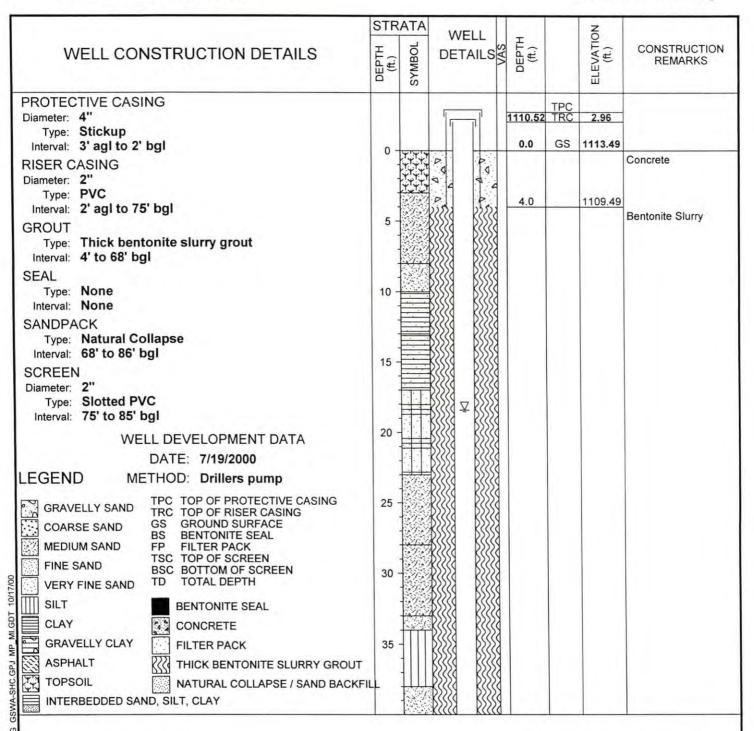
DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 18, 2000

GROUND SURFACE ELEVATION: 1113.5

DATUM: USGS

LOGGED BY: Joel Henry



MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-8

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

GROUND SURFACE ELEVATION: 1113.5

DATUM: USGS

LOGGED BY: Joel Henry

STRATA (ft.) WELL SYMBOL DEPTH DETAILS CONSTRUCTION WELL CONSTRUCTION DETAILS (ft.) REMARKS E (See Page 1) 40 Bentonite Slurry (continued) 45 50 55 60 65 68.0 1045.49 Natural Collapse 70 LEGEND 75 TPC TOP OF PROTECTIVE CASING **GRAVELLY SAND** TRC TOP OF RISER CASING **GROUND SURFACE** COARSE SAND GS BS BENTONITE SEAL MEDIUM SAND FILTER PACK TSC TOP OF SCREEN FINE SAND 80 BSC BOTTOM OF SCREEN TOTAL DEPTH VERY FINE SAND SILT BENTONITE SEAL CLAY CONCRETE 85.0 1028.49 85 **GRAVELLY CLAY** FILTER PACK **ASPHALT** THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY

MALCOLM PIRNIE 1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-8

Sheet 2 of 2

#### 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

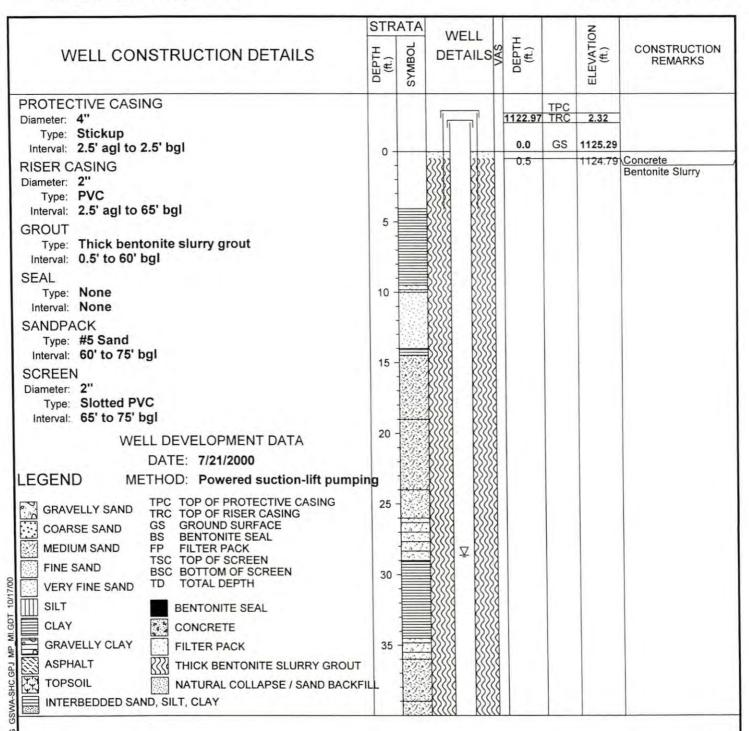
DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 20, 2000

GROUND SURFACE ELEVATION: 1125.3

DATUM: USGS

LOGGED BY: Jeff Groncki





1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-9

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

GROUND SURFACE ELEVATION: 1125.3

DATUM: USGS LOGGED BY: Jeff Groncki

		STR	ATA	WELL		Z	
WELL CO	NSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
					(See	Page 1)	
		40 -					Bentonite Slurry (continued)
		45 -					
		50 -					
		55 -	2/3/ 2/3/ 2/3/ 3/3/				
		60 -			60.0	1065.2	9 Filtered Sand Pack
		65 -					
		70 -					
GRAVELLY SAND COARSE SAND MEDIUM SAND	TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FP FILTER PACK	75			75.0 76.0	1050.2 1049.2	29 P9 Natural Collapse
FINE SAND VERY FINE SAND	TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TD TOTAL DEPTH						
SILT  CLAY  GRAVELLY CLAY	BENTONITE SEAL CONCRETE						
ASPHALT TOPSOIL	THICK BENTONITE SLURRY GROUT  NATURAL COLLAPSE / SAND BACKFI	LL					
INTERBEDDED SA	land and a second						

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-9

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

PROJECT: GSWA Spring Hill Camp

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

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 18, 2000

GROUND SURFACE ELEVATION: 1120.5

DATUM: USGS

LOGGED BY: Jeff Groncki

	STR	ATA	10	VELL	DEPTH (ft.)		Z	
WELL CONSTRUCTION DETAILS		SYMBOL		DETAILS		ELEVATION (ft.)		CONSTRUCTION REMARKS
PROTECTIVE CASING						TPC		
Diameter: 4"			1	7	1117.67	TRC	2.87	
Type: Stickup Interval: 2.5' agl to 2.5' bgl	0 -				0.0	GS	1120.54	
RISER CASING			25222	85538	0.5		1120.04	Concrete Bentonite Slurry
Diameter: 2"	-		833\$\$	88888				Bentonite Starry
Type: PVC Interval: 2.5' agl to 52' bgl			<b>\$</b> \$\$\$	\$\$\$\$\$				
GROUT	5 -	000	\$\$\$\$\$	\$\$\$\$\$				
Type: Thick Bentonite Slurry		Po 0	83333	B3333				
Interval: 0.5' to 45' bgl		601	\$\$\$\$\$	\$3333				
SEAL		01/	\$\$\$\$\$	\$5555				
Type: None	10 -		<b>}</b> }}}}	83333				
SANDPACK			83335	\$5555				
Type: Natural Collapse			\$\$\$\$\$	\$5555				
Interval: 45' to 65' bgl	15 -		<u> </u>	83333				
SCREEN Diameter: 2"			\$}}}{	\$55558				
Type: Slotted PVC			\$\$\$\$\$	85555				
Interval: 52' to 62' bgl		0/0	₹}}}}	_ 83333				
WELL DEVELOPMENT DATA	20 -		\$\$\$\$\$	* \$\$\$\$\$				
DATE: 7/20/200			3333	83333				
EGEND METHOD: Powered suction-lift pumpir	ng		<i>}</i> }}}}	83333				
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING	25		\$\\\\\	\$55558				
GRAVELLY SAND TRC TOP OF RISER CASING GS GROUND SURFACE			\$\$\$\$	85555				
BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK		18%	<i>}</i> }}}}	83333				
TSC TOP OF SCREEN		./.	<b>*</b> }}}}	\$55558				
PINE SAND BSC BOTTOM OF SCREEN  VERY FINE SAND TD TOTAL DEPTH	30	1	3333	3333				
SILT BENTONITE SEAL			33333	<b>}</b> }}}}				
CLAY CONCRETE			<b>\$</b> \$\$\$\$	<b>\$\$\$\$\$</b>				
GRAVELLY CLAY FILTER PACK	35		3	3333				
ASPHALT CHICK BENTONITE SLURRY GROUT	1	1	3333	<b>\$</b>				
TOPSOIL NATURAL COLLAPSE / SAND BACKFI		1%	<b>\$</b> \$\$\$\$	§ \$\$\$\$\$				
INTERBEDDED SAND, SILT, CLAY			3222	3 83333			1	

MALCOLM PIRNIE

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

PROJECT: GSWA Spring Hill Camp PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI GROUND SURFACE ELEVATION: 1120.5
DATUM: USGS

LOGGED BY: Jeff Groncki

		STR	ATA	WEL		5.3	z	
WELL CO	NSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAI	LS <sub>X</sub>	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
						(See F	Page 1)	
		40 -				45.0	1075.54	Bentonite Slurry (continued)
		45 - 50 -				43.0	1073.54	Natural Collapse
		55 -						
		60 -				62.0	1058.54	Natural Collapse
_EGEND		65				65.0	1055.54	
GRAVELLY SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND	TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TD TOTAL DEPTH							
SILT  CLAY  GRAVELLY CLAY  ASPHALT  TOPSOIL	BENTONITE SEAL  CONCRETE  FILTER PACK  THICK BENTONITE SLURRY GROUT  NATURAL COLLAPSE / SAND BACKFII							



