MALCOLM PIRNIE

[redacted]

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

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

GEOLOGICAL SURVEY NO

WATER WELL AND PUMP RECORD

PERMIT NUMBER

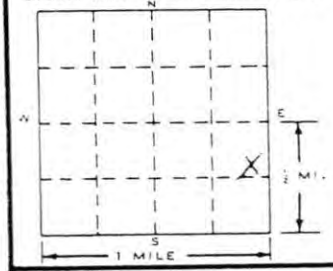
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	NE¼ NE¼ SE¼	16	18 N/S	8 E/W

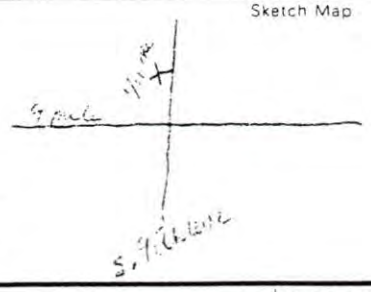
Distance And Direction From Road Intersection
Intersection of 9 Mile + 90th
1/4 North West side of rd.

Street Address & City of Well Location

Locate with "X" in Section Below



Sketch Map



3 OWNER OF WELL

Stan Forbes
Address 3 Mile Rd
Sears, Mi. 49679
Address Same As Well Location? ☐ Yes ☒ No

4 WELL DEPTH

115 FT.
Date Completed MO. 12 DAY 9 YEAR 91
☐ New Well ☒ Replacement Well

5

☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug
☒ Hollow rod ☐ Auger ☐ Jetted ☐ ____

6 USE

☒ Domestic ☐ Type I Public ☐ Type III Public
☐ Irrigation ☐ Type IIa Public ☐ Heat pump
☐ Test Well ☐ Type IIb Public ☐ ____

7 CASING

Diameter ☒ Steel ☒ Threaded ☐ Plastic ☐ Welded
2 in. to 111 ft. depth
____ in. to ____ ft. depth
Grouted Drill Hole Diameter
____ in. to ____ ft. depth
____ in. to ____ ft. depth

Height ~~Above~~/Below
Surface 4 ft.
Weight 3.75 lbs./ft.
Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	6	6
Sand + Gravel	100	106
Sand - water bearing	9	115

8 SCREEN

☐ Not Installed
Type Clayton Mark Diameter 1¼"
Slot/Gauge 80 Length 48"
Set between 111 ft. and 115 ft.
FITTINGS ☒ K-Packer ☐ Lead Packer ☒ Bremer Check
☐ Blank above screen ____ ft. Other ____

9 STATIC WATER LEVEL

96 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface

96 ft. after 1 hrs. pumping at 10 G.P.M.
____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION

☐ Pitless adapter ☐ 12" above grade
☐ 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 Septic Distance 50 ft. Direction NW
Well disinfected upon completion? ☒ Yes ☐ No
Was old well plugged? ☒ Yes ☐ No

14 PUMP

☐ Not Installed ☐ Pump Installation Only
Manufacturer's name F & W
Model number SW264H HP 1 Volts 230
Length of Drop Pipe 104 ft. capacity 6 G.P.M.
TYPE ☐ Submersible ☒ Jet ____
PRESSURE TANK
Manufacturer's name AMTROL
Model number WX202 Capacity 45 Gallons

RECEIVED
Mich. Dept. of Public Health
MAR 4 1992
BUREAU OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH-GWQS

USE A 2ND SHEET IF NEEDED

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.

Waldron Well Drlg 0935
REGISTERED BUSINESS NAME REGISTRATION NO.
Address Evart Mi 49631
Signed Warshael E Waldron Date 12/9/91
AUTHORIZED REPRESENTATIVE

17. Rig Operator's Name:

D67d 2/89

Well ID = 9

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a

GEOLOGICAL SURVEY NO

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PERMIT NUMBER

1 LOCATION OF WELL

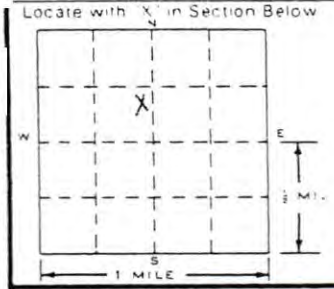
County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	NW¼ SE¼ NE¼	16	18 N/S	8 E/W

Distance And Direction From Road Intersection

9523 - 95th Avenue

Street Address & City of Well Location

Locate with "X" in Section Below



Sketch Map

3 OWNER OF WELL

Don Prichard

Address 9528 - 95th Ave.
Evart, Mi. 49631

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH:

142 FT.

Date Completed MO 6 DAY 14 YEAR 96

☒ New Well ☐ Replacement Well

5

☒ Cable tool ☒ Rotary ☐ Driven ☐ Dug
☐ Hollow rod ☐ Auger ☐ Jetted ☐ ____

6 USE

☐ Domestic ☐ Type I Public ☐ Type III Public
☐ Irrigation ☐ Type IIa Public ☐ Heat pump
☐ Test Well ☐ Type IIb Public ☐ ____

7 CASING

Diameter ☒ Steel ☒ Threaded ☐ Plastic ☐ Welded

4 in. to 137 ft. depth
____ in. to ____ ft. depth

Grouted Drill Hole Diameter
4 in. to 130 ft. depth
____ in. to ____ ft. depth

Height Above/Below Surface 1 ft

Weight ____ lbs./ft

Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay & Gravel	74	74
Gravel	12	86
Clay & Gravel	45	131
Sand	11	142

RECEIVED
Mich. Dept. of Public Health
SEP 13 1996
BUREAU OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH-GWDS

USE A 2ND SHEET IF NEEDED

8 SCREEN

☐ Not Installed

Type Howard Johnson Diameter 3½"

Slot/Gauge 10 Length 5'

Set between 137 ft. and 142 ft.

FITTINGS ☒ K-Packer ☐ Lead Packer ☐ Bremer Check

☒ Blank above screen 3 ft. Other ____

9 STATIC WATER LEVEL

65 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface

65 ft. after 2 hrs. pumping at 10 G.P.M.

____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION

☒ Pitless adapter ☐ 12" above grade
☐ Basement offset ☐ Approved pit

12 WELL GROUTED?

☐ No ☒ Yes From 0 to 130 ft.

☐ Neat cement ☒ Bentonite ☐ Other ____

No. of bags of cement 10 Additives ____

13 Nearest source of possible contamination

Type Septic Distance 60 ft. Direction NE

Well disinfected upon completion? ☒ Yes ☐ No

Was old well plugged? ☐ Yes ☐ No

14 PUMP

☐ Not Installed ☐ Pump Installation Only

Manufacturer's name Aermotor

Model number A-50 HP ½ Volts 230

Length of Drop Pipe 14 ft. capacity 10 G.P.M.

TYPE ☒ Submersible ☐ Jet

PRESSURE TANK

Manufacturer's name X-Trol

Model number 10V02 UG Capacity 42 Gallons

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

Kit Waldron Well Drilling 0907
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 10770 - 3 Mile Rd. - Evart, MI.

Signed K.F. Waldron Date 6/14/96
AUTHORIZED REPRESENTATIVE

17. Rig Operator's Name:

Gordon Bissett

D67d 2/89

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a

Well ID: 8

DEQ / MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION

WATER WELL AND PUMP RECORD

Completion is required under authority of Part 127 Act 368 PA 1978
Failure to comply is a misdemeanor

TAX NO: 67-12-16

PERMIT NO: 98- -0207

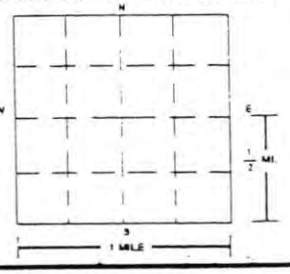
1. LOCATION OF WELL

County	Township Name	Fraction	Section No.	Town No.	Range No.
Osceola	Osceola	SE 1/4 SE1/4 SW1/4	16	18 N	8 W

Distance and Direction from Road Intersection

Street Address & City of Well Location: 95th Avenue

Locate with 'x' in Section Below — Sketch Map



3. OWNER OF WELL
Address: Michael Foster
9057 95th Avenue
Evart, MI. 49631
Address Same as Well Location ☐ Yes ☒ No

4. WELL DEPTH: 185 ft. | Date Completed 10/12/98 | ☒ New Well ☐ Replacement Well

5. ☐ Cable Tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow Roc ☐ 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 ☒ Plastic ☒ Welded ☐ Other ____
Height: Above/~~Below~~ Surface: 1 ft
Diameter: 5 in. to 180 ft. depth; 2 in. to 185 ft. depth
Weight: SDR 17 lbs./ft.
BORE HOLE: Diameter: 7 1/2 in. to 180 ft. depth; 2 in. to 185 ft. depth
☐ Drive Shoe ☐ Shale Packer

2. FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand: Gravel	30'	30'
Clay: Gravel	4'	34'
Sand: Gravel	98'	132'
Clay	8'	140'
Sand: Gravel	185'	

USE A 2ND SHEET IF NEEDED

8. SCREEN: ☐ Not Installed ☒ Gravel-Packed
Type Stainless Steel Diameter 2"
Slot/Gauze 10 Length: 5
Set Between 180 ft. and 185 ft.
FITTINGS: ☒ K-Packer ☐ Bremer Check
☒ Blank Above Screen 3 ft. Other ____

9. STATIC WATER LEVEL:
45 ft. Below Land Surface ☐ Flowing

10. PUMPING LEVEL: Below Land Surface
45 ft. After 1 hrs. Pumping at 10 G.P.M.
☐ Plunger ☐ Bailer ☒ Air ☒ Test Pump

11. WELL HEAD COMPLETION:
☒ Pitless Adapter ☐ 12" Above Grade ☐ Basement Offset ☐ Well House

12. WELL GROUTED? ☐ No ☒ Yes From 0 to 180 ft.
☐ Neat Cement ☒ Bentonite ☐ Other ____
No. of Bags 8 Additives ____

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type Septic Distance 50+ ft. Direction W
Type ____ Distance ____ ft. Direction ____

14. PUMP: ☐ Not Installed ☐ Pump Installation Only
Manufacturer's Name F.W
Model Number 4SDA07205 HP 3/4 Volts 220
Length of Drop Pipe 140 ft. Capacity 10 G.P.M.
TYPE: ☒ Submersible ☐ Jet ☐ Other ____
PRESSURE TANK:
Manufacturer's Name Well-Trol
Model Number HG 250 Capacity 11.6 Gallons 11.6

15. ABANDONED WELL PLUGGED? ☐ Yes ☐ No
Casing Diameter ____ in. Depth ____ ft.
PLUGGING MATERIAL: ☐ Neat Cement ☐ Bentonite Slurry ☐ Cement/Bentonite Slurry ☐ Concrete Grout ☐ Bentonite Chips
No. of Bags ____ Casing Removed? ☐ Yes ☐ No

16. REMARKS: (Elevation, Source of Data, etc.)

17. DRILLING MACHINE OPERATOR:
☒ Employee ☐ Subcontractor
Name Earl Cattle

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.
S.S. Water Wells 43-1747
REGISTERED BUSINESS NAME — REGISTRATION NO.
Address RR1 22C Chase, MI
Signed ____ AUTHORIZED REPRESENTATIVE Date 10/15/98

Well ID-7

EQP 2017 (12/96)

DEQ MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION

WATER WELL AND PUMP RECORD

Completion is required under authority of Part 127 Act 368 PA 1978
Failure to comply is a misdemeanor

TAX NO: 67-12-016-012-10

PERMIT NO: '98- -0089

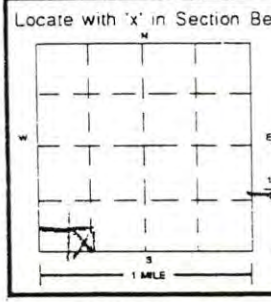
1. LOCATION OF WELL

County	Township Name	Fraction	Section No.	Town No.	Range No.
Osceola	Osceola	SE 1/4 SW 1/4 SW 1/4	16	18 N	8 W

Distance and Direction from Road Intersection: 3/4 Mile west of Osceola Twp Hall on the North side of 9 Mile Rd

Street Address & City of Well Location: 9 Mile Road

Locate with 'x' in Section Below



Sketch Map

3. OWNER OF WELL
Address: Kevin Beggs
7595 80th Avenue
Evart, MI. 49631
Address Same as Well Location ☐ Yes ☒ No

4. WELL DEPTH: 116 ft. Date Completed 4 20 98 ☒ New Well ☐ 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 ☐ _____

7. CASING: ☐ Steel ☐ Threaded ☒ Plastic ☐ Welded ☐ Other _____
Diameter: 5 in. to 109 ft. depth
_____ in. to _____ ft. depth
BORE HOLE: Diameter: 8 in. to 116 ft. depth
_____ in. to _____ ft. depth
Height: Above/Below Surface: 1.5 ft
Weight: _____ lbs./ft.
☐ Drive Shoe ☐ Shale Packer

2. FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Dk Brown loamy sand	3	3
Tan sandy clay	13	16
Tan coarse sand F-M stone Gravelly	60	76
Tan sandy clay F-2 stone	28	104
Tan F-C Sand	12	116

USE A 2ND SHEET IF NEEDED

8. SCREEN: ☐ Not Installed ☐ Gravel-Packed
Type Stainless Diameter 4 in
Slot/Gauze 20 Length: 4 ft
Set Between 110 ft. and 114 ft.
FITTINGS: ☒ K-Packer ☐ Bremer Check
☒ Blank Above Screen 2 ft. Other 2 ft sump

9. STATIC WATER LEVEL: 70 ft. Below Land Surface ☐ Flowing

10. PUMPING LEVEL: Below Land Surface
_____ ft. After _____ hrs. Pumping at _____ G.P.M.
☐ Plunger ☐ Bailer ☐ Air ☐ Test Pump

11. WELL HEAD COMPLETION:
☒ Pitless Adapter ☐ 12" Above Grade
☐ Basement Offset ☐ Well House

12. WELL GROUTED? ☐ No ☐ Yes From 5 to 100 ft.
☐ Neat Cement ☒ Bentonite ☐ Other _____
No. of Bags 10 Additives _____

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type Septic Distance 130 ft. Direction West
Type _____ Distance _____ ft. Direction _____

14. PUMP: ☐ Not Installed ☐ Pump Installation Only
Manufacturer's Name Jet Jacket
Model Number [illegible] 18 HP 1 Volts 230
Length of Drop Pipe 100 ft. Capacity 13 G.P.M.
TYPE: ☒ Submersible ☐ Jet ☐ Other _____
PRESSURE TANK:
Manufacturer's Name None / Home owned
Model Number _____ Capacity _____ Gallons _____

15. ABANDONED WELL PLUGGED? ☐ Yes ☐ No
Casing Diameter _____ in. Depth _____ ft.
PLUGGING MATERIAL: ☐ Neat Cement ☐ Bentonite Slurry ☐ Cement/Bentonite Slurry ☐ Concrete Grout ☐ Bentonite Chips
No. of Bags _____ Casing Removed? ☐ Yes ☐ No

16. REMARKS: (Elevation, Source of Data, etc.)

17. DRILLING MACHINE OPERATOR:
☒ Employee ☐ Subcontractor
Name Barry RobeAson

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.
Robe Ason well Drilling #2108
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 14455 185th Av. Luther MI 49656
Signed Barry RobeAson AUTHORIZED REPRESENTATIVE Date 4/20/98

Well ID = 4

EOP 2017 (12/96)

GEOLOGICAL SURVEY SAMPLE No.

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County: Osceola — Twp: Osceola — Fraction: SE¼ SE ¼ SW¼ — Section No.: 16 — Town: 18 N/S. — Range: 8 E/W.

Distance And Direction from Road Intersections

OWNER No.

3 OWNER OF WELL: Harold Lockwood

Address: Evart Mich R#

Street address & City of Well Location

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM

4 WELL DEPTH: (completed) ft. Date of Completion

5 [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ] ___

6 USE: [X] Domestic [ ] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ] ___

7 CASING: Threaded [ ] Welded [ ] Height: Above/Below surface ___ ft.

Diam. 7 in. to ___ ft. Depth Weight ___ lbs/ft.

___ in. to ___ ft. Depth Drive Shoe? Yes [ ] No [ ]

8 SCREEN:

Type: ___ Dia.: ___

Slot/Gauze ___ 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 ___ g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) ___ Chlorides (Cl) ___

Hardness ___

12 WELL HEAD COMPLETION: [ ] In Approved Pit [ ] Pitless Adapter [ ] 12'' Above Grade

13 GROUTING:

Well Grouted? [ ] Yes [ ] No

Material: [ ] Neat Cement [ ] ___

Depth: From ___ ft. to ___ ft.

14 SANITARY:

Nearest Source of possible contamination

___ feet ___ Direction ___ Type

Well disinfected upon completion [ ] Yes [ ] No

15 PUMP:

Manufacturer's Name ___

Model Number ___ HP ___

Length of Drop Pipe ___ ft. capacity ___ G.P.M.

Type: [ ] Submersible [ ] ___ [ ] Jet [ ] Reciprocating

16 Remarks, elevation, source of data, etc.

17 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.

John B. Moore — REGISTERED BUSINESS NAME

0866 ~~002955~~ — REGISTRATION NO.

Address: Evart Mich R#2 49631

Signed ___ AUTHORIZED REPRESENTATIVE Date: Aug 19 1968

D670 100M 6-66 11 10-4

GEOLOGICAL SURVEY NO

MICHIGAN DEPARTMENT OF PUBLIC HEALTH
WATER WELL AND PUMP RECORD
PART 127 ACT 368 P.A. 1978

PERMIT NUMBER

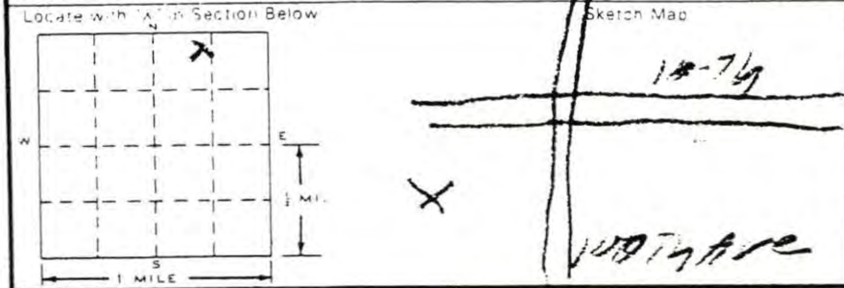
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OSCEOLA	OSCEOLA	NE¼ NE¼ NE¼	17	15 N	8 W

Distance And Direction From Road Intersection: 100TH + 10TH Ave, TAKE 10TH WEST FROM. Well on South side of Rd

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map



3 OWNER OF WELL Bill Hardy

Address R# Evart, Mich

Address Same As Well Location? [✓] Yes [ ] No

4 WELL DEPTH (completed) 102 ft. Date of Completion 8-5-82

5 [ ] Cable tool [✓] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Auger [ ] Jetted

6 USE [✓] Domestic [ ] Type I Public [ ] Type II Public [ ] Irrigation [ ] Type IIa Public [ ] Heat pump [ ] Test Well [ ] Type IIb Public [ ]

7 CASING Diameter [✓] Steel [✓] Threaded [ ] Plastic [ ] Welded

2 in. to 98 ft. depth

____ in. to ____ ft. depth

Height: Above/Below Surface 1 ft.

Weight 3.25 lbs. ft.

Grouted Drill Hole Diameter ____ in. to ____ ft. depth ____ in. to ____ ft. depth

Drive Shoe [✓] Yes [ ] No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand + Clay Red	17'	17'
Sand Yellow	23'	40'
Sand + Clay Red	10'	50'
Gravel	25'	75'
Sand Yellow	20'	95'
Sand White	7'	102'

USE A 2ND SHEET IF NEEDED

8 SCREEN [ ] Not Installed

Type JOHNSON Diameter 1½" Slot/Gauge 7 Length 4' Set between 98 ft. and 102 ft.

FITTINGS [✓] K-Packer [ ] Lead Packer [✓] Bremer Check [✓] Blank above screen 18" Other

9 STATIC WATER LEVEL 78 ft. below land surface [ ] Flow

10 PUMPING LEVEL below land surface

90 ft. after 1 hrs. pumping at 11 G.P.M.

____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION [ ] Pitless adapter [✓] 12" above grade [ ] 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 SEPTIC Distance NOT w/IN Direction ____

Well disinfected upon completion? [✓] Yes [ ] No

14 PUMP [✓] Not installed [ ] Pump Installation Only

Manufacturer's name ____

Model number ____ HP ____ Volts ____

Length of Drop Pipe ____ ft. capacity ____ G.P.M.

TYPE [ ] Submersible [ ] Jet ____

PRESSURE TANK

Manufacturer's name ____

Model number ____ Capacity ____ Gallons

RECEIVED

15 Remarks, elevation, source of data, etc.

90' 1" Drop Pipe

ADDED INFO BY DRILLER, ITEM NO.

CORRECTED BY

LOCATION BY

ELEVATION

DEPTH TO ROCK

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.

Sorensons — REGISTERED BUSINESS NAME — 1040 REGISTRATION NO.

Address R#1 Sears Mich

Signed Robt. Boerema — AUTHORIZED REPRESENTATIVE — Date 8-5-82

D67d Rev. 10 90

Well ID = 7

DEQ MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION

WATER WELL AND PUMP RECORD

Completion is required under authority of Part 127 Act 368 PA 1978
Failure to comply is a misdemeanor

TAX NO: 67-12-019-004-00

PERMIT NO: 98-04-0086

1. LOCATION OF WELL

County	Township Name	Fraction	Section No.	Town No.	Range No.
Osceola	Osceola	1/4 1/4 1/4	19	T13N	R8W

Distance and Direction from Road Intersection: 9 mi rd. west to 110th, 2 track N. of 110th

Street Address & City of Well Location: 9 Mile Road

Locate with 'x' in Section Below — Sketch Map

3. OWNER OF WELL: Pete Gruszecki
Address: 3785 Willow Drive, Grand Rapids, MI. 49525
Address Same as Well Location ☐ Yes ☒ No

4. WELL DEPTH: 80 ft. Date Completed: 7/16/98 ☒ New Well ☐ 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 ☐ ______

7. CASING: ☐ Steel ☐ Threaded ☒ Plastic ☐ Welded ☐ Other ______
Height: Above/Below Surface: ____ ft
Diameter: 5 in. to 70 ft. depth; ____ in. to ____ ft. depth
Weight: ______ lbs./ft.
BORE HOLE Diameter: 8 1/2 in. to 80 ft. depth; ____ in. to ____ ft. depth
☐ Drive Shoe ☐ Shale Packer

2. FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand		
Sand	30	30
Clay	40	70
Gravel	10	80
New House		

USE A 2ND SHEET IF NEEDED

8. SCREEN: ☐ Not Installed ☒ Gravel-Packed
Type: Saw slot Diameter: 5
Slot/Gauze: 15 Length: 10
Set Between ______ ft. and ______ ft.
FITTINGS: ☐ K-Packer ☐ Bremer Check ☐ Blank Above Screen ____ ft. Other: Glue

9. STATIC WATER LEVEL: 40 ft. Below Land Surface ☐ Flowing

10. PUMPING LEVEL: Below Land Surface 80 ft. After 1 hrs. Pumping at 8 G.P.M.
☐ Plunger ☐ Bailer ☒ Air ☐ Test Pump

11. WELL HEAD COMPLETION: ☒ Pitless Adapter ☐ 12" Above Grade ☐ Basement Offset ☐ Well House

12. WELL GROUTED? ☐ No ☒ Yes From 0 to 70 ft.
☒ Neat Cement ☒ Bentonite ☐ Other ______
No. of Bags: 4 Additives: Water

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type: Septic Distance: 6 ft. Direction: 75
Type ______ Distance ______ ft. Direction ______

14. PUMP: ☐ Not Installed ☐ Pump Installation Only
Manufacturer's Name: Sta rite
Model Number ______ HP 1/2 Volts 220
Length of Drop Pipe 65 ft. Capacity 10 G.P.M.
TYPE: ☒ Submersible ☐ Jet ☐ Other ______
PRESSURE TANK: Manufacturer's Name: Well-X Trol
Model Number: 202 Capacity 42 Gallons

15. ABANDONED WELL PLUGGED? ☐ Yes ☐ No
Casing Diameter ______ in. Depth ______ ft.
PLUGGING MATERIAL: ☐ Neat Cement ☐ Bentonite Slurry ☐ Cement/Bentonite Slurry ☐ Concrete Grout ☐ Bentonite Chips
No. of Bags ______ Casing Removed? ☐ Yes ☐ No

16. REMARKS: (Elevation, Source of Data, etc.)

17. DRILLING MACHINE OPERATOR: ☐ Employee ☐ Subcontractor
Name: Jim [illegible]

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: Wel-Drill & Pump REGISTRATION NO.: 78-1804
Address: 11337 [illegible], [illegible] 49646
Signed: [signature] AUTHORIZED REPRESENTATIVE Date: 7-26-98

WELL ID = 25

EQP 2017 (12/96)

GEOLOGICAL SURVEY SAMPLE No.

FEB 22 1980

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	NE ¼ NE ¼ NE ¼	19	18 N/S.	8 E/W.

Distance And Direction from Road Intersections: 5 E Corner of Grade & 110th AVE

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:

3 OWNER OF WELL: Fred Dillon
Address: 1210 Marcelle Ct, Rochester, Mi 48063

4 WELL DEPTH: (completed) 102 ft. Date of Completion 9-11-79

5 Cable tool [ ] Rotary [X] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ]

6 USE: Domestic [X] Public Supply [ ] Industry [ ] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

7 CASING: Threaded [X] Welded [ ] Height: Above Surface 1 ft.
Diam. 2 in. to 98 ft. Depth; ___ in. to ___ ft. Depth. Weight 3.75 lbs./ft. Drive Shoe? Yes [X] No [ ]

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	8'	8'
Clay	15'	23'
Sand	15'	38'
Clay	22'	60'
Sand-fine-water	12'	72'
Clay	15'	87'
Sand & Clay	10'	97'
Sand waterbearing	5'	102'

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type Clayton Mark Dia.: 1¼" Slot/Gauze 60 Length 48" Set between 98 ft. and 102 ft. Fittings:

9 STATIC WATER LEVEL 40 ft. below land surface

10 PUMPING LEVEL below land surface 40 ft. after 1 hrs. pumping 10 g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: In Approved Pit [ ] Pitless Adapter [ ] 12" Above Grade [X]

13 Well Grouted? Yes [ ] No [ ] Neat Cement [ ] Bentonite [ ] Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination 60 feet NS Direction Septic Type
Well disinfected upon completion [X] Yes [ ] No

15 PUMP: [X] Not installed
Manufacturer's Name ___ Model Number ___ HP ___ Volts ___ Length of Drop Pipe ___ ft. capacity ___ G.P.M. Type: Submersible [ ] Jet [ ] Reciprocating [ ]

16 Remarks, elevation, source of data, etc.
ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY ST
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 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.
Walldon Well Drilling — REGISTERED BUSINESS NAME; 0935 — REGISTRATION NO.
Address Evart, Mi 49631
Signed M. E. Walldon (AUTHORIZED REPRESENTATIVE) Date 9-11-79

D67d 100M (Rev. 12-68)

WELL ID = 24

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY NO. [ ]

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PERMIT NUMBER

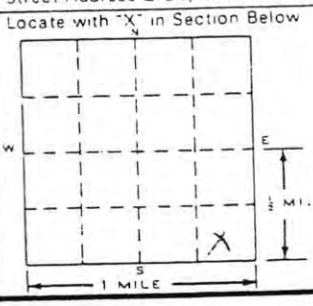
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	SE 1/4 SE 1/4 SE 1/4	20	18 N/S	8 E/W

Distance And Direction From Road Intersection: West off 100th on 8 mile Rd on Northside

Street Address & City of Well Location

Locate with "X" in Section Below



Sketch Map

3 OWNER OF WELL: ENOCH Olson

Address: 8 mile Rd Evart Mich.

Address Same As Well Location? [x] Yes [ ] No

4 WELL DEPTH: 127 FT. Date Completed MO. 9 DAY 23 YEAR 89 [x] New Well [ ] Replacement Well

5 [x] Cable tool [x] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Auger [ ] Jetted [ ] ____

6 USE: [x] Domestic [ ] Type I Public [ ] Type III Public [ ] Irrigation [ ] Type IIa Public [ ] Heat pump [ ] Test Well [ ] Type IIb Public [ ] ____

7 CASING: Diameter [x] Steel [x] Threaded [ ] Plastic [ ] Welded

4 in. to 122 ft. depth

____ in. to ____ ft. depth

Height: Above/~~Below~~ Surface 1 ft.

Weight 11 lbs./ft.

Grouted Drill Hole Diameter ____ in. to ____ ft. depth ____ in. to ____ ft. depth

Drive Shoe [x] Yes [ ] No

2

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	10	10
Sand + Clay	90	100
Clay	10	110
Water Sand	17	127

USE A 2ND SHEET IF NEEDED

8 SCREEN: [ ] Not Installed

Type Howard Smith Diameter 3 3/8"

Slot/~~Gauze~~ 10 Length 5'

Set between 122 ft. and 127 ft.

FITTINGS: [x] K-Packer [ ] Lead Packer [ ] Bremer Check

[ ] Blank above screen 3 ft. Other ____

9 STATIC WATER LEVEL: ____ ft. below land surface [ ] Flow

10 PUMPING LEVEL: below land surface

____ ft. after ____ hrs. pumping at ____ G.P.M.

____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION: [ ] Pitless adapter [ ] 12" above grade [ ] Basement offset [ ] Approved pit

12 WELL GROUTED? [x] No [ ] Yes From ____ to ____ ft.

[ ] Neat cement [ ] Bentonite [ ] Other ____

No. of bags of cement ____ Additives ____

13 Nearest source of possible contamination

Type Septic Distance 50 ft. Direction SW

Well disinfected upon completion? [x] Yes [ ] No

Was old well plugged? [ ] Yes [ ] No

14 PUMP: [ ] Not Installed [ ] Pump Installation Only

Manufacturer's name Aermotor

Model number A-75 HP 3/4 Volts 230

Length of Drop Pipe 117 ft. capacity 12 G.P.M.

TYPE: [x] Submersible [ ] Jet ____

PRESSURE TANK: Manufacturer's name X-Trol

Model number 1X203 Capacity 20 Gallons

RECEIVED Mich. Dept. of Public Health JAN 3 1990 BUREAU OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH-GWQ

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.

Waldron Well Drilling 0707

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address Evart Mich

Signed Kit Waldron Date 9/25/89

AUTHORIZED REPRESENTATIVE

17. Rig Operator's Name: Brent Waldron

D67d 12/85

Well ID = 22

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a

GEOLOGICAL SURVEY NO

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

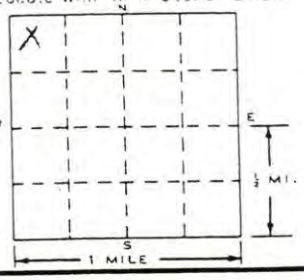
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	NW 1/4 NW 1/4 NW 1/4	20	18 N/S	8 E/W

Distance And Direction From Road Intersection
S.E Corner of 9 mile + 110th Ave

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map



3 OWNER OF WELL

Bob Stipek
19884 Cenita
Harbor Woods, MI 49755

Address

Address Same As Well Location? ☐ Yes ☒ No

4 WELL DEPTH (completed)

75 ft

Date of Completion: 6-15-87

5

☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug
☐ Hollow rod ☐ Auger ☐ Jetted ☐ ____

6 USE

☒ Domestic ☐ Type I Public ☐ Type III Public
☐ Irrigation ☐ Type IIa Public ☐ Heat pump
☐ Test Well ☐ Type IIb Public ☐ ____

7 CASING

Diameter ☒ Steel ☒ Threaded
☐ Plastic ☐ Welded
2 in. to 71 ft. depth
____ in. to ____ ft. depth

Grouted Drill Hole Diameter
____ in. to ____ ft. depth
____ in. to ____ ft. depth

Height ~~Above~~/Below
Surface 4 ft
Weight 375 lbs./ft.

Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	6'	6'
Clay	40'	46'
Sand + gravel	20'	66'
Sand, white, waterbearing	9'	75'

USE A 2ND SHEET IF NEEDED

8 SCREEN

☐ Not Installed

Type #244 S.S. Diameter 1¼"
Slot/Gauze Float Length 48"
Set between ____ ft. and ____ ft.
FITTINGS ☒ K Packer ☐ Lead Packer ☒ Bremer Check
☐ Blank above screen ____ ft. Other ____

9 STATIC WATER LEVEL

20 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface

20 ft. after 1 hrs. pumping at 10 G.P.M.
____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION

☐ Pitless adapter ☐ 12" above grade
☐ 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 septic Distance 5 ft. Direction 70
Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP

☐ Not Installed ☐ Pump Installation Only
Manufacturer's name F+W
Model number CPJ05 HP ½ Volts ____
Length of Drop Pipe 55 ft. capacity 8-10 G.P.M.
TYPE ☐ Submersible ☒ Jet ____
PRESSURE TANK
Manufacturer's name Aqua Aire
Model number ____ Capacity 42 Gallons

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

Warden Well Drilling - 0931
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address Evart MI 49631

Signed Bruce Warden Date 6-15-87
AUTHORIZED REPRESENTATIVE

D67a (Rev 10-80)

Well ID = 23

TAX NO:

MICHIGAN DEPARTMENT OF PUBLIC HEALTH
WATER WELL AND PUMP RECORD

PERMIT NO:

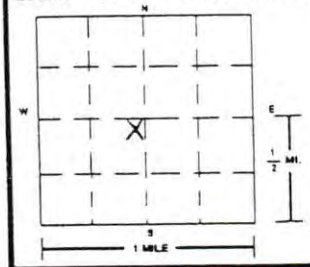
1. LOCATION OF WELL

County	Township Name	Fraction	Section No.	Town No.	Range No.
Osceola	Osceola	SW 1/4 NE 1/4 NE 1/4	21	18N	8W

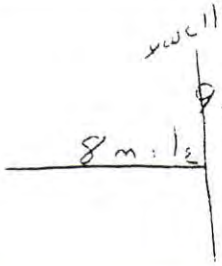
Distance and Direction from Road Intersection: 3/8 mile North of 8 mile on 95th Ave on West side

Street Address & City of Well Location

Locate with 'x' in Section Below



Sketch Map



3. OWNER OF WELL
Address: Spring Hill Camp
4859 South 95th Avenue
Evart, Mi. 49631
Address Same as Well Location ☐ Yes ☒ No

4. WELL DEPTH: 54 ft. | Date Completed: 12/6/96 | ☐ New Well ☒ 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 ☐ _____

7. CASING: ☒ Steel ☒ Threaded ☐ Plastic ☐ Welded ☐ Other _____
Diameter: 4 in. to 50 ft. depth
_____ in. to _____ ft. depth
BORE HOLE:
Diameter: 7 in. to 45 ft. depth
_____ in. to _____ ft. depth
Height: Above/Below Surface: 1 ft
Weight: 11 lbs./ft.
☒ Drive Shoe ☐ Shale Packer

2. FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand & Gravel	40	40
Clay	5	45
Sand	9	54

USE A 2ND SHEET IF NEEDED

8. SCREEN: ☐ Not Installed ☐ Gravel-Packed
Type Johnson Diameter 3 1/2"
Slot/Gauze 10 Length: 4
Set Between 50 ft. and 54 ft.
FITTINGS: ☒ K-Packer ☐ Bremer Check
☐ Blank Above Screen 2 ft. Other _____

9. STATIC WATER LEVEL:
30 ft. Below Land Surface ☐ Flowing

10. PUMPING LEVEL: Below Land Surface
35 ft. After 2 hrs. Pumping at 12 G.P.M.
☐ Plunger ☐ Bailer ☐ Air ☒ Test Pump

11. WELL HEAD COMPLETION:
☒ Pitless Adapter ☐ 12" Above Grade
☐ Basement Offset ☐ Well House

12. WELL GROUTED? ☐ No ☒ Yes From 0 to 45 ft.
☐ Neat Cement ☐ Bentonite ☐ Other _____
No. of Bags 3 Additives _____

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type Septic Distance 50 ft. Direction SE
Type _____ Distance _____ ft. Direction _____

14. PUMP: ☐ Not Installed ☐ Pump Installation Only
Manufacturer's Name Aermotor
Model Number A-12 HP 1/2 Volts 230
Length of Drop Pipe 42 ft. Capacity 12 G.P.M.
TYPE: ☐ Submersible ☐ Jet ☐ Other _____
PRESSURE TANK:
Manufacturer's Name X-Trol
Model Number LOX 202 Capacity 42 Gallons

15. ABANDONED WELL PLUGGED? ☐ Yes ☒ No
Casing Diameter _____ in. Depth _____ ft.
PLUGGING MATERIAL: ☐ Neat Cement ☐ Bentonite Slurry ☐ Cement/Bentonite Slurry ☐ Concrete Grout ☐ Bentonite Chips
No. of Bags _____ Casing Removed? ☐ Yes ☐ No

16. REMARKS: (Elevation, Source of Data, etc.)

17. DRILLING MACHINE OPERATOR:
☒ Employee ☐ Subcontractor
Name Gordon Bissett

15. 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.
Waldron Drilling 0907
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 8 mile Rd Evart 49631
Signed Kit Waldron Date 12/16/96
AUTHORIZED REPRESENTATIVE

GW-2-228 9/93

Well ID = 14

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a misdemeanor.

GEOLOGICAL SURVEY NO

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P A 1978

PERMIT NUMBER

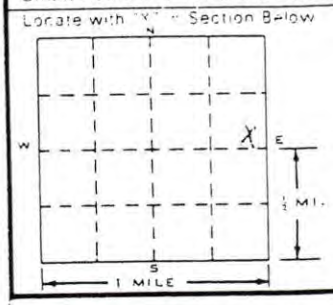
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	SE¼ NE¼ NE¼	21	18 N/S	8 E/W

Distance And Direction From Road Intersection: 1/8 mile S of 9 Mile Rd on 95th Ave

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map



3 OWNER OF WELL

Darwin Damore

Address: R R 3 - 95th Ave, Evart Mi 49631

Address Same As Well Location? [X] Yes [ ] No

4 WELL DEPTH (completed)

80 ft

Date of Completion: 9-17-85

5

[ ] Cable tool [X] Rotary [ ] Driven [ ] Dug
[ ] Hollow rod [ ] Auger [ ] Jetted [ ]

6 USE

[X] Domestic [ ] Type I Public [ ] Type II Public
[ ] Irrigation [ ] Type IIa Public [ ] Heat pump
[ ] Test Well [ ] Type IIb Public [ ]

7 CASING

Diameter [X] Steel [ ] Stainless [ ] Threaded
[ ] Plastic [ ] Welded

2 in to 76 ft. depth

in to ft. depth

Grouted Drill Hole Diameter

in to ft. depth

in to ft. depth

Height Above/Below: Surface 4 ft

Weight 375 lbs /ft

Drive Shoe [X] Yes [ ] No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	16'	16'
Sand + gravel	44'	60'
Sand + Clay	10'	70'
Sand + Gravel water bearing	10'	80'

USE A 2ND SHEET IF NEEDED.

8 SCREEN

[ ] Not Installed

Type Clayton-mack Diameter 1¼"

Slot Gauze 80 Length 48"

Set between 76 ft and 80 ft

FITTINGS [X] K-Packer [ ] Lead Packer [X] Bremer Check

[ ] Blank above screen ft Other

9 STATIC WATER LEVEL

60 ft below land surface [ ] Flow

10 PUMPING LEVEL below land surface

60 ft after 1 hrs pumping at 10 G P M

ft after hrs pumping at G P M

11 WELL HEAD COMPLETION

[ ] Pitless adapter [ ] 12" above grade
[ ] Basement offset [X] 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 Septic Distance 70 ft Direction S.W

Well disinfected upon completion? [X] Yes [ ] No

14 PUMP

[ ] Not installed [ ] Pump Installation Only

Manufacturer's name Sears

Model number HP 3/4 Volts

Length of Drop Pipe 68 ft capacity 7 G P M

TYPE [ ] Submersible [X] Jet

PRESSURE TANK

Manufacturer's name Aqua-Air

Model number V-60 Capacity 42 Gallons

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.

Waldron Well Drilling -09

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address Evart Mi 49631

Signed Donald Waldron Date 9-17-85

AUTHORIZED REPRESENTATIVE

D67a (Rev 10-80)

WELL ID = 19

GEOLOGICAL SURVEY NO. [ ]

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PERMIT NUMBER [ ][ ][ ][ ][ ][ ][ ][ ][ ]

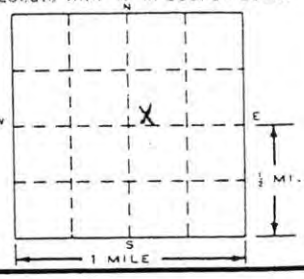
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	NE¼ SW¼ SW¼	21	18 N/S	8 E/W

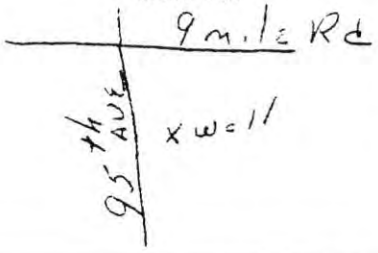
Distance And Direction From Road Intersection: South of 9 mile Rd on 95th Ave ½ mile on East side

Street Address & City of Well Location

Locate with "X" in Section Below



Sketch Map



3 OWNER OF WELL

Address: Gary Gilders, Evart, Mi. 49631

Address Same As Well Location? ☐ Yes ☒ No

4 WELL DEPTH

110 FT. | Date Completed MO 7 DAY 14 YEAR 92 | ☑ New Well ☐ Replacement Well

5

☑ Cable tool ☑ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ ____

6 USE

☑ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐ ____

7 CASING

Diameter: ☑ Steel ☑ Threaded ☐ Plastic ☐ Welded

4 in. to 105 ft. depth

____ in. to ____ ft. depth

Grouted Drill Hole Diameter

____ in. to ____ ft. depth

____ in. to ____ ft. depth

Height Above/Below Surface 1 ft.

Weight 11 lbs./ft.

Drive Shoe ☑ Yes ☐ No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	40	40
Clay & Sand	45	85
Water Sand	25	110

USE A 2ND SHEET IF NEEDED

8 SCREEN

☐ Not Installed

Type Howard Smith Diameter 3½"

Slot/Gauge 10 Length 5'

Set between 105 ft. and 110 ft.

FITTINGS ☑ K-Packer ☐ Lead Packer ☐ Bremer Check

☐ Blank above screen 3 ft. Other ____

9 STATIC WATER LEVEL

40 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface

60 ft. after 10 hrs. pumping at 20 G.P.M.

____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION

☑ Pitless adapter ☐ 12" above grade ☐ 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 None Distance ____ ft. Direction ____

Well disinfected upon completion? ☐ Yes ☐ No

Was old well plugged? ☐ Yes ☐ No

14 PUMP

☐ Not Installed ☐ Pump Installation Only

Manufacturer's name Berkley Pump

Model number A-100 HP 1 Volts 230

Length of Drop Pipe 81 ft. capacity ____ G.P.M.

TYPE ☑ Submersible ☐ Jet ____

PRESSURE TANK

Manufacturer's name ____

Model number ____ Capacity ____ Gallons

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.

Waldron Well Drilling 0707
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 8 mile Rd Evart 49631

Signed Kit Waldron AUTHORIZED REPRESENTATIVE Date 7/14/92

17. Rig Operator's Name

Kit Waldron

D67d 2/89

Well ID = 16

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a

GEOLOGICAL SURVEY NO

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

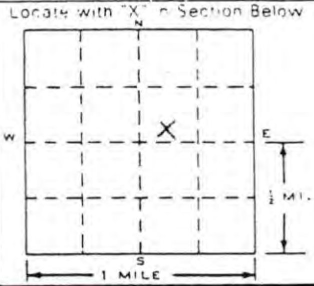
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	SW¼ SW¼ NE¼	21	18 N/S	8 E/W

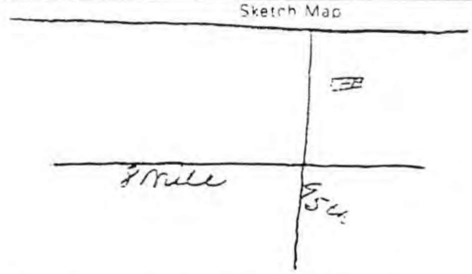
Distance And Direction From Road Intersection: 1/2 mi n. of 8 mi on 95th - E. side RD Cometery Well -

Street Address & City of Well Location:

Locate with "X" in Section Below



Sketch Map



3 OWNER OF WELL

Osceola Township

Address: c/o Darwin Booker, Avondale Rd, Evart Mi 49631

Address Same As Well Location? ☐ Yes ☒ No

4 WELL DEPTH (completed)

54 ft. Date of Completion: 6-7-82

5

☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ ____

6 USE

☐ Domestic ☐ Type I Public ☐ Type III Public ☒ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐ ____

7 CASING

Diameter: ☐ Steel ☒ Threaded ☐ Plastic ☐ Welded

2 in. to 50 ft. depth

____ in. to ____ ft. depth

Height Above/~~Below~~ Surface 1½ ft

Weight 3.75 lbs./ft.

Grouted Drill Hole Diameter

____ in. to ____ ft. depth

____ in. to ____ ft. depth

Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand & Gravel	20'	20'
Sand, Clay, gravel	30'	50'
Sand, white, Waterbearing	4'	54

USE A 2ND SHEET IF NEEDED

RECEIVED MICHIGAN ... [illegible stamp]

8 SCREEN

☐ Not Installed

Type Clayton mark Diameter 1¼"

Slot/Gauze 80 Length 48"

Set between 50 ft. and 54 ft.

FITTINGS: ☒ K-Packer ☒ Lead Packer ☒ Bremer Check

☐ Blank above screen ____ ft Other ____

9 STATIC WATER LEVEL

28 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface

28 ft. after 1 hrs. pumping at 10 G.P.M.

____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION

☐ Pitless adapter ☒ 12" above grade ☐ 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 ____ Distance ____ ft Direction ____

Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP

☐ Not Installed ☐ Pump Installation Only

Manufacturer's name: Baker (Hand Pump)

Model number ____ HP ____ Volts ____

Length of Drop Pipe ____ ft. capacity ____ G.P.M.

TYPE ☐ Submersible ☐ Jet ____

PRESSURE TANK

Manufacturer's name ____

Model number ____ Capacity ____ Gallons

15 Remarks, elevation, source of data, etc.

[illegible]ED BY DRILLER, ITEM N
[illegible]ED BY
[illegible] BY
ELEVATION
DEPTH TO ROCK

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.

Waldron Well Drilling 0925

REGISTERED BUSINESS NAME REGISTRATION NO.

Address: Evart Mi 49631

Signed: M. E. Waldron Date: 6-7-82

AUTHORIZED REPRESENTATIVE

D67d (Rev. 10-80)

Well ID #15

GEOLOGICAL SURVEY COPY

NORTH DINING HALL

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER WELL AND PUMP RECORD

TAX NO: 433-503035A

PERMIT NO: 956701

1. LOCATION OF WELL

County	Township Name	Fraction	Section No.	Town No.	Range No.
Osceola	Osceola	1/4 1/4 1/4	21		9W

Distance and Direction from Road Intersection: 1/2 mile South East of 100th and Nine Mile

Street Address & City of Well Location: 7715 95th Street, EVART

Locate with 'x' in Section Below — Sketch Map

3. OWNER OF WELL: Spring Hill Camps
Address: P.O. Box 100-7717, Evart, Mi. 49631
Address Same as Well Location: [X] Yes [ ] No

4. WELL DEPTH: 215 ft. Date Completed: 5/25/96 [X] New Well [ ] Replacement Well

5. [ ] Cable Tool [X] 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 [X] Type IIb Public [ ] ____

7. CASING: [ ] Steel [ ] Threaded [X] Plastic [X] Welded [ ] Other ____
Height: Above/Below Surface: 1 ft
Diameter: 3 in. to 5 ft. depth; 5 in. to 180 ft. depth
Weight: 5 lbs./ft.
[ ] Drive Shoe [ ] Shale Packer
BORE HOLE: Diameter: 9 in. to 215 ft. depth; ____ in. to ____ ft. depth

2. FORMATION DESCRIPTION

Formation	Thickness of Stratum	Depth to Bottom of Stratum
Brown Sand	60	60
Pink Clay	15	75
Brown Sand	115	190
Gray Sand	25	215

USE A 2ND SHEET IF NEEDED

8. SCREEN: [ ] Not Installed [ ] Gravel-Packed
Type: Stainless Diameter: 5"
Slot/Gauze: 10-15-3/12's Length: 25'
Set Between 190 ft. and 215 ft.
FITTINGS: [X] K-Packer [ ] Bremer Check [X] Blank Above Screen 2 ft. Other ____

9. STATIC WATER LEVEL: 47 ft. Below Land Surface [ ] Flowing

10. PUMPING LEVEL: Below Land Surface 47 ft. After 4 hrs. Pumping at 150 G.P.M.
[ ] Plunger [ ] Bailer [X] Air [ ] Test Pump

11. WELL HEAD COMPLETION: [X] Pitless Adapter [X] 12" Above Grade [ ] Basement Offset [ ] Well House

12. WELL GROUTED? [ ] No [X] Yes From 0 to 180 ft.
[ ] Neat Cement [X] Bentonite [ ] Other ____
No. of Bags 29 Additives POLYMER

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type Septic Distance 100+ ft. Direction NE
Type ____ Distance ____ ft. Direction ____

14. PUMP: [ ] Not Installed [ ] Pump Installation Only
Manufacturer's Name: Red Jacket
Model Number: 5550 HP 15 Volts 230
Length of Drop Pipe 147 ft. Capacity 140 G.P.M.
TYPE: [X] Submersible [ ] Jet [ ] Other ____
PRESSURE TANK: 3-tanks
Manufacturer's Name: Well Xtrol
Model Number: WX 302 Capacity 86 Gallons 25.7

15. ABANDONED WELL PLUGGED? [ ] Yes [ ] No
Casing Diameter ____ in. Depth ____ ft.
PLUGGING MATERIAL: [ ] Neat Cement [ ] Bentonite Slurry [ ] Cement/Bentonite Slurry [ ] Concrete Grout [ ] Bentonite Chips
No. of Bags ____ Casing Removed? [ ] Yes [ ] No

16. REMARKS: (Elevation, Source of Data, etc.) SCREENS, in order top to bottom 10-12-15-12-12. Casing adapter 5" steel 5' buried Baker style 4 wire submersible-buried

17. DRILLING MACHINE OPERATOR: [X] Employee [ ] Subcontractor
Name: Marty Phillips-Rick Hill

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.

Keller Well Drilling, Inc. — 1924
REGISTERED BUSINESS NAME — REGISTRATION NO.
Address: 3765 Noble, Brighton, Mi. 48116
Signed: [signature] AUTHORIZED REPRESENTATIVE Date: 5-19-97

GW-2-228 9/93

WELL ID = 21

Authority: Act 368 PA 1978 Completion: Required

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY SAMPLE No.

MAR 11 1982

MAR 11 1982

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	NE ¼ NE ¼ NE ¼	21	18 N./S.	8 E/W.

Distance And Direction from Road Intersections: [illegible] of 4 mile rd + 90th [illegible] (S W Corner)

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:

N / W / E / S — 1 MILE — ½ MI. — X

3 OWNER OF WELL: North [illegible]

Address: Evart [illegible] 49631

4 WELL DEPTH: (completed) 115 ft. Date of Completion 11-20-81

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☐ Domestic ☒ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Diam. 2 in. to 111 ft. Depth; ___ in. to ___ ft. Depth. Height: Above/Below Surface 4 ft. Weight 3.75 lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	13'	13'
Sand clay, gravel	80'	93'
Sand brown	17'	110'
Gravel - waterbearing	5'	115

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type Clayton Mark Dia.: 1¼ Slot/Gauze 60 Length 48" Set between 111 ft. and 115 ft. Fittings:

9 STATIC WATER LEVEL 70 ft. below land surface

10 PUMPING LEVEL below land surface 70 ft. after 1 hrs. pumping 10 g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) 1 Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☒ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination 75 feet E. Direction Septic Type. Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name F & W. Model Number 26067H HP ¾ Volts ___ Length of Drop Pipe 84 ft. capacity 6 G.P.M. Type: ☐ Submersible ☒ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO. ___
[illegible] BY ST
[illegible] BY
ELEVATION
DEPTH TO ROCK

17 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.

Wardelow Well [illegible] — 0435
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address Evart Mi 49631

Signed [illegible signature] AUTHORIZED REPRESENTATIVE Date 11-20-81

D67d 100M (Rev. 12-68)

Well ID = 10

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY SAMPLE No. [ ]

MAR 12 198[illegible]

WATER WELL RECORD
ACT 294 PA 1965

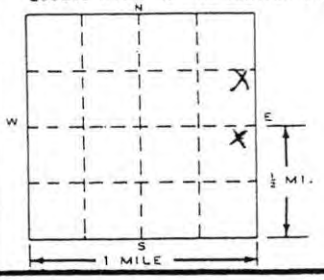
MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	NE ¼ SE ¼ NE ¼	21	18 N/S.	8 E/W.

Distance And Direction from Road Intersections
1/8 Mile So of 9 mile on 90th Ave - W Side of Rd.
Street address & City of Well Location

Locate with "X" in section below



Sketch Map:

3 OWNER OF WELL:
Address Rodney Dungen
R.R.
Evart, MI 49631

4 WELL DEPTH: (completed) Date of Completion
118 ft. 8-29-80

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug
☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐
Diam. 2 in. to 114 ft. Depth
____ in. to ____ ft. Depth
Height: ~~Above~~/Below Surface 4 ft.
Weight 375 lbs./ft.
Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand & Clay	40'	40'
Clay	30'	70'
Sand-brown	30'	100'
Sand & gravel	10'	110'
Gravel-water bearing	8'	118'

8 SCREEN:
Type Claylon mark Dia.: 1¼"
Slot/Gauze 60 Length 48"
Set between 114 ft. and 118 ft.
Fittings:

9 STATIC WATER LEVEL
60 ft. below land surface

10 PUMPING LEVEL below land surface
60 ft. after 1 hrs. pumping 10 g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit
☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
70 feet W Direction septic Type
Well disinfected upon completion ☒ 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.
[illegible] DRILLER, ITEM NO.
[illegible] BY ST
[illegible] BY
ELEVATION
DATUM IS ROCK

17 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.
Watson Well Drilling - 0935
REGISTERED BUSINESS NAME REGISTRATION NO.
Address Evart, MI 49631
Signed D. E. Watson Date 8-29-80
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

Well ID=11

GEOLOGICAL SURVEY COPY

DEQ MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION

WATER WELL AND PUMP RECORD

Completion is required under authority of Part 127 Act 368 PA 1978
Failure to comply is a misdemeanor

Page 1

TAX NO: 38-60900589

PERMIT NO: 96-11-0325

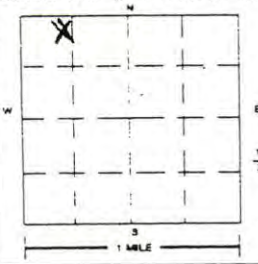
1. LOCATION OF WELL

County	Township Name	Fraction	Section No.	Town No.	Range No.
OCEOLA	OCEOLA	NE 1/4 NW 1/4 NW 1/4	28	18N	8W

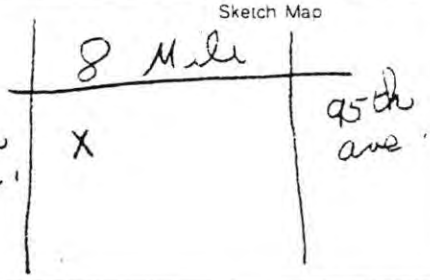
Distance and Direction from Road Intersection
1/8 MILE SOUTH EAST CORNER OF
100TH AVENUE AND EIGHT MILE

Street Address & City of Well Location NINTY FIFTH AVE. 7717

Locate with 'x' in Section Below



Sketch Map



3. OWNER OF WELL
Address SPRING HILL CAMP
7717 95 TH AVENUE
EVART, MI, 49631
Address Same as Well Location [X] Yes [ ] No

4. WELL DEPTH: 235 ft. | Date Completed 04/09/97 | [X] New Well [ ] Replacement Well

5. [ ] Cable Tool [X] 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 [X] Type IIb Public [ ] _____

7. CASING: [ ] Steel [ ] Threaded [X] Plastic [X] Welded [ ] Other _____
Diameter: 5 in. to 235 ft. depth
_____ in. to _____ ft. depth
BORE HOLE:
Diameter: 8 in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above/~~Below~~ Surface: 1 ft
Weight: 3 lbs./ft.
[ ] Drive Shoe [ ] Shale Packer

2. FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
BROWN CLAY	17	17
BROWN SAND	73	90
GRAY BROWN SAND FINE	19	109
HARD GRAY CLAY	12	121
MEDIUM BORWN GRAY SAND	14	135
~~GRAY CLAY AND SAND~~	~~5~~	~~140~~
GRAY CLAY	10	150
~~GRAY CLAY AND SAND~~	~~3~~	~~153~~
GRAY SAND	1	154
HARD GRAY CLAY	11	165
GRAY CLAY AND SAND	5	170
~~HARD GRAY CLAY~~	~~2~~	~~172~~
GRAY SAND	8	180
~~HARD GRAY CLAY~~	~~2~~	~~182~~
~~MEDIUM HARDGRAY CLAY~~	~~9~~	~~191~~

USE A 2ND SHEET IF NEEDED

8. SCREEN: [ ] Not Installed [ ] Gravel-Packed
Type PLASTIC Diameter 5 in.
Slot/~~Gauge~~ 12 Length: _____ ft.
Set Between SEE #2 ft. and _____ ft.
FITTINGS: [X] K-Packer [ ] Bremer Check
[X] Blank Above Screen _____ ft. Other _____

9. STATIC WATER LEVEL:
24 ft. Below Land Surface [ ] Flowing

10. PUMPING LEVEL: Below Land Surface
24 ft. After 2 hrs. Pumping at 150 G.P.M.
[ ] Plunger [ ] Bailer [X] Air [ ] Test Pump

11. WELL HEAD COMPLETION:
[X] Pitless Adapter [ ] 12" Above Grade
[ ] Basement Offset [ ] Well House

12. WELL GROUTED? [ ] No [X] Yes From 0 to 90 ft.
[ ] Neat Cement [X] Bentonite [ ] Other _____
No. of Bags 14 Additives PLYMER

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type SEPTIC Distance 75 ft. Direction SO.
Type _____ Distance _____ ft. Direction _____

14. PUMP: [ ] Not Installed [ ] Pump Installation Only
Manufacturer's Name RED JACKET
Model Number 10EC HP 5 Volts 230
Length of Drop Pipe 60 ft. Capacity 80 G.P.M.
TYPE: [X] Submersible [ ] Jet [ ] Other _____
PRESSURE TANK:
Manufacturer's Name CUSTOMER TO INSTALL
Model Number _____ Capacity _____ Gallons _____

15. ABANDONED WELL PLUGGED? [ ] Yes [ ] No
Casing Diameter _____ in. Depth _____ ft.
PLUGGING MATERIAL: [ ] Neat Cement [ ] Bentonite Slurry [ ] Cement/Bentonite Slurry [ ] Concrete Grout [ ] Bentonite Chips
No. of Bags _____ Casing Removed? [ ] Yes [ ] No

16. REMARKS: (Elevation, Source of Data, etc.)
SEE PAGE TWO FOR REST OF FORMATION DESCRIPTION

17. DRILLING MACHINE OPERATOR:
[X] 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.
~~Keller Well Drilling Inc.~~ REGISTERED BUSINESS NAME 1324 REGISTRATION NO.
Address 3766 Noble Brighton MI 48116
Signed Rene Keller AUTHORIZED REPRESENTATIVE Date 6-24-97

Well ID: 29

EQP 2017 (12/96)

DEQ MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION

WATER WELL AND PUMP RECORD

Completion is required under authority of Part 127 Act 368 PA 1978
Failure to comply is a misdemeanor

TAX NO: 39-6090586

PERMIT NO: 96-11-0325

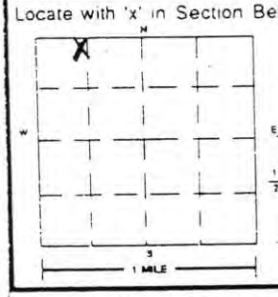
1. LOCATION OF WELL

County	Township Name	Fraction	Section No.	Town No.	Range No.
OCEOLA	OCEOLA	NE1/4 NW 1/4 NW1/4	28	18N	8W

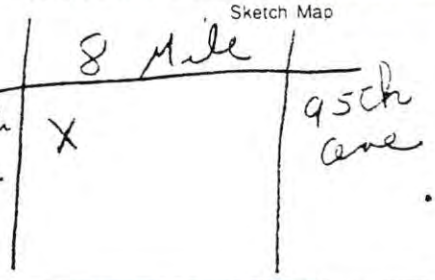
Distance and Direction from Road Intersection
1/8 MILE SOUTH/EAST CORNER OF 100TH AVENUE AND EIGHT MILE.

Street Address & City of Well Location NINTY FIFTH AVENUE 7717

Locate with 'x' in Section Below



Sketch Map



3. OWNER OF WELL

Address: SPRING HILL CAMP
7717 95TH AVENUE
EVART, MI. 49631

Address Same as Well Location ☒ Yes ☐ No

4. WELL DEPTH

235 ft. | Date Completed 04/09/97 | ☒ New Well ☐ 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 ☐ _____

7. CASING

☐ Steel ☐ Threaded
☒ Plastic ☒ Welded
☐ Other _____

Diameter: _____ in. to _____ ft. depth
_____ in. to _____ ft. depth

BORE HOLE:
Diameter: _____ in. to _____ ft. depth
_____ in. to _____ ft. depth

Heignt: Above/Below Surface: 1 ft
Weight: 3 lbs./ft.
☐ Drive Shoe
☐ Shale Packer

8. SCREEN

☐ Not Installed ☐ Gravel-Packed
Type _____ Diameter _____ in.
Slot/Gauze _____ Length: _____ ft.
Set Between _____ ft. and _____ ft.
FITTINGS: ☐ K-Packer ☐ Bremer Check
☐ Blank Above Screen _____ ft. Other _____

9. STATIC WATER LEVEL

_____ ft. Below Land Surface ☐ Flowing

10. PUMPING LEVEL: Below Land Surface

_____ ft. After _____ hrs. Pumping at _____ G.P.M.
☐ Plunger ☐ Bailer ☐ Air ☐ Test Pump

11. WELL HEAD COMPLETION

☐ Pitless Adapter ☐ 12" Above Grade
☐ Basement Offset ☐ Well House

12. WELL GROUTED?

☐ No ☒ Yes From _____ to _____ ft.
☐ Neat Cement ☐ Bentonite ☐ Other _____
No. of Bags 14 Additives Polymer

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION

Type _____ Distance _____ ft. Direction _____
Type _____ Distance _____ ft. Direction _____

2. FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
~~PAGE #2~~		
GRAY SAND	2	193
~~HARD GRAY CLAY~~	~~1~~	~~194~~
GRAY SAND	1	195
~~MEDIUM HARD GRAY CLAY~~	~~2~~	~~197~~
GRAY SAND	2	199
GRAY CLAY	19	218
FINE GRAY SAND	17	235
~~HARD GRAY CLAY~~	~~10~~	~~245~~
SCREENS		
GRAVEL PACKED WELL	90	110
90 FT TO 235 FT.	120	140
90 FT TOTAL LENGTH OF	170	180
SCREEN AREA	195	235

USE A 2ND SHEET IF NEEDED

14. PUMP

☐ Not Installed ☐ Pump Installation Only
Manufacturer's Name _____
Model Number _____ HP _____ Volts _____
Length of Drop Pipe _____ ft. Capacity _____ G.P.M.
TYPE: ☐ Submersible ☐ Jet ☐ Other _____
PRESSURE TANK:
Manufacturer's Name _____
Model Number _____ Capacity _____ Gallons _____

15. ABANDONED WELL PLUGGED?

☐ Yes ☐ No
Casing Diameter _____ in. Depth _____ ft.
PLUGGING MATERIAL:
☐ Neat Cement ☐ Bentonite Slurry
☐ Cement/Bentonite Slurry ☐ Concrete Grout ☐ Bentonite Chips
No. of Bags _____ Casing Removed? ☐ Yes ☐ No

16. REMARKS (Elevation, Source of Data, etc.)

PAGE TWO OF FORMATIONS
96-11-0325

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 ~~Keller Well Drilling Inc.~~ 1934 REGISTRATION NO.

Address 3766 Noble Brighton MI 48116

Signed Dane Keller Date 6-24-97
AUTHORIZED REPRESENTATIVE

EQP 2017 (12/96)

GEOLOGICAL SURVEY NO

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

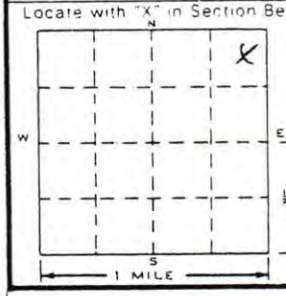
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OSCEOLA	OSCEOLA	NE ¼ NE ¼ NE ¼	29	18 N/S	8 E/W

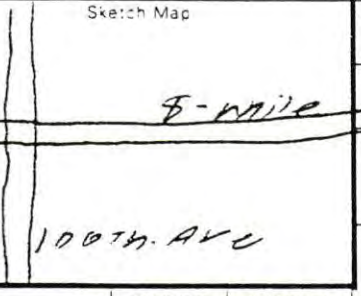
Distance And Direction From Road Intersection: ¼ mile + 100th. Ave well on South + West corner of intersection

Street Address & City of Well Location

Locate with "X" in Section Below



Sketch Map



3 OWNER OF WELL CHUCK DAVIS

Address: ELART, MICH

Address Same As Well Location? ☑ Yes ☐ No

4 WELL DEPTH (completed) 77 ft. **Date of Completion** 10-23-87

5 ☐ Cable tool ☑ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ _____

6 USE ☑ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐ _____

7 CASING Diameter ☑ Steel ☑ Threaded ☐ Plastic ☐ Welded

2 in. to 73 ft. depth

_____ in. to _____ ft. depth

Grouted Drill Hole Diameter

_____ in. to _____ ft. depth

_____ in. to _____ ft. depth

Height Above/Below Surface 1 ft

Weight 3.75 lbs./ft.

Drive Shoe ☑ Yes ☐ No

8 SCREEN ☐ Not Installed

Type Midwest Diameter 1¼"

Slot/Gauze 80 Length 4'

Set between 73 ft. and 77 ft

FITTINGS ☑ K Packer ☐ Lead Packer ☑ Bremer Check ☑ Blank above screen 1 ft Other _____

9 STATIC WATER LEVEL 60 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface

70 ft after 1 hrs. pumping at 14 G.P.M.

_____ ft after _____ hrs. pumping at _____ G.P.M

11 WELL HEAD COMPLETION ☐ Pitless adapter ☑ 12" above grade ☐ 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 Septic Distance 79 ft Direction South

Well disinfected upon completion? ☑ Yes ☐ No

14 PUMP ☑ Not Installed ☐ Pump Installation Only

Manufacturer's name _____

Model number _____ HP _____ Volts _____

Length of Drop Pipe _____ ft capacity _____ G.P.M.

TYPE ☐ Submersible ☐ Jet _____

PRESSURE TANK

Manufacturer's name _____

Model number _____ Capacity _____ Gallons

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay Red	5'	5'
Sand yellow	18'	23'
Gravel	12'	35'
Sand yellow	30'	65'
Sand White	12	77'

USE A 2ND SHEET IF NEEDED

RECEIVED
Mich. Dept. of Public Health
DEC 14 1987
Bureau of Environmental and Occupational Health - GWQS

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

64' Drop Pipe

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.

Sorensens 1565
REGISTERED BUSINESS NAME REGISTRATION NO.

Address: Ft I Sears Mich

Signed Robt. Sorensen Date 10-30-87
AUTHORIZED REPRESENTATIVE

D67d (Rev 10-80)

Well ID = 27

GEOLOGICAL SURVEY NO.

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PERMIT NUMBER

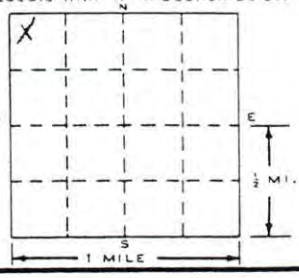
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	NW ¼ N½ NW ¼	29	17 N/S	7 E/W

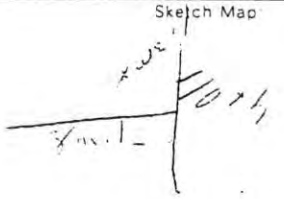
Distance And Direction From Road Intersection: 10397 - 8 Mile Road

Street Address & City of Well Location

Locate with "X" in Section Below



Sketch Map



3 OWNER OF WELL:
Address: Bill Weinberg
10397 - 8 Mile Rd.
Evart, Mi. 49631
Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH: 91 FT. Date Completed MO. 5 DAY 21 YEAR 96 ☑ New Well ☐ Replacement Well

5 ☑ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ ____

6 USE ☑ Domestic ☐ Type I Public ☐ Type II Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐ ____

7 CASING Diameter ☑ Steel ☑ Threaded ☐ Plastic ☐ Welded
4 in. to 86 ft. depth
____ in. to ____ ft. depth
Grouted Drill Hole Diameter
7 in. to 30 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 1 ft.
Weight 11 lbs./ft.
Drive Shoe ☑ Yes ☐ No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay & Gravel	10	10
Clay	10	20
Sand & Gravel	20	40
Sand	3	43
Clay & Gravel	7	50
Sand & Gravel	41	91

Mich. Dept. of Public Health
SEP 13 1996
BUREAU OF ENVIRONMENTAL & OCCUPATIONAL HEALTH-GWQS

8 SCREEN ☐ Not Installed
Type Hurd Smith Diameter 3 1/2
Slot/Gauge 10 Length 5'
Set between 76 ft. and 91 ft.
FITTINGS ☑ K-Packer ☐ Lead Packer ☐ Bremer Check ☑ Blank above screen 5 ft. Other ____

9 STATIC WATER LEVEL
45 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface
45 ft. after 2 hrs. pumping at 12 G.P.M.
____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION ☑ Pitless adapter ☐ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☐ No ☑ Yes From 0 to 30 ft.
☐ Neat cement ☑ Bentonite ☐ Other ____
No. of bags of cement 4 Additives ____

13 Nearest source of possible contamination
Type Septic Distance 50+ Direction N
Well disinfected upon completion? ☑ Yes ☐ No
Was old well plugged? ☐ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump Installation Only
Manufacturer's name A.O. Motor
Model number A-12 HP ½ Volts 230
Length of Drop Pipe 43 ft. capacity ____ G.P.M.
TYPE ☑ Submersible ☐ Jet ____
PRESSURE TANK
Manufacturer's name X-Trol
Model number 10 x 102 Capacity 42 Gallons

USE A 2ND SHEET IF NEEDED

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.
Kit Waldron Well Drilling 0907
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 10770 - 8 Mile Rd. - Evart, MI.
Signed K. Waldron Date 3/20/96
AUTHORIZED REPRESENTATIVE

17. Rig Operator's Name: Gordon Bissett

D67d 2/89

Well ID=26

GEOLOGICAL SURVEY COPY

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a

EOLOGICAL SURVEY SAMPLE No.

JUN 27 1969

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
Osceola	~~Evart~~ Osceola	NE¼ NE¼ NW¼	28	18 N/S.	8 E/W.

Distance And Direction from Road Intersections

Twin Creek Rd. & Laiman Rd. Evart Mich

Street address & City of Well Location INTERSECTION

OWNER No. ______

3 OWNER OF WELL: Spring Hill Bible Camp

Address Evart Michigan

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand - brown	30	30
Clay -	7	37
White - coarse - sand - water bearing	8	45

4 WELL DEPTH: (completed) 45 ft. Date of Completion 12/17/68

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug
☒ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☐ ______

7 CASING: Threaded ☒ Welded ☐
Diam. 2 in. to 41 ft. Depth
___ in. to ___ ft. Depth
Height: ~~Above~~/Below surface 4 ft.
Weight 2.75 lbs/ft.
Drive Shoe? Yes ☒ No ☐

8 SCREEN:
Type: #129 Dia.: 1¼
~~Slot~~/Gauze 60 Length 48"
Set between 41 ft. and 45 ft.
Fittings:

9 STATIC WATER LEVEL
21 ft. below land surface

10 PUMPING LEVEL below land surface
30 ft. after 1 hrs. pumping 10 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ___ Chlorides (Cl) ___
Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit
☒ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☒ No
Material: ☐ Neat Cement ☐ ___
Depth: From ___ ft. to ___ ft.

14 SANITARY:
Nearest Source of possible contamination
___ feet ___ Direction ___ Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:
Manufacturer's Name ___
Model Number ___ HP ___
Length of Drop Pipe ___ ft. capacity ___ G.P.M.
Type: ☐ Submersible ☐ ___
☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. DRILLER. ITEM NO.

CORRECTED BY

ADDITION BY.

17 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.

Harbour's Well Drilling — REGISTERED BUSINESS NAME — 0935 REGISTRATION NO.

Address Evart, Michigan 49631

Signed Marshall Waldron Date 12-17-68

AUTHORIZED REPRESENTATIVE

D67D 100M 6-66

Well ID=28

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY NO. MAR 02 1982

MICHIGAN DEPARTMENT OF PUBLIC HEALTH
WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

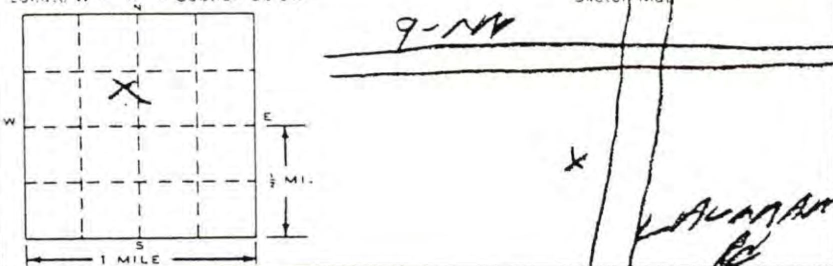
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	NW SE NE 1/4	21	18 N/S	8 E/W

Distance And Direction From Road Intersection: 9 M. Rd + Launman Rd, take Launman Rd. South 1/4 mi. well on west side of Rd

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map



3 OWNER OF WELL
Chuck Davis

Address: R #2 Evart Mich

Address Same As Well Location? ☐ Yes ☒ No

4 WELL DEPTH (completed)
83 ft

Date of Completion: 11-11-81

5
☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug
☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE
☒ Domestic ☐ Type I Public ☐ Type III Public
☐ Irrigation ☐ Type IIa Public ☐ Heat pump
☐ Test Well ☐ Type IIb Public ☐

7 CASING
Diameter ☒ Steel ☒ Threaded ☐ Plastic ☐ Welded

2 in. to 80 ft. depth
___ in. to ___ ft. depth

Height Above/~~Below~~ Surface 1 ft.
Weight 3.75 lbs./ft.

Grouted Drill Hole Diameter
___ in. to ___ ft. depth
___ in. to ___ ft. depth

Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay + Sand Red	7'	7'
Clay Red.	11'	18'
Gravel	30'	48'
Clay Red	5'	53'
Sand Yellow	6	59'
Sand + Clay Red	18'	78'
Sand White	5'	83

USE A 2ND SHEET IF NEEDED

8 SCREEN
☐ Not Installed

Type Johnson Diameter 1 1/4"
Slot/~~Gauge~~ 7 Length 42"
Set between 79 ft. and 83 ft.

FITTINGS ☒ K-Packer ☐ Lead Packer ☒ Bremer Check
☒ Blank above screen 18" Other

9 STATIC WATER LEVEL
50 ft. below land surface ☐ Flow

10 PUMPING LEVEL, below land surface
62 ft. after 1 hrs. pumping at 13 G.P.M.
___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION
☒ Pitless adapter ☐ 12" above grade
☐ 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 Septic Distance 60 ft. Direction W

Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP
☐ Not Installed ☐ Pump Installation Only

Manufacturer's name Flint + Walling
Model number C62 GH HP 3/4 Volts 220
Length of Drop Pipe 63 ft. capacity ___ G.P.M.
TYPE ☐ Submersible ☒ Jet

PRESSURE TANK
Manufacturer's name E-Trol
Model number 1DT-202 Capacity 42 Gallons

15 Remarks, elevation, source of data, etc.
REVISED INFO BY DRILLER, ITEM NO.
*CORRECTED BY –
**ADDITION BY
ELEVATION
DEPTH TO ROCK

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.

Sorensens — REGISTERED BUSINESS NAME
1040 — REGISTRATION NO.

Address: R#1 Sem

Signed: [signature] AUTHORIZED REPRESENTATIVE Date 11-11-81

D67d (Rev. 10-80)

Well ID-17

GEOLOGICAL SURVEY SAMPLE No.

734-2335

FEB 2 ? 1976

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

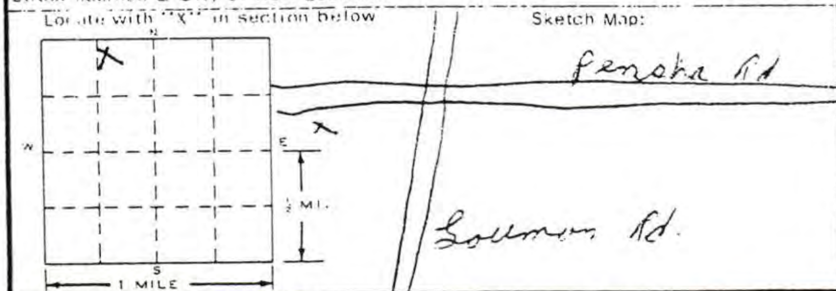
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	NE NE NW	21	18 N/S.	8 E/W.

Distance And Direction from Road Intersections: Fenska Rd & Sollman Rd. Take Fenska Rd west 100 yds well on south side of Rd.

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand Yellow	15'	15'
Sand and some clay Red	10'	25'
Sand Yellow	25	50'
Sand White	7'	57'

USE A 2ND SHEET IF NEEDED

3 OWNER OF WELL: Mrs Diane Clark

Address [illegible]

4 WELL DEPTH: (completed) 57' ft. Date of Completion 12-13-75

5 ☐ Cable tool ☑ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☑ Welded ☐ Height: Above/Below Surface 1 ft.
Diam. 2 in. to ____ ft. Depth; ____ in. to 55 ft. Depth. Weight 3.75 lbs./ft. Drive Shoe? Yes ☑ No ☐

8 SCREEN: Type: Set Dia.: 1 1/4" Slot/Gauze 80 Length 4' Set between 53 ft. and 57' ft.
Fittings: Brass check

9 STATIC WATER LEVEL: 48 ft. below land surface

10 PUMPING LEVEL below land surface: 50 ft. after 1 hrs. pumping 10 g.p.m.; ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☑ 12" Above Grade

13 Well Grouted? ☐ Yes ☑ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination: 40 feet E Direction Septic Tank Type. Well disinfected upon completion ☑ 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

16 Remarks, elevation, source of data, etc.: Use 50' of Drop Pipe from top of Well.

17 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.

Sollman's — REGISTERED BUSINESS NAME — 1010 REGISTRATION NO.

Address R #1 Sears Mich

Signed [signature] AUTHORIZED REPRESENTATIVE Date 12-15-75

D67d 100M (Rev. 12-68) ELEVATION

WELL ID = 20

GEOLOGICAL SURVEY SAMPLE No.