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

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

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

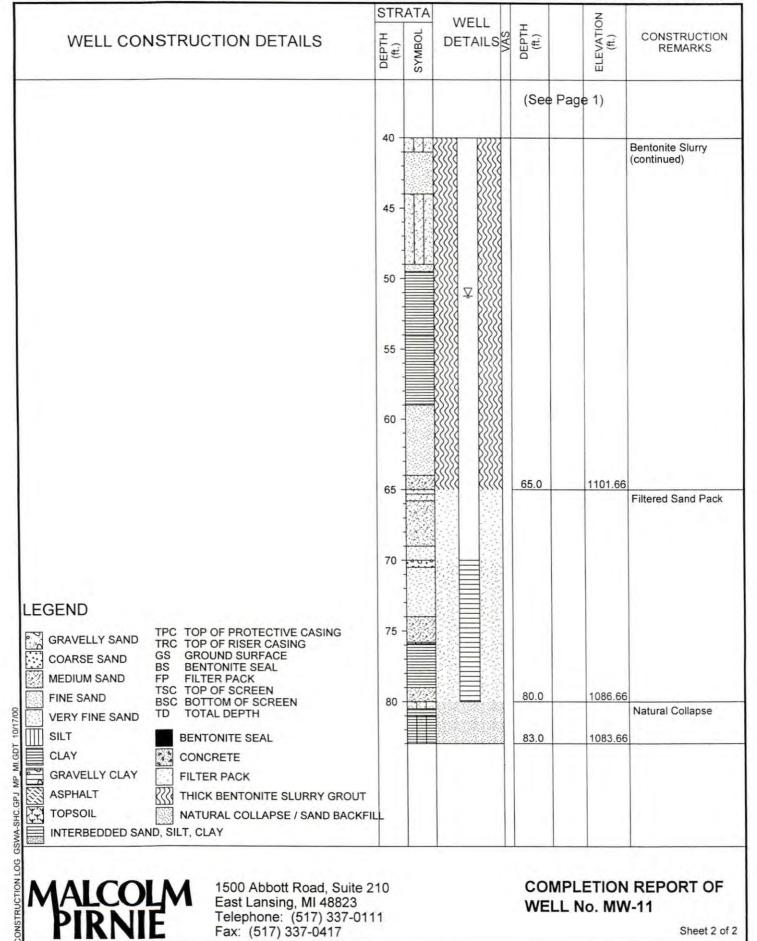
	STR	ATA	WELL			Z		
WELL CONSTRUCTION DETAILS		SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)		CONSTRUCTION REMARKS	
PROTECTIVE CASING				1	TPC	17.4		
Diameter: 4"				1164.08	TRC	2.58		
Type: Stickup Interval: 2.5' agl to 2.5' bgl				0.0	GS	1166.66		
RISER CASING	0 -		2222	0.5			Concrete	
Diameter: 2"			<b>6</b> 5555				Bentonite Slurry	
Type: PVC			\$\$\$\$\$ <b>\$\$</b> \$\$\$					
Interval: 2.5' agl to 70' bgl	5 -	7,30,75,767	R					
GROUT Type: Thick Bentonite Slurry	-		83333 83333					
Interval: 0.5' to 65' bgl			85555					
SEAL			\$\$\$\$\$ <b>\$</b> \$\$\$\$		9			
Type: None	10 -		\$\$\$\$\$ \$\$\$\$\$				7	
Interval: None			83333 83333					
SANDPACK Type: #5 Filter Pack Sand			83333 83333					
Interval: 65' to 80' bgl	1	01848	83339 83339					
SCREEN	15 -		85553 85559					
Diameter: 2"			\$\$\$\$9 \$\$\$\$9					
Type: Slotted PVC Interval: 70' to 80' bgl			B3333 B3333					
	20 -		83333 83333					
WELL DEVELOPMENT DATA		1	BSSS9 BSSSS9					
DATE: 8/7/2000			\$\$\$\$\$ \$\$\$\$\$					
EGEND METHOD: Submersible Grundfos Pum	P		\$\$\$\$\$ \$\$\$\$\$					
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING	25 -		B3333 B3333					
COARSE SAND GS GROUND SURFACE			83333 8333					
BS BENTONITE SEAL  MEDIUM SAND FP FILTER PACK			85559 85559					
FINE SAND TSC TOP OF SCREEN BSC BOTTOM OF SCREEN		775	\$\$\$\$\$ \$\$\$\$\$					
VERY FINE SAND TO TOTAL DEPTH	30	100	\$\$\$\$\$ \$\$\$\$\$					
SILT BENTONITE SEAL			<b>33333 33333</b>					
CLAY CONCRETE			83333 83359					
GRAVELLY CLAY FILTER PACK	35	- 377	\$5559 \$5559					
ASPHALT THICK BENTONITE SLURRY GROUT		, /,	R}}}}					
TOPSOIL NATURAL COLLAPSE / SAND BACKFI		1	\$\$\$\$\$ \$\$\$\$\$					
INTERBEDDED SAND, SILT, CLAY		W. W.	85553 B55558	5				

MALCOLM PIRNIE

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

PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI GROUND SURFACE ELEVATION: 1166.7

DATUM: USGS LOGGED BY: Jeff Groncki



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

COMPLETION REPORT OF WELL No. MW-11

PROJECT 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

	STR	ATA	WELL			Z	
WELL CONSTRUCTION DETAILS	WELL CONSTRUCTION DETAILS		SYMBOL (ft.)			ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING					TPC		
Diameter: 4"		- 1		1160.7	TRC	2.42	
Type: Stickup Interval: 3.0' agl to 2.0' bgl				0.0	GS	1163.21	
RISER CASING	0 -		D D	-		1.00.21	Concrete
Diameter: 2"			D)))	2.0		1161.21	
Type: PVC			SSS\$\$ <b>\$\$</b> \$\$\$				Bentonite Slurry
Interval: 2.5' agl to 105' bgl	5 -		}}}}}				
GROUT	3 .	100 20	\$\$\$\$\$ \$\$\$\$\$				
Type: Thick Bentonite Slurry Interval: 2.0' to 102' bgl			}}}}}				
SEAL			83333   83333	90			
Type: None	10 -	.,	ssss - B		1		
Interval: None	,		83334   83333				
SANDPACK			ssss - Bssss				
Type: #5 Filter Pack Sand			83333 83333		1		
Interval: 103' to 115' bgl	15 -	200	ssssa - Bssss				
SCREEN Diameter: 2"	-		ssssa - Bssss				
Type: Slotted PVC			SSSS9 BSSSS		1		
Interval: 105' to 115' bgl			sssss				
WELL DEVELOPMENT DATA	20 -	1	SSSS9 BSSSS				
DATE: 7/27/00			\$\$\$\$\$ <b>\$</b> \$\$\$\$				
_EGEND METHOD: Air Sparging			SSSS9				
		1.271.27	\$\$\$\$\$ \$\$\$\$\$				
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING	25 -	1.7.7	\$\$\$\$\$				
COARSE SAND GS GROUND SURFACE BS BENTONITE SEAL			}}}}} ]				
MEDIUM SAND FP FILTER PACK		37.7	\$\$\$\$\$ <b>\$</b> \$\$\$\$				
FINE SAND TSC TOP OF SCREEN BSC BOTTOM OF SCREEN		1.77	}}}}} ]				
VERY FINE SAND TO TOTAL DEPTH	30 -	.7.7	\$\$\$\$\$ \$\$\$\$\$				
SILT BENTONITE SEAL			B3333   B3333				
CLAY CONCRETE	100	7.7	SSSSS - BSSSS				
GRAVELLY CLAY FILTER PACK	35 -		BSSSS - BSSSS				
ASPHALT CHICK BENTONITE SLURRY GROUT	35		33333 83553				
<u> </u>			KSSSS				
TOPSOIL NATURAL COLLAPSE / SAND BACKF INTERBEDDED SAND, SILT, CLAY	ILL		83338 83358				
THE ROLL OF STATE OF		76.7	KSSSA KSSSS				,
AAAI COI AA 1500 Abbott Road, Suite 2	210			CO	MPL	ETION	REPORT OF
East Lansing, MI 48823						o. MW	
PIRNIE Telephone: (517) 337-01 Fax: (517) 337-0417	11			100			

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

GROUND SURFACE ELEVATION: 1163.2

DATUM: USGS

LOGGED BY: J.Henry/G.Fox

	STR	ATA	WELL		Z	100
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See	Page 1)	
	40 -		SSSSS   BSSSS			Bentonite Slurry
						(continued)
	45	.77.7	83333			
	45 -		\$}}}}			
	50 -	0,1	B B B B B B B B B B B B B B B B B B B			
			XXXX XXXX			
	55 -	7.7	XXXX XXXX			
			XXXX XXXX			
			XXXX XXXX			
	60 -		<b>\$</b>			
			<b>}</b>			
	65 -		B)}}}			
	70	200	\$}}}}			
	70 -					
CCEND						
EGEND TPC TOP OF PROTECTIVE CASING	75 -	3	XXXX XXXX			
GRAVELLY SAND TRC TOP OF RISER CASING COARSE SAND GS GROUND SURFACE	1		\$\$\$\$\$ <b>\$\$\$\$\$</b>			
BS BENTONITE SEAL  MEDIUM SAND FP FILTER PACK		100	<b>*****</b>			
FINE SAND TSC TOP OF SCREEN BSC BOTTOM OF SCREEN	80					
VERY FINE SAND TO TOTAL DEPTH						
SILT BENTONITE SEAL  CLAY CONCRETE			\$}}}}			
S CRAVELLY OLAY	85	000	33333			
ASPHALT THICK BENTONITE SLURRY GROUT		0.0	\$}}}}			
TOPSOIL NATURAL COLLAPSE / SAND BACKFI	4	0.0				
			KKKKQ KKKKGE			



1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-12d

Sheet 2 of 3

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

PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1163.2
DATUM: USGS

LOGGED BY: J.Henry/G.Fox

	DEPTH (ft.)	SYMBOL Y	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	95 -	AS AS		102.0 103.0	1061.21 1060.21	Bentonite Slurry (continued)  Natural Collapse Filtered Sand Pack
LEGEND  GRAVELLY SAND TRC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FINE SAND FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TO TOTAL DEPTH  SILT BENTONITE SEAL CLAY CONCRETE GRAVELLY CLAY FILTER PACK TOP OF SCREEN TO TOTAL DEPTH  BENTONITE SEAL CONCRETE FILTER PACK THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFI INTERBEDDED SAND, SILT, CLAY	115			115.0	1048.21	

MALCOLM PIRNIE 1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-12d

Sheet 3 of 3

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

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 27, 2000

GROUND SURFACE ELEVATION: 1162.5

DATUM: USGS

LOGGED BY: Greg Fox

WELL CONSTRUCTION DETAILS	DEPTH ST (ft.)		WELL DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION
		DETAILS		DEF	ELEVA		REMARKS
PROTECTIVE CASING Diameter: 4"				1160.15	TPC	2.32	,
Type: Stickup							
Interval: 2.5' agl to 2.5' bgl	0 -			0.0	GS	1162.47	Concrete
RISER CASING Diameter: 2"			0 0	2.0		1160.47	
Type: PVC	-		\$\$\$\$\$ <b>\$\$</b> \$\$\$				Bentonite Slurry
Interval: 2.5' agl to 52' bgl	5 -		B3333 B3333				
GROUT Type: Thick Bentonite Slurry			83339 83339				
Interval: 0.5' to 48' bgl			\$\$\$\$\$ <b>\$</b> \$\$\$\$				
SEAL		577	83333 83333				
Type: None Interval: None	10 -		R				
SANDPACK			83333 83333				
Type: Filter pack sand			\$\$\$\$\$ \$\$\$\$\$				
Interval: 48' to 62' bgl.	15 -	17.7	83333 B3333				
SCREEN Diameter: 2"			83333 8333				
Type: Slotted PVC			\$\$\$\$\$ <b>\$</b> \$\$\$\$				
Interval: 52' to 62' bgl.		3.3	B3333 B3333				
WELL DEVELOPMENT DATA	20 -		\$\$\$\$\$ <b>\$</b> \$\$\$\$				
DATE: 8/8/2000			\$\$\$\$\$ <b>\$</b> \$\$\$\$				
EGEND METHOD: Submersible Grundfos Pum	P		\$\$\$\$\$ \$\$\$\$\$				
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING	25 -		83333				
COARSE SAND GS GROUND SURFACE			\$}}}}  \\				
BS BENTONITE SEAL  MEDIUM SAND FP FILTER PACK			\$\$\$\$\$ \$\$\$\$\$				
FINE SAND TSC TOP OF SCREEN BSC BOTTOM OF SCREEN		11/	83333 B3333				
VERY FINE SAND TO TOTAL DEPTH	30 -		\$3333 <b>\$333</b> \$				
SILT BENTONITE SEAL			\$\$\$\$\$ <b>\$\$\$\$</b> \$				
CLAY CONCRETE			\$\$\$\$\$ \$\$\$\$\$		1		
GRAVELLY CLAY FILTER PACK	35 -		\$}}}}				
ASPHALT THICK BENTONITE SLURRY GROUT			\$\$\$\$\$ <b>\$</b> \$\$\$\$				
TOPSOIL NATURAL COLLAPSE / SAND BACKFIL	1		\$3333 <b>\$333</b> 3	5			
INTERBEDDED SAND, SILT, CLAY		*/*	\$\$\$\$\$ \$\$\$\$\$				

MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-12i

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

GROUND SURFACE ELEVATION: 1162.5

DATUM: USGS
LOGGED BY: Greg Fox

	STR	ATA	1.3.1		7	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)		WELL DETAILS S	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
	40 - 45 - 50 -			48.0 52.0	1114.47 1110.47	
GRAVELLY SAND  GRAVELLY SAND  COARSE SAND  MEDIUM SAND  FINE SAND  VERY FINE SAND  SILT  BENTONITE SEAL  BOTTOM OF SCREEN  TOTAL DEPTH  BENTONITE SEAL  CONCRETE  GRAVELLY CLAY  FILTER PACK  TOTAL DEPTH  BENTONITE SEAL  CONCRETE  GRAVELLY CLAY  FILTER PACK  TOTAL DEPTH  TOTAL DEPTH  TOTAL DEPTH  ASPHALT  TOPSOIL  NATURAL COLLAPSE / SAND BACKFILL  INTERBEDDED SAND, SILT, CLAY						



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Sheet 2 of 2

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

DRILLING CONTRACTOR: Stearns

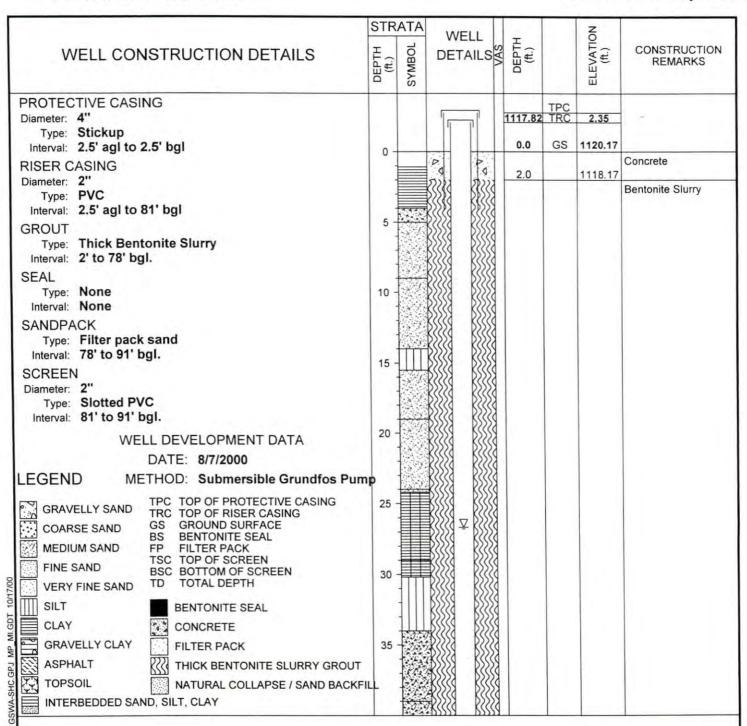
DRILLING METHOD: 4 1/4" HSA

DATE COMPLETED: July 27, 2000

GROUND SURFACE ELEVATION: 1120.2

DATUM: USGS

LOGGED BY: J.Henry/G.Fox



MALCOLM PIRNIE

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. MW-13

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

PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1120.2 DATUM: USGS

LOGGED BY: J.Henry/G.Fox

		STR	ATA	WELL	_		NO	
WELL CO	NSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
					(Se	e Page	e 1)	
		40 -						Bentonite Slurry (continued)
		45 -						
		50 -						
		55 -						
		60 -						
		65 -						
		70 -						
GRAVELLY SAND	TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE	75 -						
MEDIUM SAND FINE SAND VERY FINE SAND	BS BENTONITE SEAL FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TD TOTAL DEPTH	80 -		\$\$\$\$\$ \$\$\$\$\$ 	78.0		1042.1	Filtered Sand Pack
SILT CLAY GRAVELLY CLAY	BENTONITE SEAL CONCRETE FILTER PACK	85						
ASPHALT TOPSOIL INTERBEDDED SAI	THICK BENTONITE SLURRY GROUT  NATURAL COLLAPSE / SAND BACKFIL  ND, SILT, CLAY	L						



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COMPLETION REPORT OF WELL No. MW-13

Sheet 2 of 3

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

GROUND SURFACE ELEVATION: 1120.2

DATUM: USGS

LOGGED BY: J.Henry/G.Fox

	STR	ATA	WELL			J. J. Helliy/G.
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See I	Page 1)	
		٥		91.0	1029.17	Natural Collapse
		0 0				
	95 -					
	100 -					
	105 -					
	110 -					
				113.0	1007.17	7
EGEND						
GRAVELLY SAND TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING						
COARSE SAND  GS GROUND SURFACE BS BENTONITE SEAL  MEDIUM SAND  FP FILTER PACK						
FINE SAND TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TD TOTAL DEPTH TOTAL DEPTH						
SILT BENTONITE SEAL						
CLAY CONCRETE  GRAVELLY CLAY FILTER PACK						
ASPHALT COLLAPSE / SAND BACKFI	LL					
INTERBEDDED SAND, SILT, CLAY						



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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

DRILLING CONTRACTOR: Stearns

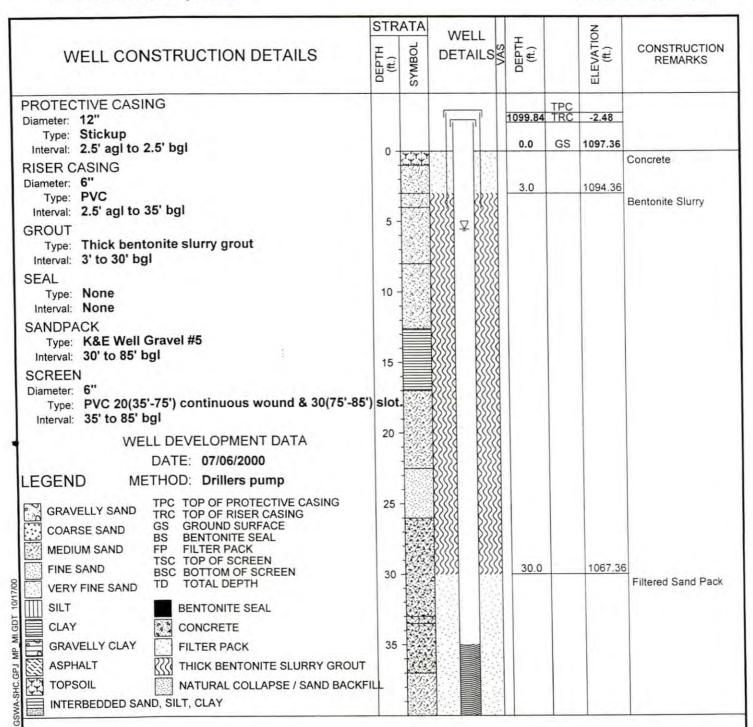
DRILLING METHOD: 10 1/4" HSA

DATE COMPLETED: July 6, 2000

GROUND SURFACE ELEVATION: 1097.4

DATUM: USGS

LOGGED BY: Joel Henry



MALCOLM PIRNIE

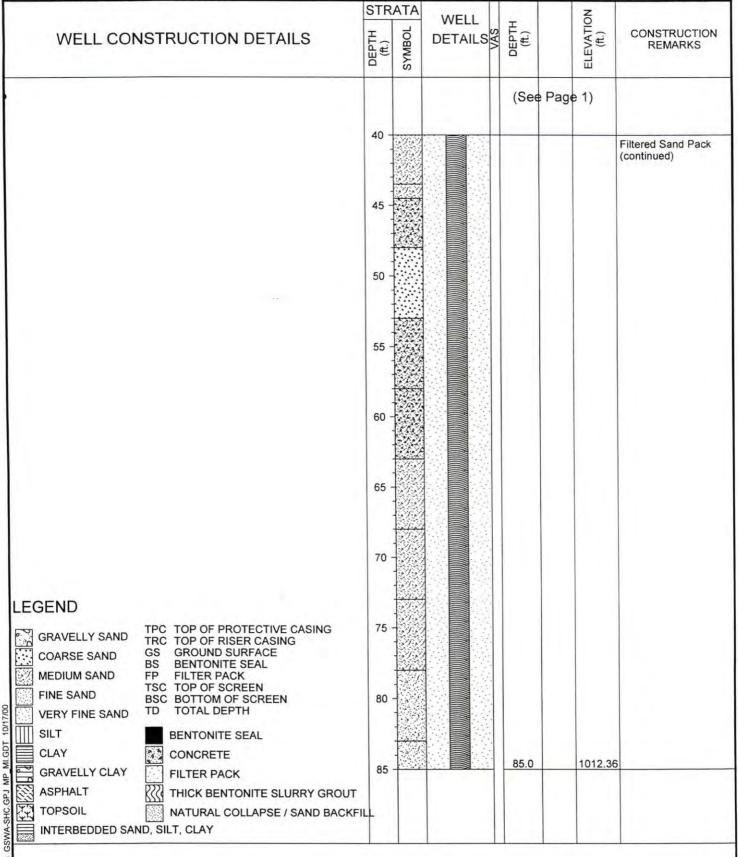
1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 COMPLETION REPORT OF WELL No. TW-1