8

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

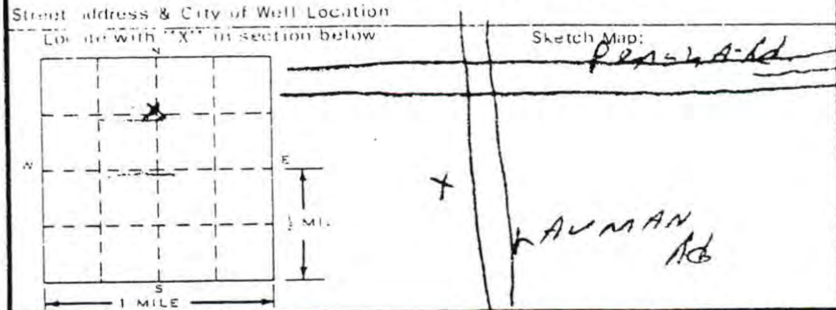
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OSceola	OSceola	SE¼ NE¼ NW¼	21	18 N	8 W

Distance And Direction from Road Intersections: Pensha + Iauman Rd Take Iauman Rd South 250 yds, well on west side of Rd

Street Address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL: Dave Vouilla
Address: R# Evart Mich

4 WELL DEPTH: (completed) 47 ft. Date of Completion: 9 Sep-74

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☑ Welded ☐ Diam. 2 in. to 44 ft. Depth; ___ in. to ___ ft. Depth. Height: Above/Below Surface 1 ft. Weight 3.7 lbs./ft. Drive Shoe? Yes ☑ No ☐

8 SCREEN: Type: Jet. Dia.: 1¼". Slot/Gauze 30. Length 4'. Set between 43 ft. and 47 ft. Fittings: Elbow check

9 STATIC WATER LEVEL: 33 ft. below land surface

10 PUMPING LEVEL below land surface: 40 ft. after 1 hrs. pumping 12 g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☑ No ☐ Neat Cement ☐ Bentonite ☐ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination ___ feet ___ Direction None. Type ___
Well disinfected upon completion ☑ 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

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand yellow	4'	4'
Sand + clay	2'	6'
Clay Red	10'	16'
Sand yellow	22'	38'
Clay Red	2	40'
Sand yellow	7'	47

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.
Use 40' drop pipe from top of Grd

17 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.
Sorensen's — REGISTERED BUSINESS NAME; 1040 — REGISTRATION NO.
Address R#1 Sears Mich
Signed Robert Sorensen (AUTHORIZED REPRESENTATIVE) Date 11-Sep-74

D67d 100M (Rev. 12-68)

Well ID = 18

GEOLOGICAL SURVEY SAMPLE No.

FEB 2 0 1976

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	SW¼ NE¼ NE¼	21	18 N/S	8 E/W.

Distance And Direction from Road Intersections: Pinney & Evart Rd. take Evart Rd. south, west side of Rd.

Street address & City of Well Location

Locate with "X" in Section below — Sketch Map: Pinney Rd, Evart Rd.

3 OWNER OF WELL:

Jim Laffey

Address: Evart, Mich.

4 WELL DEPTH: (completed) 98 ft. Date of Completion 12-10-75

5 ☐ Cable tool ☑ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☑ Welded ☐ Height: Above/Below Surface 1 ft.

Diam. 2 in. to 95 ft. Depth; ___ in. to ___ ft. Depth

Weight 3.75 lbs./ft. Drive Shoe? Yes ☑ No ☐

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand + clay	36	36'
Clay Red	15'	51'
Sand + clay	30'	81'
clay gray	10'	91'
Sand yellow	8'	99'

USE A 2ND SHEET IF NEEDED

8 SCREEN: Type: Jet Dia.: 1¼" Slot/Gauze 20 Length 4' Set between 94 ft. and 98 ft. Fittings: 15 Plumb-Peerless

9 STATIC WATER LEVEL: 70 ft. below land surface

10 PUMPING LEVEL below land surface: 80 ft. after 1 hrs. pumping 9 g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☑ 12" Above Grade

13 Well Grouted? ☐ Yes ☑ No ☐ Neat Cement ☐ Bentonite ☐ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination: 75 feet N Direction Septic tank Type. Well disinfected upon completion ☑ Yes ☐ No

15 PUMP: ☐ Not installed. Manufacturer's Name Fairbanks. Model Number #1E HP ½ Volts 220. Length of Drop Pipe 70 ft. capacity ___ G.P.M. Type: ☐ Submersible ☑ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

RECEIVED BY DRILLER ITEM NO. 85

ELEVATION

DEPTH TO ROCK

17 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.

Goodman's — 1010
REGISTERED BUSINESS NAME — REGISTRATION NO.

Address: Rt. 1, Sears, Mich.

Signed: [signature] (AUTHORIZED REPRESENTATIVE) Date 1-10-75

D67d 100M (Rev. 12-68)

WELL ID = 12

GEOLOGICAL SURVEY NO

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

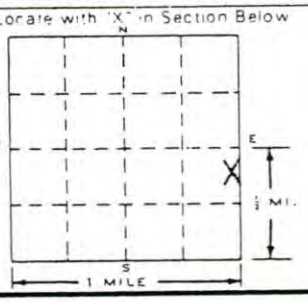
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	SE¼ NE¼ NE¼	21	18 N/S	8 E/W

Distance And Direction From Road Intersection: North of Evart on Evart Rd. 1½ mile on West side of Rd.

Street Address & City of Well Location

Locate with "X" in Section Below



Sketch Map

3 OWNER OF WELL

Gary Gilders

Address: Evart, Mich 49631

Address Same As Well Location? ☑ Yes ☐ No

4 WELL DEPTH (completed)

110 ft.

Date of Completion: 7/15/85

5

☑ Cable tool ☑ Rotary ☐ Driven ☐ Dug
☐ Hollow rod ☐ Auger ☐ Jetted ☐ ____

6 USE

☑ Domestic ☐ Type I Public ☐ Type III Public
☐ Irrigation ☐ Type IIa Public ☐ Heat pump
☐ Test Well ☐ Type IIb Public ☐ ____

7 CASING

Diameter ☑ Steel ☑ Threaded
☐ Plastic ☐ Welded

4 in. to 105 ft. depth

____ in. to ____ ft. depth

Grouted Drill Hole Diameter

____ in. to ____ ft. depth

____ in. to ____ ft. depth

Height ~~Above~~/Below Surface 5 ft

Weight 11 lbs./ft.

Drive Shoe ☑ Yes ☐ No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	20	20
Gravel	50	70
Muddy Sand	20	90
Water Sand	20	110

8 SCREEN

☐ Not Installed

Type Johnson Diameter 3½"

Slot/Gauge 12 Length 5'

Set between 105 ft. and 110 ft.

FITTINGS ☑ K-Packer ☐ Lead Packer ☐ Bremer Check

☑ Blank above screen 2 ft. Other ____

9 STATIC WATER LEVEL

70 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface

____ ft. after ____ hrs. pumping at ____ G.P.M.

____ ft. after ____ hrs. pumping at ____ G.P.M.

11 WELL HEAD COMPLETION

☑ Pitless adapter ☐ 12" above grade
☐ 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 Septic Distance 50 ft. Direction North

Well disinfected upon completion? ☐ Yes ☐ No

14 PUMP

☐ Not Installed ☐ Pump installation Only

Manufacturer's name Airmotor

Model number 51809 HP ¾ Volts 230

Length of Drop Pipe 92 ft. Capacity 20 G.P.M.

TYPE ☑ Submersible ☐ Jet ____

PRESSURE TANK

Manufacturer's name ____

Model number ____ Capacity ____ Gallons

RECEIVED
Mich. Dept. of Public Health

USE A 2ND SHEET IF NEEDED

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

Waldron Well Drilling 0907
REGISTERED BUSINESS NAME REGISTRATION NO.

Address Evart Mich. 49631

Signed Kit Waldron Date 8/3/85
AUTHORIZED REPRESENTATIVE

D67a (Rev 10-80)

Well ID = 13

GEOLOGICAL SURVEY COPY

:OLOGICAL SURVEY SAMPLE No. _____

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

LOCATION OF WELL

ounty	Twp.	Fraction	Section No.	Town	Range
Osceola	Osceola	NE¼ of SE¼ of NE¼	17	18 N/S.	8 E/W.

istance And Direction from Road Intersections: 4 mi. N. Lucas Rd - Evart, Mich.

treet address & City of Well Location

OWNER No. _____

3 OWNER OF WELL:
Address Carl Miller R. #3 Evart Mich.

? FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand-	18'	18'
Gravel-Sand-Clay	72'	90'
Fine-brown-sand-water bearing	50'	140'
Gravel & Sand-water bearing	8'	148'

4 WELL DEPTH: (completed) 148 ft. Date of Completion 4/15/69

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ _____

7 CASING: Diam. 2 in. to 144 ft. Depth; Threaded ☐ Welded ☐; Height ~~Above~~/Below surface 5 ft.; Weight 3.75 lbs/ft.; ___ in. to ___ ft. Depth; Drive Shoe? Yes ☒ No ☐

8 SCREEN:
Type: 129 (S.S.) Dia.: 1 1/4
Slot/Gauze 80 Length 48'
Set between 144 ft. and 148 ft.
Fittings:

9 STATIC WATER LEVEL
60 ft. below land surface

10 PUMPING LEVEL below land surface
80 ft. after 1 hrs. pumping 10 g.p.m.
_____ ft. after ___ hrs. pumping _____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) _____ Chlorides (Cl) _____
Hardness _____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☒ Pitless Adapter ☒ 12" Above Grade

13 GROUTING:
Well Grouted? ☐ Yes ☒ No
Material: ☐ Neat Cement ☐ _____
Depth: From ___ ft. to ___ ft.

14 SANITARY:
Nearest Source of possible contamination
75 feet So Direction Septic Type
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:
Manufacturer's Name F. & W.
Model Number _____ HP 3/4
Length of Drop Pipe ___ ft. capacity ___ G.P.M.
Type: ☐ Submersible ☐ _____ ☒ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

17 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.
Haldron Well Drilling 0435
REGISTERED BUSINESS NAME REGISTRATION NO.
Address Evart, Mich.
Signed M. E. Haldron Date 4/30/69
AUTHORIZED REPRESENTATIVE

D67D 100M 6-66

Well ID = 3

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY SAMPLE No.

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

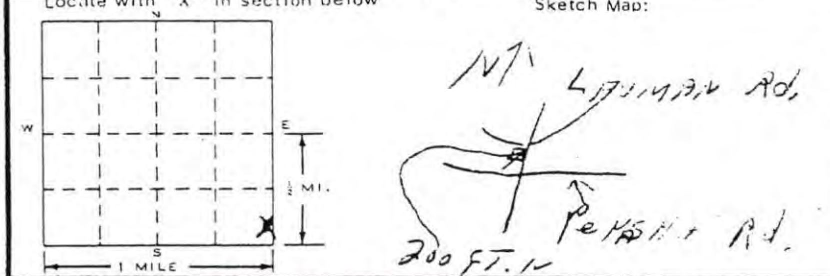
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OSCEOLA	OSCEOLA	SE¼ SE¼ SW¼	16	18 N/S.	8 E/W.

Distance And Direction from Road Intersections: 200 FT NORTH of PENASHA Rd. ON LAUMAN Rd.

Street address & City of Well Location

Locate with "X" in section below — Sketch Map:



3 OWNER OF WELL: H.S. Lockwood

Address: R.R. 3 EVART, MICH

4 WELL DEPTH: (completed) 72' ft. Date of Completion 6-13-70

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☒ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☐ Welded ☐ Diam. 2 in. to 68 ft. Depth; ___ in. to ___ ft. Depth. Height: Above/Below Surface 0 ft. Weight 3.68 lbs./ft. Drive Shoe? Yes ☒ No ☐

8 SCREEN: Type: Drive Dia.: 1-¼" Slot/Gauze 60 Length 4 Feet Set between 68 ft. and 72 ft. Fittings:

9 STATIC WATER LEVEL ~~28~~ 68 ft. 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 (Cl) ___ Hardness ___ Other ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☐ Yes ☒ No ☐ Neat Cement ☐ Bentonite ☐ ___ Depth: From ___ ft. to ___ ft.

14 Nearest Source of possible contamination 50 feet ___ Direction ___ Type. Well disinfected upon completion ☐ 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

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
SURFACE SAND	2'	2'
SAND & GRAVEL	70"	72"

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

... ITEM NO.

... BY

17 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.

Moore Well Drilling — REGISTERED BUSINESS NAME; 0866 — REGISTRATION NO.

Address R.R. 2 EVART, MICH.

Signed [signature] AUTHORIZED REPRESENTATIVE Date 9-28-70

D67d 100M (Rev. 12-68)

Well ID = 5

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY SAMPLE No. [ ]

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

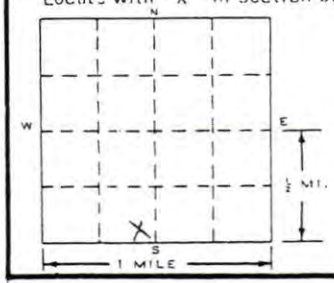
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
OSCEOLA	OSCEOLA	~~SW¼ SE¼ SE¼~~ SE SE SW	17	18 N/S.	8 E/W.

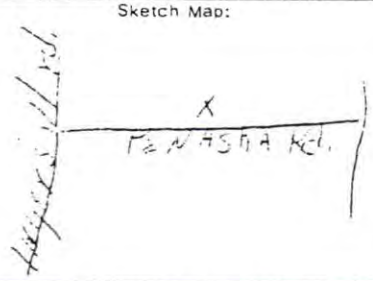
Distance And Direction from Road Intersections: 1/2 mile EAST OF INGERSOLL ON PENASHA RD

Street address & City of Well Location: R#3 EVART

Locate with "X" in section below



Sketch Map:



3 OWNER OF WELL: CALVIN E. TALHELM

Address: EVART, MICH.

4 WELL DEPTH: (completed) 134 ft. Date of Completion 9/1/71

5 ☐ Cable tool ☑ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☑ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐

7 CASING: Threaded ☑ Welded ☐ Diam. 2 in. to 130 ft. Depth; ____ in. to ____ ft. Depth. Height: Above/Below Surface 1 ft. Weight 3.75 lbs./ft. Drive Shoe? Yes ☑ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
SAND	40	40
CLAY & SAND	90	130
SAND & GRAVEL	4	134

8 SCREEN: Type: STAINLESS Dia.: 1¼" Slot/Gauze 80 Length 4' Set between 130 ft. and 134 ft. Fittings:

9 STATIC WATER LEVEL 90 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 (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☑ 12" Above Grade

13 Well Grouted? ☐ Yes ☑ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination: 50 feet SW Direction SEPTIC TANK Type. Well disinfected upon completion ☐ 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 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.

WATSON WELL Drilling 0107

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address: EVART MICH.

Signed: [signature] AUTHORIZED REPRESENTATIVE Date 9/1/71

D67d 100M (Rev. 12-68)

WELL ID = 1

DEQ MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION

WATER WELL AND PUMP RECORD

Completion is required under authority of Part 127 Act 368 PA 1978
Failure to comply is a misdemeanor

TAX NO: 67-12-021-010-00

PERMIT NO: 00-0097

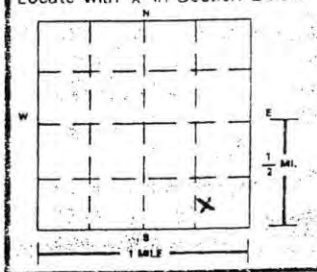
1. LOCATION OF WELL

County	Township Name	Fraction	Section No.	Town No.	Range No.
Osceola	Osceola	NW 1/4 SE 1/4 SE 1/4	30	16N	8W

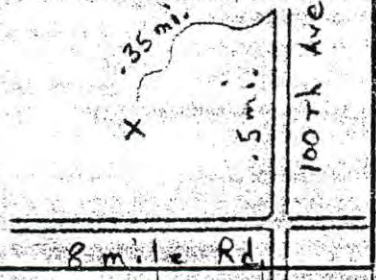
Distance and Direction from Road Intersection: About .5 mile North of 8 Mile Road and about .35 mile West & South of 100th Avenue

Street Address & City of Well Location

Locate with 'x' in Section Below



Sketch Map



3. OWNER OF WELL
Address: Spring Hill Camps
7717 95th Avenue
Evart, MI 49631
Address Same as Well Location ☐ Yes ☒ No

4. WELL DEPTH: 87 ft. Date Completed: 4 18 00 ☒ New Well ☐ 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 ☐ ____

7. CASING: ☐ Steel ☒ Threaded ☐ Plastic ☒ Welded ☐ Other
Height: Above/Below Surface: 1 ft.
Diameter: 2 in. to 82 ft. depth
____ in. to ____ ft. depth
Weight: 3.75 lbs./ft.
BORE HOLE: Diameter: ____ in. to ____ ft. depth ____ in. to ____ ft. depth
☒ Drive Shoe ☐ Shale Packer

8. SCREEN: ☐ Not Installed ☐ Gravel-Packed
Type: Johnson Diameter: 1¼"
Slot/Gauze: 10 Length: 4 ft.
Set Between: 83 ft. and 87 ft.
FITTINGS: ☒ K-Packer ☒ Bremer Check ☒ Blank Above Screen ____ 1 ____ ft. Other

9. STATIC WATER LEVEL: 28 ft. Below Land Surface ☐ Flowing

10. PUMPING LEVEL: Below Land Surface
40 ft. After 1 hrs. Pumping at 15 G.P.M.
☒ Plunger ☐ Bailer ☐ Air ☐ Test Pump

11. WELL HEAD COMPLETION:
☐ Pitless Adapter ☒ 12" Above Grade
☐ Basement Offset ☒ Well House

12. WELL GROUTED? ☐ No ☒ Yes From 0 to 72 ft.
☐ Neat Cement ☒ Bentonite ☐ Other
No. of Bags 11 Additives

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type Gray water Distance 75 ft. Direction NE
Type ____ Distance ____ ft. Direction ____

14. PUMP: ☐ Not Installed ☐ Pump Installation Only
Manufacturer's Name: Baker-Hand pump
Model Number ____ HP ____ Volts ____
Length of Drop Pipe ____ ft. Capacity ____ G.P.M.
TYPE: ☐ Submersible ☐ Jet ☐ Other
PRESSURE TANK:
Manufacturer's Name ____
Model Number ____ Capacity ____ Gallons ____

2. FORMATION DESCRIPTION

	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	22	22
Sand & Red Clay	6	28
Sand	7	35
Blue Clay	10	45
Sand & Blue Clay	5	50
Sand	2	52
Sand, Gravel & Fine Blue Clay	10	62
Blue Clay	18	80
Sand	7	87

JUN - 7 2000

USE A 2ND SHEET IF NEEDED

15. ABANDONED WELL PLUGGED? ☐ Yes ☐ No
Casing Diameter ____ in. Depth ____ ft.
PLUGGING MATERIAL: ☐ Neat Cement ☐ Bentonite Slurry ☐ Cement/Bentonite Slurry ☐ Concrete Grout ☐ Bentonite Chips
No. of Bags ____ Casing Removed? ☐ Yes ☐ No

16. REMARKS: (Elevation, Source of Data, etc.)

17. DRILLING MACHINE OPERATOR:
☐ Employee ☐ Subcontractor
Name: Frederick Fekrul

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.

Fekrul Well Drilling (REGISTERED BUSINESS NAME) 67-1297 (REGISTRATION NO.)
Address: 19985 Hoover Rd., Big Rapids, MI 49307
Signed: Frederick J. Fekrul (REGISTERED REPRESENTATIVE) Date: 6-6-00

EQP 2017 (12/96)

TAX NO:

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER WELL AND PUMP RECORD

PERMIT NO: 98-030444

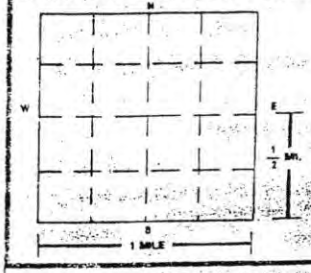
1. LOCATION OF WELL

County	Township Name	Fraction	Section No.	Town No.	Range No.
Osceola	Osceola	NW 1/4 SW 1/4 SE 1/4	20	T-18	R-7

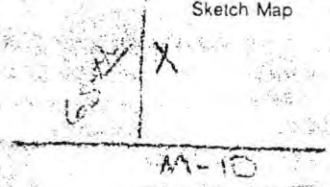
Distance and Direction from Road Intersection: North of M-10 on the east side of 65th Ave.

Street Address & City of Well Location: 65th Ave., Evart

Locate with 'x' in Section Below



Sketch Map



3. OWNER OF WELL: Rich Bentley
Address: 65th Ave. Evart, MI 49631
Address Same as Well Location: ☒ Yes ☐ No

4. WELL DEPTH: 275 ft. Date Completed: 5/30/98 ☒ New Well ☐ 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 ☐

7. CASING: ☐ Steel ☐ Threaded ☒ Plastic ☐ Welded ☐ Other
Diameter: 5 in. to 215 ft. depth; _____ in. to _____ ft. depth
BORE HOLE Diameter: 6 1/2 in. to 215 ft. depth; 4 1/2 in. to 275 ft. depth
Height: Above/Below Surface: 1 ft.
Weight: _____ lbs./ft.
☐ Drive Shoe ☐ Shale Packer

2. FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay	270	270
Sand	5	275
RECEIVED		
AUG -3 1998		
Well log is late, because we were waiting for final hook-up, but ours has decided to hook-up.		
new well		

USE A 2ND SHEET IF NEEDED

8. SCREEN: ☐ Not Installed ☐ Gravel-Packed
Type: Stainless Diameter: 2"
Slot/Gauze: 10 Length: 60'
Set Between: 215 ft. and 275 ft.
FITTINGS: ☐ K-Packer ☐ Bremer Check ☒ Blank Above Screen: 60 ft. Other: 2 x 5

9. STATIC WATER LEVEL: 60 ft. Below Land Surface ☐ Flowing

10. PUMPING LEVEL: Below Land Surface 275 ft. After 1 hrs. Pumping at 5 G.P.M.
☐ Plunger ☐ Bailer ☒ Air ☐ Test Pump

11. WELL HEAD COMPLETION:
☐ Pitless Adapter ☒ 12" Above Grade ☐ Basement Offset ☐ Well House

12. WELL GROUTED? ☐ No ☒ Yes From 215 to 0 ft.
☒ Neat Cement ☒ Bentonite ☐ Other
No. of Bags: 15 Additives: Water

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type: Septic Distance: 75 ft. Direction: West
Type: _____ Distance: _____ ft. Direction: _____

14. PUMP: ☒ Not Installed ☐ Pump Installation Only
Manufacturer's Name: _____
Model Number: _____ HP: _____ Volts: _____
Length of Drop Pipe: _____ ft. Capacity: _____ G.P.M.
TYPE: ☐ Submersible ☐ Jet ☐ Other: _____
PRESSURE TANK:
Manufacturer's Name: _____
Model Number: _____ Capacity: _____ Gallons: _____

15. ABANDONED WELL PLUGGED? ☐ Yes ☐ No
Casing Diameter _____ in. Depth _____ ft.
PLUGGING MATERIAL: ☐ Neat Cement ☐ Bentonite Slurry ☐ Cement/Bentonite Slurry ☐ Concrete Grout ☐ Bentonite Chips
No. of Bags: _____ Casing Removed? ☐ Yes ☐ No

16. REMARKS: (Elevation, Source of Data, etc.)

17. DRILLING MACHINE OPERATOR:
☒ Employee ☐ Subcontractor
Name: Jim Mobley

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.
Herb's Well & Pump Service 78-1804
REGISTERED BUSINESS NAME REGISTRATION NO.
Address: 11337 Sheridan Rd., New Lothrop, MI 48460
Signed: Neil Lowell AUTHORIZED REPRESENTATIVE Date: 7-30-98

GW-2-226 9/93

Authority: Act 368 PA 1978

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

GEOLOGICAL SURVEY NO. [ ]

WATER WELL AND PUMP RECORD

PERMIT NUMBER 6718082000 2

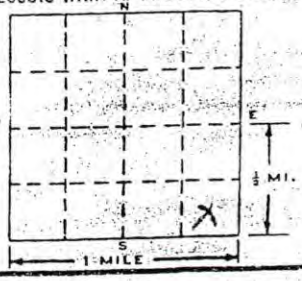
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Osceola	Osceola	SE¼ SE¼ SE¼	20	18 N/S	8 E/W

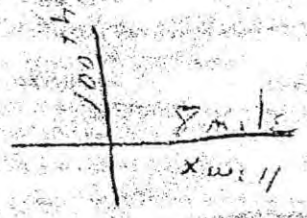
Distance And Direction From Road Intersection: West of 5 100 th on 8 mile Rd on North Side

Street Address & City of Well Location

Locate with "X" in Section Below



Sketch Map



3 OWNER OF WELL: Enoch Olson

Address 8 mile Rd Evart Mich.

Address Same As Well Location? ☑ Yes ☐ No

4 WELL DEPTH: 127 FT. Date Completed MO 9 DAY 23 YEAR 89 ☑ New Well ☐ Replacement Well

5 ☑ Cable tool ☑ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ _____

6 USE: ☑ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐ _____

7 CASING: Diameter 4 in. to 122 ft. depth ☑ Steel ☑ Threaded ☐ Plastic ☐ Welded

_____ in. to _____ ft. depth

Grouted Drill Hole Diameter _____ in. to _____ ft. depth

_____ in. to _____ ft. depth

Height: Above/Below Surface 1 ft

Weight 11 lbs./ft.

Drive Shoe ☑ Yes ☐ No

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	10	10
Sand & Clay	90	100
Clay	10	110
Water Sand	17	127

USE A 2ND SHEET IF NEEDED

8 SCREEN: ☐ Not Installed

Type Howard Smith Diameter 3 3/8

Slot/Gauze 10 Length 5'

Set between 122 ft. and 127 ft.

FITTINGS: ☑ K-Packer ☐ Lead Packer ☐ Bremer Check ☐ Blank above screen 3 ft. Other _____

9 STATIC WATER LEVEL:

_____ ft. below land surface ☐ Flow

10 PUMPING LEVEL: below land surface

_____ ft. after _____ hrs. pumping at _____ G.P.M.

_____ ft. after _____ hrs. pumping at _____ G.P.M.

11 WELL HEAD COMPLETION: ☐ Pitless adapter ☐ 12" above grade ☐ 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 Septic Distance 50 ft. Direction SW

Well disinfected upon completion? ☑ Yes ☐ No

Was old well plugged? ☐ Yes ☒ No

14 PUMP: ☐ Not Installed ☐ Pump Installation Only

Manufacturer's name Aermotor

Model number A-75 HP ¾ Volts 230

Length of Drop Pipe 117 ft. capacity 12 G.P.M.

TYPE: ☑ Submersible ☐ Jet _____

PRESSURE TANK:

Manufacturer's name X-Trol

Model number 10X203 Capacity 80 Gallons

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.

Waldron Well Drilling 0907

REGISTERED BUSINESS NAME REGISTRATION NO.

Address Evart Mich

Signed Kit W. Colson Date 9/25/89

AUTHORIZED REPRESENTATIVE

17. Rig Operator's Name: Brent Waldron

D67d 12/85

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a

GEOLOGICAL SURVEY NO

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978 67180820001

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Oscoda	Oscoda	NW ¼ NW ¼ NW ¼	20	18 N/S	8 E/W

Distance And Direction From Road Intersection: S. E. Corner of 9 mile + North Line

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map

3 OWNER OF WELL: Rick Stipek

Address: 15884 Anita, Harper Woods, MI 48225

Address Same As Well Location? ☐ Yes ☒ No

4 WELL DEPTH: (completed) 75 ft. Date of Completion 6-15-87

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE: ☒ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☐ Test Well ☐ Type IIb Public ☐

7 CASING: Diameter ☒ Steel ☒ Threaded ☐ Plastic ☐ Welded — Height: Above/Below Surface 4 ft

2 in. to 71 ft. depth — Weight 3.75 lbs./ft.

___ in. to ___ ft. depth

Grouted Drill Hole Diameter ___ in. to ___ ft. depth — Drive Shoe ☒ Yes ☐ No

___ in. to ___ ft. depth

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	6'	6'
Clay	40'	46'
Sand & gravel	20	66'
Sand white, waterbearing	9'	75'

USE A 2ND SHEET IF NEEDED

8 SCREEN ☒ Not Installed

Type 148 SS Diameter 1¼

Slot/Gauze Point Length 45"

Set between ___ ft. and ___ ft.

FITTINGS: ☒ K-Packer ☐ Lead Packer ☒ Bremer Check ☐ Blank above screen ___ ft. Other ___

9 STATIC WATER LEVEL: 20 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface

20 ft. after 1 hrs. pumping at 10 G.P.M.

___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION: ☐ Pitless adapter ☐ 12" above grade ☐ 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 Septic Distance 50 ft. Direction N

Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump Installation Only

Manufacturer's name F&W

Model number CP705 HP ½ Volts ___

Length of Drop Pipe 45 ft capacity 8-10 G.P.M.

TYPE: ☐ Submersible ☒ Jet ___

PRESSURE TANK

Manufacturer's name Champ Aire

Model number ___ Capacity 42 Gallons

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.

Wheeldon Well Drilling - 693

REGISTERED BUSINESS NAME — REGISTRATION NO. 1693-?

Address ___ MI

Signed Wheeldon Date 6-15-87

AUTHORIZED REPRESENTATIVE

D67d (Rev. 10-80)

LOCAL HEALTH DEPT. COPY

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

Environmental Data Resources, Inc.
an edr company

***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

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

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:	2443085-H3 EVART, MI
Source:	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-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
RAATS..... RCRA Administrative Action Tracking System
TRIS..... Toxic Chemical Release Inventory 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

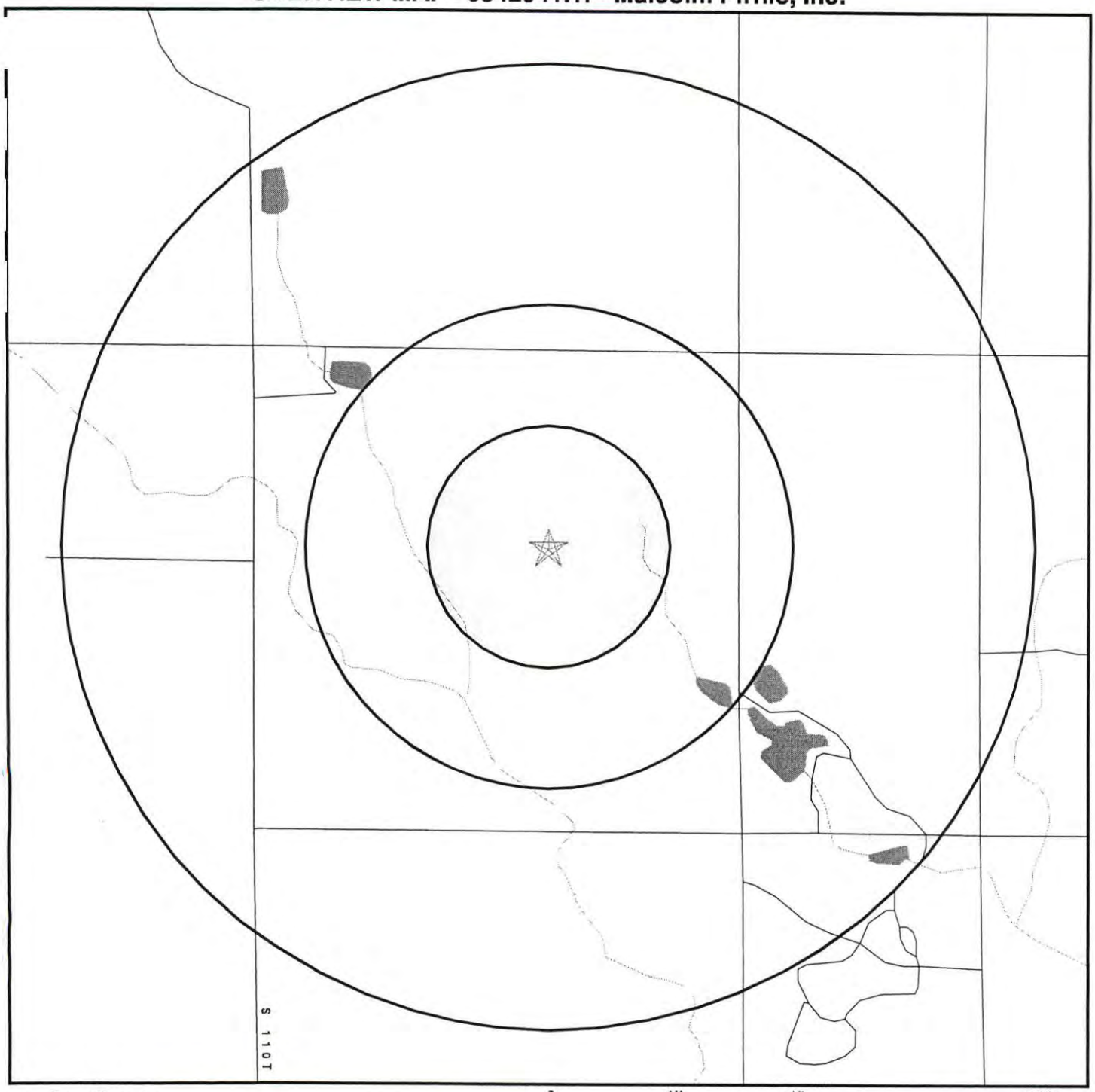
Surrounding sites were identified.

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

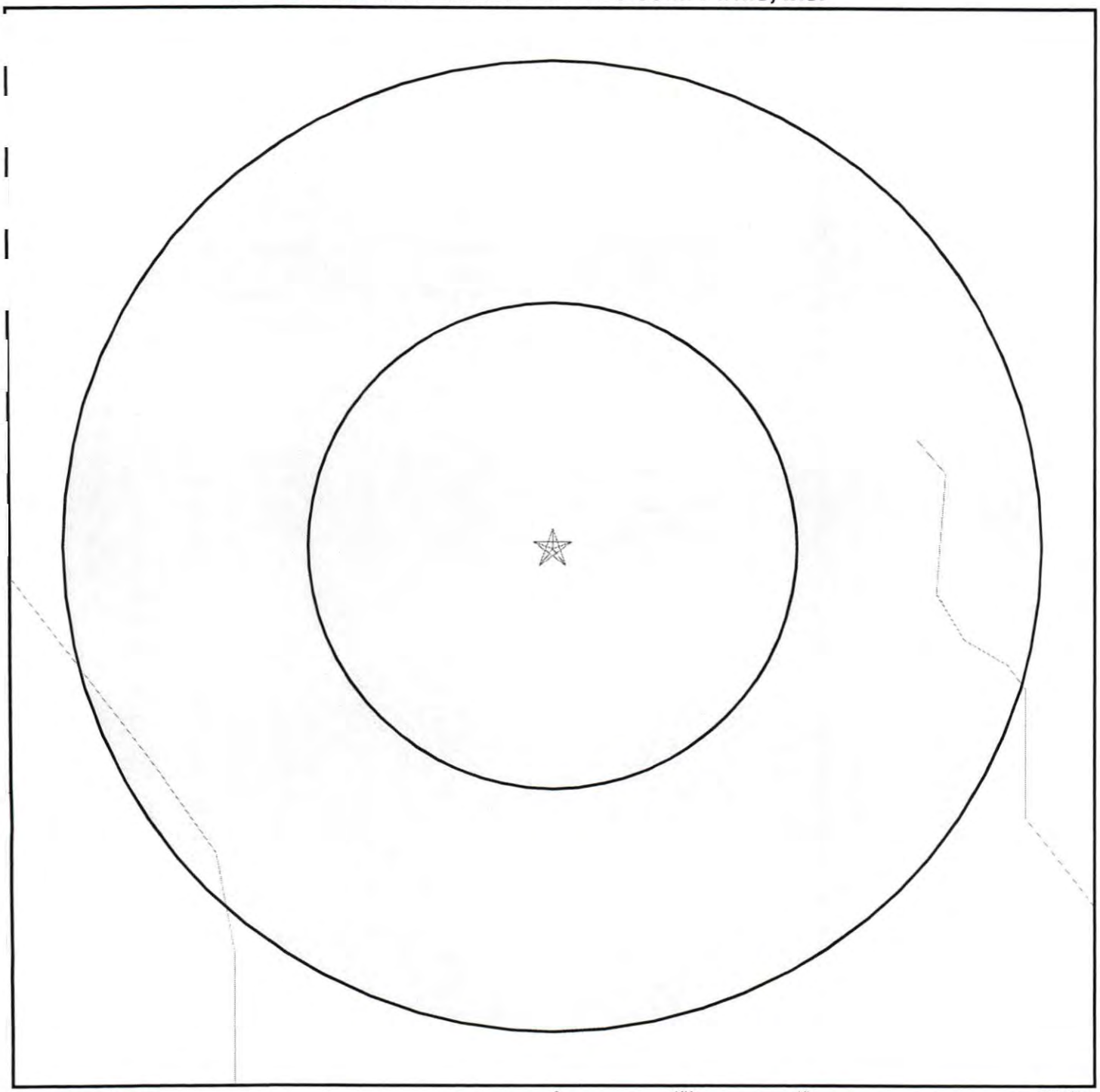
OVERVIEW MAP - 0542941.1r - Malcolm Pirnie, Inc.



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Coal Gasification Sites (if requested)
- National Priority List Sites
- Landfill Sites
- Power transmission lines
- Oil & Gas pipelines

TARGET PROPERTY:	Spring Hill Camp	CUSTOMER:	Malcolm Pirnie, Inc.
ADDRESS:	100 Avenue and 9 Mile	CONTACT:	Shane McDonald
CITY/STATE/ZIP:	Evart MI 49631	INQUIRY #:	0542941.1r
LAT/LONG:	43.9380 / 85.2945	DATE:	September 20, 2000 2:43 pm

DETAIL MAP - 0542941.1r - Malcolm Pirnie, Inc.



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Coal Gasification Sites (if requested)
- Sensitive Receptors
- National Priority List Sites
- Landfill Sites
- Power transmission lines
- Oil & Gas pipelines

0 1/16 1/8 1/4 Miles

TARGET PROPERTY:	Spring Hill Camp	CUSTOMER:	Malcolm Pirnie, Inc.
ADDRESS:	100 Avenue and 9 Mile	CONTACT:	Shane McDonald
CITY/STATE/ZIP:	Evart MI 49631	INQUIRY #:	0542941.1r
LAT/LONG:	43.9380 / 85.2945	DATE:	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								
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 SUPPLEMENTAL								
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
FINDS		TP	NR	NR	NR	NR	NR	0
HMIRS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
NPL Liens		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
STATE OR LOCAL ASTM SUPPLEMENTAL								
AST		TP	NR	NR	NR	NR	NR	0
EDR PROPRIETARY DATABASES								
Coal Gas		1.000	0	0	0	0	NR	0

AQUIFLOW - see EDR Physical Setting Source Addendum

TP = Target Property

NR = Not Requested at this Search Distance

* Sites may be listed in more than one database

Map ID Direction Distance Distance (ft.) Elevation	MAP FINDINGS Site	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	S100070558	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

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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 (EPIC).

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

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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
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
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 05/15/00
Date of Next Scheduled EDR Contact: 08/14/00

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
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: N/A
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 site.

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 sites.

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

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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. 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.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

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

Target Property County	FEMA Q3 Flood 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 Quad at Target Property	NWI Electronic Coverage
EVART	NO

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.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

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.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION 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 Code:	Jc
Era:	Mesozoic
System:	Jurassic
Series:	Jurassic

GEOLOGIC AGE IDENTIFICATION

Category: Continental Deposits

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.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

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

Soil Layer Information

	Boundary			Classification		
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

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

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.