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

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

GROUND SURFACE ELEVATION: 1097.4
DATUM: USGS

LOGGED BY: Joel Henry





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Sheet 2 of 2

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

DRILLING CONTRACTOR: Stearns

GROUND SURFACE ELEVATION: 1119.4

DRILLING METHOD: 10 1/4" HSA

DATUM: USGS

DATE COMPLETED: August 2, 2000

DAT

LOGGED BY: M.B. & G.Fox

		STR	ATA	WELL	т		NO	
WELL CO	WELL CONSTRUCTION DETAILS		SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CAS	ING					TPC		
Diameter: NA Type: NA					1115.92	TRC	3.49	
Interval: NA		0 -			0.0	GS	1119.41	14
RISER CASING				33333 88333				Bentonite Slurry
Diameter: 8"				85558 85555				
Type: PVC Interval: 2.5' agl to	58' ha			SSSSS				
GROUT 2.5 agr to	50 bg.	5 -	27.77	R				
Type: Thick Ben								
Interval: 0' to 47.5'	bgl			B3333 B3333				
SEAL Type: None		10 -	17	SSSSS				
Interval: None		10		85559 85559				
SANDPACK	Per			\$\$\$\$\$ <b>\$\$\$\$\$</b>				
Type: #5 & #7 Fi				B3333 B3333				
Interval: 48' to 103	bgi	15 -	Ш	83333 83333				
SCREEN Diameter: 8"			1	XXXX XXXX				
Type: PVC 20 (5	3'-63') & 30 (63-103') slot (continuous	wou	d).	B3333 B3333				
Interval: 53' to 103	' bgl			83333 83333				
WE	LL DEVELOPMENT DATA	20 -		K				
	DATE: 8/7/2000			R E				
LEGEND MI	ETHOD: Air Sparging			83333 × 83333				
GRAVELLY SAND	TPC TOP OF PROTECTIVE CASING	25		\$\$\$\$\$ \$\$\$\$\$				
COARSE SAND	TRC TOP OF RISER CASING GS GROUND SURFACE			<b>8</b> 8888 <b>88888</b>				
MEDIUM SAND	BS BENTONITE SEAL FP FILTER PACK			B333 B333				
FINE SAND	TSC TOP OF SCREEN			83333 83333				
VERY FINE SAND	BSC BOTTOM OF SCREEN TD TOTAL DEPTH	30	1	\$\$\$\$\$ \$\$\$\$\$				
SILT	BENTONITE SEAL		-	\$\$\$\$\$ \$\$\$\$\$				
CLAY	CONCRETE			<b>B</b>				
GRAVELLY CLAY	FILTER PACK	35		\$3558 <b>\$355</b> 8				
ASPHALT	THICK BENTONITE SLURRY GROUT		. E. 1	\$\$\$\$\$ <b>\$</b> \$\$\$\$				
TOPSOIL	NATURAL COLLAPSE / SAND BACKFIL		100	B3333 B3333				
INTERBEDDED SA	المنتقا		1	\$\$\$\$\$ \$\$\$\$\$				
WWW.			1	V///X V////X				

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COMPLETION REPORT OF WELL No. TW-2

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

GROUND SURFACE ELEVATION: 1119.4
DATUM: USGS

LOGGED BY: M.B. & G.Fox

	STR	ATA	WELL		Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See	Page 1)	
	40 -					Bentonite Slurry (continued)
	45 -			47.5	1071.91	
	50 -			48.0	1071.41	Natural Collapse Filtered Sand Pack
	55 -					
	60 -					
	65					
	70					
GRAVELLY SAND  TPC TOP OF PROTECTIVE CASING TRC TOP OF RISER CASING GS GROUND SURFACE  GS GROUND SURFACE	75					
MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN BSC BOTTOM OF SCREEN TD TOTAL DEPTH	80					
SILT BENTONITE SEAL  CLAY CONCRETE  GRAVELLY CLAY FILTER PACK  ASPHALT CT THICK BENTONITE SLURRY GROUT	85					
ASPHALT  THICK BENTONITE SLURRY GROUT  TOPSOIL  NATURAL COLLAPSE / SAND BACKFIL  INTERBEDDED SAND, SILT, CLAY		. 0				

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Sheet 2 of 3

PROJECT: GSWA Spring Hill Camp PROJECT NO: 4065-001 PROJECT LOCATION: Osceola, MI GROUND SURFACE ELEVATION: 1119.4
DATUM: USGS

LOGGED BY: M.B. & G.Fox

	STR	ATA	WELL			Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See	Page	e 1)	
	95 -			400.5			Filtered Sand Pack (continued)
				103.0		1016.41	
EGEND							
GRAVELLY SAND  COARSE SAND  MEDIUM SAND  FINE SAND  VERY FINE SAND  TC  TOP OF PROTECTIVE CASING TRC  TOP OF RISER CASING GS GROUND SURFACE BS BENTONITE SEAL FP FILTER PACK TSC TOP OF SCREEN TOTAL DEPTH  TOTAL DEPTH							
SILT BENTONITE SEAL  CLAY CONCRETE  GRAVELLY CLAY FILTER PACK  ASPHALT THICK BENTONITE SLURRY GROUT							
TOPSOIL NATURAL COLLAPSE / SAND BACKFI	L						



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Sheet 3 of 3

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

PROJECT: GSWA Spring Hill Camp

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

DRILLING CONTRACTOR: Stearns

DRILLING METHOD: 10 1/4" HSA

DATE COMPLETED: July 28, 2000

GROUND SURFACE ELEVATION: 1148.6

DATUM: USGS

LOGGED BY: Joel Henry

	STR		WI	ELL	_		NO	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL		AILS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
PROTECTIVE CASING					1145.75	TPC		
Diameter: NA Type: NA			1	7[	1145.75	TRC	2.82	
Interval: NA	0 -				0.0	GS	1148.57	
RISER CASING	-		D	P	20		4440.57	Concrete
Diameter: 8"	14		2555	2555	2.0		1146.57	Bentonite Slurry
Type: PVC Interval: 2.5' agl to 82' bgl			833 <b>8</b> 3	88888				Demonito Ciarry
A - P - S - C - C - C - C - C - C - C - C - C	5 -		\$\$\$\$	\$\$\$\$\$				
GROUT Type: Thick Bentonite Slurry Interval: 0' to 74' bgl				}}}}				
SEAL		100	\$\$\$\$\$	\$\$\$\$\$				
Type: None	10 -		\$\$\$\$\$	\$\$\$\$\$				
Interval: None			<b>\$</b> }}}}	<b>\$</b> }}}}				
SANDPACK			\$\$\$\$\$	\$\$\$\$\$				
Type: Global Filter Pack Sand Interval: 74' to 122' bgl			83333	33333				
SCREEN	15 -		83333	\$\$\$\$\$				
Diameter: 8"			83339	83333				
Type: PVC 20 (82'-92') & 30 (92'-122') slot (continuous	wou	ınd).	\$\$\$\$\$	\$\$\$\$\$				
Interval: 82' to 122' bgl			\$\$\$\$\$	\$\$\$\$\$				
WELL DEVELOPMENT DATA	20		R}}}}}	83333				
DATE: 8/2/2000			\$\$\$\$\$	\$\$\$\$\$				
LEGEND METHOD: Air Sparging		1	\$3333	83333				
TPC TOP OF PROTECTIVE CASING	25	1	\$\$\$\$\$	\$5555				
GRAVELLY SAND TRC TOP OF RISER CASING GS GROUND SURFACE	1	100	\$\$\$\$\$	\$\$\$\$\$				
BS BENTONITE SEAL			<b>}</b> }}}}	85555				
MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN		Ш	\$\$\$\$\$	\$\$\$\$\$				
BSC BOTTOM OF SCREEN	30	-	<b> </b>	83333				
VERT FIRE SAND			<b>}</b> }}}	\$\$\$\$\$				
SILT BENTONITE SEAL			<b>3</b>	33333		1		
CLAY CONCRETE			\$}}}}	\$\$\$\$\$				
GRAVELLY CLAY FILTER PACK	35		<b>3</b>	83333				
ASPHALT THICK BENTONITE SLURRY GROUT			888	\$\$\$\$\$				
TOPSOIL NATURAL COLLAPSE / SAND BACKFI	L	+	<b>*</b>	\$\$\$\$\$				
INTERBEDDED SAND, SILT, CLAY		10.20	K < < < <	KKKK				

MALCOLM PIRNIF

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

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

PROJECT LOCATION: Osceola, MI

GROUND SURFACE ELEVATION: 1148.6
DATUM: USGS
LOGGED BY: Joel Henry

STRATA ELEVATION (ft.) WELL DEPTH (ft.) DEPTH (ft.) DETAILS CONSTRUCTION SYMBOL WELL CONSTRUCTION DETAILS REMARKS (See Page 1) 40 Bentonite Slurry (continued) 65 70 LEGEND 74.0 1074.57 Filtered Sand Pack TPC TOP OF PROTECTIVE CASING 75 **GRAVELLY SAND** TOP OF RISER CASING TRC GS **GROUND SURFACE** COARSE SAND BS BENTONITE SEAL MEDIUM SAND FP FILTER PACK TSC TOP OF SCREEN FINE SAND BSC BOTTOM OF SCREEN 80 TOTAL DEPTH TD VERY FINE SAND SILT BENTONITE SEAL CLAY CONCRETE 85 **GRAVELLY CLAY** FILTER PACK **ASPHALT** THICK BENTONITE SLURRY GROUT TOPSOIL NATURAL COLLAPSE / SAND BACKFILL INTERBEDDED SAND, SILT, CLAY



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Sheet 2 of 3

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

GROUND SURFACE ELEVATION: 1148.6

DATUM: USGS LOGGED BY: Joel Henry

	STR	ATA	WELL	7.36	Z	
WELL CONSTRUCTION DETAILS	DEPTH (ft.)	SYMBOL	DETAILS	DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See	Page 1)	
	95 - 100 - 105 - 115 -			122.2	1026.37	Filtered Sand Pack (continued)
GRAVELLY SAND TRC TOP OF PROTECTIVE CASING TOP OF RISER CASING GROUND SURFACE BS BENTONITE SEAL FILTER PACK TOP OF SCREEN BSC BOTTOM OF SCREEN TOTAL DEPTH  SILT BENTONITE SEAL CONCRETE  GRAVELLY CLAY FILTER PACK  TOP OF RISER CASING GROUND SURFACE BENTONITE SEAL FILTER PACK CONCRETE FILTER PACK TOP OF PROTECTIVE CASING TOP OF RISER CASING TOP OF ROTECTIVE CASING TOP OF RISER CASING TOP OF RISER CASING TOP OF ROTECTIVE CASING TOP OF RISER CASING TOP OF RESER CASING TOP OF RISER CASING TOP OF RESER CASING TOP OF CASING T						



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Sheet 3 of 3

# APPENDIX D SIEVE ANALYSIS DATA

### For the Pilot Boring Soil Samples at the Spring Hill Creek Location Proposed Test Well

Client: Malcolm Pirnie

Stearns Project #: 00-8587-6

Date: 6/28/00

200

Pan

2.9

0

Project Name: Spring Hill Creek Project Location: Evart, Michigan

Date: 6/28/00
Sample Identification: OB-1
Sample Depth: 33' - 35'
Initial Sample Weight in Grams: 94.4