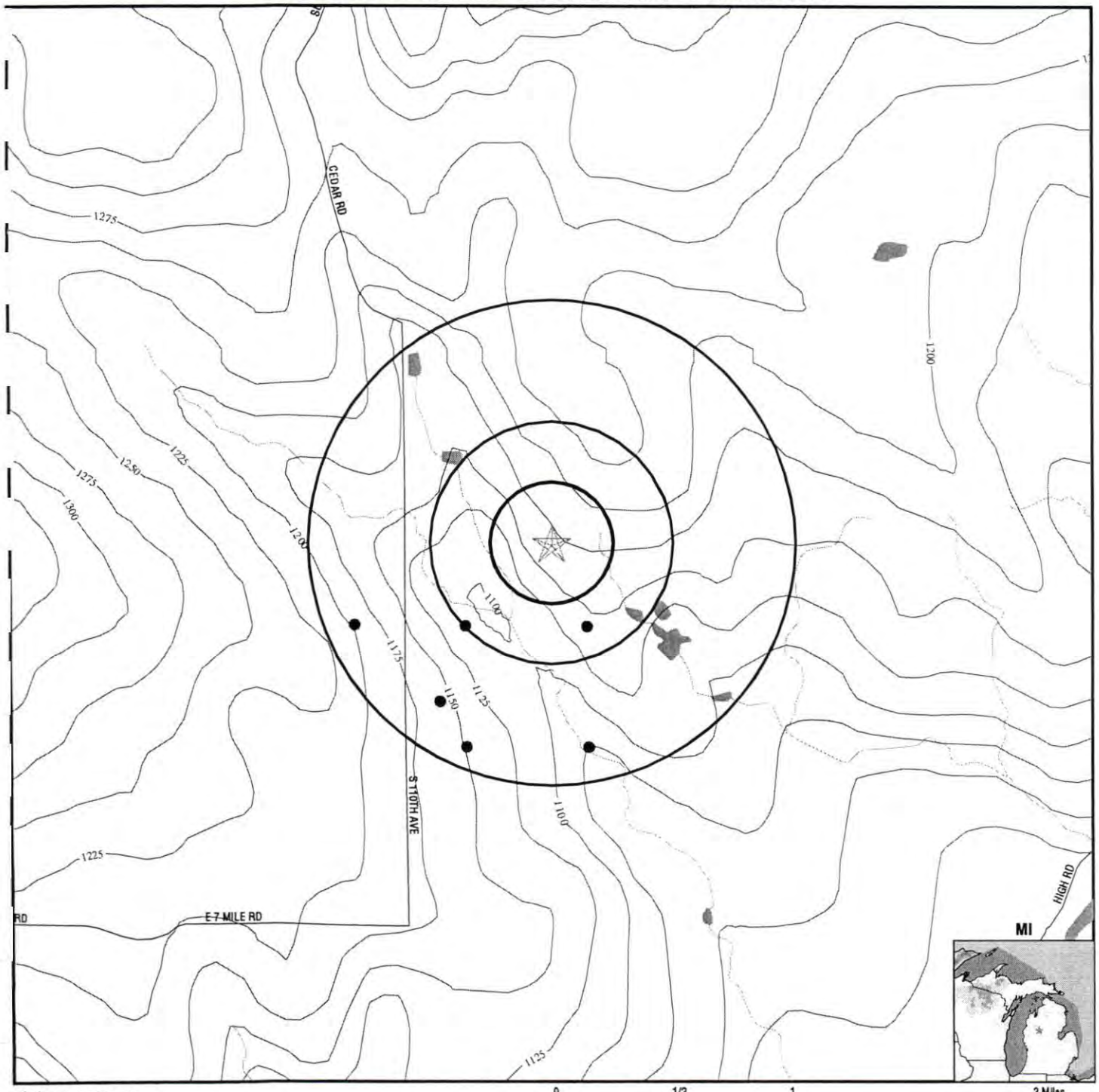
STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

STATE OIL/GAS WELL INFORMATION

DISTANCE FROM TP (Miles)	DISTANCE FROM TP (Miles)
1/2 - 1 Mile WSW	1/4 - 1/2 Mile SW
1/4 - 1/2 Mile SSE	1/2 - 1 Mile SW
1/2 - 1 Mile South	1/2 - 1 Mile SSW

PHYSICAL SETTING SOURCE MAP - 0542941.1r



- Major Roads
- Contour Lines
- Water Wells
- Public Water Supply Wells
- Groundwater Flow Direction
- Indeterminate Groundwater Flow at Location
- Groundwater Flow Varies at Location
- Cluster of Multiple Icons
- Earthquake epicenter, Richter 5 or greater
- Closest Hydrogeological Data
- Oil, gas or related wells

TARGET PROPERTY:	Spring Hill Camp	CUSTOMER:	Malcolm Pirnie, Inc.
ADDRESS:	100 Avenue and 9 Mile	CONTACT:	Shane McDonald
CITY/STATE/ZIP:	Evart MI 49631	INQUIRY #:	0542941.1r
LAT/LONG:	43.9380 / 85.2945	DATE:	September 20, 2000 2:43 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

OTHER STATE DATABASE INFORMATION

Permit Number:	010884	Well Type:	Dry Hole
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:	PIERSON-STIPEK ETAL 4		
Township Number:	12	N/S Tier Number:	18N
E/W Range Number:	08W	Section Number:	19
10 Acre Fraction:	Not Reported	40 Acre Fraction:	CN
160 Acre Fraction:	SE	Category:	Not Reported
X Coordinate:	1742484.88	Y Coordinate:	226280.12
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:	011175	Well Type:	Dry Hole
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:	KOEPPE & DAVY ETAL EVART		
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
160 Acre Fraction:	SW	Category:	Not Reported
X Coordinate:	1744900.50	Y Coordinate:	226229.27
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:	011189	Well Type:	Dry Hole
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:	BECKER & POLWARTH ET AL EVART		
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
160 Acre Fraction:	SE	Category:	Not Reported
X Coordinate:	1747537.56	Y Coordinate:	226187.01
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	

OTHER STATE DATABASE INFORMATION

Permit Number:	010336	Well Type:	Dry Hole
Well Number:	Not Reported	DNR Owner/Operator Num:	4906
Permit Prefix:	Not Reported	Permit Suffix:	Not Reported
County:	OSCEOLA	Well Status:	Abandoned
Owner:	Not Reported		
Name of Lease:	DAVY, VERNAL R C-1		
Township Number:	12	N/S Tier Number:	18N
E/W Range Number:	08W	Section Number:	29
10 Acre Fraction:	N2	40 Acre Fraction:	NW
160 Acre Fraction:	NW	Category:	Not Reported
X Coordinate:	1744332.93	Y Coordinate:	224599.01
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:	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
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:	NW	Category:	Not Reported
X Coordinate:	1744903.37	Y Coordinate:	223600.49
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
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[R] 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

MALCOLM PIRNIE
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 **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **M.B. & J.H.**

COORDINATES **N 227,267.5 E 1,746,801.7**
SURFACE ELEVATION **1097.16** DATUM **USGS**

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
								Brown loam (TOPSOIL).	SM	Stratigraphic information taken from MW-1d boring log. MW-1s drilled approx. 10' from MW-1s. Hand auger to 8' bgl to clear utilities.	1097.16
								Red, MEDIUM TO FINE SAND, little silt.	SM		1096.16
								Light brown, FINE TO MEDIUM SAND, little silt, moist.	SM		1094.16
5								Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.	SM		1093.16
								~~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.~~	1089.16

BORING LOG GSWA-SHC.GPJ MP_MI.GDT 10/18/00

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

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

COORDINATES **N 227,272.7 E 1,746,801.0**
SURFACE ELEVATION **1097.66** DATUM **USGS**

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								Brown loam (TOPSOIL).	SM	Hand auger to 8' bgl to clear utilities.	1097.66
								Red, MEDIUM TO FINE SAND, little silt.	SM		1096.66
		Hand Auger						Light brown, FINE TO MEDIUM SAND, little silt, moist.	SM		1094.66
5								Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.	SM		1093.66
		SSS	3-4 7-7	100				Light brown, FINE TO MEDIUM SAND, little fine to medium gravel, little silt,poorly sorted, round and spherical, loose, wet at 9.5'- 2" clayey gravel and silt seam.	SP	0.25" clay seam at 9.6' bgl	1089.66
10											
		SSS	3-6 10-11	95				Gray to brown, CLAY, trace silt and fine sand, medium plasticity, firm to hard, dry to moist clay.	CL	Driller notes change at 12.5' bgl.	1085.06
15											
		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.	1080.66
20											
		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 of medium sand with little silt at 23.5'.	SM	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1075.16
25											
		SSS	1-1 8-6	100				Buff to light brown, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose, wet.	SP	Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.	1071.66
30											
		SSS	3-0 3-5	75				Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose, wet.	SP	Granite fragments.	1064.66
								Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, few medium angular gravel, subrounded, spherical to elongate, loose, wet.	SP		1064.16
35								Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is	SP		1060.66
		SSS	2-4 8-10	75							

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

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

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

COORDINATES **N 227,272.7 E 1,746,801.0**
SURFACE ELEVATION **1097.66** DATUM **USGS**

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								subangular and elongate, loose, poorly sorted, wet. Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is subangular and elongate, loose, poorly sorted, wet. *(continued)*	SP		
45		SSS	1-4 5-8	88				Buff, MEDIUM SAND, few fine sand, round and spherical, poorly sorted, loose, wet.	SP	Outwash or glaciofluvial.	1054.16 1053.16
								Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine gravel, subrounded and subspherical, poorly sorted, loose, wet.	SP		
50		SSS	5-6 6-3	60				Buff, COARSE SAND, little medium sand, few fine gravel, round and subspherical, poorly sorted, loose, wet.	SP	Outwash or glaciofluvial.	1049.66
55		SSS	8-6 4-5	50				Buff, MEDIUM TO COARSE SAND, little fine to medium sand, few coarse sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP	Bail approx. 3.25' heave from augers.	1044.66
60		SSS	4-5 9-8	80				Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP		1039.66
65		SSS	4-5 5-11	85				Buff, MEDIUM SAND, little medium to coarse sand, few fine sand, trace coarse sand, round and very spherical, poorly sorted, loose, wet.	SP	Bail approx. 3' heave from augers.	1034.66
70		SSS	0-2 5-9	70				Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP	Bail approx. 2' heave from augers.	1029.66
75		SSS	0-0 0-0	90				Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, trace fine gravel, round and very spherical, sorted, very loose, wet.	SP	Bail approx. 2.5' heave from augers.	1024.66
80		SSS	1-5 12-13	50				Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP	Bail approx. 1.9' heave from augers.	1019.66
85		SSS	1-0 1-0	55				Buff, FINE TO MEDIUM SAND, few fine sand, round and spherical, sorted, very loose, wet.	SP	Bail approx. 2.5' heave from augers.	1014.66
90		SSS	5-15 20-27	90				Buff, FINE SAND, round and spherical, well sorted, loose, medium density, wet.	SP	Possible till at 89' bgl.	1009.66
								Gray, VERY FINE SANDY SILT, trace fine to medium gravel, poorly sorted, moist to wet.	SM	Bail approx. 1.0' heave from augers.	1008.66

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

COORDINATES **N 227,272.7 E 1,746,801.0**
SURFACE ELEVATION **1097.66** DATUM **USGS**

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
95		SSS	9-17 44-59	100				Gray, SILTY CLAY, trace fine sand and fine to medium gravel, low to medium plasticity, hard, dry to moist. *(continued)*	CL	Varved 93-95' bgl.	1004.66
								Brown to gray, FINE TO MEDIUM SAND, trace silt and clay, loose, round and spherical, wet.	SP	Driller notes change at 97' bgl.	1000.66
100		SSS	5-12 11-12	25							
105		SSS	3-4 10-11	90				Buff, MEDIUM TO COARSE SAND, little fine sand, few coarse sand, trace gray sand and clay, round and spherical, poorly sorted, loose, wet.	SP	Bail approx. 1.0' heave from augers.	994.56
110		SSS	4-12 18-28	100				Buff, MEDIUM TO COARSE SAND, little fine sand, trace fine gravel, subrounded and elongate to spherical, poorly sorted, loose, wet, 1" gray clay stringers at 109.5' and at 110' bgl.	SP	Bail approx. 0.5' heave from augers.	989.66
		SSS	6-5 29-52	95				Buff, MEDIUM TO COARSE SAND, little fine sand, trace fine gravel, subrounded and subspherical, poorly sortyed, loose, wet.	SP		984.66
115								Gray, SILT, little medium sand, dense, moist.	~~SM~~	~~End of boring - 115' bgl.~~	983.16

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

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

COORDINATES **N 227,278.5 E 1,746,804.4**
SURFACE ELEVATION **1098.39** DATUM **USGS**

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
								Brown loam (TOPSOIL).	SM	Stratigraphic information taken from MW-1d boring log. MW-1i drilled approx. 10' from MW-1d.	1098.39
								Red,medium to fine SAND,little silt.	SM		1097.39
								Light brown,fine to medium SAND,little silt,moist.	SM		1095.39
5								Light brown,fine to medium SAND,little silt,trace fine to medium gravel,poorly sorted,round and spherical,wet.	SM		1094.39 ▽
10								Light brown,fine to medium SAND,little fine to medium gravel,little silt,poorly sorted,round and spherical,loose,wet,at 9.5'- 2" clayey gravel and silt seam.	SP	0.25" clay seam at 9.6' bgl	1090.39
15								Gray to brown,CLAY,trace silt and fine sand,medium plasticity,firm to hard,dry to moist clay.	CL	Driller notes change at 12.5' bgl.	1085.79
20								Grayish brown,medium SAND,some silt and clay,sand is round and spherical,very loose,moist to wet.	SC	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K. Interbedded/gradation band per driller.	1081.39
25								Grayish brown,fine SAND,some silt,trace medium sand,medium density,round and spherical,moist with wet sandier seams,1/4" seam of clay at 22.75',gray 1" seam of silt at 23',1" seam of medium sand with little silt at 23.5'.	SM	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1075.89
30								Buff to light brown,medium to coarse SAND,few fine to medium gravel,subrounded and spherical,loose,wet.	SP	Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.	1072.39
35								Buff,medium to coarse SAND,few fine to medium gravel,subrounded and spherical,loose,wet.	SP	Granite fragments.	1065.39
								Buff,medium to coarse SAND,few fine to medium gravel,few medium angular gravel,subrounded,spherical to elongate,loose,wet.	SP		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

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

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BORING NO. **MW-2** SHEET **1** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **K.E. & J.H.**

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

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								Dark brown,loamy TOPSOIL (silty sand).	SM		1101.70
								Red,medium SAND,some silt,few clay,round and spherical,poorly sorted,loose,moist.	SM		1099.90
		Hand Auger						Medium brown,medium SAND,some silt,little clay,round and spherical,poorly sorted,loose,moist.	SP		1098.20
5								Red,CLAY,some silt,few fine sand,medium plasticity,moist.	CL		1096.90
								Buff,fine to medium SAND,little silt,few clay,round and spherical,loose,moist.	SP		1096.70
		SSS	2-1 1-0	100				Red,CLAY,some medium sand,little silt,low to medium plasticity,soft,very moist.	CL	Not similar to clay at MW-1.	1093.60
10								Buff,fine to medium SAND,some fine sand,few coarse sand,trace fine gravel,very rounded and spherical,loose, wet.	SP		▽1092.20
15		SSS	2-2 3-3	50				Buff,fine to very fine SAND,some fine sand,trace silt and fine gravel,rounded and spherical,loose,wet.	SP		1087.70
								Buff to gray,CLAY,some fine sand,low plasticity,soft,wet.	CL	Clay/Sand contact at 18' inferred from cuttings and driller's comments.	1085.80
20		SSS	2-2 3-2	50				Buff,medium to coarse SAND,some fine sand,little coarse sand,few silt,angular to round and subspherical to spherical,poorly sorted,loose,wet.	SP	Gravelly 22-24' bgl per driller.	1083.70
25		SSS	1-1 1-0	95				Buff,medium SAND,some medium to coarse sand,little fine sand,few silt,trace fine to medium gravel,rounded to subrounded and spherical,loose,wet,1" clayey silty fine sand stringer at 25.5'.	SP		1077.70
30		SSS	0-1 5-5	100				Buff,medium to coarse SAND,some fine sand,little silt,rounded and spherical,loose,wet,poorly sorted,1" red silt stringers at 30' and 30.5'.	SP		1072.70
35		SSS	1-2 7-9	25				Buff,medium SAND,few coarse sand,few silt,rounded and spherical,loose,wet.	SP	No Recovery at 39-41' interval due to 2" piece of gravel.	1067.70
			5-7								

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

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

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

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		SSS	12-10	0					SP		
		SSS	4-7 11-13	50				Buff,fine to medium SAND,trace fine gravel,rounded to subrounded,loose,wet.	SP	Bailed approx. 0.5' heave from augers.	1060.70
45		SSS	2-6 11-12	50				Buff,fine to medium SAND,trace fine gravel,rounded,loose,wet.	SP		1057.70
50		SSS	5-12 13-16	60				Buff,fine to medium SAND,trace fine rounded gravel,rounded to subrounded,loose,wet.	SP	Bailed approx. 1.0' heave from augers.	1052.70
55		SSS	4-9 15-16	60				Buff,medium SAND,trace fine sand,fine to medium rounded gravel,rounded to subrounded,loose,wet.	SP		1047.70
60		SSS	6-10 13-11	75				Buff,fine to medium SAND,trace fine gravel,rounded to subrounded,loose,wet.	SP	Bailed approx. 0.5' heave from augers.	1042.70
65		SSS	6-10 16-20	75				Buff,fine to medium SAND,trace coarse sand,trace fine rounded gravel,dense,few coarse sand stringers,rounded to subrounded.	SP		1037.70
70		SSS	5-9 22-25	90				Buff,fine to medium SAND,trace fine gravel,medium density,rounded to subrounded,2" seam of buff fine sand in tip of spoon.	SP		1032.70
75		SSS	6-12 22-23	40				Buff,fine to medium SAND,trace fine to medium gravel,medium density,rounded to subrounded.	SP	Tough drilling 74-76' bgl.	1027.70
80		SSS	7-17 18-25	100				Buff,fine to medium SAND,medium density,loose.	SP		1022.70
								Buff,clayey SAND,(fine to medium sand,little clay).	SP		1021.20
85		SSS	6-15 23-26	80				Buff,medium SAND,rounded to subrounded,trace fine sand,medium density.	SP		1017.70
90		SSS	2-8 19-27	60				Buff,medium SAND,trace fine sand,rounded to subrounded,loose to medium density.	SP		1012.70

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

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

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

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

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

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

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

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 1050**
DRILLING STARTED **6/28/00** ENDED **6/28/00**

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

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

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

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

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

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
								Buff,clayey fine to medium SAND,soft,trace gravel.		Rock wedged in tip of 43-45' sample.	1067.00
45		SSS	6-4 4-4	10					SC		
50		SSS	1-2 2-2	100				Buff,clayey fine to medium SAND,soft,few rounded gravel,saturated.	SC	48-50' sample is much softer than 43-45' sample.	1059.00
55		SSS	1-2 1-6	100				Buff,clayey fine to medium SAND,soft,few rounded gravel,saturated.	SC		1054.00
60		SSS	1-1 1-1	20				Buff,medium SAND,loose,trace fine and coarse sand,trace fine rounded gravel,rounded to subrounded,saturated .	SP		1049.00
65		SSS	1-1 3-2	100				Buff,medium SAND,loose,trace fine and coarse sand,trace clay,rounded to subrounded,saturated.	SP		1044.00
70		SSS	1-1 2-2	100				Buff,fine to medium SAND,trace coarse sand and fine gravel,loose,rounded to subrounded,saturated.	SP		1039.00
75		SSS	1-4 2-7	40				Buff,medium SAND,trace fine and coarse sand,loose,rounded to subrounded,saturated.	SP		1034.00
80		SSS	3-3 4-5	90				Buff,fine to medium SAND,loose,saturated,trace coarse sand and silt,trace fine gravel.	SP		1029.00
85		SSS	1-2 2-3	100				Buff,medium SAND,loose,rounded to subrounded,saturated,with lenses of fine and coarse sand.	SP		1024.00
								Coarse to very coarse SAND,fine to medium gravel,little medium sand.	SP		1022.50
90		SSS	2-2 2-3	100				Buff,fine to medium SAND,loose,rounded to subrounded,saturated,trace coarse sand.	SP		1019.00

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

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

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

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
95		SSS	6-7 7-9	100				Buff,fine to medium SAND,loose,rounded to subrounded,saturated,trace coarse sand. *(continued)*	SP		
		SSS	5-6 7-9	100				Mix of coarse SAND and fine GRAVEL seams in fine to medium sand,very saturated,trace clay.	SP		1009.00
100		SSS	6-9 13-15	50				Gray,fine SAND,hard,few clay and silt (till?).	SP		1008.00
								Gray,fine to medium SAND,medium hardness,silt,clay till.	SP	End of boring - 102' bgl.	1007.00

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

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

COORDINATES **N 227,190.7 E 1,746,649.2**
SURFACE ELEVATION **1090.06** DATUM **USGS**

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

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

BORING LOG GSWA-SHC.GPJ MP_MI.GDT 10/18/00

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BORING NO. **MW-4d** SHEET **1** OF **2**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

COORDINATES **N 227,193.5 E 1,746,646.7**
SURFACE ELEVATION **1089.51** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 1050**
DRILLING STARTED **6/29/00** ENDED **6/29/00**

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
		Hand Auger						Dark yellow to brown,TOPSOIL,clayey sand,moist.	SP		1089.51
								Buff,medium SAND,rounded to subrounded,moist to wet,trace fine sand.	SP		1087.51
5		SSS	4-4 2-2	80				Buff,medium SAND,rounded to subrounded,moist to wet,trace fine sand.	SP		1085.51
10		SSS	1-1 1-2	40				Buff,fine to medium SAND,rounded to subrounded,loose,saturated,trace rounded coarse sand,trace clay.	SP		1080.51
15		SSS	6-4 3-1	90				Buff,medium SAND,loose,saturated,trace coarse sand,little fine to medium subrounded gravel,trace clay (gravelly sand).	SP		1075.51
20		SSS	4-7 8-8	60				Light buff,sandy CLAY,hard,moist,few subrounded to subangular fine to medium gravel.	CL		1070.51
25		SSS	2-2 3-4	50				Buff,fine to coarse SAND,loose,saturated,few fine to medium subrounded gravel,trace clay (gravelly sand).	SP		1065.51
30		SSS	3-5 4-5	60				Buff,medium to coarse SAND,loose,saturated,little fine to coarse rounded to subrounded gravel.	SP		1060.51
								Light buff,sandy SILT,soft,saturated,trace fine angular to subangular gravel.	ML		1059.51
		SSS	1-1 1-1	50				Light buff,silty clayey fine to medium SAND,very soft,moist to wet,trace subrounded to subangular gravel.	SC		1058.51
35		SSS	1-1 2-2	90				Light buff,silty clayey fine to medium SAND,firm,moist to wet,trace gravel.	SC		1055.51
			1-1								

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

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

COORDINATES **N 227,193.5 E 1,746,646.7**
SURFACE ELEVATION **1089.51** DATUM **USGS**

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		SSS	2-3	100				Light buff,silty clayey fine to medium SAND,firm,moist to wet,trace gravel. *(continued)*	SC		
45		SSS	1-1 1-1	50				Light buff,silty clayey fine to medium SAND,loose, rounded to subrounded,saturated.	SC		1045.51
50		SSS	2-3 2-2	75				4" to 6" interbedded lenses of light buff silty clayey fine to medium,loose,saturated,SAND and buff medium,saturated SAND with trace fine sand and clay.	SC		1040.51
55		SSS	1-1 3-3	75				Light buff,silty clayey fine to medium SAND,soft,saturated.	SC		1035.51
60		SSS	1-3 5-6	90				Interbedded lenses of very soft, saturated silty clayey fine to medium SAND and buff medium to coarse rounded to subrounded SAND.	SC		1030.51
65		SSS	1-2 3-4	100				Light buff,silty clayey fine to medium SAND,saturated,trace fine gravel (less silt and clay content than previous spoon).	SC		1025.51
								Light buff,clayey fine to medium SAND,hard,moist.	SC		1023.81
70		SSS	2-3 4-5	70				Light buff,silty clayey fine to medium SAND,saturated.	SC		1020.51
75		SSS	1-0 1-3	100				Buff,fine to medium SAND,loose,rounded to subrounded,saturated,trace coarse sand and gravel,little rust colored banding.	SP		1015.51
80		SSS	3-6 6-7	100				Buff,medium SAND,loose,rounded to subrounded,saturated,trace fine and coarse sand,significant orange rust banding and staining.	SP		1010.51
85		SSS	4-4 9-10	75				Buff to light brown,interbedded fine to medium SAND,with silt,saturated.	SP		1005.51
								Light gray to brown,medium to coarse SAND,saturated,trace fine sand,trace fine subangular gravel.	SP		1005.01
		SSS	4-10 17-22	60				Medium gray to brown,fine to medium SAND,silt (till?),identical to unit encountered at 100' at MW-3.	CL	Driller felt till at 86' bgl.	1003.51
90		SSS		100				Medium gray,clay TILL,very firm,moist.	CL	End of boring - 91' bgl.	1000.51

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

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BORING NO. **MW-5d** SHEET **1** OF **4**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

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

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 95**
DRILLING STARTED **7/18/00** ENDED **7/19/00**

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
											1146.40
5		SSS	3-4 4-6	100				Medium brown SANDY CLAY, soft, damp to dry.	CL		
								Interbedded medium brown SANDY CLAY with light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.	CL		1144.90
10		SSS	19-20 12-4	25				Medium brown SANDY CLAY.	CL	Drove rock.	1141.40
								Light buff, dry, loose, FINE TO MEDIUM SAND, subangular to subrounded.	SP		1141.20
15		SSS	2-3 4-4	100				Dry, loose, light buff, MEDIUM SAND, trace fine sand, subrounded.	SP		1136.40
20		SSS	4-5 5-5	70				Dry, loose, light buff MEDIUM SAND, trace fine sand, subrounded. One <1/2" lens medium brown silt @ 19.5' bgl. No silt in remaining sample.	SP		1131.40
25		SSS	2-2 4-6	60				Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.	SP		1126.40
		SSS	14-9 11-15	100				Saturated medium dense light yellow brown SANDY SILT.	SM/ML		1121.40
30								Dry hard medium yellow brown SILTY/SANDY CLAY.	CL		1120.40
35		SSS	4-8 10-14	100				Dry/damp, hard medium grey CLAY, trace silt partings.	CL		1116.40
								Color change to light yellow brown SILTY CLAY, dry and hard.	CL	Felt lithology change at 36' bgl.	1114.90
		SSS	1-8 12-16	40				Saturated, light yellow brown, soft, SILT AND CLAY. Water may have entered spoon from	CL SP	Water may have entered spoon from	1111.40 1110.40

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

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BORING NO. **MW-5d** SHEET **2** OF **4**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

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

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								perched zone.		perched zone.	
								Dry light buff loose MEDIUM SAND, trace fine sand. *(continued)*	SP		
45		SSS	2-5 7-10	60				Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.	SP		1106.40
50		SSS	3-4 6-9	60				Dry, loose, light buff MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, one fine to medium gravel stringer @ 48.5'.	SP		1101.40
55		SSS	0-0 1-1	50				Saturated, loose light yellow brown MEDIUM TO FINE SAND, trace medium rounded gravel.	SP		1096.40
								Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC		1095.90
60		SSS	2-3 5-5	80				Saturated, loose light yellow brown MEDIUM TO COARSE, trace fine sand, trace gravel.	SP GP		1091.40 1090.90
		SSS	4-70/6"	40				Saturated loose subangular to subrounded FINE TO COARSE GRAVEL.	GP		1089.40
		SSS	9-14 19-22	100				Mixed FINE TO MEDIUM GRAVEL AND FINE TO MEDIUM SAND, saturated. May be slough. Poor recovery, seemed to be pushing a cobble.	SP ML		1087.40 1086.40
65		SSS	2-4 11-14	50				Saturated light yellow brown FINE TO MEDIUM SAND with some fine subangular to subrounded gravel.	SP		1085.90 1085.40
								Moist medium yellow brown FINE SAND AND SILT, firm.	SP		
70		SSS	2-4 5-5	60				Saturated light yellow brown, FINE TO MEDIUM SAND trace silt.	SP		1081.40
								Saturated light yellow brown, FINE TO MEDIUM SAND, trace silt, subangular to subrounded.	SP		1080.90
								Saturated light yellow MEDIUM TO FINE SAND, rounded to subrounded.			
75		SSS	0-1 6-10	60				Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay.			1076.40
								Saturated light yellow brown MEDIUM TO FINE SAND, trace fine to medium subrounded gravel.	SP		
80		SSS 78-80 Grain size analysis	4-11 18-26	100				Saturated light yellow brown MEDIUM TO FINE SAND.	SP		1071.40
								Saturated light yellow brown SILT, some fine to medium sand.	ML		1070.40
85		SSS 83-85 Grain size analysis	1-2 4-6	100				Saturated light yellow brown FINE TO MEDIUM SAND, trace to few silt, trace clay.	SP		1066.40
90		SSS	2-2 2-3	50				Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.	SP		1061.40

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

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BORING NO. **MW-5d** SHEET **3** OF **4**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

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

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
95		SSS 93-95 Grain size analysis	1-2 3-5	60				Saturated light yellow brown MEDIUM TO COARSE SAND, little to some fine subangular to subrounded gravel, trace clay (gravelly sand). *(continued)*	SP		1056.40
		SSS	3-5 7-10	40				Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, trace gravel, trace clay.	SP		1051.40
100								Saturated subangular to subrounded GRAVEL, trace fine to medium sand. One large gravel (1") wedged in bottom of spoon.	GP		1050.90
		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
105											
		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
110											
		SSS	2-3 6-10	100				Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand.	SP		1036.40
115											
		SSS 18-120 Grain size analysis	1-2 3-5	100				Saturated, loose, light yellow brown MEDIUM SAND, trace fine gravel.	SP		1031.40
120											
		SSS	2-4 8-20	3100				Saturated, light yellow brown FINE TO COARSE SAND, interbedded lenses.	SW		1026.40
125								Medium grey fine to very fine SILTY SAND, trace clay. Saturated, loose.	SM		1024.90
		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
130											
		SSS	0-0 0-2	100				Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, trace coarse sand, rounded and subrounded.	SP	No change felt in drilling.	1016.40
135								Moist moderate grey CLAY, sandy/silty clay (till?)	CL		1014.60
		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
140											
		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
145											

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

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

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

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

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BORING NO. **MW-5i** SHEET **1** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

COORDINATES **N 227,274.3 E 1,747,404.0**
SURFACE ELEVATION **1148.75** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 95**
DRILLING STARTED **7/18/00** ENDED **7/20/00**

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
								Medium brown SANDY CLAY, soft, damp to dry.	CL	Stratigraphic information taken from MW-5d boring log. MW-5i drilled approx. 10' from MW-5d.	1145.75
5								Interbedded medium brown SANDY CLAY with light yellow brown MEDIUM TO COARSE SAND, dry, subangular to subrounded.	CL		1144.25
								Medium brown SANDY CLAY.	CL	Drove rock.	1140.75
								Light buff, dry, loose, FINE TO MEDIUM SAND, subangular to subrounded.	SP		1140.55
10											
								Dry, loose, light buff, MEDIUM SAND, trace fine sand, subrounded.			1135.75
15									SP		
								Dry, loose, light buff MEDIUM SAND, trace fine sand, subrounded. One <1/2" lens medium brown silt @ 19.5' bgl. No silt in remaining sample.			1130.75
20									SP		
								Saturated, loose, light yellow brown MEDIUM SAND, trace fine sand, rounded to subrounded.			1125.75
25									SP		
								Saturated medium dense light yellow brown SANDY SILT.	SM/ML		1120.75
								Dry hard medium yellow brown SILTY/SANDY CLAY.			1119.75
30									CL		
								Dry/damp, hard medium grey CLAY, trace silt partings.	CL		1115.75
								Color change to light yellow brown SILTY CLAY, dry and hard.		Felt lithology change at 36' bgl.	1114.25
35									CL		
								Saturated, light yellow brown, soft, SILT AND CLAY. Water may have entered spoon from	CL SP	Water may have entered spoon from	1110.75 1109.75

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

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BORING NO. **MW-5i** SHEET **2** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

COORDINATES **N 227,274.3 E 1,747,404.0**
SURFACE ELEVATION **1148.75** DATUM **USGS**

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								perched zone.		perched zone.	
								Dry light buff loose MEDIUM SAND, trace fine sand. *(continued)*	SP		
								Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.			1105.75
45									SP		
								Dry, loose, light buff MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, one fine to medium gravel stringer @ 48.5'.			1100.75
50									SP		
								Saturated, loose light yellow brown MEDIUM TO FINE SAND, trace medium rounded gravel.	SP		1095.75
55								Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC		1095.25
								Saturated, loose light yellow brown MEDIUM TO COARSE, trace fine sand, trace gravel.	SP		1090.75
									GP		1090.25
60								Saturated loose subangular to subrounded FINE TO COARSE GRAVEL.	GP		1088.75
								Mixed FINE TO MEDIUM GRAVEL AND FINE TO MEDIUM SAND, saturated. May be slough. Poor recovery, seemed to be pushing a cobble.	SP		1086.75
									ML		1085.75
								Saturated light yellow brown FINE TO MEDIUM SAND with some fine subangular to subrounded gravel.	SP		1085.25
65											1084.75
								Moist medium yellow brown FINE SAND AND SILT, firm.	SP		
								Saturated light yellow brown, FINE TO MEDIUM SAND trace silt.	SP		1080.75
								Saturated light yellow brown, FINE TO MEDIUM SAND, trace silt, subangular to subrounded.			1080.25
70								Saturated light yellow MEDIUM TO FINE SAND, rounded to subrounded.	SP		
								Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay.			1075.75
								Saturated light yellow brown MEDIUM TO FINE SAND, trace fine to medium subrounded gravel.			
75									SP		
								Saturated light yellow brown MEDIUM TO FINE SAND.	SP		1070.75
								Saturated light yellow brown SILT, some fine to medium sand.			1069.75
80									ML		
								Saturated light yellow brown FINE TO MEDIUM SAND, trace to few silt, trace clay.			1065.75
85									SP		
								Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.			1060.75
90									SP		

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

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

COORDINATES **N 227,274.3 E 1,747,404.0**
SURFACE ELEVATION **1148.75** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
95								Saturated light yellow brown MEDIUM TO COARSE SAND, little to some fine subangular to subrounded gravel, trace clay (gravelly sand). *(continued)*	SP		1055.75
								Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, trace gravel, trace clay.	SP		1050.75
100								Saturated subangular to subrounded GRAVEL, trace fine to medium sand. One large gravel (1") wedged in bottom of spoon.	GP	End of boring - 100' bgl.	1050.25

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

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

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

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
5		SSS	3-5 5-6	80				Saturated yellow brown medium Sand, trace fine sand.	SP		1139.44
10		SSS	2-2 3-2	75				Saturated, light yellow brown medium Sand, inc. percentage of clay.	SP		1134.94
								Light yellow brown Clay, trace fine sand, dry.	CL		1133.44
15		SSS	4-9 14-19	100				Dry medium grey brown Clay, trace fine sand, very stiff.	CL		1129.94
20		SSS	3-5 6-7	80				Dry light yellow brown medium Sand, trace coarse sand, trace fine gravel, rounded and subrounded grains.	SP	Drilling easier at 17' bgl.	1124.94
25		SSS	11-14 17-25	90				Interbedded (varved?) layers of very clean, light brown to cream colored medium Sand, with layers of light yellow brown silty fine to medium sand, trace clay. Very tight.	SM		1119.94
30		SSS	9-16 24-26	90							
35		SSS	7-17 18-28	70				Interbedded layers of cream, dry medium to fine sand, and layers of dry light yellow brown fine to medium Sand and Silt (mostly silt). Layers 1/2 to 4" each.	SM-ML		1109.94
		SSS	6-13 18-19	70				Damp, light yellow grown fine to medium Sand, trace silt, rounded and subrounded, loose.	SM		1104.94

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

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

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

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
								Damp, light yellow grown fine to medium Sand, trace silt, rounded and subrounded, loose. *(continued)*	SM		
		SSS	4-7 14-18	60				Light yellow brown, saturated lenses of medium to coarse Sand, and fine to medium sand, with one lens (1") of light yellow brown silt.	SM		1099.94 ▽
45								Saturated light yellow brown fine to medium Sand, rounded and subrounded, trace silt.	SM		1094.94
50		SSS	1-7 12-12	80							
		SSS	3-5 10-14	100				Saturated light yellow brown fine to medium Sand, increase percentage of silt and clay.	SM		1089.94
55								Saturated light yellow brown silt.	ML		1088.44
		SSS	1-3 7-7	100				Moderate grey brown Silt, clay in tip of spoon.	ML		1087.54
								Saturated light yellow brown medium to fine Sand, rounded and subrounded.	SP		1084.94
60								Saturated light yellow brown fine to very fine Sand, silt, trace clay.	SP		1083.44
		SSS	5-7 13-19	80				Saturated light yellow brown fine to medium Sand, with few thin lenses (1-3") of silt or clayey sand.	SM/SC		1079.94
65											
		SSS	2-2 6-6	100				Saturated light yellow brown fine to medium Sand, rounded and subrounded, trace clay.	SP		1074.94
70											
		SSS	2-2 3-5	100				Saturated light yellow brown medium to coarse Sand, trace fine sand, trace fine to medium subangular gravel, one 2" lens silty fine to medium sand.	SP		1069.94
75											
		SSS	1-3 10-22	100				Saturated light yellow brown medium Sand, rounded and subrounded, trace clay, trace coarse sand, trace fine subrounded gravel.	SP	End of boring -80' bgl.	1064.94
80											

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

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BORING NO. **MW-7** SHEET **1** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Jeff Groncki**

COORDINATES **N 227,527.9 E 1,746,900.2**
SURFACE ELEVATION **1149.23** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 1050**
DRILLING STARTED **7/18/00** ENDED **7/19/00**

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
											1149.23
5		SSS	2-3 4-4	75				Brown, stiff CLAY, dry-moist.	CL		1144.23
10		SSS	4-7 9-10	40				Light brown FINE TO VERY FINE SAND, with trace medium to coarse sand, dry.	SP		1139.23
15		SSS	4-6 10-10	75				Light brown, medium SAND, large to medium gravel, coarse sand, dry.	SP		1135.23
20		SSS	2-4 8-9	80				Brown, stiff to very stiff CLAY, dry.	CL		1129.23
25		SSS	5-7 12-13	60				Light brown, medium to fine SAND, some medium to fine gravel, little coarse gravel.	SP		1125.03
30		SSS	6-10 14-21	60				Light brown, medium to fine SAND, some medium to fine gravel, little coarse gravel, two 1/4" clay lenses, one at 29 ft. bgl, one at 31.5 ft. bgl.	SP		1120.23
35		SSS	24-28 18-32	5				Light brown, medium SAND, some coarse sand, fine gravel.	SP	Driller comment: Pushed stone 34-36 ft. bgl.	1115.23
			7-12						SM		1110.23

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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**

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		SSS	28-26	90				Brown clay 2", Light brown, fine silty sand 2", Light brown very FINE SAND, very dry. *(continued)*	SM		
45		SSS	7-12 17-45	90				Brown clay 2", Light brown, fine silty sand 2", Light brown very FINE SAND, very dry.	SM		1105.23
50		SSS	10-11 14-16	90				Light brown VERY FINE SILTY SAND, 6" very stiff brown CLAY, brown VERY FINE CLAYEY SAND, with many thin (1/8-1/4") clay lenses.	SC	Driller comment: Hard drilling 52-53 ft. bgl.	1100.23
55		SSS	7-14 15-18	90				Brown FINE CLAYEY SAND, wet.	SC		1095.23
								Brown CLAY, wet, trace fine sand.	CL		1094.23
								Light brown FINE SAND, brown wet clay with little fine to very fine sand.	SP	Wet at 59' bgl.	1093.73
60		SSS	1-2 4-7	60				Light brown MEDIUM SAND, with some coarse and fine sand and little fine gravel. 1/2" of brown clay at approx. 61 ft. bgl.	SP		1090.23
		SSS	3-4 7-9	100				FINE GRAVEL, with some medium gravel and coarse sand.	GP	Sand bailed auger.	1088.23
65		SSS	5-5 9-13	70				Light brown MEDIUM TO FINE SAND, with some coarse sand, trace fine gravel. 2" brown clay approx. 65.6 ft. bgl., light brown medium to coarse sand approx. 66 ft. bgl.	SP	Sand bailed auger.	1085.23
70		SSS	4-9 15-18	90				Light brown MEDIUM SAND, with some coarse and fine sand, little fine gravel, becomes clayey approx. 71' bgl.	SP	Sand bailed auger.	1080.23
75		SSS	11-13 16-18	90				Light brown MEDIUM TO COARSE SAND, with some fine gravel and little to trace fine sand and medium gravel. 6" gravel seam approx. 75 ft. bgl.	SP	Sand bailed auger.	1075.23
80		SSS	8-21 18-23	90				Brown CLAYEY SAND, with coarse gravel.	SC	Driller comment: Easier drilling 83-84' bgl.	1069.23
85		SSS	4-7 14-20	80				Light brown MEDIUM SAND, with little to some coarse sand. 3/4" brown clay with some fine sand approx 86 ft. bgl.	SP		1065.23
								Light brown MEDIUM TO COARSE SAND, trace fine to medium gravel.	SP		1063.73
90		SSS	6-11 13-15	80				Light brown MEDIUM SAND, little to some coarse sand.	SP	Sand bailed auger.	1060.23
								Light brown COARSE SAND, with some fine gravel and trace medium gravel and medium sand.	SP		1058.73