Sieve ASTM No.	Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
4	187	2.6	2.8
8	93.7	6.4	6.8
10	78.7	8.6	9.1
20	33.1	13.6	14.5
30	23.4	18.4	19.6
40	16.5	27.4	29.1
50	11.7	46.5	49.4
60	9.8	64.8	68.9
100	5.9	88.2	93.7
200	2.9	92.6	98.4
Pan		94.1	100.0

nitial Sa	mple Wei	ght in Grams:	98.5
Sieve ASTM No.	Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
4	187	1.7	1.7
8	93.7	5.7	5.8
10	78,7	6.4	6.5
20	33.1	14.9	15.2
30	23.4	21.4	21.8
40	16.5	36.7	37.4
50	11.7	61.7	62.9
60	9.8	76.1	77.6
100	5.9	94.7	96.5

Error (grams): 0.3

90 % Retained Size (Inches): 0.0065 Uniformity Coefficient: 2.2

40 % Retained Size (Inches): 0.0140 ... 70 % Retained Size (Inches): 0.0095 Error (grams): 0.4

97.5

98,1

99.4

100.0

90 % Retained Size (Inches): 0.0070 Uniformity Coefficient: 2.3

40 % Retained Size (Inches): 0.0160 70 % Retained Size (Inches): 0.0110

## For the Pilot Boring Soil Samples at the Spring Hill Creek Location Proposed Test Well

Client: Malcolm Pirnie

Stearns Project #: 00-8587-6

Project Name: Spring Hill Creek Project Location: Evart, Michigan

Date: 6/28/00	7.10k./s/	
Sample Identificat	ion: OB-1	
Sample Depth: 33'	- 35'	
Initial Sample We	ight in Grams:	94.4
	Completing	Cumularius

Sieve ASTM No.	Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
4	187	2.6	2.8
8	93.7	6.4	6.8
10	78.7	8.6	9.1
20	33.1	13.6	14.5
30	23.4	18.4	19.6
40	16.5	27.4	29.1
50	11.7	46.5	49.4
60	9.8	64.8	68.9
100	5.9	88.2	93.7
200	2.9	92.6	98.4
Pan		94.1	100.0

Fror	(grams):	0.3
LILLON	Granis).	0.5

90 % Retained Size (Inches):	0.0065
Uniformity Coefficient:	2.2

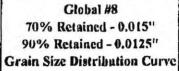
40 % Retained	Size (Inches):	0.0140	
70 % Retained	Size (Inches):	0.0095	

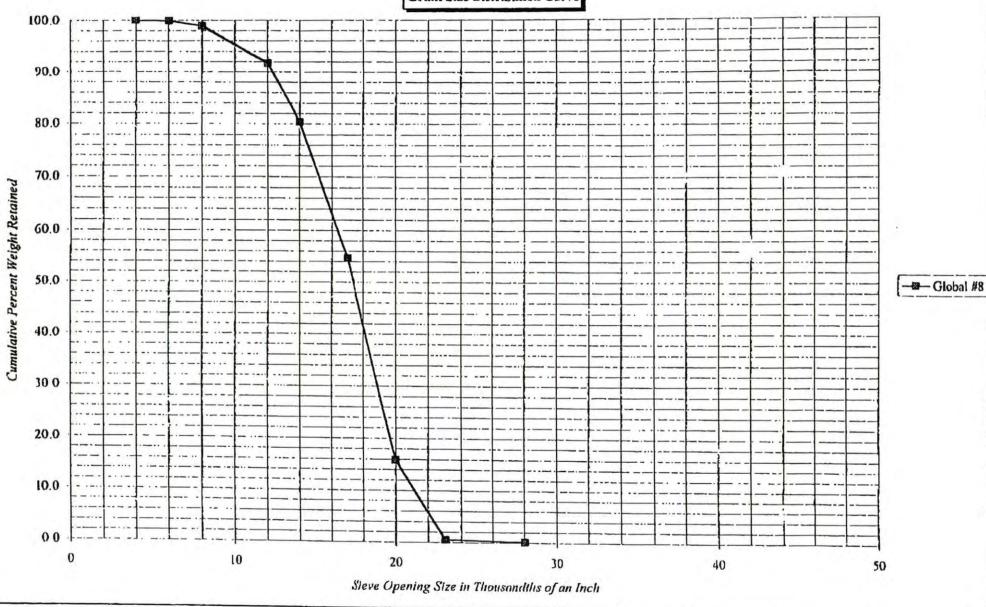
Date: 6/2			
	dentificati depth: 43.	ion: OB-1	
		ght in Grams:	98.5
Sieve ASTM No.	Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
4	187	1.7	1.7
8	93.7	5.7	5.8
10	78,7	6.4	6.5
20	33.1	14.9	15.2
30	23.4	21.4	21.8
40	16.5	36.7	37.4
50	11.7	61.7	62.9
60	9.8	76.1	77.6
100	5.9	94.7	96.5
200	2.9	97,5	99.4
D	0	08.1	100.0

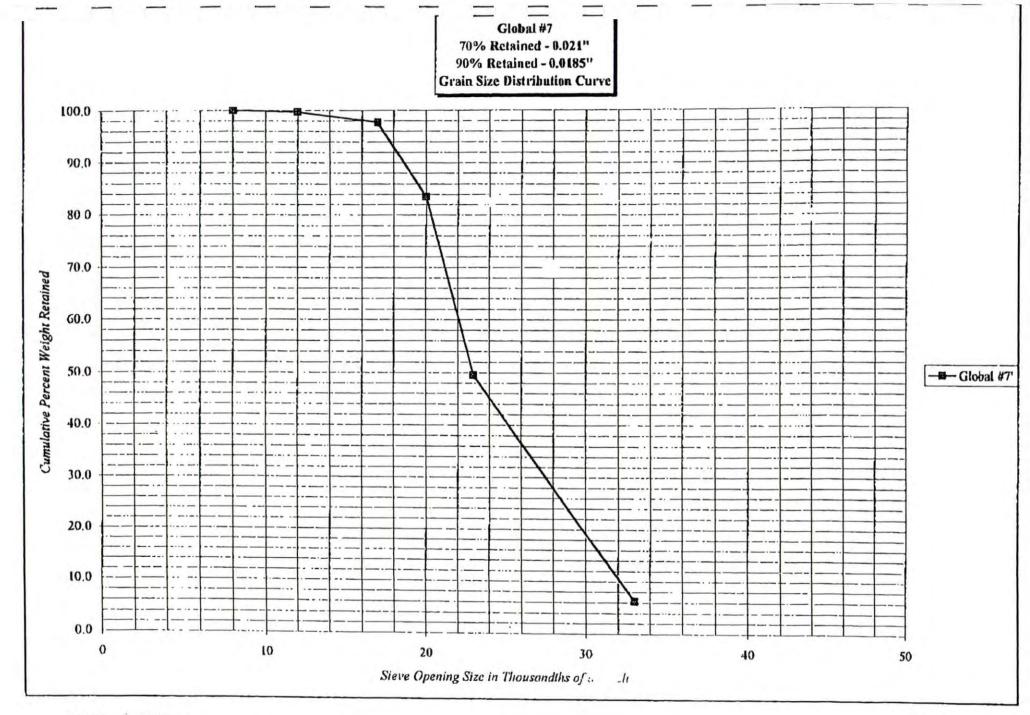
Error (grams): 0.4

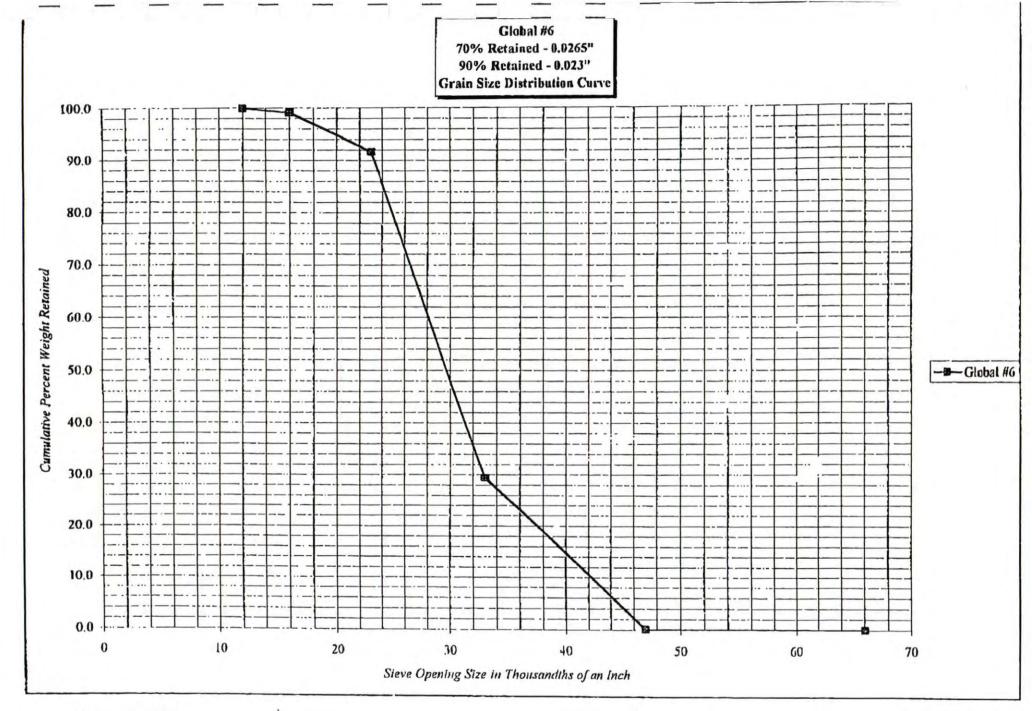
90 % Retained Size (Inches): 0.0070 Uniformity Coefficient: 2.3

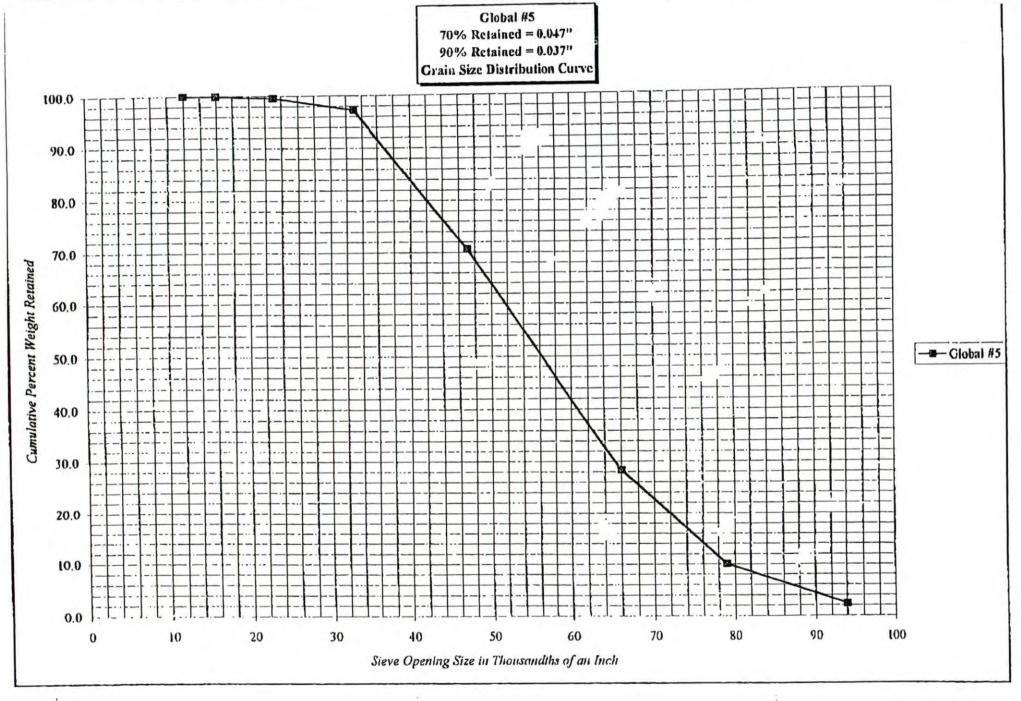
40 % Retained Size (Inches): 0.0160 70 % Retained Size (Inches): 0.0110











ASTM 1000th No.		Cumulative Sample Weight (Grams)	Cumulative Percent Retained
12	66	0.0	0.0
16	47	0.0	0.1
20	33	0.0	29.4
30	23	0.0	91.6
40	16	. 0.0	99.1
50	12	0.0	99.9

Sieve	Size	Cumulative	Cumulative
ASTM No.	1000th Inches	Sample Weight (Grams)	Percent Retained
8	94	0.0	2.3
10	79	0.0	10.0
12	66	0.0	28.3
16	47	0.0	70.6
20	33	0.0	97.2
30	23	0.0	99.5
40	16	0.0	99.9
50	12	0.0	100.0
-			

Effective Grain Size (Inches): 0.023 Uniformity Coefficient: 1.3 Effective Grain Size (Inches): 0.0365 Uniformity Coefficient: 1.7

ASTM 1000th No.		Cumulative Sample Weight (Grams)	Cumulative Percent Retained
25	28	0.0	0.1
30	23	0.0	0.5
35	20	0.0	15.9
40	17	0.0	54.6
	14	0.0	80.4
50	12	0.0	91.7
70	8	0.0	98.9
100	6	0.0	99.9
140	4	0.0	100.0

Sieve Size ASTM 1000th No. Inches		Cumulative Sample Weight (Grams)	Cumulative Percent Retained
20	33	0.0	6.2
30	23	0.0	49.5
35	20	0.0	83.5
40	17	0.0	97.7
50	12	0.0	99.7
70	8	0.0	100.0
_			

Effective Grain Size (Inches): 0.012 Uniformity Coefficient: 1.5 Effective Grain Size (Inches): 0.0185 Uniformity Coefficient: 1.4

# For the Pilot Boring Soil Samples at the Spring Hill Creek Location Proposed Test Well

Client: Malcolm Pirnie

Stearns Project #: 00-8587-6

Project Name: Spring Hill Creek Project Location: Evart, Michigan

	dentificat	tion: OB-1	
Sample I Initial Sa	Depth: 73 ample We	ight in Grams:	98.3
Sieve ASTM No.	Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
4	187	0.0	0.0

Sieve Size ASTM 1000th No. Inches		TM 1000th Sample Weight	
4	187	0.0	0.0
8	93.7	0.4	0.4
10	78.7	0.5	0.5
20	33.1	2.0	2.1
30	23.4	5.1	5.2
40	16.5	17.5	18.0
50	11.7	47.6	48.9
60	9.8	67.1	68.9
100	5,9	92.6	95.1
200	2.9	96.5	99.1
Pan	0	97.4	100.0

Error (grams): 0.9

90 % Retained Size (Inches): 0.0065 Uniformity Coefficient: 2.0

40 % Retained Size (Inches): 0.0130 70 % Retained Size (Inches): 0.0095

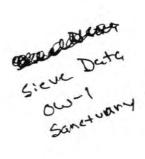
	ample Depth: 83' - 85' nitial Sample Weight in Grams:				
Sieve Size ASTM 1000th No. Inches		Cumulative Sample Weight (Grams)	Cumulative Percent Retained		
4	187	0.0	0.0		
8	93,7	0,3	0.3		
10	78.7	0.5	0.5		
20	33.1	0.9	0.9		
30	23.4	2.7	2.8		
40	16.5	11.7	12.2		
50	11.7	39.4	41.0		
60	9.8	60.8	63.3		
100	5.9	90.3	94.0		
200	2.9	95.4	99.3		
Pan	0	96.1	100.0		

Error (grams): 0.9

90 % Retained Size (Inches): 0.0065 Uniformity Coefficient: 1.9

40 % Retained Size (Inches): 0.0120 70 % Retained Size (Inches): 0.0090





# **Facsimile Cover Sheet**

To: Mr. Greg Foote

Company: Malcolm Pirnie Engineers, LLP

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

From: Mr. Larry L. Herron

Company: Stearns Drilling Phone: (616) 698-7770 Fax: (616) 698-9886

E-Mail: Info@StearnsDrilling.com

Date: 07/13/00

Pages including this

cover page: 14

Comments: A hard copy will not follow unless requested.

# For OW-1 Pilot Boring Soil Samples at the Sanctuary Drill Site Proposed 6-inch Water Test Well

Client: Malcolm Pirnie

Stearns Project #: 00-8616-7

Project Name: Sanctuary

Project Location: Rodney, Michigan

Date: 7/13/00

Sample Identification: OW-1

Sample Depth: 54 - 56

Initial Sample Weight in Grams: 79.0

Sieve Size ASTM 1000th No. Inches		STM 1000th Sample Weight	
4	187	0.0	0.0
8	93.7	0,0	0.0
10	78.7	0.0	0.0
20	33.1	0.1	0.1
30	23.4	0.6	0.8
40	16.5	2.8	3.5
50	11.7	13.8	17.5
60	9.8	22.4	28.4
100	5.9	64.0	81.0
200	2.9	76.8	97.2
Pan		79.0	100.0

Date: 7/13/00

Sample Identification: OW-1

Sample Depth: 64' - 66'

Initial Sample Weight in Grams: 81.1

Sieve Size		Cumulative	Cumulative
ASTM No.	1000th Inches	Sample Weight (Grams)	Percent Retained
4	187	0.6	0.7
8	93.7	0.7	0.9
10	78.7	0.8	1.0
20	33.1	0.9	1.1
30	23.4	1.2	1.5
40	16.5	2.4	3.0
50	11.7	9.1	11,2
60	9.8	17,5	21.6
100	5.9	56.0	69.1
200	2.9	77.1	95.2
Pan	0	81.0	100.0

Error (grams): 0.0

90 % Retained Size (Inches): 0.0040

Uniformity Coefficient: 2.3

40 % Retained Size (Inches): 0.0090 70 % Retained Size (Inches): 0.0065 90 % Retained Size (Inches): 0.0035

Uniformity Coefficient: 2.4

Error (grams): 0.1

40 % Retained Size (Inches): 0.0085

70 % Retained Size (Inches): 0.0055

# For OW-1 Pilot Boring Soil Samples at the Sanctuary Drill Site Proposed 6-inch Water Test Well

Client: Malcolm Pirnie

Stearns Project #: 00-8616-7

Project Name: Sanctuary

Project Location: Rodney, Michigan

Date: 7/13/00

Sample Identification: OW-1

Sample Depth: 74' - 76'

Initial Sample Weight in Grams:

104.9

Sieve Size ASTM 1000th No. luches		M 1000th Sample Weight	
4	187	0.0	0.0
8	93.7	0.0	0.0
10	78.7	0.0	0.0
20	33.1	0.4	0.4
30	23.4	1.0	0.9
40	16.5	3.5	3.3
50	11.7	13.8	13.1
60	9.8	24.6	23.3
100	5.9	74.9	70.9
200	2.9	101.5	96.0
Pan	0	105.7	100.0

Date:	7/	13	/00	
Comm	10	TA	201	4

Sample Identification: OW-I

Sample Depth: 84 - 86

Initial Sample Weight in Grams: 94.2

Sieve Size ASTM 1000th No. Inches		M 1000th Sample Weight	
4	187	0.0	0.0
8	93.7	0.0	0.0
10	78.7	0.0	0.0
20	33.1	0.0	0.0
30	23.4	0.4	0.4
40	16.5	1.5	1.6
50	11.7	8.5	9.0
60	9.8	15.9	16.9
100	5.9	45.3	48.1
200	2.9	74.4	79.1
Pan	0	94.1	100.0

Error (grams): -0.8

90 % Retained Size (Inches): 0.0035

Uniformity Coefficient: 2.4

40 % Retained Size (Inches): 0.0085

70 % Retained Size (Inches): 0.0060

Error (grams): 0.1

90 % Retained Size (Inches): 0.0015

Uniformity Coefficient: 4.7

40 % Retained Size (Inches): 0.0070

70 % Retained Size (Inches): 0.0035

# For OW-1 Pilot Boring Soil Samples at the Sanctuary Drill Site Proposed 6-inch Water Test Well

Client: Malcolm Pirnie

Stearns Project #: 00-8616-7

Project Name: Sanctuary

Project Location: Rodney, Michigan

Date: 7/13/00

Sample Identification: OW-1

Sample Depth: 94' - 96'

Initial Sample Weight in Grams: 103.1

Sieve ASTM No.	Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
4	187	0.0	0.0
8	93.7	0.0	0.0
10	78.7	0.0	0.0
20	33.1	0.1	0.1
30	23.4	1.0	1.0
40	16.5	8.7	8.5
50	11.7	34.7	33.9
60	9.8	53.9	52.6
100	5.9	91.1	89.0
200	2.9	101.2	98.8
Pan	0	102.4	100.0

Date: 7/13/00	
Sample Identification: OW-1	
Sample Death: 104' - 106'	

Initial Sample Weight in Grams:

104.0

Sieve ASTM No.	Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
4	187	5.4	5.2
8	93.7	11.5	11.0
10	78.7	11.9	11.4
20	33.1	14.1	13.5
30	23.4	15.8	15.1
40	16.5	20.2	19.3
50	11.7	32.5	31.0
60	9.8	41.7	39.8
100	5.9	69.0	65.9
200	2.9	91.8	87.7
Pan	0	104.7	100.0