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

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BORING NO. **MW-7** SHEET **3** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Jeff Groncki**

COORDINATES **N 227,527.9 E 1,746,900.2**
SURFACE ELEVATION **1149.23** DATUM **USGS**

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

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

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BORING NO. **MW-8** SHEET **1** OF **2**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

COORDINATES **N 227,562.3 E 1,746,466.4**
SURFACE ELEVATION **1113.49** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA** EQUIPMENT **CME 95**
DRILLING STARTED **7/18/00** ENDED **7/18/00**

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		AUG						Topsoil.	SP-SM		1113.49
5		SSS	2-2 1-2	60				Dry, medium orange-brown, MEDIUM SAND, trace fine sand, subangular to subrounded, loose.	SP		1110.49
10		SSS	3-5 8-10	80				Dry, loose, light brown, FINE TO MEDIUM SAND, subrounded.	SP		1105.49
								Silty, very firm, dry SANDY CLAY.	CL		1103.49
15		SSS	3-6 10-12	100				SANDY CLAY, stiff, very firm, dry.	CL	Felt lithology change @17 ft. bgl.	1100.49
20		SSS	1-1 2-3	10				Saturated, light yellow brown, MEDIUM SAND with lens of light yellow brown SANDY SILT.	SM-ML		1096.49
25		SSS	1-3 5-6	40				Saturated, light yellow brown, MEDIUM SAND, rounded to subrounded, trace fine sand, trace coarse sand, trace clay.	SP		1090.49
30		SSS	3-3 5-8	50				Saturated, light yellow brown, MEDIUM SAND, rounded to subrounded, trace fine sand.	SP		1085.49
35		SSS	4-9 12-13	100				Saturated, light yellow brown, MEDIUM TO FINE SAND, rounded to subrounded.	SP		1080.49
								Saturated, light yellow brown SILT, few fine to very fine sand.	ML		1079.49
		SSS	6-3 6-10	100					SP		1075.49

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

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

COORDINATES **N 227,562.3 E 1,746,466.4**
SURFACE ELEVATION **1113.49** DATUM **USGS**

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								Saturated light yellow brown, FINE TO MEDIUM SAND, trace sand, rounded to subrounded, one silt pocket at 39.5' bgl (1" thick). *(continued)*	SP		
45		SSS	2-3 4-6	90				Saturated, light yellow brown, MEDIUM TO FINE SAND, rounded and subrounded.	SP		1070.49
								Saturated, light yellow brown, SILTY FINE SAND.	SM		1069.49
50		SSS	2-5 7-10	100				Saturated, light yellow brown, MEDIUM TO FINE SAND, rounded and subrounded. One 2" lens of gravel, rounded at 49' bgl.	SP		1065.49
55		SSS	4-7 8-8	100				Saturated, light yellow brown, MEDIUM TO FINE SAND, lenses of silt, coarse sand imbedded in fine to medium sand.	SP		1060.49
								Light yellow brown MEDIUM TO FINE SAND, saturated, thin lenses of silt, coarse sand imbedded in fine to medium sand.	SP		1059.49
60		SSS	5-11 13-17	100				Light yellow brown SANDY SILT, trace fine gravel, saturated.	SM-ML		1055.49
								Dry light yellow brown SANDY CLAY, with stringers of dry light brown fine sand.	CL		1054.49
65		SSS	1-2 4-8	100				Saturated light yellow brown MEDIUM SAND, trace fine sand, trace coarse sand.	SP	Felt lithology change at 62.5' bgl.	1050.99
								Saturated light yellow brown FINE TO VERY FINE SAND and silt.	SM		1048.99
70		SSS	1-3 3-6	100				Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace coarse sand, loose.	SP		1045.49
75		SSS	1-3 4-6	90				Saturated light yellow brown MEDIUM SAND, rounded and subrounded, trace fine sand, loose.	SP		1040.49
80		SSS	2-3 5-7	40				Saturated light yellow brown MEDIUM SAND, trace fine sand, rounded and subrounded, loose.	SP		1035.49
85		SSS	2-3 5-8	90				Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand, subrounded.	SP	End of boring -85' bgl.	1030.49

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BORING NO. **MW-9** SHEET **1** OF **2**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Jeff Groncki**

COORDINATES **N 227,063.9 E 1,747,879.5**
SURFACE ELEVATION **1125.29** DATUM **USGS**

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **4 1/4" HSA**
EQUIPMENT **CME 1050**
DRILLING STARTED **7/19/00**
ENDED **7/20/00**

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
											1125.29
5		SSS	1-1 3-2	50				Brown stiff CLAY, saturated/moist	CL		
10		SSS	3-4 5-6	50				Light brown, VERY FINE CLAYEY SAND.	SC		1115.79
								Light brown FINE TO VERY FINE SAND, with trace coarse sand and fine gravel.	SP		1115.29
15		SSS	4-8 8-10	50				Brown soft CLAY, saturated/moist.	CL		1111.29
								Light brown MEDIUM SAND, with some fine to mediuim gravel.	SP		1110.79
20		SSS	3-6 8-8	60				Light brown MEDIUM SAND, with some fine to coarse gravel, saturated/moist. Two inch thick brown CLAY lens at 20.5' bgl.	SP		1106.29
25		SSS	2-2 2-4	75				Light brown FINE TO MEDIUM SAND, wet at 25'.	SP		1101.29
								Light brown CLAYEY SAND, trace medium gravel.	SC		1099.29
30		SSS	2-2 3-4	100				Brown CLAY with little to some medium sand, trace fine gravel, moist.	CL		1096.29
35		SSS	3-7 14-17	100				Brown FINE CLAYEY SAND, interbedded with silty layers, wet at 35' bgl.	SC-SM		1090.79
								Light brown MEDIUM SAND, with some coarse sand.	SP		1089.29
			1-6						SP		1086.29

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

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

COORDINATES **N 227,063.9 E 1,747,879.5**
SURFACE ELEVATION **1125.29** DATUM **USGS**

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		SSS	9-10	90			Light brown MEDIUM SAND, with some fine sand, little coarse sand, becoming clayey toward 41' bgl. *(continued)*	SP		
45		SSS	5-5 7-11	80			Light brown MEDIUM SAND, with some coarse sand, trace fine gravel.	SP		1081.29
50		SSS	4-7 10-10	90			Light brown MEDIUM SAND, with some coarse sand, trace fine gravel, with some clayey lenses (1/8" thick).	SP		1076.29
55		SSS	7-12 18-19	100			Brown CLAY.	CL		1070.29
							Light brown MEDIUM TO FINE CLAYEY SAND.	SC		1069.99
60		SSS	8-9 13-7	100			Light brown MEDIUM SAND, with little fine sand, becoming clayey toward 60 ft. bgl.	SC		1066.29
							Light brown MEDIUM SAND with some coarse sand, becoming clayey toward 61 ft. bgl.	SC		1065.29
65		SSS	1-3 4-11	90			Light brown MEDIUM SAND, with little to some coarse sand and fine gravel.	SP		1061.29
70		SSS	5-10 26-37	90			Light brown MEDIUM SAND, with some coarse sand and fine gravel, little medium to coarse gravel. One thin (1/8" thick) clay lens at 70 ft. bgl.	SP		1056.29
75		SSS	3-6 11-24	90			Light brown MEDIUM SAND, with some coarse sand, some medium gravel, few iron oxide stained laminations, some medium to fine gravel lenses.	SP		1051.29
							Brownish gray SILTY CLAY.	CL	End of boring - 76' bgl	1050.49

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

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

COORDINATES **N 227,478.6 E 1,747,980.1**
SURFACE ELEVATION **1120.54** DATUM **USGS**

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
											1116.54
5		SSS	2-4 2-2	30				Medium to coarse GRAVEL, with some light brown medium to coarse sand, dry.	GP		
											1111.54
10		SSS	1-2 4-8	70				Brown, soft, wet CLAY, with light brown very fine to fine sand interbedded. Clay becomes sandy from 11 ft. to 14 ft. bgl, dry to moist.	CL		
								Lihgt brown fine SAND.	SP		1106.54
15		SSS	1-2 4-7	60				1/8" brown clay seam underlain by light brown, clayey FINE SAND.	SC		1105.54
								Light brown medium SAND, with some iron oxide stained laminations, moist to dry.	SP		1105.04
20		SSS	1 (18")-6	100				Light brown MEDIUM TO FINE SAND, with some very fine sand, wet to very moist.	SP		1101.54
								Brown, very FINE SAND, with little to some clay, wet.	SP		1100.54
25		SSS	3-12 10-13	40				Light brown, MEDIUM SAND, with trace to little fine sand, wet.	SP		1096.54
30		SSS	11-10 16-24	100				Light brown FINE SAND, with some medium to coarse sand seams, with trace to little fine grave.	SP		1091.54
								Light brown MEDIUM SAND.	SP		1090.04
35		SSS	2-4 9-17	100				Light brown VERY FINE to FINE SAND.	SP		1086.54
								Light brown MEDIUM SAND, with little to some coarse sand.	SP		1085.54
			3-7						SP		1081.54

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

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

COORDINATES **N 227,478.6 E 1,747,980.1**
SURFACE ELEVATION **1120.54** DATUM **USGS**

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

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

COORDINATES **N 229,202.3 E 1,746,172.8**
SURFACE ELEVATION **1166.66** DATUM **USGS**

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
5		SSS	2-2 3-3	80				Orangish-brown FINE SAND.	SP		1162.66
								Soft, brown, moist CLAY, with little fine sand.	CL		1162.16
10		SSS	8-10 10-11	80				Stiff, brown, dry CLAY, with little fine gravel and trace medium gravel and fine sand.	CL		1157.66
15		SSS	8-15 21-22	70				Light brown VERY FINE SILTY SAND.	SM		1152.66
								Light brown FINE TO MEDIUM SAND, with trace coarse sand.	SP	Pushed rock in 19 to 21 ft. sample (no recovery). Cutting shoe banged up; gravel present 19 to 21 ft. bgl.	1151.16
20		SSS	9-50	0							
25		SSS	8-13 21-29	60				Light brown FINE TO VERY FINE SAND, with some seams (2" thick) of medium sand with some coarse sand, very dry.	SP		1142.66
30		SSS	8-12 15-22	60				Light brown MEDIUM SAND, with little coarse sand, dry.	SP		1137.66
								Light brown FINE SAND, with some silt and clay, wet.	SP		1135.66
								Brown CLAY, moist at the top, dry at the bottom.	CL		1135.16
35		SSS	7-7 11-17	80				Light brown MEDIUM SAND, dry.	SP		1132.66
								Silty brown CLAYEY FINE SAND.	SC		1132.16
								Stiff brown CLAY, dry.	CL		1131.16
								Light brown MEDIUM SAND, dry.	SP		1130.66
			10-24					Brown stiff CLAY.	CL		1127.66

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

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

COORDINATES **N 229,202.3 E 1,746,172.8**
SURFACE ELEVATION **1166.66** DATUM **USGS**

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

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

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

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

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
5		SSS	3-3 5-6	50				Moderate reddish-brown, cohesive CLAYEY FINE TO COARSE SAND, clast supported, dry to moist.	SC		1159.21
10		SSS	7-1 3-5	70				Moist to wet, soft CLAYEY FINE TO COARSE SAND, cohesive, trace fine gravel.	SC		1154.21
15		SSS	3-2 1(12")	100				Moist to wet, semi-cohesive, light yellow brown MEDIUM SAND, trace coarse sand, trace gravel, trace clay.	SP		1149.21
								Saturated, very loose, light yellow brown FINE TO MEDIUM SAND, trace silt, trace clay.	SP		1148.21
20		SSS	1-0 0-6	100				Saturated, very loose, MEDIUM TO COARSE SAND, light yellow brown, trace coarse gravel, trace silt.	SP		1144.21
								Moist, stiff to hard moderate yellow brown CLAY, with trace medium sand, very cohesive.	CL		1143.21
25		SSS	5-8 16-27	75				Dry, light buff MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, rounded to subrounded.	SP		1139.21
30		SSS	8-15 33-28	75				Dry, light buff MEDIUM SAND, dense, well packed, light/dark banding at 30.5 ft. bgl (light buff to medium buff, 1/4" bands).	SP		1134.21
35		SSS	8-8 16-25	75				Dry, light buff, MEDIUM SAND, medium dense, subrounded.	SP		1129.21
			5-11					Dry, light buff, MEDIUIM SAND, loose.	SP		1124.21

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

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

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

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		SSS	24-29	75				Dry, light buff, FINE SAND, loose. *(continued)*	SP		1123.71
45		SSS	5-8 14-19	75				Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace silt and clay.	SP		1119.21
								Dry to moist, stiff, moderate yellow brown SILTY CLAY.	CL		▽ 1117.71
50		SSS	5-8 9-9	75				Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel, trace clay, rounded to subrounded.	SP		1114.21
55		SSS	3-6 9-13	60				Saturated, loose, light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand.	SP		1109.21
60		SSS	5-5 16-23	60				Saturated, loose, light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace fine gravel, rounded to subrounded, subangular gravel.	SP		1104.21
65		SSS	6-18 50(4")	100				Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel.	SP		1099.21
								Saturated, loose, light yellow brown FINE TO VERY FINE SAND, some silt.	SM		1098.21
70		SSS	10-14 30-34	100				Saturated, loose, light yellow brown, interbedded layers of MEDIUM TO COARSE SAND, and FINE SAND.	SP		1094.21
75		SSS	23-50 (6")	100				Saturated loose, light yellow brown MEDIUM TO COARSE SAND (probably fallback).	SP		1089.21
								Wet, stiff and very hard, light yellow brown CLAYEY MEDIUM SAND.	SP-SC		1088.21
80		SSS	6-26 50 (5"0	50				Wet, stiff, dense, MEDIUM SAND, with few clay, cohesive.	SP		1084.21
85		SSS	28-50 (6")	60				Saturated light yellow brown MEDIUM SAND.	SP		1079.21
								Saturated, rounded to subrounded, FINE GRAVEL, trace medium sand.	GP		1078.21
90		SSS		100				Light yellow brown MEDIUM SAND, saturated, loose, medium dense. Three inches coarse sand and fine to medium rounded gravel lens at 90 ft. bgl.	SP	Did not get blow counts, rig line blew. Very hard drilling 90-93' bgl.	1074.21
								Interbedded light yellow brown, saturated, FINE TO	SP		1073.21

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

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

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
95		SSS	8-12 18-18	80				MEDIUM SAND, with moderate yellow brown dry to moist silt. Lenses approx. 3-5" each. Interbedded light yellow brown, saturated FINE SAND, and light yellow brown dry silt.	SP		1069.21
								Light yellow brown FINE TO MEDIUM SAND, few silt, wet, soft.	SP		1068.71
100		SSS	13-17 28-32	100				Light yellow brown FINE TO MEDIUM SAND, trace coarse sand, few silt, saturated, dense, semi-cohesive.	SP		1064.21
105		SSS	24-50 (6")	50				Moderate gray brown, moist SILTY CLAY, not varved.	CL-ML		1059.21
								Light yellow brown moist SILT.	ML		1058.61
110		SSS	2-6 16-17	50				Light yellow brown FINE TO COARSE SAND, one lens varved gray/brown, moist silt at 109.8 ft. bgl.	SP		1054.21
115		SSS	14-32 50 (5")	75				Light yellow brown FINE TO MEDIUM SAND, saturated, increasing silt content and density from 115 to 115.5 ft. bgl.	SP	End of boring - 115.5' bgl.	1049.21

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

COORDINATES **N 229,155.3 E 1,747,490.7**
SURFACE ELEVATION **1162.47** DATUM **USGS**

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								Moderate reddish-brown, cohesive CLAYEY FINE TO COARSE SAND, clast supported, dry to moist.	SC	Stratigraphic information taken from MW-12d boring log. MW-12i drilled approx. 10' from MW-12d.	1158.47
10								Moist to wet, soft CLAYEY FINE TO COARSE SAND, cohesive, trace fine gravel.	SC		1153.47
15								Moist to wet, semi-cohesive, light yellow brown MEDIUM SAND, trace coarse sand, trace gravel, trace clay.	SP		1148.47
								Saturated, very loose, light yellow brown FINE TO MEDIUM SAND, trace silt, trace clay.	SP		1147.47
20								Saturated, very loose, MEDIUM TO COARSE SAND, light yellow brown, trace coarse gravel, trace silt.	SP		1143.47
								Moist, stiff to hard moderate yellow brown CLAY, with trace medium sand, very cohesive.	CL		1142.47
25								Dry, light buff MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, rounded to subrounded.	SP		1138.47
30								Dry, light buff MEDIUM SAND, dense, well packed, light/dark banding at 30.5 ft. bgl (light buff to medium buff, 1/4" bands).	SP		1133.47
35								Dry, light buff, MEDIUM SAND, medium dense, subrounded.	SP		1128.47
								Dry, light buff, MEDIUIM SAND, loose.	SP		1123.47

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

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

COORDINATES **N 229,155.3 E 1,747,490.7**
SURFACE ELEVATION **1162.47** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
								Dry, light buff, FINE SAND, loose. *(continued)*	SP		1122.97
45								Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace silt and clay.	SP		1118.47
								Dry to moist, stiff, moderate yellow brown SILTY CLAY.	CL		1116.97
50								Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel, trace clay, rounded to subrounded.	SP		1113.47
55								Saturated, loose, light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand.	SP		1108.47
60								Saturated, loose, light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace fine gravel, rounded to subrounded, subangular gravel.	SP	End of boring - 62'	1103.47

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BORING NO. **MW-13** SHEET **1** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **J.Henry/G.Fox**

COORDINATES **N 227,193.1 E 1,747,065.5**
SURFACE ELEVATION **1120.17** DATUM **USGS**

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		AUG						Moderate reddish brown CLAY, damp to moist, soft, trace fine sand.	CH	Based on drill cuttings.	1119.17
5		SSS	3-4 7-8	90				Moderate yellow brown FINE TO COARSE SAND, stiff and cohesive, few clay and silt, damp.	SC		1116.17
								Moderate yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, cohesive, stiff.	SC		1115.17
10		SSS	3-4 7-9	100				Moderate yellow brown FINE TO MEDIUM SAND, trace fine to medium rounded gravel, trace to few clay and silt, moist, clast supported.	SC		1111.17
15		SSS	4-7 7-5	100				Moderate yellow brown FINE TO MEDIUM SAND AND SILT, trace clay, moist. Seam of wet moderate yellow brown medium sand, trace fine gravel at 15 ft. bgl.	ML		1106.17
								Light yellow brown MEDIUM TO FINE SAND, moist to damp, loose, subround to subangular.	SP		1104.67
20		SSS	3-5 5-3	100				Light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, moist, cohesive, stiff, with the following two seams: 19.7-20' Light yellow brown MEDIUM TO COARSE SAND, loose, wet, round and subround; 20.7-21' Moderate orange brown MEDIUM TO COARSE SAND, wet, one large gravel.	SP		1101.17
25		SSS	2-6 8-8	100				Moderate yellow brown FINE TO MEDIUM SAND, some clay and silt, moist.	SC		1096.17
								Kark yellow gray SILTY CLAY, trace fine sand.	CL	▽	1095.97
30		SSS	2-4 11-11	100				Dark yellow gray SILTY CLAY, stringers of light gray silt, dry to damp.	CL		1091.17
								Light gray SILT, dry, moderately dense.	ML		1089.97
35		SSS	1-0 0-0	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.	1086.17
		SSS	2 (24")	80							
			1-1						SP	Gauged well @36-38'	1081.17

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

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BORING NO. **MW-13** SHEET **2** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **J.Henry/G.Fox**

COORDINATES **N 227,193.1 E 1,747,065.5**
SURFACE ELEVATION **1120.17** DATUM **USGS**

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
		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.	
		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
45		SSS	1-1 1-2					Brown MEDIUM TO COARSE SAND, trace fine sand, saturated, medium dense, trace fine gravel, note: coarsens downward.	SP		1074.17
		SSS	1-2 2-3					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.	SP-ML		1073.17
50		SSS						FINE TO COARSE SAND, with fine to coarse gravel, saturated, note occasional gray silty clay with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick.	SP-ML		1071.17
55		SSS	1-2 2-4								
		SSS	1-1 1-1					FINE TO COARSE SAND, with fine to coarse gravel, saturated, note occasional gray silty clay with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick. Note: Gravelly seam 63.8-64.0' bgl.	SP-ML		1062.17
60											
65		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.	SP-ML		1056.17
70		SSS	1-3 5-9								
75		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.	1046.17
80		SSS	2-5 6-12						SP		
85		SSS	3-5 7-12								
90		SSS	3-4 7-13					Brown FINE TO COARSE SAND and FINE TO MEDIUM GRAVEL, trace coarse gravel, saturated. At 90.9' bgl: FINE SAND seam, trace silt, brown, saturated.	SP-GP		1031.17

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

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BORING NO. **MW-13** SHEET **3** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **J.Henry/G.Fox**

COORDINATES **N 227,193.1 E 1,747,065.5**
SURFACE ELEVATION **1120.17** DATUM **USGS**

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
95		SSS	2-8 12-13					Brown FINE TO COARSE SAND, trace silt, trace fine gravel, saturated.	SP		1026.17
100		SSS	WOH-WOH 6-6					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		1021.17
105		SSS	3-4 10-10					Brown MEDIUM SAND, trace fine sand, trace coarse sand, trace fine gravel, trace silt, saturated.	SP		1016.17
110		SSS	4-12 15-12					Gray SILTY CLAY AND MEDIUM SAND, saturated, dense.	SP-SC	End of boring - 113' bgl	1010.17
		SSS	2-3 3-4								

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

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

COORDINATES **N 227,266.3 E 1,746,816.7**
SURFACE ELEVATION **1097.36** DATUM **USGS**

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
								Brown loam (TOPSOIL).	SM	Stratigraphic information taken from MW-1d boring log. TW-1 drilled approx. 15' from MW-1d. Hand auger to 8' bgl to clear utilities.	1097.36
								Red, MEDIUM TO FINE SAND, little silt.	SM		1096.36
								Light brown, FINE TO MEDIUM SAND, little silt, moist.	SM		1094.36
5								Light brown, FINE TO MEDIUM SAND, little silt, trace fine to medium gravel, poorly sorted, round and spherical, wet.	SM		1093.36
								Light brown, FINE TO MEDIUM SAND, little fine to medium gravel, little silt,poorly sorted, round and spherical, loose, wet at 9.5'- 2" clayey gravel and silt seam.	SP	0.25" clay seam at 9.6' bgl	1089.36
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.	1084.76
15											
								Grayish brown, MEDIUM SAND, some silt and clay, sand is round and spherical, very loose, moist to wet.	SC	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K. Interbedded/gradation band per driller.	1080.36
20											
								Grayish brown, FINE SAND, some silt,trace medium sand, medium density, round and spherical, moist with wet sandier seams, 1/4" seam of clay at 22.75', gray 1" seam of silt at 23',1" seam of medium sand with little silt at 23.5'.	SM	Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1074.86
25								Buff to light brown, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose, wet.	SP	Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.	1071.36
30											
								Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, subrounded and spherical, loose, wet.	SP	Granite fragments.	1064.36
35								Buff, MEDIUM TO COARSE SAND, few fine to medium gravel, few medium angular gravel, subrounded, spherical to elongate, loose, wet.	SP		1063.86
								Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is	SP		1060.36

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

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

COORDINATES **N 227,266.3 E 1,746,816.7**
SURFACE ELEVATION **1097.36** DATUM **USGS**

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
								subangular and elongate, loose, poorly sorted, wet.			
								Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is subangular and elongate, loose, poorly sorted, wet. *(continued)*	SP		
45								Buff, MEDIUM SAND, few fine sand, round and spherical, poorly sorted, loose, wet.	SP	Outwash or glaciofluvial.	1053.86 1052.86
								Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine gravel, subrounded and subspherical, poorly sorted, loose, wet.	SP		
50								Buff, COARSE SAND, little medium sand, few fine gravel, round and subspherical, poorly sorted, loose, wet.	SP	Outwash or glaciofluvial.	1049.36
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								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

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BORING NO. **TW-2** SHEET **1** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **M.B. & G.Fox**

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

DRILLING CONTRACTOR
Stearns
DRILLING METHOD **10 1/4" HSA**
EQUIPMENT **CME 1050/CME 95**
DRILLING STARTED **7/28/00**
ENDED **8/2/00**

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								Moderate reddish brown CLAY, damp to moist, soft, trace fine sand.	CH	Stratigraphic information from MW-13 boring log. TW-2 is located approx. 10' from MW-13.	1118.41
5								Moderate yellow brown FINE TO COARSE SAND, stiff and cohesive, few clay and silt, damp.	SC		1115.41
								Moderate yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, cohesive, stiff.	SC		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 moderate yellow brown medium sand, trace fine gravel at 15 ft. bgl.	ML		1105.41
								Light yellow brown MEDIUM TO FINE SAND, moist to damp, loose, subround to subangular.	SP		1103.91
20								Light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace clay and silt, moist, cohesive, stiff, with the following two seams: 19.7-20' Light yellow brown MEDIUM TO COARSE SAND, loose, wet, round and subround; 20.7-21' Moderate orange brown MEDIUM TO COARSE SAND, wet, one large gravel.	SP		1100.41
									SC		1095.41
25								Moderate yellow brown FINE TO MEDIUM SAND, some clay and silt, moist.			1095.21
								Dark yellow gray SILTY CLAY, trace fine sand.	CL		
30								Dark yellow gray SILTY CLAY, stringers of light gray silt, dry to damp.	CL		1090.41
								Light gray SILT, dry, moderately dense.	ML		1089.21
35								Light yellow brown MEDIUM TO COARSE SAND, loose, saturated, subrounded to subangular, with fine angular gravel at 38 ft. bgl.	SP	No recovery in 34-36' split spoon sample, saturated.	1085.41
									SP	Gauged well @36-38'	1080.41

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

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

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

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Ham-mer)	Rec-overy %	VAS	PID (ppm)					
								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.	
								Moderate yellow brown SILTY CLAY, moist, hard, with numerous light yellow brown dry silt partings.	CL-ML		1076.41
45								Brown MEDIUM TO COARSE SAND, trace fine sand, saturated, medium dense, trace fine gravel, note: coarsens downward.	SP		1073.41
								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.	SP-ML		1072.41
50								FINE TO COARSE SAND, with fine to coarse gravel, saturated, note occasional gray silty clay with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick.	SP-ML		1070.41
55											
60								FINE TO COARSE SAND, with fine to coarse gravel, saturated, note occasional gray silty clay with fine to coarse sand and fine gravel at oblique angle to sand, less than 0.3' thick. Note: Gravelly seam 63.8-64.0' bgl.	SP-ML		1061.41
65								Brown MEDIUM TO COARSE SAND, trace fine gravel, trace coarse gravel, saturated. Note: 0.2' thick clay seam, brown silty clay, trace fine sand, moist, stiff.	SP-ML		1055.41
70											
75								Brown MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, saturated.		No recovery in 84-86' split spoon sample.	1045.41
80									SP		
85											
90								Brown FINE TO COARSE SAND and FINE TO MEDIUM GRAVEL, trace coarse gravel, saturated. At 90.9' bgl: FINE SAND seam, trace silt, brown, saturated.	SP-GP		1030.41

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

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

SAMPLE INFORMATION							Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)					
95								Brown FINE TO COARSE SAND, trace silt, trace fine gravel, saturated.	SP		1025.41
100								Brown MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, saturated. Note: Brown fine to coarse sand, trace fine to coarse gravel at 100.5 ft. bgl.	SP	End of boring - 103' bgl.	1020.41

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

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BORING NO. **TW-3** SHEET **1** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

COORDINATES **N 227,257.0 E 1,747,420.1**
SURFACE ELEVATION **1148.57** DATUM **USGS**

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

STRATA KEY
SAND, SILT, CLAY, PEAT, GRAVEL, FILL

LOCATION DESCRIPTION:

See Report Figures for Locations

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

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BORING NO. **TW-3** SHEET **2** OF **3**
PROJECT **GSWA Spring Hill Camp**
LOCATION **Osceola, MI**
PROJECT NO. **4065-001**
LOGGED BY **Joel Henry**

COORDINATES **N 227,257.0 E 1,747,420.1**
SURFACE ELEVATION **1148.57** DATUM **USGS**

Depth feet	Lab Sample	Sample Type	Blow Counts (300 lb. Hammer)	Recovery %	VAS	PID (ppm)	Strata	DESCRIPTION	USCS	REMARKS	Elevation Feet
								perched zone.		perched zone.	
								Dry light buff loose MEDIUM SAND, trace fine sand. *(continued)*	SP		
								Dry loose, light buff MEDIUM SAND, trace fine sand, subangular to subrounded.			1105.57
45									SP		
								Dry, loose, light buff MEDIUM TO COARSE SAND, trace fine sand, trace fine gravel, one fine to medium gravel stringer @ 48.5'.			1100.57
50									SP		
								Saturated, loose light yellow brown MEDIUM TO FINE SAND, trace medium rounded gravel.	SP		1095.57
55								Saturated, soft medium yellow brown SANDY CLAY/CLAYEY SAND, semi-cohesive.	SP/SC		1095.07
								Saturated, loose light yellow brown MEDIUM TO COARSE, trace fine sand, trace gravel.	SP		1090.57
									GP		1090.07
60								Saturated loose subangular to subrounded FINE TO COARSE GRAVEL.	GP		1088.57
								Mixed FINE TO MEDIUM GRAVEL AND FINE TO MEDIUM SAND, saturated. May be slough. Poor recovery, seemed to be pushing a cobble.	SP		1086.57
									ML		1085.57
								Saturated light yellow brown FINE TO MEDIUM SAND with some fine subangular to subrounded gravel.	SP		1085.07
65											1084.57
								Moist medium yellow brown FINE SAND AND SILT, firm.	SP		
								Saturated light yellow brown, FINE TO MEDIUM SAND trace silt.	SP		1080.57
								Saturated light yellow brown, FINE TO MEDIUM SAND, trace silt, subangular to subrounded.			1080.07
70								Saturated light yellow MEDIUM TO FINE SAND, rounded to subrounded.	SP		
								Saturated light yellow brown MEDIUM TO FINE SAND, trace to few fine gravel, trace clay.			1075.57
								Saturated light yellow brown MEDIUM TO FINE SAND, trace fine to medium subrounded gravel.			
75									SP		
								Saturated light yellow brown MEDIUM TO FINE SAND.	SP		1070.57
								Saturated light yellow brown SILT, some fine to medium sand.			1069.57
80									ML		
								Saturated light yellow brown FINE TO MEDIUM SAND, trace to few silt, trace clay.			1065.57
85									SP		
								Saturated, light yellow brown MEDIUM SAND, trace fine sand, few medium subrounded gravel.			1060.57
90									SP		

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

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

COORDINATES **N 227,257.0 E 1,747,420.1**
SURFACE ELEVATION **1148.57** DATUM **USGS**

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

COMPLETION REPORT OF WELL No. MW-1s

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

WATER LEVEL: ▽ **7.28** ▼ _____ ▼ _____
DATE: **10-12-00** _____ _____
TIME: **1233** _____ _____

DRILLING CONTRACTOR: **NA**
DRILLING METHOD: **Hand Auger**
DATE COMPLETED: **June 29, 2000**

GROUND SURFACE ELEVATION: **1097.2**
DATUM: **USGS**
LOGGED BY: **M.B. & J.H.**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **NA**
Type: **NA**
Interval: **NA**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **1.6' agl to 3.4' bgl**

GROUT
Type: **Bentonite Chips**
Interval: **0.5' to 2.5'**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Filter pack sand**
Interval: **2.5' to 8.4' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **3.4' to 8.4' bgl**

WELL DEVELOPMENT DATA
DATE: **7/19/2000**
METHOD: **Bailer**

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

STRATA DEPTH (ft.)	STRATA SYMBOL	WELL DETAILS	VAS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
					TPC		
				1098.75	TRC	-1.59	
				0.0	GS	1097.16	
0				0.5		1096.66	Filtered Sand Pack Bentonite Chips
				2.5		1094.66	
							Filtered Sand Pack
5							
				8.4		1088.76	

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COMPLETION REPORT OF WELL No. MW-1s

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

COMPLETION REPORT OF WELL No. MW-1d

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

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

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

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

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 103.5' bgl**

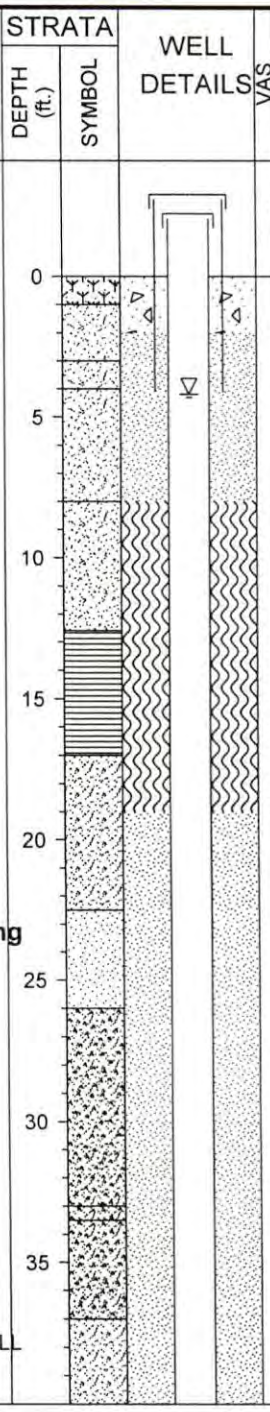
GROUT
Type: **Thick Bentonite Slurry**
Interval: **8' to 19' bgl and 50' to 99.5' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Natural Collapse**
Interval: **99.5' to 109' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **103.5' to 108.5' bgl**

WELL DEVELOPMENT DATA
DATE: **7/6/2000**
METHOD: **Powered suction-lift pumping**



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1100.19	TPC TRC	-2.53	
0.0	GS	1097.66	
2.0		1095.66	Concrete
			Natural Collapse
8.0		1089.66	
			Bentonite Slurry
19.0		1078.66	
			Natural Collapse

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-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**

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-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**

WELL CONSTRUCTION DETAILS

STRATA DEPTH (ft.)	STRATA SYMBOL	WELL DETAILS	VAS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See Page 1)			
95				99.5		998.16	Bentonite Slurry (continued)
100				108.5		989.16	Natural Collapse
105				115.0		982.66	Natural Collapse
110							
115							

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-1d

COMPLETION REPORT OF WELL No. MW-1i

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

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

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

GROUND SURFACE ELEVATION: **1098.4**
DATUM: **USGS**
LOGGED BY: **Ken Ewers**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 33.5' bgl**

GROUT
Type: **Thick Bentonite Slurry**
Interval: **3' to 29' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Natural Collapse**
Interval: **29' to 39' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **33.5' to 38.5' bgl**

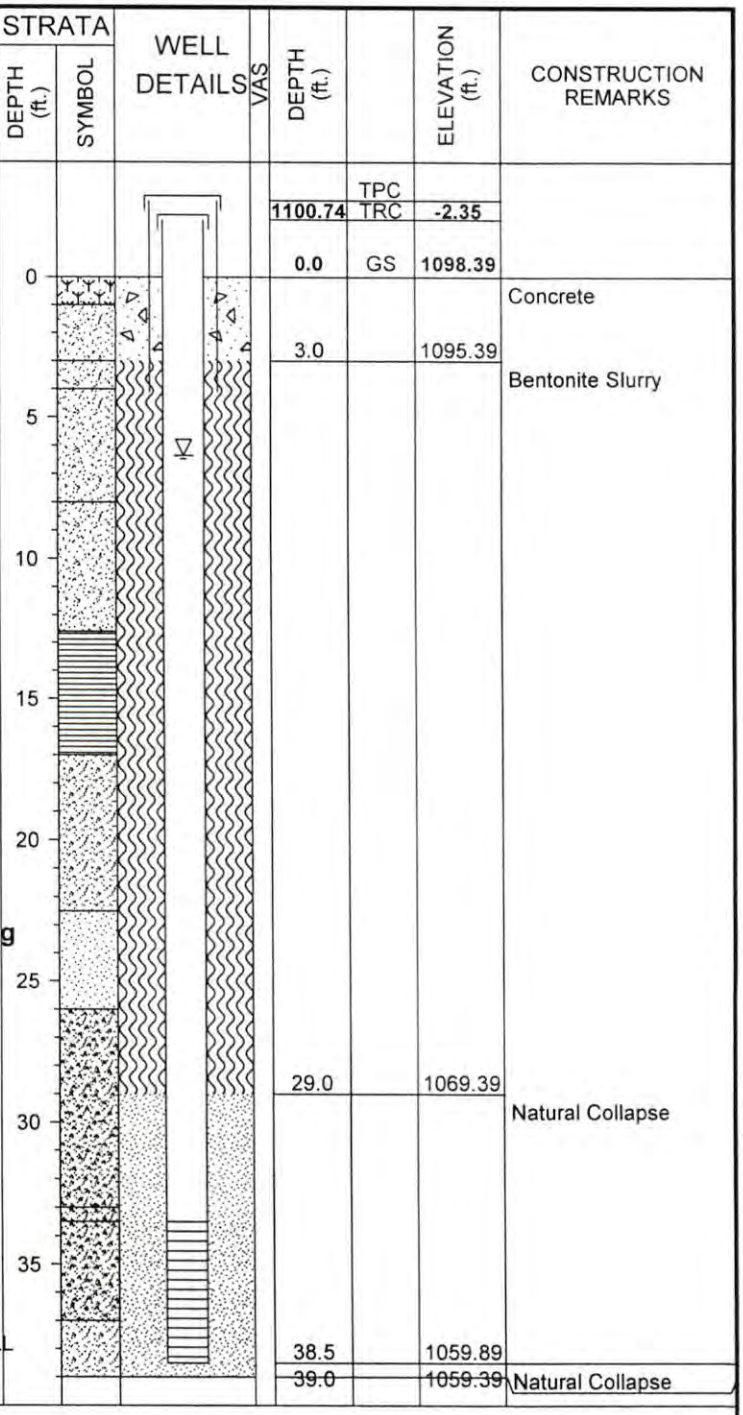
WELL DEVELOPMENT DATA
DATE: **7/6/2000**
METHOD: **Powered suction-lift pumping**

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1100.74	TPC	-2.35	
	TRC		
0.0	GS	1098.39	
3.0		1095.39	Concrete
			Bentonite Slurry
29.0		1069.39	
			Natural Collapse
38.5		1059.89	
39.0		1059.39	Natural Collapse

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COMPLETION REPORT OF WELL No. MW-1i

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

COMPLETION REPORT OF WELL No. MW-2

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

WATER LEVEL: ▽ **10.15** ▼ _____ ▼ _____
DATE: **10-12-00** _____ _____
TIME: **1237** _____ _____

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **4 1/4" HSA**
DATE COMPLETED: **June 28, 2000**

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

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 55' bgl**

GROUT
Type: **Thick Bentonite Slurry**
Interval: **37' to 49' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Natural Collapse**
Interval: **49' to 101' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **55' to 60' bgl**