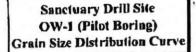
Error (grams): 0.7

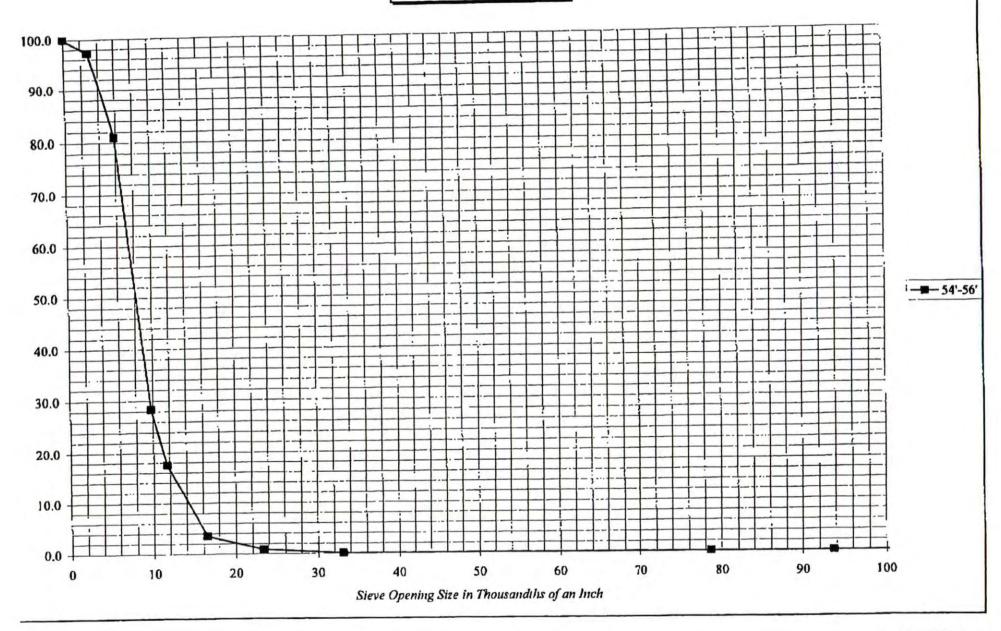
90 % Retained Size (Inches): 0.0055 Uniformity Coefficient: 2.0

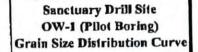
40 % Retained Size (Inches): 0.0110 70 % Retained Size (Inches): 0.0080 Error (grams): -0.7

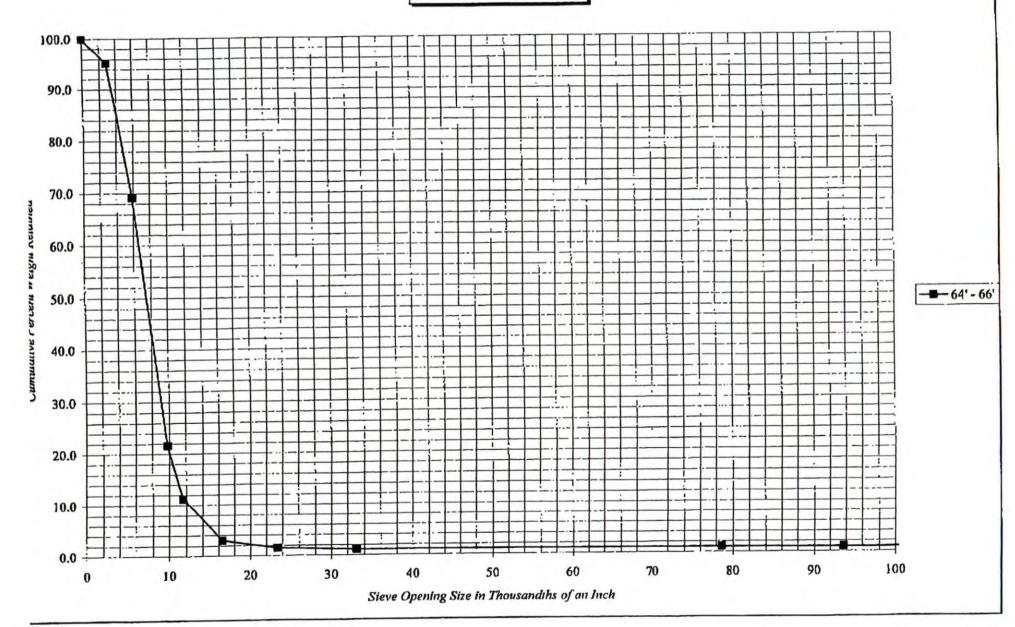
90 % Retained Size (Inches): 0.0025 Uniformity Coefficient: 3.8

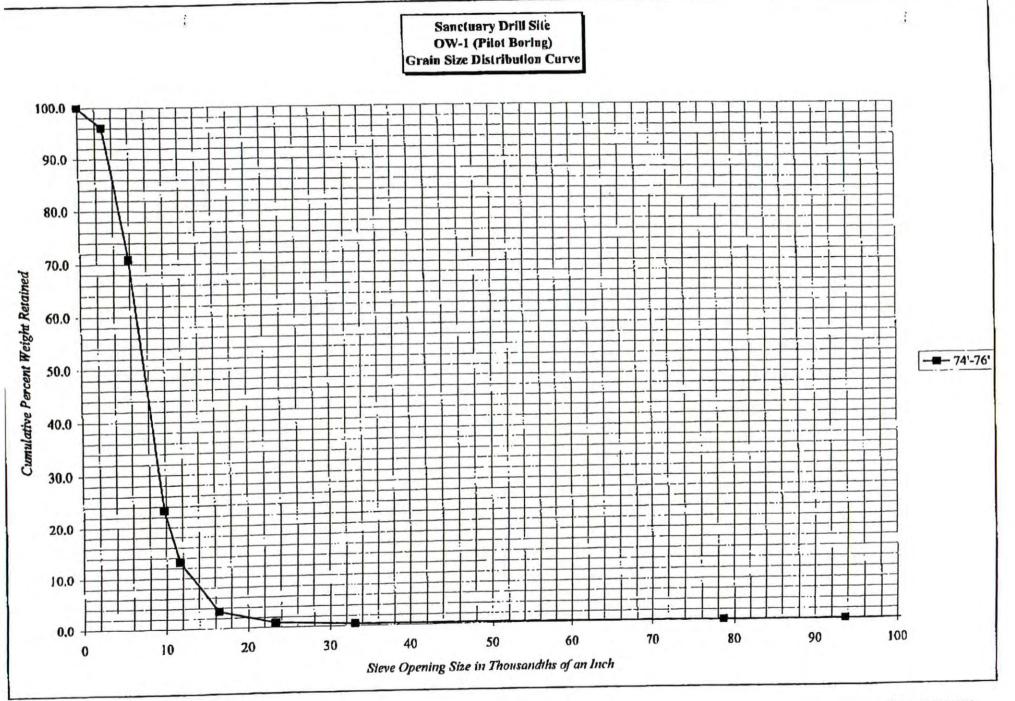
40 % Retained Size (Inches): 0.0095 70 % Retained Size (Inches): 0.0055