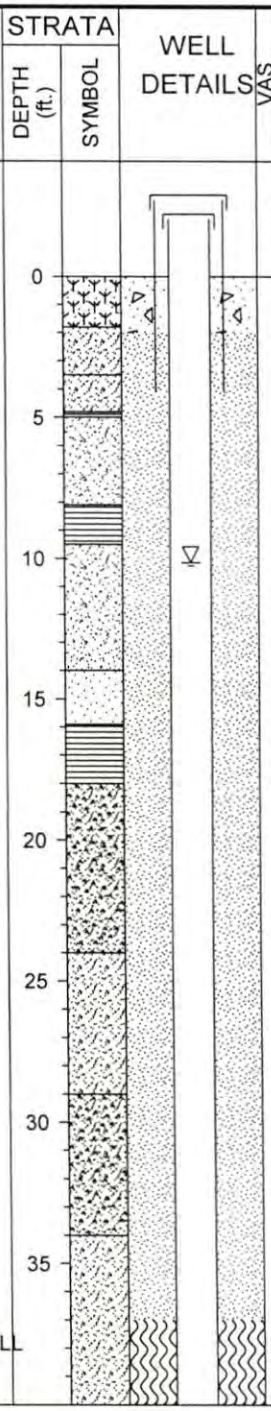
WELL DEVELOPMENT DATA
DATE: **7/6/2000**
METHOD: **Drillers pump**

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1104.08	TPC	-2.38	
1104.08	TRC	-2.38	
0.0	GS	1101.70	
2.0		1099.70	Concrete
			Natural Collapse
37.0		1064.70	
			Bentonite Slurry

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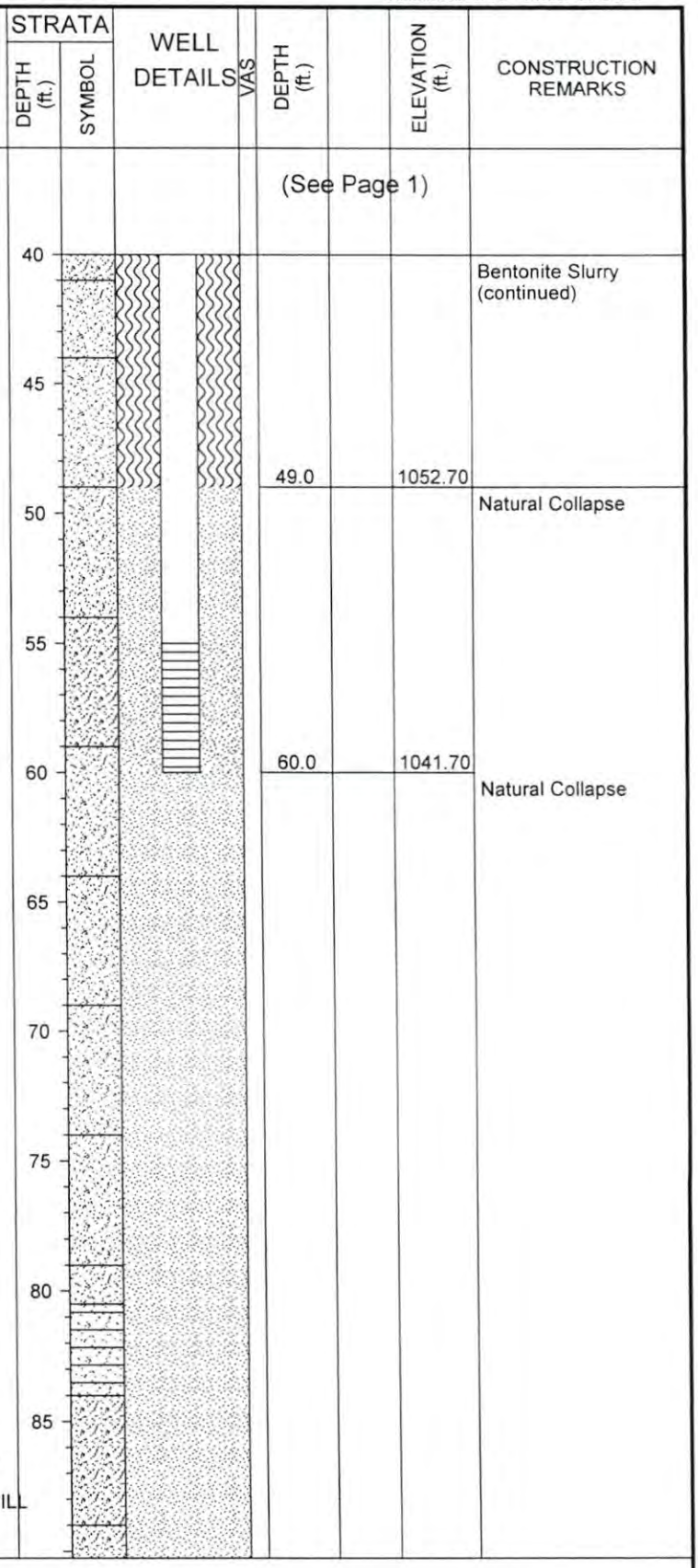
COMPLETION REPORT OF WELL No. MW-2

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

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

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

WELL CONSTRUCTION DETAILS



LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-2

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

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

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-2

COMPLETION REPORT OF WELL No. MW-3

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

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

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **4 1/4" HSA**
DATE COMPLETED: **June 28, 2000**

GROUND SURFACE ELEVATION: **1107.0**
DATUM: **USGS**
LOGGED BY: **Ken Ewers**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 81' bgl**

GROUT
Type: **Thick Bentonite Slurry**
Interval: **2' to 75' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Natural Collapse**
Interval: **75' to 102' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **81' to 86' bgl**

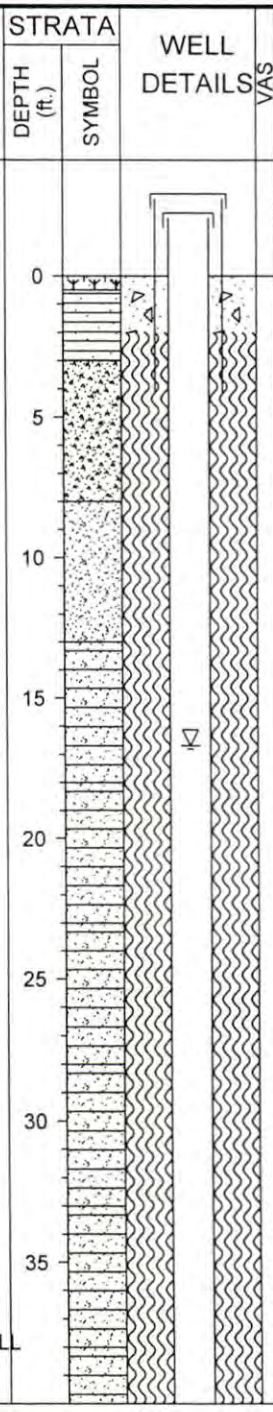
WELL DEVELOPMENT DATA
DATE: **6/29/2000**
METHOD: **Drillers pump**

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1109.57	TPC TRC	-2.57	
0.0	GS	1107.00	
2.0		1105.00	Concrete
			Bentonite Slurry

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

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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**

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-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**

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-3

COMPLETION REPORT OF WELL No. MW-4s

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

WATER LEVEL: ▽ 6.91 ▼ ▼
DATE: 10-12-00
TIME: 1222

DRILLING CONTRACTOR: **NA**
DRILLING METHOD: **Hand Auger**
DATE COMPLETED: **June 29, 2000**

GROUND SURFACE ELEVATION: **1090.1**
DATUM: **USGS**
LOGGED BY: **M.B. & J.H.**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **NA**
Type: **NA**
Interval: **NA**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **1.3' agl to 3.7' bgl**

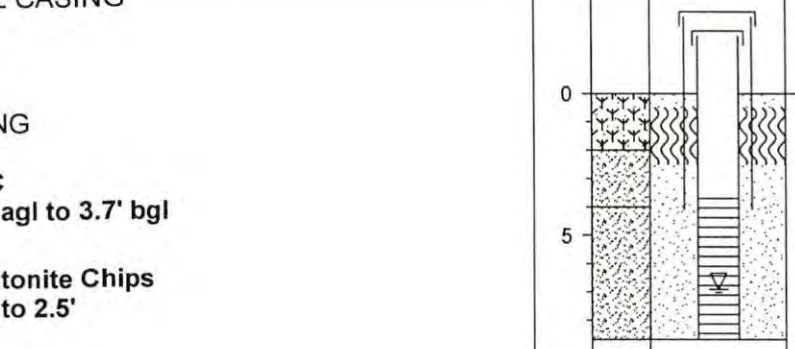
GROUT
Type: **Bentonite Chips**
Interval: **0.5' to 2.5'**

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**
METHOD: **Bailer**



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1091.38	TPC	-1.32	
1091.38	TRC	-1.32	
0.0	GS	1090.06	
0.5		1089.56	Filtered Sand Pack
			Bentonite Chips
2.5		1087.56	
			Filtered Sand Pack
8.7		1081.36	

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-4s

COMPLETION REPORT OF WELL No. MW-4d

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

WATER LEVEL: **Artesian** ▼ _____ ▼ _____
DATE: **10-12-00** _____ _____
TIME: **1225** _____ _____

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **4 1/4" HSA**
DATE COMPLETED: **June 29, 2000**

GROUND SURFACE ELEVATION: **1089.5**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 73' bgl**

GROUT
Type: **Thick Bentonite Slurry**
Interval: **4' to 68' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Natural Collapse**
Interval: **68' to 78' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **73' to 78' bgl**

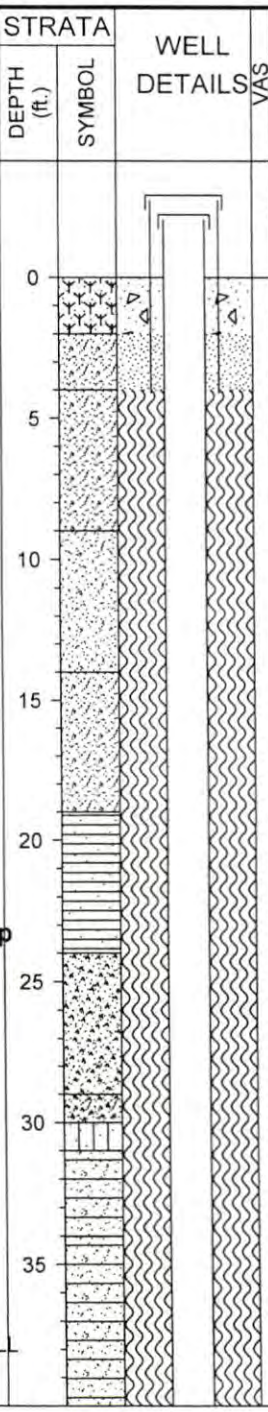
WELL DEVELOPMENT DATA
DATE: **06/29/2000**
METHOD: **Submersible Grundfos Pump**

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1096.04	TPC	-6.53	
	TRC		
0.0	GS	1089.51	
2.0		1087.51	Concrete
4.0		1085.51	Natural Collapse
			Bentonite Slurry

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

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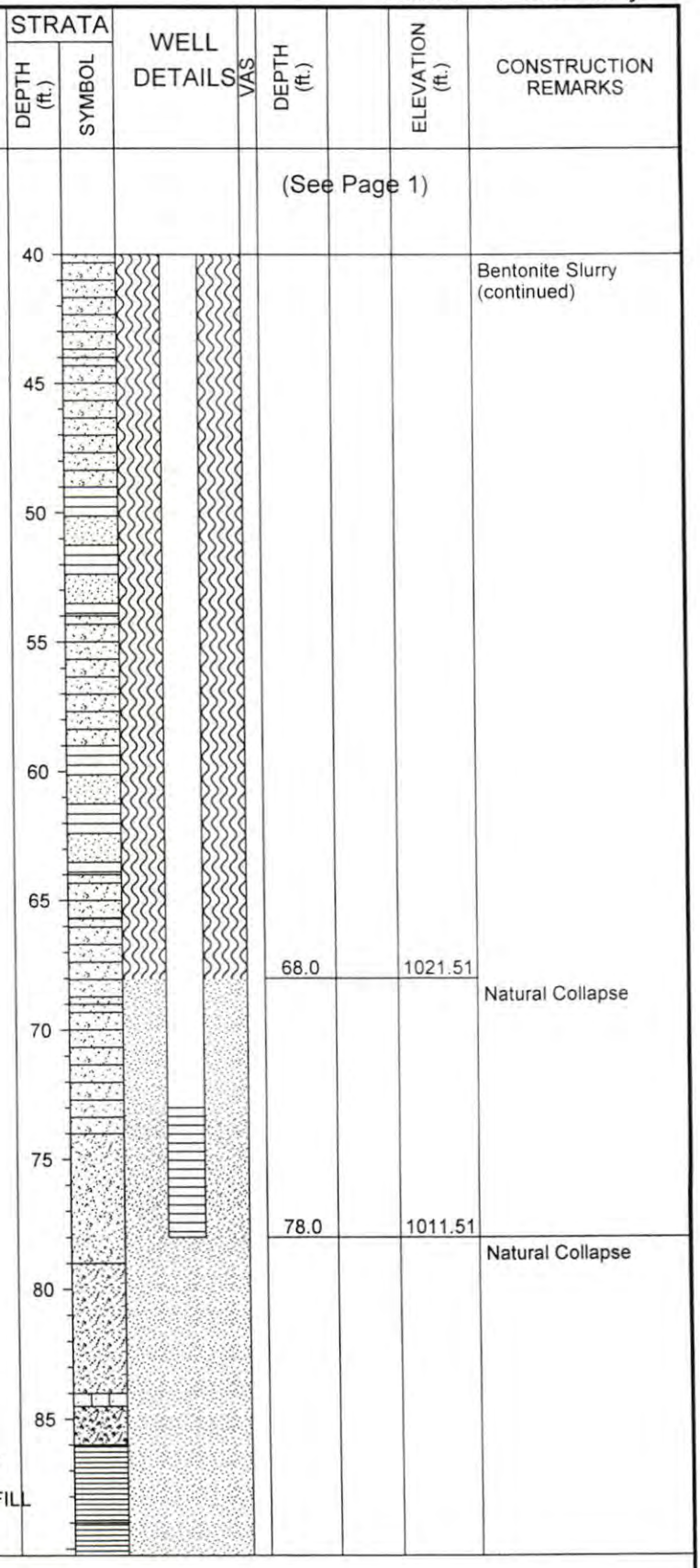
COMPLETION REPORT OF WELL No. MW-4d

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

GROUND SURFACE ELEVATION: **1089.5**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS



LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-4d

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

GROUND SURFACE ELEVATION: **1089.5**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS	STRATA DEPTH (ft.)	STRATA SYMBOL	WELL DETAILS	VAS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
					(See Page 1)			
					~~91.0~~		~~998.51~~	

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-4d

COMPLETION REPORT OF WELL No. MW-5d

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

WATER LEVEL: ▽ **52.56** ▼ _____ ▽ _____
DATE: **10-12-00** _____ _____
TIME: **1143** _____ _____

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **4 1/4" HSA**
DATE COMPLETED: **July 20, 2000**

GROUND SURFACE ELEVATION: **1149.4**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 153' bgl**

GROUT
Type: **Thick Bentonite Slurry**
Interval: **2' to 149' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **K&E Well Gravel #0**
Interval: **149' to 152' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **153' to 158' bgl**

WELL DEVELOPMENT DATA
DATE: **07/21/2000**
METHOD: **Air Sparging**

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

STRATA DEPTH (ft.)	STRATA SYMBOL	WELL DETAILS	VAS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
					TPC		
				1147.43	TRC	1.97	
				0.0	GS	1149.40	
0							Concrete
				2.0		1147.40	
							Bentonite Slurry
5							
10							
15							
20							
25							
30							
35							

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COMPLETION REPORT OF WELL No. MW-5d

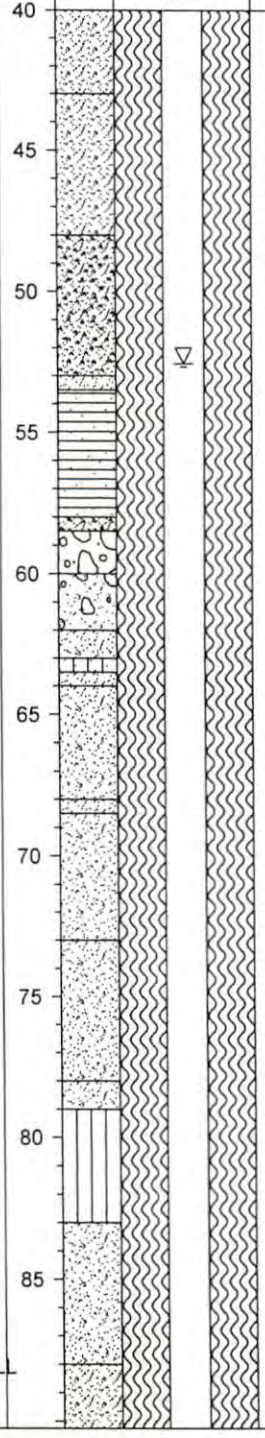
CONSTRUCTION LOG GSWA-SHC.GPJ MP_MI.GDT 10/17/00

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

GROUND SURFACE ELEVATION: **1149.4**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS

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



LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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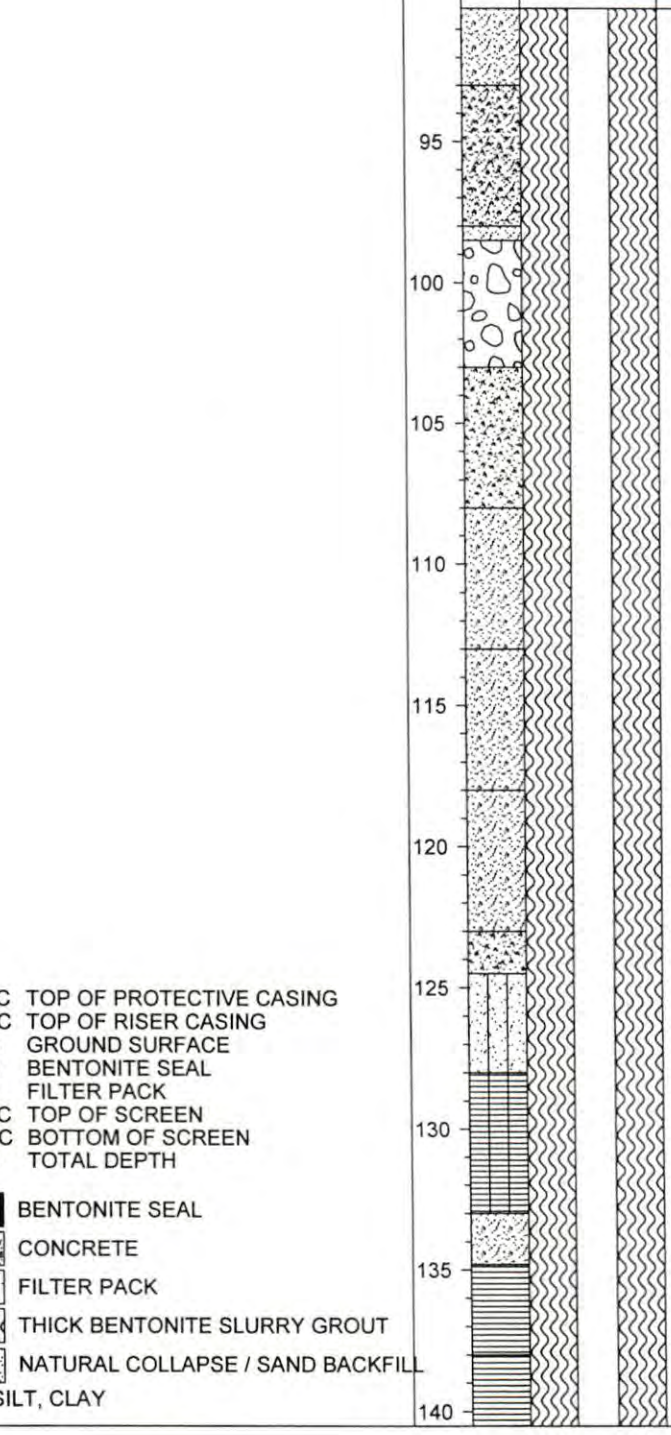
COMPLETION REPORT OF WELL No. MW-5d

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

GROUND SURFACE ELEVATION: **1149.4**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS	STRATA DEPTH (ft.)	STRATA SYMBOL	WELL DETAILS	VAS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
					(See Page 1)			
								Bentonite Slurry *(continued)*



LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-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**

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-5d

COMPLETION REPORT OF WELL No. MW-5i

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

WATER LEVEL: ▽ 52.96 ▼ ▽
DATE: 10-12-00
TIME: 1145

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **4 1/4" HSA**
DATE COMPLETED: **July 20, 2000**

GROUND SURFACE ELEVATION: **1148.8**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 90' bgl**

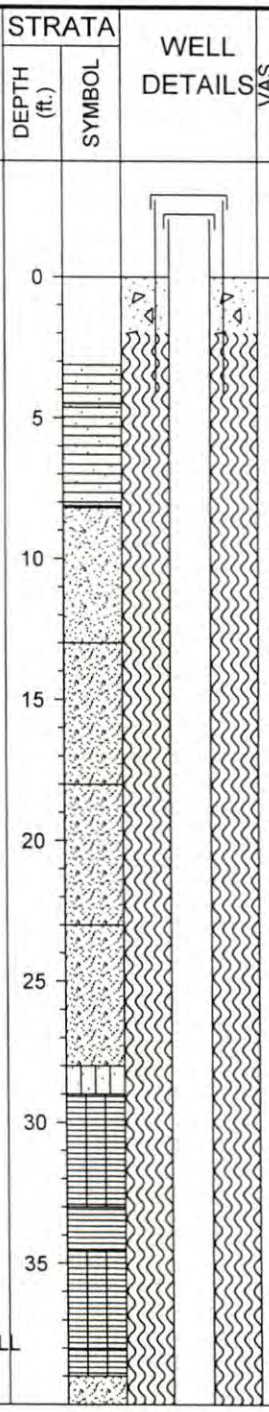
GROUT
Type: **Thick Bentonite Slurry**
Interval: **2' to 85' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Filter Pack Sand**
Interval: **85' to 100' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **90' to 100' bgl**

WELL DEVELOPMENT DATA
DATE: **07/21/2000**
METHOD: **Air Sparging**



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1147.09	TPC	1.66	
	TRC		
0.0	GS	1148.75	
2.0		1146.75	Concrete
			Bentonite Slurry

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-5i

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

GROUND SURFACE ELEVATION: **1148.8**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-5i

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

GROUND SURFACE ELEVATION: **1148.8**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-5i

COMPLETION REPORT OF WELL No. MW-6

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

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

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **4 1/4" HSA**
DATE COMPLETED: **July 17, 2000**

GROUND SURFACE ELEVATION: **1142.4**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 70' bgl**

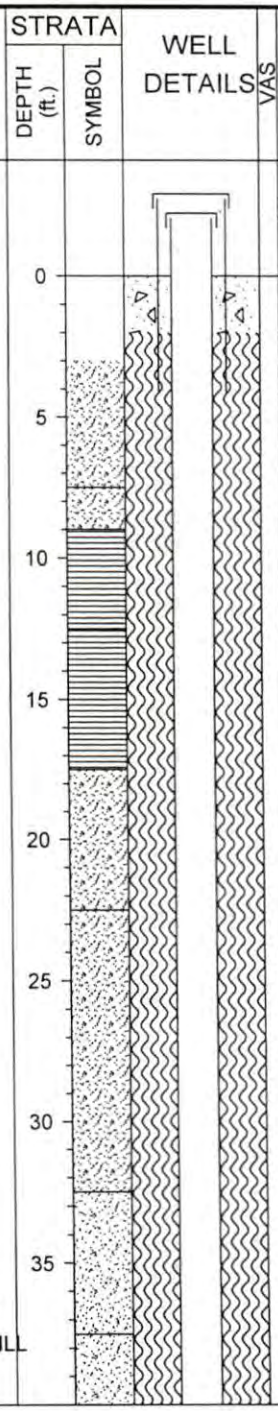
GROUT
Type: **Thick bentonite slurry**
Interval: **2' to 64' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Natural Collapse**
Interval: **64' to 80' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **70' to 80' bgl**

WELL DEVELOPMENT DATA
DATE: **7/20/2000**
METHOD: **Air Sparging**



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1139.96	TPC	2.48	
	TRC		
0.0	GS	1142.44	
2.0		1140.44	Concrete
			Bentonite Slurry

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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COMPLETION REPORT OF WELL No. MW-6

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

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

GROUND SURFACE ELEVATION: **1142.4**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS

STRATA DEPTH (ft.)	STRATA SYMBOL	WELL DETAILS	VAS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
				(See Page 1)			
40							Bentonite Slurry (continued)
45							
50							
55							
60							
				64.0		1078.44	
65							Filtered Sand Pack
70							
75							
80				80.0		1062.44	

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-6

COMPLETION REPORT OF WELL No. MW-7

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

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

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

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

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 0.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 89' bgl**

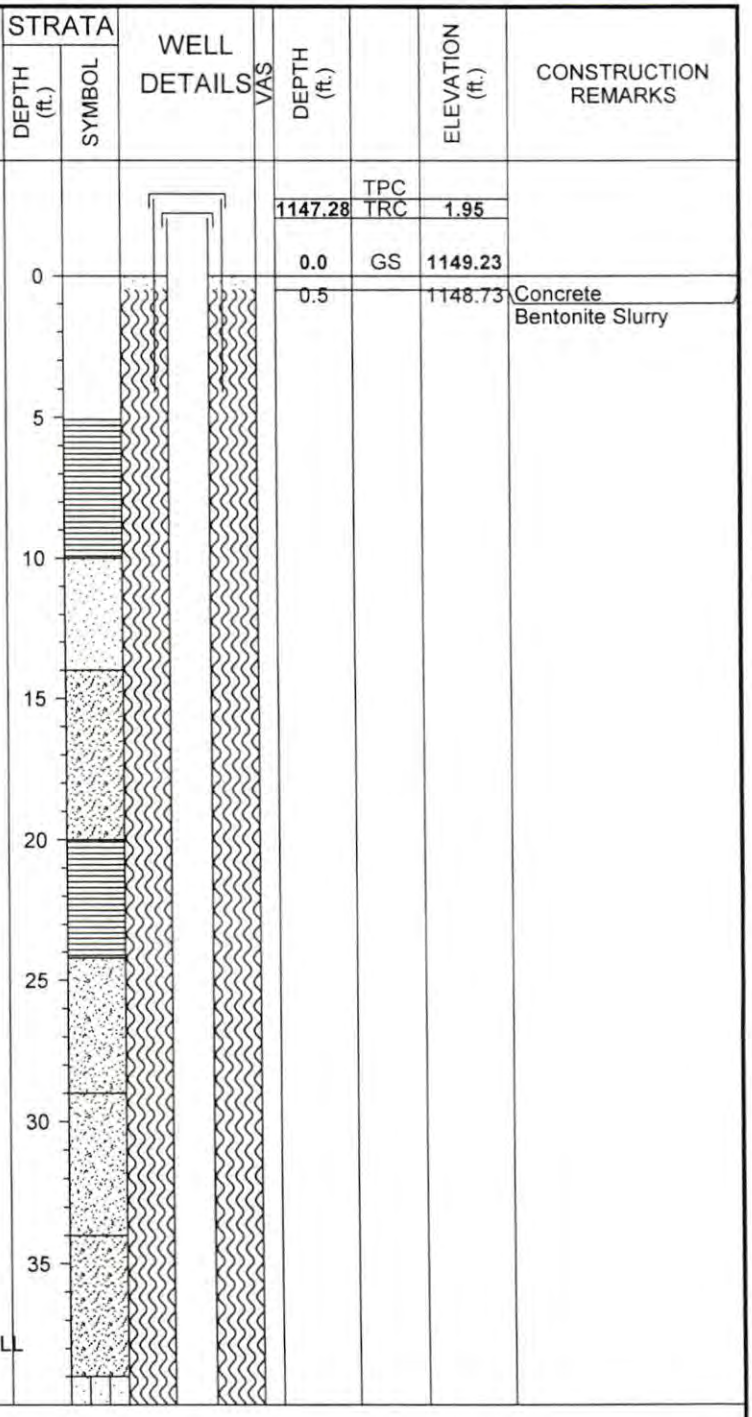
GROUT
Type: **Thick Bentonite Slurry**
Interval: **0.5' to 84' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Natural Collapse**
Interval: **84' to 99' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **89' to 99' bgl**

WELL DEVELOPMENT DATA
DATE: **7/20/2000**
METHOD: **Air Sparging**



LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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COMPLETION REPORT OF WELL No. MW-7

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

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

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

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-7

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

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

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-7

COMPLETION REPORT OF WELL No. MW-8

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

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

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

GROUND SURFACE ELEVATION: **1113.5**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **3' agl to 2' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2' agl to 75' bgl**

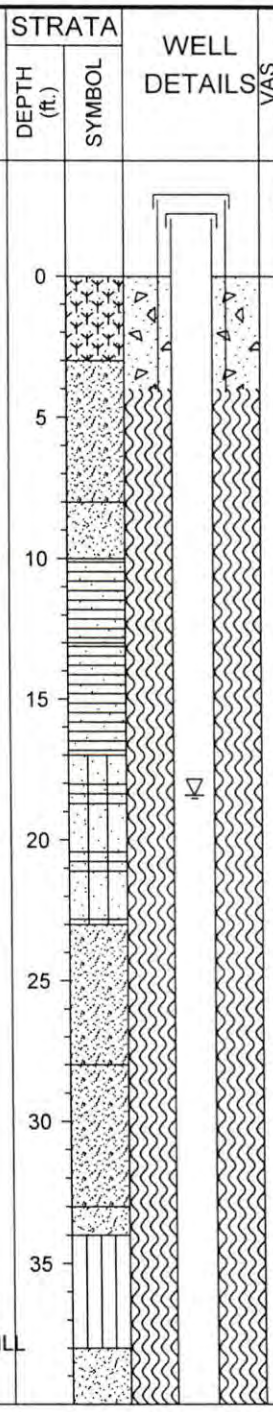
GROUT
Type: **Thick bentonite slurry grout**
Interval: **4' to 68' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Natural Collapse**
Interval: **68' to 86' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **75' to 85' bgl**

WELL DEVELOPMENT DATA
DATE: **7/19/2000**
METHOD: **Drillers pump**



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1110.52	TPC	2.96	
	TRC		
0.0	GS	1113.49	
			Concrete
4.0		1109.49	
			Bentonite Slurry

LEGEND

GRAVELLY SAND
COARSE SAND
MEDIUM SAND
FINE SAND
VERY FINE SAND
SILT
CLAY
GRAVELLY CLAY
ASPHALT
TOPSOIL
INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

BENTONITE SEAL
CONCRETE
FILTER PACK
THICK BENTONITE SLURRY GROUT
NATURAL COLLAPSE / SAND BACKFILL

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COMPLETION REPORT OF WELL No. MW-8

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

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

GROUND SURFACE ELEVATION: **1113.5**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS	STRATA DEPTH (ft.)	STRATA SYMBOL	WELL DETAILS	VAS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
					(See Page 1)			
	40							Bentonite Slurry (continued)
	45							
	50							
	55							
	60							
	65							
					68.0		1045.49	Natural Collapse
	70							
	75							
	80							
	85				85.0		1028.49	

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-8

COMPLETION REPORT OF WELL No. MW-9

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

WATER LEVEL: ▽ 28.63 ▼ ▼
DATE: 10-12-00
TIME: 1126

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **4 1/4" HSA**
DATE COMPLETED: **July 20, 2000**

GROUND SURFACE ELEVATION: **1125.3**
DATUM: **USGS**
LOGGED BY: **Jeff Groncki**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 65' bgl**

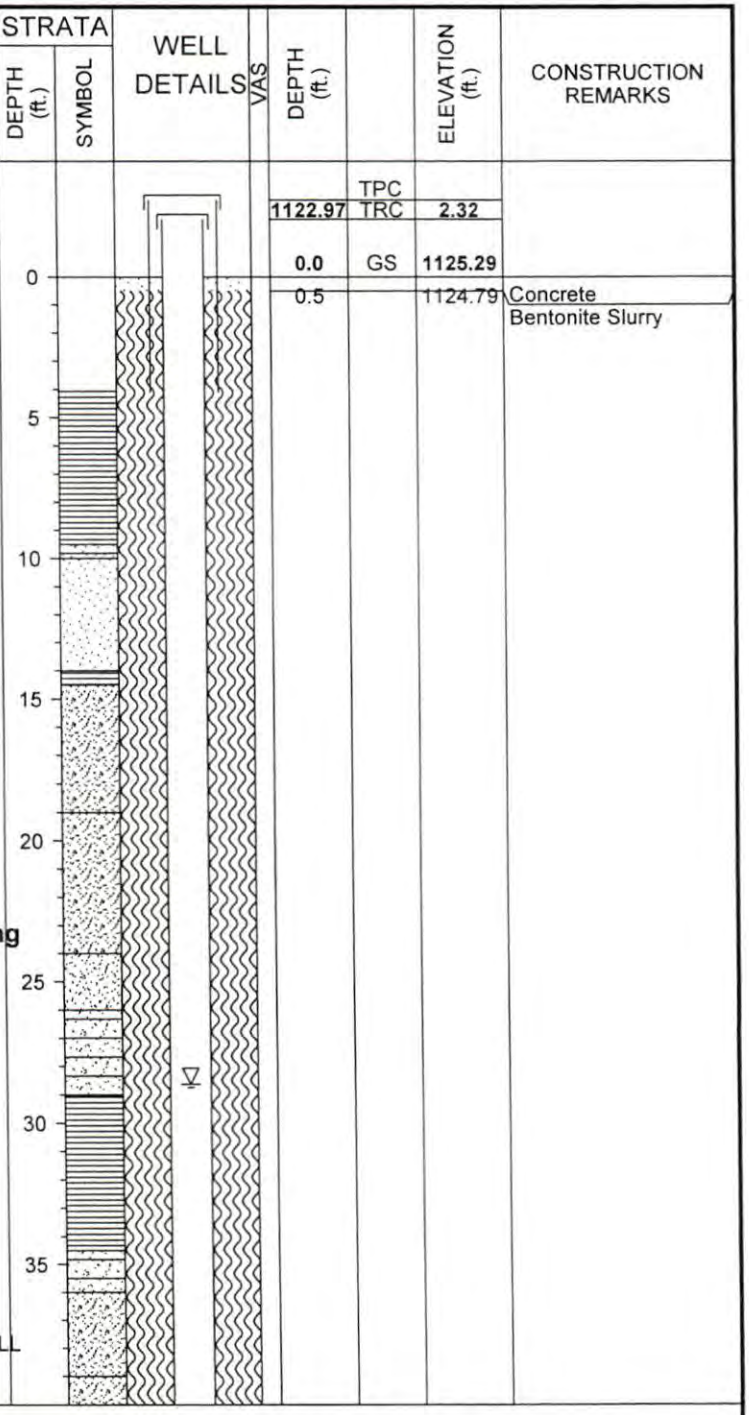
GROUT
Type: **Thick bentonite slurry grout**
Interval: **0.5' to 60' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **#5 Sand**
Interval: **60' to 75' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **65' to 75' bgl**

WELL DEVELOPMENT DATA
DATE: **7/21/2000**
METHOD: **Powered suction-lift pumping**



LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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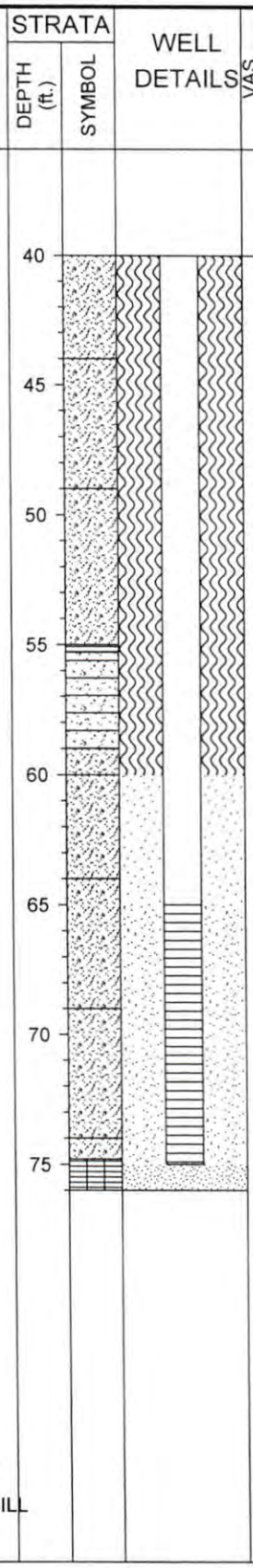
Fax: (517) 337-0417

COMPLETION REPORT OF WELL No. MW-9

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

GROUND SURFACE ELEVATION: **1125.3**
DATUM: **USGS**
LOGGED BY: **Jeff Groncki**

WELL CONSTRUCTION DETAILS



DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
(See Page 1)		
		Bentonite Slurry (continued)
60.0	1065.29	
		Filtered Sand Pack
75.0	1050.29	
76.0	1049.29	Natural Collapse

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-9

COMPLETION REPORT OF WELL No. MW-10

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

WATER LEVEL: ▽ **20.12** ▼ _____ ⊻ _____
DATE: **10-12-00** _____ _____
TIME: **1136** _____ _____

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

GROUND SURFACE ELEVATION: **1120.5**
DATUM: **USGS**
LOGGED BY: **Jeff Groncki**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 52' bgl**

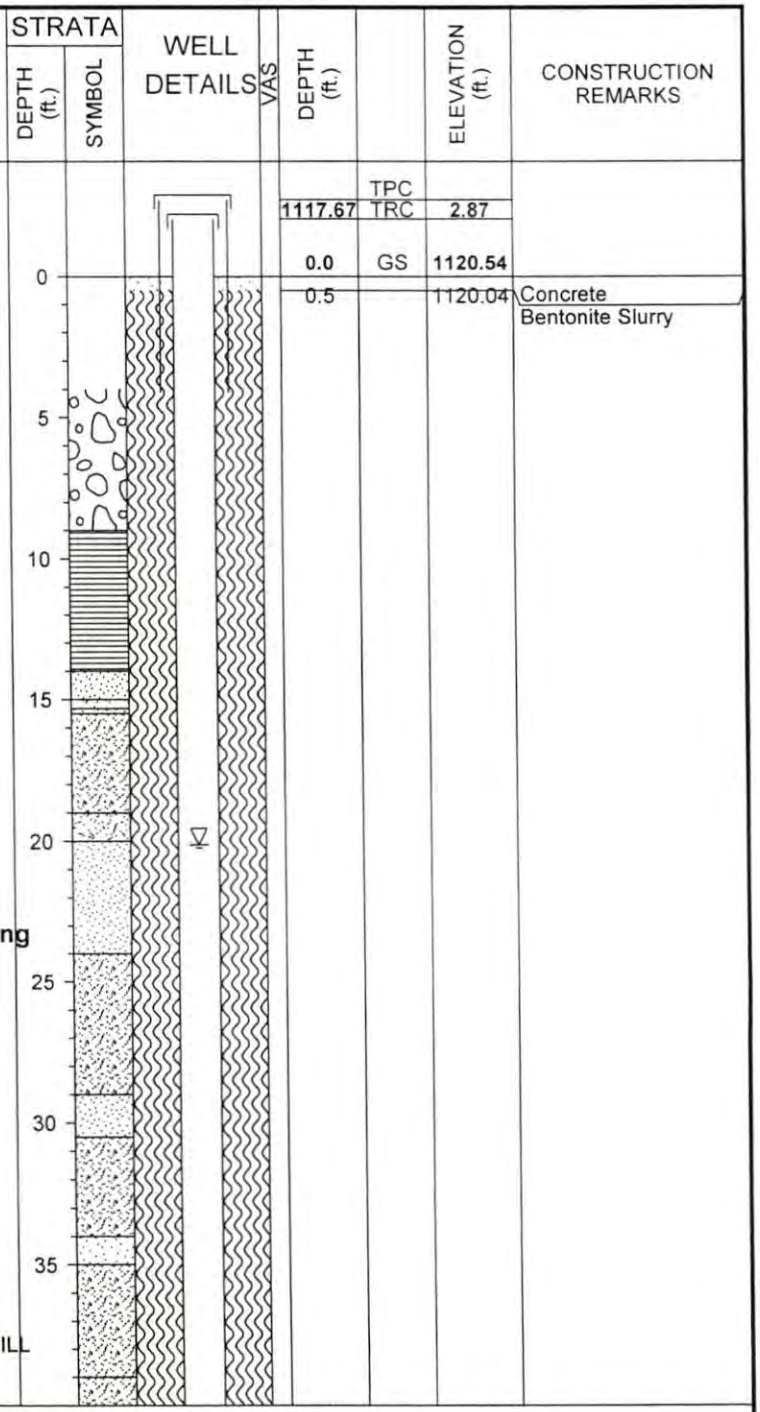
GROUT
Type: **Thick Bentonite Slurry**
Interval: **0.5' to 45' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Natural Collapse**
Interval: **45' to 65' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **52' to 62' bgl**

WELL DEVELOPMENT DATA
DATE: **7/20/200**
METHOD: **Powered suction-lift pumping**



LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-10

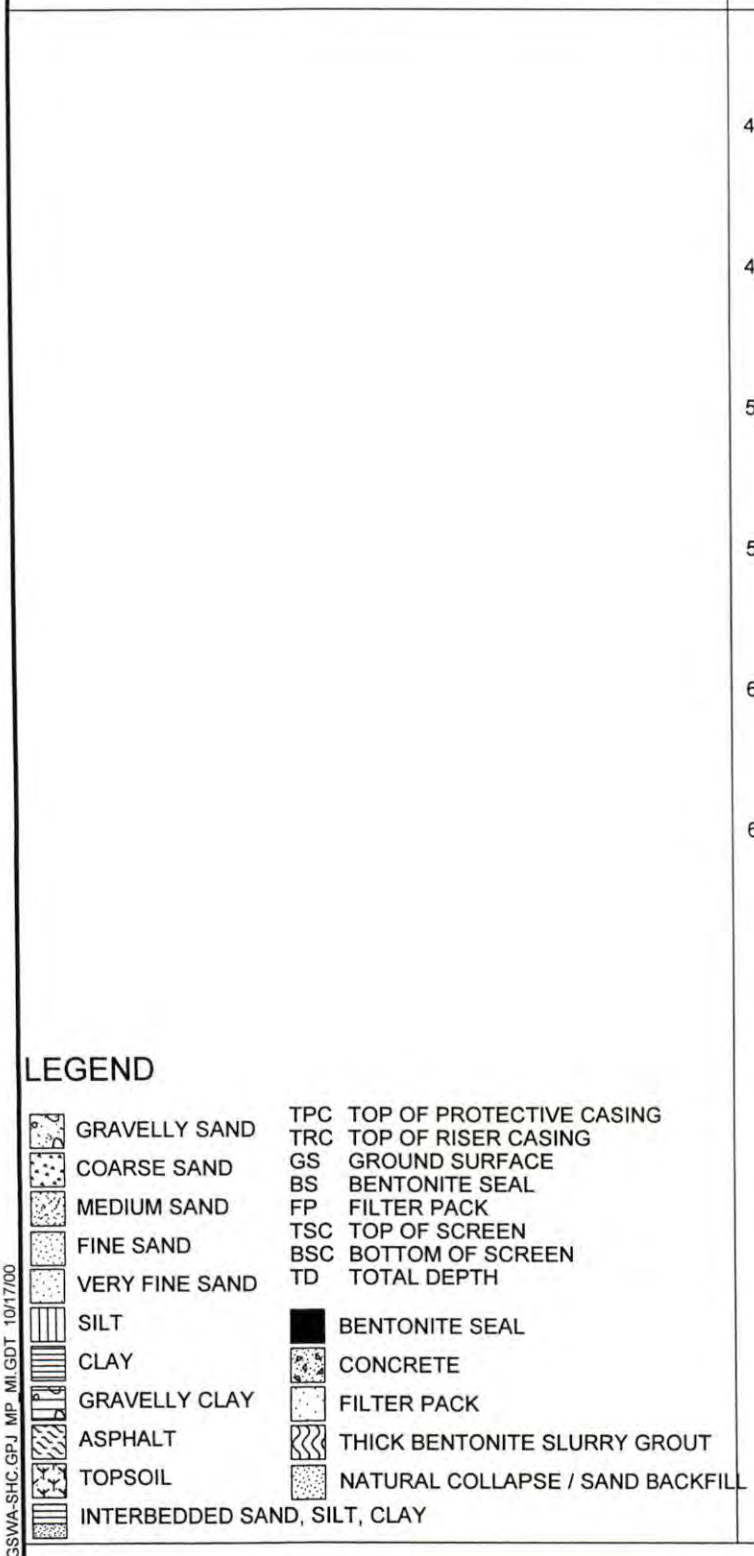
Sheet 1 of 2

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

GROUND SURFACE ELEVATION: **1120.5**
DATUM: **USGS**
LOGGED BY: **Jeff Groncki**

WELL CONSTRUCTION DETAILS

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



LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-10

COMPLETION REPORT OF WELL No. MW-11

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

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

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **4 1/4" HSA**
DATE COMPLETED: **July 21, 2000**

GROUND SURFACE ELEVATION: **1166.7**
DATUM: **USGS**
LOGGED BY: **Jeff Groncki**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 70' bgl**

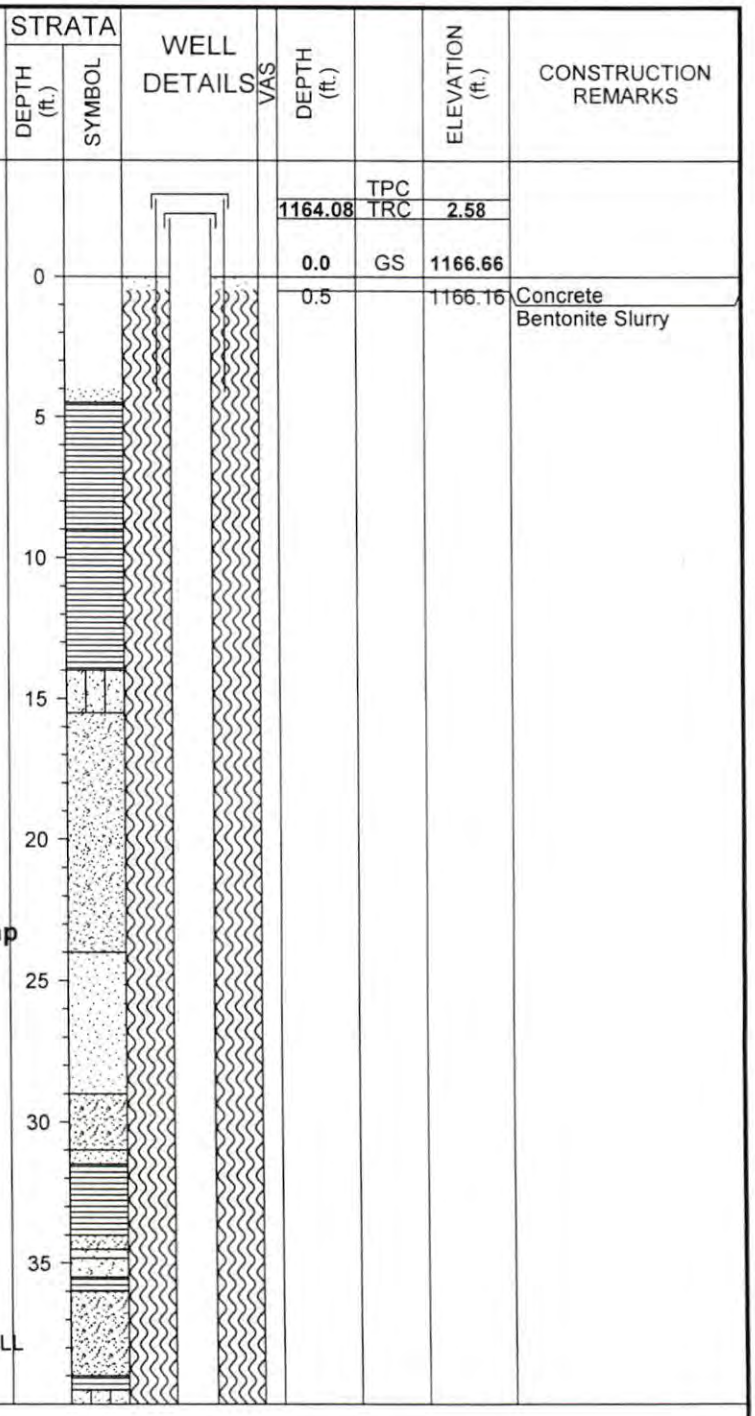
GROUT
Type: **Thick Bentonite Slurry**
Interval: **0.5' to 65' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **#5 Filter Pack Sand**
Interval: **65' to 80' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **70' to 80' bgl**

WELL DEVELOPMENT DATA
DATE: **8/7/2000**
METHOD: **Submersible Grundfos Pump**



LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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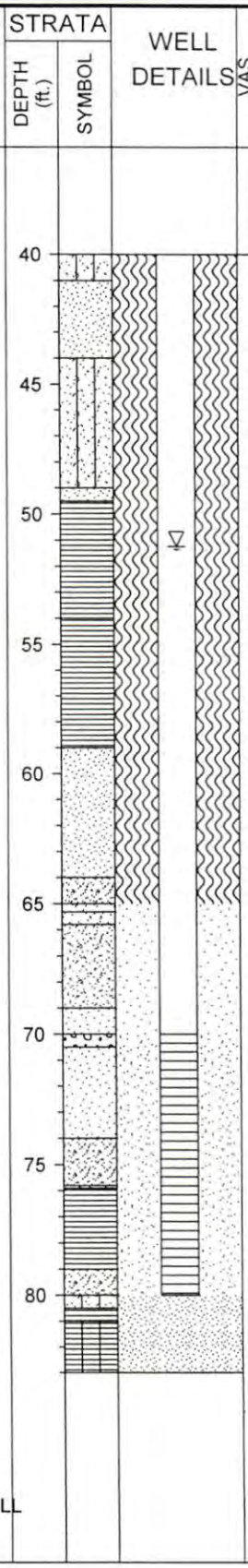
COMPLETION REPORT OF WELL No. MW-11

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

GROUND SURFACE ELEVATION: **1166.7**
DATUM: **USGS**
LOGGED BY: **Jeff Groncki**

WELL CONSTRUCTION DETAILS



DEPTH (ft.)	ELEVATION (ft.)	CONSTRUCTION REMARKS
(See Page 1)		
		Bentonite Slurry (continued)
65.0	1101.66	
		Filtered Sand Pack
80.0	1086.66	
		Natural Collapse
83.0	1083.66	

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-11

COMPLETION REPORT OF WELL No. MW-12d

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

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

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **4 1/4" HSA**
DATE COMPLETED: **July 25, 2000**

GROUND SURFACE ELEVATION: **1163.2**
DATUM: **USGS**
LOGGED BY: **J.Henry/G.Fox**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **3.0' agl to 2.0' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 105' bgl**

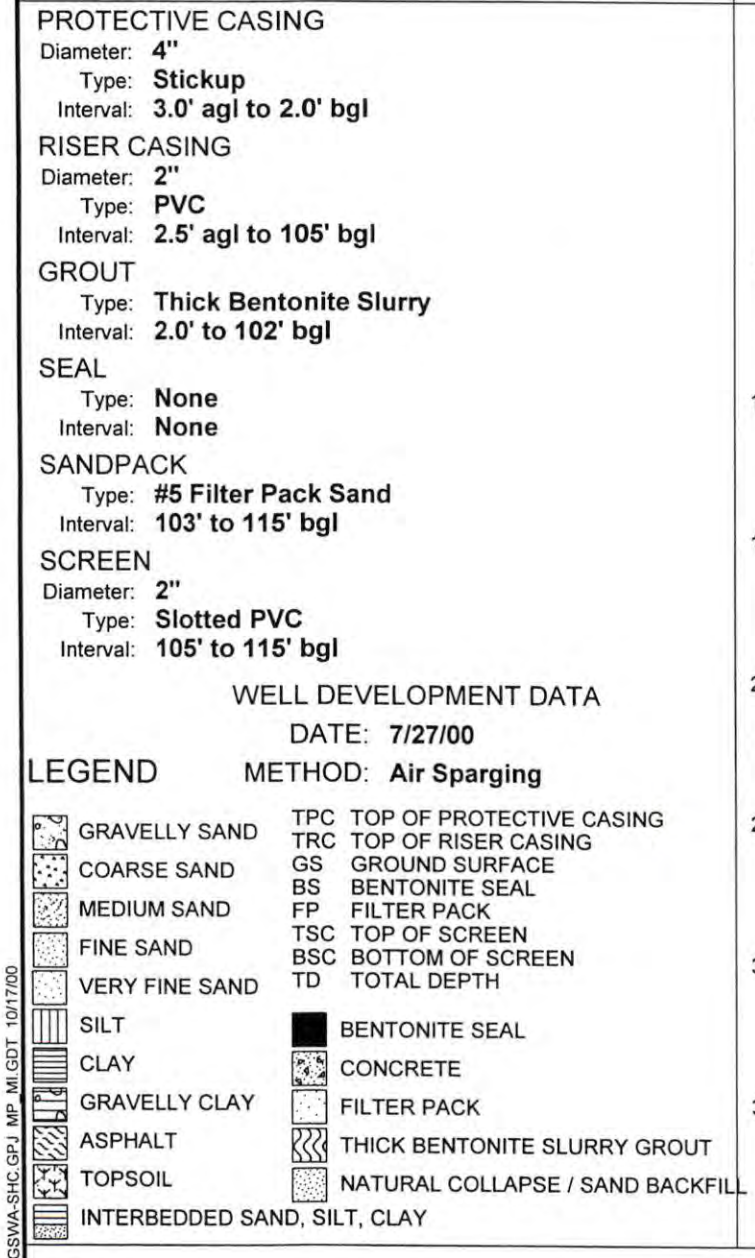
GROUT
Type: **Thick Bentonite Slurry**
Interval: **2.0' to 102' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **#5 Filter Pack Sand**
Interval: **103' to 115' bgl**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **105' to 115' bgl**

WELL DEVELOPMENT DATA
DATE: **7/27/00**
METHOD: **Air Sparging**



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1160.79	TPC	2.42	
	TRC		
0.0	GS	1163.21	
2.0		1161.21	Concrete
			Bentonite Slurry

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-12d

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**

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-12d

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**

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-12d

COMPLETION REPORT OF WELL No. MW-12i

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

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

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

GROUND SURFACE ELEVATION: **1162.5**
DATUM: **USGS**
LOGGED BY: **Greg Fox**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 52' bgl**

GROUT
Type: **Thick Bentonite Slurry**
Interval: **0.5' to 48' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Filter pack sand**
Interval: **48' to 62' bgl.**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **52' to 62' bgl.**

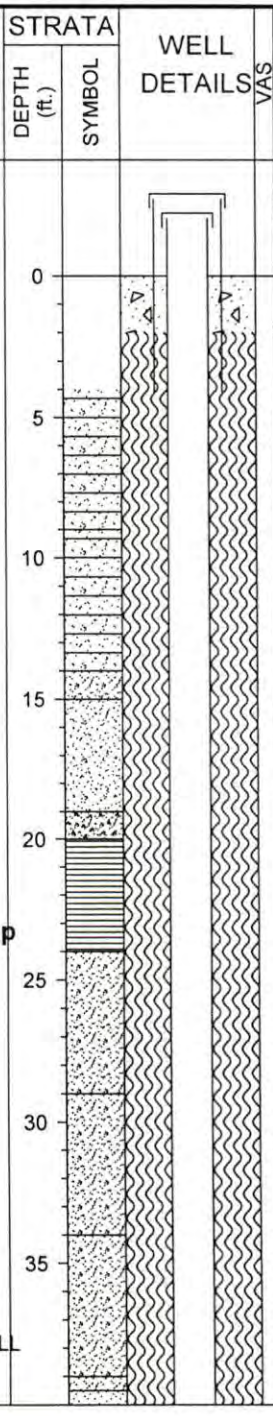
WELL DEVELOPMENT DATA
DATE: **8/8/2000**
METHOD: **Submersible Grundfos Pump**

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1160.15	TPC	2.32	
	TRC		
0.0	GS	1162.47	
2.0		1160.47	Concrete
			Bentonite Slurry

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

MALCOLM PIRNIE
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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**

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-12i

COMPLETION REPORT OF WELL No. MW-13

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

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

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

GROUND SURFACE ELEVATION: **1120.2**
DATUM: **USGS**
LOGGED BY: **J.Henry/G.Fox**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **2.5' agl to 81' bgl**

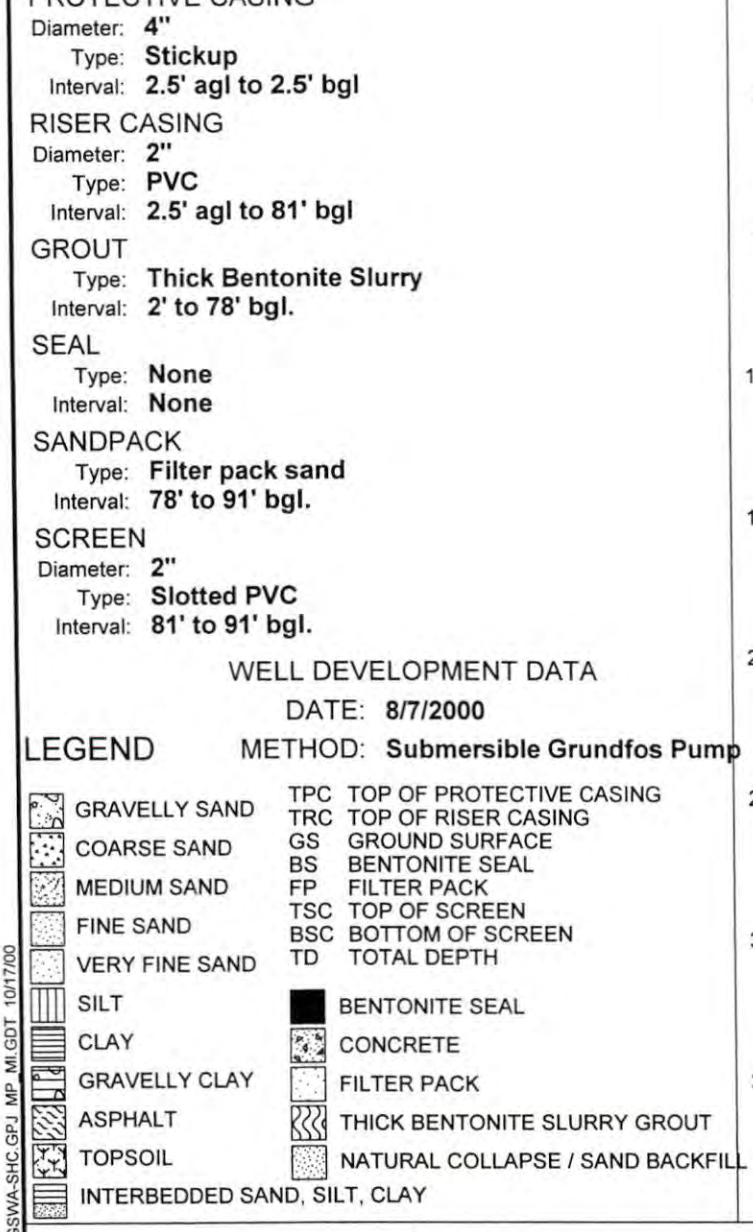
GROUT
Type: **Thick Bentonite Slurry**
Interval: **2' to 78' bgl.**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Filter pack sand**
Interval: **78' to 91' bgl.**

SCREEN
Diameter: **2"**
Type: **Slotted PVC**
Interval: **81' to 91' bgl.**

WELL DEVELOPMENT DATA
DATE: **8/7/2000**
METHOD: **Submersible Grundfos Pump**



DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1117.82	TPC	2.35	
0.0	GS	1120.17	
2.0		1118.17	Concrete
			Bentonite Slurry

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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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**

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-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**

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. MW-13

COMPLETION REPORT OF WELL No. TW-1

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

WATER LEVEL: ▽ 5.55 ▼ ▼
DATE: 10-12-00
TIME: 1235

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **10 1/4" HSA**
DATE COMPLETED: **July 6, 2000**

GROUND SURFACE ELEVATION: **1097.4**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **12"**
Type: **Stickup**
Interval: **2.5' agl to 2.5' bgl**

RISER CASING
Diameter: **6"**
Type: **PVC**
Interval: **2.5' agl to 35' bgl**

GROUT
Type: **Thick bentonite slurry grout**
Interval: **3' to 30' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **K&E Well Gravel #5**
Interval: **30' to 85' bgl**

SCREEN
Diameter: **6"**
Type: **PVC 20(35'-75') continuous wound & 30(75'-85') slot.**
Interval: **35' to 85' bgl**

WELL DEVELOPMENT DATA
DATE: **07/06/2000**
METHOD: **Drillers pump**

DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
1099.84	TPC	-2.48	
	TRC		
0.0	GS	1097.36	
			Concrete
3.0		1094.36	
			Bentonite Slurry
30.0		1067.36	
			Filtered Sand Pack

LEGEND

GRAVELLY SAND
COARSE SAND
MEDIUM SAND
FINE SAND
VERY FINE SAND
SILT
CLAY
GRAVELLY CLAY
ASPHALT
TOPSOIL
INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

BENTONITE SEAL
CONCRETE
FILTER PACK
THICK BENTONITE SLURRY GROUT
NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. TW-1

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

GROUND SURFACE ELEVATION: **1097.4**
DATUM: **USGS**
LOGGED BY: **Joel Henry**

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. TW-1

COMPLETION REPORT OF WELL No. TW-2

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

WATER LEVEL: ▽ **24.00** ▼ _____ ▼ _____
DATE: **10-12-00** _____ _____
TIME: **1216** _____ _____

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **10 1/4" HSA**
DATE COMPLETED: **August 2, 2000**

GROUND SURFACE ELEVATION: **1119.4**
DATUM: **USGS**
LOGGED BY: **M.B. & G.Fox**

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **NA**
Type: **NA**
Interval: **NA**

RISER CASING
Diameter: **8"**
Type: **PVC**
Interval: **2.5' agl to 58' bg.**

GROUT
Type: **Thick Bentonite Slurry**
Interval: **0' to 47.5' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **#5 & #7 Filter pack sand**
Interval: **48' to 103' bgl**

SCREEN
Diameter: **8"**
Type: **PVC 20 (53'-63') & 30 (63-103') slot (continuous wound)**
Interval: **53' to 103' bgl**

WELL DEVELOPMENT DATA
DATE: **8/7/2000**
METHOD: **Air Sparging**

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

STRATA DEPTH (ft.)	STRATA SYMBOL	WELL DETAILS	VAS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
				1115.92	TPC TRC	3.49	
				0.0	GS	1119.41	
0							Bentonite Slurry
5							
10							
15							
20							
25							
30							
35							

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COMPLETION REPORT OF WELL No. TW-2

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

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**

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. TW-2

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**

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. TW-2

COMPLETION REPORT OF WELL No. TW-3

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

WATER LEVEL: ▽ **52.78** ▼ _____ ▼ _____
DATE: **10-12-00** _____ _____
TIME: **1146** _____ _____

DRILLING CONTRACTOR: **Stearns**
DRILLING METHOD: **10 1/4" HSA**
DATE COMPLETED: **July 28, 2000**

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

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **NA**
Type: **NA**
Interval: **NA**

RISER CASING
Diameter: **8"**
Type: **PVC**
Interval: **2.5' agl to 82' bgl**

GROUT
Type: **Thick Bentonite Slurry**
Interval: **0' to 74' bgl**

SEAL
Type: **None**
Interval: **None**

SANDPACK
Type: **Global Filter Pack Sand**
Interval: **74' to 122' bgl**

SCREEN
Diameter: **8"**
Type: **PVC 20 (82'-92') & 30 (92'-122') slot (continuous wound).**
Interval: **82' to 122' bgl**

WELL DEVELOPMENT DATA
DATE: **8/2/2000**
METHOD: **Air Sparging**

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

STRATA DEPTH (ft.)	STRATA SYMBOL	WELL DETAILS VAS	DEPTH (ft.)		ELEVATION (ft.)	CONSTRUCTION REMARKS
				TPC		
			1145.75	TRC	2.82	
			0.0	GS	1148.57	
0						
			2.0		1146.57	Concrete
5						Bentonite Slurry
10						
15						
20						
25						
30						
35						

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

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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**

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

- TPC TOP OF PROTECTIVE CASING
- TRC TOP OF RISER CASING
- GS GROUND SURFACE
- BS BENTONITE SEAL
- FP FILTER PACK
- TSC TOP OF SCREEN
- BSC BOTTOM OF SCREEN
- TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. TW-3

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

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

WELL CONSTRUCTION DETAILS

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

LEGEND

- GRAVELLY SAND
- COARSE SAND
- MEDIUM SAND
- FINE SAND
- VERY FINE SAND
- SILT
- CLAY
- GRAVELLY CLAY
- ASPHALT
- TOPSOIL
- INTERBEDDED SAND, SILT, CLAY

TPC TOP OF PROTECTIVE CASING
TRC TOP OF RISER CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH

- BENTONITE SEAL
- CONCRETE
- FILTER PACK
- THICK BENTONITE SLURRY GROUT
- NATURAL COLLAPSE / SAND BACKFILL

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

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COMPLETION REPORT OF WELL No. TW-3

APPENDIX D

SIEVE ANALYSIS DATA

Sieve Test Record
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
Sample Identification: OB-1
Sample Depth: 33' - 35'
Initial Sample Weight in Grams: 94.4

Sieve Size ASTM No.	Sieve 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

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

Date: 6/28/00
Sample Identification: OB-1
Sample Depth: 43.5' - 45.5'
Initial Sample Weight in Grams: 98.5

Sieve Size ASTM No.	Sieve 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
Pan	0	98.1	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

Sieve Test Record
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
Sample Identification: OB-1
Sample Depth: 33' - 35'
Initial Sample Weight in Grams: 94.4

Sieve Size ASTM No.	Sieve 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

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

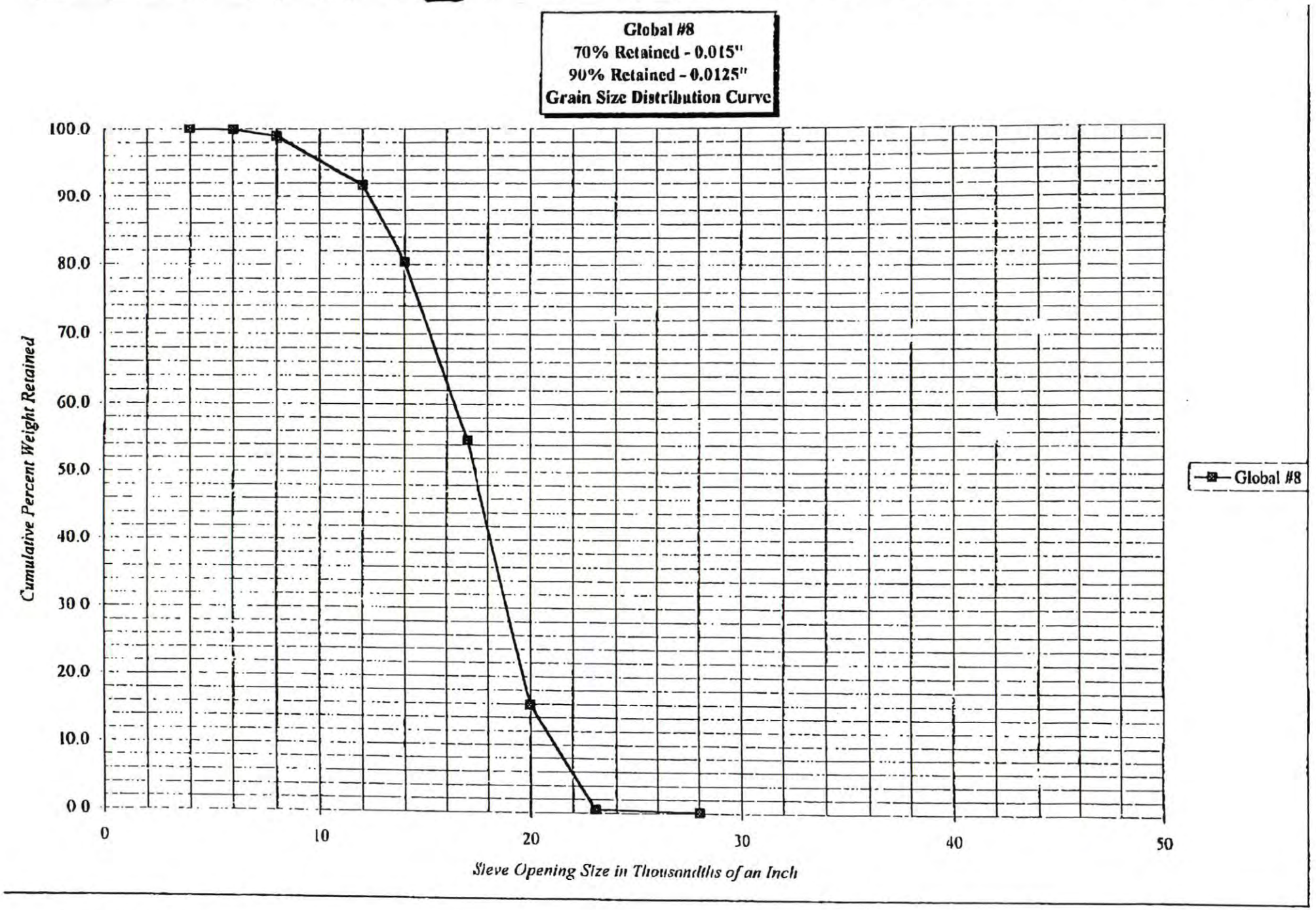
Date: 6/28/00
Sample Identification: OB-1
Sample Depth: 43.5' - 45.5'
Initial Sample Weight in Grams: 98.5

Sieve Size ASTM No.	Sieve 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
Pan	0	98.1	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



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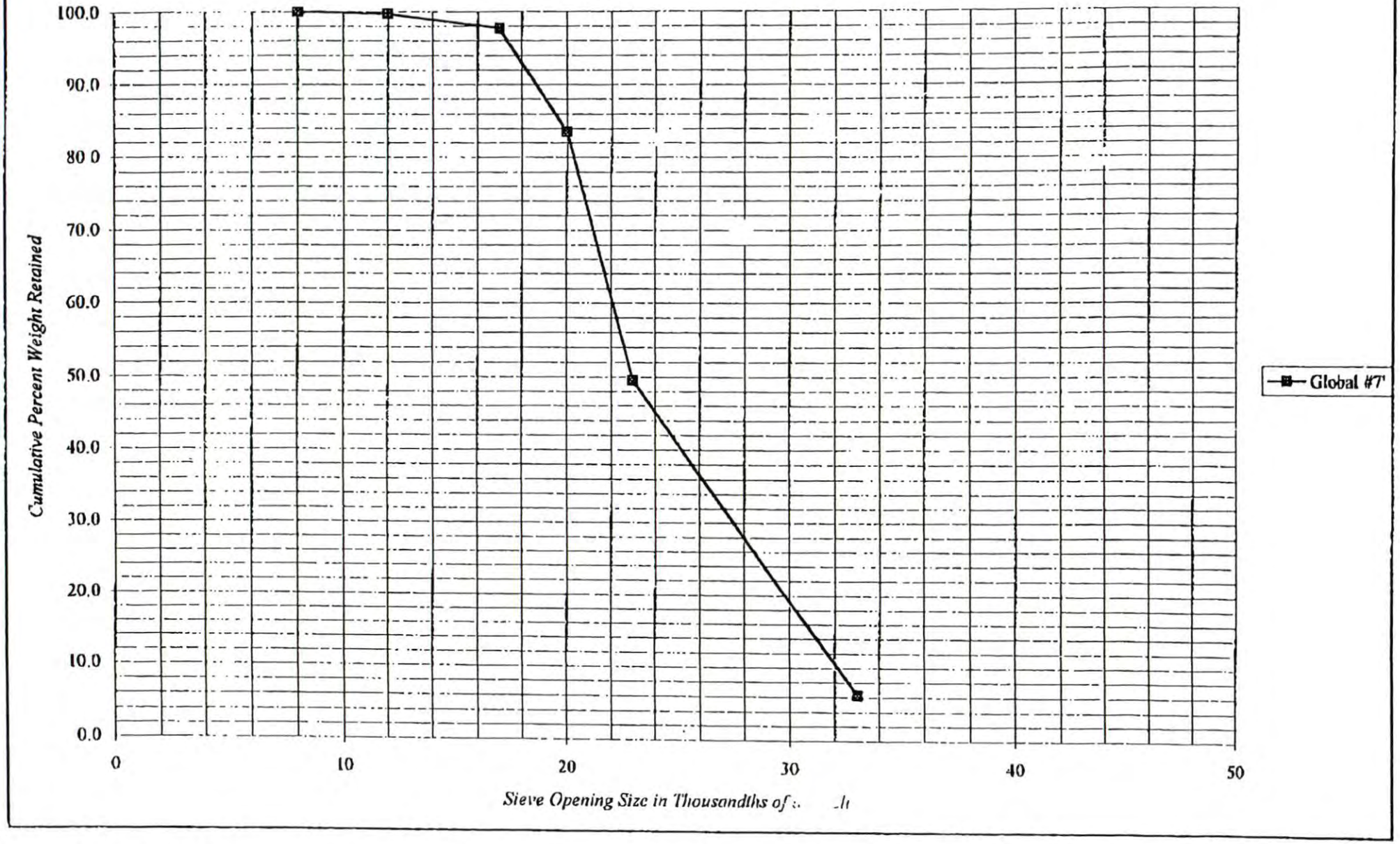
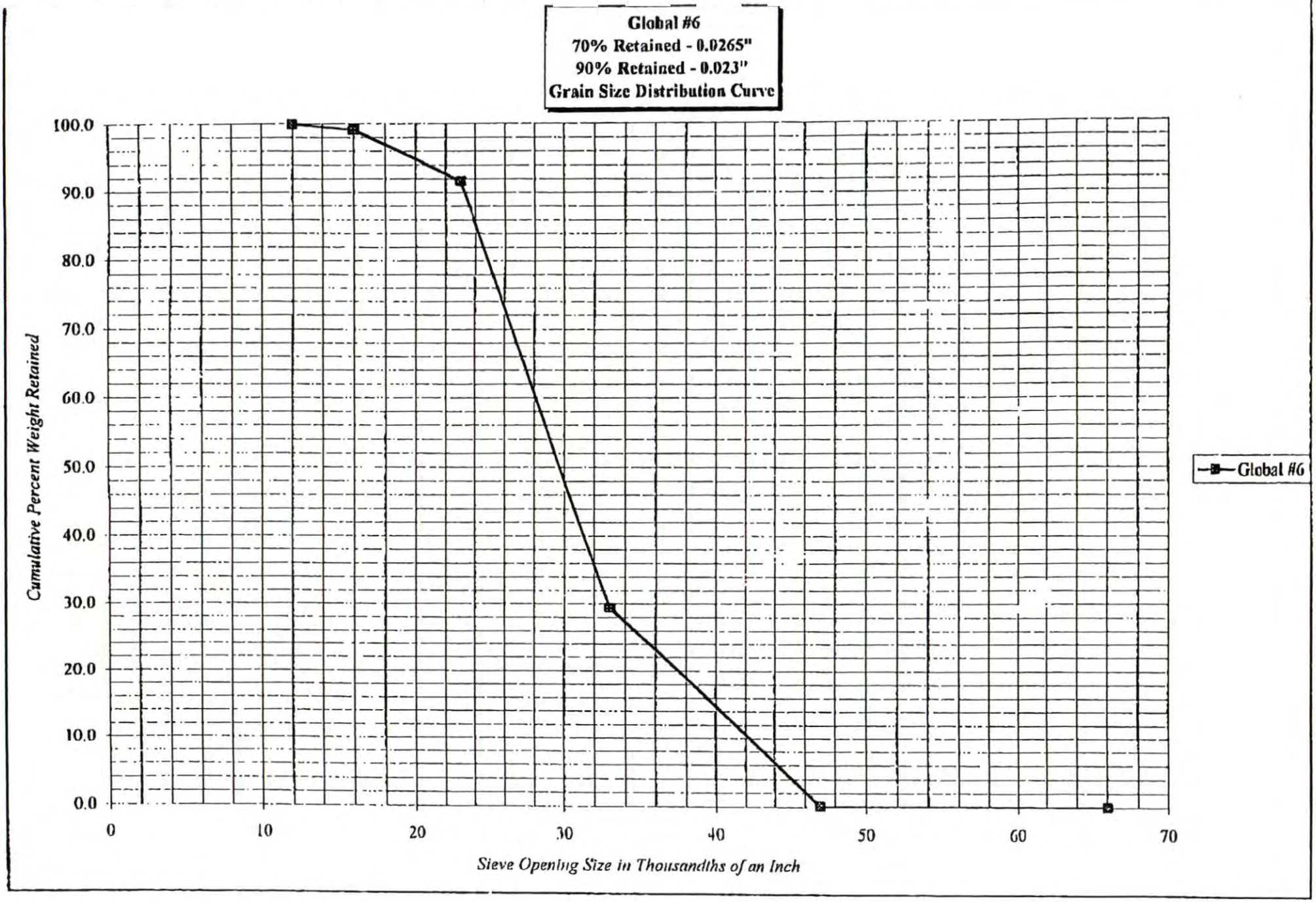
Global #7
70% Retained - 0.021"
90% Retained - 0.0185"
Grain Size Distribution Curve





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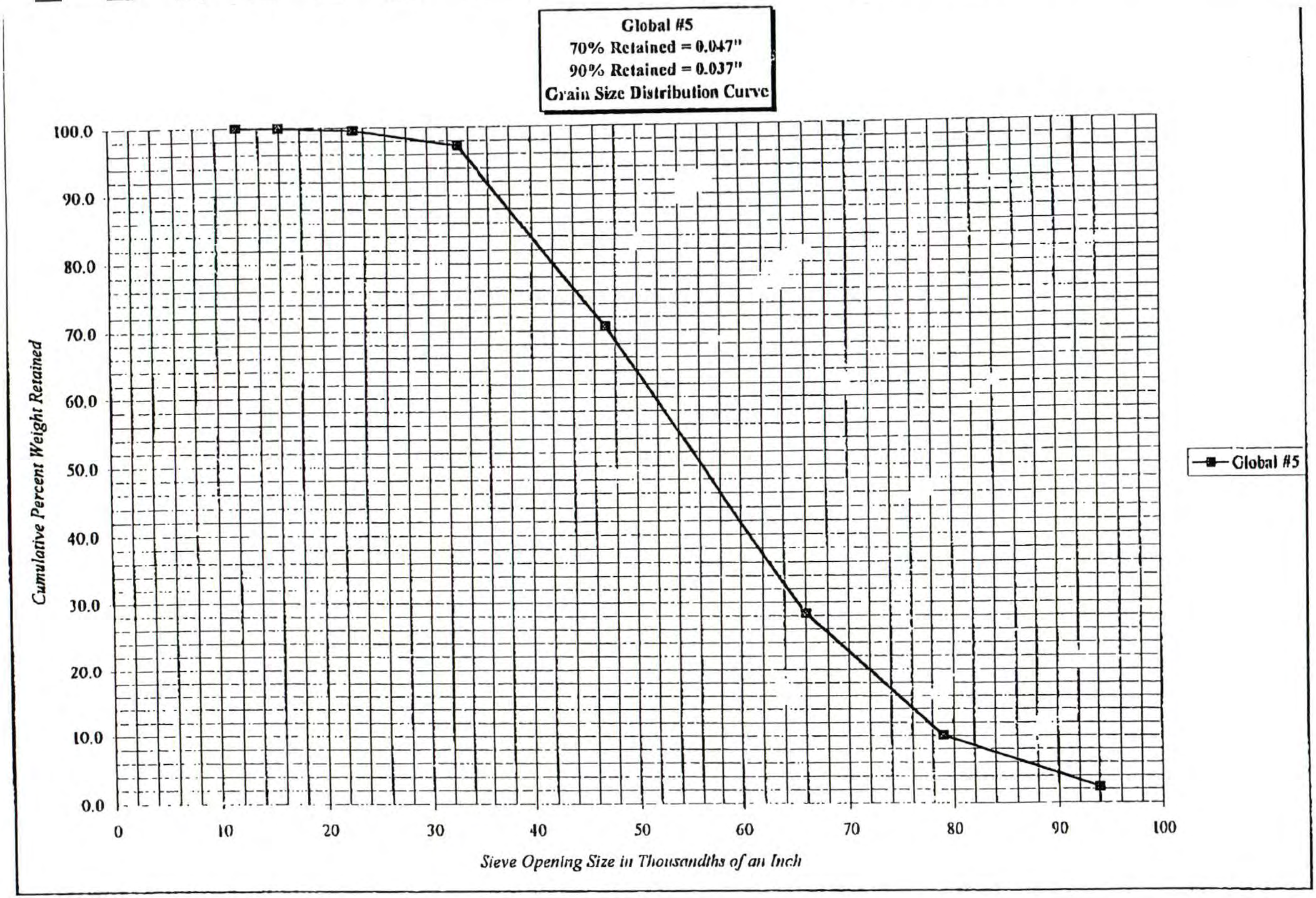


Global #5
70% Retained = 0.047"
90% Retained = 0.037"
Grain Size Distribution Curve
Cumulative Percent Weight Retained
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0
10
20
30
40
50
60
70
80
90
100
Sieve Opening Size in Thousandths of an Inch
Global #5

Global #6

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

Global #5

Sieve Size ASTM No.	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

Global #8			
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

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

Global #7			
Sieve Size ASTM No.	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

Sieve Test Record
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
Sample Identification: OB-1
Sample Depth: 73' - 75'
Initial Sample Weight in Grams: 98.3

Sieve Size ASTM No.	Sieve Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
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

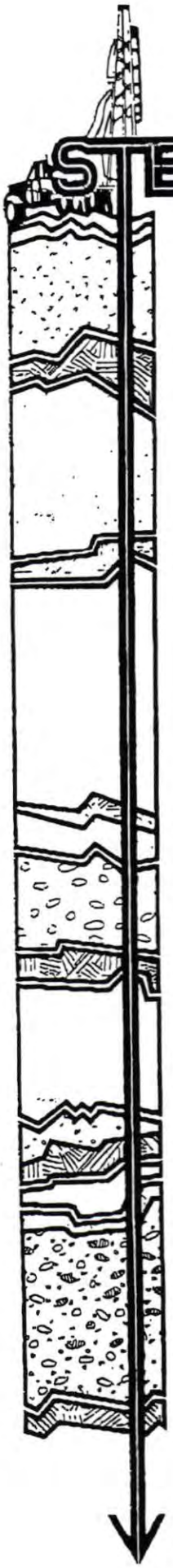
Date: 6/28/00
Sample Identification: OB-1
Sample Depth: 83' - 85'
Initial Sample Weight in Grams: 97.0

Sieve Size ASTM No.	Sieve Size 1000th 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



STEARNS DRILLING

Sieve Data
OW-1
Sanctuary

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.