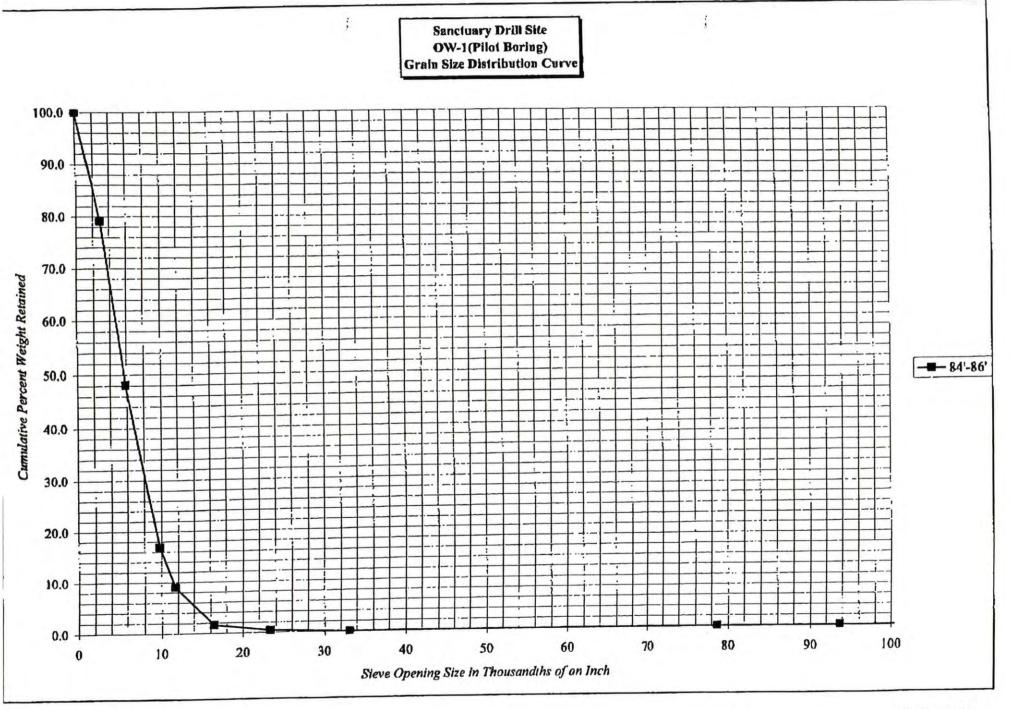


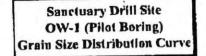


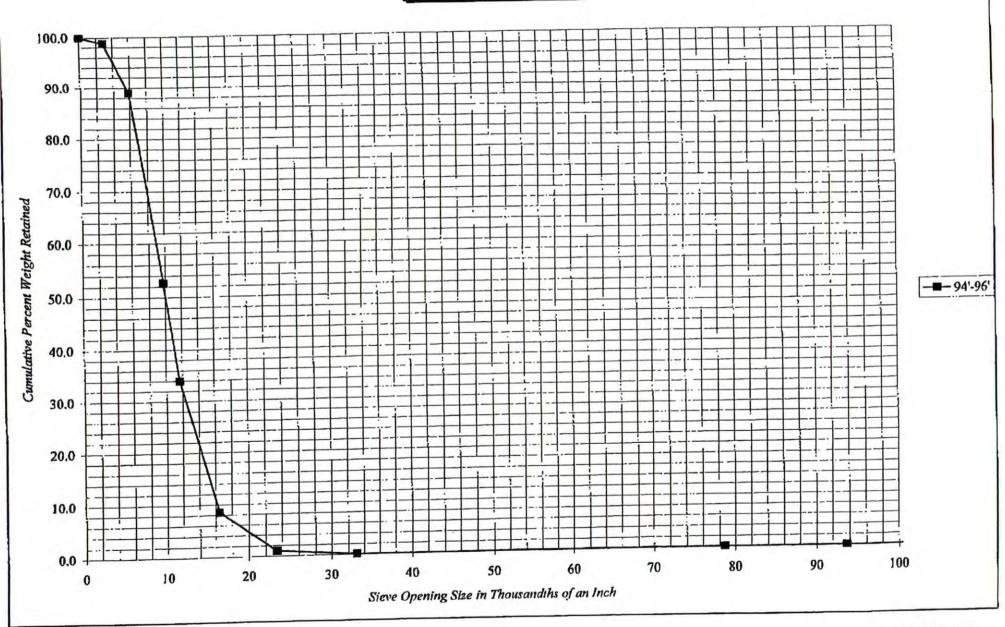


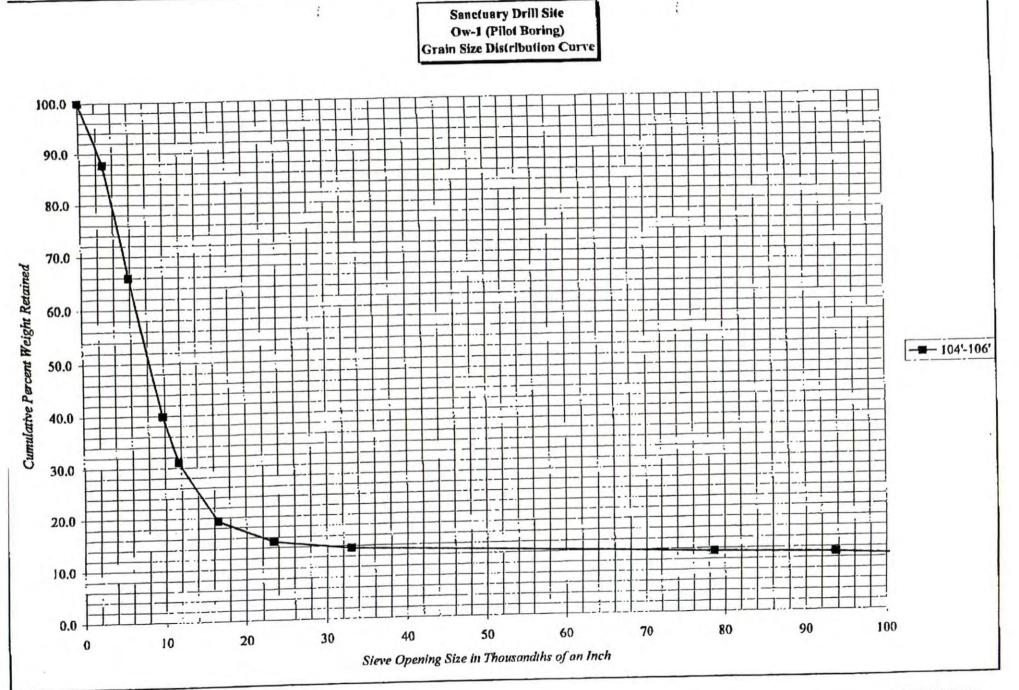










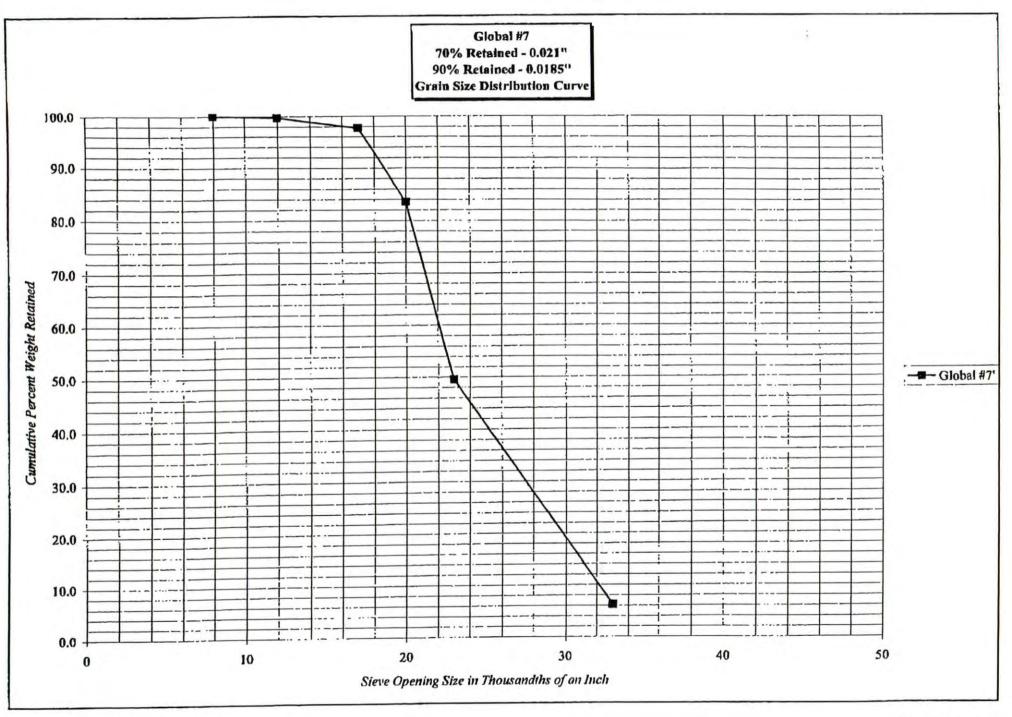


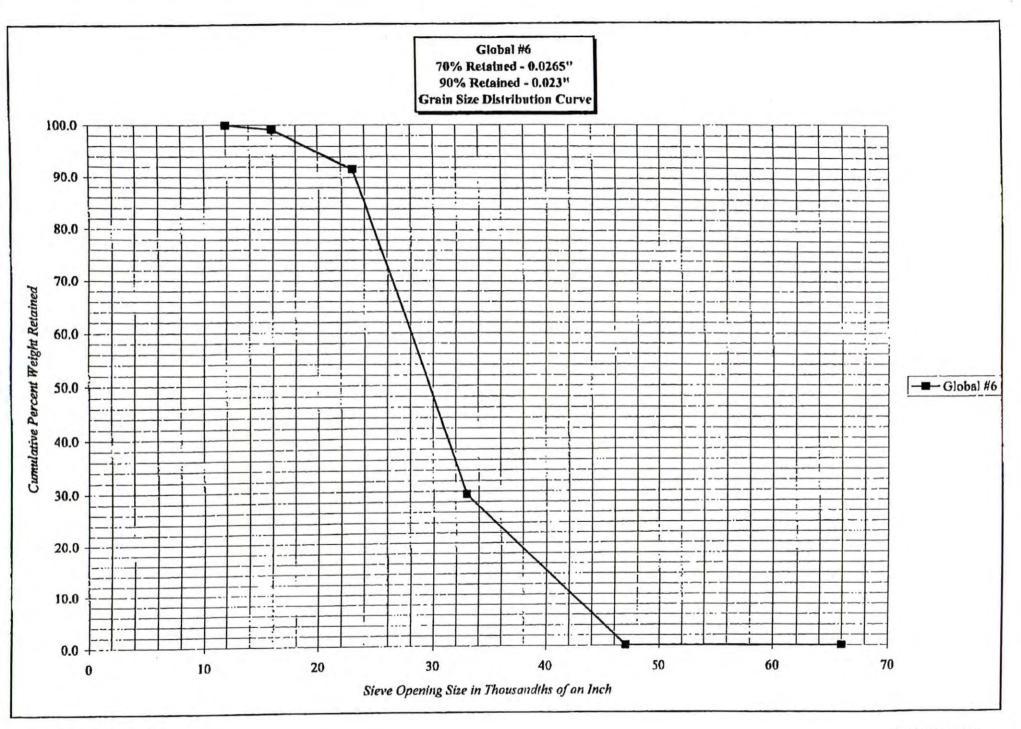
Sieve ASTM No.	Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
20	33	0.0	6.2
30	23	0.0	49.5
35	20	0.0	83.5
40	17	0.0	97.7
50	12	0.0	99.7
70	8	0.0	100.0

Effective Grain Size (Inches): 0.0185 Uniformity Coefficient: 1.4

ASTM 1000th No.		Cumulative Sample Weight (Grams)	Cumulative Percent Retained
12	66	0.0	0.0
16	47	0.0	0.1
20	33	0.0	29.4
30	23	0.0	91.6
40	16	0.0	99.1
50	12	0.0	99.9

Effective Grain Size (Inches): 0.023 Uniformity Coefficient: 1.3







## **Facsimile Cover Sheet**

To: Mr. Greg Foote

Company: Malcolm Pirnie Engineers, LLP

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

From: Mr. Larry L. Herron

Company: Stearns Drilling Phone: (616) 698-7770

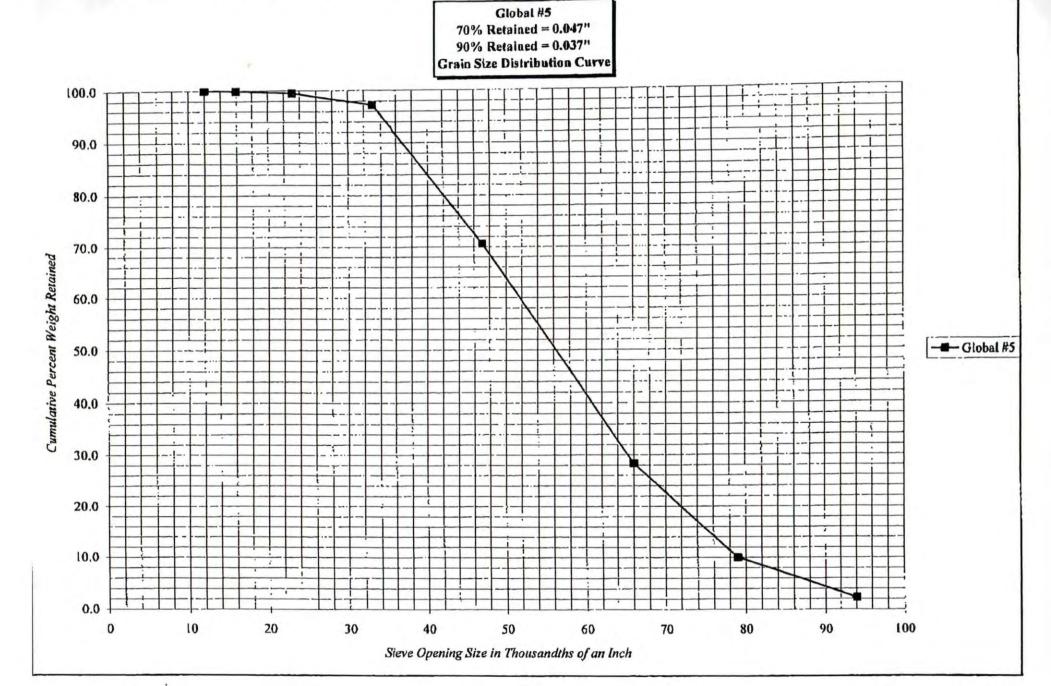
Fax: (616) 698-9886

E-Mail: Info@StearnsDrilling.com

Date: 07/20/00

Pages including this cover page: 3

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Sieve ASTM No.	Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
8	94	0.0	2.3
10	79	0.0	10.0
12	66	0.0	28.3
16	47	0.0	70.6
20	33	0.0	97.2
30	23	0.0	99.5
40	16	0.0	99.9
50	12	0.0	100.0

Effective Grain Size (Inches): 0.0365 Uniformity Coefficient: 1.7