Sieve Test Record
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 No.	Sieve 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	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

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

Date: 7/13/00
Sample Identification: OW-1
Sample Depth: 64' - 66'
Initial Sample Weight in Grams: 81.1

Sieve Size ASTM No.	Sieve Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative 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): 0.1

90 % Retained Size (Inches): 0.0035
Uniformity Coefficient: 2.4

40 % Retained Size (Inches): 0.0085
70 % Retained Size (Inches): 0.0055

Sieve Test Record
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 No.	Sieve 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	0.4	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

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

Date: 7/13/00
Sample Identification: OW-1
Sample Depth: 84 - 86
Initial Sample Weight in Grams: 94.2

Sieve Size ASTM No.	Sieve 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	0.0	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): 0.1

90 % Retained Size (Inches): 0.0015
Uniformity Coefficient: 4.7

40 % Retained Size (Inches): 0.0070
70 % Retained Size (Inches): 0.0035

Sieve Test Record
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 Size ASTM No.	Sieve 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

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

Date: 7/13/00
Sample Identification: OW-1
Sample Depth: 104' - 106'
Initial Sample Weight in Grams: 104.0

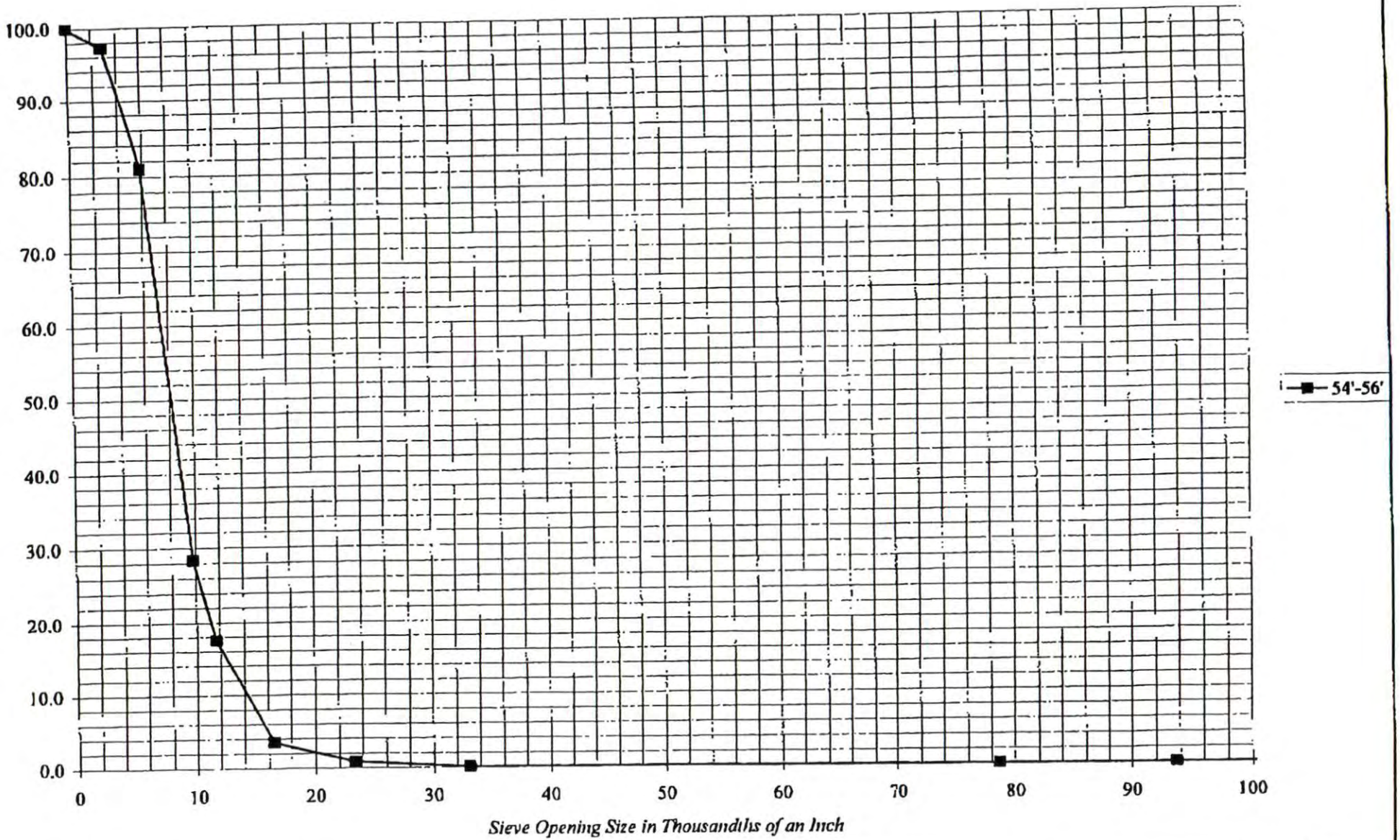
Sieve Size ASTM No.	Sieve Size 1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
4	187	5.4	5.2
8	93.7	11.5	11.0
10	78.7	11.9	11.4
20	33.1	14.1	13.5
30	23.4	15.8	15.1
40	16.5	20.2	19.3
50	11.7	32.5	31.0
60	9.8	41.7	39.8
100	5.9	69.0	65.9
200	2.9	91.8	87.7
Pan	0	104.7	100.0

Error (grams): -0.7

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

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

Sanctuary Drill Site
OW-1 (Pilot Boring)
Grain Size Distribution Curve



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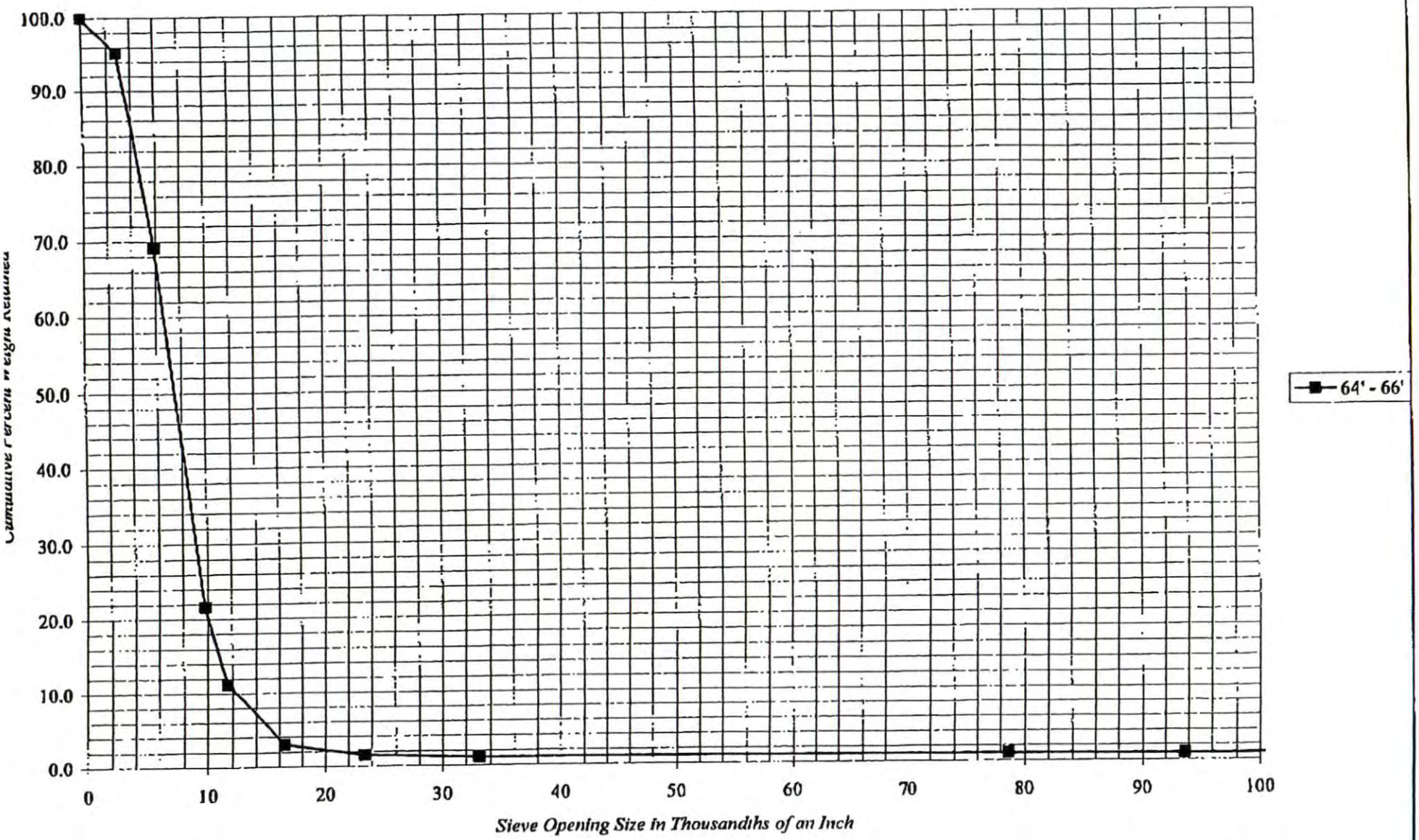
Sanctuary Drill Site
OW-1 (Pilot Boring)
Grain Size Distribution Curve



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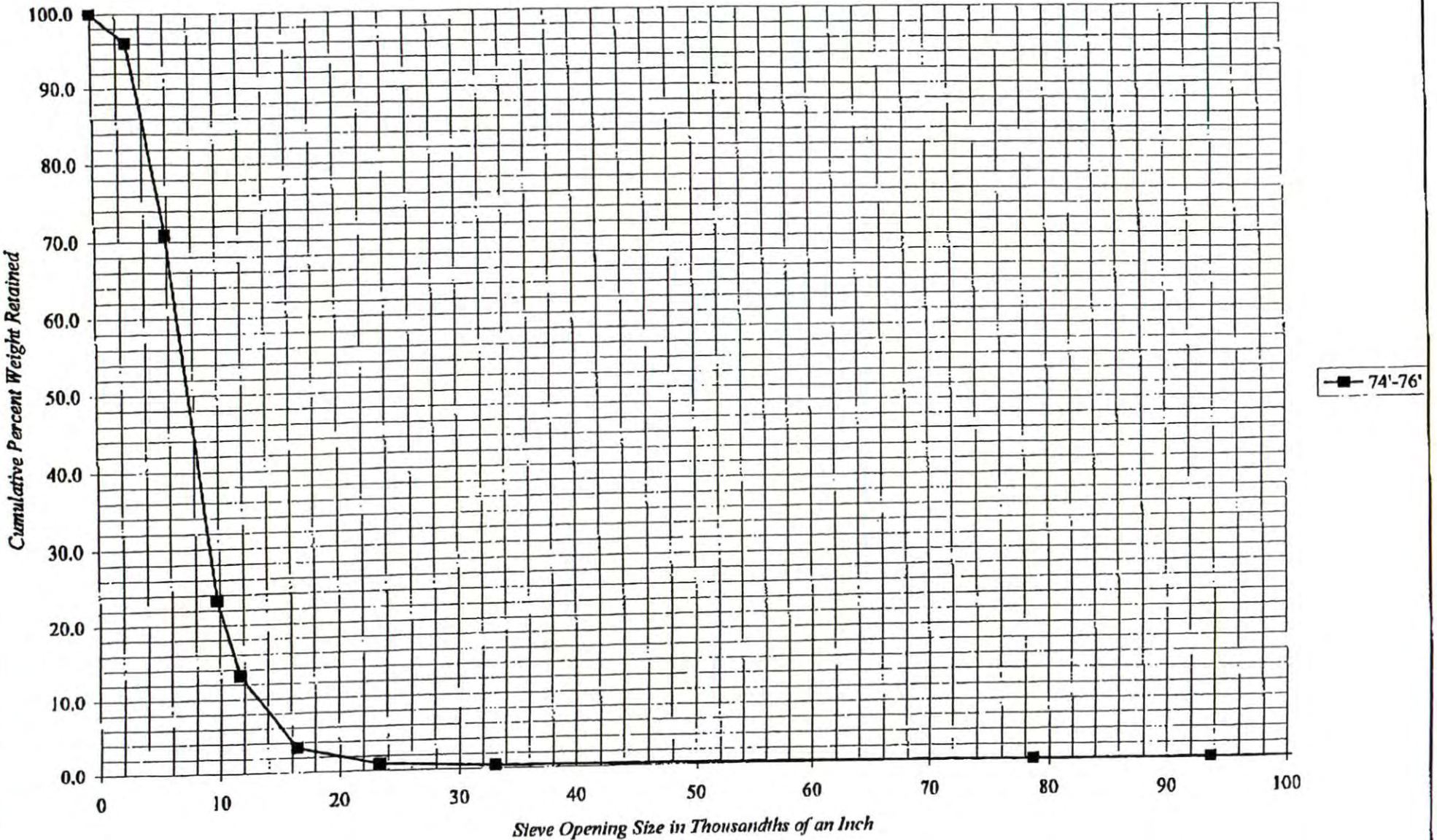
Sanctuary Drill Site
OW-1 (Pilot Boring)
Grain Size Distribution Curve



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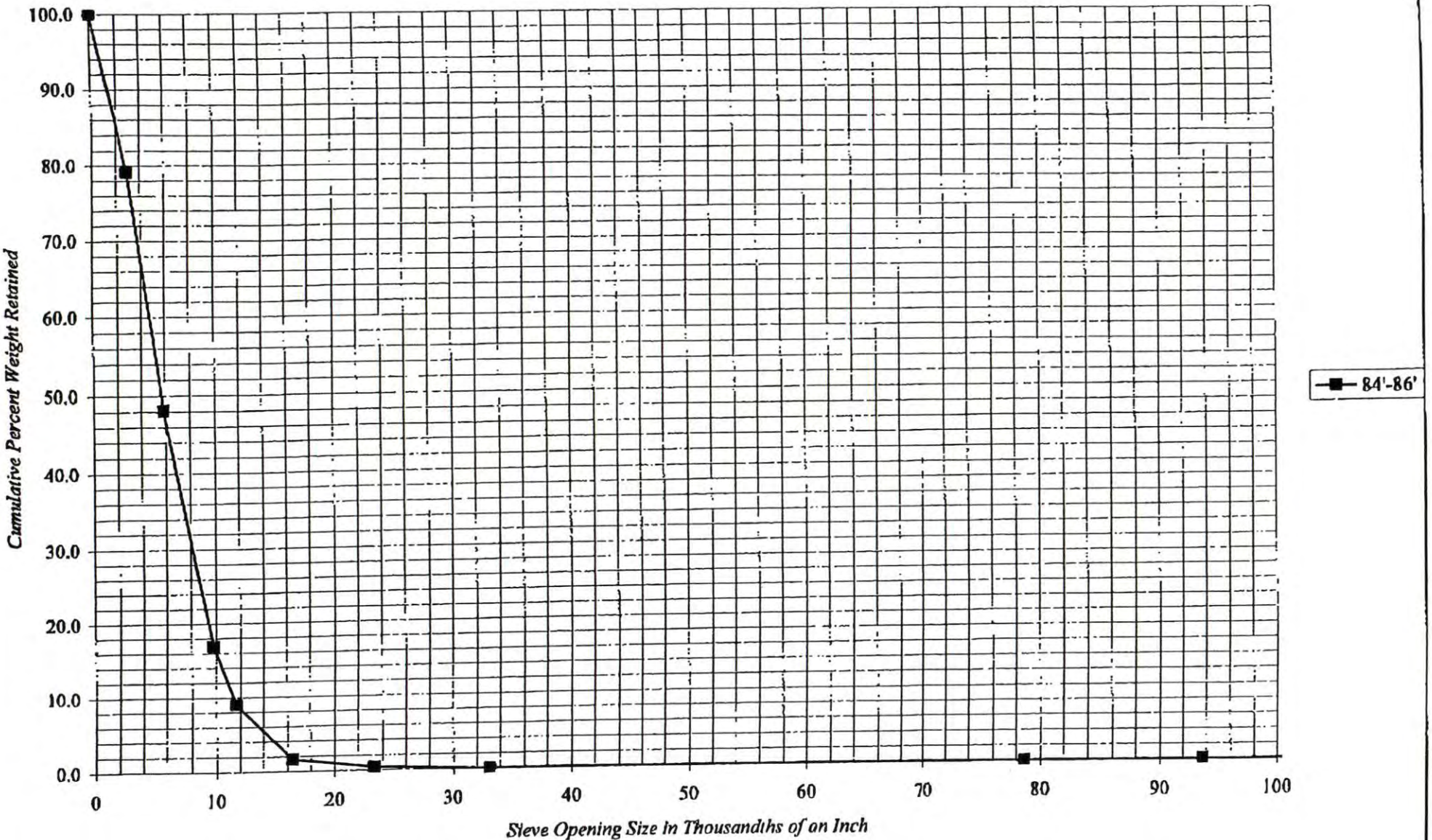
Sanctuary Drill Site
OW-1(Pilot Boring)
Grain Size Distribution Curve



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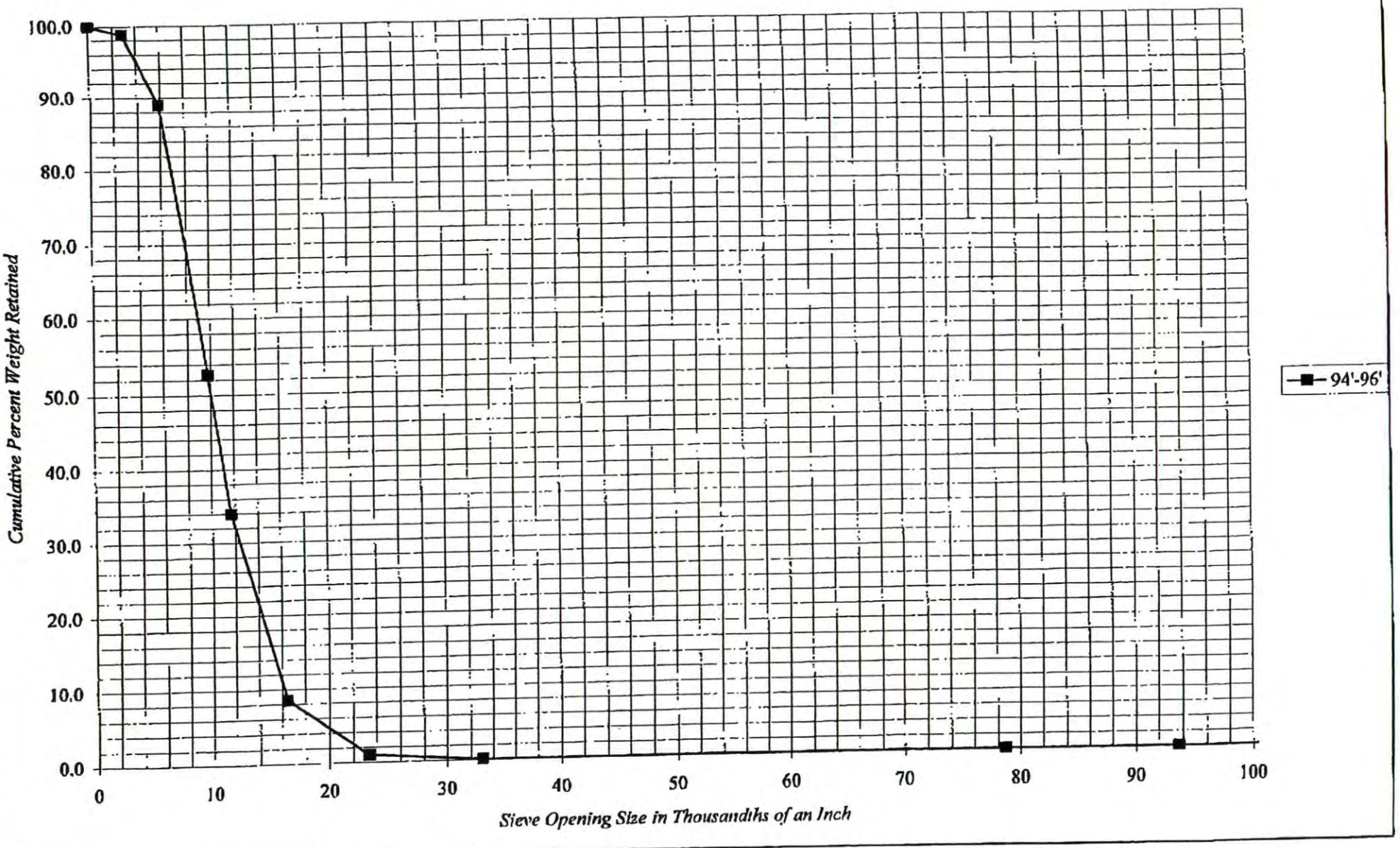
Sanctuary Drill Site
OW-1 (Pilot Boring)
Grain Size Distribution Curve



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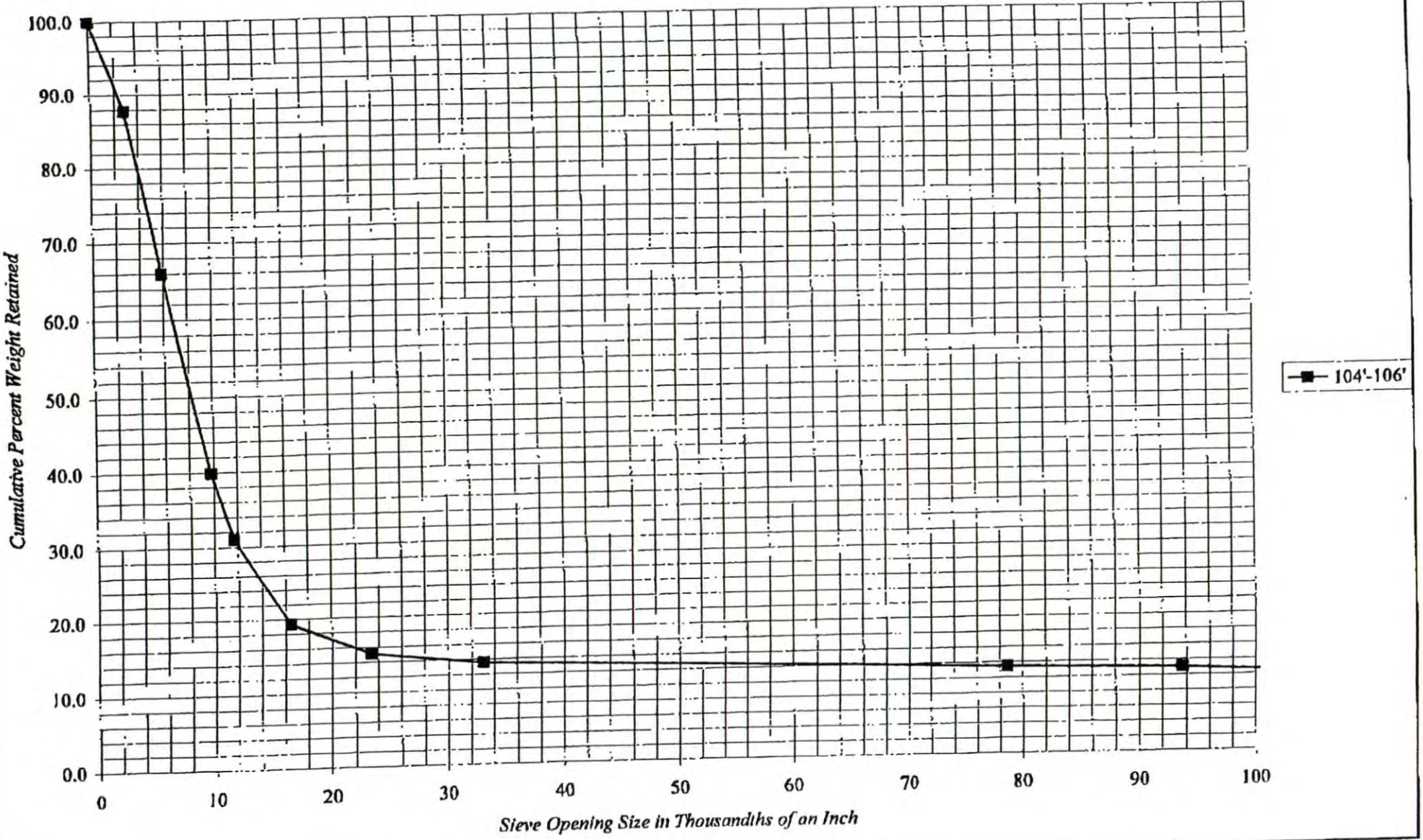
Sanctuary Drill Site
Ow-1 (Pilot Boring)
Grain Size Distribution Curve



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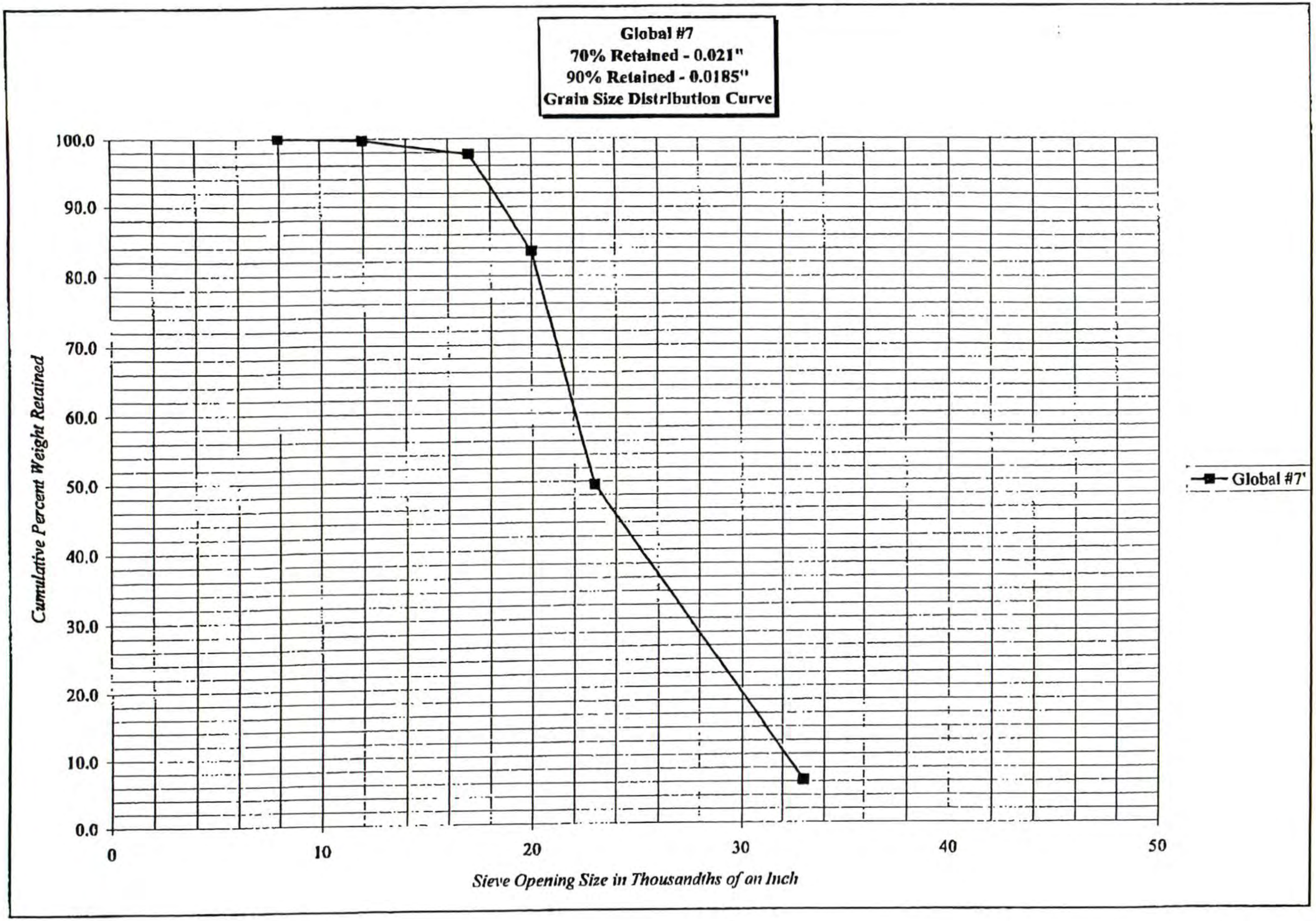
Global #7			
Sieve Size ASTM No.	1000th Inches	Cumulative Sample Weight (Grams)	Cumulative Percent Retained
20	33	0.0	6.2
30	23	0.0	49.5
35	20	0.0	83.5
40	17	0.0	97.7
50	12	0.0	99.7
70	8	0.0	100.0

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

Global #6			
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



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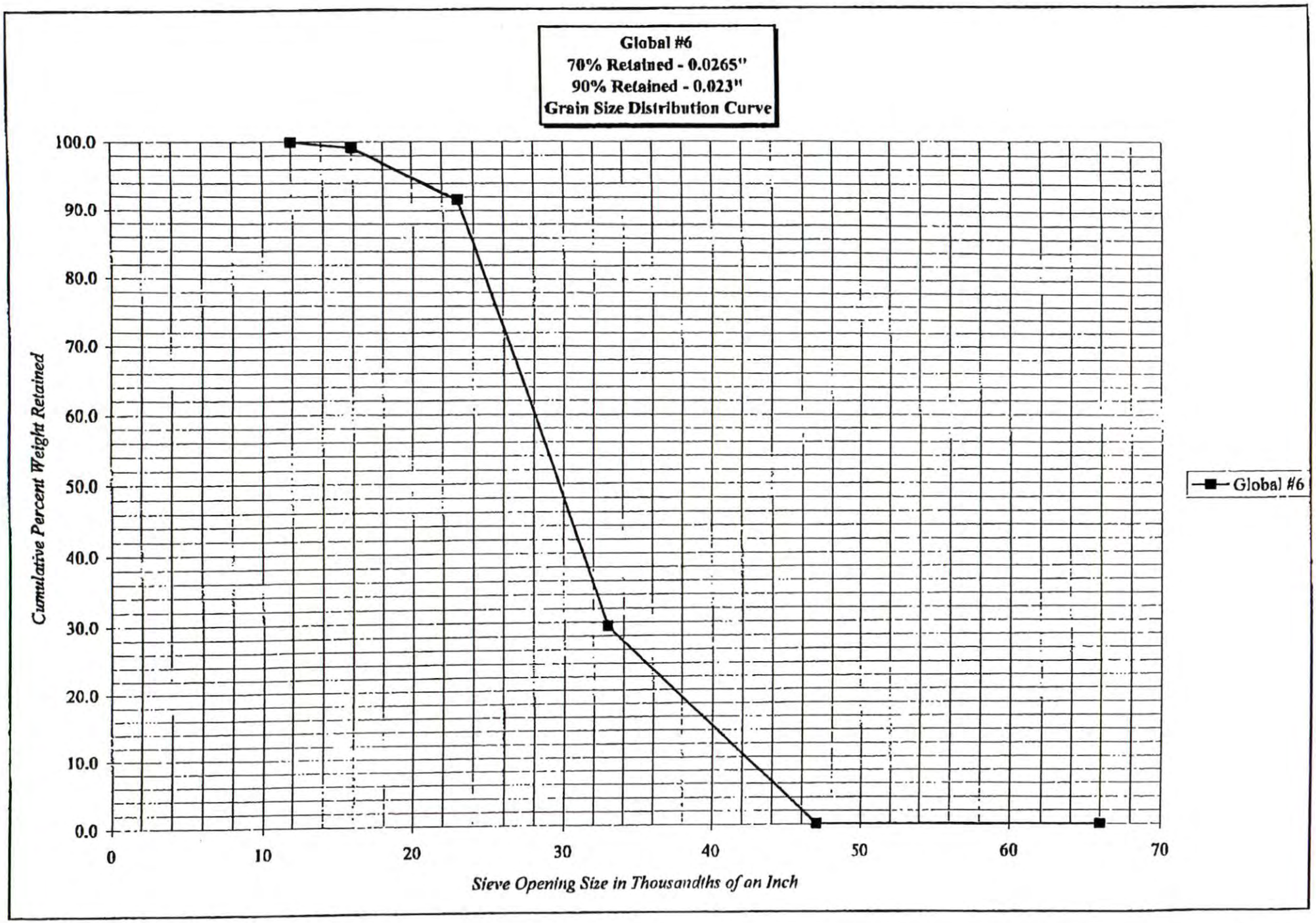

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STEARNS DRILLING

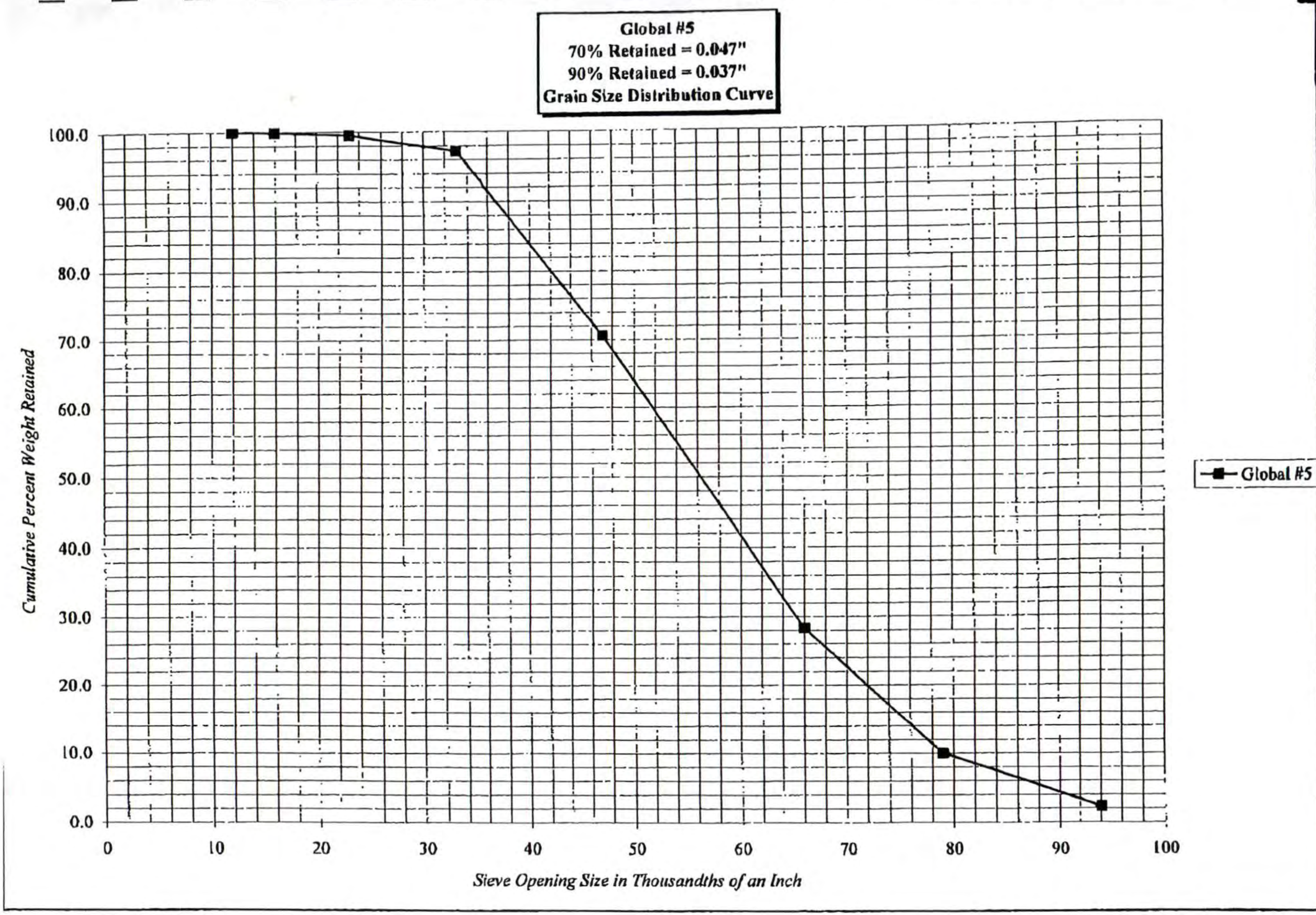
Facsimile Cover Sheet

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

Comments: A hard copy will not follow unless requested.



Global #5
70% Retained = 0.047"
90% Retained = 0.037"
Grain Size Distribution Curve
Cumulative Percent Weight Retained
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0
10
20
30
40
50
60
70
80
90
100
Sieve Opening Size in Thousandths of an Inch
Global #5

Global #5			
Sieve Size ASTM No.	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